MD6430A
Network Data Analyzer
Operation Manual
Panel Operating Instructions

11th Edition

For safety and warning information, please read this manual before attempting to use the equipment.
Keep this manual with the equipment.

ANRITSU CORPORATION

Document No.: M-W1542AE-11.0

Safety Symbols

To prevent the risk of personal injury or loss related to equipment malfunction, Anritsu Corporation uses the following safety symbols to indicate safety-related information. Ensure that you clearly understand the meanings of the symbols BEFORE using the equipment. Some or all of the following symbols may be used on all Anritsu equipment. In addition, there may be other labels attached to products that are not shown in the diagrams in this manual.

Symbols used in manual

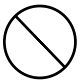
DANGER ⚠ This indicates a very dangerous procedure that could result in serious injury or death if not performed properly.

WARNING ⚠ This indicates a hazardous procedure that could result in serious injury or death if not performed properly.

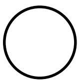
CAUTION ⚠ This indicates a hazardous procedure or danger that could result in light-to-severe injury, or loss related to equipment malfunction, if proper precautions are not taken.

Safety Symbols Used on Equipment and in Manual

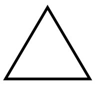
The following safety symbols are used inside or on the equipment near operation locations to provide information about safety items and operation precautions. Ensure that you clearly understand the meanings of the symbols and take the necessary precautions BEFORE using the equipment.



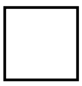
This indicates a prohibited operation. The prohibited operation is indicated symbolically in or near the barred circle.



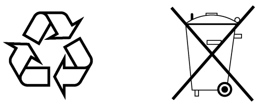
This indicates an obligatory safety precaution. The obligatory operation is indicated symbolically in or near the circle.



This indicates a warning or caution. The contents are indicated symbolically in or near the triangle.



This indicates a note. The contents are described in the box.



These indicate that the marked part should be recycled.

MD6430A
Network Data Analyzer
Operation Manual Panel Operating Instructions

12 March 1999 (First Edition)
15 September 2006 (11th Edition)

For Safety

DANGER

NEVER touch parts where the label shown on the left is attached. Such parts have high voltages of at least 1 kV and there is a risk of receiving a fatal electric shock.

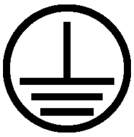
WARNING

1. ALWAYS refer to the operation manual when working near locations at which the alert mark shown on the left is attached. If the advice in the operation manual is not followed there is a risk of personal injury or reduced equipment performance. The alert mark shown on the left may also be used with other marks and descriptions to indicate other dangers.

2. IEC 61010 Standard
   The IEC 61010 standard specifies four categories to ensure that an instrument is used only at locations where it is safe to make measurements. This instrument is designed for measurement category I (CAT I). DO NOT use this instrument at locations specified as category II, III, or IV as defined below.
   Measurement category I (CAT I):
   Secondary circuits of a device that is not directly connected to a power outlet.
   Measurement category II (CAT II):
   Primary circuits of a device that is directly connected to a power outlet, e.g., portable tools or home appliance.
   Measurement category III (CAT III):
   Primary circuits of a device (fixed equipment) to which power is supplied directly from the distribution panel, and circuits running from the distribution panel to power outlet.
   Measurement category IV (CAT IV):
   Building service-line entrance circuits, and circuits running from the service-line entrance to the meter or primary circuit breaker (distribution panel).

For Safety

WARNING



3. To ensure that the instrument is grounded, always use the supplied 3-pin power cord, and insert the plug into an outlet with a ground terminal. If power is supplied without grounding the equipment, there is a risk of receiving a severe or fatal electric shock.

Repair

WARNING

4. This equipment cannot be repaired by the operator. DO NOT attempt to remove the equipment covers or unit covers or to disassemble internal components. Only qualified service personnel with a knowledge of electrical fire and shock hazards should service this equipment. There are high-voltage parts in this equipment presenting a risk of severe injury or fatal electric shock to untrained personnel. In addition, there is a risk of damage to precision components.

Calibration

5. The performance-guarantee seal verifies the integrity of the equipment. To ensure the continued integrity of the equipment, only Anritsu service personnel, or service personnel of an Anritsu sales representative, should break this seal to repair or calibrate the equipment. If the performance-guarantee seal is broken by you or a third party, the performance of the equipment cannot be guaranteed.

Falling Over

6. This equipment should always be positioned in the correct manner. If the cabinet is turned on its side, etc., it will be unstable and may be damaged if it falls over as a result of receiving a slight mechanical shock.
   Always set up the equipment in a position where the power switch can be reached without difficulty.

Replacing Battery

7. When replacing the battery, use the specified battery and insert it with the correct polarity. If the wrong battery is used, or if the battery is inserted with reversed polarity, there is a risk of explosion causing severe injury or death.

For Safety

WARNING ⚠

Battery Fluid

8. DO NOT short the battery terminals and never attempt to disassemble the battery or dispose of it in a fire. If the battery is damaged by any of these actions, the battery fluid may leak. This fluid is poisonous.
   DO NOT touch the battery fluid, ingest it, or get in your eyes. If it is accidentally ingested, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

LCD

9. This instrument uses a Liquid Crystal Display (LCD). DO NOT subject the instrument to excessive force or drop it. If the LCD is subjected to strong mechanical shock, it may break and liquid may leak.
   This liquid is very caustic and poisonous.
   DO NOT touch it, ingest it, or get in your eyes. If it is ingested accidentally, spit it out immediately, rinse your mouth with water and seek medical help. If it enters your eyes accidentally, do not rub your eyes, rinse them with clean running water and seek medical help. If the liquid gets on your skin or clothes, wash it off carefully and thoroughly.

For Safety

CAUTION ⚠

Cleaning

1. Keep the power supply and cooling fan free of dust.
   - Clean the power inlet regularly. If dust accumulates around the power pins, there is a risk of fire.
   - Keep the cooling fan clean so that the ventilation holes are not obstructed. If the ventilation is obstructed, the cabinet may overheat and catch fire.

Check Terminal

2. Never input a signal of more than the indicated value between the measured terminal and ground. Input of an excessive signal may damage the equipment.

For Safety

CAUTION ⚠

Replacing Memory Back-up Battery

This equipment uses a Poly-carbomonofluoride lithium battery to backup the memory. This battery must be replaced by service personnel when it has reached the end of its useful life; contact the Anritsu sales section or your nearest representative.

Note: The battery used in this equipment has a maximum useful life of 7 years. It should be replaced before this period has elapsed.

External Storage Media

This equipment uses memory cards as external storage media for storing data and programs.

If this media is mishandled or becomes faulty, important data may be lost. To prevent this chance occurrence, all important data and programs should be backed-up.

<u>Anritsu will not be held responsible for lost data.</u>

Pay careful attention to the following points.

- Never remove the memory card from the pulse tester while it is being accessed.
- The memory card may be damaged by static electric charges.
- The back-up battery in SRAM memory cards has a finite life. Replace the battery periodically. For details, refer to the explanation on the memory card later in this manual.

Floppy Disk

Do not place in a dusty area.
Clean the magnetic head periodically to ensure normal operation.
Refer to the section on cleaning the head later in this manual.

Equipment Certificate

Anritsu Corporation certifies that this equipment was tested before shipment using calibrated measuring instruments with direct traceability to public testing organizations recognized by national research laboratories, including the National Institute of Advanced Industrial Science and Technology, and the National Institute of Information and Communications Technology, and was found to meet the published specifications.

Anritsu Warranty

Anritsu Corporation will repair this equipment free-of-charge if a malfunction occurs within one year after shipment due to a manufacturing fault, under the condition that this warranty is void when:

- The fault is outside the scope of the warranty conditions described in the operation manual.
- The fault is due to mishandling, misuse, or unauthorized modification or repair of the equipment by the customer.
- The fault is due to severe usage clearly exceeding normal usage.
- The fault is due to improper or insufficient maintenance by the customer.
- The fault is due to natural disaster including fire, flooding, earthquake, etc.
- The fault is due to use of non-specified peripheral equipment, peripheral parts, consumables, etc.
- The fault is due to use of a non-specified power supply or in a non-specified installation location.

In addition, this warranty is valid only for the original equipment purchaser. It is not transferable if the equipment is resold.

Anritsu Corporation will not accept liability for equipment faults due to unforeseen and unusual circumstances, nor for faults due to mishandling by the customer.

Anritsu Corporation Contact

In the event that this equipment malfunctions, contact an Anritsu Service and Sales office. Contact information can be found on the last page of the printed version of this manual, and is available in a separate file on the CD version.

Notes On Export Management

This product and its manuals may require an Export License/Approval by the Government of the product's country of origin for re-export from your country.

Before re-exporting the product or manuals, please contact us to confirm whether they are export-controlled items or not.

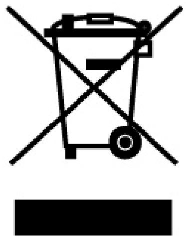
When you dispose of export-controlled items, the products/manuals need to be broken/shredded so as not to be unlawfully used for military purpose.

Disposal Procedure

The product that you have purchased contains a rechargeable battery. The battery is recyclable. At the end of its useful life, under various state and local laws, it may be illegal to dispose of this battery into the municipal waste stream. Check with your local solid waste officials for details in your area for recycling options or proper disposal.

Crossed-out Wheeled Bin Symbol

Equipment marked with the Crossed-out Wheeled Bin Symbol complies with council directive 2002/96/EC (the “WEEE Directive”) in European Union.



For Products placed on the EU market after August 13, 2005, please contact your local Anritsu representative at the end of the product's useful life to arrange disposal in accordance with your initial contract and the local law.

CE Conformity Marking

Anritsu affixes the CE Conformity marking on the following product(s) in accordance with the Council Directive 93/68/EEC to indicate that they conform to the EMC and LVD directive of the European Union (EU).

CE marking

1. Product Model

Model: MD6430A Network Data Analyzer

2. Applied Directive

EMC: Council Directive 89/336/EEC
LVD: Council Directive 73/23/EEC

3. Applied Standards

- EMC: Emission: EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003 (Class A)
  Immunity: EN 61326: 1997 + A1: 1998 + A2: 2001 + A3: 2003 (Annex A)

	Performance Criteria*
IEC 61000-4-2 (ESD)	B
IEC 61000-4-3 (EMF)	A
IEC 61000-4-4 (Burst)	B
IEC 61000-4-5 (Surge)	B
IEC 61000-4-6 (CRF)	A
IEC 61000-4-11 (V dip/short)	B

*: Performance Criteria
A: During testing normal performance within the specification limits.
B: During testing temporary degradation, or loss of function or performance which is self-recovering.

Harmonic current emissions:
EN 61000-3-2: 2000 (Class A equipment)
: No limits apply for this equipment with an active input power under 75 W.

- LVD: EN 61010-1: 2001 (Pollution Degree 2)

ABOUT THIS MANUAL

Composition of the MD6430A operation manuals

Composition of the MD6430A Network Data Analyzer operation manuals are composed of the following two documents. Use them properly according to the usage purpose.

Composition of the MD6430A operation manuals

MD6430A Network Data Analyzer operation manual Panel Operating Instructions

MD6430ANetwork Data Analyzer operation manual Remote Control

- **MD6430A Network Data Analyzer operation manual : Panel Operating Instructions**
  Describes the outline, preparation before use, panel description, specifications, performance test, and manual operation of the MD6430A.
- **MD6430A Network Data Analyzer operation manual : Remote Control**
  Describes the remote control and program examples used for the external interfaces of RS-232C and GPIB.

CONTENTS

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SECTION 7 PRINCIPLES OF OPERATION · 7-1

Section 1 Overview

1.1 Overview

The MD6430A Network Data Analyzer is a measuring equipment which can be used for quality evaluation, maintenance, and installation of circuit lines and terminal equipment. The MD6430A is compatible with the wide range of interfaces from low-speed modems to high-speed digital circuit lines.

■ Measurement functions

- Error measurement
- Frame relay measurement
- Line interval measurement
- Transmission delay measurement
- Frequency measurement
- Digital level measurement
- Pattern data sending and word tracing
- Long-time collection and analysis of error measurement data
- Protocol monitor

■ Features

- **Compatible with a wide range of interfaces**
  With interfaces ranging from 50 bit/s to 10 Mbit/s, the MD6430A is compatible with each type of ITU-T V/X/G/I-series interfaces for low-speed modems to high-speed digital circuit lines.
- **Integrated interfaces**
  As a single interface unit containing all the available interfaces is integrated into the main-frame, the user can select the desired interface without replacing the unit.
- **Measurements between different interfaces**
  As the MD6430A allows different settings between the send and receive systems; devices with different I/O, such as a MUX, can be measured.
- **Two-input simultaneous measurement**
  The Tx and Rx lines can be measured, simultaneously.
- **Simultaneous measurement of several error measurement items**
  Error count (bit error, parity error, CRC error, and code error), error rate, block error count, block error rate, clock slip occurrence count, clock slip occurrence seconds, pattern sync loss (PSL) count, performance measurement, and alarm occurrence time (such as input loss and AIS) can be measured at the same time.
- **ISDN compatible (option)**
  The JT-Q921/Q931 ISDN Signalling option/ETSI ISDN Signalling option allows users to access the public networks of basic interfaces and primary rate interface.
- **Graphic display of error measurement data**
  By displaying the results of error measurement as a graph, any change of the state of circuit lines and instantaneous errors can be detected.

- **One-touch setting function for measurement conditions**
  Measurement conditions can be saved in memory, and recalled by one-touch operation for starting the measurement.
- **Protocol monitor function for ISDN and frame relay**
  ISDN layer 3 and frame relay layer 2 can be monitored according to the protocol procedure between the MD6430A and network.
- **Automatic printing of measured results**
  By selecting either of the two print conditions ("print when any error alarm occurred" and "print at every period"), users can execute automatic printing with the selected timing.
- **Continuous error measurement after power recovery**
  Even if a power failure occurs during the error measurement, the last data is saved; and after the power recovery, the measurement is continued, automatically.
- **Compact and light weight**
  It is easy to carry the compact and light weight body.
  Dimensions: W 290 mm×H 194 mm×D 94 mm, Mass: 4.2 kg(battery not included)
- **Color LCD**
  For clear display, 8.4 type TFT color LCD is equipped.
- **Touch panel operation**
  The touch panel function provides an easy operation.
- **Battery operation (optional accessory)**
  The internal battery allows measurement without AC power supply.
- **FDD**
  Setting conditions can be saved/recalled, and measured results can be saved to a floppy disk.
  Data is saved in the 1.44 MB MS-DOS ® format, so that it can be edited on a personal computer.
  In particular, measured results displayed as a graph can be saved in the CSV format, and can be edited and displayed by Microsoft Excel ®.
- **External printer**
  An external printer conforming to Centronics can be used.
- **SCPI compliant**
  The MD6430A can be operated with remote control commands compliant with the Standard Commands for Programmable Instruments (SCPI).
- **Year 2000 compliant**

Section 2 Specifications

2.1 Specifications

2.1.1 Standard compositions

Standard compositions of the MD6430A are as follows.

Item	Model/Order No.	Name	Qty.	Remarks
Main body	MD6430A	Network Data Analyzer	1	
Accessories	Z0695	AC/DC adaptor	1	AC100 to 240V - DC24V conversion adaptor
		Power cord	1	
	Z0406A	Touch pen	1	
	W1542AE	MD6430A operation manual Panel Operating Instructions	1	Involves operation of MU643000A/B/C DATACOM interface unit
	W1543AE	MD6430A operation manual Remote Control	1	
	Z0417	MD6430A Remote Sample Program	1	
	Z0402A	Protective cover	1	For front panel of main body
	Z0403A	Belt with hook	1	For MD6430A

2.1.2 Unit

Model/Order No.	Name	Remarks
MU643000A	DATACOM Interface Unit	All interface units are installed.
MU643000B	DATACOM Interface Unit	For Japan
MU643000C	DATACOM Interface Unit	For Europe
MU643000K	DATACOM Interface Unit	Conforms to the transmission-unit ST frame specifications by the Ministry of Construction in Japan.

2.1.3 Option

Model/Order No.	Name	Remarks
MD6430A*01	GPIB	For main body
MU643000A*01	JT-Q921/Q931 ISDN Signalling	For MU643000A
MU643000A*02	ETSI ISDN Signalling	For MU643000A
MU643000A*22	CAS/FAS	For MU643000A
MU643000B*01	JT-Q921/Q931 ISDN Signalling	For MU643000B
MU643000B*22	CAS/FAS	For MU643000B
MU643000K*01	JT-Q921/Q931 ISDN Signalling	For MU643000K
MU643000K*22	CAS/FAS	For MU643000K
MU643000C*02	ETSI ISDN Signalling	For MU643000C
MU643000C*22	CAS/FAS	For MU643000C

2.1.4 Optional accessories and peripherals

Model/Order No.	Name	Remarks
Z0404A	Lithium ion battery	For main body
A0006	Headset	For MU643000A/B/C/K
J0654A	Serial interface cable(Cross cable D-Sub9 .-. D-Sub9), 2m	For remote control of main body
J920B	Cross cable (D-Sub 9 .-. D-Sub 25), 3m	For remote control of main body
J0661A	RS-232C cable (Straight cable D-Sub 9 .-. D-Sub 25), 2m	For remote control of main body
J0913A	Measurement cable (D-Sub 25-pin .-. half-pitch 36), 2m (for V.24/V.28)	For MU643000A/B/C/K
J0914A	Measurement cable (V.35 .-. half-pitch 36), 2m (for V.35)	For MU643000A/B/C/K
J0915A	Measurement cable (D-Sub37 .-. half-pitch36), 2m (for V.36/RS449)	For MU643000A/B/C/K
J0916A	Measurement cable (D-Sub15 .-. half-pitch 36), 2m (for X.20/X.21, B terminal ST1 output type (X.21))	For MU643000A/B/C/K
J0945	Measurement cable (D-Sub15 .-. half-pitch 36), 2m (for X.20/X.21, B terminal ST2 input type (X.21))	For MU643000A/B/C/K
J0929	Cross measurement cable (D-sub15 .-. half-pitch36), 2m (for X.20/X.21,MUX/DEMUX)	For MU643000A/B/C/K
J0923A	Measurement cable (double half-pitch 36), 1m (for TT L/CMOS)	For MU643000A/B/C/K
J0917A	TTL/CMOS connection BOX(for TTL/CMOS)	For MU643000A/B/C/K
J0127B	Coaxial cord (BNC .-. BNC), 2m(for 2M unbalance and 6M)	For MU643000A/B/C/K
J0844A	Balance cable (ISO10173 8-pin modular .-. ISO10173 8-pin modular, straight), 2m (for 1.5M/2M)	For MU643000A/B/C/K
J0921B	Balance cable (M-1PS .-. ISO10173 8-pin modular), 2m (for 1.5M/2M)	For MU643000A/B/C/K
J0946A	Balance cable (M-3912 .-. ISO10173 8-pin modular), 1m (for 1.5M/2M)	For MU643000A/B/C/K
J0946B	Balance cable (M-3912 .-. ISO10173 8-pin modular), 2m (for 1.5M/2M)	For MU643000A/B/C/K
J0950	Balance cable (ISO10173 8-pin modular .-. clip), 2m (for 1.5M/2M)	For MU643000A/B/C/K
J0951	Balance cable (ISO10173 8-pin modular .-. RJ45 8-pin modular, cross), 2m (for 1.5M/2M)	For MU643000A/B/C/K
J0968	Balance cable (ISO10173 8-pin modular .-. RJ45 8-pin modular, straight), 2m (for 1.5M/2M)	For MU643000A/B/C/K
J0538	Coaxial code, 3CV-CPP-(2), 2m (for 6M)	For MU643000K
J0463C	Balance cable (RJ45 8-pin modular .-. RJ45 8-pin modular, straight), 2m (for 192k)	For MU643000A/B/C/K
J0959B	Balance cable (RJ45 8-pin modular .-. clip), 2m (for 192k)	For MU643000A/B/C/K
J0922B	Balance cable (M-1PS .-. mini-bantam), 2m (for 64k/2M CMI)	For MU643000A/B/C/K
J0930	Balance cable (M-3912 .-. mini-bantam), 2m (for 64k)	For MU643000A/B/C/K

Model/Order No.	Name	Remarks
J0960B	Balance cable (clip .-. mini-bantam), 2m (for 64k/2M CMI)	For MU643000A/B/C/K
J0924B	Balance cable (I-214APS .-. mini-bantam), 2m (for 64k+8k)	For MU643000A/B/C/K
J0925B	Y cable (D-Sub25 .-. half-pitch 36 / D-Sub25), 2m (for V.24/V.28)	For MU643000A/B/C/K
J0926B	Y cable (V.35 .-. half-pitch 36 / V.35), 2m (for V.35)	For MU643000A/B/C/K
J0927B	Y cable (D-Sub37 .-. half-pitch 36 / D-Sub37), 2m (for V.36/RS449)	For MU643000A/B/C/K
J0928B	Y cable (D-Sub15 .-. half-pitch 36 / D-Sub15), 2m (for X.20/X.21)	For MU643000A/B/C/K
J0388B	25-pin DCE-DTE conversion adaptor	
J0390	34-pin DCE-DTE conversion adaptor	
J0392B	37-pin DCE-DTE conversion adaptor	
B0441	Hard case for carrying	For MD6430A
B0442	Soft case for carrying	For MD6430A
B0443	Rack mount kit	For MD6430A
J1026A	Exclusive GPIB cable (for Option 01), 2m	For controlling MD6430A using GPIB

2.2 Specifications

2.2.1 Specifications of MD6430A

The specifications of the MD6430A are shown below.

<table>
<tr><th>No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>1.</td><td>Electrical Performance</td><td></td></tr>
<tr><td>1.1</td><td>Display</td><td>・8.4 type reflection-type color LCD with back light
・640×480 dots (80 characters×30 lines, regular size)
・Contrast adjust function provided</td></tr>
<tr><td>1.2</td><td>Serial interface</td><td>・Conforms to RS-232C standard.
・Bit rat : 300,600,1200,2400,4800,9600,19200bit/s
・Parity : None, Odd, Even
・Character length : 7,8 bits
・Stop bit : 1,2 bits
・Flow control : X-On/X-Off、Ready/Busy
・Connector : D-Sub 9 pins
・Pin arrangement
<table>
<tr><th>Pin No.</th><th>Function</th><th>Signal name</th><th>Direction</th></tr>
<tr><td>1</td><td>Carrier detection</td><td>CD</td><td>Input</td></tr>
<tr><td>2</td><td>Receive data</td><td>RXD</td><td>Input</td></tr>
<tr><td>3</td><td>Transmission data</td><td>TXD</td><td>Output</td></tr>
<tr><td>4</td><td>Data terminal ready</td><td>DTR</td><td>Output</td></tr>
<tr><td>5</td><td>Signal ground</td><td>SG</td><td>--</td></tr>
<tr><td>6</td><td>Data set ready</td><td>DSR</td><td>Input</td></tr>
<tr><td>7</td><td>Request to send</td><td>RTS</td><td>Output</td></tr>
<tr><td>8</td><td>Clear to send</td><td>CTS</td><td>Input</td></tr>
<tr><td>9</td><td>(Empty)</td><td>(Empty)</td><td>--</td></tr>
</table></td></tr>
<tr><td>1.3</td><td>Printer interface</td><td>・Conforms to Centronics
・Paper size: A4 letter size
・Print type: Character printing
・Connector: D-sub 25 pins
・Pin arrangement
<table>
<tr><th>Pin No.</th><th>Function</th><th>Signal name</th><th>Direction</th></tr>
<tr><td>1</td><td>Data strobe</td><td>STB</td><td>Output</td></tr>
<tr><td>2 to 9</td><td>Parallel data (8 bits)</td><td>D0 to D7</td><td>Output</td></tr>
<tr><td>11</td><td>Busy</td><td>BUSY</td><td>Input</td></tr>
<tr><td>12</td><td>Paper end</td><td>PE</td><td>Input</td></tr>
<tr><td>15</td><td>Error</td><td>ERROR</td><td>Input</td></tr>
<tr><td>18 to 25</td><td>Signal ground</td><td>SG</td><td>--</td></tr>
<tr><td>Others</td><td>(Empty)</td><td>--</td><td>--</td></tr>
</table></td></tr>
</table>

No.	Item	Specifications
1.4	Floppy disk	・Operation mode : 2MB ・Disk used : 2HD（1.44MB）,3.5 inches ・Data transfer speed : 500kbit/s ・Disk rotation speed : 300rpm ・Track density : 135tpi ・Track shift time : 3ms
1.5	Calendar clock	・Year/Month/Day/Hour:Minute:Second (Gregorian calendar, 4-digit indication of year) ・Battery backuped ・Accuracy : 5 ppm (error of approx. 0.5 s/day) at operation(reference) 11.574 ppm (error of approx. 1 s/day) at backuped operation(reference)
1.6	LED	・Power : Lights (green) at power on ・Panel Lock/Remote : Lights (green) at panel locked and remote modes ・Battery : Unlights at no battery Lights (green) at discharging or full-charged Lights (red) at requirement of charging Lights (orange) at charging Blinks (red) at abnormal battery Blinks (orange) at temperature alarm
1.7	Key switch	Quick : Moves to Quick operation screen Print Now : Prints the current screen information at an external printer Panel Lock/Local : Toggles between panel lock/unlock, and moves to local mode from remote
1.8	Touch panel	Analog resistive film method Calibration function provided
1.9	Memory	Stores the following contents in backup memory. ・Resume memory : At power on, recovers the setting conditions immediately before the power off. ・Measurement condition memory : Saves max. 10 measurement conditions.

<table>
<tr><th>No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td></td><td></td><td>・Analyze memory :
■Graph data : Graph data obtained at Error/Alarm measurement
<table>
<tr><th>Resolution</th><th>Max. Saved Amount (Unit: day)</th></tr>
<tr><td>1sec</td><td>0.0216 to 0.0379</td></tr>
<tr><td>1min</td><td>1.2993 to 2.2743</td></tr>
<tr><td>15min</td><td>19.4895 to 34.1145</td></tr>
<tr><td>60min</td><td>77.9583 to 136.4583</td></tr>
</table>
(Max approx. 128 KB : 1781 to 3275lines)
Note: Max. saved amount changes by the state of alarm occurrence.
■Log data : Log data obtained by Error/Alarm measurement(Max. Approx. 128 KB: 229 events, only saved when error,alarm and so on occurred.) If error occurred every seconds, the memory capacity becomes 76 minute amount.
■Trace data : Trace data obtained by Word trace measurement (Max. 128 KB)
■Character pattern data : Character pattern used for Error/Alarm measurement (Max. 128 KB)
■Program data : Transmission data used for Word trace measurement (Max. 128 KB)
■Protocol monitor data : Result data of protocol monitor data (Max. 128 KB : 2340lines)
The Graph data, Log data, Trace data, Character pattern data, Program data and Protocol monitor data shares the memory, whose total capacity is 512 KB and saved types are 10</td></tr>
<tr><td>1.10</td><td>External memory</td><td>Saves the following contents in Floppy disk.
・Measurement condition data
・graph data
・log data
・Trace data
・Character pattern data
・Program data
・Protocol monitor data</td></tr>
<tr><td>1.11</td><td>Print</td><td>Prints the followings at an external printer.
Printing by Print Now key : Prints current displayed contents.
Automatic printing : In Error/Alarm measurement, prints measurement start time, measurement condition, one-second data and intermediate data during measurement, and data at measurement end.</td></tr>
</table>

No.	Item	Specifications
1.12	Screen off	・Pressing Screen off key turns LCD back light off.Operating Touch panel or panel key turns it on. ・Auto screen off : If the Touch panel or panel key is not pressed for a specified period; LCD back light turns off, automatically. (On/Off function provided) Operating Touch panel or panel key turns it on. Setting range: 1 to 99 minutes
1.13	Selftest	Selftest at power on: At power on, checks RAM of the MD6430A main frame and units, and displays the test results.
1.14	Buzzer	Sets buzzer sound on/off at each the following conditions. Touch sound : Rings when any button on Touch panel is pressed. Operation error sound : Rings when input error occurred, message displayed, confirmation window displayed, or battery capacity residue < 5%. Error & Alarm sound : Rings when error occurred during Error/Alarm measurement or Frame relay measurements, or when alarm occurred during Error/Alarm measurement.
1.15	Quick operation	Measurement conditions stored in internal memory can be recalled by pressing Quick key.
1.16	Power supply (using AC adaptor)	85 to 250 Vac, 47.5 to 63 Hz, < 70 VA (interface unit installed)

No.	Item	Specifications
2	Option opt-01	GPIB • Configuration : GPIB card (included in MD6430A) · · · · 1 Exclusive GPIB cable (J1026A) · · · · · · · 1 • Specifications : Conforms to IEEE488.2 • Allocation of unit number : 0 to 30 • Interface function

Function name	Symbol	Description
Source handshake	SH1	All SH functions are available
Acceptor handshake	AH1	All AH functions are available
Talker	T6	Basic talker functions are available Serial pole function is available Talk only mode is available Talker release function by MLA is available
Listener	L4	Basic listener functions are available Listen only mode is available Talker release function by MTA is available
Service request	SR1	All Service request functions are available
Remote/Local	RL1	All Remote/Local functions are available
Parallel pole	PP0	No Parallel pole function
Device clear	DC1	All Device clear functions are available
Device trigger	DT1	All Device trigger functions are available
System controller	C0	No system controller function

• Card connector pin arrangement

No.	Name	Input/ Output	No.	Name	Input/ Output	No.	Name	Input/ Output
1	DIO1	I/O	10	SRQ	I/O	19	GND	-
2	DIO2	I/O	11	ATN	I/O	20	GND	-
3	DIO3	I/O	12	GND	-	21	GND	-
4	DIO4	I/O	13	DIO5	I/O	22	GND	-
5	EOI	I/O	14	DIO6	I/O	23	GND	-
6	DAV	I/O	15	DIO7	I/O	24	GND	-
7	NRFD	I/O	16	DIO8	I/O	25	GND	-
8	NDAC	I/O	17	REN	I/O	26	GND	-
9	IFC	I/O	18	GND	-			

<table>
<tr><th>No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td></td><td></td><td>• GPIB connector pin arrangement(IEEE488 specifications)
<table>
<tr><th>No.</th><th>Name</th><th>No.</th><th>Name</th><th>No.</th><th>Name</th></tr>
<tr><td>1</td><td>DIO1
Data Input Output1</td><td>9</td><td>IFC
Interface Clear</td><td>17</td><td>REN
Remote Enable</td></tr>
<tr><td>2</td><td>DIO2
Data Input Output2</td><td>10</td><td>SRQ
Service Request</td><td>18</td><td>GND</td></tr>
<tr><td>3</td><td>DIO3
Data Input Output3</td><td>11</td><td>ATN
Attention</td><td>19</td><td>GND</td></tr>
<tr><td>4</td><td>DIO4
Data Input Output4</td><td>12</td><td>GND</td><td>20</td><td>GND</td></tr>
<tr><td>5</td><td>EOI
END or Identify</td><td>13</td><td>DIO5
Data Input Output5</td><td>21</td><td>GND</td></tr>
<tr><td>6</td><td>DAV
Data Varied</td><td>14</td><td>DIO6
Data Input Output6</td><td>22</td><td>GND</td></tr>
<tr><td>7</td><td>NRFD
Not Ready For Data</td><td>15</td><td>DIO7
Data Input Output7</td><td>23</td><td>GND</td></tr>
<tr><td>8</td><td>NDAC
Not Data Accepted</td><td>16</td><td>DIO8
Data Input Output8</td><td>24</td><td>GND</td></tr>
</table>
* All signal lines can input/output signals.</td></tr>
<tr><td>3
3.1

3.2</td><td>Environmental Conditions
Operating temperature

Storage temperature</td><td>
0 to 50℃ (+5 to 40℃ when floppy disc drive and battery pack used.)

-20 to 50℃ (-20 to 35℃ and one year or less for battery pack.)</td></tr>
<tr><td>4</td><td>Dimensions and Mass</td><td>290 W x 194 H x 94 D (mm), < 4.2 kg (unit included, battery not included)
290 W x 194H x 45 D (mm), < 2.3 kg (only main frame)</td></tr>
</table>

2.2.2 Specifications of MU643000A/B/C/K

The specifications of the MU643000A/B/C/K are shown below.

<table>
<tr><th>No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>1</td><td>Model/Instrument Name
Usage</td><td>MU643000A/B/C/K DATACOM Interface Unit
Interface unit for MD6430A</td></tr>
<tr><td>2
2.1
2.2</td><td>Composition
Main frame
Option
opt-01

opt-02

opt-22</td><td>
MD6430A main frame

JT-Q921/Q931 ISDN Signalling
• Enables the ISDN call control for JT-Q921/Q931
ETSI ISDN signalling
• Enables the ISDN call control for ETSI
CAS,FAS Function
• The following functions are added when using the interfaces in the table below.
<table>
<tr><th>No.</th><th colspan="2">Interface</th><th>CAS function</th><th>FAS function</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">G.704/I.431 1.544M</td><td>24MFP (G.704)</td><td>○</td><td>○</td></tr>
<tr><td>24MFP (NTT)</td><td>○</td><td>○</td></tr>
<tr><td>12MFP (G.704)</td><td>○</td><td>○</td></tr>
<tr><td rowspan="4">2</td><td rowspan="4">G.704/I.431 2.048M</td><td>16MFP (30B+D)</td><td>○</td><td>○</td></tr>
<tr><td>16MFP (31B)</td><td></td><td>○</td></tr>
<tr><td>2MFP (30B+D)</td><td>○</td><td>○</td></tr>
<tr><td>2MFP (31B)</td><td></td><td>○</td></tr>
<tr><td rowspan="2">3</td><td rowspan="2">2M CMI</td><td>PBX</td><td>○</td><td>○</td></tr>
<tr><td>CRV</td><td></td><td>○</td></tr>
<tr><td>4</td><td>G.704 6.312M</td><td>4MFP (G.704)</td><td></td><td>○</td></tr>
</table>
CAS function - Performs the transmission output setting and Monitoring (synchronously for Tx and Rx at 2In) for all signaling bits.
FAS function - Monitors frame bit.
Performs the transmission setting and Monitoring for DL bit (only for No.1,4).
Performs the transmission setting and Monitoring for SSM and Sa bits (only for No.2).
Monitors MFAS (only for No.2 16MFP(30B+D), 2MFP(30B+D))</td></tr>
</table>

No.	Item	Specifications
3	Electrical Performance	
3.1	Interface	
3.1.1	V.24/V.28	
	[1]Electrical condition	V.28
	[2]Synchronization method	Synchronous(ST1,ST2, ST2(INV),RT ,RT(INV)) ASYNC Start-Stop Start bit : 1, Stop bit : 1,1.5,2, Data length : 5,6,7,8 Parity : none,odd,even
	Synchronous Speed (bit/s)	50 to 200kbit/s(in 5bit/s step)
	ASYNC Speed(bit/s)	50,75,100,110,150,200,256,300,400,500,512,600,768,800,1k,1.2k, 1.6k,1.8k,2k,2.4k,2.56k,3k,3.2k,3.6k,4.8k,7.2k,8k,9.6k,12k, 12.8k,14.4k,16k,16.8k,19.2k,28.8k,32k,38.4k,46k,48k,50k,56k, 56.6k,64k,72k,76.8k,115.2k
	Start-Stop Speed(bit/s)	Same as ASYNC
	[3]Connector	Amphenol half pitch 36 pins

Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	-	-	-
2	-	-	-	20	-	-	-
3	SD	out	V.28	21	-	-	-
4	ST2	in/out	V.28	22	-	-	-
5	RD	in	V.28	23	-	-	-
6	RS	out	V.28	24	-	-	-
7	RT	in	V.28	25	-	-	-
8	CS	in	V.28	26	-	-	-
9	LLB	out	V.28	27	-	-	-
10	DR	in	V.28	28	-	-	-
11	ER	out	V.28	29	-	-	-
12	CD	in	V.28	30	-	-	-
13	RLB	out	V.28	31	-	-	-
14	CI	in	V.28	32	-	-	-
15	ST1	out	V.28	33	-	-	-
16	TI	in	V.28	34	-	-	-
17	-	-	-	35	-	-	-
18	-	-	-	36	SG	-	-

No.	Item	Specifications
3.1.2	V.35 [1]Electrical condition [2]Synchronization method Speed(bit/s) [3]Connector	V.28(unbalanced), V.35(balanced) Synchronous(ST1,ST2, ST2(INV),RT ,RT(INV)) 50 to 10Mbit/s(in 5bit/s step) Amphenol half pitch 36 pins

Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	-	-	-
2	-	-	-	20	-	-	-
3	SDA	out	V.35	21	SDB	out	V.35
4	ST2A	in/out	V.35	22	ST2B	in/out	V.35
5	RDA	in	V.35	23	RDB	in	V.35
6	RS	out	V.28	24	-	-	-
7	RTA	in	V.35	25	RTB	in	V.35
8	CS	in	V.28	26	-	-	-
9	LLB	out	V.28	27	-	-	-
10	DR	in	V.28	28	-	-	-
11	ER	out	V.28	29	-	-	-
12	CD	in	V.28	30	-	-	-
13	RLB	out	V.28	31	-	-	-
14	CI	in	V.28	32	-	-	-
15	ST1A	out	V.35	33	ST1B	out	V.35
16	TI	in	V.28	34	-	-	-
17	-	-	-	35	-	-	-
18	-	-	-	36	SG	-	-

No.	Item	Specifications
3.1.3	V.36	
	[1]Electrical condition	V.10(unbalance), V.11(balance)
	[2]Synchronization method	Synchronous(ST1,ST2, ST2(INV),RT ,RT(INV))
	Speed (bit/s)	50 to 10Mbit/s(in 5bit/s step)
	[3]Connector	Amphenol half pitch 36 pins

Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	-	-	-
2	-	-	-	20	-	-	-
3	SDA	out	V.11	21	SDB	out	V.11
4	ST2A	in/out	V.11	22	ST2B	in/out	V.11
5	RDA	in	V.11	23	RDB	in	V.11
6	RS	out	V.10	24	-	-	-
7	RTA	in	V.11	25	RTB	in	V.11
8	CS	in	V.10	26	-	-	-
9	LLB	out	V.10	27	-	-	-
10	DR	in	V.10	28	-	-	-
11	ER	out	V.10	29	-	-	-
12	CD	in	V.10	30	-	-	-
13	RLB	out	V.10	31	-	-	-
14	CI	in	V.10	32	-	-	-
15	ST1A	out	V.11	33	ST1B	out	V.11
16	TI	in	V.10	34	-	-	-
17	-	-	-	35	-	-	-
18	-	-	-	36	SG	-	-

No.	Item	Specifications
3.1.4	RS449	
	[1]Electrical condition	V.10(unbalance), V.11(balance)
	[2]Synchronization method	Synchronous(ST1,ST2, ST2(INV),RT ,RT(INV))
	Speed(bit/s)	50 to 10Mbit/s(in 5bit/s step)
	[3]Connector	Amphenol half pitch 36 pins

Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	-	-	-
2	-	-	-	20	-	-	-
3	SDA	out	V.11	21	SDB	out	V.11
4	ST2A	in/out	V.11	22	ST2B	in/out	V.11
5	RDA	in	V.11	23	RDB	in	V.11
6	RSA	out	V.11	24	RSB	out	V.11
7	RTA	in	V.11	25	RTB	in	V.11
8	CSA	in	V.11	26	CSB	in	V.11
9	LLB	out	V.10	27	-	-	-
10	DRA	in	V.11	28	DRB	in	V.11
11	ERA	out	V.11	29	ERB	out	V.11
12	CDA	in	V.11	30	CDB	in	V.11
13	RLB	out	V.10	31	-	-	-
14	CI	in	V.10	32	-	-	-
15	ST1A	out	V.11	33	ST1B	out	V.11
16	TI	in	V.10	34	-	-	-
17	SGA	-	-	35	-	-	-
18	SGB	-	-	36	SG	-	-

No.	Item	Specifications
3.1.5	X.20(RS423)	
	[1]Electrical condition	V.10
	[2]Synchronization method	ASYNC Synchronous Start bit :1, Stop bit :1,1.5,2, Data length : 5,6,7,8, Parity : none,odd,even
	ASYNC Speed(bit/s)	50,75,100,110,150,200,256,300,400,500,510,600,770,800,1k,1.2k, 1.6k,1.8k,2k,2.4k,2.56k,3k,3.2k,3.6k,4.8k,7.2k,8k,9.6k,12k, 12.8k,14.4k,16k,16.8k,19.2k,28.8k,32k,38.4k,46k,48k,50k, 56k, 56.6k,64k,72k,76.8k,115.2k
	Start-Stop Speed(bit/s)	Same as ASYNC
	[3]Connector	Amphenol half pitch 36 pins

Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	-	-	-
2	-	-	-	20	-	-	-
3	T	out	V.10	21	GA	out	V.10
4	-	-	-	22	-	-	-
5	R	in	V.10	23	GB	in	V.10
6	-	-	-	24	-	-	-
7	-	-	-	25	-	-	-
8	-	-	-	26	-	-	-
9	-	-	-	27	-	-	-
10	-	-	-	28	-	-	-
11	-	-	-	29	-	-	-
12	-	-	-	30	-	-	-
13	-	-	-	31	-	-	-
14	-	-	-	32	-	-	-
15	-	-	-	33	-	-	-
16	-	-	-	34	-	-	-
17	-	-	-	35	-	-	-
18	-	-	-	36	SG	-	-

No.	Item	Specifications
3.1.6	X.21(RS422)	
	[1]Electrical condition	V.11
	[2]Synchronization method	Synchronous(ST1,ST2, ST2(INV),S, S(INV))
	Speed(bit/s)	50 to 10Mbit/s(in 5bit/s step)
	[3]Connector	Amphenol half pitch 36 pins

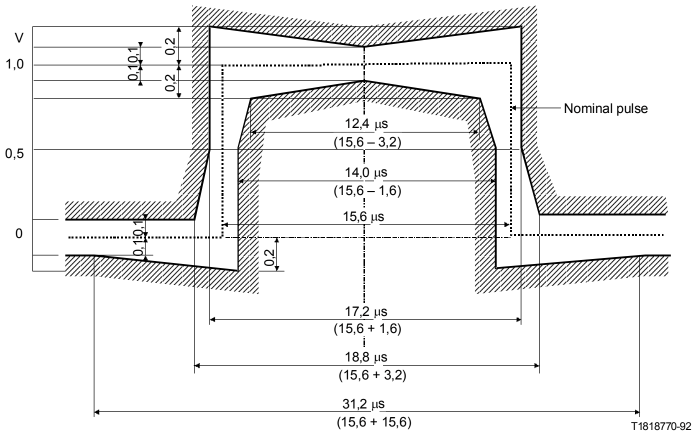
Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	-	-	-
2	-	-	-	20	-	-	-
3	TA	out	V.11	21	TB	out	V.11
4	-	-	-	22	-	-	-
5	RA	in	V.11	23	RB	in	V.11
6	CA	out	V.11	24	CB	out	V.11
7	SA	in	V.11	25	SB	in	V.11
8	IA	in	V.11	26	IB	in	V.11
9	-	-	-	27	-	-	-
10	-	-	-	28	-	-	-
11	-	-	-	29	-	-	-
12	-	-	-	30	-	-	-
13	-	-	-	31	-	-	-
14	-	-	-	32	-	-	-
15	BA	out	V.11	33	BB	out	V.11
16	-	-	-	34	-	-	-
17	-	-	-	35	-	-	-
18	-	-	-	36	SG		

No.	Item	Specifications
3.1.7	TTL/CMOS	
	[1]Electrical condition	TTL/CMOS
	[2]Synchronization method	Synchronous(ST1,ST2, ST2(INV),RT ,RT(INV)) ASYNC Start-Stop Start bit:1, Stop bit:1,1.5,2, Data length:5,6,7,8, Parity:none,odd,even
	Synchronous Speed(bit/s)	50 to 10Mbit/s(in 5bit/s step)
	ASYNC Speed(bit/s)	50,75,100,110,150,200,256,300,400,500,512,600,768,800,1k,1.2k, 1.6k,1.8k,2k,2.4k,2.56k,3k,3.2k,3.6k,4.8k,7.2k,8k,9.6k,12k, 12.8k,14.4k,16k,16.8k,19.2k,28.8k,32k,38.4k,46k,48k,50k,56k, 56.6k,64k,72k,76.8k,115.2k
	Start-Stop Speed(bit/s)	Same as ASYNC
	[3]Connector	Amphenol half pitch 36 pins

Pin No.	Name	I/O	Level	Pin No.	Name	I/O	Level
1	FG	-	-	19	SD	out	TTL/ CMOS
2	-	-	-	20	ST1	out	TTL/ CMOS
3	-	-	-	21	-	-	-
4	-	-	-	22	-	-	-
5	-	-	-	23	-	-	-
6	-	-	-	24	-	-	-
7	-	-	-	25	-	-	-
8	-	-	-	26	-	-	-
9	-	-	-	27	-	-	-
10	-	-	-	28	-	-	-
11	-	-	-	29	-	-	-
12	-	-	-	30	-	-	-
13	-	-	-	31	RD	in	TTL/ CMOS
14	-	-	-	32	ST2	in	TTL/ CMOS
15	-	-	-	33	-	-	-
16	-	-	-	34	RT	in	TTL/ CMOS
17	-	-	-	35	(ST*)	out	TTL/ CMOS
18	-	-	-	36	SG	-	-

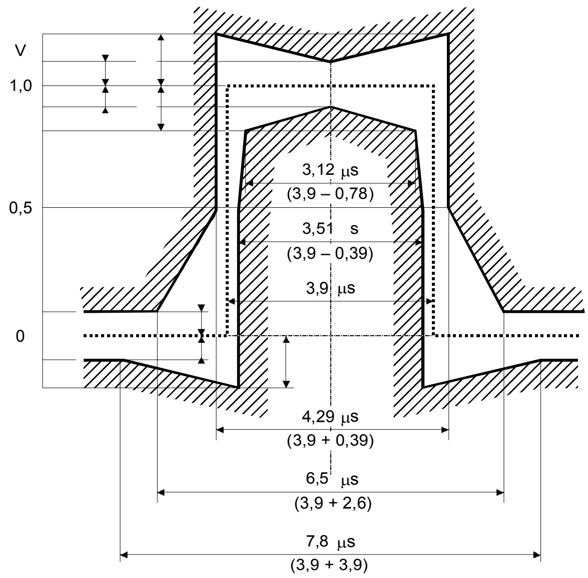
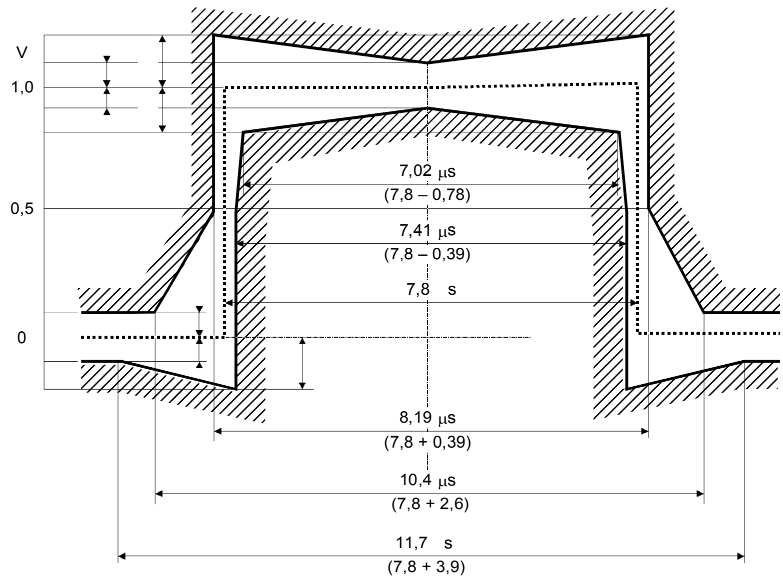
* : ST : 64k,192k,1.5M,2M,2MCMI,6M
When send interface selects 64k,192k,1.5M,2M,2MCMI and 6M, ST-pin assigns send clock of send interface.

No.	Item	Specifications
3.1.8	G.703 64k	
	[1]Electrical condition	
	Frequency	64kHz
	Code	100%AMI
	Impedance	110 Ω, high impedance (only for main signal and reception)
	Level	Main signal : 1 $V_{0\text{-}p}$ ±10%
		26dB Monitor :Main signal-26dB
	[2]Clock	Self-oscillation: ±5ppm(Accuracy)
		Slave-oscillation (External input 64k+8kbit/s,reception data):
		±100ppm(Slave range)
	[3]Frame	Centralized clock, codirectional (for MU643000A/C)
	[4]Sub Frame	X.50 20 multi, X.50 80 multi, universal
	[5]Data Speed	64k,56k,48k,8k,16k,32k,0.6k,2.4K,4.8k,9.6k,
		2.4k×n(n:1 to 20),0.6k×n(n:1 to 80)
	[6]Connector	Mini-bantam
	[7]Pulse mask	



Note 1 – When one pulse is immediately followed by another pulse of the opposite polarity, the time limits at the zero-crossing between the pulses should be ± 0.8 μs.

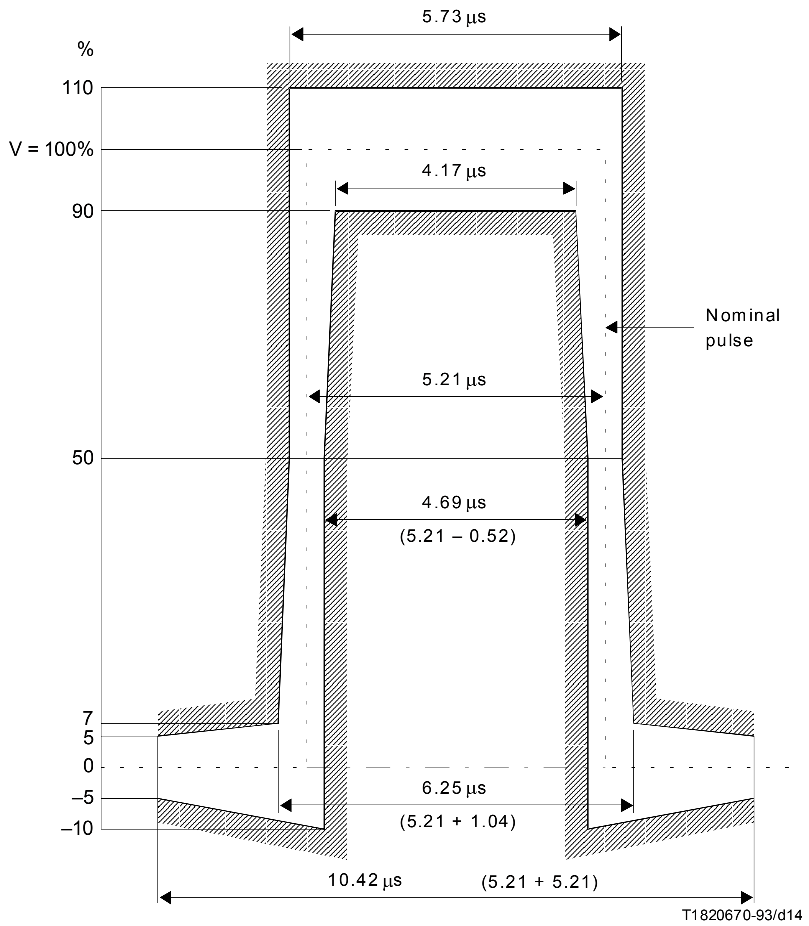
Note 2 – The time instants at which a transition from one state to another in the data signal may occur are determined by the timing signal. On the service (e.g. data or signalling) side of the interface it is essential that these transitions are not initiated in advance o the timing instants given by the received timing signal.

No.	Item	Specifications
		 a) Mask for single pulse  b) Mask for double pulse *Note* – The limits apply to pulses of either polarity.

No.	Item	Specifications
3.1.9	I.430/I.430-a 192k	
	[1]Electrical condition	
	Frequency	192kHz
	Code	100%AMI
	Impedance	50Ω, 100Ω, Open
	Level	$0.75V_{0\text{-}p}\pm10\%$
	[2]Clock	Slave-oscillation (Reception data): ±100ppm(Slave range)
	[3]Frame	I.430 20 multi, I.430 multi UnFrame
	[4]Sub Frame	X.50 20 multi, X.50 80 multi, universal
	[5]Speed	64k,128k,56k,48k,8k,16k,32k,144k,2.4K,4.8k,9.6k, 2.4k×n(n:1 to 20)、0.6k×n(n:1 to 80)
	[6]Connector	8-pin modular jack (RJ45)
	[7]Pin layout	

No.	Function	Polarity	No.	Function	Polarity	No.	Function	Polarity
1	-	-	4	Receive-T	+	7	-	-
2	-	-	5	Receive-R	−	8	-	-
3	Send-T	+	6	Send-R	−			

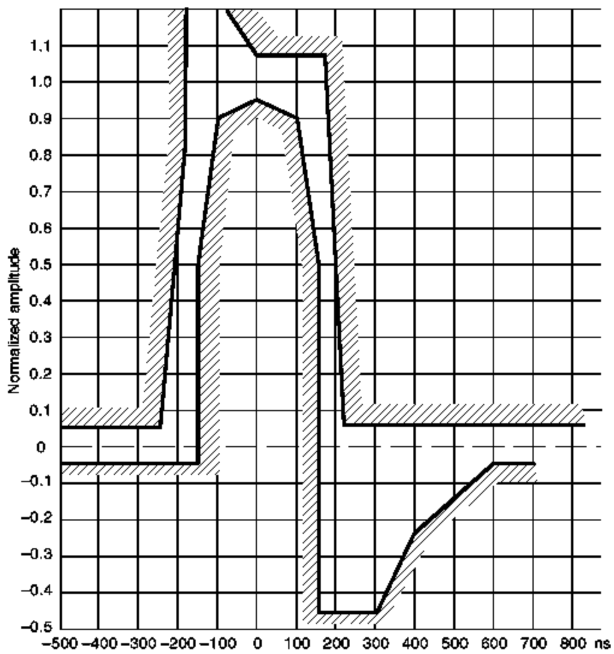
[8]Pulse mask



No.	Item	Specifications
3.1.10	G.704/I.431 1.544M	For MU643000A/B/K
	[1]Electrical condition	
	Frequency	1.544MHz
	Code	B8ZS/AMI
	Impedance	100Ω, high impedance (only for main signal and reception)
	Level	Main signal　: 3 $V_{0\text{-}p}$ ±10% 26dBMonitor　: Main signal-26dB
	[2]Clock	Self-oscillation: ±5ppm(Accuracy) Slave-oscillation (External input 64k+8kbit/s,reception data): ±100ppm(Slave range)
	[3]Frame	24 MFP(G.704), 24 MFP(NTT), 12 MFP(G.704),Unframe *24ST(G.704), *24ST(NTT), *12ST(G.704)
	[4]Sub Frame	X.50 20 multi, universal
	[5]Data Speed	64k×n (n:1 to 24),56k×n(n: 1to 24),48k,8k,16k,32k,2.4k,4.8k,9.6k, 2.4k×n(n:1 to 20)
	[6]Handling group	*HGn (n:1 to 4)
	[7]Connector	8-pin modular jack (ISO10173)
	[8]Pin layout	

No.	Function	Polarity	No.	Function	Polarity	No.	Function	Polarity
1	Receive-T	+	4	Send-T	+	7	-	-
2	Receive-R	−	5	Send-R	−	8	-	-
3	-	-	6	-	-			

[9]Pulse mask

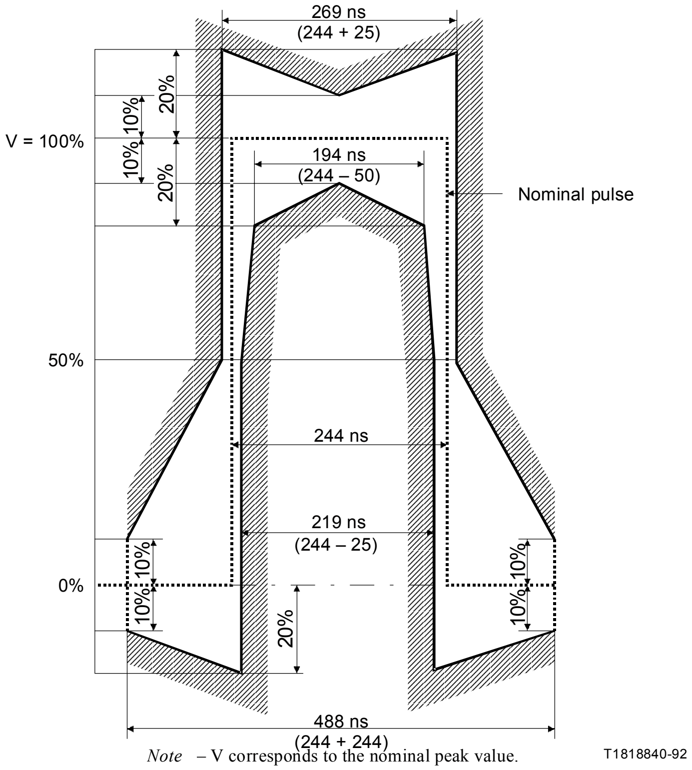


* : For MU643000K

No.	Item	Specifications
3.1.11	G.704/I.431 2.048M	For MU643000A/C
	[1]Electrical condition	
	Frequency	2.048MHz
	Code	HDB3/AMI
	Impedance	120 Ω (balance), 75 Ω (unbalance), high impedance (only for main signal and reception)
	Level	Main signal : 3$V_{0\text{-}p}$±10%(120 Ω) , 2.37$V_{0\text{-}p}$±10%(75 Ω)
		26dB Monitor:Main signal-26dB
	[2]Clock	Self-oscillation: ±5ppm(Accuracy)
		Slave-oscillation (External input 64k+8kbit/s,reception data): ±100ppm(Slave range)
	[3]Frame	2 MFP(30B+D),2 MFP(31B),16 MFP(30B+D),16 MFP(31B),Unframe
	[4]Sub Frame	X.50 20 multi, X.50 80 multi, universal
	[5]Data Speed	64k×n(n:1 to 31),56k×n(n:1 to 31) ,48k,8k,16k,32k,0.6k,2.4k,4.8k,9.6k, 2.4k×n(n:1 to 20),0.6k×n(n:1 to 80)
	[6]Connector	120 Ω : 8-pin modular jack(ISO10173)

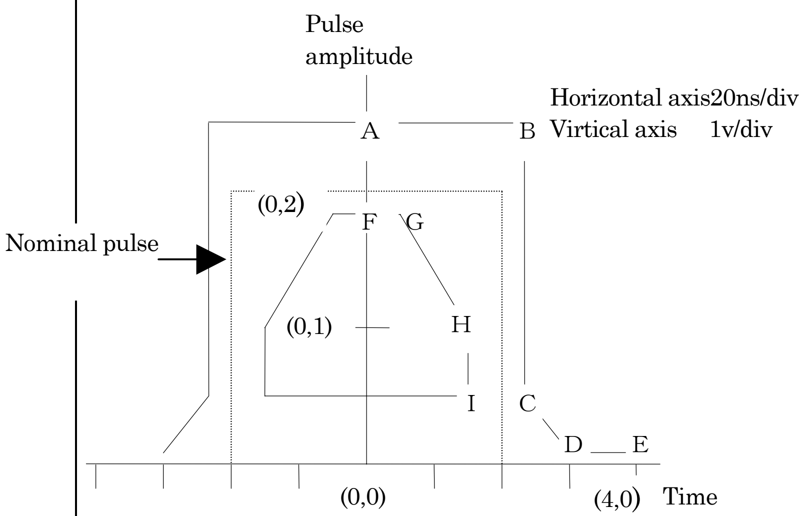
No.	Function	Polarity	No.	Function	Polarity	No.	Function	Polarity
1	Receive-T	+	4	Send-T	+	7	-	-
2	Receive-R	−	5	Send-R	−	8	-	-
3	-	-	6	-	-			

		75 Ω : BNC
	[7]Pulse mask	



Note – V corresponds to the nominal peak value.

No.	Item	Specifications
3.1.12	2M CMI	For MU643000A/B/K
	[1]Electrical condition	
	Frequency	2.048MHz
	Code	CMI
	Impedance	110Ω high impedance (only for main signal and reception)
	Level	Main signal : $3V_{p\text{-}p}\pm10\%$
		26dB Monitor :Main signal-26dB
	[2]Clock	Self-oscillation: ±5ppm(Accuracy)
		Slave-oscillation (External input 64k+8kbit/s,reception data):
		±100ppm(Slave range)
	[3]Frame	PBX,CRV,ST Unframe
	[4]Sub Frame	X.50 20 multi, Universal
	[5]Data Speed	64k×n(n:1 to 30),56k×n(n:1 to 30),48k,8k,16k,32k,2.4k,4.8k,9.6k,
		2.4k×n(n:1 to 20)
	[6]Handling group	HGn (n:1 to 5)
	[7]Connector	Mini-bantam
3.1.13	G.704 6.312M	For MU643000A/B/K
	[1]Electrical condition	
	Frequency	6.312MHz
	Code	B8ZS
	Impedance	100Ω, high impedance (only for main signal and reception)
	Level	Main signal : $2V_{0\text{-}p}\pm10\%$
		26dB Monitor :Main signal-26dB
	[2]Clock	Self-oscillation: ±5ppm(Accuracy)
		Slave-oscillation (External input 64k+8kbit/s,reception data):
		±100ppm(Slave range)
	[3]Frame	4 MFP (G.704),Unframe
		*4ST (G.704)
	[4]Sub Frame	X.50 20 multi, Universal
	[5]Data Speed	64k×n(n:1 to 98),56k×n(n:1 to 98),48k,8k,16k,32k,2.4k,4.8k,9.6k,
		2.4k×n(n:1 to 20)
	[6]Handling group	*HGn (n:1 to 16)
	[7]Connector	BNC
		* : For MU643000K

No.	Item	Specifications
	[7]Pulse mask	 Coordinates of each point A : (0, 2.3) F : (0, 1.7) B : (2.4, 2.3) G : (0.4, 1.7) C : (2.4, 1.0) H : (1.6, 0.9) D : (3.2, 0.3) I : (1.6, 0.3) E : (4.0, 0.3)
3.2	Transmission Clock	
3.2.1	Internal clock	ST1, ASYNC, Start-Stop
	[1]Accuracy	Self-oscillation: ±5ppm(Accuracy) Slave-oscillation (External input 64k+8kbit/s): ±100ppm(Slave range)
3.2.2	External clock	ST2, RT, S (Enables the bit invert)
	[1]Frequency	50bit/s to 10Mbit/s
3.3	Reception Clock	
3.3.1	Internal clock	ASYNC, Start-Stop
	[1]Accuracy	< ±5 ppm
3.3.2	External clock	RT, S (Enables the bit invert)
	[1]Frequency	50bit/s to 10Mbit/s

<table>
<tr><th>No.</th><th>Item</th><th>Specifications</th></tr>
<tr><td>3.4</td><td>Transmission Pattern</td><td></td></tr>
<tr><td>3.4.1</td><td>PRBS pattern</td><td>PRBS6($1+X^5+X^6$),PRBS7($1+X^6+X^7$, conform to V.29),
PRBS9($1+X^5+X^9$, conform toV.52),PRBS11($1+X^9+X^{11}$, conform to O.152)
PRBS15($1+X^{14}+X^{15}$, conform to O.151),
PRBS19($1+X+X^2+X^5+X^{19}$, conform to I.430),
PRBS20($1+X^3+X^{20}$, conform to V.57),RPRBS20($1+X^{17}+X^{20}$),
PRBS23($1+X^{18}+X^{23}$, conform to O.151),
QRSS($1+X^{17}+X^{20}$, 14-zero suppression)
Enables the bit invert of each PRBS pattern.</td></tr>
<tr><td>3.4.2</td><td>Fixed pattern</td><td>All 0, All 1, 1:1 (repetition of 1/0)</td></tr>
<tr><td>3.4.3</td><td>Program pattern</td><td>8-bit repetition of 00000000 to 11111111
Note: At ST/SP, 5-bit to 8-bit repetition depending on DATA length</td></tr>
<tr><td>3.4.4.</td><td>Character pattern
[1]Pattern length
[2]Input format
[3]Number of used bits</td><td>
1 to 1024characters (in 1 character step)
Hex,ASCII
5,6,7,8 bit</td></tr>
<tr><td>3.4.5</td><td>Word pattern generation</td><td>Enables to send any user-specified pattern of 1 to 128 kbytes.</td></tr>
<tr><td>3.5</td><td>Error Insertion
(1) Error type</td><td>
Bit,Bit+Code,Code(Includes CRC ERROR at Bit.)
<table>
<tr><th>Transmission Interface</th><th>Error type</th></tr>
<tr><td>V.24/V.28(RS-232C)</td><td>Bit</td></tr>
<tr><td>V.35</td><td>Bit</td></tr>
<tr><td>V.36</td><td>Bit</td></tr>
<tr><td>RS-449</td><td>Bit</td></tr>
<tr><td>X.20(RS-423)</td><td>Bit</td></tr>
<tr><td>X.21(RS-422)</td><td>Bit</td></tr>
<tr><td>TTL/CMOS</td><td>Bit</td></tr>
<tr><td>G.703 64k</td><td>Bit,Bit+Code,Code</td></tr>
<tr><td>I.430/I.430-a 192k</td><td>Bit</td></tr>
<tr><td>G.704/I.431 1.544M</td><td>Bit,Bit+Code,Code</td></tr>
<tr><td>G.704/I.431 2.048M</td><td>Bit,Bit+Code,Code</td></tr>
<tr><td>2M CMI</td><td>Bit,Bit+Code,Code</td></tr>
<tr><td>G.704 6.312M</td><td>Bit,Bit+Code,Code</td></tr>
</table></td></tr>
<tr><td></td><td>[2]Insertion type</td><td>Single(Pressing key inserts single error.),Repeat(Inserts one error per second, repeatedly.),Cyclic</td></tr>
<tr><td></td><td>[3] Cyclic error rate</td><td>2.5E-1 to 1.7E-7
(mE-n)
m: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
n:1 to 7</td></tr>
</table>

No.	Item	Specifications
3.6	Alarm/Signal Addition	
	[1]Alarm	AIS,SA,RAI,XA, *BAIS
	[2]Signal	ER,RS,LLB,RLB,C,IF0T, *ST bit

Transmission Interface	1	2	3	4	5	6
V.24/V.28(RS-232C)	ER	RS	LLB	RLB	–	–
V.35	ER	RS	LLB	RLB	–	–
V.36	ER	RS	LLB	RLB	–	–
RS-449	ER	RS	LLB	RLB	–	–
X.20(RS-423)	–	–	–	–	–	–
X.21(RS-422)	C	–	–	–	–	–
TTL/CMOS	–	–	–	–	–	–
G.703 64k	AIS	XA	–	–	–	–
I.430/I.430-a 192k	IF0T	XA	–	–	–	–
G.704/I.431 1.544M	AIS	RAI	XA	HGAIS	BAIS	–
G.704/I.431 2.048M	AIS	RAI	XA	–	–	–
2M CMI	AIS	SA	XA	HGAIS	BAIS	–
G.704 6.312M	AIS	SA	RAI	XA	HGAIS	BAIS

No.	Item	Specifications
3.7	Alarm/Signal Monitor	V.24/V.28(RS-232C), V.35, V.36, RS-449 Signal:SD,RD,ST1,ST2,RT,ER,DR,RS,CS,CD,CI,TI,LLB,RLB X.20(RS-423) Signal:T,R X.21(RS-422) Signal:T,R,C,I,S,B TTL/CMOS Signal:SD,RD,ST1,ST2,RT G.703 64k Alarm:LOS,AIS,XL,XA I.430/I.430-a 192k Signal :INFO 0T,INFO 1,INFO 3,INFO 0R,INFO 2,INFO 4 ,S11,S12,S13,S14,Q11,Q12,Q13,Q14 Alarm:LOF,MF Loss,QFL,XL,XA,PFA G.704/I.431 1.544M Signal:SgA,SgB,SgC,SgD, *ST bit Alarm:LOS,LOF,AIS,RAI,XL,XA, *ST LOF, *HG AIS, *BAIS G.704/I.431 2.048M Signal:SgA,SgB,SgC,SgD,Sa4,Sa5,Sa6,Sa7,Sa8 Alarm:LOS,LOF,MFLoss,AIS,RAI,XL,XA,E1/Si1,E2/Si2,Y 2M CMI Signal:SIG, ST bit Alarm:LOS,LOF,AIS,SA,XL,XA, ST LOF, HGAIS, BAIS G.704 6.312M Signal:X1,X2,X3, *ST bit Alarm:LOS,LOF,AIS,SA,RAI,XL,XA, *ST LOF, *HGAIS, *BAIS * For MU64300K

No.	Item	Specifications
3.8	Error Measurement	
3.8.1	Error type	
	[1]Bit	Bit error
	[2]CRC	CRC error
	[3]Frame	Frame error
	[4]X.50 Frame	X.50 frame error
	[5]Parity	Parity error
	[6]Code	Code rule error
	[7]1/8	1st and 8th bit error
	[8]E bit	E bit error

Transmission Interface	1	2	3	4	5	6	7	8
V.24/V.28(RS-232C)	Bit	Parity	–	–	—	–	–	–
V.35	Bit	–	–	–	—	–	–	–
V.36	Bit	–	–	–	—	–	–	–
RS-449	Bit	–	–	–	—	–	–	–
X.20(RS-423)	Bit	Parity	–	–	—	–	–	–
X.21(RS-422)	Bit	–	–	–	—	–	–	–
TTL/CMOS	Bit	Parity	–	–	—	–	–	–
G.703 64k	Bit	–	Code	–	—	X.50 Frame	1/8	–
I.430/I.430-a 192k	Bit	–	–	–	—	X.50 Frame	1/8	–
G.704/I.431 1.544M	Bit	–	Code	CRC	Frame	X.50 Frame	1/8	–
G.704/I.431 2.048M	Bit	–	Code	CRC	Frame	X.50 Frame	1/8	E bit
2M CMI	Bit	–	Code	–	Frame	X.50 Frame	1/8	–
G.704 6.312M	Bit	–	Code	CRC	Frame	X.50 Frame	1/8	–

No.	Item	Specifications
3.8.2	Measurement block length	1.0E01,1.0E02,1.0E03,1.0E04,1.0E05,1.0E06,32,64,128,256,512, 1024,2048,4096,8192,16384,32768,65536
3.8.3	Measurement mode	
	[1]Single measurement	1 second to 99 days, 23 hours, 59 minutes, 59 seconds
	[2]Repeat measurement	1 second to 99 days, 23 hours, 59 minutes, 59 seconds
	[3]Manual measurement	Up to 1 year

No.	Item	Specifications
3.8.4	Error measurement (For definition of each error, see Appendix.)	Measurement item [1]Error count [6] EFS [2]Error rate [7] Clock slip count [3]Block error count [8] Clock slip second [4]Block error rate [9] PSL Count [5]ES [10] Character error
3.8.5	Error performance measurement (For definition of each error performance, see Appendix.)	
	[1] G.821	Measurement item [1] ES [8] %EFS [2] EFS [9] %SES [3] SES [10] %US [4] US [11] %AT [5] AT [12] %DM [6] DM [13] AnD%ES [7] %ES
	[2] G.826	Measurement item [1] EB [6] SESR [2] ES [7] BBER [3] SES [8] US [4] BBE [9] AT
	[3] M.2100	Measurement item [1] ES [2] SES [3] US [4] AT [5] Test
3.8.6	HDLC measurement (For definition of each measurement item , see Appendix.)	Measurement item [1] Bad frame count [2] About frame count
3.8.7	Alarm measurement (For definition of each alarm, see Appendix.)	Measurement item [1] Power fail [7] LOS [13] SA [2] PSL [8] LOF [14] RAI [3] OPD [9] MF Loss [15] Disconnection [4] FLGL [10] AIS [16]*ST LOF [5] ALL0 [11] XL [17]*HG AIS [6] ALL1 [12] XA [18]*BAIS * : For MU643000K with the G.704/I.431 1.544M, G.704 6.312M interfaces

No.	Item	Specifications
3.9	Frame Relay Measurement	Sends test packet, and compares it with the received packet to detect the match/mis-match. At the same time, detects the HDLC frame error. Enables to monitor the congestion. (Valid at I.430 192k and G.704/I.431 1.544M/2.048M.) Conforms to PVC connection confirmation procedure.
3.9.1	Measurement Item	
	(1)Test sequence count	Counts the number of test sequences.
	(2)Complete sequence count	Counts the number of complete test sequences.
	(3)Incomplete CR sequence count	Counts the number of incomplete CR sequences. (CR: Call Request)
	(4)Incomplete DT sequence count	Counts the number of incomplete DT sequences. (DT: DaTa)
	(5)Incomplete CQ sequence count	Counts the number of incomplete CQ sequence. (CQ: Clear reQuest)
	(6)Receive CR packet count	Counts the number of received CR packets. (CR: Call Request)
	(7)Receive DT packet count	Counts the number of received DT packets. (DT: DaTa)
	(8)Receive CQ packet count	Counts the number of received CQ packets. (CQ: Clear Request)
	(9)Bad frame count	Counts the number of HDLC bad frames.
	(10)Abort frame count	Counts the number of HDLC abort frames.
3.9.2	PVC connection confirmation procedure	Enables PVC signalling test for MD6430A of remote station, depending on the ITU-T Q.933 Annex A.
3.9.3	DLCI	16 to 991
3.9.4	Interval time	5 to 30s,1s step
3.9.5	Frame relay congestion state monitor	BECN, FECN, and CLLM of congestion information, depending on the ITU-T Q.933 Annex A. Enables to detect message.
3.9.6	Error insertion	Insert the reversed value by Single into the random number parts of DT sequence.
3.10	Delay Time Measurement	
3.10.1	Transmit delay	Sends test pattern, and measures the time interval for the pattern to be returned to the receive side. (Invalid at asynchronous mode.)
	Interval	Off,0.5s,1.0s,5.0s
	Measurement range	0.001ms to 16s, 0.001ms step

No.	Item	Specifications
3.10.2	Line interval delay	Measures the time interval between the transition points of two signals.
	Measurement range	0.001ms to 16s, 0.001ms step
	Start trigger	Transition point：On->Off,Off->On Line　:ER,DR,RS,CS,CD,CI,TI,LLB,RLB,C,I IF0T,IF1,IF3,IF0R,IF2,IF4（valid, when 1 in or 2 in）
	Stop trigger	Transition point：On->Off,Off->On Line　:ER,DR,RS,CS,CD,CI,TI,LLB,RLB,C,I IF0T,IF1,IF3,IF0R,IF2,IF4（valid, when 1 in or 2 in）
3.11	Frequency Measurement	Measures the frequencies of the V/X interface clock and the receive data clock signals.
3.11.1	Measurement signal	ST1,ST2,RT,S,ST,RT(Tx),RT(Rx)
3.11.2	Measurement accuracy	±5 ppm ±1 digit
3.11.3	Interval Time	Off,0.5s,1.0s,5.0s
3.11.4	Measurement range Display resolution Gate time	see table below
3.12	Digital Level Measurement	
	[1]Code rule	64 k CODEC of A-law and μ-law
	[2]Measurement range	+3 to -60 dBm in 0.1 dB step
	[3]Transmission pattern	0dBm0 1 kHz pattern (Conforms to ITU-T G.711)
3.13	Word Trace	Enables pattern trace of 128 kbytes.
3.14	Signalling	Enables the ISDN calling/being-called connect on I.430/I.430-a, G.704/I.431 1.544M, G.704/I.431 2.048M interface. (Opt-01, Opt-02)
3.14.1	Call loop connection	Enables to call self and to turn up the channel for calling by replacing to channel for being-called. (Only data connect)
3.14.2	Address/Channel setting	
	(1)Data connection	Remote destination address(max. 15 digits), remote destination subaddress(Max.19 digits), channel for calling(specified channel / Any), subaddress for judgment at being-called(max 19 digits), channel for judgement at being-called(specified cannel / Any)
	(2)Voice connection	Remote destination address(max. 15 digits), remote destination subaddress(Max.19 digits), channel for calling(specified channel / Any), subaddress for judgment at being-called(max 19 digits), channel for judgement at being-called(specified cannel / Any)

Gate time	Measurement range	Display resolution
0.1s	DC to 11MHz	10Hz
1.0s	DC to 11MHz	1Hz
10.0s	DC to 1.6MHz	0.1Hz

No.	Item	Specifications
3.15	Protocol monitor	Enables to analyze the protocol during ISDN (Dch)Layer3 connection and Frame relay Layer2 measurement, and sending to RS-232C or showing to screen.
3.16	MUX/DMUX	Enables to drop/insert the specified channel of high-speed interface with 64 x n (n = 1 to 96) kbit/s.
	[1]Interface	X.21
3.17	Voice CODEC	Enables to voice-monitor and transmit the specified channel.
	[1]Code rule	A-law, μ -law
3.18	Error Analysis	Displays error measurement data in time sequence. Displays graphics of time-sequence error and alarm-generation data to be saved.
3.19	Preset of Measurement Condition	Enables to preset max. 10 types of measurement conditions, which are recalled by pressing one-touch key for starting measurement.
3.20	External Clock	
	(1)Clock	64k+8k
	(2)Input level	0.5 to 1.0Vo-p
	(3)Connector	Mini-bantam
3.21	Input mode	1Out/1In : V.24/V.28,V.35,V.36,RS449,X.20,X.21,G.703 64k, I.430/I.431,192k G.704/I.431 1.544MHz G.704/I.431 2.048MHz 2M CMI G.704 6.312MHz 1In : G.703 64k,192k G.704/I.431 1.544MHz G.704/I.431 2.048MHz 2M CMI G.704 6.312MHz 2In : V.24/V.28,V.35,V.36,RS449,X.20,X.21,G.703 64k, I.430/I.431,192k G.704/I.431 1.544MHz G.704/I.431 2.048MHz 2M CMI G.704 6.312MHz
3.22	Selftest	Provided.
3.23	Power Supply	Supplied from MD6430A main-frame. < 30 W

No.	Item	Specifications
4.	Environmental Condition	
4.1	Operating Temperature Range	0 to 50℃
4.2	Storage Temperature Range	-20 to 50℃
5.	Dimensions and Mass	290W×194H×49D(mm) Excluding the protruding parts., < 1.9kg

2.3　Battery

2.3.1　Operation Guarantee time

The MD6430A is prepared the Lithium ion battery as optional accessory.
Guarantees the MD6430A to operate with Lithium ion battery until three hours and to charge Lithium ion battery in max. three hours. (Operating and charging time are changed by environment, how to use and so on.)

2.3.2　LED indication

Enables to confirm the state of battery at Battery LED on front panel.

LED state	battery state	occurrence condition
Lights (green)	Discharging or full- charged	
Lights (red)	Charging required	Rest capacity < 5%*
Lights (orange)	Charging	Rest capacity < 99.5% and AC/DC adaptor attached
Blinks (red)	Abnormal battery	Something wrong (too much current etc.)
Blinks (orange)	Temperature alarm	More then 60℃
Unlighted	No battery	

* : Sounds buzzer, (When Operation error item is set on in System : Common Sub-screen.)

2.3.3　Storage Term

Storage term of each environmental condition is shown below.

Environmental condition	Storage term
Temperature	
−20 to 35 ℃	long-term storage (less one year)
−20 to 40 ℃	less six months
−20 to 45 ℃	less one months
−20 to 50 ℃	less one week

2.3.4　For correct operation

Lithium ion battery pack has BMU (Battery Management Unit) for rest capacity management.
Rest capacity value of BMU is indefinite when being shipped. For this reason, MD6430A dose not recognize rest capacity when use battery for the first time. MD6430A continues displaying rest capacity 0% and dose not charge battery correctly.

Escape this issue, when charge a battery at the first time, Once operate the MD6430A on only battery until rest capacity 10% or under. After that charge a battery. This time, MD6430A continues displaying rest capacity 0%, but true rest capacity makes 10% or under, then MD6430A urge you to charge a battery by buzzer.

Method of confirming rest capacity refer to Operation Manual section 5.2 “Description of Each S creen”.

Section 3 Setup

3.1 Usage Preparations

3.1.1 Setup Location Environment conditions

MD6430A (Network Data Analyzer) will operate normally if the peripheral temperature is between 0℃ to 50℃ and the relative humidity is 85% or less. (Between 5℃ to 40℃ when using FDD or battery.)
Store the MD6430A at the temperature condition between -20℃ to 50℃. (Between -20℃ to 35℃ when long-term storage with battery.)
Avoid using the device in the following types of locations:

1. In a location affected by strong vibrations
2. In a dusty location
3. In a location that receives direct sunlight
4. In a location that may be affected by active gas
5. In a location that may be affected by water
6. In a location that may be affected by oxidation

CAUTION ⚠

1. When use this equipment, put the rear panel downward or set up by stand.
Avoid putting other than the rear panel downward that are unbalanced and in danger of doing damage to the LCD and inside circuit by falling down.
2. Do not block the air ventilation in lets and outlets.
3. Using this equipment at room temperature after it is stored for a long period of time at a low temperature can cause short circuits due to condensation , and cause damage.
Be sure to dry the equipment sufficiently before using it in this situation.

3.1.2 Safety Measures

For safety and to prevent destroying this equipment , avoid using this device in the following conditions.

CAUTION ⚠

1. When input signals into this equipment , make sure that the voltage is not in excess of the rating to avoid destroying the circuits.
2. Do not attempt to flow the current into output terminal.
3. Be sure to discharge external conductors and cable connectors of their electrical charges with a cable metal part etc , before using them.
   The external conductor and cable line of coaxial cables sometimes act as a condenser and carry static build-up.
4. Before connecting this equipment to other devices , confirm the both input/output level.
5. Connect printers and other peripherals with the MD6430A power off.
6. Do not touch the touch panel with anything other them the pen provided for that purpose , or your finger.
7. Do not attempt to open the cabinet.
   If opening the cabinet causes the performance deterioration , there are some case that reject maintenance.
8. This equipment's memory backup battery has a life span of seven years.
   When the life span is exceeded, the backup memory information will be lost , and during the power on will not restore the device to its state just before it was previously turned off.
   Replace the battery as soon as possible.

3.2 Connecting to AC Power Supply

To operate the MD6430A with the AC/DC adaptor of an supplied accessory or charge the built-in battery, connect the DC plug of the AC/DC adaptor to the DC plug jack of the MD6430A as follows:

[1]Turn off the power switch on the upper left of the left side panel.
[2]Plug the power cord to the AC/DC adaptor.
[3]Attach the DC plug of the AC/DC adaptor to the DC plug jack on the left side panel of the MD6430A.

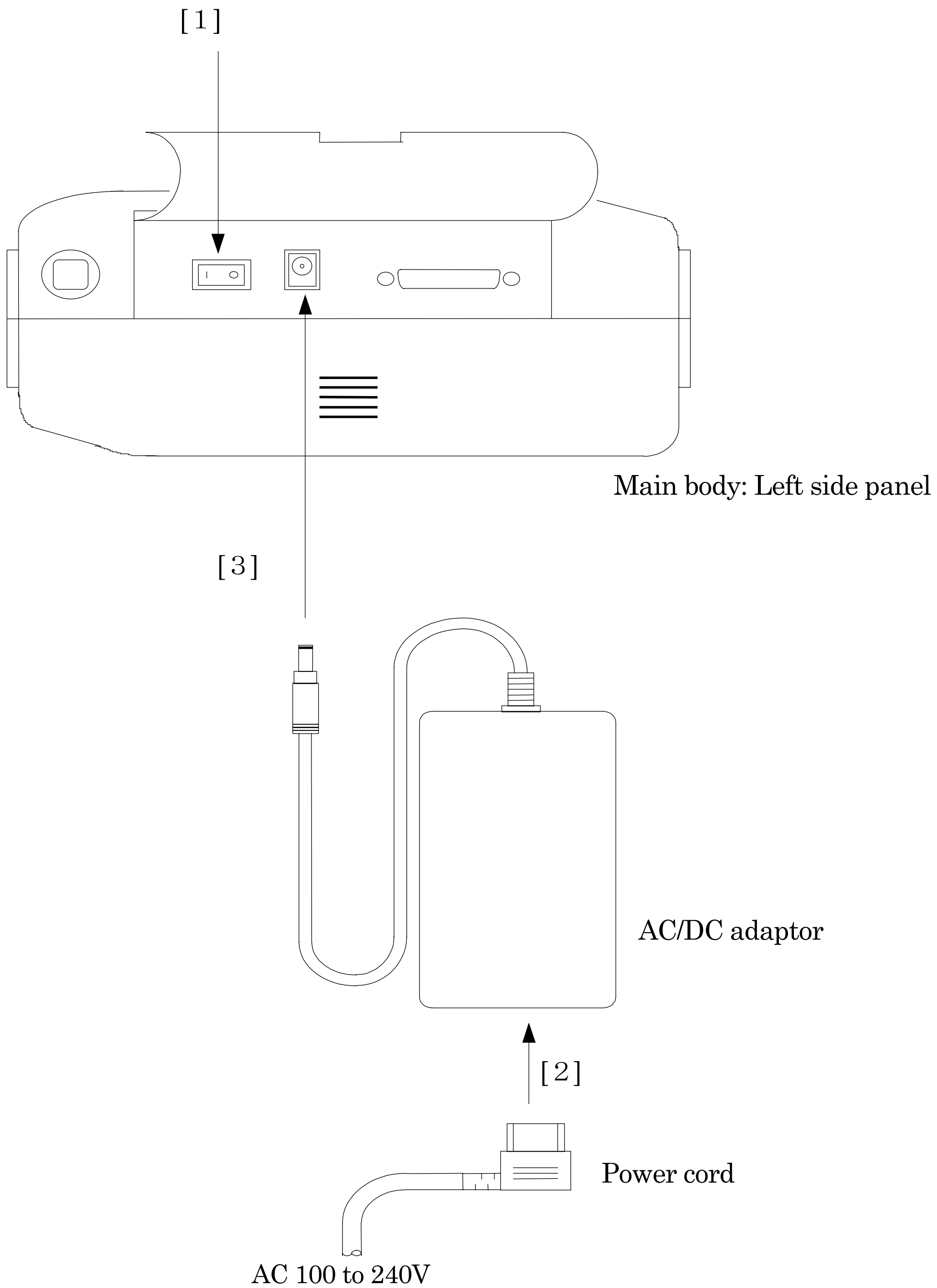


Fig. 3.2-1 Connecting to AC Power Supply

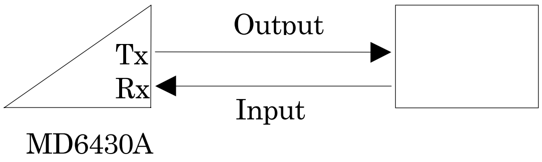
3.3 Connecting Cables

3.3.1 I/O form

The MD6430A has three I/O types, which you can select depending on use. Connection examples are as follows:

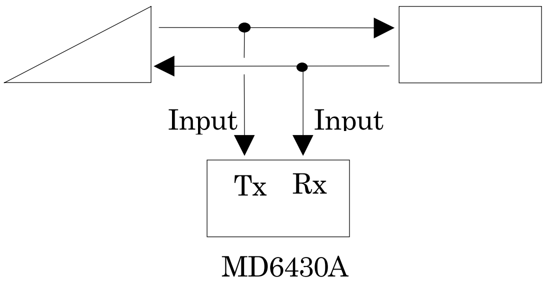
- **1Out / 1In**

Sets Tx to output and Rx to input.



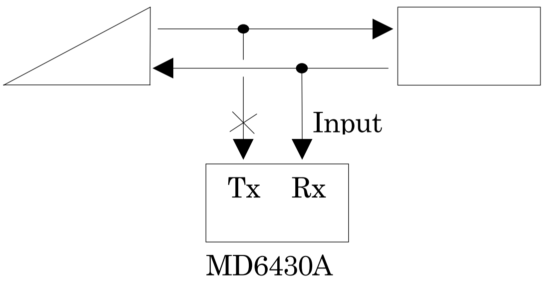
- **2In**

Sets both Tx and Rx to input.



- **1In**

Sets Rx to input. Tx is not used for output



According to each I/O type, connects each interface on the top panel of the MD6430A to each test circuit line.
Connection by optional accessories is recommended.

3.3.2　Cable connection for 1Out/1In

As to cable connection for 1Out/1In, two types of connection are available: when Tx and Rx use the same interface and when these use different interfaces. For the same interface, one type of cable is used. For different interfaces, two types of cable are required.
In the following examples, connection by one type of cable is shown.

■ **V / X / TTL/CMOS Interface**

To the V/X/TTL/CMOS interfaces, connect the following optional accessories.

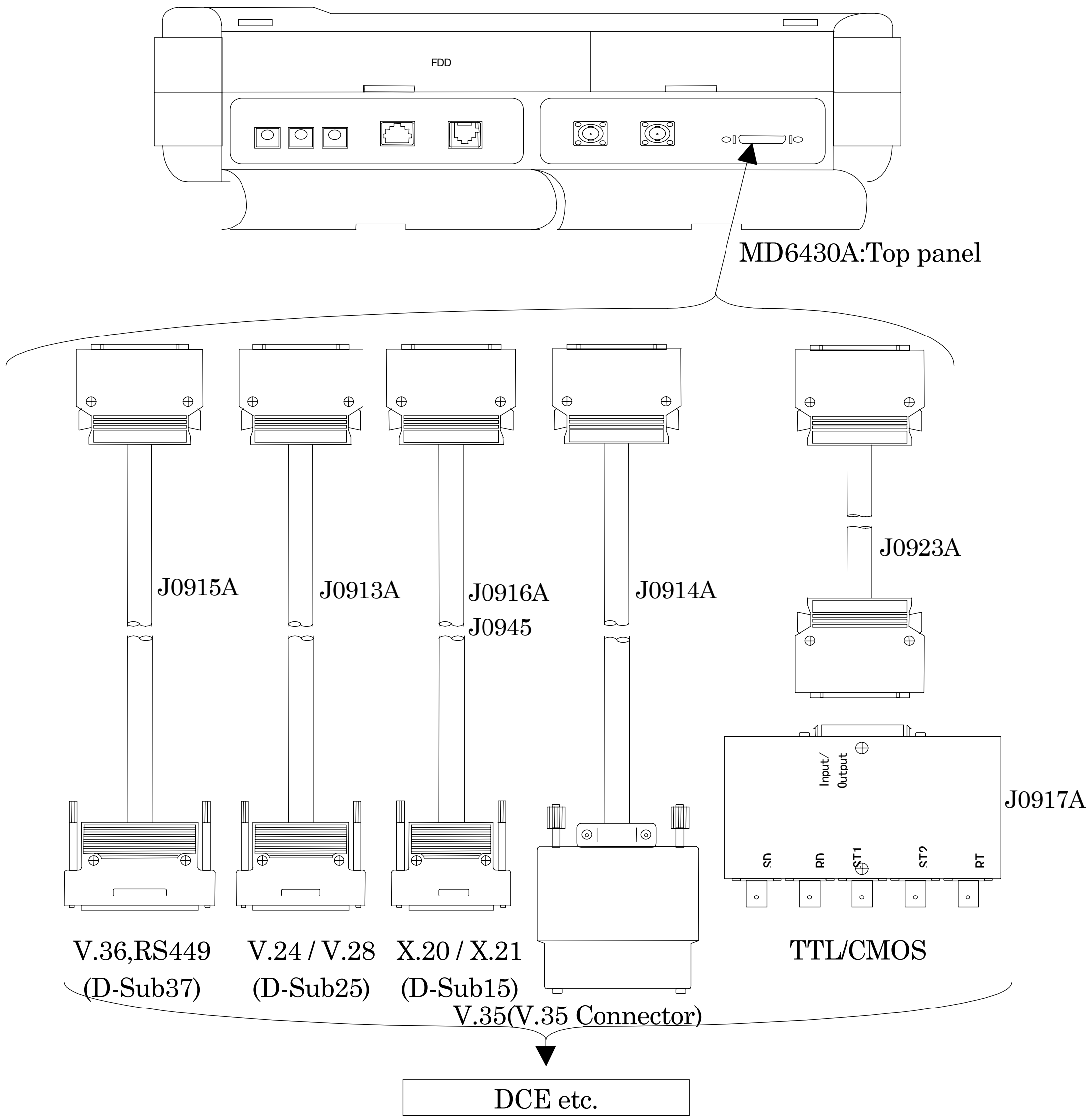


Fig. 3.3-1　Connection to V/X/TTL/CMOS Interfaces

The connector for the V/X/TTL/CMOS interfaces （anphenol half-pitch 36-pin） shares the plural voltage standard.
Avoids to connect that the interface selected with in MD6430A and the interface that measuring objection have are different.
Presents a risk of having a bad influence on the MD6430A and the measuring objection.
If the interface setting of MD6430A is changed, removes the cable from both interfaces.
After the confirm of that both interfaces are same , connects both interfaces with the cable.

■ G.704/I.431 1.544M/2.048M(BAL),G.704 6.312M, I.430/I.430-a 192k Interface

Connection to the following interfaces is shown below.

- G.704/I.431 1.544M and G.704/I.431 2.048 (BAL) interfaces
- G.704/I.431 2.048M (UNBAL) and G.704 6.312M interfaces
- I.430/I.430-a 192k interfaces

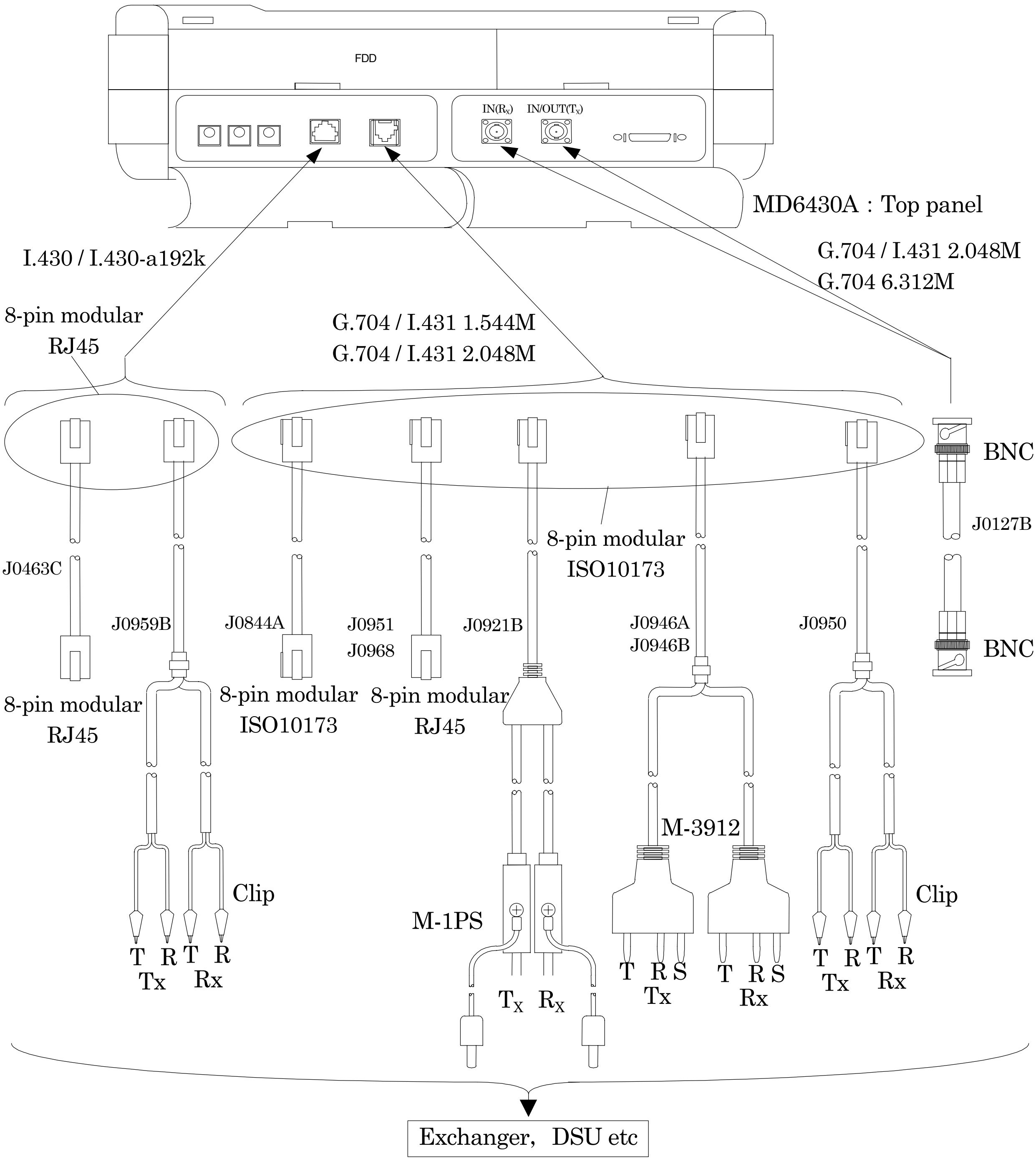


Fig. 3.3-2 Connection to G.704/I.431 1.544M/2.048M (BAL), G.704 6.312M and I.430/I.430-a 192k Interfaces

■ G.703 64k/2M CMI interfaces and 64k+8k external clock

To the G.703 64k/2M CMI interfaces and 64k+8k external clock, connect the following optional accessories.

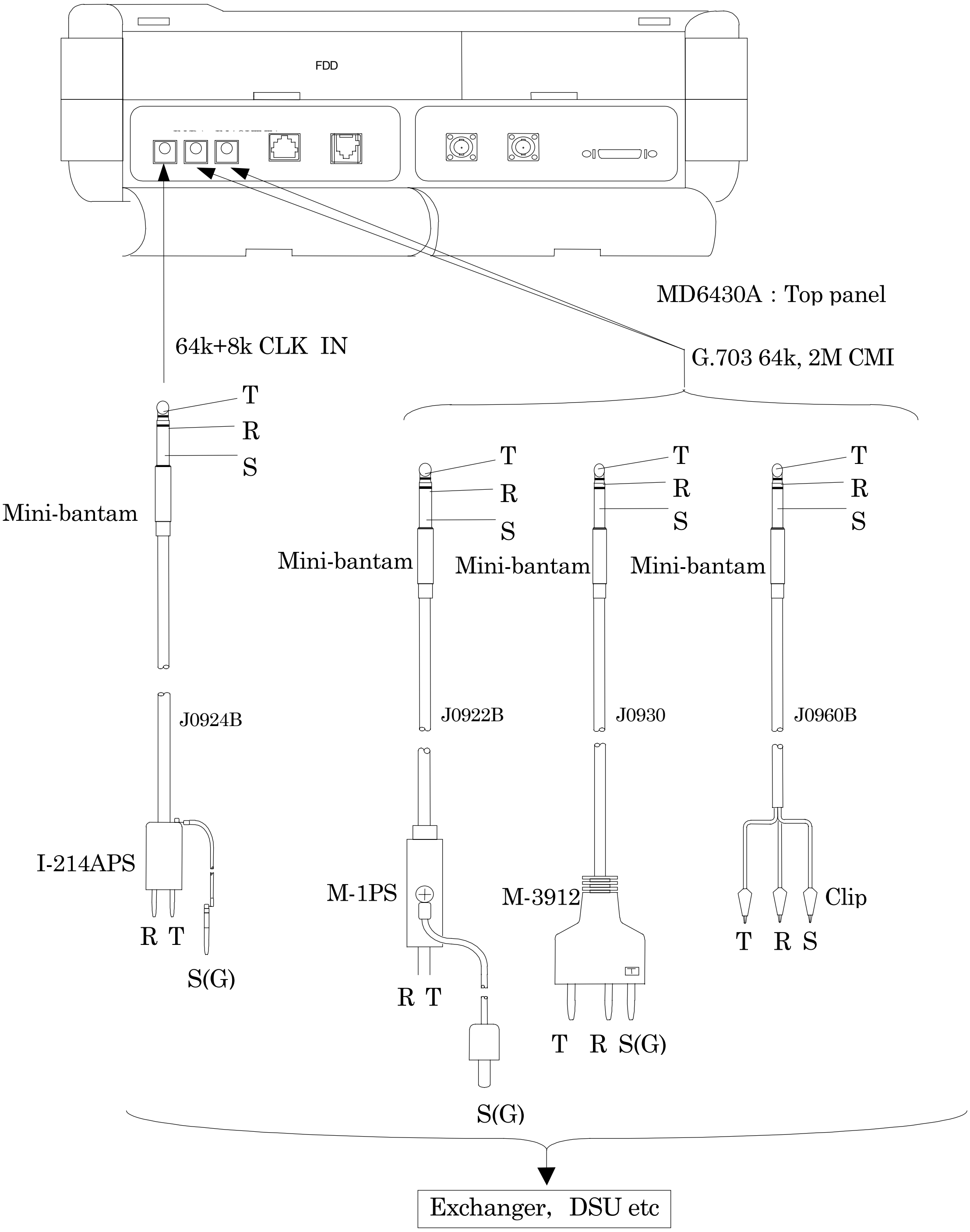


Fig. 3.3-3 Connection to G.703 64k/2M CMI Interfaces and 64k+8k External Clock

3.3.3　Cable connection for 2In or 1In

Measurement by 2In or 1In is suited to monitor Tx/Rx lines of the connected lines being used to transmit/receive.
Examples of connection are shown below.

■ **V / X Interface**

To the V/X interface, connect the following optional accessories.

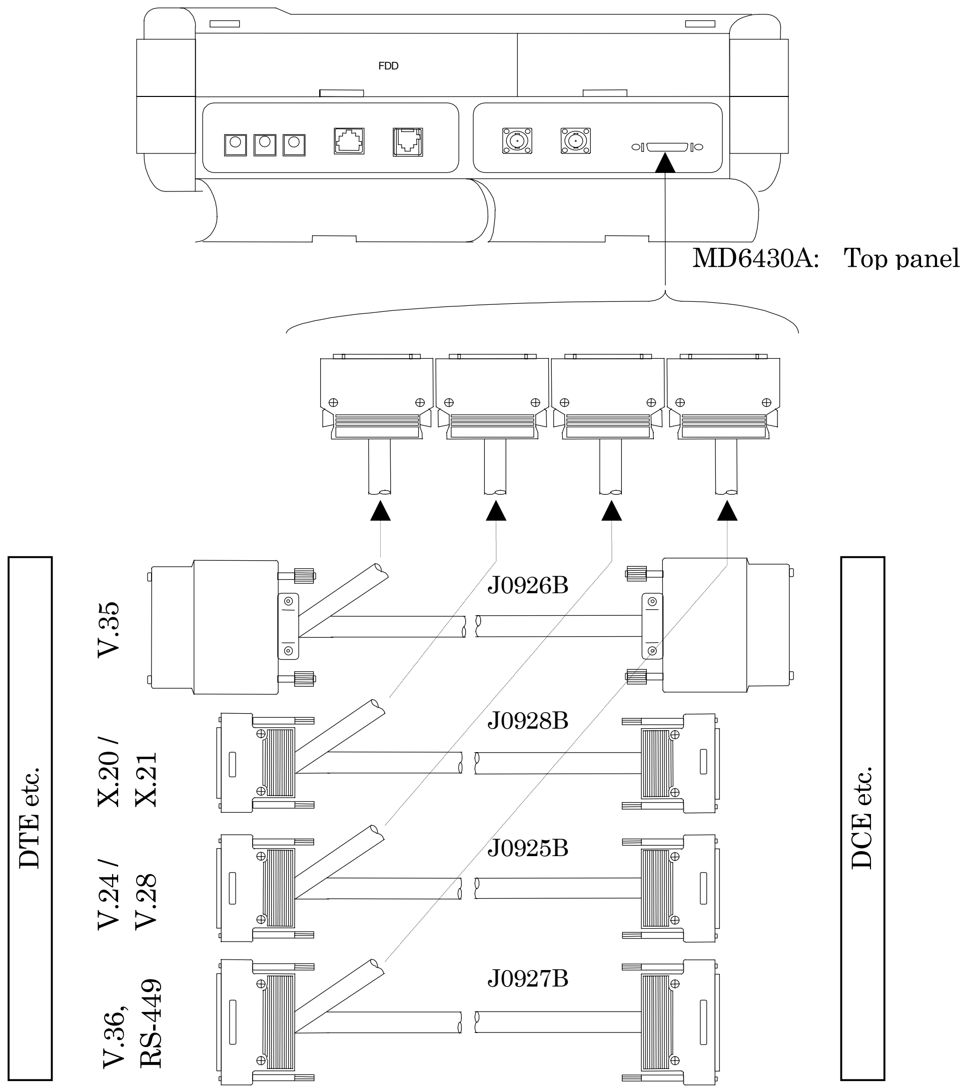


Fig. 3.3-4　Connection to V/X Interface

■ TTL / CMOS Interface

A connection example of the TTL/CMOS interface is shown below.

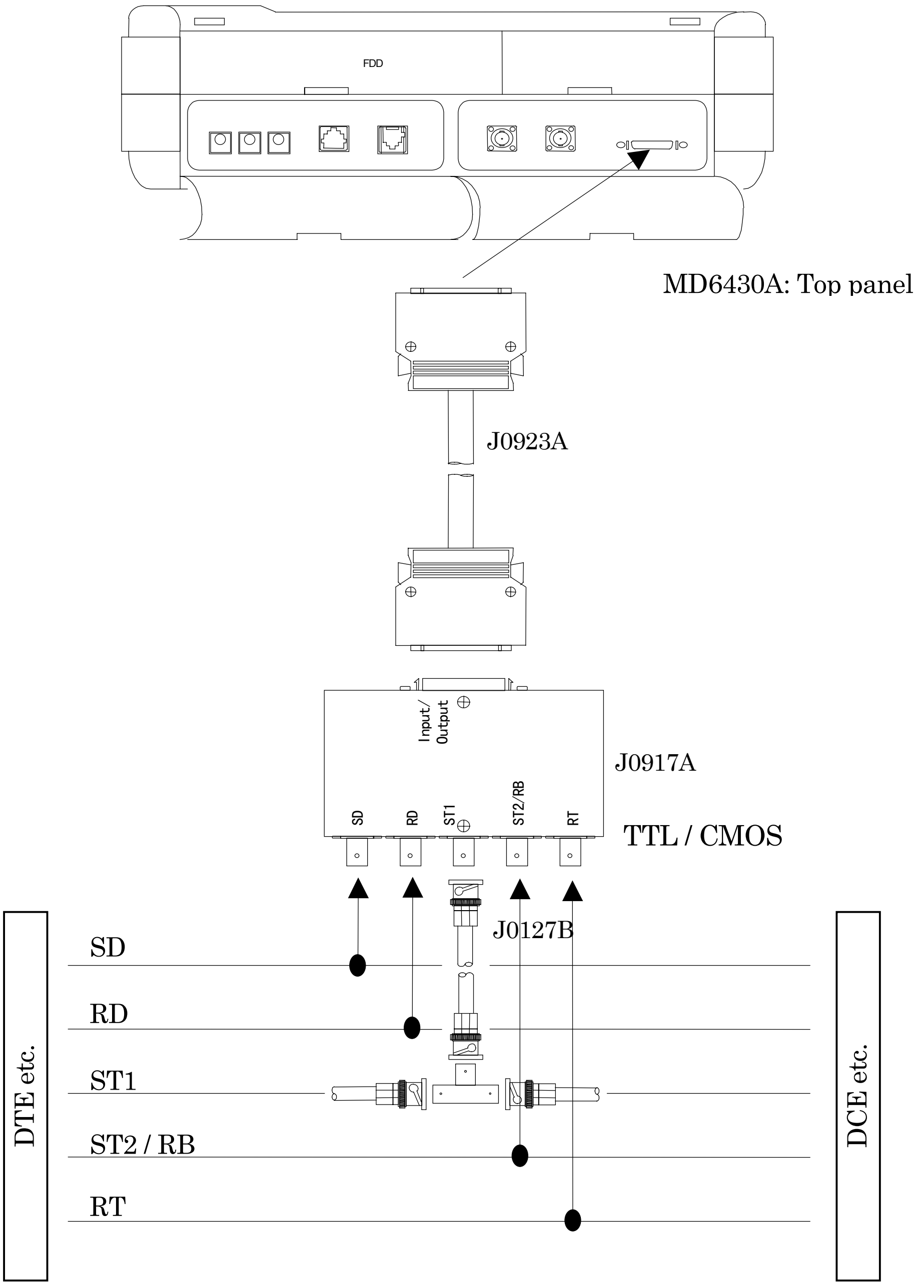


Fig. 3.3-5 Connection to TTL/CMOS Interface

■ I.430/I.430-a 192k, G.704/I.431 1.544M/2.048M (BAL) and G.704 6.312M interfaces

A connection example of the I.430/I.430-a 192k, G.704/I.431 1.544M/2.048M (BAL) and G.704 6.312M interfaces is shown below.

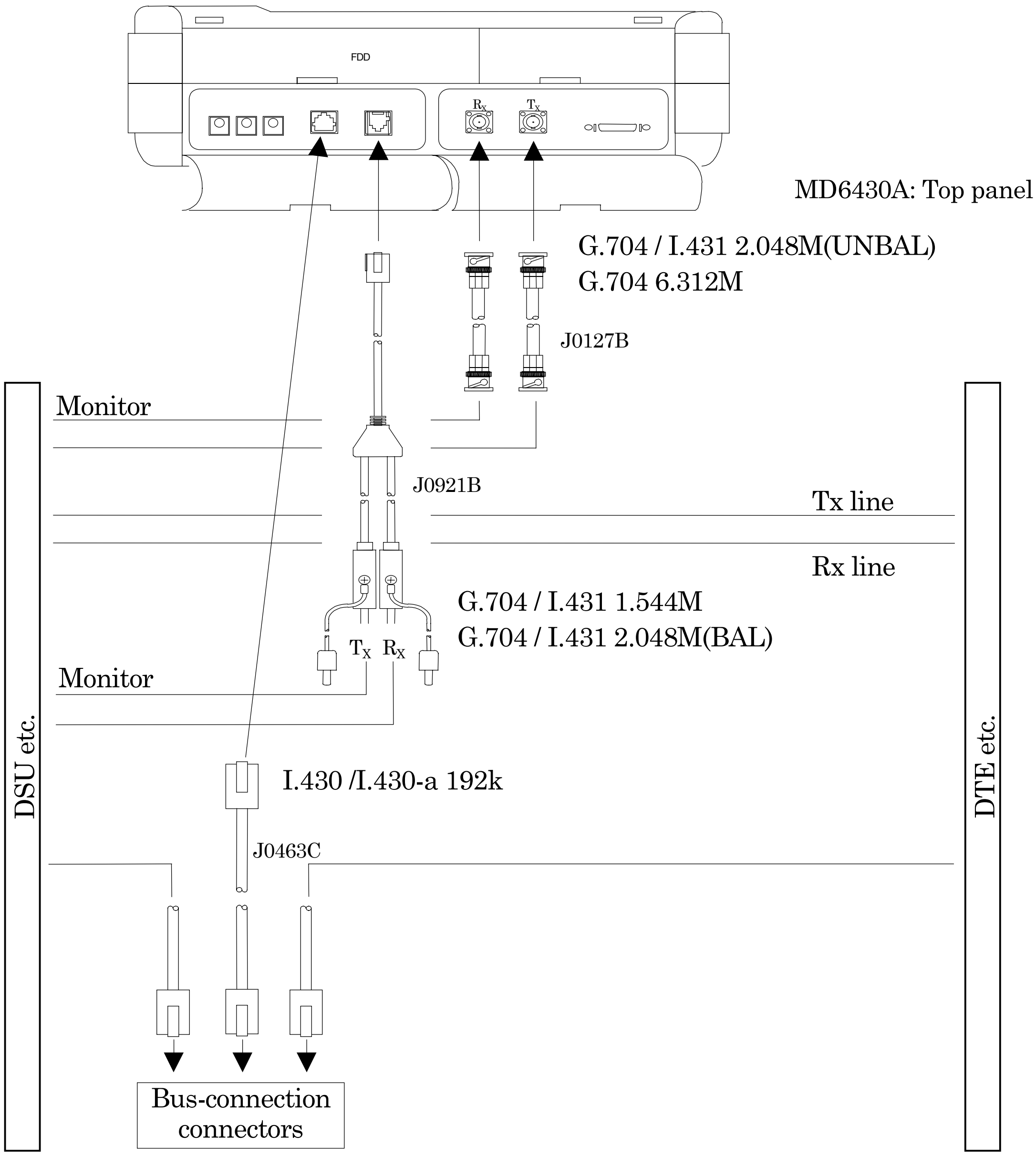


Fig. 3.3-6 Connection to I.430/I.430-a 192k, G.704/I.431 1.544M/2.048M (BAL) and G.704 6.312M Interfaces

■ G.703 64k, 2M CMI Interface

A connection example of the G.703 64k and 2M CMI interfaces is shown below.

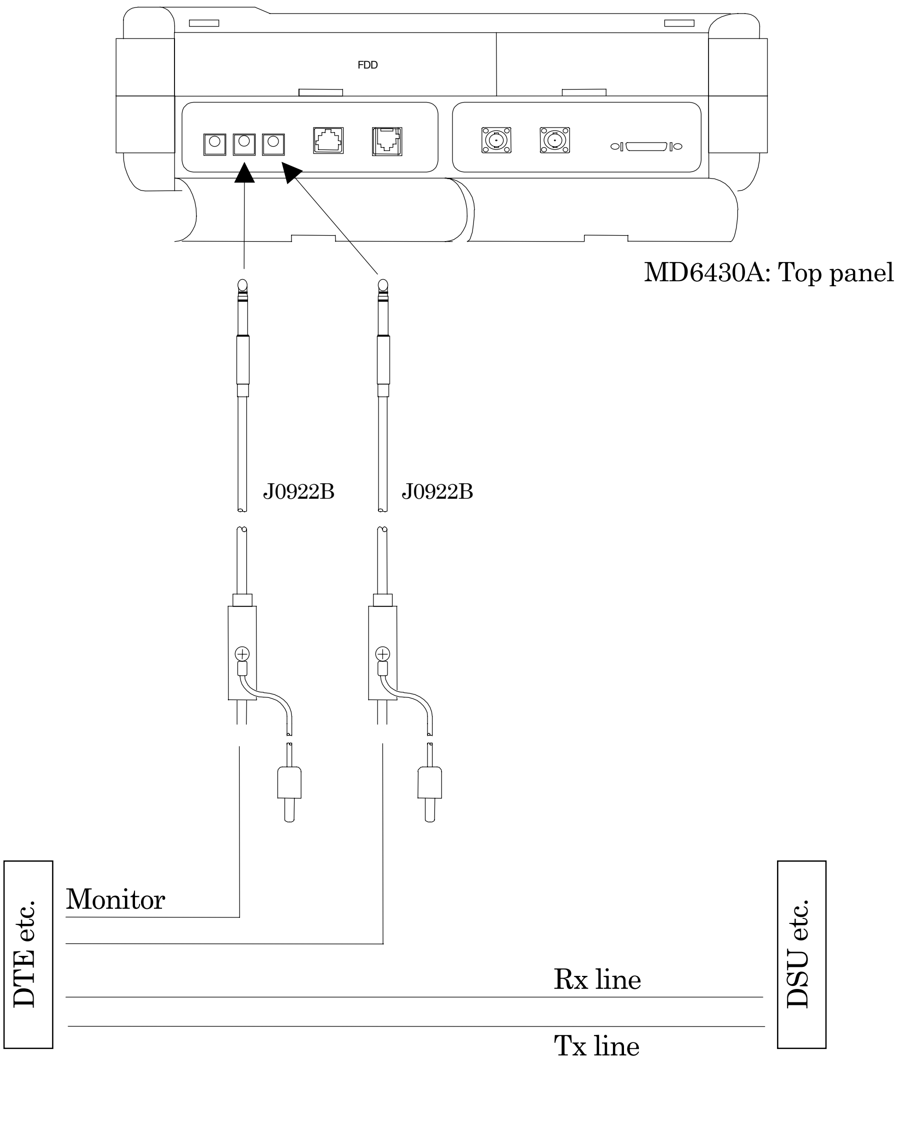


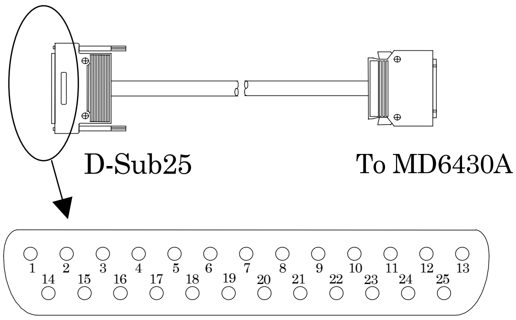
Fig. 3.3-7 Connection to G.703 64k and 2M CMI Interfaces

3.3.4 Pin layout of connector

■ V.24 / V.28 cable (J0913A) pin layout （D-Sub25 connector）

In "No." columns of the following table; numbers at the left indicate pin numbers of the D-Sub25 connector, and numbers at the right indicate those of the MD6430A main-frame connector.

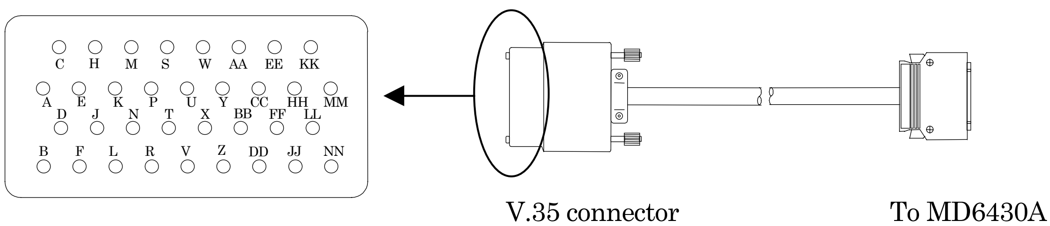
No.	Name	No.	Name	No.	Name
1-1	FG	10	-	19	-
2-3	SD	11	-	20-11	ER
3-5	RD	12	-	21-13	RLB
4-6	RS	13	-	22-14	CI
5-8	CS	14	-	23	-
6-10	DR	15-4	ST2	24-15	ST1
7-36	SG	16	-	25-16	TI
8-12	CD	17-7	RT		
9	-	18-9	LLB		



■ V.35 cable (J0914A) pin layout (V.35 connector)

In "No." columns of the following table; numbers at the left indicate pin numbers of the V.35 connector, and numbers at the right indicate those of the MD6430A main-frame connector.

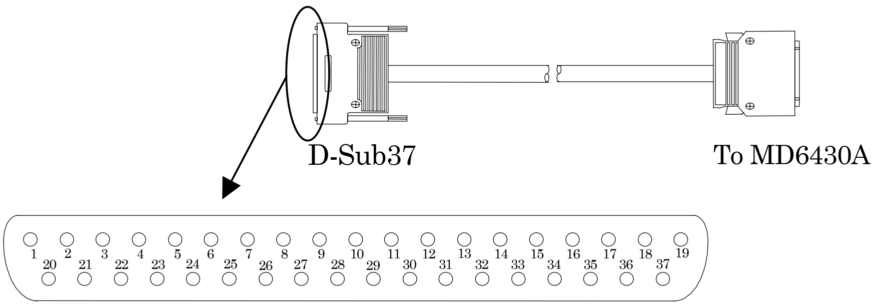
No.	Name	No.	Name	No.	Name	No.	Name
A-1	FG	L-9	LLB	W-33	ST1B	FF	-
B-36	SG	M	-	X-25	RTB	HH	-
C-6	RS	N-13	RLB	Y-4	ST2A	JJ	-
D-8	CS	P-3	SDA	Z	-	KK	-
E-10	DR	R-5	RDA	AA-22	ST2B	LL	-
F-12	CD	S-21	SDB	BB	-	MM	-
H-11	ER	T-23	RDB	CC	-	NN-16	TI
J-14	CI	U-15	ST1A	DD	-		
K	-	V-7	RTA	EE	-		



■ V.36 / RS449 cable (J0915A) pin layout (D-sub37 connector)

In "No." columns of the following table; numbers at the left indicate pin numbers of the D-sub37 connector, and numbers at the right indicate those of the MD6430A main-frame connector.

No.	Name	No.	Name	No.	Name	No.	Name
1-1	FG	11-10	DR	21	-	31	-
2	-	12-11	ER	22-21	SDB	32	-
3	-	13-12	CD	23-22	ST2B	33	-
4-3	SDA	14-13	RLB	24-23	RDA	34	-
5-4	ST2A	15-14	CI	25	-	35	ST1B
6-5	RDA	16	-	26	RTB	36	-
7-6	RS	17-15	ST1A	27	-	37	-
8-7	RTA	18-16	TI	28	-		
9-8	CS	19-36	SG	29	-		
10-9	LLB	20		30	-		

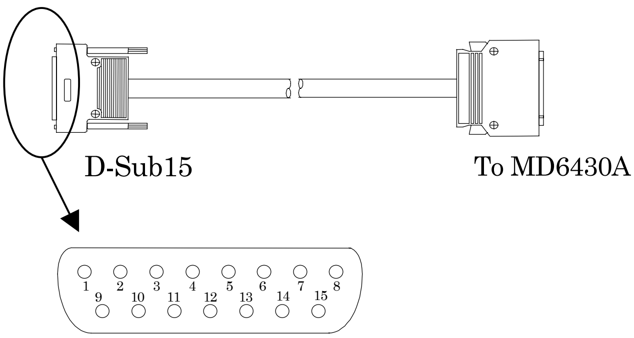


■ X.20 (RS423) cable (J0916A/J0945) pin layout (D-sub15 connector)

In "No." columns of the following table; numbers at the left indicate pin numbers of the D-sub15 connector, and numbers at the right indicate those of the MD6430A main-frame connector.

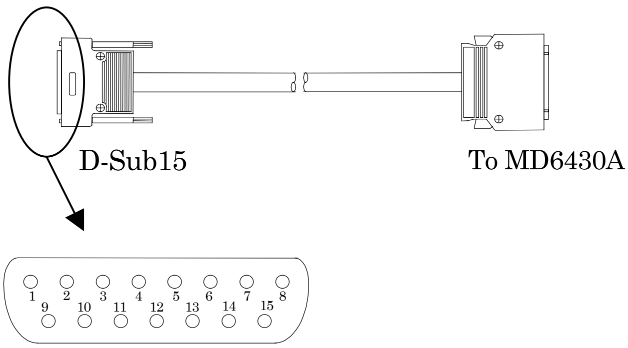
J0916A, J0945

No.	Name	No.	Name
1-1	FG	9-21	GA
2-3	T	10	-
3	-	11-23	GB
4-5	R	12	-
5	-	13	-
6	-	14	-
7	-	15	-
8-36	SG		



■ X.21 (RS422) cable (J0916A/J0945) pin layout (D-sub15 connector)

In "No." columns of the following table; numbers at the left indicate pin numbers of the D-sub15 connector, and numbers at the right indicate those of the MD6430A main-frame connector.



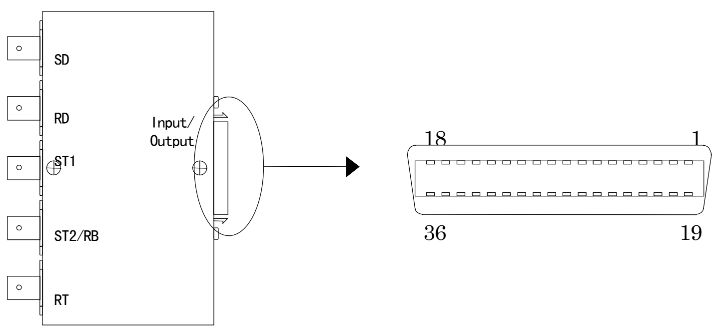
J0916A B terminal ST1 output type

No.	Name	No.	Name
1-1	FG	9-21	TB
2-3	TA	10-24	CB
3-6	CA	11-23	RB
4-5	RA	12-26	IB
5-8	IA	13-25	SB
6-7	SA	14-33	BB
7-15	BA	15	-
8-36	SG		

J0945 B terminal ST2 input type

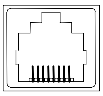
No.	Name	No.	Name
1-1	FG	9-21	TB
2-3	TA	10-24	CB
3-6	CA	11-23	RB
4-5	RA	12-26	IB
5-8	IA	13-25	SB
6-7	SA	14-22	BB
7-15	BA	15	-
8-36	SG		

■ TTL / CMOS pin layout



No.	Name	No.	Name	No.	Name	No.	Name	No.	Name	No.	Name
1	FG	7	-	13	-	19	SD	25	-	31	RD
2	-	8	-	14	-	20	ST1	26	-	32	ST2
3	-	9	-	15	-	21	-	27	-	33	-
4	-	10	-	16	-	22	-	28	-	34	RT
5	-	11	-	17	-	23	-	29	-	35	-
6	-	12	-	18	-	24	-	30	-	36	SG

■ Pin layout of I.430/I.430-a 192k of MD6430A main-frame connector



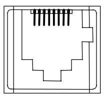
8 1

MD6430A connector

Table 3.3-1 Pin Layout of MD6430A Connector

No.	Function	Polarity	No.	Function	Polarity	No.	Function	Polarity
1	-	-	4	Receive-T	+	7	-	-
2	-	-	5	Receive-R	−	8	-	-
3	Send-T	+	6	Send-R	−			

■ Pin layout of G.704/I.431 1.544M and G704/I.431 2.048M (BAL) of MD6430A main-frame connector



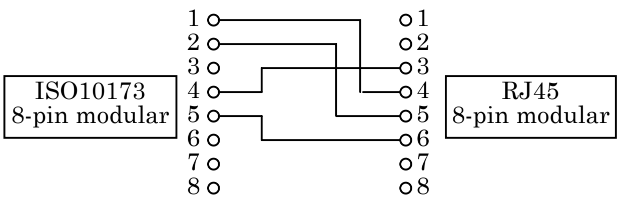
1 8

MD6430A connector

Table 3.3-2 Pin Layout of MD6430A Connector

No.	Function	Polarity	No.	Function	Polarity	No.	Function	Polarity
1	Receive-T	+	4	Send-T	+	7	-	-
2	Receive-R	−	5	Send-R	−	8	-	-
3	-	-	6	-	-			

The connecting line of J0951 balance cable (ISO10173 8-pin modular .-. RJ45 8-pin modular, cross) is as follows.



3.4 Connecting Peripheral Devices

■ Connection Using RS-232C Interface

The RS-232C interface is used to operate the MD6430A by an external controller or to send the protocol monitor data to an external controller.

Connect the external controller to the RS-232C connector on the right side of the MD6430A, as described below.

Make a cross connection between the connector on the MD6430A side with a D-sub 9-pin connector and the one on the external controller side following its specifications.

The connector connection diagram and the connector pin layout are shown below.

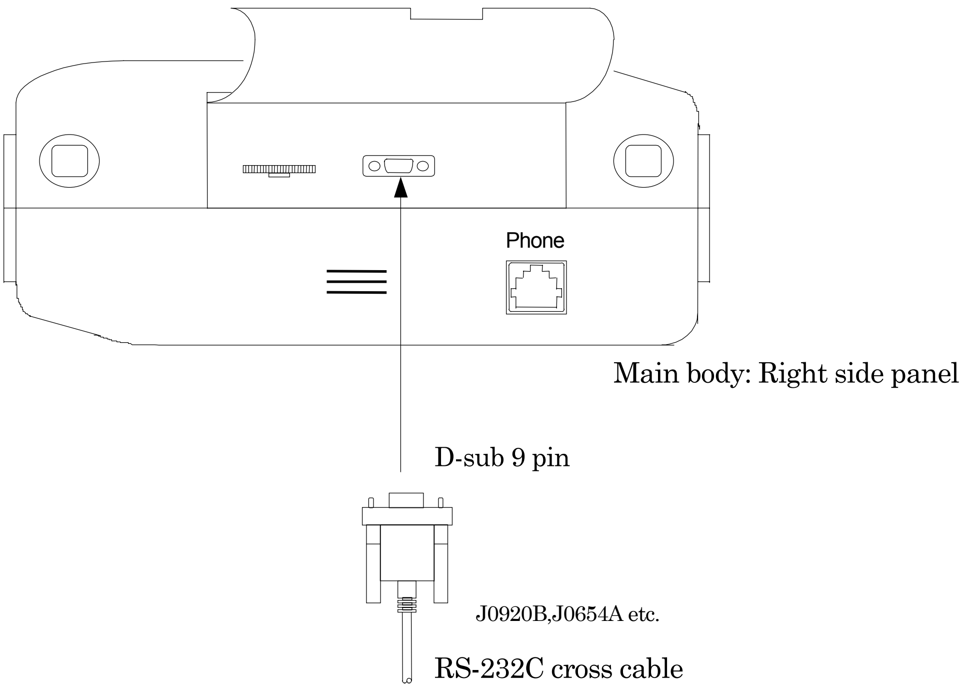
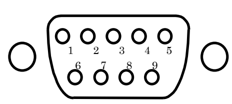


Fig. 3.4-1 Connection Using RS-232C interface

Table 3.4-1 RS-232C Pin Layout

No	I / O	Name	
1	I	DCD(CD)	Carrier Detect
2	I	RXD(RD)	Receive Data
3	O	TXD(SD)	Send Data
4	O	DTR(ER)	Equipment Ready
5	—	SG	Signal Ground
6	I	DSR(DR)	Data Set Ready
7	O	RTS(RS)	Request to Send
8	I	CTS(CS)	Clear to Send
9	—	—	—



■ Connecting Printer

This interface is used to print out measured and analyzed results, information on the screen, and so on.
Connect the printer connector on the left side panel of the MD6430A and a printer with the printer cable, as described below.
The connector connection diagram and the connector pin layout are shown below.

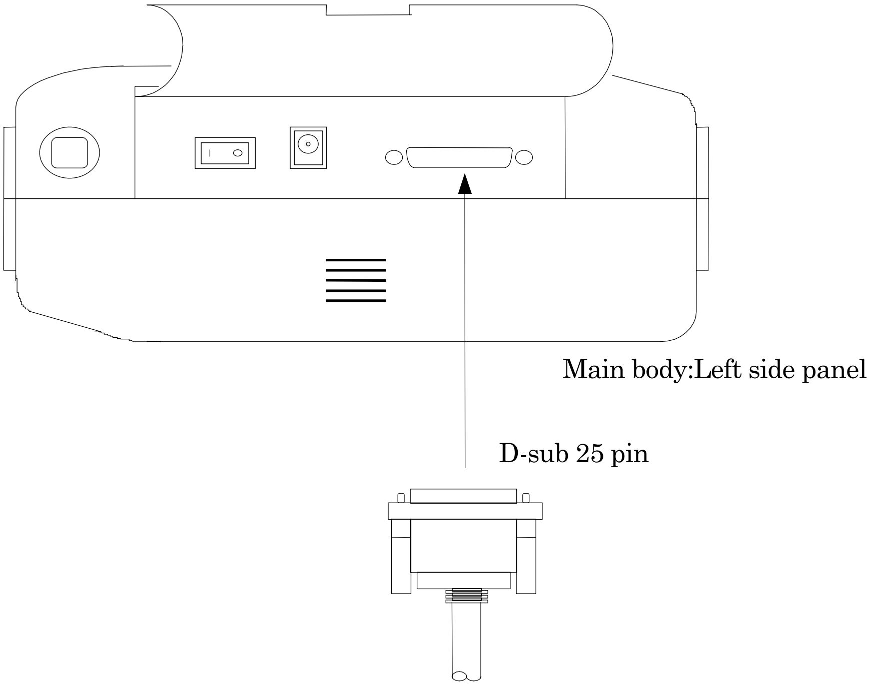
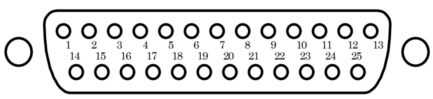


Fig. 3.4-2 Connecting Printer Cable

Table 3.4-2 Pin Layout of Printer Connector

No	I / O	Name	
1	O	STB	Data Strobe
2	O	D0	Pararel Data
3	O	D1	Pararel Data
4	O	D2	Pararel Data
5	O	D3	Pararel Data
6	O	D4	Pararel Data
7	O	D5	Pararel Data
8	O	D6	Pararel Data
9	O	D7	Pararel Data
11	I	BUSY	Busy
12	I	PE	Paper End
15	I	ERROR	Error
18-25	—	SG	Signal Ground
else	—	—	—



■ Connecting Headset

The headset is used to verify voice calls.
Connect the headset to the headset jack on the right side of the MD6430A, as shown below.

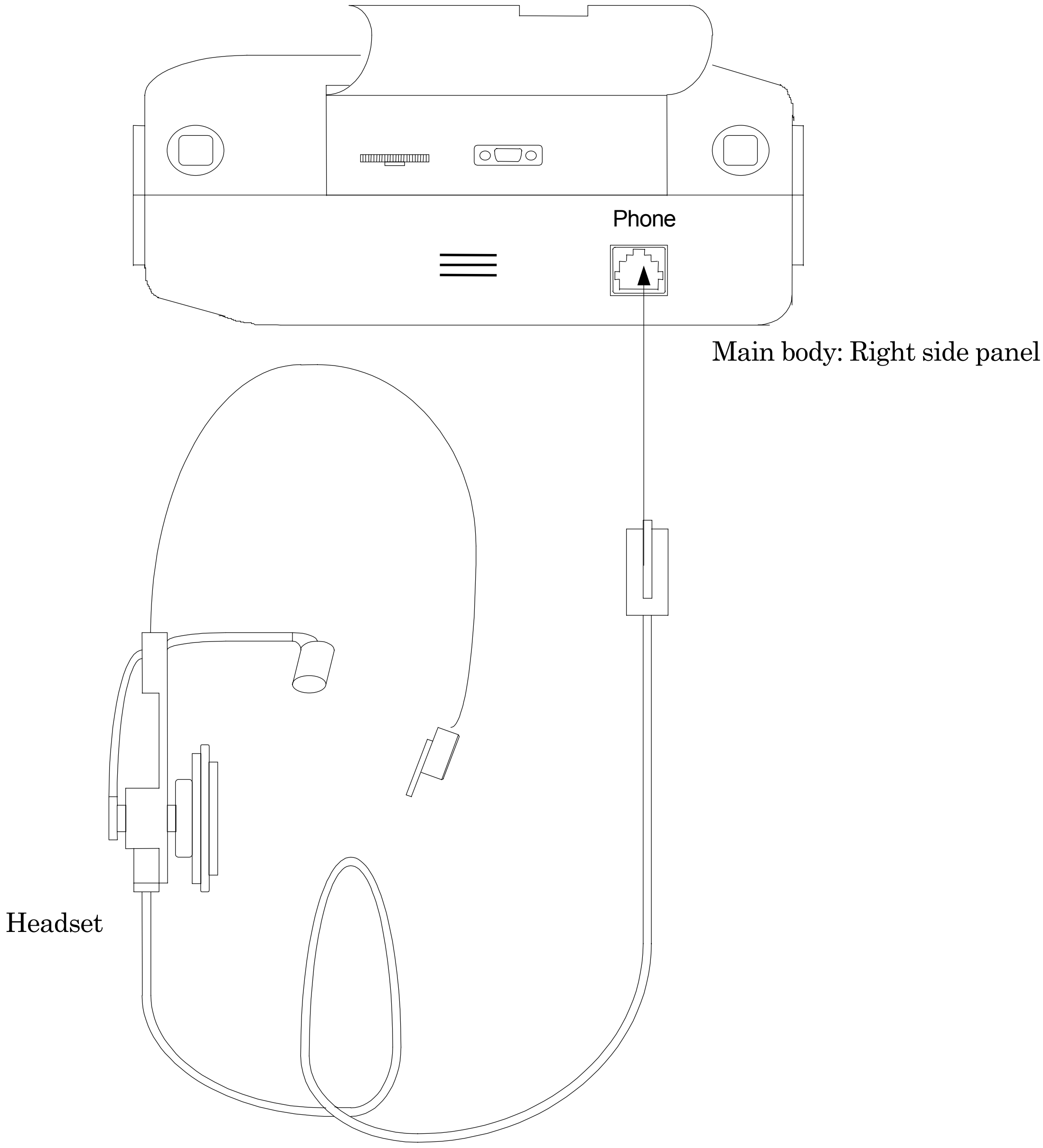


Fig. 3.4-3 Connecting headset

■ Connecting GPIB (Option 01)

The Option 01 is used when the MD6430A is remotely operated from an external controller via GPIB interface, or when the measured data is sent from the MD6430A to the external controller.

The GPIB connector on the upper surface panel is connected to an external controller with exclusive GPIB cable (J1026A).

The connector setup and connector-pin arrangements are shown below.

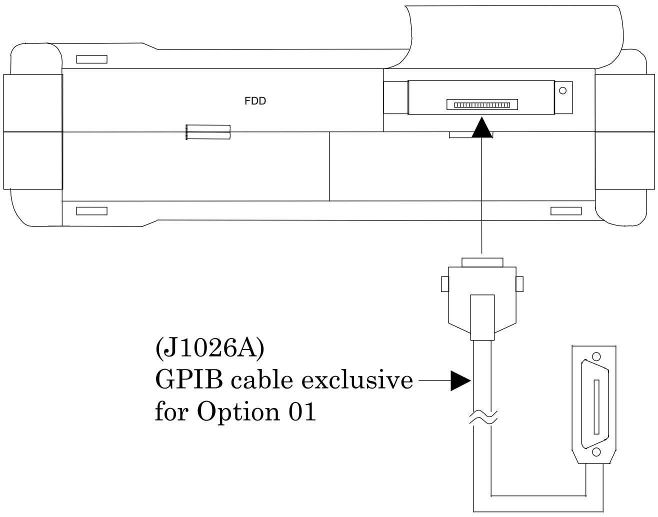
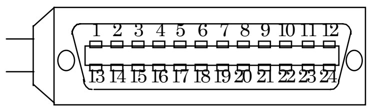


Fig. 3.4-4 Connecting GPIB Cable (Option 01)

Table 3.4-3 GPIB Connector Pin Arrangement

No	Name	No	Name	No	Name
1	DIO1 Data Input Output1	9	IFC Interface Clear	17	REN Remote Enable
2	DIO2 Data Input Output2	10	SRQ Service Request	18	GND
3	DIO3 Data Input Output3	11	ATN Attention	19	GND
4	DIO4 Data Input Output4	12	GND	20	GND
5	EOI END or Identify	13	DIO5 Data Input Output5	21	GND
6	DAV Data Varied	14	DIO6 Data Input Output6	22	GND
7	NRFD Not Ready For Data	15	DIO7 Data Input Output7	23	GND
8	NDAC Not Data Accepted	16	DIO8 Data Input Output8	24	GND



* All signal lines can be used for signal input/output .

3.5 Installation and removal

3.5.1 Installing/Removing unit

The MU643000A/B/C/K unit must be installed or removed in the following procedure.
Indicate the example for is as following.

- **Removing MU643000A/B/C/K unit:**

1. Turn-off the power switch on the left side of the MD6430A.
2. Undo the four case fixing screws that hold the unit case on the rear of the cabinet with a flat-blade screwdriver (these screws cannot be unscrewed).
3. Now, the unit is removed from the MD6430A.

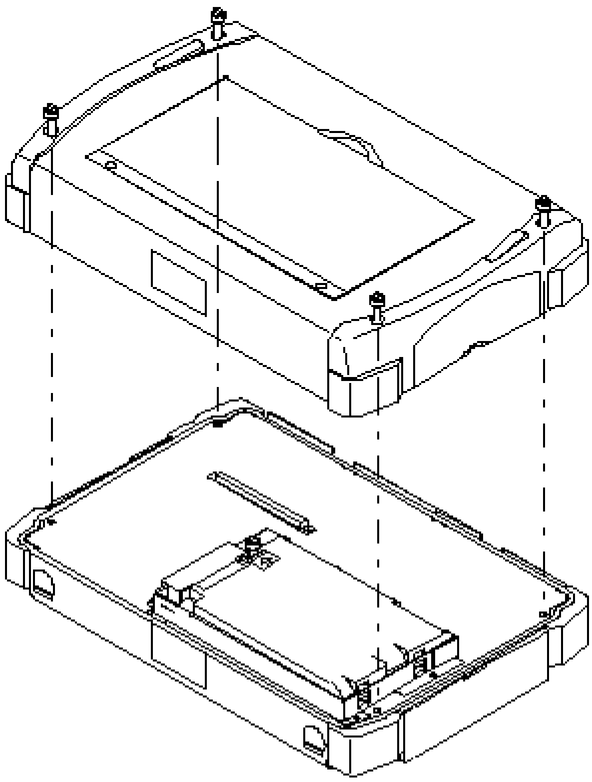


Fig. 3.5-1 Installing/Removing unit

- **Installing MU643000A/B/C/K unit:**

1. Adjust the unit to the cabinet so that the connectors can be connected.
(Take an enough care not to damage the connectors.)
2. With a flat-blade screwdriver, fasten the four unit-case screws onto the rear of the cabinet.

3.5.2 Installing/Removing battery

The battery must be installed or removed in the following procedure.

■ **Installing battery**

1. Turn-off the power switch on the left side of the MD6430A.
2. If the AC/DC adaptor is installed , removes surely.
3. Remove the MU643000A/B/C/K unit from the MD6430A main-frame, following to the procedure described before in the paragraph "Installing/Removing unit".
4. You can see the battery mounting place.
5. Turn the label side of the battery down.
6. Hooks the hollow of the battery on the metal hook of the MD6430A , pushes the part of the arrow mark on the battery lightly below , then receives , the battery.
7. Hooks the metal hook of the connector cover on the hole for the connector cover, then overlays the battery connector.
8. Fasten the screws[6] to fix the connector cover onto the cabinet with a flat-blade screwdriver.

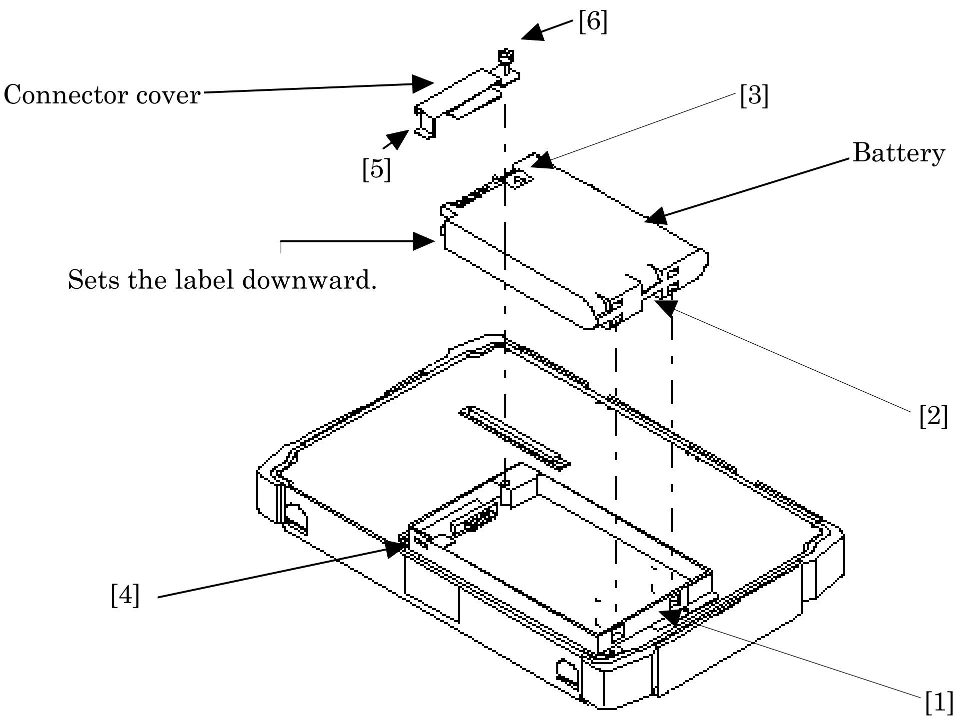


Fig. 3.5-2 Installing/Removing battery

■ Removing battery

1. Turn-off the power switch on the left side of the MD6430A.
2. If the AC/DC adaptor is installed , removes surely.
3. Remove the MU643000A/B/C/K unit from the MD6430A main-frame, following to the procedure described before in the paragraph "Installing/Removing unit".
4. Unscrew the connector cover with a flat-blade screwdriver.
5. Remove the connector cover.
6. Pinch-up the part indicated by an arrow. And then, remove the battery.

3.5.3 Installing/Removing front protection cover

The front protection cover must be installed or removed in the following procedure.

■ Installing protection cover

1. Cover the front panel of the MD6430A over with the protection cover so that the logo "Anritsu" is at the front.
2. Press the cover down until it clicks into place.

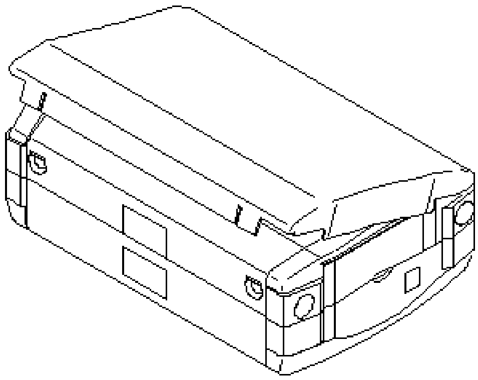


Fig. 3.5-3 Installing/Removing front protection cover

■ Removing protection cover

1. From underneath, uncover the protection cover.

Note: When you lift up the MD6430A covered with the protection cover, be sure to hold both the MD6430A main-frame and the cover.
Otherwise, the MD6430A may slip from the cover, and drop down to the floor.

Section 4 Panel Description

4.1 Front Panel

This section shows a front panel layout of the MD6430A and explains the functions of each part.

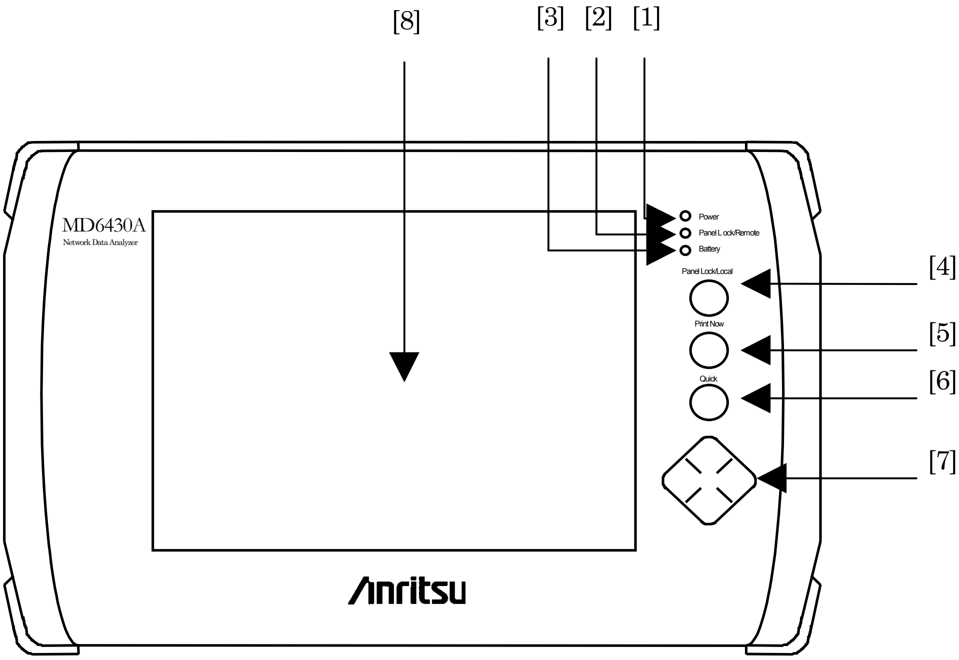


Fig. 4.1-1 Front Panel

Table 4.1-1 Description of Front Panel

No.	Label	Name	Description
[1]	Power	Power-On LED	Lights on (green) when the power is on.
[2]	Panel Lock / Remote	Panel Lock/Remote LED	Lights on (green) when the panel keys are locked or operation is in remote control mode.
[3]	Battery	Battery LED	Shows the state of the battery as follows: On (green) : Normal On (orange) : Charging On (red) : Charging required Flicker(red) : Failure Flicker(orange) : Temperature alarm Off: : Exhausted or no battery
[4]	Panel Lock / Local	Panel Lock/Local key	Sets or releases the panel key lock, or exits remote control mode.
[5]	Print Now	Print Now key	Prints the display on the screen, or forcibly terminates the current printing.
[6]	Quick	Quick key	Calls up the Quick Operation screen.
[7]		Cursor key	Scrolls the screen display.
[8]		Color LCD	A display with a touch panel that displays the set items and measured results.

* : The [4],[5],[6] and [7] keys are generically called Panel key.

4.2 Right Side Panel

4.2.1 MU643000A/B/C/K

This section shows a right panel layout of the MD6430A configured with a built-in MU643000A/B/C/K interface unit, and explains the functions of each part.

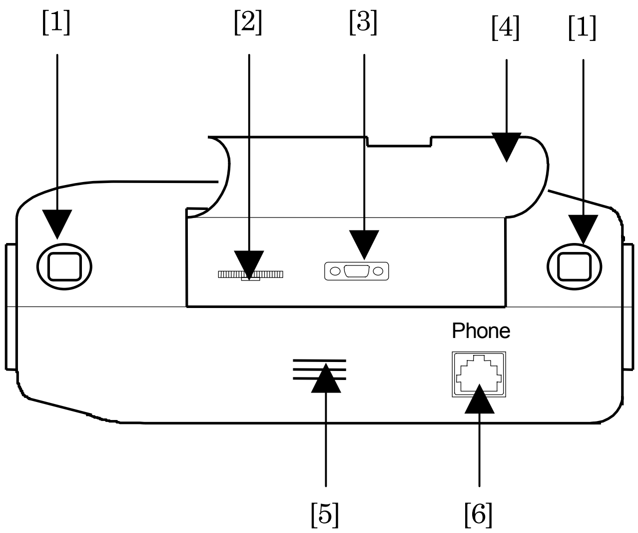


Fig. 4.2-1 Right Side Panel

Table 4.2-1 Description of Right Side Panel

No.	Name	Description
[1]	Rings attaching hook	Rings to which a belt with a portable hook is attached, respectively.
[2]	Contrast adjuster volume	Adjusts the contrast of the screen.
[3]	RS-232C Connector	A connector for connecting the MD6430A to an external controller through the RS-232C interface. The pin layout is shown in the subsection "Connection Using RS-232C Interface" in section "3.4 Connecting Peripheral Devices." Connector: D-sub 9-pin
[4]	Protective cover	A cover for protecting the switches and connectors on the panel.
[5]	Speaker	Outputs the voice created through the voice CODEC function.
[6]	Phone connector	A connection terminal for a headset. Used for voice calls.

4.3 Left Side Panel

4.3.1 MU643000A/B/C/K

This section shows a left panel layout of the MD6430A configured with a built-in MU643000A/B/C/K interface unit, and explains the functions of each part.

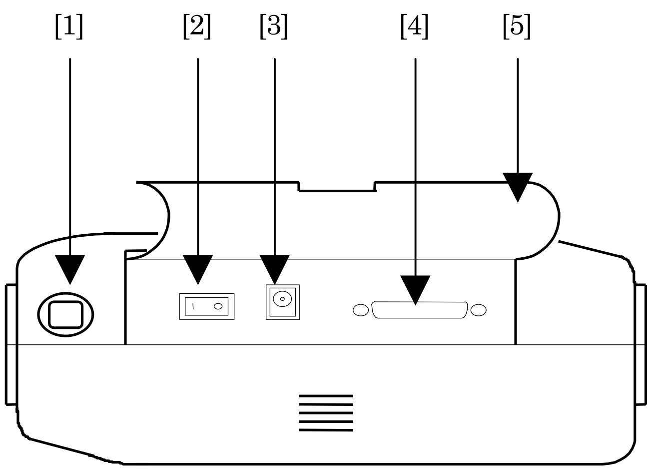


Fig. 4.3-1 Left Side Panel

Table 4.3-1 Description of Left Side Panel

No.	Name	Description
[1]	Rings attaching hook	Ring to which a belt with a portable hook is attached.
[2]	Power switch	A switch for turning on/off the power supply.
[3]	DC power connector	A DC power input connector for using the MD6430A with an external power. Be sure to use the AC/DC adaptor of an supplied accessory of the MD6430A. ⊕–◐–⊖ 24V, Max 70W
[4]	Printer connector	A connector for connecting an external printer. The pin layout is shown in the paragraph "Connecting printer" in section "3.4 Connecting Peripheral Devices." Connector: D-sub 25 pins
[5]	Protective cover	A cover for protecting the switches and connectors on the panel.

4.4 Top Panel

4.4.1 MU643000A/B/C/K

This section shows a top panel layout of the MD6430A configured with a built-in MU643000A/B/C/K interface unit, and explains the functions of each part.

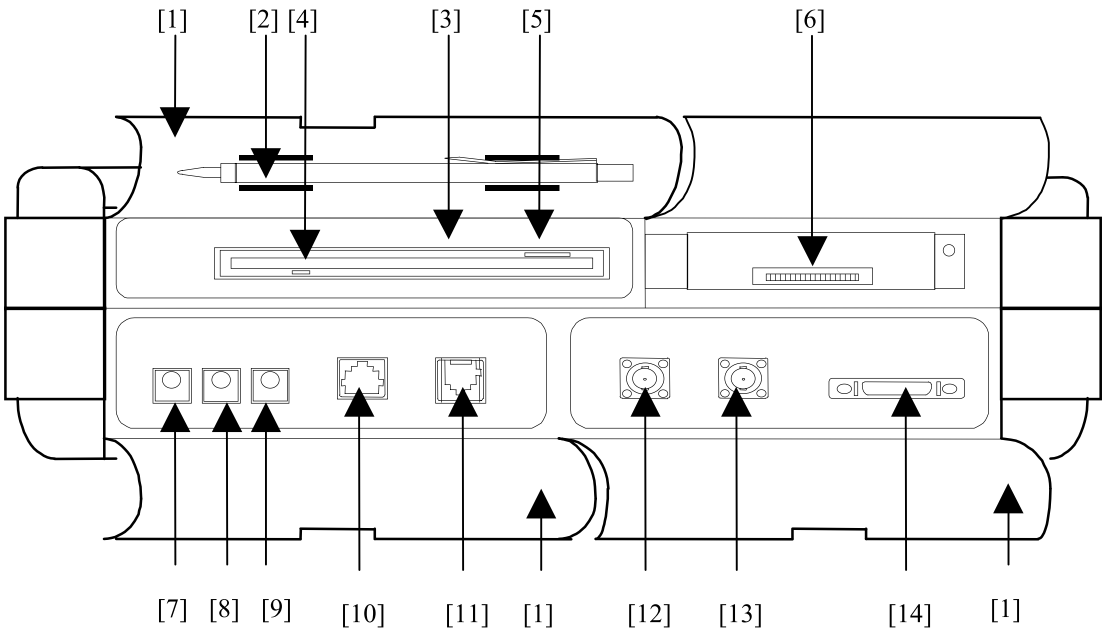


Fig. 4.4-1 Top Panel

Table 4.4-1 Description of Top Panel

No.	Name	Description
[1]	Protective covers	Covers for protecting the switches and connectors on the panel.
[2]	Touch pen holder	A place for putting away a pen to use the touch panel with.
[3]	Floppy disk drive	A drive for a 3.5-inch floppy disk. Able to use a 2HD (1.44 MB) floppy disk.
[4]	Floppy disk drive access LED	Lights on while a floppy disk is being accessed.
[5]	Floppy disk drive eject button	A button for taking a floppy disk out of the drive.
[6]	GPIB connector (Option 01)	A connector for connecting the MD6430A to an external controller by GPIB interface. The connection method is described in "Connecting GPIB (Option 01)" of "3.4 Connecting Peripheral Devices".
[7]	Input connector for 64 k + 8 k external clock	An external input connector for synchronizing the transmi t signal to an external clock. Connector: mini-bantam

No.	Name	Description
[8]	G.703 64 k, 2 M CMI interface input connector	Conforms to the G.703 64k and TTC 2.0M(CMI) interfaces. Used as an input terminal. Connector: mini-bantam 110 Ω
[9]	G.703 64 k, 2 M CMI interface input connector	Conforms to the G.703 64k and TTC 2.0M(CMI) interfaces. Used as an input or output terminal, depending on the settings. Connector: mini-bantam 110 Ω
[10]	I.430/I.430-a 192 k interface connector	Conforms to the JT-I.430 and I.430-a ISDN 192k interfaces. Connector: 8-terminal modular 100 Ω
[11]	G.704/I.431 1.544 M and G.704/I.431 2.048M interface connector	Conforms to the I.431-a/NTT 1.5M and G.704/I.431 2.048M (BAL) interfaces. Connector: 8-terminal modular (1.5M), 100 Ω 8-terminal modular (2M), 120 Ω
[12]	G.704/I.431 2.048 M and G.704 6.312 M interface input connector	Conforms to the G.704/I.431 2.048M(UNBAL) and G.704 6.312M interfaces. Used as an input connector. Connector: BNC 75 Ω
[13]	G.704/I.431 2.048M and G.704 6.312 M interface input/output connector	Conforms to the G.704/I.431 2.048M(UNBAL) and G.704 6.312M interfaces. Used as an input or output connector, depending on the s ettings. Connector: BNC 75 Ω
[14]	V/X/TTL/CMOS interface connector	Conforms to the V.24/V28, V.35, V.36, RS449, X.20/X.21, a nd TTC/CMOS interfaces. To connect to each interface, an appropriate converter of a n optional accessory is required. For connecting to interfaces, see the section "3.2 Connecting Cables." Connector: Amphenol half-pitch 36 pin

CAUTION ⚠

Make sure that the access LED is not turned on when taking out a floppy disk.

4.5 Bottom Panel

4.5.1 MU643000A/B/C/K

This section shows a bottom panel layout of the MD6430A configured with a built-in MU643000A/B/C/K interface unit, and explains the functions of each part.

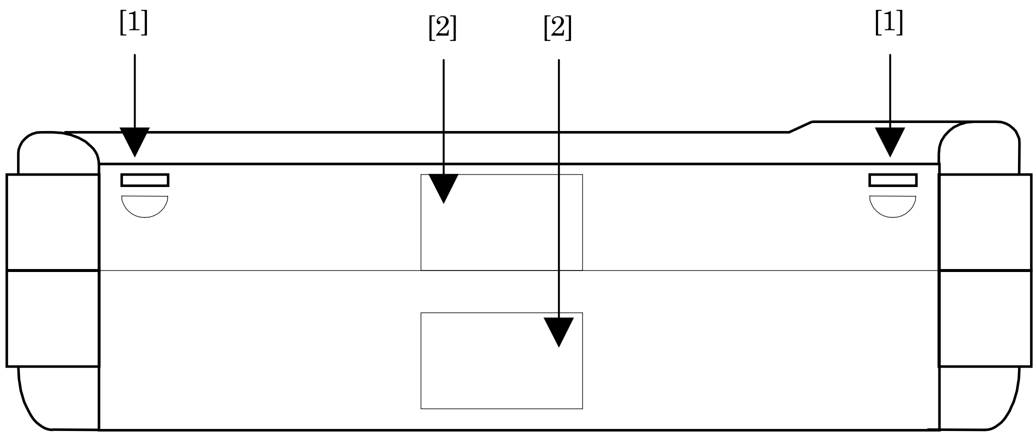


Fig. 4.5-1 Bottom Panel

Table 4.5-1 Description of Bottom Panel

No.	Name	Description
[1]	Holes for attaching front protective cover	Holes for attaching the protective cover at the front panel.
[2]	Name plates	Indicate the serial number and the installed option number of the MD6430A.

4.6 Rear Panel

4.6.1 MU643000A/B/C/K

This section shows a rear panel layout of the MD6430A configured with a built-in MU643000A/B/C/K interface unit, and explains the functions of each part.

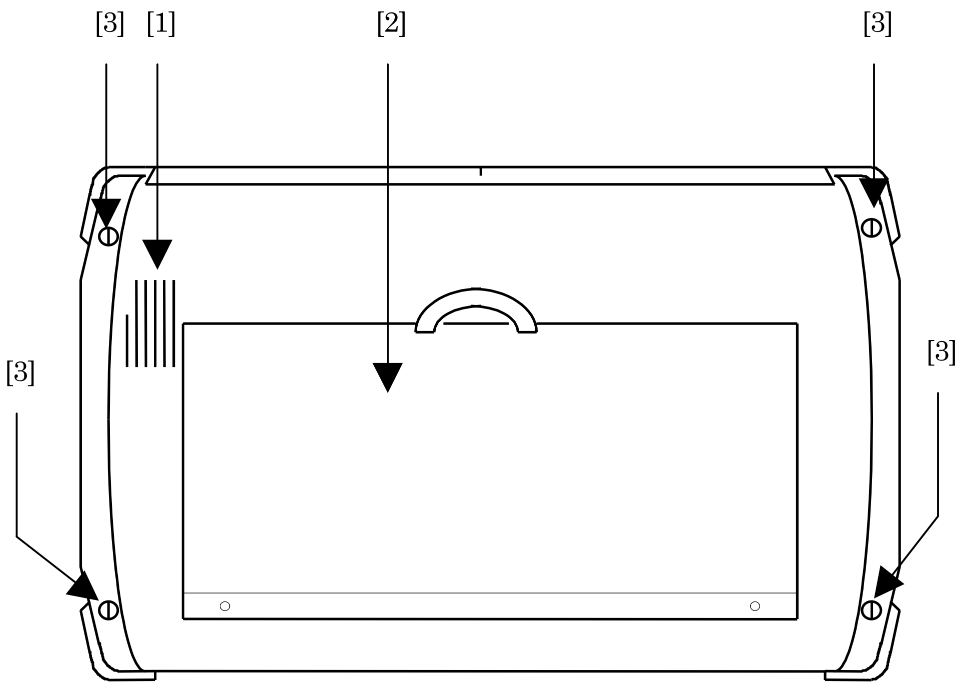


Fig. 4.6-1 Rear Panel

Table 4.6-1 Description of Rear Panel

No.	Name	Description
[1]	Fan	A cooling fan. Do not put anything to block the surface.
[2]	Stand	Used for operating the MD6430A being stood.
[3]	Case fixing screws	Screws for fixing the case to the frame. To open the MD6430A for replacing a battery or unit, follow the instructions in paragraph "3.5.2 Installing and removing battery."

Section 5　Screens

5.1 Screen Configuration (Layer Structure)

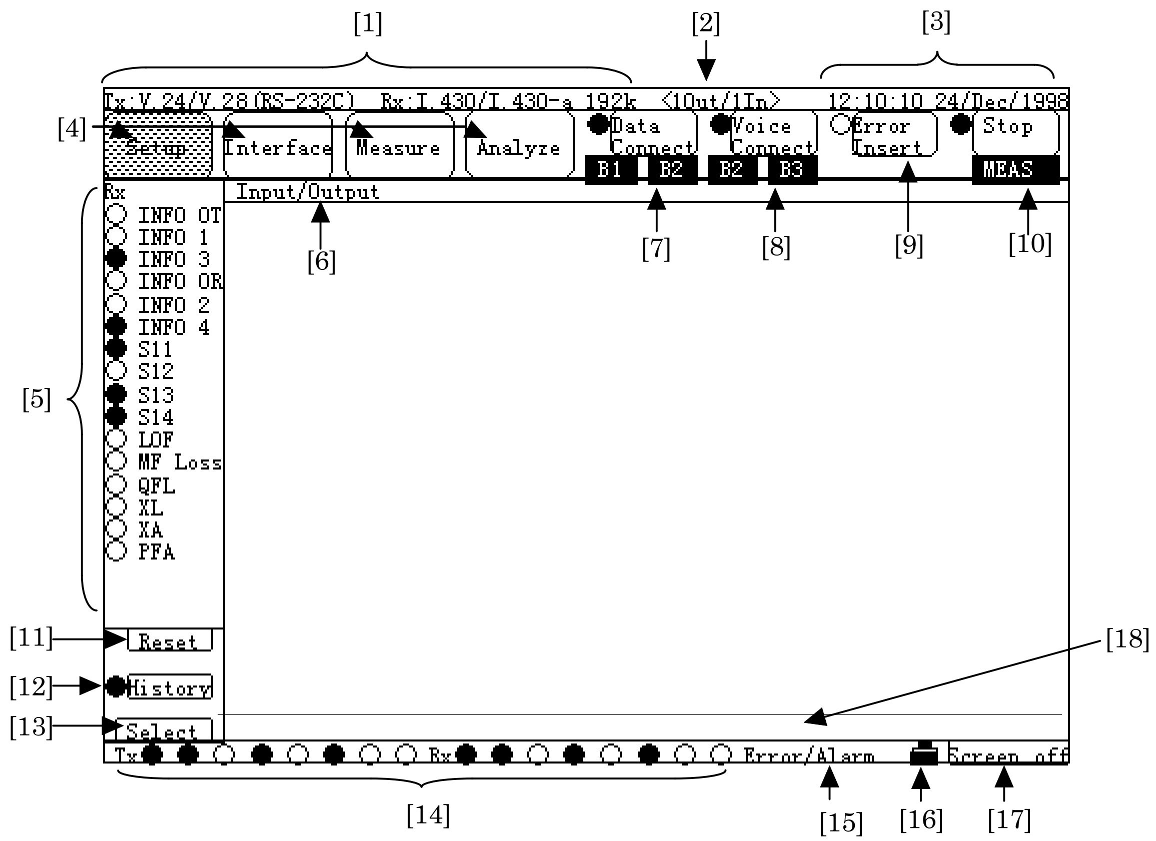
The configuration of main-screens and sub-screens of the MD6430A is shown in the following table.
In this manual, each screen is represented as "main-screen:sub-screen".

Main-screen	Sub-screen	Description	Paragraph No.
Setup	Input/Output	Changes I/O of an interface.	5.2.2.1
	Memory	Saves/recalls the measurement conditions or analysis data.	5.2.2.2
	System	Sets the buzzer sound, timer, sound volume of the speaker, and RS-232C etc..	5.2.2.3
	Print	Sets the printer parameters.	5.2.2.4
	Floppy disk	Saves/recalls the measurement conditions or analysis data into/from a floppy disk.	5.2.2.5
	Selftest	Executes a selftest and displays the result or error code.	5.2.2.6
	Option/Revision	Displays the options included, and model name of the interface unit.	5.2.2.7
Interface	Interface	Sets send/receive interfaces, respectively.	5.2.3.1
Measure	Error/Alarm	Sets the conditions for error/alarm and performance measurements, and displays the result of each measurement.	5.2.4.1
	Frame relay	Sets the conditions for a frame relay measurement and displays the measured result.	5.2.4.2
	Delay	Sets the conditions for a delay time measurement and displays the measured result.	5.2.4.3
	Frequency	Sets the conditions for a frequency measurement and displays the measured result.	5.2.4.4
	Digital level	Sets a digital level measurement and displays the measured result.	5.2.4.5
	Word trace	Sets the conditions for a word trace measurement and edits the PRGM data.	5.2.4.6
Analyze	Error/Alarm	Displays the result of an error/alarm measurement as log data or graph data.	5.2.5.1
	Trace data	Displays the trace data in hexadecimal or binary.	5.2.5.2
	Protocol monitor	Analyzes the protocol of ISDN connection or Frame relay measurement and displays the analyzed results.	5.2.5.3
	Recall	Displays the data saved in the memory or floppy disk.	5.2.5.4

Screen	Description	Paragraph No.
Quick operation	Reads the internal memory.	5.2.6.1
Panel adjust	Adjusts the touch panel.	5.2.6.2

5.2 Description of Each Screen

5.2.1 Common area



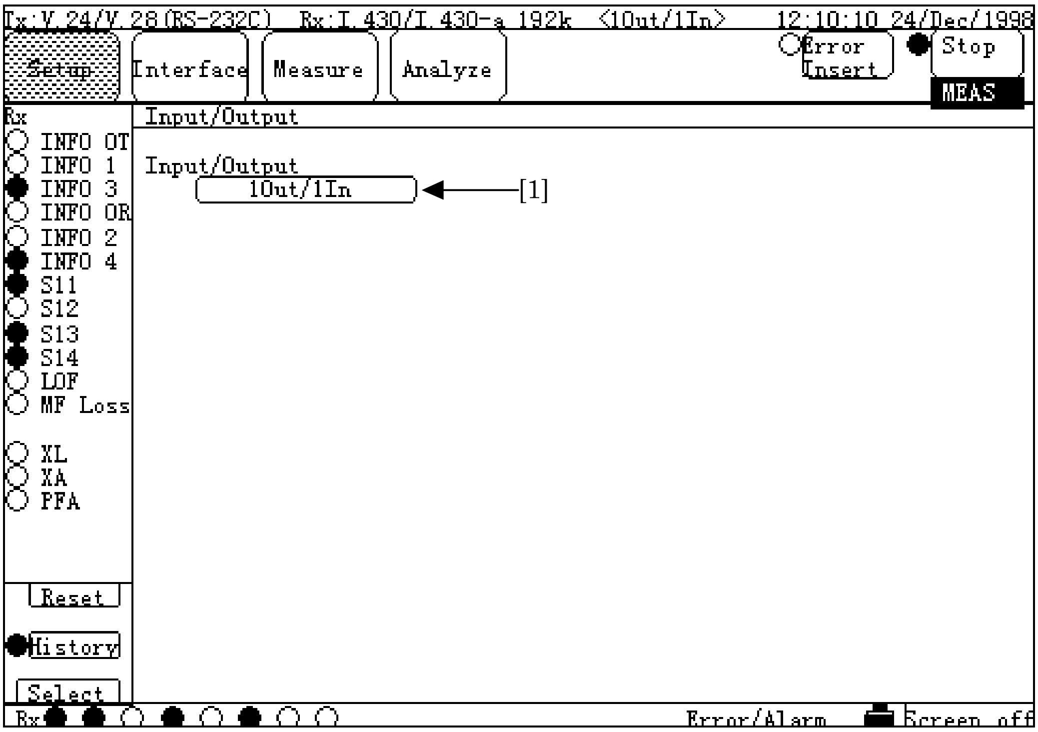
No.	Item	Description
[1]	Tx/Rx	Displays the type of Tx/Rx interfaces. The type can be set on the Interface:Interface screen.
[2]	(Input/ Output)	Displays the state of I/O. The state can be set on the Setup:Input/Output screen.
[3]	(Time/Date)	Displays the time and date. The state can be set on the Setup:System screen.
[4]	(Main - screen)	Selects the main-screen. The main-screen label of the displaying screen turns green.
[5]	(Signal line/ Alarm monitor)	Displays the state of signal line and alarm. For signal line detection, lamp on the left to the label turns green; for alarm detection, lamp turns red.
[6]	(Sub - screen)	Displays the sub-screen being selected.

[7]	Data Connect	Changes call/disconnect for ISDN data. Lamp on the left to the button indicates whether the data is connected or disconnected. Unlights : Not connected Blinks : Trying connection.(Ringing) Lights(Green) : Connected When connected; connected channels, B1 to B31 and H0 are highlighted (calling channels are displayed on the left and called channels are on the right). For details, refer to Section 6. This item can be displayed only when the JT-Q921/Q931 ISDN Signalling /ETSI ISDN Signalling option has been installed.
[8]	Voice Connect	Changes calling/being called/disconnect for ISDN voice. Lamp on the left to the button indicates voice connection, disconnection, or ringing: Unlights : Not connected Blinks : Trying connection. (Ringing) Lights(Green) : Connected When connected; connected channels, B1 to B31 and H0 are highlighted (calling channels are displayed on the left and called channels are on the right). For details, refer to Section 6. This item can be displayed only when the JT-Q921/Q931 ISDN Signalling option has been installed.
[9]	Error Insert Send Start/Stop	In the error/alarm measurement mode; performs error insertion/removal, and displays the state of the error insertion. In the word trace measurement mode, displays the state of the word pattern send/stop. For details, refer to the description of the corresponding Measure screen.
[10]	Start/Stop Trace Start/Stop	Starts or stops the error/alarm, frame relay, delay time, frequency, word trace, or selftest measurement. For details, refer to the description of the corresponding Measure screen.
[11]	Reset	Reset the history of the signal-line/alarm monitor. The one-shot button can be used.
[12]	History	Specifies whether the history of signal-line/alarm monitor is displayed or not (ON/OFF). When the history is displayed, Lamp on the left to the button lights green.
[13]	Select	Changes the Tx-line-monitor/Rx-line-monitor of signal-line/alarm monitor displayed in [5] above.
[14]	Tx/Rx	Displays the Tx/Rx data in a eight-bit unit. When "1Out/1In" or "1In" is displayed in [2], Rx data is displayed.
[15]	(Measurement Item)	Displays the item of measurement being selected.

[16]	(Remaining battery capacity icon)	Displays the rest capacity of the battery. Click this icon to open the window, which indicates the rest capacity of the battery.
[17]	Screen off	Press this button to clear the screen. By pressing the screen or any panel key, the screen is displayed again. This can reduce power consumption and therefore is useful for power saving.
[18]	(Message)	Displays messages if necessary (for example, when a failure occurs or when a function is executing.).

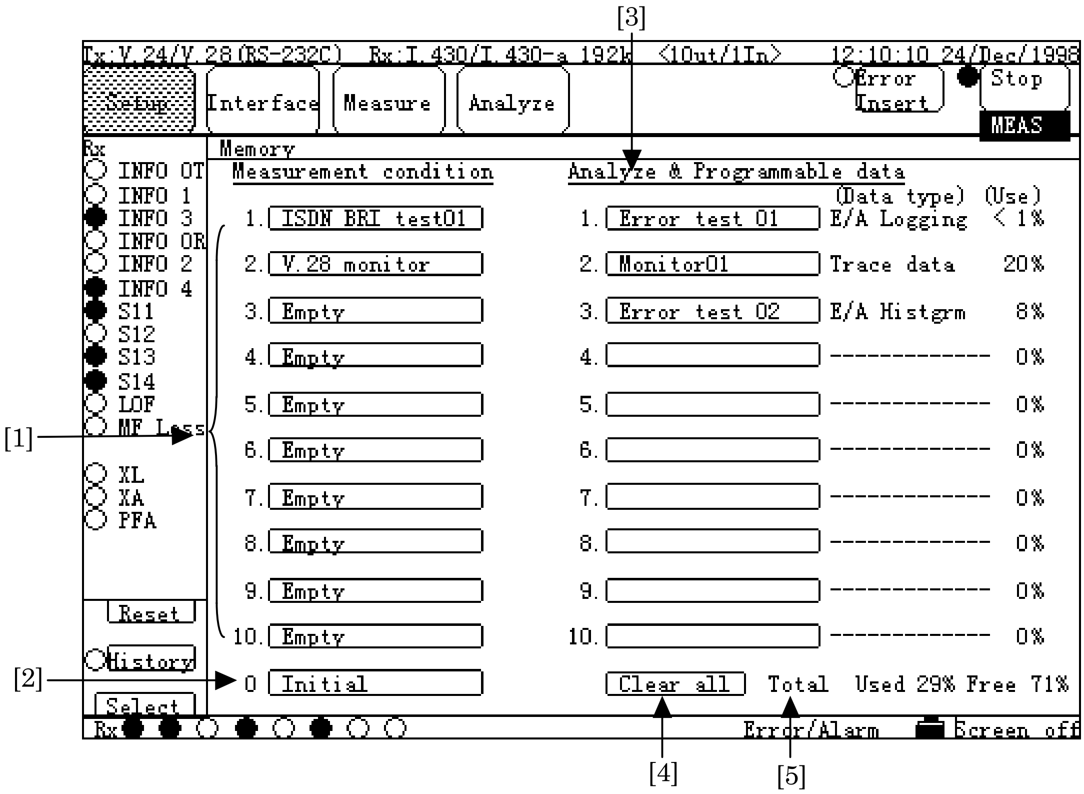
5.2.2 Setup screen

5.2.2.1 Input/Output sub-screen



No.	Item	Description
[1]	Input/Output	Changes the state of I/O: ・1Out/1In : Tx output and Rx input ・1In : Rx input ・ 2In : Tx input and Rx input

5.2.2.2 Memory sub-screen



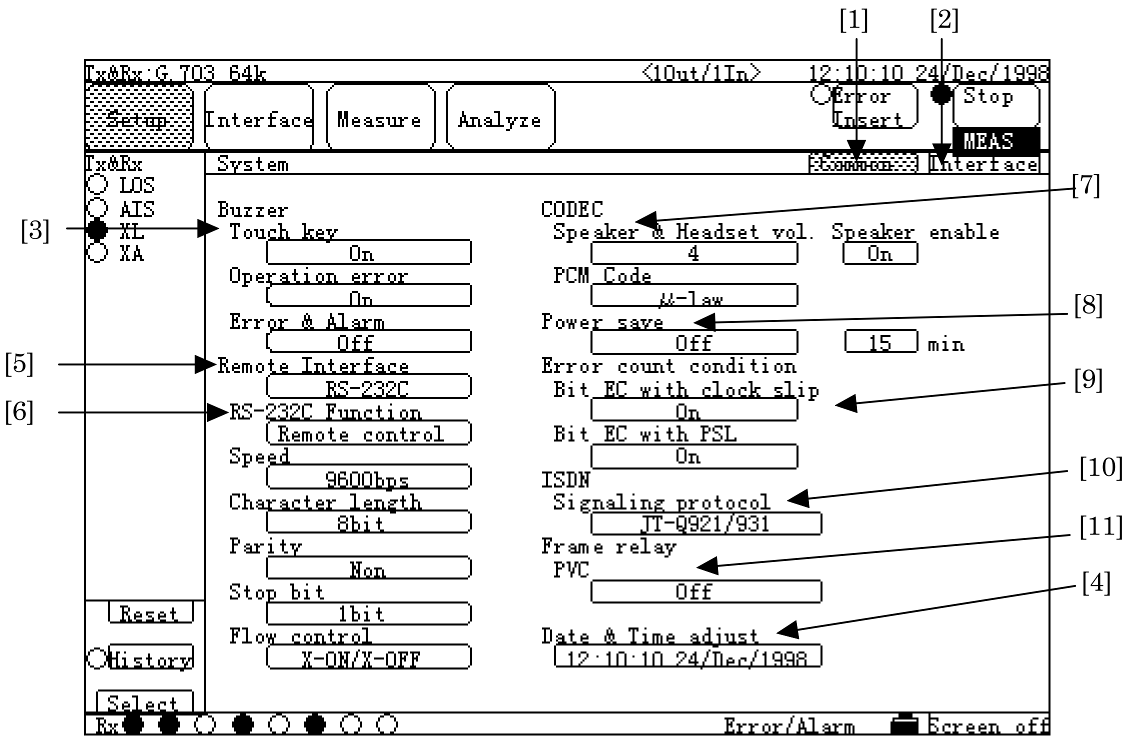
No.	Item	Description
[1]	Measurement condition 1 to 10	Memory to which measurement conditions are saved. Up to ten memory items can be registered. Operations such as store, overwrite, recall, clear, and rename are available. When the memory is empty, the memory name is displayed as "Empty".
[2]	Measurement condition 0 Initial	Special memory to which initial values are saved. This memory can be used for resetting measurement conditions to initial values. This memory is read-only.

[3]	Analyze & Programmable data 1 to 10 (Data type) (Use)	Operations such as hold analysis data/programmable data, rename memory, and delete are available. If "Store" is executed on one of the following screens, data is saved in the order from No.1 memory. ・Measure:Error/Alarm (Character) screen ・Measure:Word trace (PRGM Data) screen ・Analyze:Error/Alarm (Logging) screen ・Analyze:Error/Alarm (Histogram) screen ・Analyze:Trace Data screen ・Analyze:Protocol monitor screen To display the saved data, press a data button from 1 to 10 and then press the "Recall" button, and see the data on the Analyze:Recall screen. Although up to ten memory items can be saved, saving large data reduces the number of savable memory items. Types of saved data are displayed. The used area rate of the memory is displayed.
[4]	Clear all	Clears all of the analysis data and programmable data saved in [3].
[5]	Total	Displays the ratios of used memory and unused memory to total memory.

For details, refer to para. 6.3 "Saving memory".

5.2.2.3 System sub-screen

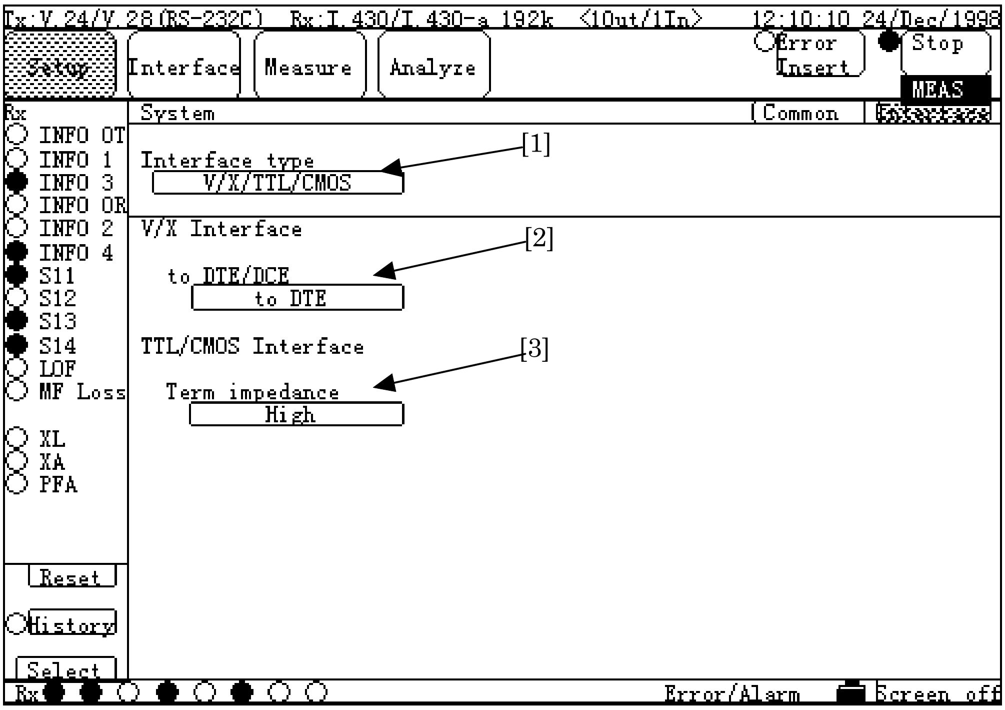
- **Common display**



No.	Item	Description
[1]	Common	Displays the screen on which the MD6430A system mode function, date, time, and remote functions can be set. When this screen is displayed, the "Common" button lights green.
[2]	Interface	Displays the screen on which the settings related to interface can be specified. When this screen is displayed, the "Interface" button lights g reen. For details of the Interface screen, see the following paragraphs.
[3]	Buzzer Touch key Operation error Error & Alarm	Specifies whether buzzer sound is used or not in the following cases: When pressing a button on the touch panel. When an input operation error occurs and the error message is displayed. When an error or alarm occurs during an error/alarm measurement or frame relay measurement.

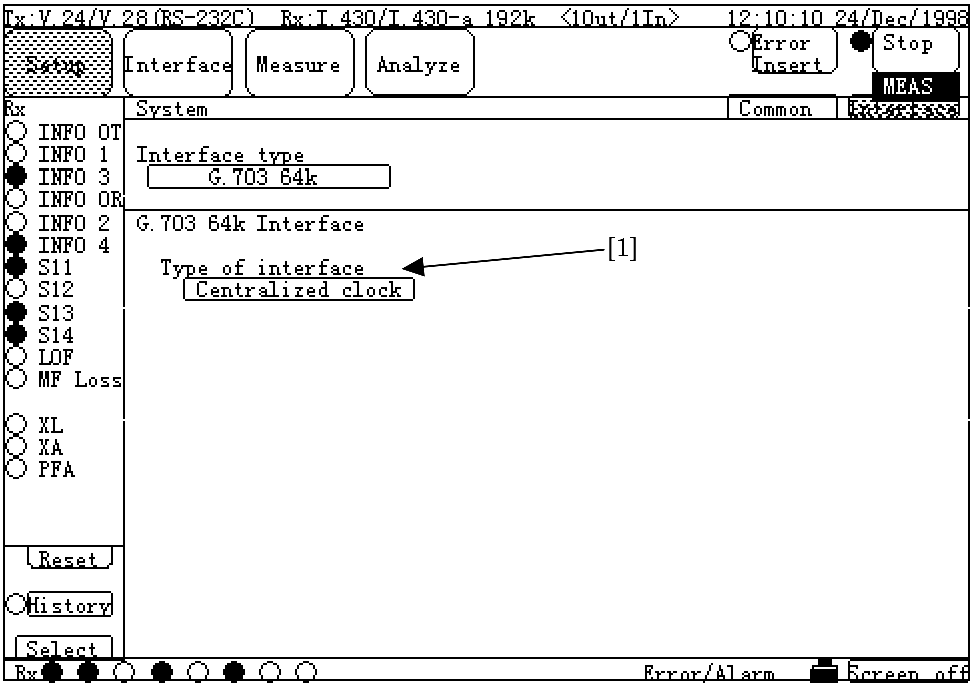
[4]	Date & Time adjust	Sets date and time. For details of setting, refer to para. 8.5 "Adjusting time".
[5]	Remote Interface	Sets the remote interface function. When the MD6430A Option-01 GPIB is installed; either of RS-232C or GPIB can be selected. When GPIB is not installed, fixed to RS-232C.
[6]	RS-232C Function (Displayed when "Remote Interface" is RS-232C)	Sets RS-232C for data output from Protocol monitor or remote operation. • Protocol monitor: For details of using Protocol monitor, see "6.1.13 or 6.1.14". • Remote control: For details of remote operation, see "Operation manual of Remote control".
	Address (Displayed when "Remote Interface" is GPIB)	Sets GPIB address for remote operation.
[7]	CODEC Speaker & Headset Vol. Speaker enable PCM Code	Specifies the following settings for the CODEC. Sets the sound volume of the speaker and headset. Sets ON/OFF of speakers. Sets code rule.
[8]	Power save	Sets the power save function. After setting the function to ON, specify the waiting time (1 to 99 min.) for power saving start.
[9]	Error count condition Bit EC with clock slip Bit EC with PSL	Specifies the following settings for bit error count. Sets ON/OFF of bit error count during clock slip. Sets ON/OFF of bit error count during pattern sync loss.
[10]	ISDN Signalling Protocol	Specifies the following setting for the ISDN calling/being called protocol. ・ JT-Q921/Q931 : Call control for Japan ・ ETSI : Call control for Europe
[11]	Frame relay PVC	Sets ON/OFF of the confirmation procedure for frame relay PVC. ・ITU-T Q.933 AnnexA : PVC confirmation procedure provided. (ITU-T Q.933 AnnexA) ・OFF : PVC confirmation procedure not provided.

■ Interface display, Interface type: V/X/TTL/CMOS



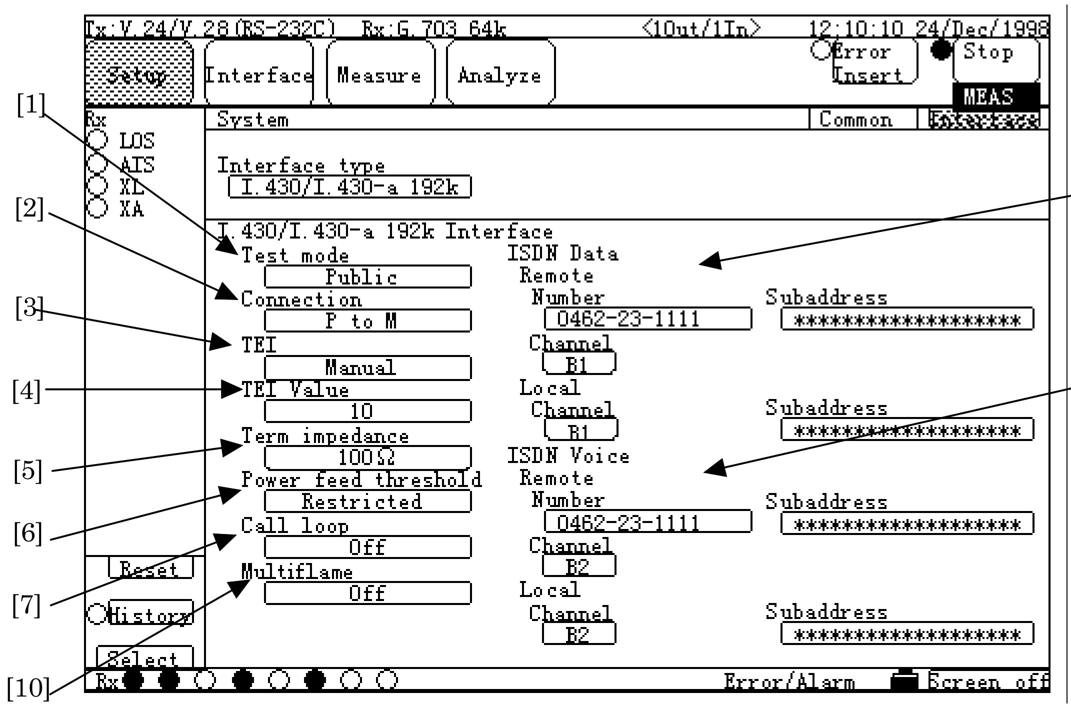
No.	Item	Description
[1]	Interface type	Changes the screen depending on the type of interface.
[2]	to DTE/DCE	Changes the connection destination DTE/DCE. The connector is on the upper panel.
[3]	Term impedance	Changes the TTL/CMOS termination impedance. The connector is on the upper panel.

■ **Interface display, Interface type: G.703 64k**



No	Item	Description
[1]	Type of Interface	Sets the type of the G.703 64k interface.

■ Interface display, Interface type: I.430/I.430-a 192k



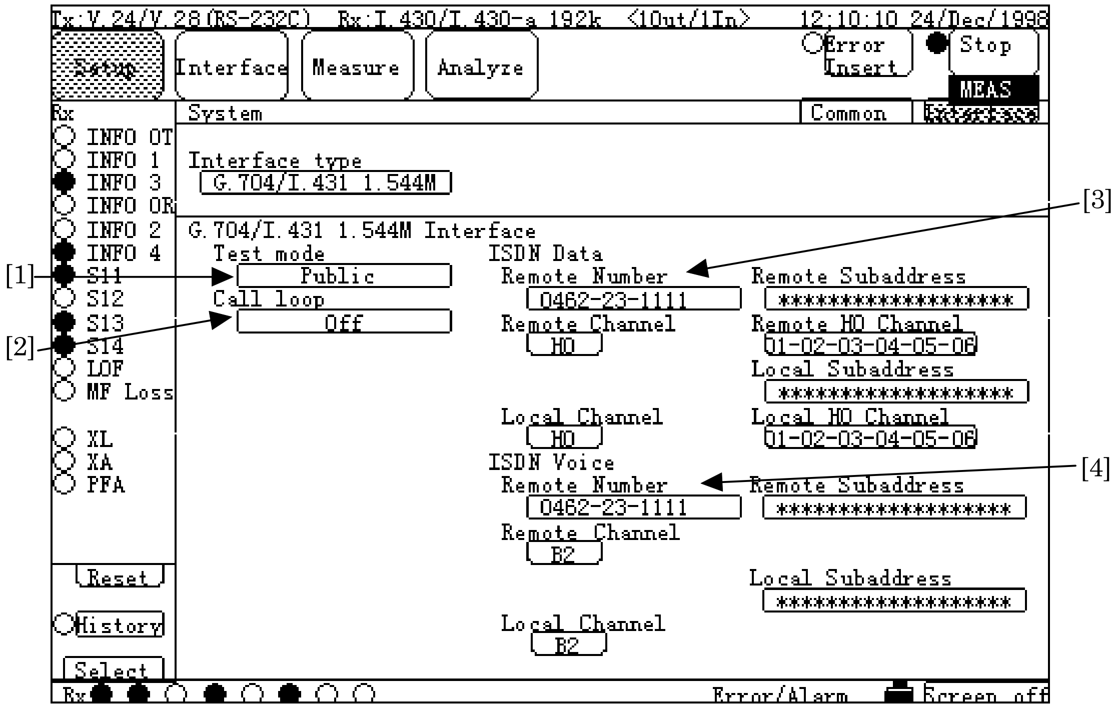
No	Item	Description
[1]	Test mode	Sets the measurement mode of the I.430/I.430-a 192k. ・ Lease: Measures on lease line. ・ Public : Measures on public line.
[2]	Connection	Sets the connection type of the I.430/I.430-a 192k.
[3]	TEI	Sets TEI management of the I.430/I.430-a 192k.
[4]	TEI Value	Sets TEI value of the I.430/I.430-a 192k.
[5]	Call loop*1	Sets a called loop back of the I.430/I.430-a 192k.
[6]	Term Impedance	Sets the termination impedance of the I.430/I.430-a 192k.
[7]	Power feed threshold	Sets the power feed threshold of the I.430/I.430-a 192k, as f ollows. ・ Normal: Sets the normal value. ・ Restricted: Sets the internal fixed value of the MD6430A.

[8]	ISDN Data*2	Specifies the following settings of the measurement channels of the I.430/I.430-a 192k.
	Remote number subaddress channel	Sets the remote destination number. Sets the remote destination subaddress. Sets the following channel used for calling: ・Any :Uses any channel specified by the network party. ・B1 :Uses the B1 channel. ・B2 :Uses the B2 channel
	Local subaddress channel	Sets the subaddress for judgment at being called. Sets the channel used for being called: ・Any :Uses any channel specified by the network party. ・B1 :Uses the B1 channel. ・B2 :Uses the B2 channel. ・None :No channel can be used.
[9]	ISDN Voice*2	Specifies the following settings of voice call channels of the I.430/I.430-a 192k.
	Remote number subaddress channel	Sets the remote destination number. Sets the remote destination subaddress. Sets the channel used for calling.
	Local subaddress channel	Sets the subaddress for judgment at being called. Sets the channel used for being called.
[10]	Multiframe	Sets ON/OFF of the I.430/I.430-a 192k multiframe discrimination.

*1 : This allows the MD6430A to call itself to perform a loop back test on the public line.

*2 : Unless "Remote number" of "ISDN Data" is set, measurement cannot be executed.
On the other hand, neither "Remote subaddress" or "Local subaddress" needs to be set (in other word, they can be remained to "******************") for measurement.

■ Interface display, Interface type: G.704/I.431 1.544M

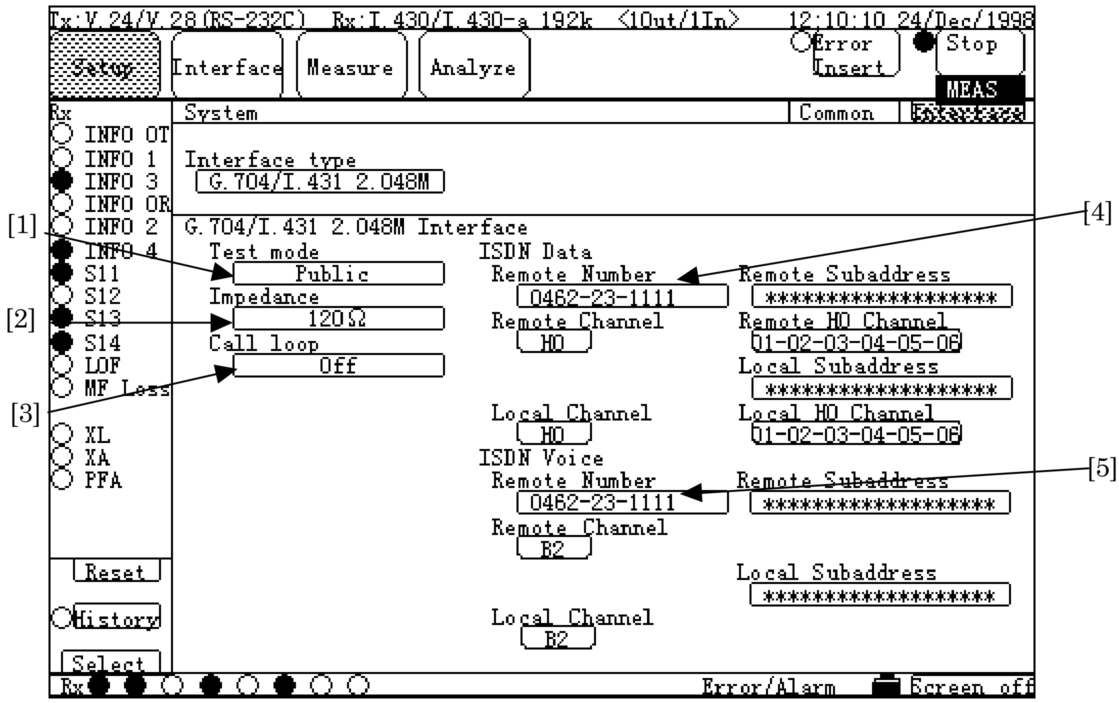


No	Item	Description
[1]	Test mode	Sets the measurement mode of the G.704/I.431 1.544M. ・Lease :Measures on lease line. ・Public :Measures on public line.
[2]	Call loop[*1]	Sets called loop back of the G.704/I.431 1.544M.
[3]	ISDN Data[*2] Remote number subaddress channel H0 channel Local subaddress channel H0 channel	Specifies the following settings of channels of the G.704/I.431 1.544M for measurement. Sets the remote destination number. Sets the remote destination subaddress. Sets the communication channel used for calling. Sets the H0 channel. Set the subaddress for judgment at being called. Sets the channel used for being called. Sets the H0 channel.

[4]	ISDN Voice*2		Specifies the following settings of voice call channels of the G.704/I.431 1.544M.
	Remote	number subaddress channel	Sets the remote destination number. Sets the remote destination subaddress. Sets the channel used for calling.
	Local	subaddress channel	Sets the subaddress for judgment at being called. Sets the channel used for being called.

*1 and *2: Refer to page 5-15.

■ Interface display, Interface type: G.704/I.431 2.048M

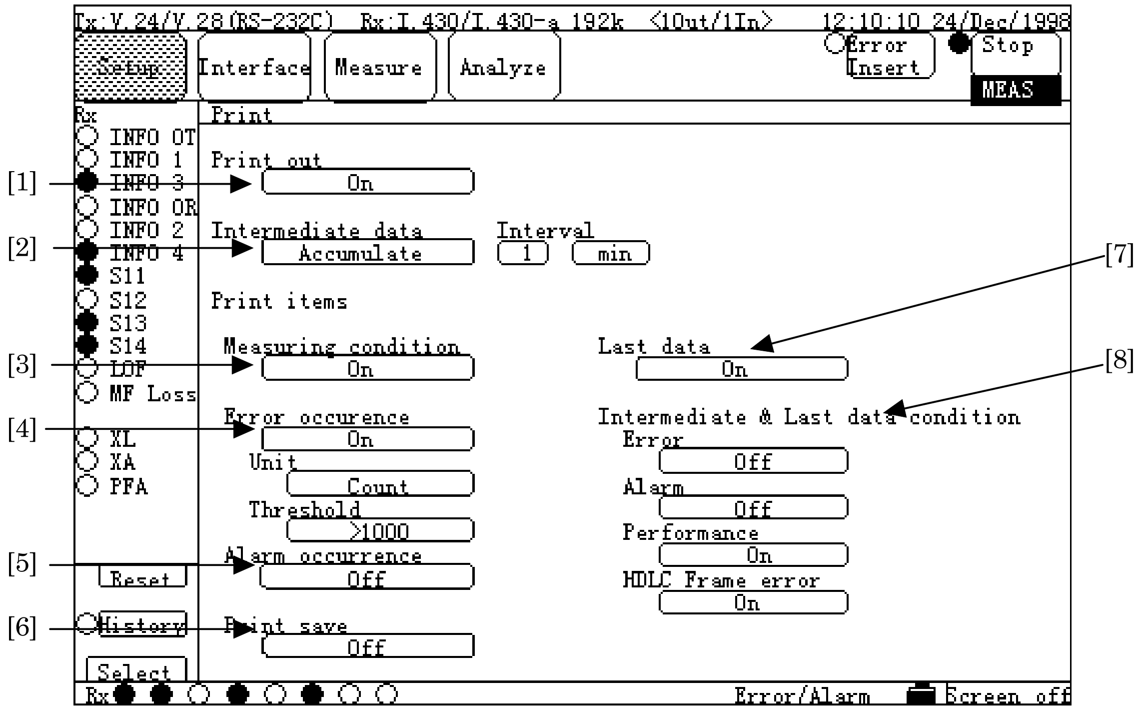


No	Item	Description
[1]	Test mode	Sets the following measurement mode of the G.704/I.431 2.048M. ・Lease :Measures on lease line. ・Public :Measures on public line.
[2]	Impedance	Sets the I/O impedance of the G.704/I.431 2.048M. ・75Ω :BNC connector ・120Ω :Eight-pin modular
[3]	Call loop[*1]	Sets the called loop back of the G.704/I.431 2.048M.
[4]	ISDN Data[*2]	Specifies the following settings of measurement channels of the G.704/I.431 2.048M.
	Remote number	Sets the remote destination number.
	subaddress	Sets the remote destination subaddress.
	channel	Sets the communication channel used for calling.
	H0 channel	Sets the H0 channel.
	Local subaddress	Sets the subaddress for judgment at being called.
	channel	Sets the channel used for being called.
	H0 channel	Sets the H0 channel.

[5]	ISDN Voice*2		Specifies the following settings of voice call channels of the G.704/I.431 2.048M.
	Remote	number	Sets the remote destination number.
		subaddress	Sets the remote destination subaddress.
		channel	Sets the channel used for calling.
	Local	subaddress	Sets the subaddress for judgment at being called.
		channel	Sets the channel used for being called.

*1 and *2: Refer to page 5-15.

5.2.2.4 Print sub-screen

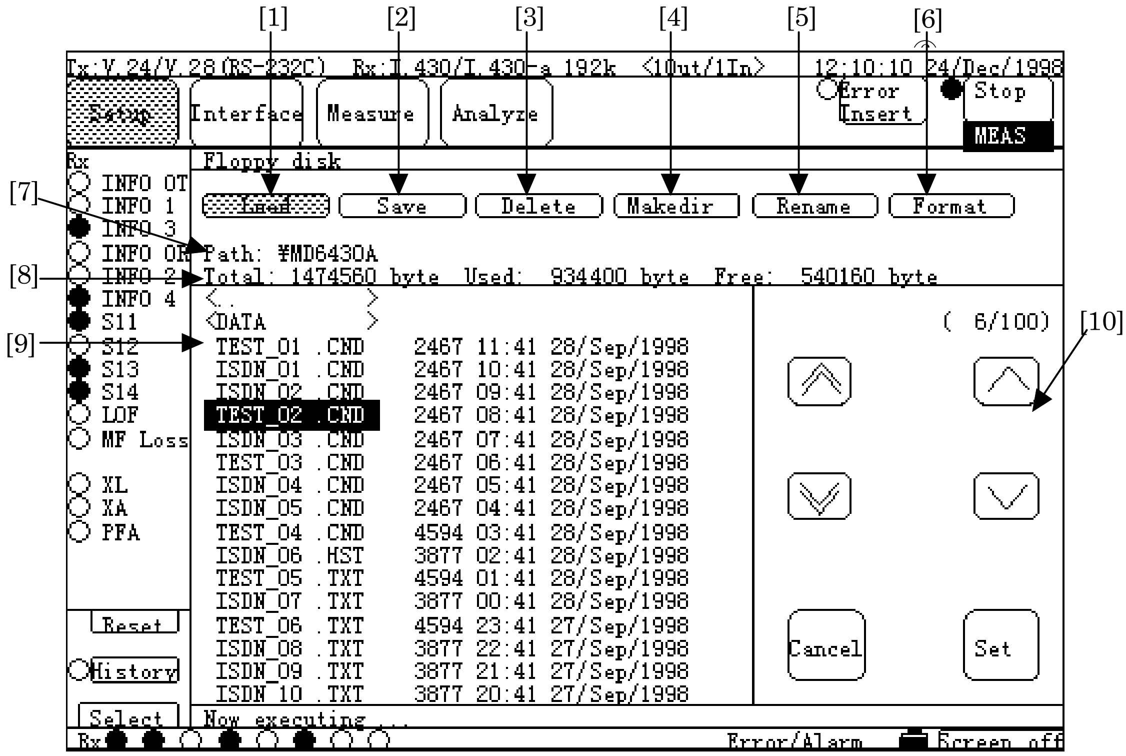


No	Item	Description
[1]	Print out	Sets ON/OFF of output to an external printer.
[2]	Intermediate data (Interval) (Unit)	Sets the following settings for printing of intermediate data during measurement. ・Individual :Prints the measured values in a period of print. ・Accumulate :Prints the measured values accumulated from the start. Sets the interval of intermediate data print. (From one second to 99 days)
[3]	Measuring condition	Sets ON/OFF of measurement conditions print.
[4]	Error occurrence Unit Threshold	Sets ON/OFF of error data of one second print. After setting "ON", specify the following settings: When setting one second print to ON, set the print format. Sets the threshold of error count or rate.
[5]	Alarm occurrence	Sets ON/OFF of alarm data of one second print.
[6]	Print save	Specifies whether print stops or not when successive errors/alarms occur.

[7]	Last data	Specifies whether the last data is printed or not when measurement is completed.
[8]	Intermediate & Last data condition Error Alarm Performance HDLC Frame error	Sets ON/OFF of following items of intermediate data and last data prints. Sets ON/OFF of error data print. Sets ON/OFF of alarm data print. Sets ON/OFF of performance data print. Sets ON/OFF of HDLC error data print.

For details, refer to para. 6.2 "Printing".

5.2.2.5 Floppy disk sub-screen

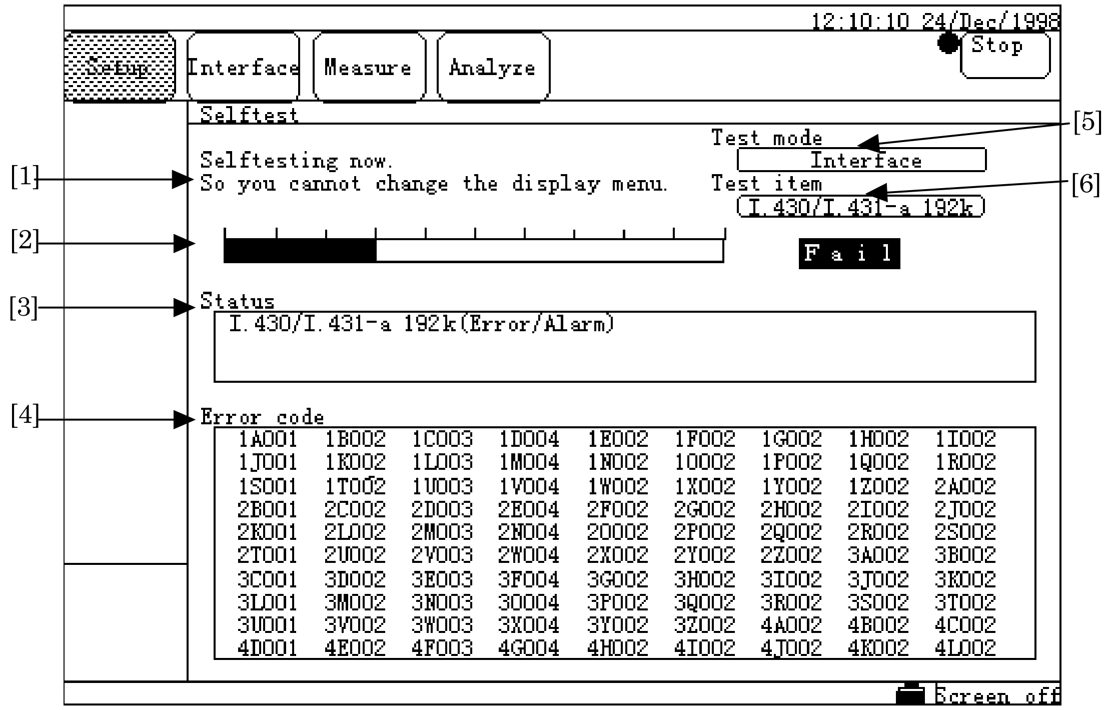


No	Item	Description
[1]	Load	Reads files from a floppy disk, as follows. By selecting this item, the Selection window opens. On the window, select a file to be read.
[2]	Save	Saves measurement condition data or analysis data into a floppy disk, as follows. By selecting this item, the Data Type Selection window opens. On the window, select data to be saved and specify the file name.
[3]	Delete	Deletes files or directories of a floppy disk, as follows. By selecting this item, the current mode is changed to the file delete mode. Then, select a file(s) or directory to be deleted using cursor keys described in [10], and press the "Set" button. The confirmation window opens, and select "Yes" to delete the selected file or directory. To delete a directory: ・All files under the selected directory must already have to be deleted. The file or directory to be deleted should not be read-only type.

[4]	Makedir	Creates a directory, as follows. By selecting this item, the character string entry window opens. Specify the desired directory name, then the directory with the specified name is created.
[5]	Rename	Changes the file name, as follows. By selecting this item, the current mode is changed to the file neme rename mode. Then, select a file or directory to be renamed using cursor keys described in [10], and press the "Set" button. The character string entry window opens. Specify the desired file name on the window, then the file name is changed to the new name.
[6]	Format	Formats a floppy disk, as follows. Select this item and also select "Yes" on the confirmation window, then the floppy disk is formatted in 2HD 1.44MB format.
[7]	Path	Displays the current directory.
[8]	Total Use Free	Displays the total space, used space, and free space of a floppy disk.
[9]	(File list)	Displays files and directories in a floppy disk. Directories are enclosed with "< >" on display. This item can be used for moving other directories.
[10]	(Cursor) ︽ ︾ ︿ ﹀ Cancel Set	On the file list in item [9] above, the following operations can be performed. Scrolls the current displayed file list by one page forward. Scrolls the current displayed file list by one page backward. Moves the cursor at the current file or directory by one line up. Moves the cursor at the current file or directory by one line down. Cancels file selection Selects the file where the cursor is placed.

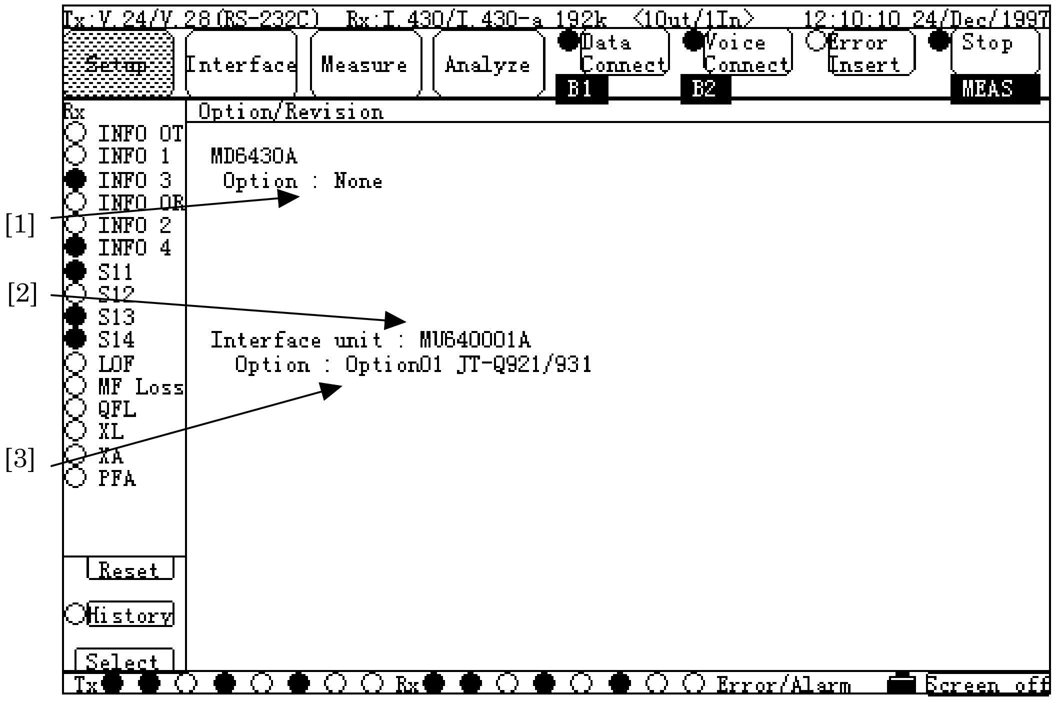
For details, refer to para. 6.4 "Recording to FD".

5.2.2.6 Selftest sub-screen



No	Item	Description
[1]	(Message)	Displays guidance messages for selftest. Follow these message to complete selftest, successfully.
[2]		Displays the execution status of the selftest and test item for performance test by a bar graph. After the test completion, the judgment of the result is displayed at the right of the bar graph. ・Pass :The specified selftest is completed, successfully. ・Fail :An error is detected in the specified selftest.
[3]	Status	Displays the test item being processed.
[4]	Error code	Displays an error code when the result of the selftest is "Fail". For details, refer to Appendix A "Selftest error code list" at the end of this manual.
[5]	Test mode	Select the type of the selftest and test item for performance test. ・All :Tests all items. ・Interface :Tests the items related to interface. ・Measure :Tests the items related to measurement. ・INFO1 Send :Test item for performance test.
[6]	Test item	When selecting "Interface" and "Measure" in [5], select further detail items for the selftest.

5.2.2.7 Option/Revision sub-screen

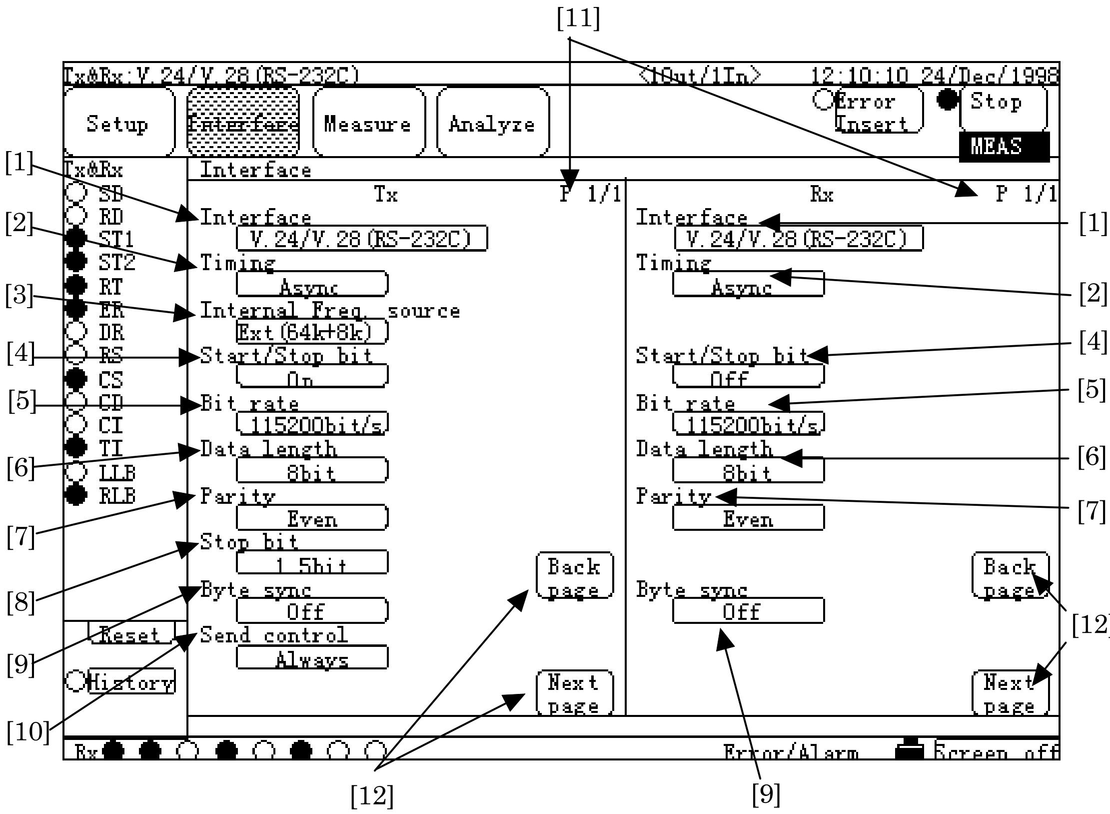


No	Item	Description
[1]	Option	Displays the option name included in the MD6430A main unit. If no option are included, "None" is displayed.
[2]	Interface unit	Displays the installed interface unit name.
[3]	Option	Displays the option name included in the interface unit. If no option are included, "None" is displayed.

5.2.3 Interface main screen

5.2.3.1 Interface sub-screen

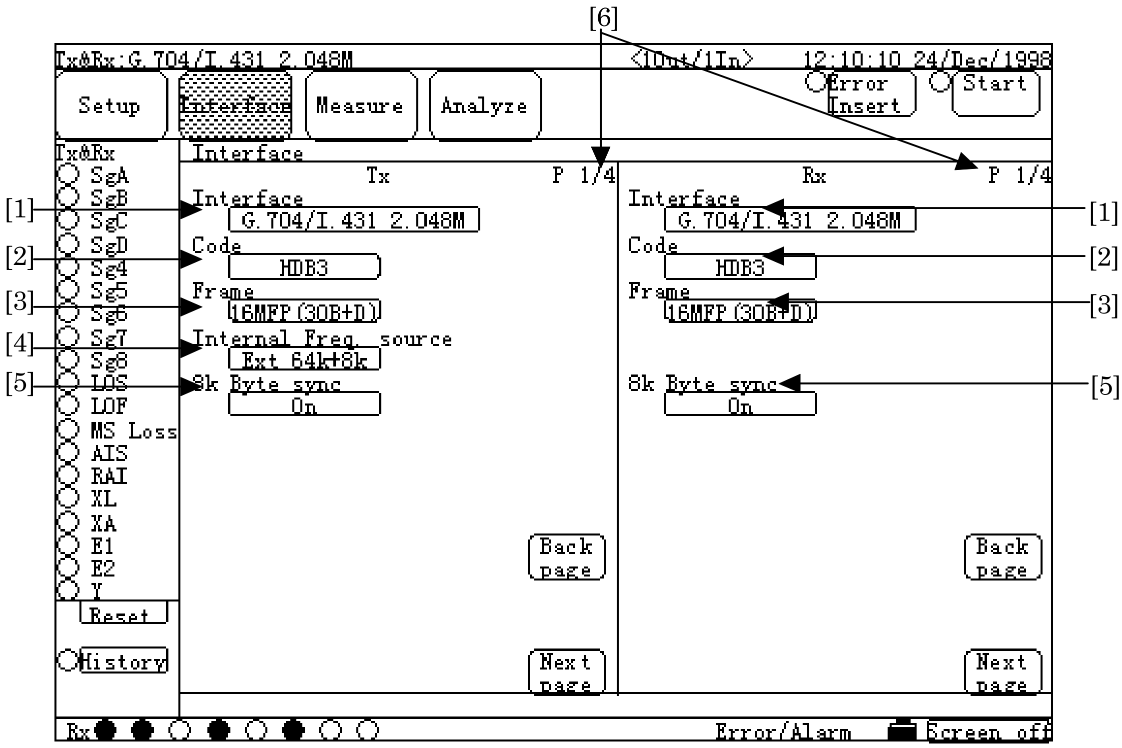
■ **Low-speed system Tx screen / Low-speed system Rx screen**



No	Item	Description
[1]	Interface	Sets the type of interface.
[2]	Timing	Sets the sync/async mode and timing clock.
[3]	Internal Freq. source	Sets the internal clock source.(For send only)
[4]	Start/Stop bit	Sets the use of start/stop bits.
[5]	Bit rate	Sets the internal clock frequency.
[6]	Data length	Sets the data length.
[7]	Parity	Sets the parity.
[8]	Stop bit	Sets the stop bit. (For send only)
[9]	Byte sync	Sets the byte synchronization using B line.
[10]	Send control	Sets the send control.(For send only)
[11]	P	Indicates the current displaying page. This screen consists of only one page.
[12]	Back page Next page	Scrolls the screen by one page backward. Scrolls the screen by one page forward.

Settings for a Tx line can be specified on the left of the screen; for a Rx line, on the right.

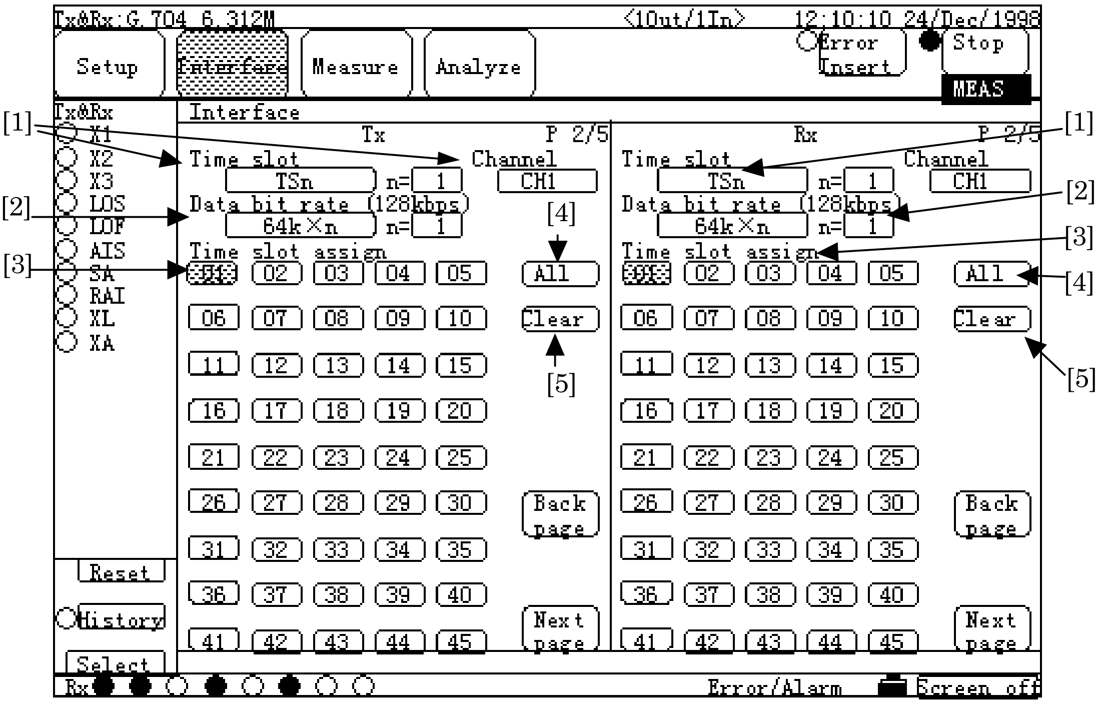
■ **High-speed system Tx screen (1) / high-speed system Rx screen (1)**



No	Item	Description
[1]	Interface	Sets the type of interface.
[2]	Code	Sets the transmission code.
[3]	Frame	Sets the frame format.
[4]	Internal Freq. source	Sets the internal clock source.
[5]	8k Byte sync.	Sets the byte synchronization using Ext(64k+8k) input signal.
[6]	P	Indicates the current displaying page. This high-speed system screen consists of six pages. However, the number of pages may be reduced depending on the set conditions.

Settings for a Tx line can be specified on the left of the screen; for a Rx line, on the right.

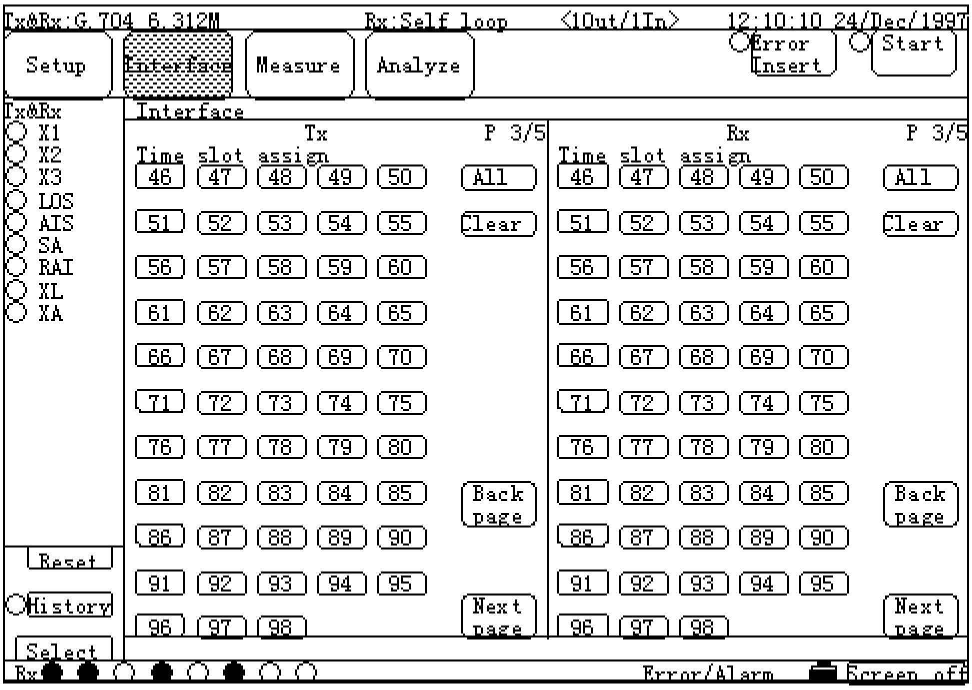
■ High-speed system Tx screen (2) / high-speed system Rx screen (2)



No	Item	Description
[1]	Time slot* n	Sets the time slot for measurement. When "TSn" selected, sets the first time slot number. When "HGn" is set, set the specified handling group number, and then set the top channel at Channel field.
	Data channel*	For "Interface" of I.430/I.430-a 192k, sets the measurement channel.
[2]	Data bit rate* n	Sets the data bit rate for measurement. Sets the number of successive time slots.
	H0 channel*	Sets the H0 channel.
[3]	Time slot assign	When "Any" selected in [1], sets the time-assigned slot. Multiple slots can be selected (1 to 98).(Selected : Green) When "Any" not selected, the specified time slot is displayed in highlighted.
[4]	All	Selects all time-assigned slots.
[5]	Clear	Clears the selection for all or parts of the time-assigned slots. After the clear, select "01" only.

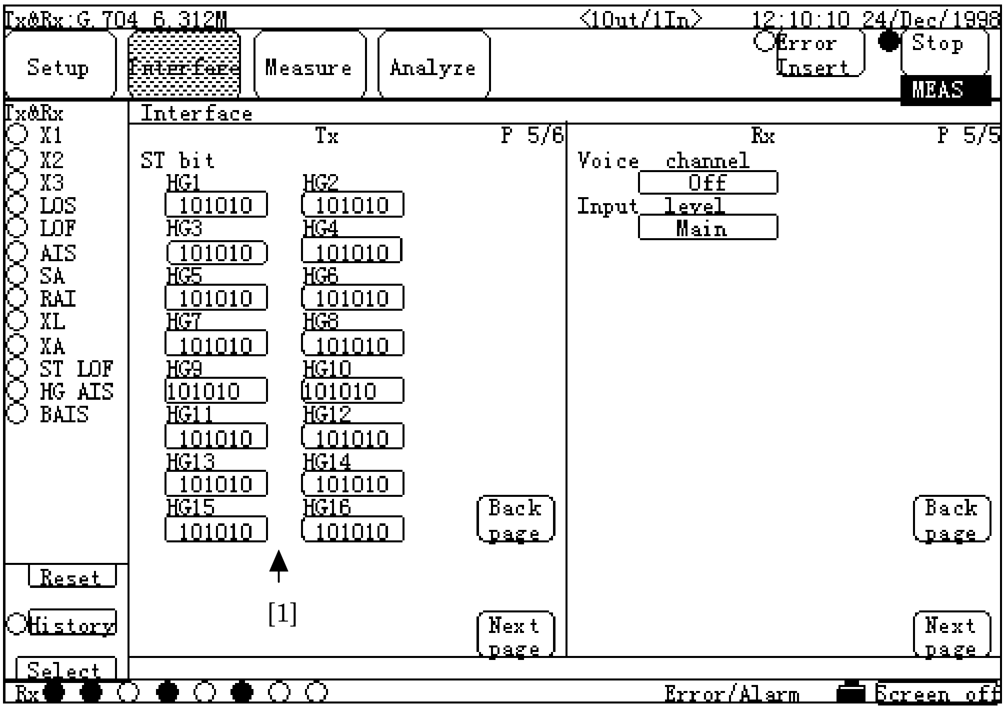
* : [1] and [2] have two items, because the item to be displayed depends on the settings of each item.
Watch the item displayed, then refer to the corresponding description.
Settings for a Tx line can be specified on the left of the screen; for a Rx line, on the right.

■ High-speed system Tx screen (3) / high-speed system Rx screen (3)



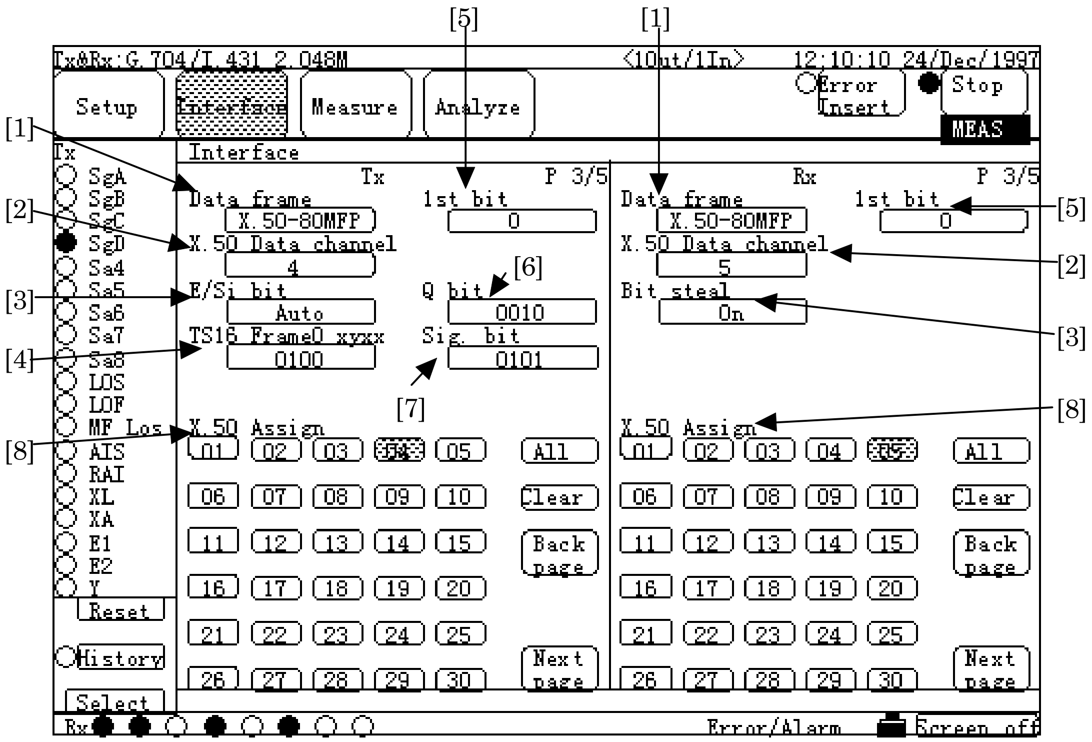
The description of each item is the same as that in the high-speed system Tx screen (2) / high-speed system Rx screen (2), before.

■ High-speed system Tx screen (4) / high-speed system Rx screen (4)



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>ST bit</td><td>Sets ST bit by handling group unit in send ST frame.
<table>
<tr><th></th><th>Interface</th><th>Frame</th><th>Handling group</th></tr>
<tr><td>1*</td><td>G.704/I.431
1.544M</td><td>24ST(G.704)
24ST(NTT)
12ST(G.704)</td><td>HG1 to HG4</td></tr>
<tr><td>2</td><td>2M CMI</td><td>ST</td><td>HG1 to HG5</td></tr>
<tr><td>3*</td><td>G.704
6.312M</td><td>4ST(G.704)</td><td>HG1 to HG16</td></tr>
</table>
* : MU643000K can be used for the G.704/I.431 1.544M and G.704 6.312M interfaces.</td></tr>
</table>

■ **High-speed system Tx screen (5) / high-speed system Rx screen (5)**



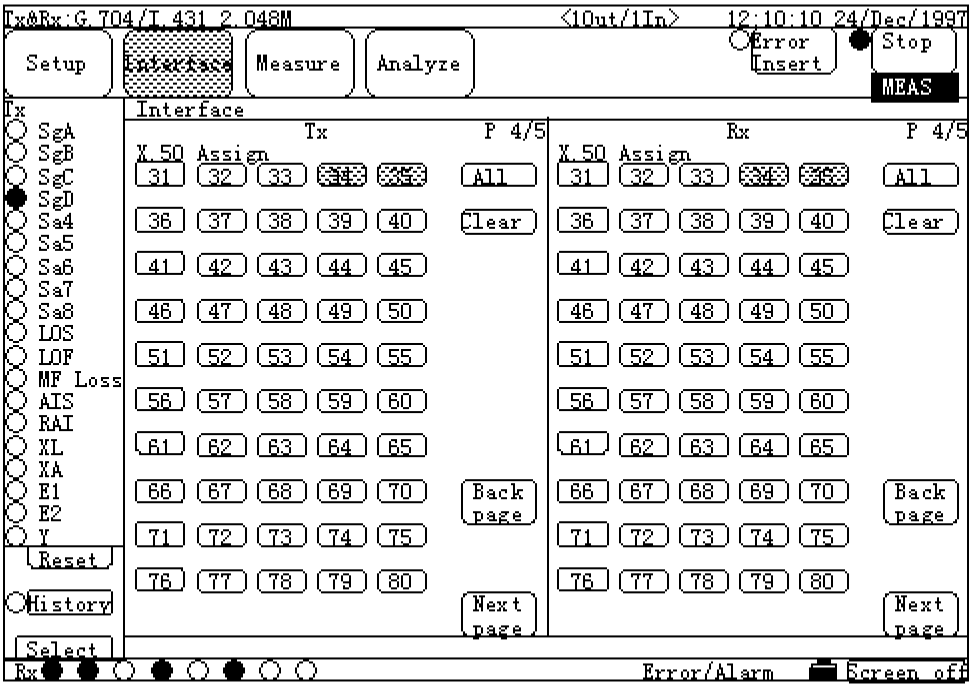
No	Item	Description
[1]	Data frame*	Sets the data frame.
	MUX/DEMUX*	Sets the MUX/DEMUX. For reception, MUX cannot be selected.
	Bit agsign*	Sets the measurement data channel.
[2]	X.50 Data channel	Sets the data channel for X.50 frame measurement.
[3]	E/Si bit*	Sets the E/Si bit.(For send only)
	Bit steal*	Sets the Signalling bit.
[4]	TS16 Frame0 xyxx*	Sets the time slot 16 frame 0 pattern. Specify the value in binary. (For send only)
	Bit agsign*	Sets the measurement data channel.
	Bit rate*	Sets the internal clock frequency.
[5]	1st bit*	Sets the time-slot bit 1.
	8th bit*	Sets the time-slot bit 8.
[6]	Q bit*	Sets the Q bit. Specify the value in binary.(For send only)
	Sa bit*	Sets the Sa bit. Specify the value in binary.(For send only)
	SP bit*	Sets the spare bit. Specify the value in binary.(For send only)

[7]	Sig. bit*	Sets the Signalling information bit. Specify the value in binary. (For send only)
	Signalling bit*	Sets the Signalling information bit (2M CMI).(For send only)
[8]	X.50 Assign	Sets the X.50 time-assigned channel. Multiple channels can be selected (1 to 80 channels).

* : Some No. have two items, because the item to be displayed depends on the settings of each item. Watch the item displayed, then refer to the corresponding description.

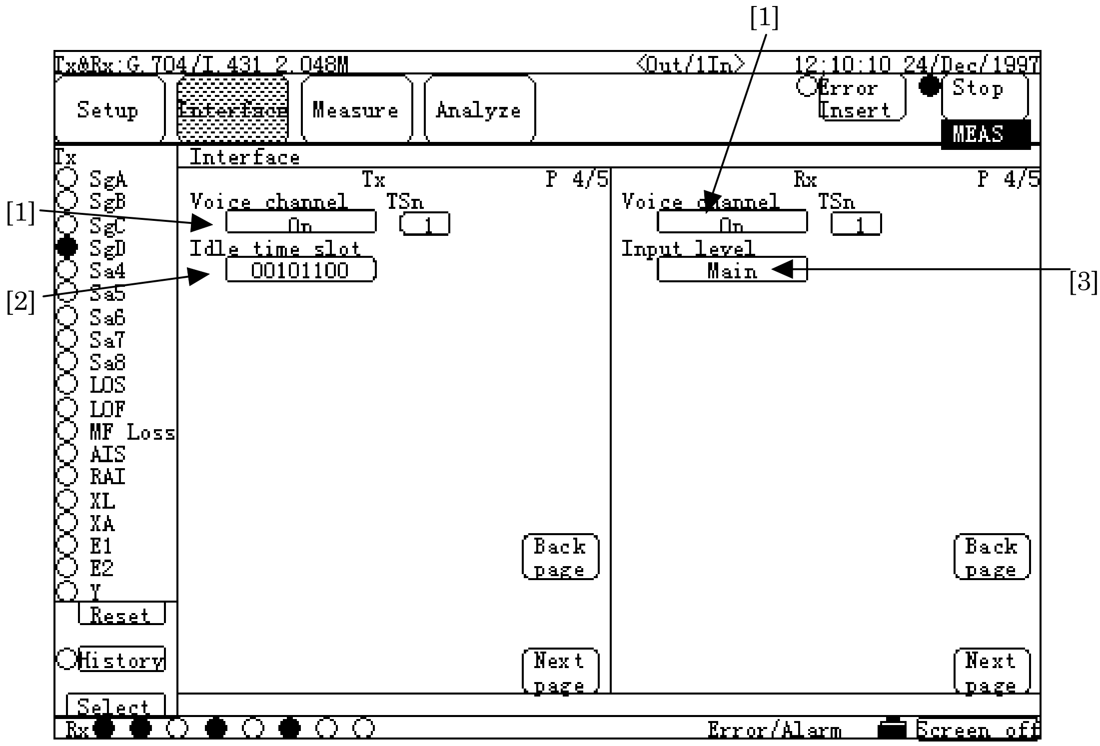
Settings for Tx line can be specified on the left of the screen; for Rx line, on the right.

■ High-speed system Tx screen (6) / high-speed system Rx screen (6)



The description of each item is the same as that in the high-speed system Tx screen (4) / high-speed system Rx screen (4), before.

■ High-speed system Tx screen (7) / high-speed system Rx screen (7)



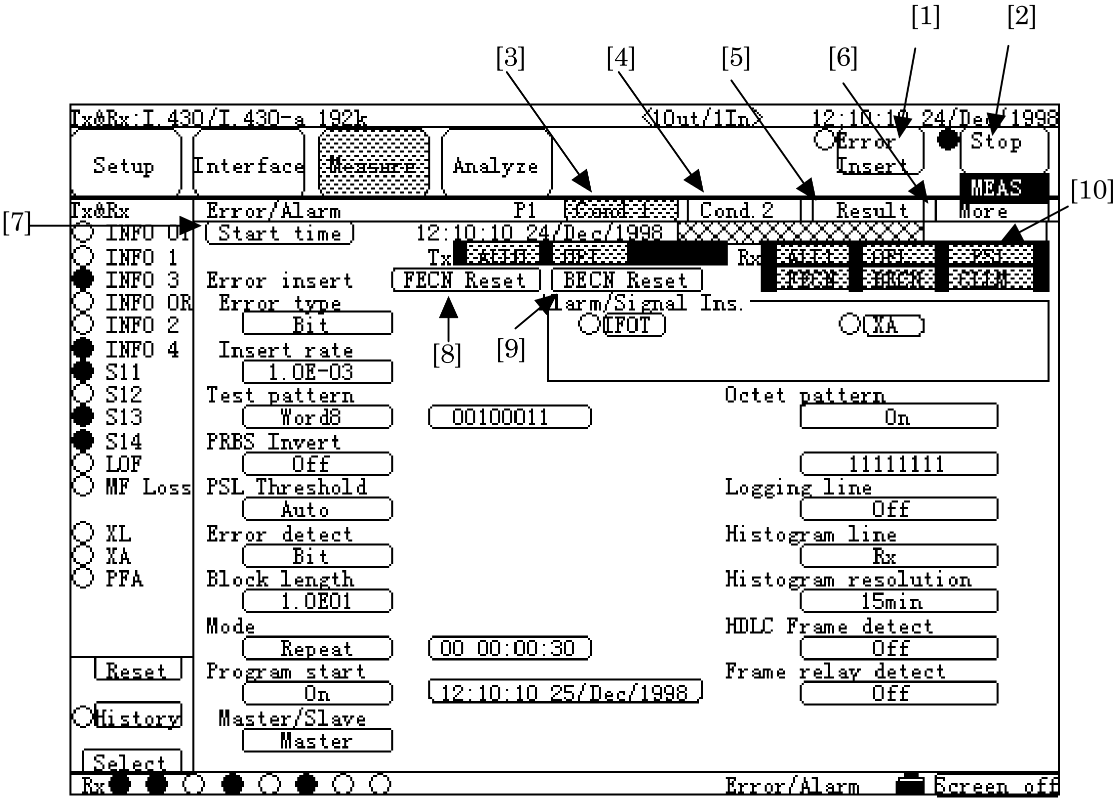
No	Item	Description
[1]	Voice channel TSn	Sets the use ON/OFF of the voice channel. After setting the voice channel ON, set the voice channels. (1 to 98)
[2]	Idle time slot	Sets the idle time slot. Specify the value in binary.
[3]	Input level	Sets the input level.

Settings for Tx line can be specified on the left of the screen; for Rx line, on the right.

5.2.4 Measure main-screen

5.2.4.1 Error/Alarm sub-screen

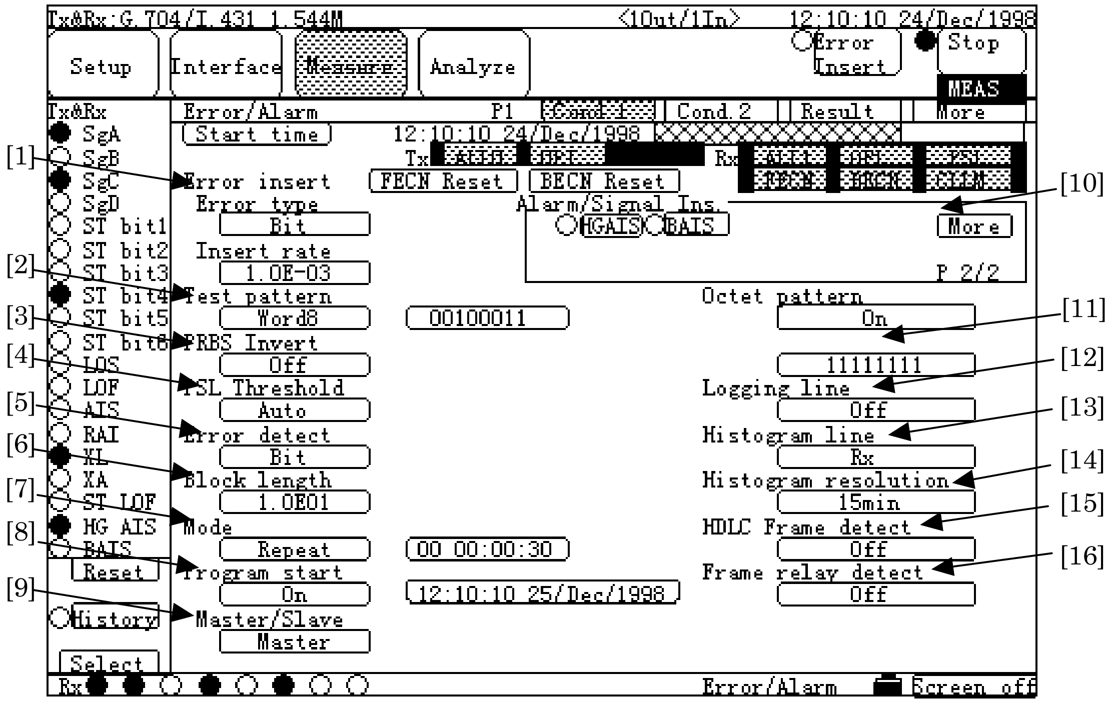
■ **Error/Alarm sub-screen, Common items**



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Error Insert</td><td>Inserts or stops the error.
The lamp at the left of the button indicates:
○ :Not inserting
● :Inserting</td></tr>
<tr><td>[2]</td><td>Start/Stop</td><td>Starts or stops the error/alarm measurement.
The button, the lamp at the left of the button, and the highlighted display field below the button indicate the following measurement states:
<table>
<tr><th>Error/Alarm measurement state</th><th>Button indication</th><th>Highlighted display field</th><th>Lamp</th></tr>
<tr><td>Stopping measurement</td><td>"Start"</td><td>None</td><td>○</td></tr>
<tr><td>Waiting program start during measurement stopping</td><td>"Start"</td><td>"PRGM"</td><td>○</td></tr>
<tr><td>Waiting synchronization establishment at measurement start</td><td>"Stop"</td><td>"WAIT"</td><td>●</td></tr>
<tr><td>Measuring</td><td>"Stop"</td><td>"MEAS"</td><td>●</td></tr>
</table></td></tr>
</table>

[3]	Cond.1	Displays the screen to set the error/alarm measurement. When selected, the label turns to green.
[4]	Cond.2	Displays the screen to set the performance measurement. When selected, the label turns to green.
[5]	Character	Displays the screen to set the character pattern. When selected, the label turns to green.
[6]	More	Used when Error/Alarm sub-screen is selected.
[7]	(Measured time)	Displays the measurement time. ・Start time :The time when the measurement is started. ・Elapsed time :The elapsed time from the time the measurement started until now.
[8]	FECN Reset	Resets FECN alarm display. Pressing this button resets the FECN of the channel alarm in [10]. This button is displayed when "HDLC frame detect" or "Frame relay detect" on the Cond.1 screen is set to "ON".
[9]	BECN Reset	Resets BECN alarm display. Pressing this button resets the BECN of the channel alarm in [10]. This button is displayed when "HDLC frame detect" or "Frame relay detect" on the Cond.1 screen is set to "ON".
[10]	(Channel Alarm) Tx/Rx	Indicate the alarm state of Tx/Rx channel

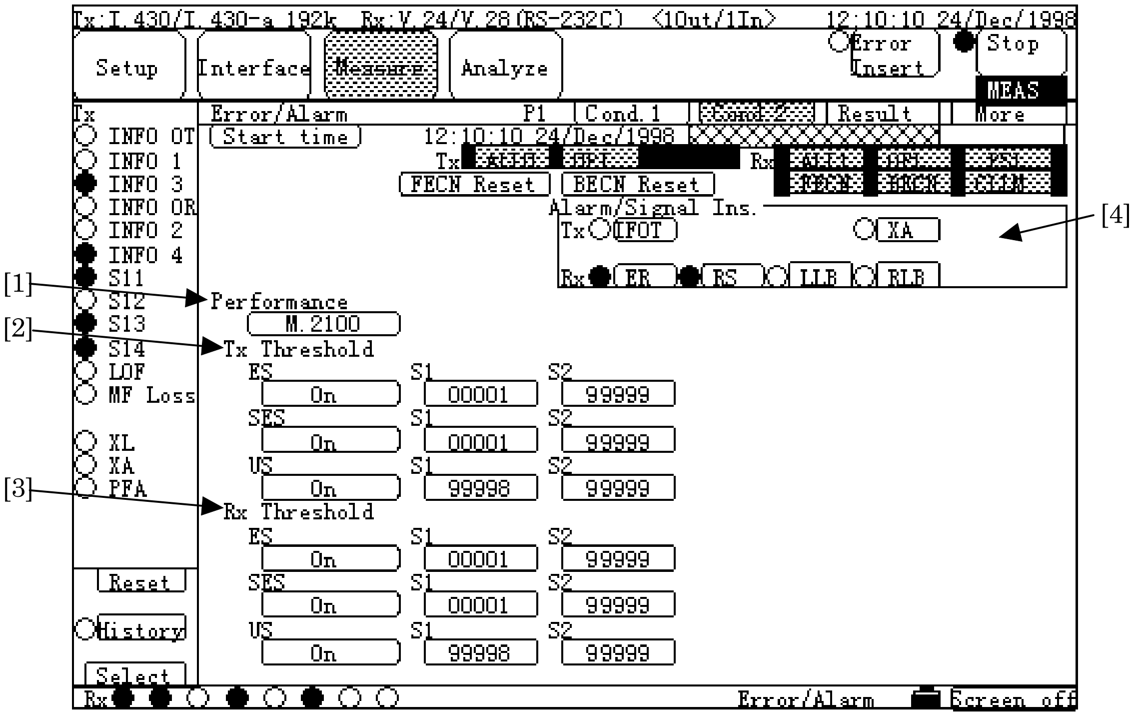
■ Cond.1



No	Item	Description
[1]	Error Insert Error type Insert rate	Sets error insertion. Selects the type of error to be inserted. Sets the timing of error to be inserted. When selected, the confirmation window opens. For details of setting, see para. 5.4.5 "Error addition rate setting window".
[2]	Test pattern	Sets the measurement pattern. When "Word8" selected, set the eight-bit fixed pattern.
[3]	PRBS Invert	Sets the bit invert of the PRBS pattern.
[4]	PSL Threshold	Sets the detection threshold of pattern sync loss (PSL).
[5]	Error detect	Sets the type of error to be detected.
[6]	Block length	Sets the measurement block length.
[7]	Mode	Sets the measurement mode. After other than "Manual" selected, set the time of measurement gating period.

[8]	Program start	Sets ON/OFF of the program start (the function to start measurement automatically). After "ON" selected, set the start time of automatic measurement. For details, see para. 8.5 "Time setting window". Then, the program start is waiting.
[9]	Master/Slave Master Slave	Sets the calling-party/called-party of the program start. Calling party :Automatic measurement is started by calling at the specified time. Called party :Automatic measurement is started when being called.
[10]	Alarm/Signal Ins.	Inserts alarm/signal line. Use the corresponding one-shot button to insert/stop alarm or signal line. By selecting the button of the target alarm or signal line button, Lamp on the left to the button turns to green, then each alarm or signal line is inserted. When Lamp on the left to the button does not light, neither alarm or signal line is not inserted.
[11]	Octet pattern	Sets the pattern for octet pattern matching detection.
[12]	Logging line	Sets ON/OFF of log data generation.
[13]	Histogram line	Sets ON/OFF of graph data generation, and sets object line.
[14]	Histogram resolution	Sets time axis resolution in graph data generation.
[15]	HDLC Frame detect	Sets ON/OFF of HDLC frame detection. (Channel alarms "Bad frame" and "Abort frame" are displayed.)
[16]	Frame relay detect	Sets ON/OFF of Frame-relay frame. (Channel alarms BECN, FECN, and CLLM are displayed.)

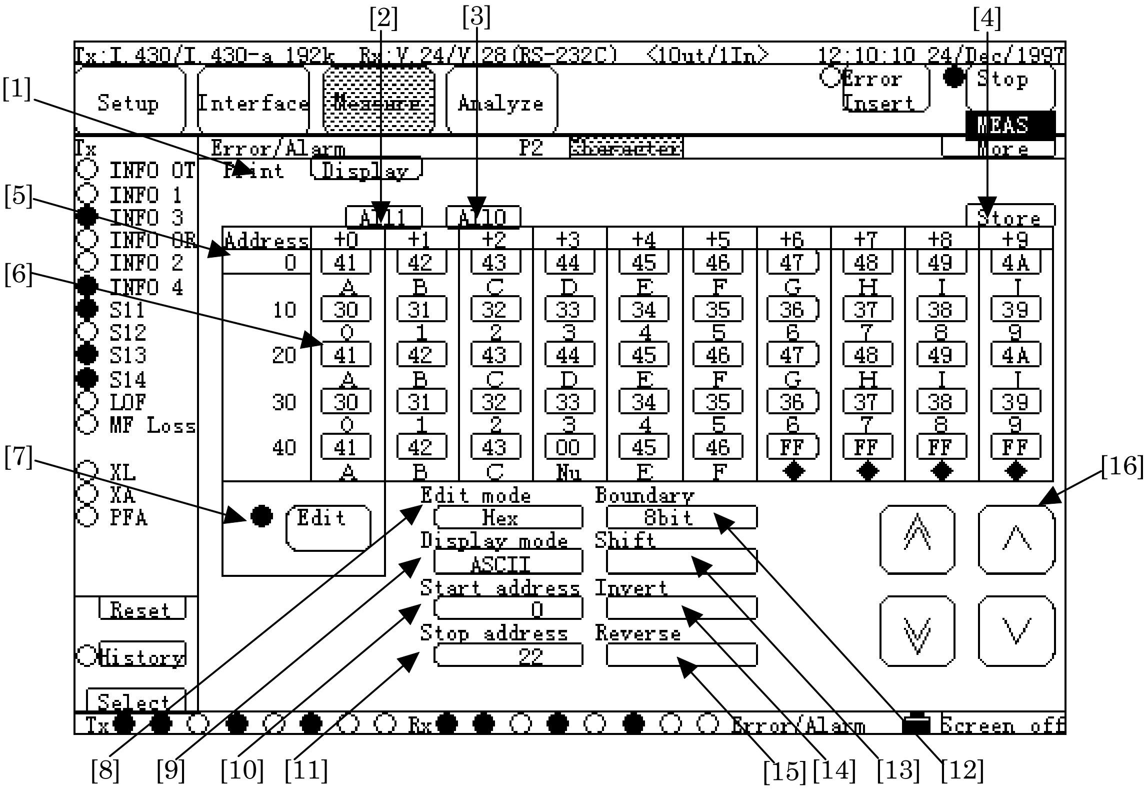
■ Cond.2



No	Item	Description
[1]	Performance	Sets the object specification of error performance. When "M.2100" selected, set [2] and [3].
[2]	Tx Threshold ES SES US	Sets On/Off of threshold of the Tx M.2100. After "On" selected, also set the threshold. After "Off" selected, the result of the performance measurement is not judged. Error Seconds (sum of the occurrence time of error counts) Severely Errorred Seconds (sum of the occurrence time of $>10^{-3}$ errors, LOS, and LOF) Unavailable Seconds (sum of the unavailable time)

[3]	Rx Threshold	Sets On/Off of threshold of the Rx M.2100. After "On" selected, also set the threshold. After "Off" selected, the result of the performance measurement is not judged.
	ES	Error Seconds (sum of the occurrence time of error counts)
	SES	Severely Errorred Seconds (sum of the occurrence time of $>10^{-3}$ error, LOS, and LOF)
	US	Unavailable Seconds (sum of the unavailable time)
[4]	AlarmSignal Ins.	Inserts alarm and signal line. For details, see the Cond.1 screen.

■ In case of Character pattern data



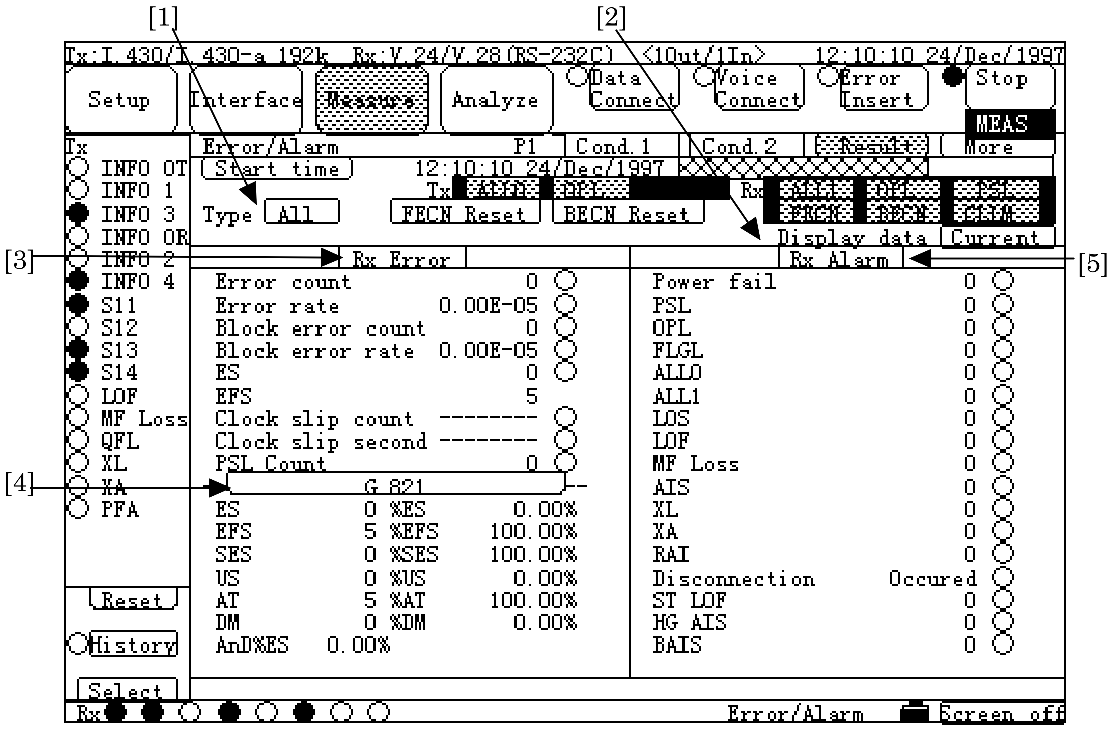
No	Item	Description
[1]	Print	Selects the contents of data to be printed by pressing the "Print Now" key. ・Display :Prints the contents of current displaying data. ・All :Prints the contents of data from the beginning to the end. ・After :Prints the contents of data following the current displaying data. ・Before :Prints the contents of data preceding the current displaying data.
[2]	All1	Sets 1 to all bits of the character pattern.
[3]	All0	Sets 0 to all bits of the character pattern.
[4]	Store	Saves measured results to the memory. By pressing this button, the character string entry window opens. Input the memory name to save it in the memory, which is displayed in "Analyze & Programmable data" of the Setup:Memory screen.
[5]	(Address)	Sets the start address of character pattern data to be displayed.

[6]	(Character Pattern data)	Displays and edits the character pattern data. Individual data is displayed, at the upper part, in the input mode set in [8]; and at the lower part, in the display mode set in [9]. When "ON" selected in [7], data is edited in the upper part. When edit ON selected in [7] and "ASCII" selected in [8]; the character string entry window opens. On the window, up to ten characters can be input, successively.
[7]	Edit	Changes the edit mode of the character pattern described in [6]. ● (green) :"ON", edits the character pattern. ○ (not-lit) :"OFF", not edit the character pattern. The character pattern can be sent when "Character" is set in "Test pattern" of the Cond.1 screen and also "OFF" is set in this item, simultaneously.
[8]	Edit mode	Sets the edit mode.
[9]	Display mode	Sets the display mode of the character data.
[10]	Start address	Specifies the first address for sending the character pattern.
[11]	Stop address	Specifies the last address for sending the character pattern.
[12]	Boundary	Sets the number of bits to be used.
[13]	Shift	Sets bit shift amount.
[14]	Invert	Inverts logic.
[15]	Reverse	Reverses MSB/LSB.
[16]	(Cursor) ⩓ ⩔ ∧ ∨	These cursors can be used to: Scrolls the page by one page forward. Scrolls the page by one page backward. Scrolls the page by one line up. Scrolls the page by one line down.

The functions of [2] to [4] and [8] to [15] can be set only when "Edit" in [7] is set to "OFF".

The character pattern set here can be used only when "Test pattern Character" has been selected on the Cond.1 screen.

■ In case of Result, All<Performance (G.821)>

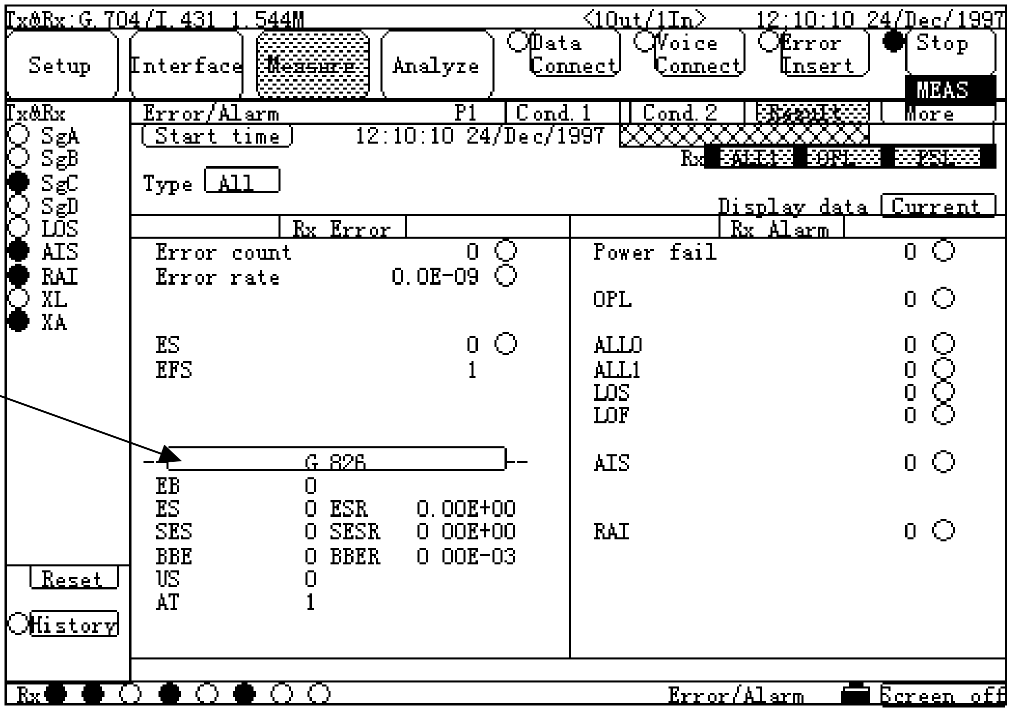


No	Item	Description
[1]	Type	Selects the display style of measured result.
[2]	Display data	Changes the display mode of measured result.
[3]	Rx Error/Tx Error/	Displays the measured results for Rx or Tx error, as follows. ○ :No failure exist, or error does not occur. ●(red):Failure exists, or error occurs.
	Error count	Error count value
	Error rate	Error rate value
	Block error count	Block error count value
	Block error rate	Block error rate value
	ES	The total of Error Seconds (sum of the time during which error count occurs) during measurement available time
	EFS	The total of Error Free Seconds (sum of the time during which error count does not occur) during measurement available time
	Clock slip count	Clock slip count value
	Clock slip second	The total of occurrence time of clock slip (in second unit)
	PSL count	The total of occurrence time of pattern synchronization loss (in second unit)
	Character error	Number of character errors

[4]	G.821	Displays results of performance measurement.
	ES	The total of Error Seconds during measurement available time
	EFS	The total of Error Free Seconds during measurement available time
	SES	The total of Severely Errorred Seconds during measurement available time (sum of the occurrence time of >10^{-3} error, LOS, and LOF)
	US	The total of Unavailable Seconds during measurement available time (sum of the unavailable time)
	AT	measurement Available Time
	DM	The total of Degraded Minutes during measurement available time (sum of the occurrence time of >10^{-6} Error, excluding the error during SES time)
	%ES	The total of occurrence time of error during measurement available time (in second unit)
	%EFS	The total of time during which no error occurs during measurement time (in second unit)
	%SES	The total of occurrence time of SES during measurement time (i n second unit)
	%US	The ratio of US to measurement time
	%AT	The ratio of AT to measurement time
	%DM	The ratio of DM to measurement time
	AnD%ES	The ratio of ES of ITU-T G.821 Annex-D to measurement available time

[5]	Rx Alarm/Tx Alarm	Display measured results for Rx or Tx alarm. ○ :No failure exist, or error does not occur ● :Failure exists, or error occurs
	Power fail	Power failure time
	PSL	The total of occurrence time of Pattern Sync Loss
	OPD	The total of occurrence time of Octet Pattern Detect (octet pattern detection)
	FLGL	The total of occurrence time of HDLC Flag Loss (sync loss)
	ALL0	The total of occurrence time of "0" pattern (measurement signal has consecutive 64 or more 0s)
	ALL1	The total of occurrence time of "1" pattern (measurement signal has consecutive 64 or more 1s)
	LOS	The total of occurrence time of Loss Of Signal (no signal)
	LOF	The total of occurrence time of Loss Of Frame (frame sync loss)
	MF loss	The total of occurrence time of Multi-Frame loss (multi-frame sync loss)
	AIS	The total of occurrence time of Alarm Indicator Signal (AIS alarm)
	XL	The total of occurrence time of X.50 Frame loss (X.50 frame sync loss)
	XA	The total of occurrence time of X.50 Alarm
	SA	The total of occurrence time of Send Alarm
	RAI	The total of occurrence time of Remote Alarm Indication (RAI alarm)
	Disconnection	Exist/not-exist of Connect/disconnect during measurement at ISDN calling/being-called
	ST LOF	The total of occurrence time of ST frame Sync Loss (ST LOF alarm)
	HG AIS	The total of occurrence time of Handling Group Alarm Indication Signal (HG AIS alarm)
	BAIS	The total of occurrence time of Handling Group Backward Alarm Indication Signal (BAIS alarm)

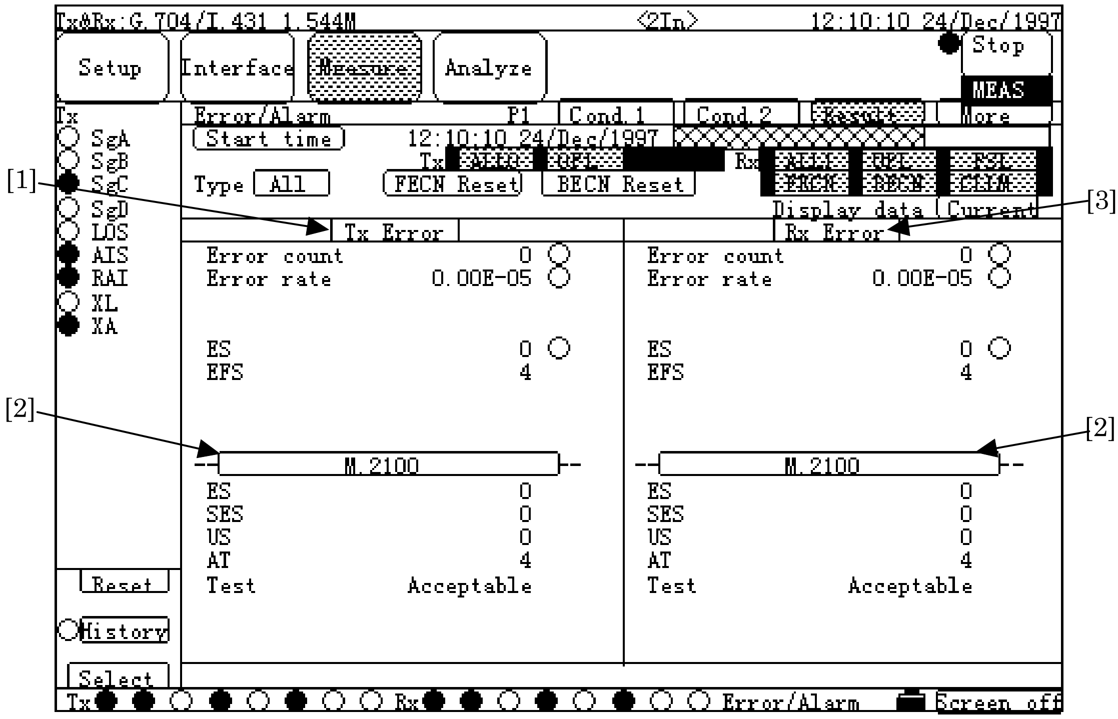
■ **In case of Result, All<Performance (G.826)>**



[1]

No	Item	Description
[1]	G.826	Displays results of performance measurement.
	EB	The number of Errorred Blocks (sum of blocks with one or more errors)
	ES	The number of Error Seconds (sum of the occurrence time of EB)
	SES	The number of Severely Errorred Seconds (sum of the occurrence time of EB of more than 30% and SDP (LOS, AIS, and LOF))
	BBE	The number of Background Block Errors (sum of EBs excluding SES and US judgment blocks)
	US	The total of measurement unavailable time
	AT	Measurement Available Time
	ESR	Errorred Second Ratio (the ratio of ES to AT)
	SESR	Severely Errorred Seconds Ratio (the ratio of SES to AT)
	BBER	Background Block Error Ratio (the ratio of BBE to all blocks (except SES) during measurement available time)

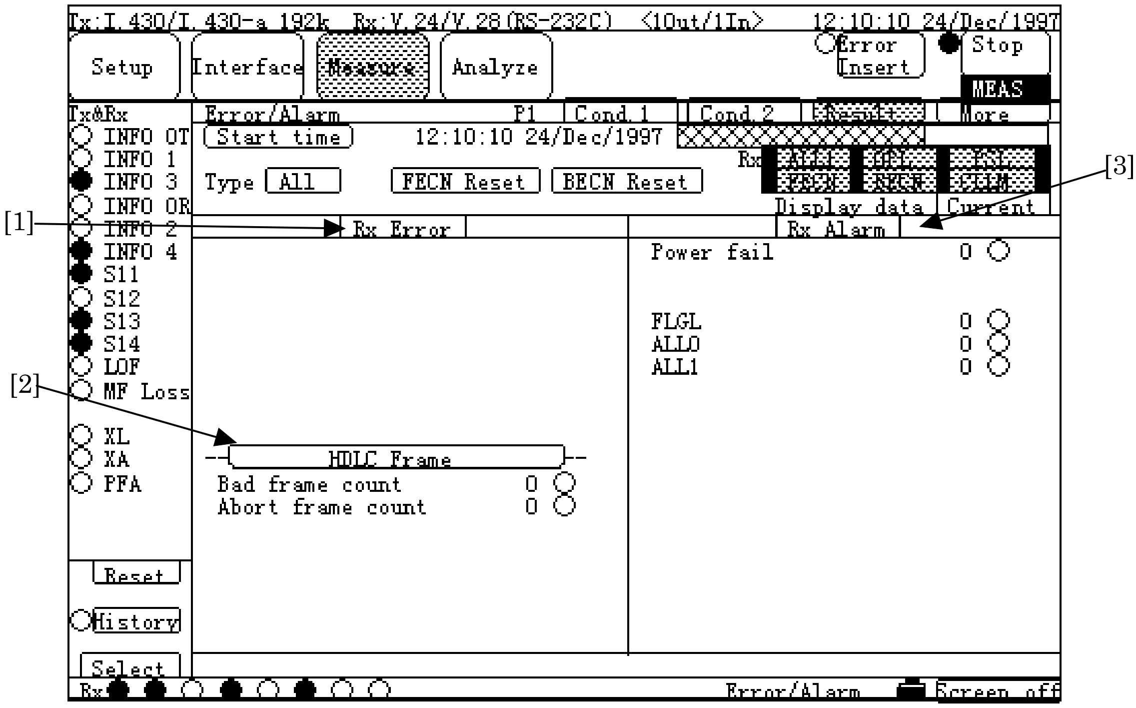
■ In case of Result, All<Performance (M.2100)>



No	Item	Description
[1]	Tx Error	Displays the measured results for Tx errors. Refer to the description of the screen at "In case of Result, All<Performance (G.821)>".
[2]	M.2100	Displays results of performance measurement.
	ES	The total of Error Seconds during measurement available time
	SES	The total of Severely Errorred Seconds during measurement available time (sum of the occurrence time of $>10^{-3}$ error, LOS, and LOF)
	US	The total of Unavailable Seconds during measurement available time (sum of the unavailable time)
	AT	Measurement Available Time
	Test	Displays the judged results based on the threshold set on the Cond.2 screen of the Measure:Error/Alarm screen (not displayed when settings of thresholds are all "OFF"), as follows. Acceptable :Measured results < S1 Degraded :S1 ≦ Measured results ≦ S2 Unacceptable :S2 < Measured results

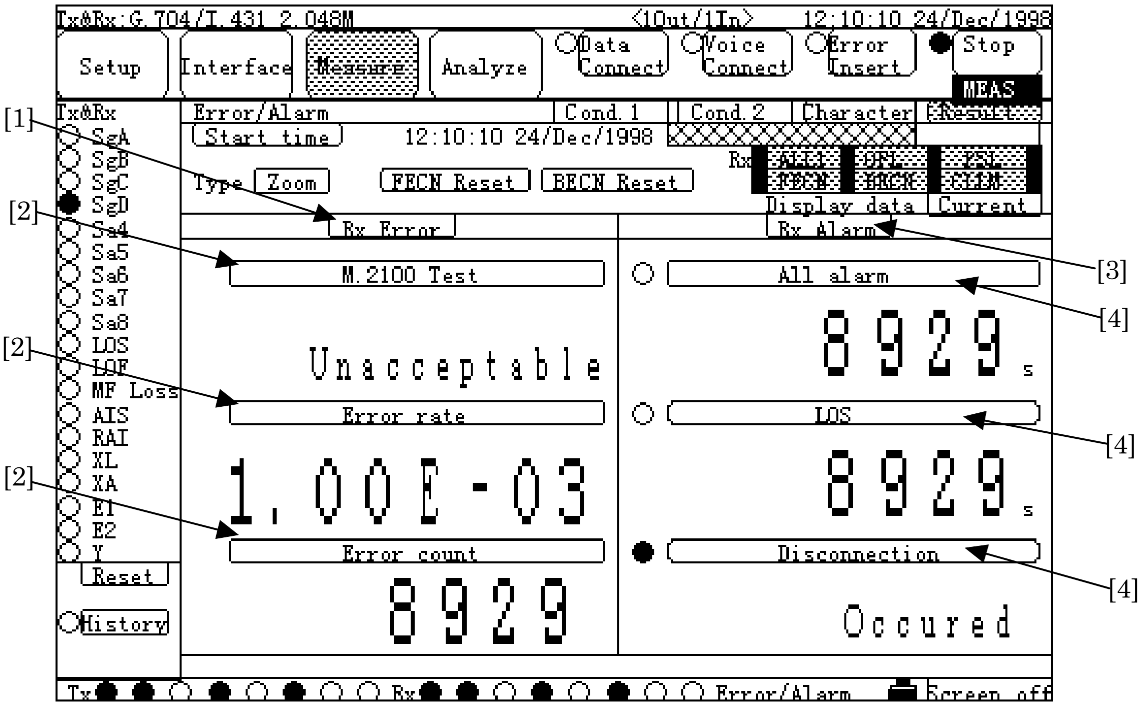
[3]	Rx Error	Displays the measured results for Rx errors. Refer to the description of the screen at "In case of Result, All<Performance (G.821)>".

■ In case of Result, All<HDLC Frame>



No	Item	Description
[1]	Rx Error	Displays the measured results for Rx errors. See the description of the screen at "In case of Result, All<Performance (G.821)>".
[2]	HDLC Frame Bad frame count About frame count	Displays the measured results for HDLC frame. The count value at which one of the following frames is detected: ・Short frame ・Long frame ・FCS error frame ・Fraction frame The count value at which a frame containing more than seven successive "1"s is detected
[3]	Rx Alarm	Displays the measured results for Rx alarms. See the description of the screen at "In case of Result, All<Performance (G.821)>".

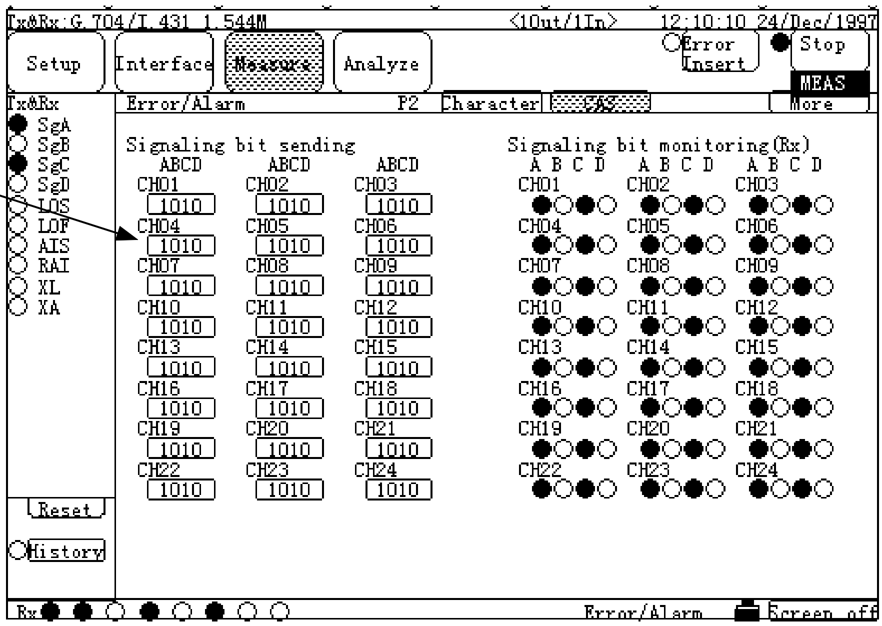
■ In case of Result, Zoom



No	Item	Description
[1]	(Result(Left))	Changes the display of measured results.
[2]	(Zoom Item(Left))	Selects the desired results, and displays them in enlarged view. Selectable items depend on [1]. ○ :No failure exist, or error does not occur ● :Failure or error occurs
[3]	(Result(Right))	Changes the display of measured results.
[4]	(Zoom Item(Right))	Selects the desired results, and displays them in enlarged view. Selectable items depend on [3]. ○ :No failure exist, or error does not occur ● :Failure or error occurs

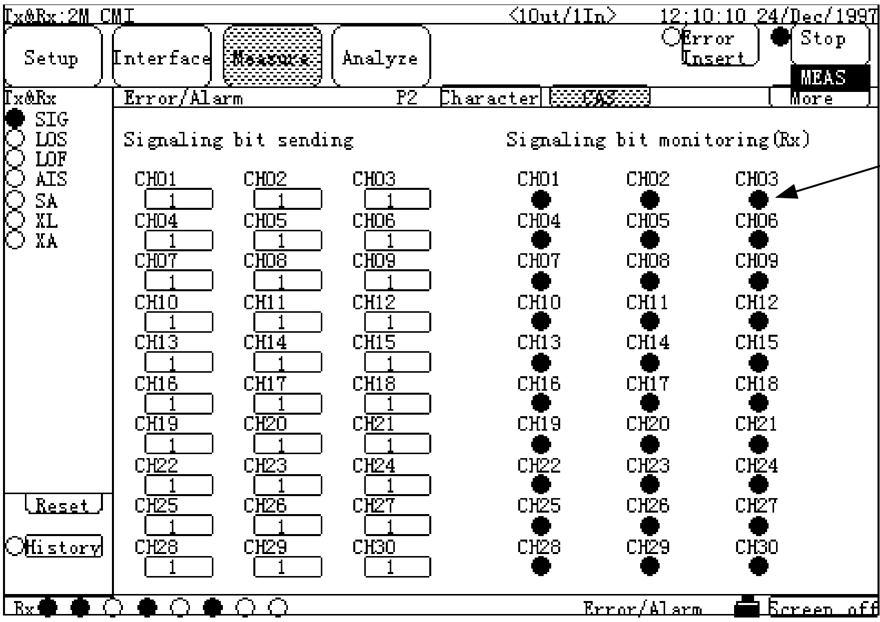
■ **In case of CAS, Signaling bit sending**

[1]



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Signaling bit sending</td><td>Sets Signaling bit.
Settable bits in each interface are shown below.
<table>
<tr><th></th><th>Interface</th><th>Frame</th><th>Settable bit</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">G.704/I.431
1.544M</td><td>24MFP (G.704)
24MFP (NTT)</td><td>Sig A, B, C and D in each of CH1 to CH24</td></tr>
<tr><td>12MFP (G.704)</td><td>Sig A and B in each of CH1 to CH24</td></tr>
<tr><td>2</td><td>G.704/I.431
2.048M</td><td>16MFP (30B+D)
2MFP (30B+D)</td><td>Sig A, B, C and D in each of CH1 to CH30</td></tr>
<tr><td>3</td><td>2M CMI</td><td>PBX</td><td>Signaling bit in each of CH1 to CH30</td></tr>
</table>
</td></tr>
</table>

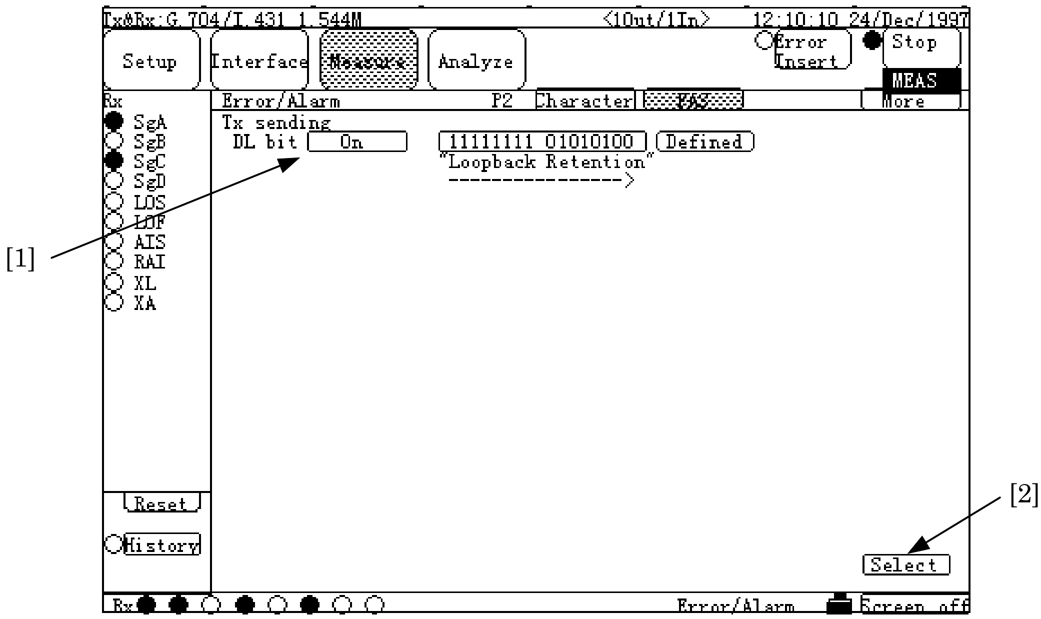
■ In case of CAS, Signaling bit monitoring



[1]

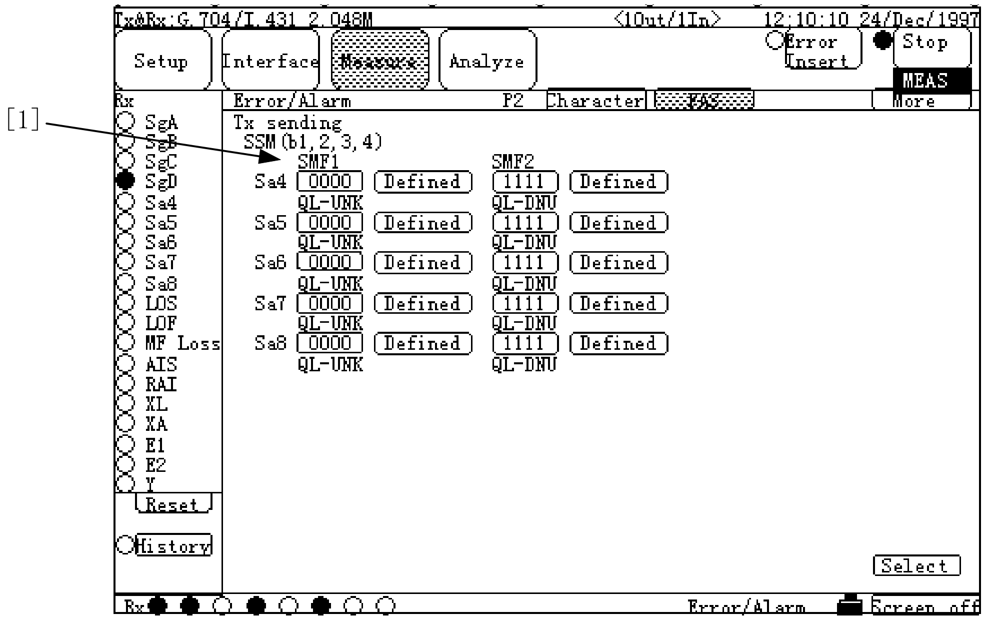
<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Signaling bit monitoring</td><td>Monitors the Signaling bit.
Monitor-enable bits in each interface are shown below.
<table>
<tr><th></th><th>Interface</th><th>Frame</th><th>Settable bit</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">G.704/I.431
1.544M</td><td>24MFP (G.704)
24MFP (NTT)</td><td>Sig A, B, C and D in each of CH1 to CH24</td></tr>
<tr><td>12MFP (G.704)</td><td>Sig A and B in each of CH1 to CH24</td></tr>
<tr><td>2</td><td>G.704/I.431
2.048M</td><td>16MFP (30B+D)
2MFP (30B+D)</td><td>Sig A, B, C and D in each of CH1 to CH30</td></tr>
<tr><td>3</td><td>2M CMI</td><td>PBX</td><td>Signaling bit in each of CH1 to CH30</td></tr>
</table>
When the input/output form is 2In, Tx and Rx can be monitored, simultaneously.</td></tr>
</table>

■ In case of FAS, TX sending (1)



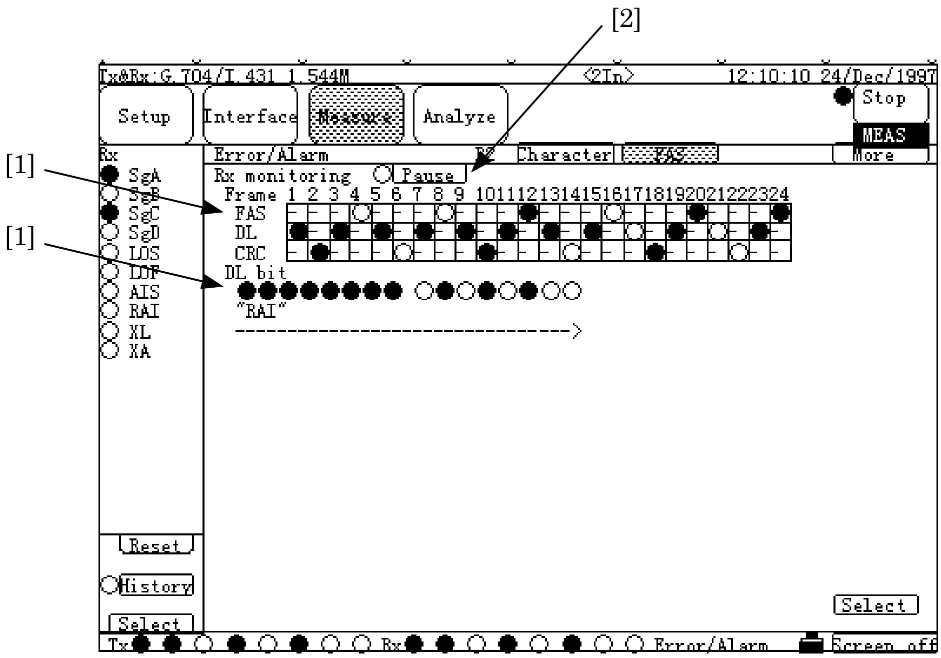
<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>DL bit</td><td>Sets DL bits.
When DL bit is set to On, any 16-bit data can be sent.
In addition, DL bit translation is displayed for 1.544M 24MFP (G.704). (See 5.2.4.2 Code conversion table.)
When DL bit is set to Off, the following data are sent.
<table>
<tr><th></th><th>Interface</th><th>Frame</th><th>DL bit output data</th></tr>
<tr><td rowspan="2">1</td><td rowspan="2">G.704/I.431
1.544M</td><td>24MFP (G.704)</td><td>Flag pattern
“01111110”</td></tr>
<tr><td>24MFP (NTT)</td><td>All "0" pattern</td></tr>
<tr><td>2</td><td>G.704
6.312M</td><td>4MFP (G.704)</td><td>Flag pattern
“01111110”</td></tr>
</table></td></tr>
<tr><td>[2]</td><td>Select</td><td>When the input/output form is 1Out/1In or 2In, FAS screen can be switched with this Select button.</td></tr>
</table>

■ In case of FAS, TX sending (2)



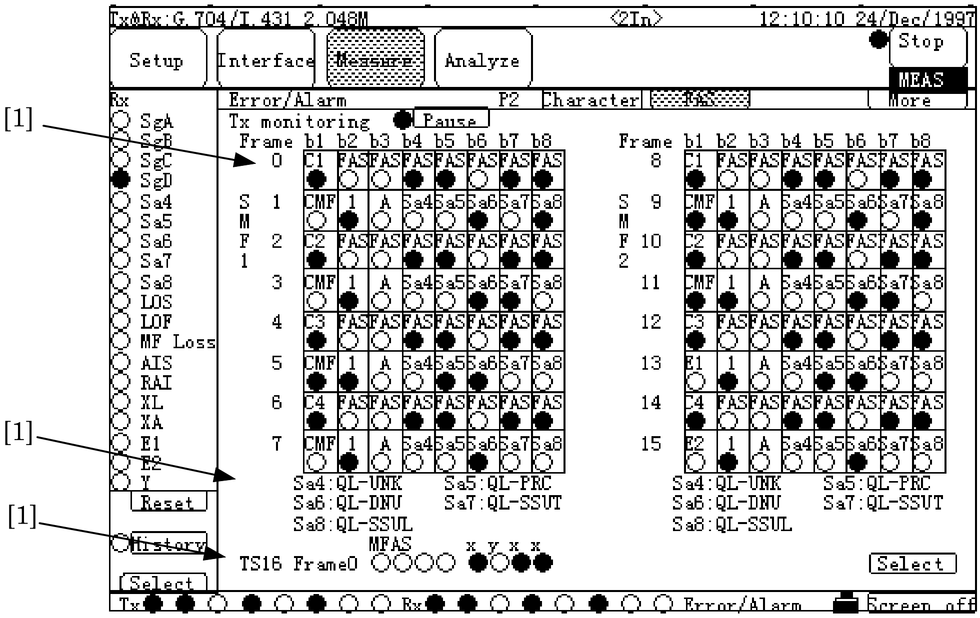
No	Item	Description
[1]	SMF1, 2	Sets SMM bit in 2.048M 16MFP (30B+D) and 16MFP (31B). In addition, SMM bit translation is displayed. (See 5.2.4.2 Code conversion table.) Sets Sa bit for 2.048M 2MFP (30B+D) and 2MFP (31B).

■ In case of FAS, RX monitoring (1)



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Frame
DL bit</td><td>Monitors the Frame and DL bit.
Corresponding interfaces are shown below.
<table>
<tr><th></th><th>Interface</th><th>Frame</th><th>Monitor-enable bit</th></tr>
<tr><td rowspan="3">1</td><td rowspan="3">G.704/I.431
1.544M</td><td>24MFP (G.704)</td><td>Frame,
DL bit (with translation display)</td></tr>
<tr><td>24MFP (NTT)</td><td>Frame,
DL bit</td></tr>
<tr><td>12MFP (G.704)</td><td>Frame</td></tr>
<tr><td>2</td><td>G.704
6.312M</td><td>4MFP (G.704)</td><td>Frame,
DL bit (with translation display)</td></tr>
</table>
See 5.2.4.2 Code conversion table for translation display contents.</td></tr>
<tr><td>[2]</td><td>Pause</td><td>Press this Pause button to stop the lamp monitor operation.
Press again to restart the lamp monitor operation</td></tr>
</table>

■ In case of FAS, RX monitoring (2)



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Frame
Sa4 to Sa8
TS16 Frame0</td><td>Monitors the Frame and TS16 Frame 0
In addition, Sa4 to Sa8 translation is displayed. (See 5.2.4.2 Code conversion table.)
Monitor-enable bits in each interface are shown below.
<table>
<tr><th></th><th>Interface</th><th>Frame</th><th>Monitor-enable bit</th></tr>
<tr><td rowspan="4">1</td><td rowspan="4">G.704/I.431
2.048M</td><td>16MFP (30B+D)</td><td>Frame, TS16 Frame0
Sa4 to Sa8 (with translation display)</td></tr>
<tr><td>16MFP (31B)</td><td>Frame
Sa4 to Sa8 (with translation display)</td></tr>
<tr><td>2MFP (30B+D)</td><td>Frame, TS16 Frame0</td></tr>
<tr><td>2MFP (31B)</td><td>Frame</td></tr>
<tr><td>2</td><td>2M CMI</td><td>PBX
CRV</td><td>Frame</td></tr>
</table>
</td></tr>
</table>

5.2.4.2 Code conversion table

- Code conversion table for DL bit translation of G.704/I.431 1.544M 24MFP (G.704) is shown below. The message contents are translated and displayed, depending on the set or monitored DL bit.

Character string to be displayed	Code	Character string to be displayed	Code
“RAI”	11111111 00000000	“Operate Line 16”	11111111 00000110
“Loopback Retention”	11111111 01010100	“Operate Line 17”	11111111 01000110
“Customer Installation Type A Operate”	11111111 01110000	“Operate Line 18”	11111111 00100110
“Customer Installation Type A Release”	11111111 00011100	“Operate Line 19”	11111111 01100110
“Customer Installation Type B Operate”	11111111 00000100	“Operate Line 20”	11111111 00010110
“Customer Installation Type C Operate”	11111111 01110100	“Operate Line 21”	11111111 01010110
“Payload Operate”	11111111 00101000	“Operate Line 22”	11111111 00110110
“Payload Release”	11111111 01001100	“Operate Line 23”	11111111 01110110
“Network Type A Operate”	11111111 01001000	“Operate Line 24”	11111111 00001110
“Universal Release”	11111111 00100100	“Operate Line 25”	11111111 01001110
“Operate Line 1”	11111111 01000010	“Operate Line 26”	11111111 00101110
“Operate Line 2”	11111111 00100010	“Operate Line 27”	11111111 01101110
“Operate Line 3”	11111111 01100010	“Acknowledge Protection switching action”	11111111 00011000
“Operate Line 4”	11111111 00010010	“Release protection switch”	11111111 01100100
“Operate Line 5”	11111111 01010010	“QL-PRS“	11111111 00100000
“Operate Line 6”	11111111 00110010	“QL-ST2“	11111111 00110000
“Operate Line 7”	11111111 01110010	“QL-ST3E“	11111111 00111110
“Operate Line 8”	11111111 00001010	“QL-ST3“	11111111 00001000
“Operate Line 9”	11111111 01001010	“QL-ST4“	11111111 00010100
“Operate Line 10”	11111111 00101010	“QL-SMC“	11111111 01000100
“Operate Line 11”	11111111 01101010	“QL-TNC“	11111111 00011110
“Operate Line 12”	11111111 00011010	“QL-STU“	11111111 00010000
“Operate Line 13”	11111111 01011010	“QL-DUS“	11111111 00001100
“Operate Line 14”	11111111 00111010	“QL-PROV“	11111111 00000010
“Operate Line 15”	11111111 01111010	“Not assigned“	Code other than above

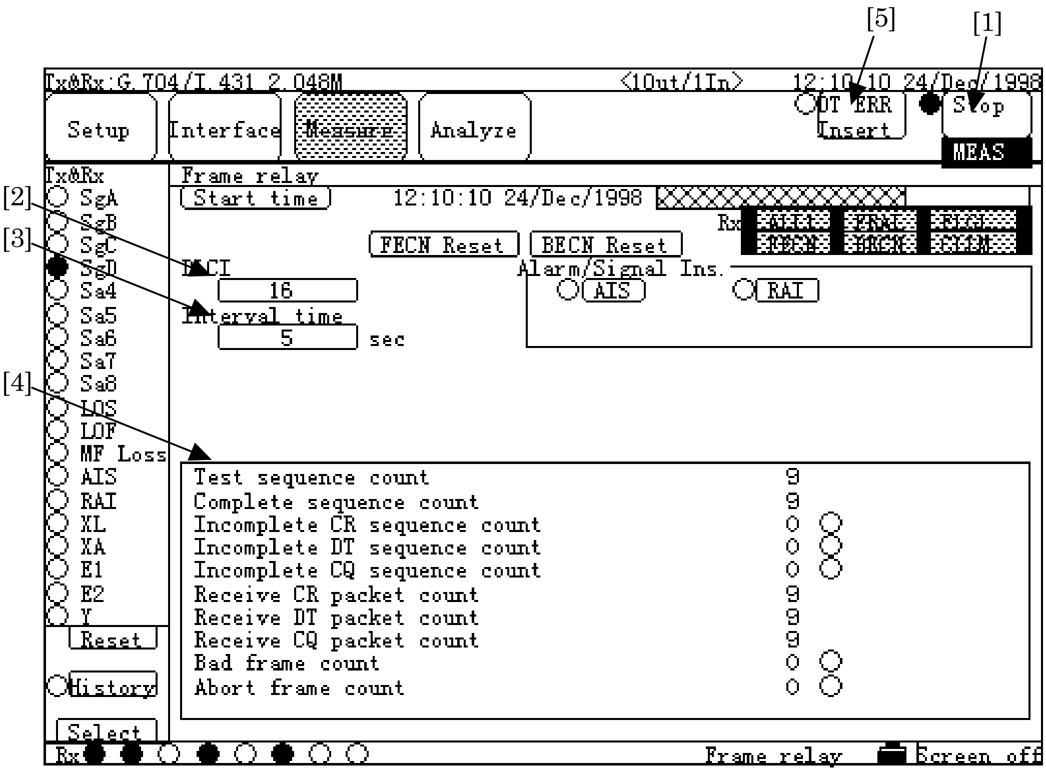
- Code conversion table for SSM bit translation of G.704/I.431 2.048M 16MFP (30B+D) and 16MFP (31B), is shown below.
  The message contents are translated and displayed, depending on the set or monitored SSM bits (Sa 4 to 8).

Character string to be displayed	Code (San1,San2,San3,San4)
QL-UNK	0000
QL-PRC	0010
QL-SSUT	0100
QL-SSUL	1000
QL-SEC	1011
QL-DNU	1111
Reserved	Code other than above

- Code conversion table for DL bit translation of G.704 6.312M 4MFP (G.703) is shown below.
  The message contents are translated and displayed, depending on the monitored DL bit.

Character string to be displayed	Code
“RAI”	11111111 00000000
(Blank)	Code other than above

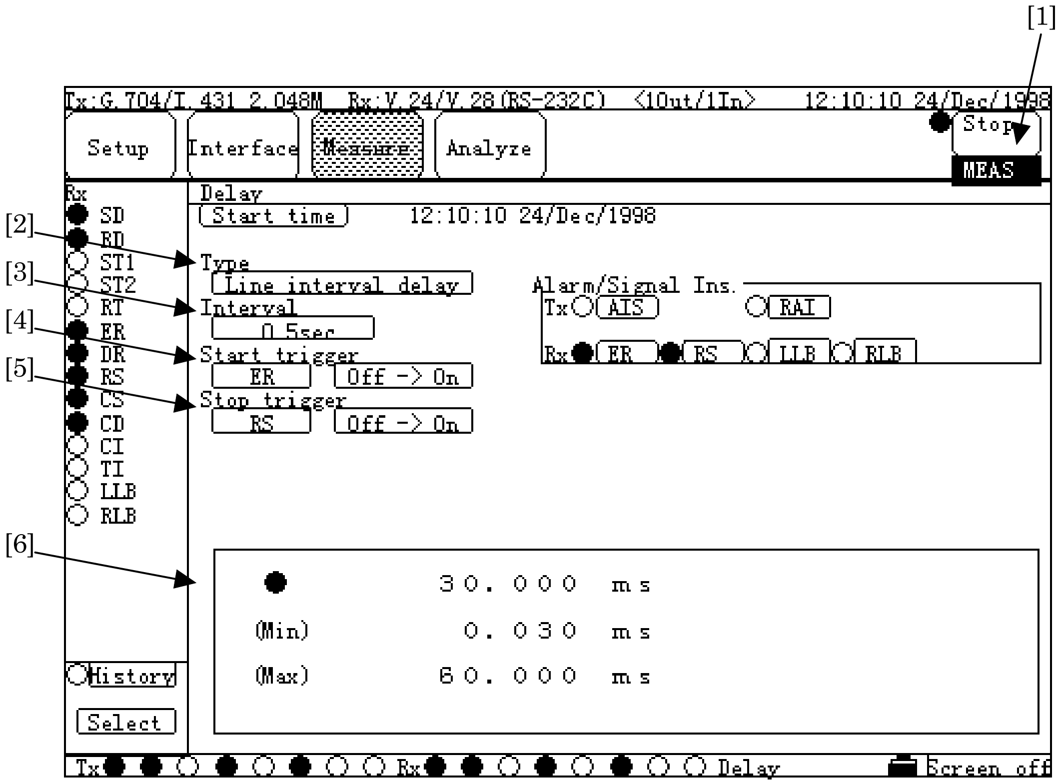
5.2.4.3 Frame relay sub-screen



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Start/Stop</td><td>Starts/stops the frame relay measurement.
The lamp on the left to button and the highlighted display field below the button indicate the following states:
<table>
<tr><td>Frame relay measurement state</td><td>Button indication</td><td>Highlighted display field</td><td>Lamp</td></tr>
<tr><td>Stopping</td><td>"Start"</td><td>None</td><td>○</td></tr>
<tr><td>Waiting for link establishing</td><td>"Stop"</td><td>"WAIT"</td><td>●</td></tr>
<tr><td>Measuring</td><td>"Stop"</td><td>"MEAS"</td><td>●</td></tr>
</table></td></tr>
<tr><td>[2]</td><td>DLCI</td><td>Sets DLCI value for test packets.</td></tr>
<tr><td>[3]</td><td>Interval time</td><td>Sets the interval time for sending test packets.</td></tr>
</table>

[4]	(Result)	Displays the results of frame relay measurement. ○ :No failure ● :Failure occurs.
	Test sequence count	The count value of Test sequences (including incomplete test sequences)
	Complete sequence count	The count value of complete test sequences
	Incomplete CR sequence count	The count value of incomplete CR sequences
	Incomplete DT sequence count	The count value of incomplete DT sequences
	Incomplete CQ sequence count	The count value of incomplete CQ sequences
	Receive CR packet count	The received count value of Connect Request (CR) packets
	Receive DT packet count	The received count value of data (DT) packets
	Receive CQ packet count	The received count value of Clear reQuest (CQ) packets
	Bad frame count	The count value at which one of the following frames is detected. ・Short frame ・Long frame ・FCS error frame ・Fraction frame
	Abort frame count	The count value at which a frame containing more than seven successive "1"s is detected.
[5]	DT ERR Insert	Inserts error for send data (DT) packet. ○ : Normal ● (Flashes one time.) : Indicates the error insertion. This button is not displayed while the measurement is stopped.

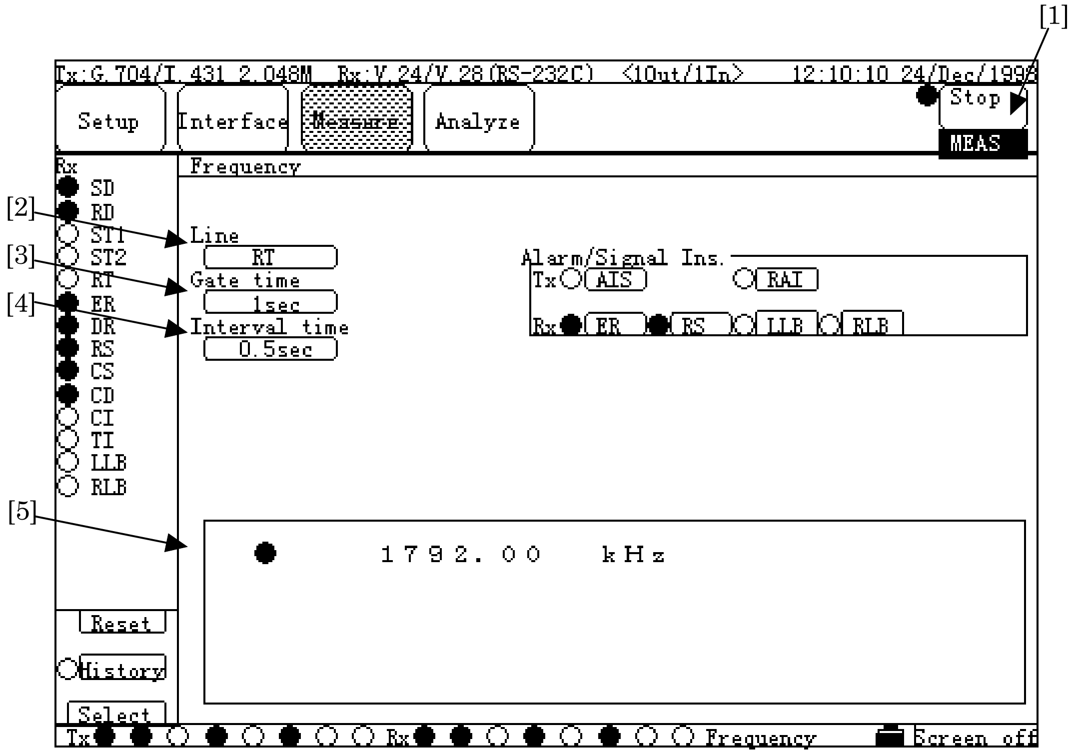
5.2.4.4 Delay sub-screen



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Start/Stop</td><td>Starts/stops the delay measurement.
The lamp on the left to the button, and the highlighted display field below the button indicate the following states:
<table>
<tr><th>Delay measurement state</th><th>Button indication</th><th>Highlighted display field</th><th>Lamp</th></tr>
<tr><td>Stopping</td><td>"Start"</td><td>None</td><td>○</td></tr>
<tr><td>Waiting for start trigger</td><td>"Stop"</td><td>"WAIT"</td><td>●</td></tr>
<tr><td>Measuring</td><td>"Stop"</td><td>"MEAS"</td><td>●</td></tr>
</table></td></tr>
<tr><td>[2]</td><td>Type</td><td>Sets the type of measurement.</td></tr>
<tr><td>[3]</td><td>Interval</td><td>When "Transmit delay" in [2] selected, sets the period of measurement.</td></tr>
<tr><td>[4]</td><td>Start trigger</td><td>When "Line interval delay" in [2] selected, sets the start trigger of the measurement.</td></tr>
<tr><td>[5]</td><td>Stop trigger</td><td>When "Line interval delay" in [2] selected, sets the stop trigger of the measurement.</td></tr>
</table>

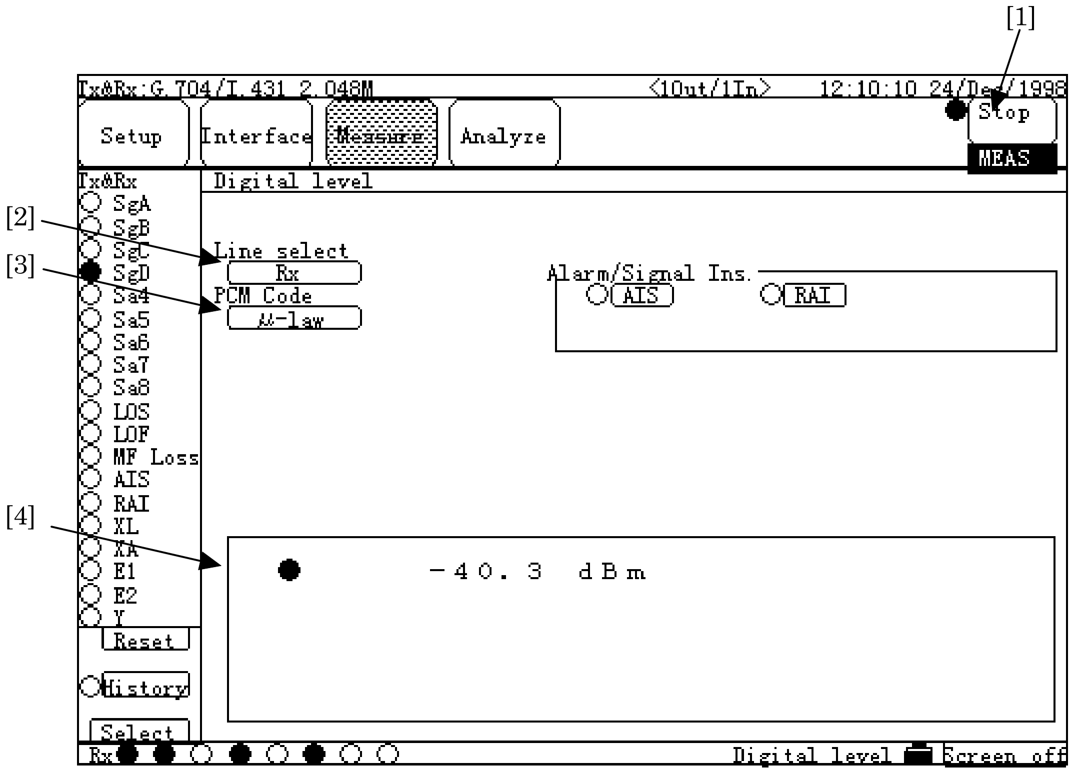
[6]	(Result)	Displays the result of delay measurement. The last measured results are displayed. If the result is more than sixteen seconds, "Timeout" is displayed. The lamp lights in a period of measurement.
	(Min)	Displays the minimum delay value during the interval from the measurement start time to the present time.
	(Max)	Displays the maximum delay value during the interval from the measurement start time to the present time. (Min) and (Max) values are not displayed when the type "Line interval delay" has been set in [2].

5.2.4.5 Frequency sub-screen



<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Start/Stop</td><td>Starts/stops the frequency measurement.
The lamp on the left to the button, and the highlighted display field below the button indicate the following states.:
<table><tr><td>Frequency measurement state</td><td>Button indication</td><td>Highlighted display field</td><td>Lamp</td></tr><tr><td>Stopping</td><td>"Start"</td><td>None</td><td>○</td></tr><tr><td>Measuring</td><td>"Stop"</td><td>"MEAS"</td><td>●</td></tr></table></td></tr>
<tr><td>[2]</td><td>Line</td><td>Sets the object line of measurement.</td></tr>
<tr><td>[3]</td><td>Gate time</td><td>Sets the gate time.</td></tr>
<tr><td>[4]</td><td>Interval</td><td>Sets the period of measurement.</td></tr>
<tr><td>[5]</td><td>(Result)</td><td>Displays the results of frequency measurement.
The lamp lights in a period of measurement.</td></tr>
</table>

5.2.4.6 Digital level sub-screen

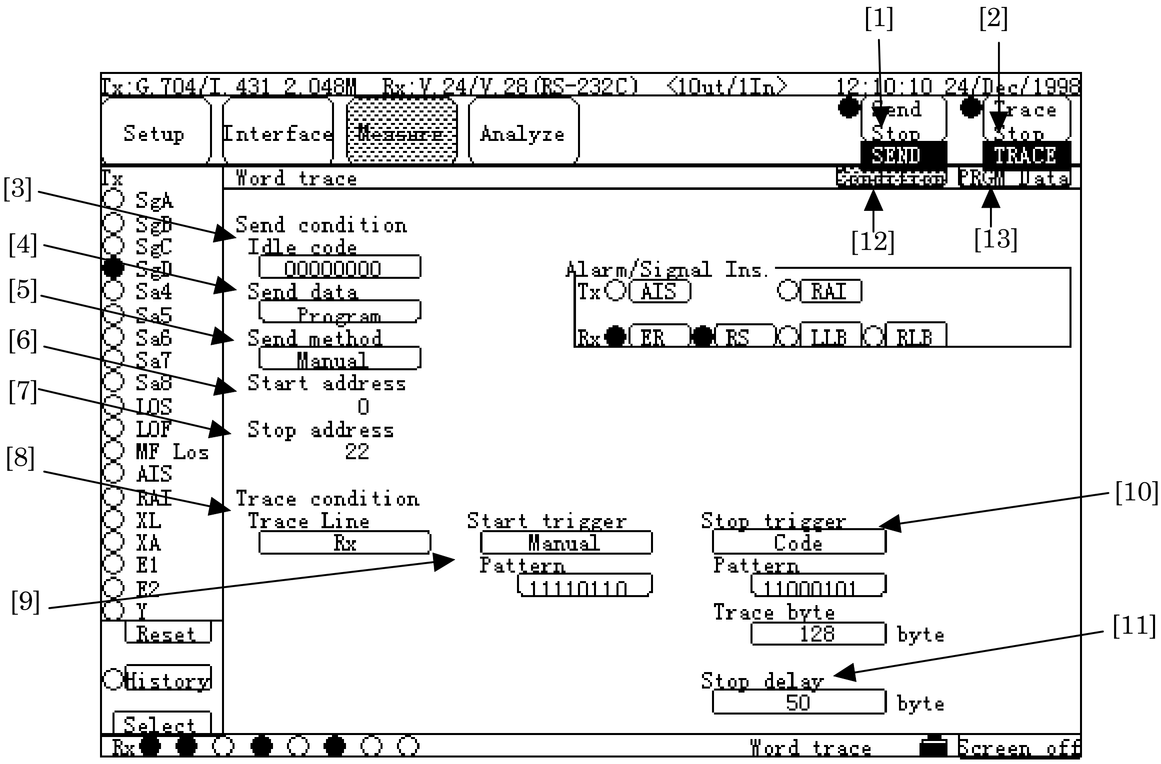


<table>
<tr><th>No</th><th>Item</th><th>Description</th></tr>
<tr><td>[1]</td><td>Start/Stop</td><td>Starts/stops the digital level measurement.

The lamp on the left to the button, and the highlighted display field below the button indicate the following states:
<table>
<tr><th>Digital level measurement state</th><th>Button indication</th><th>Highlighted display field</th><th>Lamp</th></tr>
<tr><td>Stopping</td><td>"Start"</td><td>None</td><td>○</td></tr>
<tr><td>Measuring</td><td>"Stop"</td><td>"MEAS"</td><td>●</td></tr>
</table></td></tr>
<tr><td>[2]</td><td>Line select</td><td>Sets the object line of measurement.</td></tr>
<tr><td>[3]</td><td>PCM Code</td><td>Sets PCM code.</td></tr>
<tr><td>[4]</td><td>(Result)</td><td>Displays the results of digital level measurement.
The lamp lights in a period of measurement.</td></tr>
</table>

5.2.4.7 Word trace sub-screen

■ **Display of Condition**

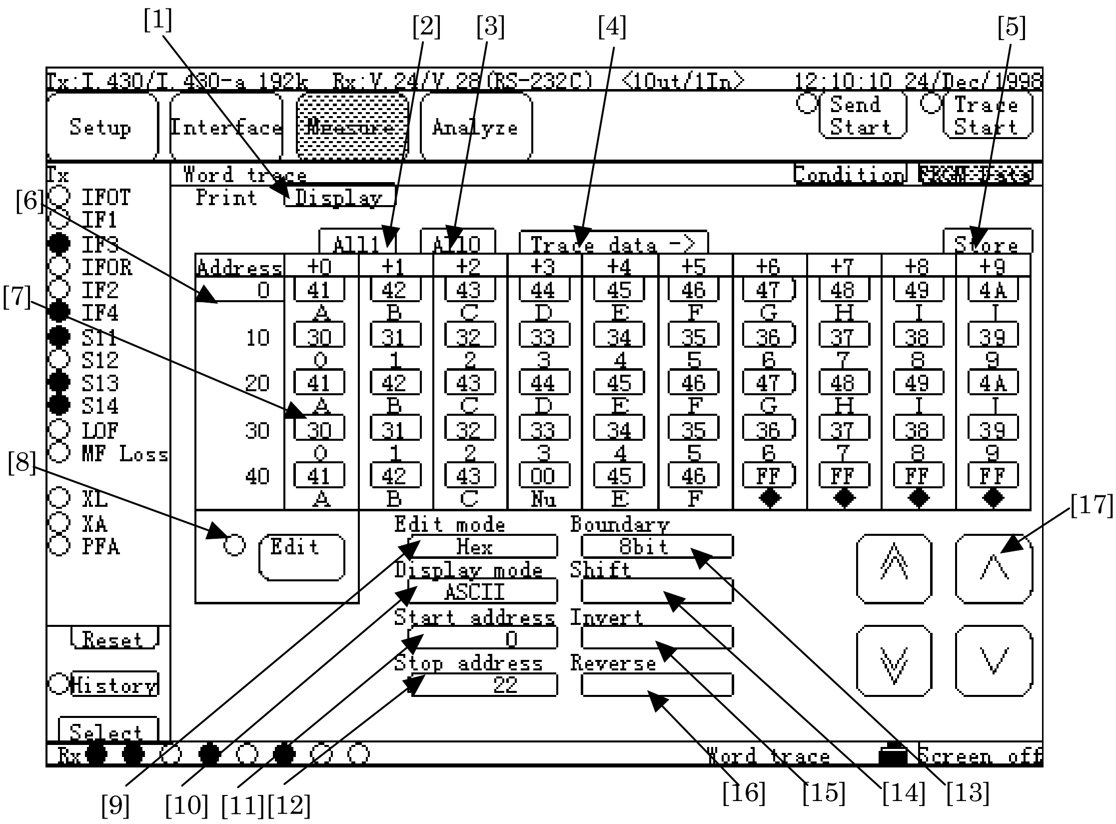


No	Item	Description
[1]	Send	Starts/stops sending the data. The lamp on the left to the button, and the highlighted display field below the button indicate the following states: <table><tr><td>State of sending data</td><td>Button indication</td><td>Highlighted display field</td><td>Lamp</td></tr><tr><td>Stopping</td><td>"Send Start"</td><td>None</td><td>○</td></tr><tr><td>Sending</td><td>"Send Stop"</td><td>"SEND"</td><td>●</td></tr></table>

<table>
<tr><td>[2]</td><td>Trace</td><td>Starts/stops the word trace measurement.
The lamp on the left to the button, and the highlighted display field below the button indicate the following states:
<table>
<tr><th>State of word trace measurement</th><th>Button indication</th><th>Highlighted display field</th><th>Lamp</th></tr>
<tr><td>Stopping</td><td>"Send Start"</td><td>None</td><td>○</td></tr>
<tr><td>Waiting for the start trigger</td><td>"Trace Stop"</td><td>"WAIT"</td><td>●</td></tr>
<tr><td>Tracing</td><td>"Trace Stop"</td><td>"TRACE"</td><td>●</td></tr>
</table></td></tr>
<tr><td>[3]</td><td>Idle code</td><td>Sets the code to be sent in the idle state.
This is the word pattern sent when the PRGM Data (send data) is not sent.</td></tr>
<tr><td>[4]</td><td>Send data</td><td>Selects the send data pattern.</td></tr>
<tr><td>[5]</td><td>Send method</td><td>Sets the send method of the pattern.</td></tr>
<tr><td>[6]</td><td>Start address</td><td>Displays the start address of send data pattern.</td></tr>
<tr><td>[7]</td><td>Stop address</td><td>Displays the stop address of send data pattern.</td></tr>
<tr><td>[8]</td><td>Trace line</td><td>Sets the line to be traced.</td></tr>
<tr><td>[9]</td><td>Start trigger
Pattern*1</td><td>Sets the start trigger of trace.
Set the trace start code.</td></tr>
<tr><td>[10]</td><td>Stop trigger
Pattern
Trace byte</td><td>Sets the stop trigger of trace.
Sets the trace stop code.
Sets the number of bytes to be traced.</td></tr>
<tr><td>[11]</td><td>Stop delay</td><td>Sets the stop delay.</td></tr>
<tr><td>[12]</td><td>Condition</td><td>Displays the screen where the conditions for word trace measurement can be set.</td></tr>
<tr><td>[13]</td><td>PRGM Data</td><td>Displays the screen where the send data pattern can be edited.</td></tr>
</table>

*1 : In except patterns that are transmitted by 8-bits unit (8 bits data length in the start/stop mode, 64k×n bit/s data bit rate in framed signal), 2-bytes consecutive set patterns are regarded as the start trigger of trace.

■ Display of PRGM Data：Hex



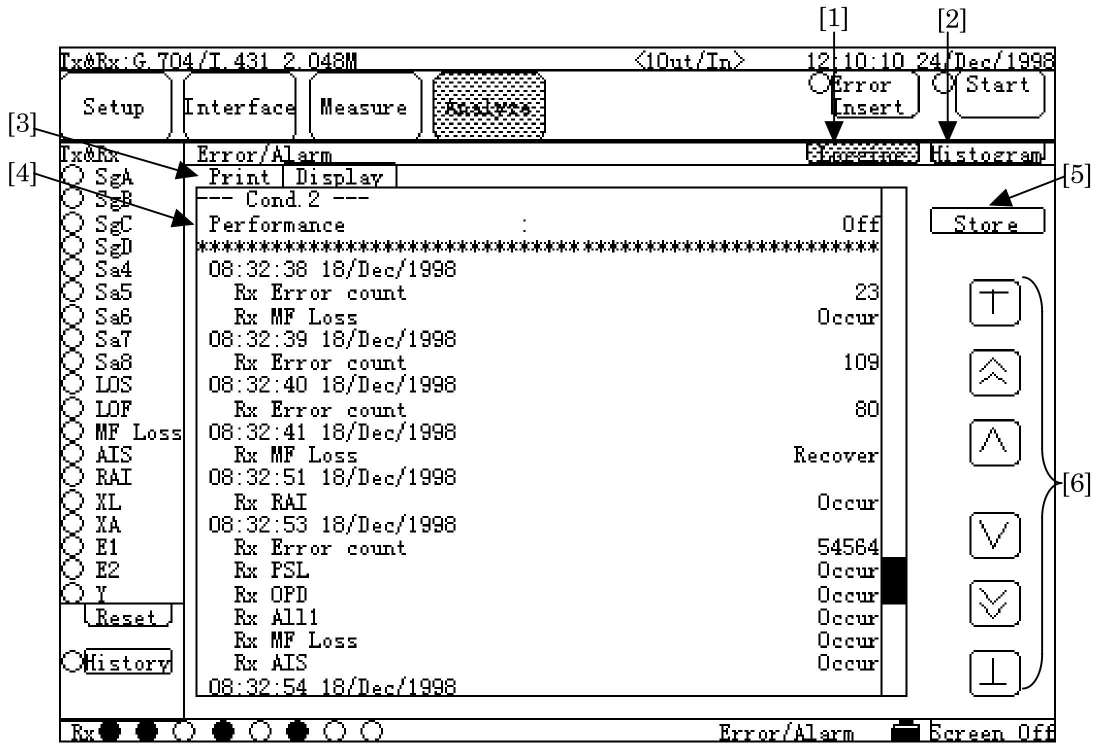
No	Item	Description
[1]	Print	Selects the contents of send data (PRGM Data) to be printed by pressing the "Print Now" key, as follows. ・Display:Prints the contents of current displaying data. ・All :Prints the contents of data from the first to the last. ・After :Prints the contents of data following the current displaying data. ・Before :Prints the contents of data preceding the current displaying data.
[2]	All1	Sets 1 to all bits of send data.
[3]	All0	Sets 0 to all bits of send data.
[4]	Trace data	Copies the trace data of the Analyze screen to send data.
[5]	Store	Saves the send data to the memory, as follows. By pressing this button, the character string entry window opens. After specifying a name; it is saved in the memory, and displayed in "Analyze&Programmable data" of the Setup:Memory screen.
[6]	(Address)	Sets the start address for display.

[7]	(PRGM date)	Displays the send data, as follows. Individual data is displayed, at the upper part, in the edit mode set in [9]; and at the lower part, in the display mode set in [10]. Also, when Edit "ON" selected in [8], performs the editing data in the upper part.
[8]	Edit	Changes ON/OFF of the edit mode of the send data. ● :Send data editable ○ :Send data not editable (display only)
[9]	Edit mode	Sets the edit method.
[10]	Display mode	Sets the display mode of the send data.
[11]	Start address	Sets the first address of the send data.
[12]	Stop address	Sets the last address of the send data.
[13]	Boundary	Sets the number of bits to be used.
[14]	Shift	Sets the bit shift.
[15]	Invert	Inverts logic.
[16]	Reverse	Reverses MSB/LSB.
[17]	(Cursor) ⩓ ⩔ ∧ ∨	These cursors are used to scroll the current displaying send data: Scrolls the page by one page forward. Scrolls the page by one page backward Scrolls the line by one line up. Scrolls the line by one line down.

5.2.5 Analyze main-screen

5.2.5.1 Error/Alarm sub-screen

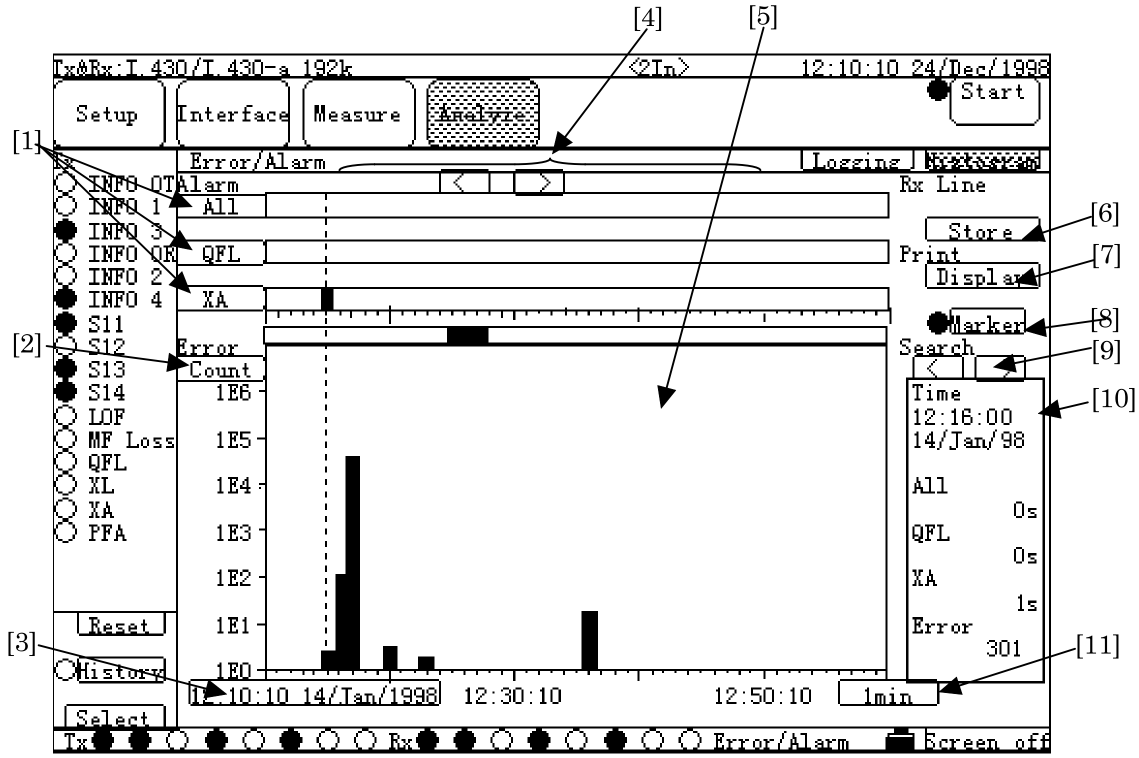
■ **Logging display**



No	Item	Description
[1]	Logging	Displays the results of error/alarm measurement as log data. When this screen is displayed, the label lights up in green.
[2]	Histogram	Displays the results of error/alarm measurement as graph data. When this screen is displayed, the label lights up in green.
[3]	Print	Selects the contents of log data to be printed by pressing the "Print Now" key, as follows. ・Display :Prints the contents of current displaying data. ・All :Prints the contents of data from the first to the last. ・After :Prints the contents of data following the current displaying data. ・Before :Prints the contents of data preceding the current displaying data.
[4]	(Data)	Displays the results of error/alarm measurement as log data. For details, see para. "6.2 Printing".

[5]	Store	Saves the log data to the memory, as follows. By pressing this button, the character string entry window opens. After specifying a name; it is saved in the memory, and displayed in "Analyze&Programmable data" of the Setup:Memory screen.
[6]	(Cursor) ⊤ ⩓ ∧ ∨ ⩔ ⊥	These cursors are used to scroll the log data: Moves to the first line. Scrolls the screen by the half of the screen upward. Scrolls the line by one line up. Scrolls the line by one line down. Scrolls the screen by the half of the screen downward. Moves to the last line.

■ Histogram display

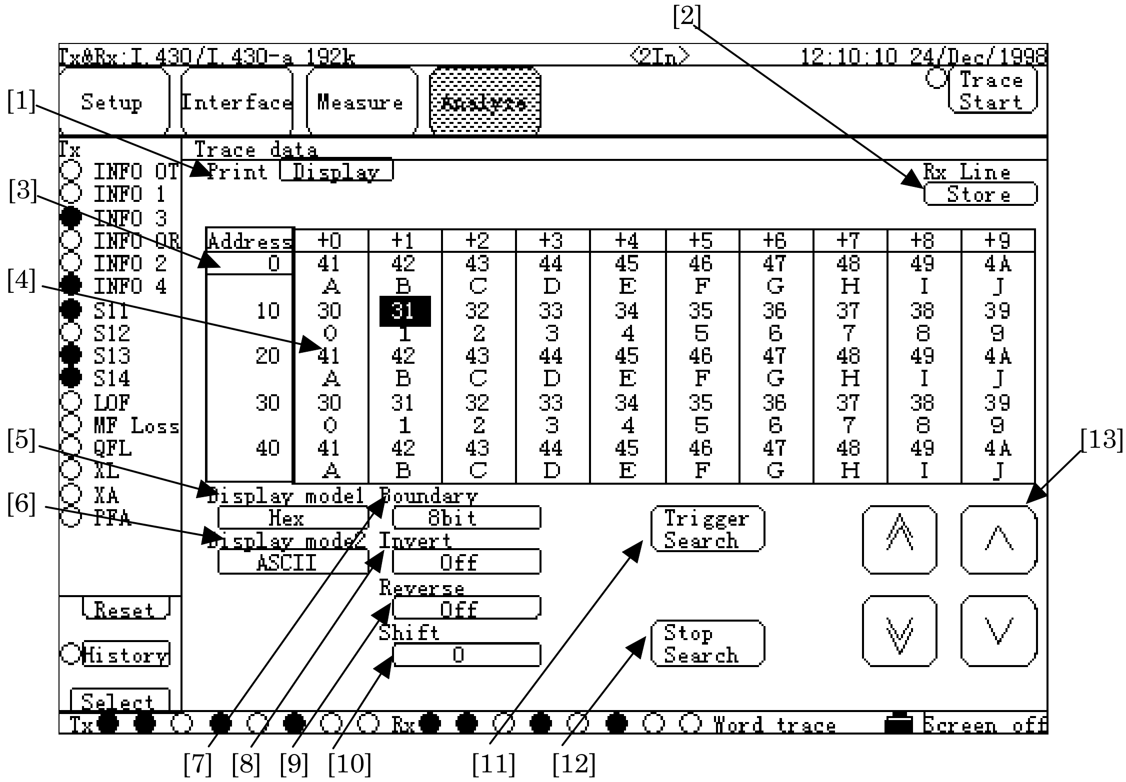


No	Item	Description
[1]	Alarm	Sets the alarm items to be displayed. Up to three items can be set. If the set alarm occurs, it is indicated in red on the graph at the occurrence time.
[2]	(Count/Rate)	Sets the error display format, as follows. ・Count :Displays the number of errors occurred. ・Rate :Displays the rate of errors occurred.
[3]	Start time	Sets the start time of displaying data.
[4]	(Cursor)	These cursors are used to scroll the horizontal axis of graph data, as follows: Moves to the start point. Scrolls the graph by the half of the graph leftward. Scrolls the graph to the left. Scrolls the graph to the right. Scrolls the graph by the half of the graph rightward. Moves to the last data.
[5]	(Graph)	Displays the results of error/alarm measurement, graphically.

[6]	Store	Saves the graph data to the memory, as follows. By pressing this button, the character string entry window opens. After specifying a name; it is saved in the memory, and displayed in "Analyze&Programmable data" of the Setup:Memory screen.
[7]	Print	Selects the contents of graph data to be printed by pressing the "Print Now" key, as follows. ・Display :Prints the contents of current displaying data. ・All :Prints the contents of data from the first to the last. ・After :Prints the contents of data following the current displaying data. ・Before :Prints the contents of data preceding the current displaying data.
[8]	Marker	Indicates ON/OFF of the marker. ○ :Marker is OFF. ● :Marker is ON. The dashed line on the graph indicates the place of the marker.
[9]	Search	Searches where the error/alarm has occurred, as follows. < :Searches forward. > :Searches backward.
[10]	(Marker)	Displays the detailed data of error/alarm with both the time and location of the marker.
[11]	(Interval)	Sets the interval of time axes of the graph data. The set range depends on the setting in the "Histogram resolution" of the Measure:Error/Alarm screen.

5.2.5.2 Trace data sub-screen

■ **Hex display**

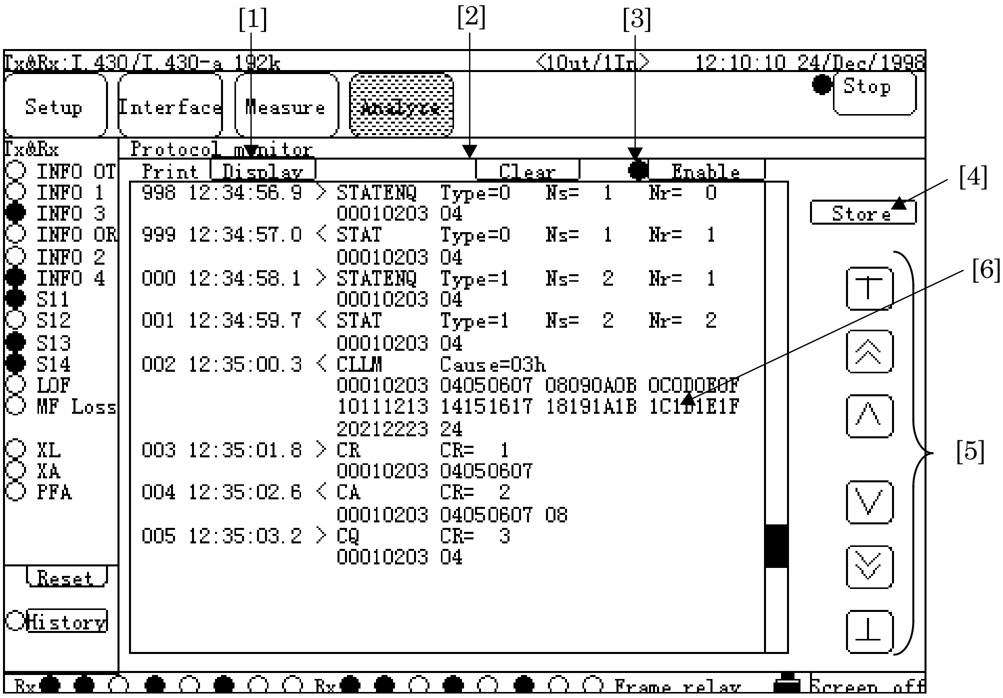


No	Item	Description
[1]	Print	Selects the contents of data to be printed by pressing the "Print Now" key, as follows. ・Display :Prints the contents of current displaying data. ・All :Prints the contents of data from the first to the last. ・After :Prints the contents of data following the current displaying data. ・Before :Prints the contents of data preceding the current displaying data.
[2]	Store	Saves the trace data to the memory, as follows. By pressing this button, the character string entry window opens. After specifying a name; it is saved in the memory, and displayed in "Analyze&Programmable data" of the Setup:Memory screen.
[3]	(Address)	Sets the start address of trace data for display.
[4]	(Trace data)	Displays the trace data, as follows. Individual data is displayed, at the upper part, in the edit mode set in [5]; and at the lower part, in the display mode set in [6]. Also, the stop trigger point is highlighted.
[5]	Display mode1	Sets the display mode of trace data.
[6]	Display mode2	Sets the display character code of trace data.

[7]	Boundary	Sets the number of bits to be used.
[8]	Invert	Inverts the logic.
[9]	Reverse	Reverses MSB/LSB.
[10]	Shift	Sets the bit shift.
[11]	Trigger Search	Searches the stop trigger. Searching can be executed only by pressing here.
[12]	Stop Search	Searches the stop point of trace. Searching can be executed only by pressing here.
[13]	(Cursor) ︽ ︾ ∧ ∨	These cursors are used to: Scrolls the page by one page forward. Scrolls the page by one page backward. Scrolls the line by one line up. Scrolls the line by one line down.

5.2.5.3 Protocol monitor sub-screen

■ **Frame relay measurement**



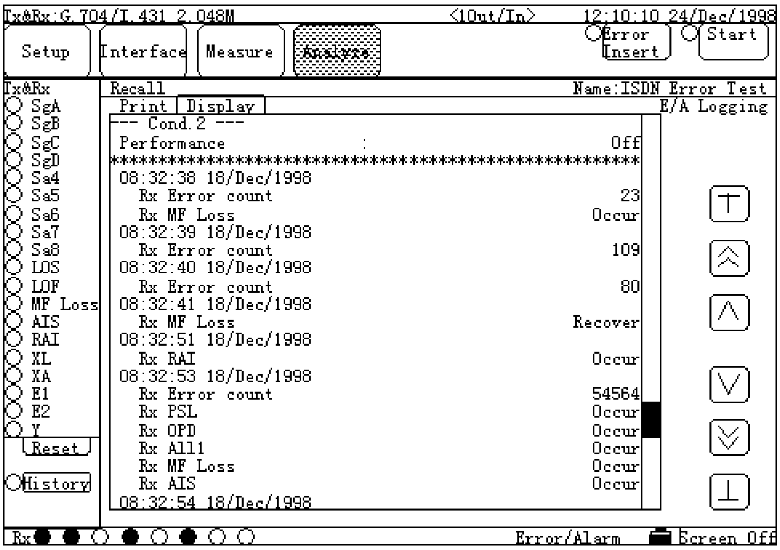
No	Item	Description
[1]	Print	Selects the contents of protocol monitor data to be printed by pressing the "Print Now" key , as follows. ・Display : Prints the contents of current displaying data. ・All : Prints the contents of data from the first to the last. ・After : Prints the contents of data following the current displaying data. ・Before : Prints the contents of data preceding the current displaying data.
[2]	Clear	Clears the contents of data from the first to the last.
[3]	Enable	Starts/Stops displaying the results of monitoring protocol data. ○ : Not display the result of monitoring. ● : Displays the result of monitoring.
[4]	Store	Saves the protocol monitor data to the memory , as follows. By pressing this button , the character string entry window opens. After specifying a name ; it is saves in the memory , and displayed in "Analyze & Programmable data" of the Setup:Memory screen.

[5]	(Cursor) ⊤ ⩓ ∧ ∨ ⩔ ⊥	These cursors are used to scroll the log data: Moves to the first line. Scrolls the screen by the half of the screen upward. Scrolls the line by one line up. Scrolls the line by one line down. Scrolls the screen by the half of the screen downward. Moves to the last line.
[6]	(Data)*	Displays monitoring CLLM , PVC status confirmation procedure and the contents of the packet which has the specified DLCI. The format of displayed data refer to Appendix C.

*: When the ISDN calling /be called function is valid , displays the results of monitoring the information on the layer 3.

5.2.5.4 Recall sub-screen

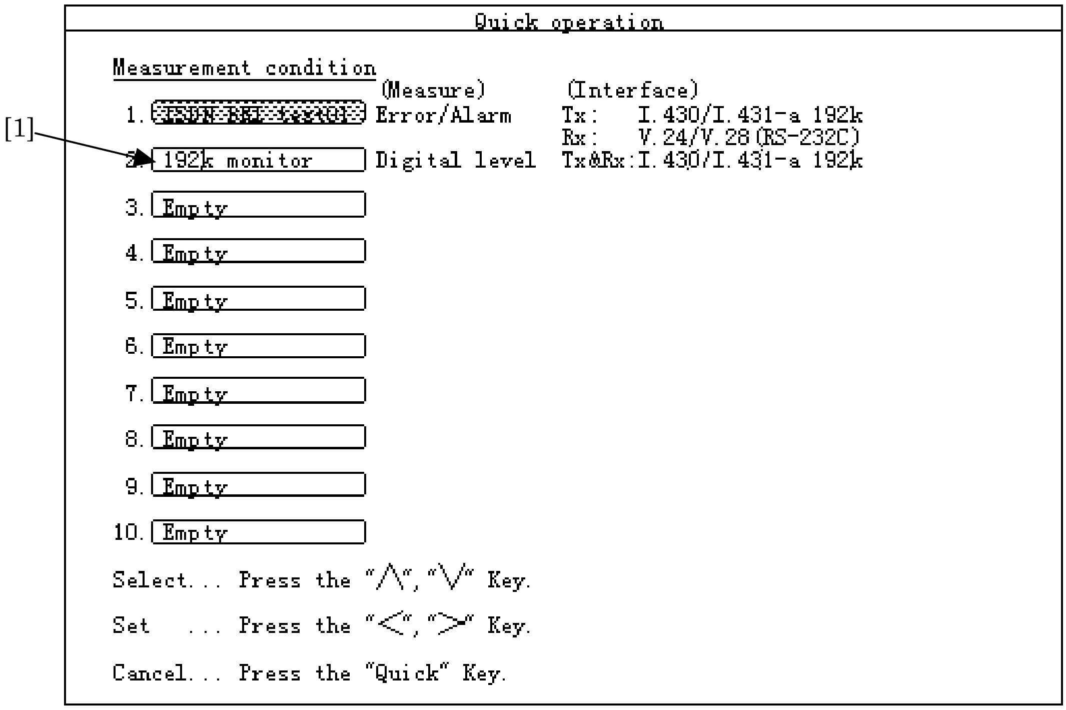
■ **Error/Alarm Logging display**



The method of operation is the same as that for the Logging display of the Analyze:Error/Alarm screen. However, the "Store" cannot be used. The method of each operation of other Recall screens is the same as that for the corresponding Analyze screen, and the "Store" cannot be used.

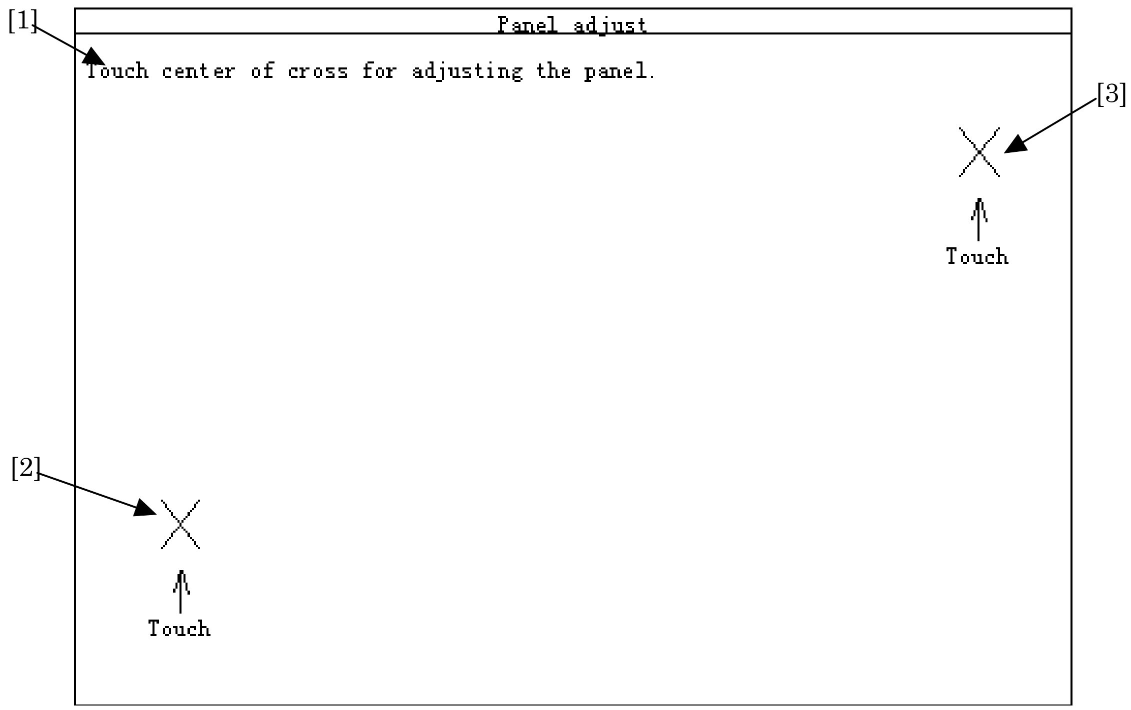
5.2.6 Special screen

5.2.6.1 Quick Operation screen



No	Item	Description
[1]	Measurement condition	Displays the measurement condition data or the measured results data stored in the internal memory.
	(Measure)	Displays the Measurement conditions screen of the stored data.
	(Interface)	Displays the type of interface.

5.2.6.2 Panel adjust screen



No	Item	Description
[1]	(Message)	Displays the operation method by messages.
[2]	(Adjust point1)	Indicates the Adjust point 1.
[3]	(Adjust point2)	Indicates the Adjust point 2.

For details, see para. 8.4 "Adjusting Touch Panel".

5.3 Method of Operation

To operate the MD6430A, the following three methods can be used:

- Touch panel operation
- Button operation
- Remote operation

Generally, the touch panel operation is the basic among the above three methods.
In the touch panel operation, the following two operations are involved. These two operations as well as the above operations are described in this section.

- Operation of switching screen
- Quick operation

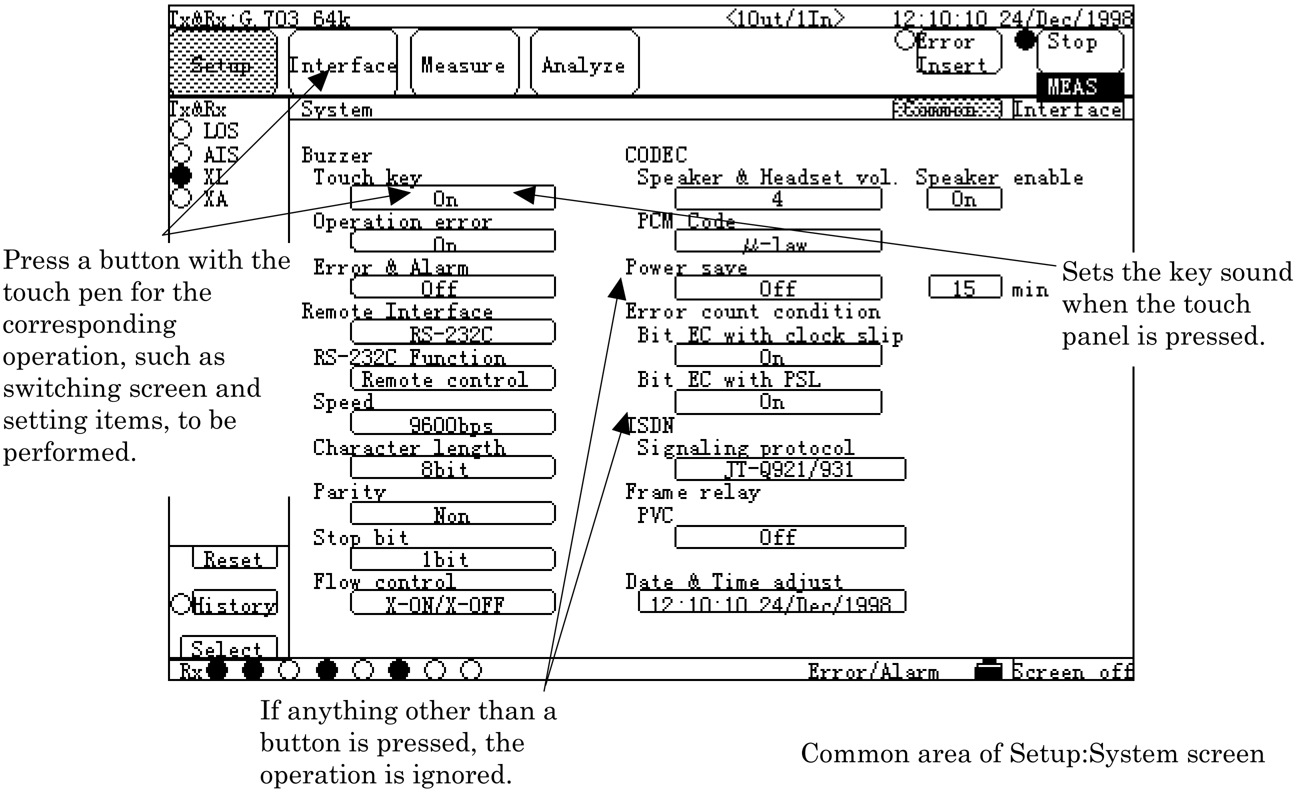
5.3.1 Touch panel operation

The touch panel operation is the basic operation of the MD6430A.
In the touch panel operation, the switching-screen operation and the quick operation are involved. These two operations are described in the following two paragraphs.
In this paragraph, the basic operation of the touch panel is described.

To use the touch panel function, perform the calibration by referring to para. 8.4 "Adjusting Touch Panel".
Also, use the touch pen of an supplied accessory for the touch panel operation.

■ Example of basic operation

Examples of the touch panel operation are described below



Common area of Setup:System screen

Fig. 5.3-1 Touch Panel Operation

Note:

(1) Do not apply a high pressure on the panel. The screen may be broken. If broken, never touch the broken screen.

(2) When the Panel Lock/Remote lamp is ON; press the Panel Lock/Remote key (at the right of the front panel) and wait for the lamp to turn OFF, and then operate the touch panel.

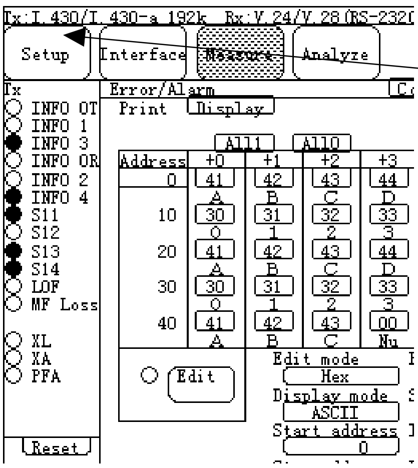
5.3.2 Switching screen

The MD6430A has four main screens, 17 sub-screens, and extension screens for each sub-screen.
In general, one sub-screen is displayed.
To perform a required setting or measurement, move from the main screen to the required sub-screen or extension screen.

■ Switching to other sub-screen

The procedure for switching to other sub-screen is as follows.
In the steps below, the switching (from the Measure:Error/Alarm sub-screen to the Setup:System sub-screen) is described.

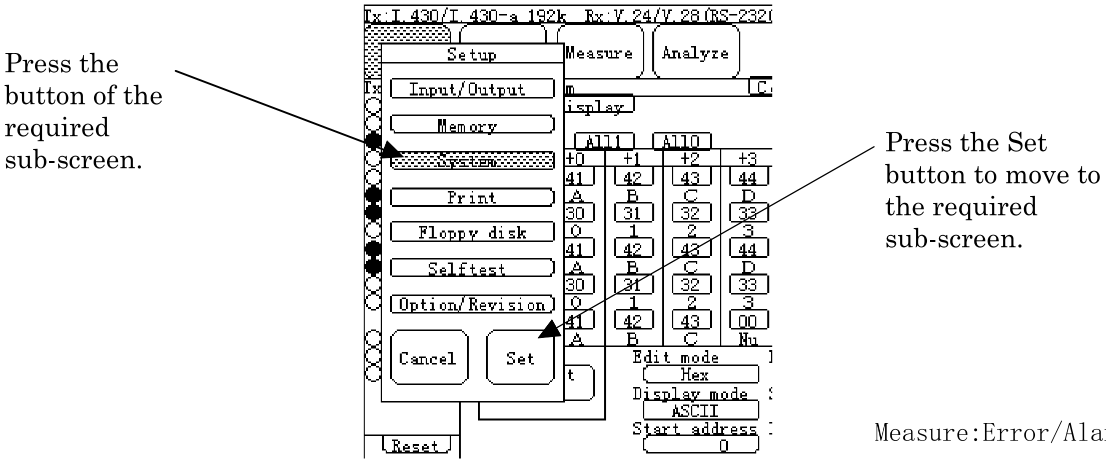
(1) Press the Main screen selection button corresponding to the required sub-screen.
To select a main screen; press one of the four selection buttons (Main screen selection buttons) displayed in the common area, using the touch pen.



Press the button of the required main screen to be moved.

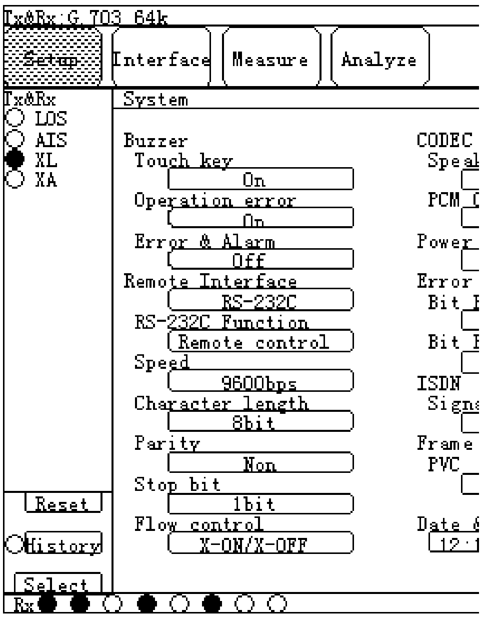
Measure:Error/Alarm sub-screen

(2) After pressing the Main screen selection button, the sub-screen selection window (belonging to the selected main screen) opens. Select the button of the required sub-screen, and press the Set button.



Measure:Error/Alarm sub-screen

(3) The required sub-screen appears.



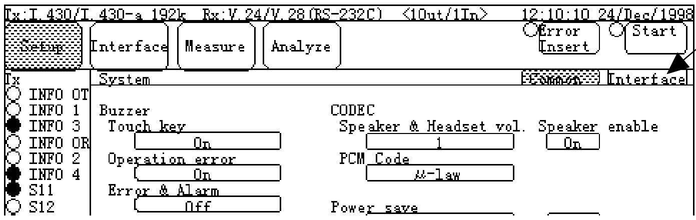
Setup:System sub-screen

■ Switching to other extension screen

(1) First, select and display the sub-screen belonging to the required extension screen.

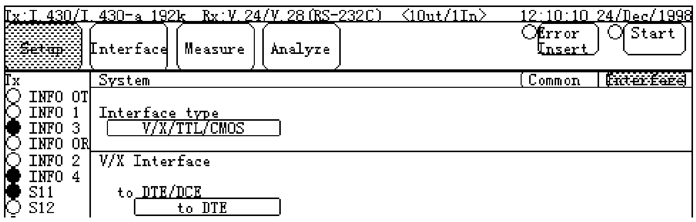
(2) In the extension-screen button area, press the required extension-screen button.

Press the button of the required extension screen.



Common area of Setup:System screen

(3) The required extension screen appears.



Interface area of Setup:System screen

Fig. 5.3-2 An Example of Switching Extension Screen

■ Switching Interface:Interface sub-screen

The method of switching the Interface:Interface sub-screen differs from that of the other sub-screens. Also, the number of pages to be displayed depends on the type of the selected interface.

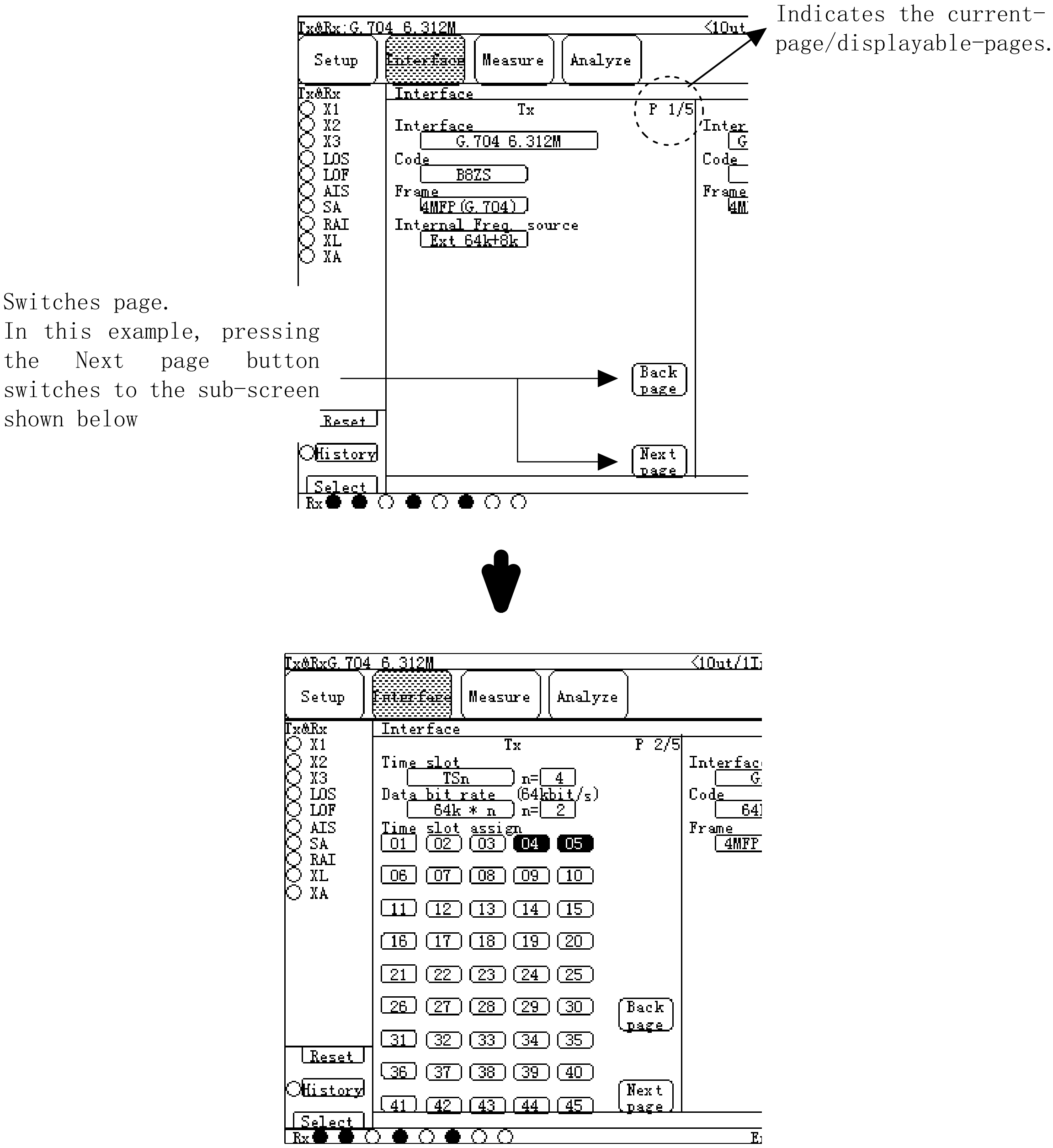


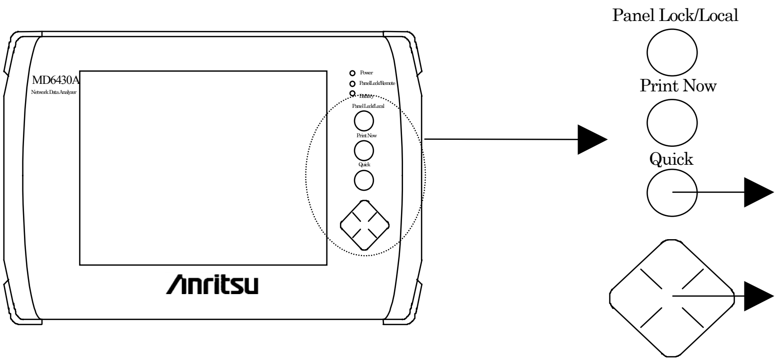
Fig. 5.3-3 An Example of Switching Interface:Interface Sub-screen

5.3.3 Quick operation

The quick operation is used to change the measurement conditions quickly. Therefore, prior to this operation, the measurement conditions must be registered. For details of the method of registering the measurement conditions, see para. 6.3 "Saving in Memory".

The steps of the quick operation are as follows.

(1) Press the Quick key on the right of the front panel of the MD6430A.



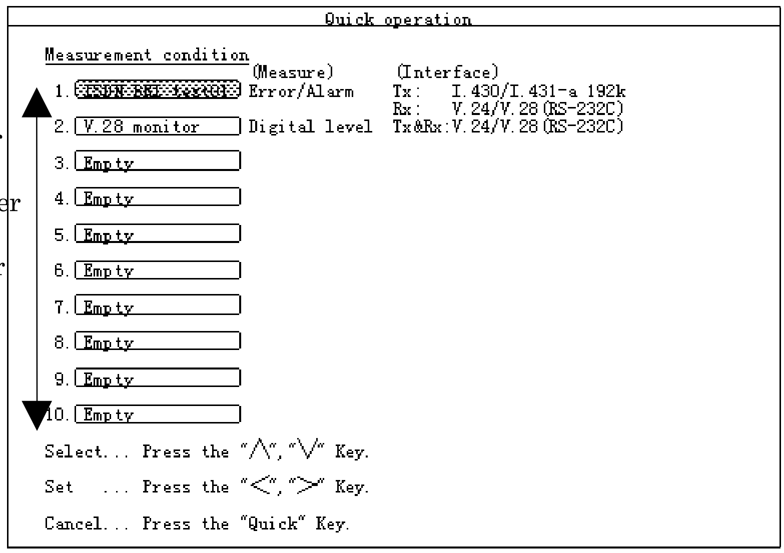
Quick key
Displays the Quick operation screen.

Cursor keys
Selects the item of measurement condition on the Quick operation screen.

(2) The Quick operation screen appears.

(3) From the list of the measurement conditions, select the desired condition number by using the Up/Down cursor keys (∧ and ∨) on the front panel to move the cursor to the desired registration number.
Recall the desired item of the measurement condition in the selected number by using the Left/Right cursor keys (< and >).

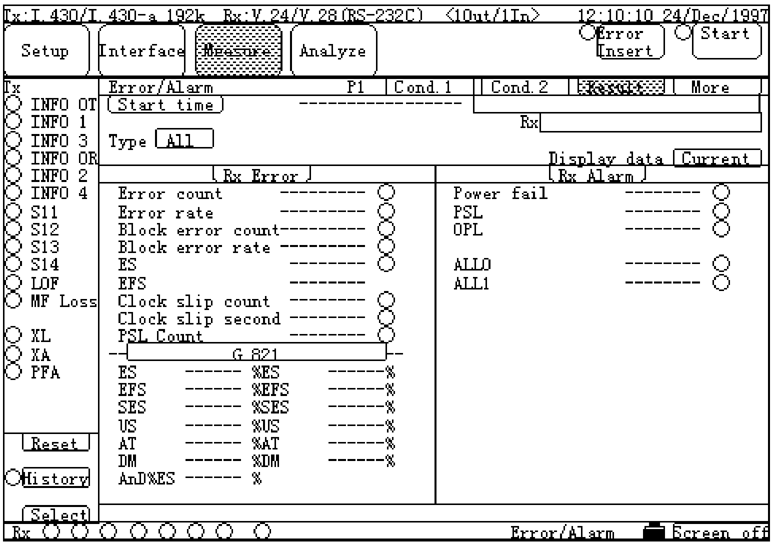
Move the cursor to the desired condition number using the Up/Down cursor keys ("∧" and "∨").



Quick operation screen

Recall the desired item of the measurement condition in the selected number using the Left/Right cursor keys (< and >), then the corresponding screen appears.

(4) The selected measurement condition which is saved are recalled, and the screen corresponding to the measurement mode appears.



Result display of the Measure:Error/Alarm screen

Fig. 5.3-4 Quick Operation Screen

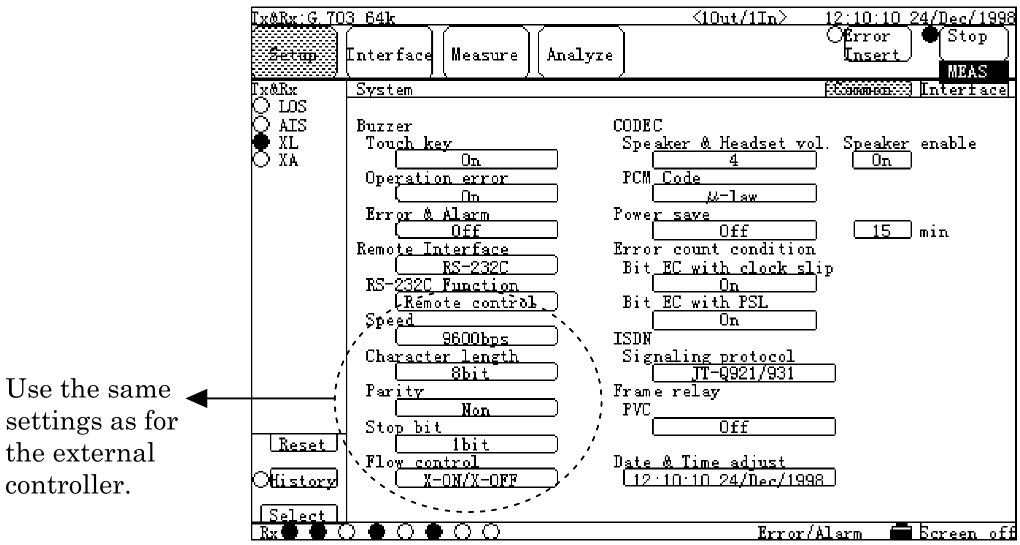
5.3.4 Remote operation

The remote operation is used to perform the measurement/analysis at a location far from the MD6430A.
The external controller to be used for the remote operation must have a communication software of the RS-232C. Or, use the same communication software as that of the remote sample program shipped with the MD6430A.

(1) Connect the MD6430A to an external controller by the RS-232C cable.
For details of the cable connection, see para. 3.4 "Connecting Peripheral Equipment".

(2) On the Common area of the Setup:System screen, set the items of "RS-232C Remote Interface".
The item of "Function" sets "Remote control" , other items set the same setting for the external controller.

(3) Send the remote command from the external controller to the MD6430A.
When the MD6430A receives the command, the Panel Lock/Remote lamp on the right of the front panel turns on to indicate that the touch panel operation becomes unavailable.
When the touch panel operation is desired again; press the Panel Lock/Remote button on the right of the front panel to turn the Panel Lock/Remote lamp off.



Common area of Setup:System screen

Fig. 5.3-5 Remote Setup Screen for RS-232C

5.4 Method of Setting

5.4.1 Entering numeric value

For setting by entering a numeric value, a value entry window opens.
On the window, enter numeric values and press the "Set" button to complete the setting.
There are three types of the Decimal entry, Hexadecimal entry, and Binary entry windows.
The operation procedure for each value entry window is described in this section.

- **Decimal entry window**

(1) When a Decimal entry window opened, the following window appears.

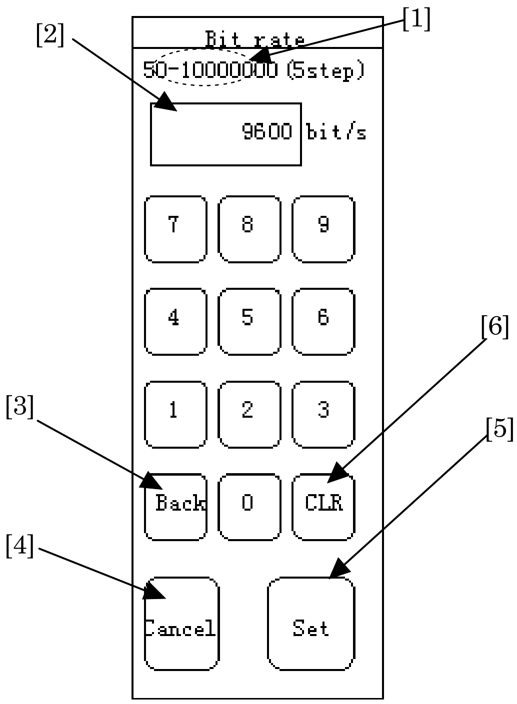


Fig. 5.4-1 Decimal Entry Window

(2) Enter the desired values in the range of "0" to "9". The [1] in Fig. 5.4-1 Decimal Entry Window indicates the range of set values. (The [2] indicates the initial values or values before change.)

- When the number of digits of the entered value exceeds the maximum digits:
  The highest digit is deleted.
- When corrects the latest entered value (lowest digit of 1 order):
  Press the "Back" button ([3] in Fig. 5.4-1 Decimal Entry Window) to delete the lowest digit so that the number of entered digits is decreased.
- When clears all the entered value:
  Press the "CLR" button ([6] in Fig. 5.4-1 Decimal Entry Window).

(3) When the entering value completed, press the "Set" button ([5] in Fig. 5.4-1 Decimal Entry Window).

(4) The Decimal entry window is closed, automatically; and the setting is completed.

- When trying to stop the setting, press the "Cancel" button ([4] in Fig. 5.4-1 Decimal Entry Window) to reset the value to the previous value.
- Some items do not open the entry window because the corresponding window does not exist. For details, see para. 5.4.4 "One-shot entry".

■ Hexadecimal entry window

(1) When a hexadecimal entry window opened, the following window appears.

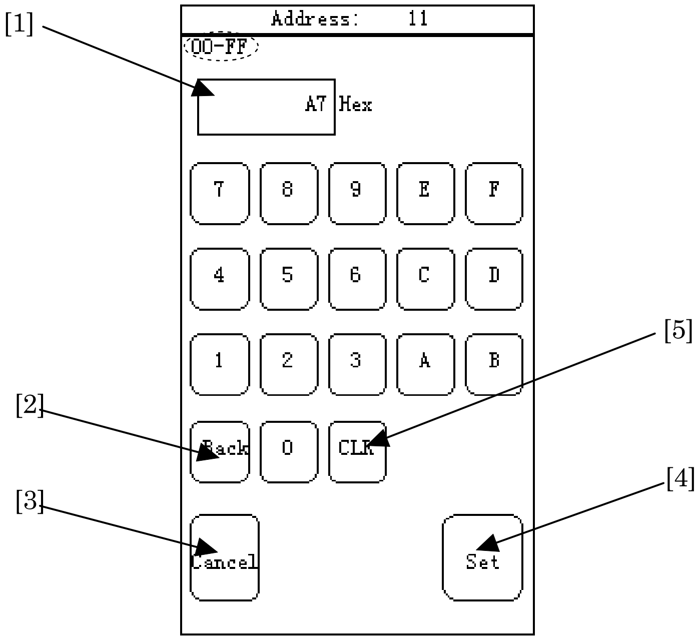


Fig. 5.4-2 Hexadecimal Entry Window

(2) Enter the desired values in the range of "0" to "F".
(The [1] in Fig. 5.4-2 indicates the initial values or values before change.)

- When the number of digits of the entered value exceeds the maximum digits:
  The highest digit is deleted.
- When corrects the latest entered value (lowest 16^0 digit):
  Press the "Back" button ([2] in Fig. 5.4-2) to delete the 16^0 digit so that the number of entered digits is decreased
- When clears all the entered value:
  Press the "CLR" button ([5] in Fig. 5.4-2).

(3) When the entering value completed, press the "Set" button ([4] in Fig. 5.4-2).

(4) The Hexadecimal entry window is closed, automatically; and the setting is completed.

- When trying to stop the setting, press the "Cancel" button ([3] in Fig. 5.4-2) to reset the value to the previous value.
- Some items do not open the entry window because the corresponding window does not exist. For details, see para. 5.4.4 "One-shot entry".

■ Binary entry window 1

(1) When a Binary entry window opened, the following window appears.

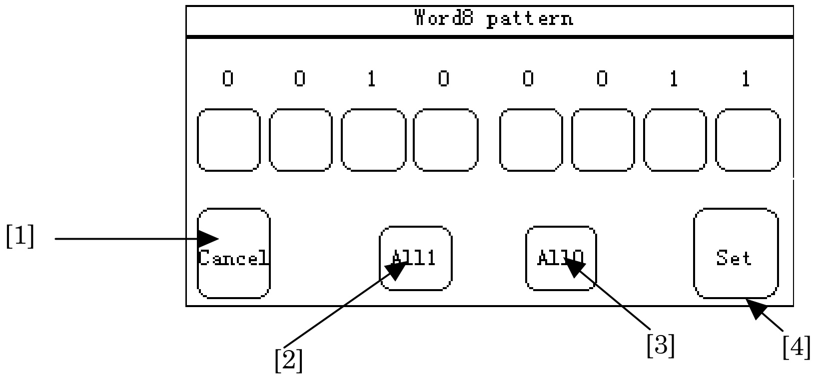


Fig. 5.4-3 Binary Entry Window 1

(2) Set the desired binary value to the bit corresponding to each bit button.

Pressing the bit button performs the following operations:

- The value 0 is changed to 1.
- The value 1 is changed to 0.

Pressing the "All1" button ([2] in Fig. 5.4-3) and the "All0" button ([3] in Fig. 5.4-3) perform the following operations, respectively:

- Pressing the "All1" button changes all bits to 1.
- Pressing the "All0" button changes all bits to 0.

(3) When the entering value completed, press the "Set" button ([4] in Fig. 5.4-3).

(4) The Binary entry window is closed, automatically; and the setting is completed.

- When trying to stop the setting, press the "Cancel" button ([1] in Fig. 5.4-3) to reset the value to the previous value.
- Some items do not open the entry window because the corresponding window does not exist. For details, see para. 5.4.4 "One-shot entry".

■ Binary entry window 2

(1) When a Binary entry window opened, the following window appears.

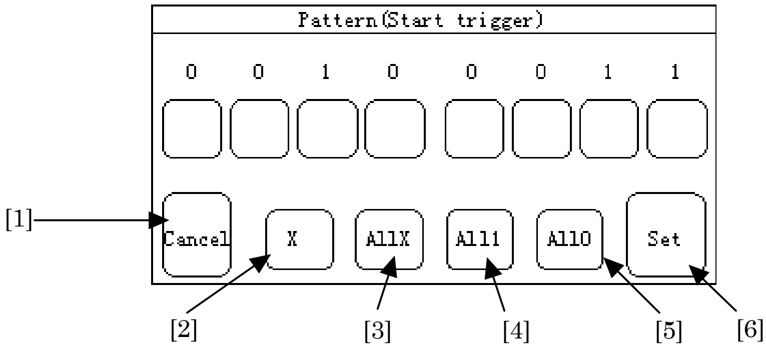


Fig. 5.4-4 Binary Entry Window 2

(2) Set the desired binary value to the bit corresponding to each bit button.

Pressing the bit button performs the following operations
(when the "X" button ([2] in Fig. 5.4-4) is "OFF"):

- The value 0 is changed to 1.
- The value 1 is changed to 0.
- The value X is changed to the previous value (0 or 1).

Pressing the bit button performs the following operations
(when the "X" button ([2] in Fig. 5.4-4) is "ON"):

- The value 0 is changed to X.
- The value 1 is changed to X.
- The value X is changed to the previous value (0 or 1).

Pressing the "AllX" button ([3] in Fig. 5.4-4), "All1" button ([4] in Fig. 5.4-4) and the "All0" button ([5] in Fig. 5.4-4) perform the following operations, respectively:

- Pressing the "All1" button changes all bits to 1.
- Pressing the "All0" button changes all bits to 0.
- Pressing the "AllX" button changes all bits to X.

(3) When the entered value completed, press the "Set" button ([6] in Fig. 5.4-4).

(4) The Binary entry window is closed, automatically; and the setting is completed.

- The X button ([2] in Fig. 5.4-4) is "OFF" immediately after the window is opened. Each time you press the button, the state is toggled between ON and OFF. The state of the button is indicated by its color.
  ON : Green
  OFF : White
- When trying to stop setting, press the "Cancel" button ([1] in Fig. 5.4-4) to reset the value to the previous value.
- Some items do not open the entry window because the corresponding window does not exist. For details, see para. 5.4.4 "One-shot entry".

5.4.2　Entering character

For setting by entering characters, the character string entry window opens. On this window, enter a string by alphanumeric and special character buttons, and press the "Set" button to complete the setting.
The operation procedure on the character string entry window is described below.

Setup:System sub-screen

(1)　When the character string entry window opened, the following window appears.

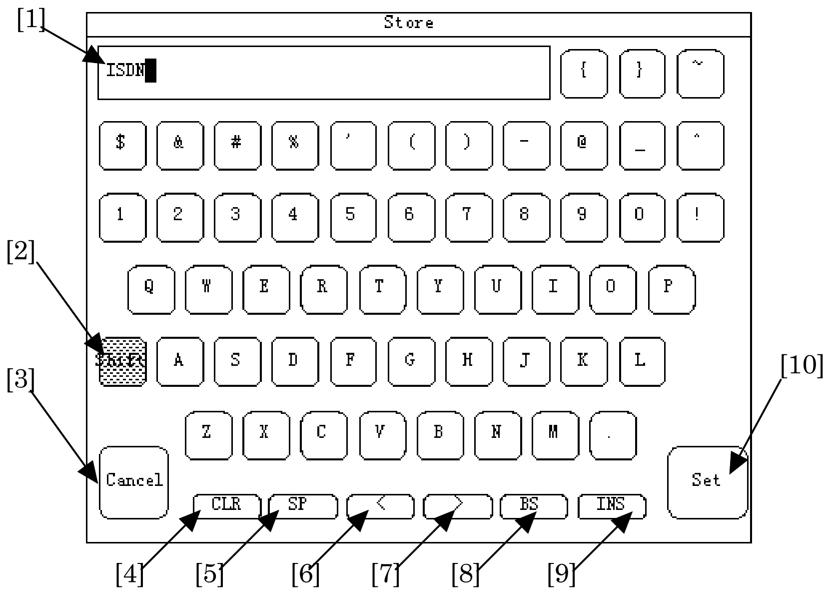


Fig. 5.4-5　Character String Entry Window

(2) Enter the desired characters.
The entered characters are displayed at [1] in Fig. 5.4-5.The following operations can be used.

- Entering an uppercase letter:
  Press the "Shift" button (Fig. 5.4-5,[2]), and then the desired character button to enter the uppercase letter. In the Shift state, the button is illuminated in green. Pressing the "Shift" button ([2]) again to remove the Shift state.
- Entering a blank character:
  Press the "SP" button ([5]).
- Moving the cursor by one character position to the left:
  Press the "<" button ([6]).
- Moving the cursor by one character position to the right:
  Press the ">" button ([7]).
- Deleting all the character string:
  Press the "CLR" button ([4]).
- Deleting a single character:
  Move the cursor at the right of the desired character, and press the "BS" button ([8]).
- Inserting a character into a character string:
  Press the "INS" button ([9]). In the "INS" state, the button is illuminated in green.
  Removing from the "INS" state, press one of the "INS", "<", ">", "BS", or "CLR" button.

At [1] in Fig. 5.4-5, the previous setting is displayed. To set a new character, move the cursor to the most-left end, and enter the desired character to overwrite the old character.

(3) When entering a string completed, press the "Set" button ([10] in Fig. 5.4-5).

(4) The string entry window is closed, automatically; the setting is completed.

- When trying to stop setting, press the "Cancel" button ([3] in Fig. 5.4-5) to reset the value to the previous value.
- In the INS state (when the "INS" button is illuminated in green); the functions by the "<" [6], ">" [7], "BS" [8], and "CLR" [4] buttons do not work. These buttons will work when the INS state is removed.
- Some items do not open the character entry window because the corresponding window does not exist. For details, see para. 5.4.4 "One-shot entry".

5.4.3 Selection entry

For setting by selection entry, the item selection window opens. On this window, select items and press the "Set" key to complete the setting.
The operation procedure on the item selection window is described below.

■ Item selection window

(1) When the item selection window opened, the following window appears.

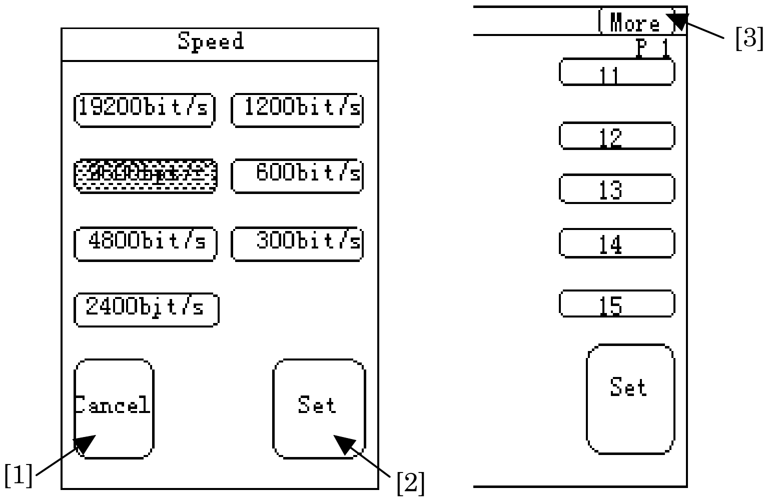


Fig. 5.4-6 Item Selection Window

When the items to be selected are displayed on multiple pages, switch the page to the next page by pressing the "More" button ([3] in Fig. 5.4-6). Also, when the last page is displayed, pressing the "More" button returns the page to the first page.

(2) Select the desired items.

(3) When the selection is completed, press the "Set" button ([2] in Fig. 5.4-6).

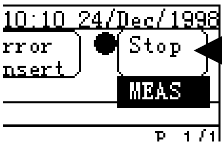
(4) The item selection window is closed, automatically, and the setting is completed.

- When trying to stop the setting, press the "Cancel" button ([1] in Fig. 5.4-6) to reset the value to the previous value.

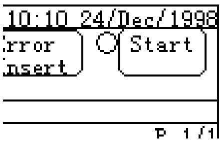
5.4.4 One-shot entry

For setting by one-shot entry, any windows do not open. Instead, by pressing the one-shot entry button, the function is executed.
The following two methods are used for one-shot entry.

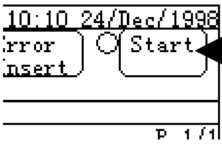
- Case that the state is maintained (toggle switch):



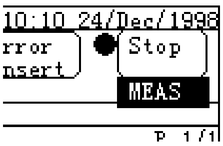
(1) Press the button to execute the function.



(2) Switches to the another different state from that before pressing the button.

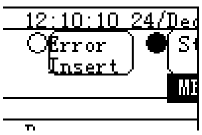


(3) Press the button again.

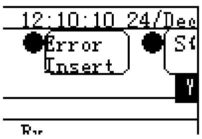


(4) Returns to the original state.

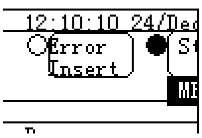
- Case that the state is not maintained (momentary switch):



(1) Press the button.



(2) The button is highlighted at a moment, and the function is executed.



(3) State is the same as that before pressing the button.

5.4.5 Error-addition rate setting window

The error-addition rate setting window is used to set an error-addition rate of Error/Alarm measurement etc..

The operation procedure on the setting window is described below.

(1) Switch to the Measure:Error/Alarm screen.

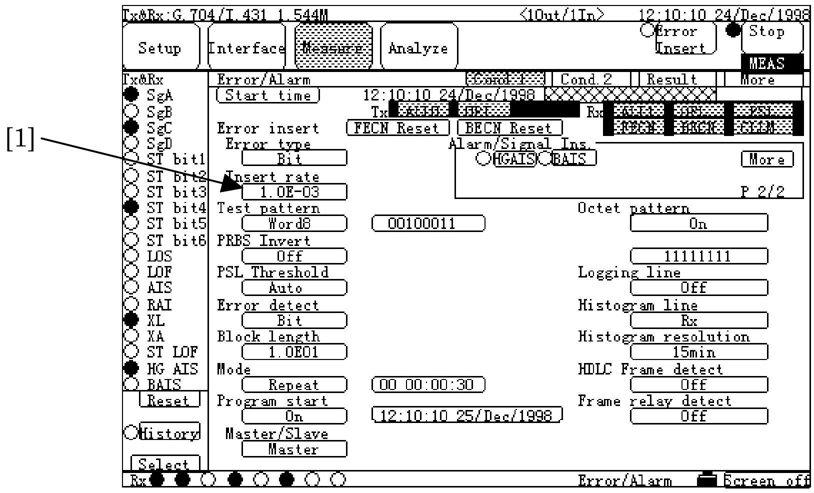


Fig. 5.4-7 Measure:Error/Alarm Screen

(2) Press the "Insert rate" button ([1] in Fig. 5.4-7). When "Single" or "Repeat(1s)" is set in [1], the following window opens. Otherwise, the window in Fig. 5.4-9 opens.

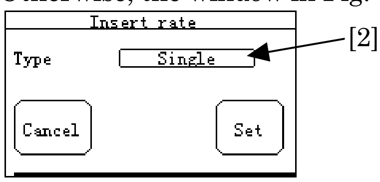


Fig. 5.4-8 Insert Rate Window

(3) Press the "Type" button ([2] in Fig. 5.4-7), then the window shown below opens. On this window, select the type of error rate ([3] in Fig. 5.4-9).

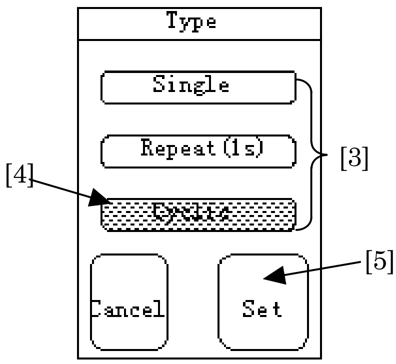


Fig. 5.4-9 Type Setting Window

(4) Select "Cyclic" ([4] in Fig. 5.4-9) and press the "Set" button ([5] in Fig. 5.4-9), then the Error-addition setting window shown below opens.
If [4] not selected, the Insert Rate window (Fig. 5.4-8) is returned again.

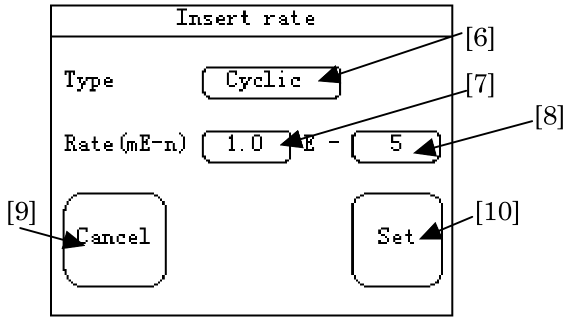


Fig. 5.4-10 Error Addition Setting Window

(5) Press the "Rate:m" button ([7] in Fig. 5.4-10) and the "Rate:n" button ([8] in Fig. 5.4-10) to set each the addition rate with steps from here to 7.
For setting "Rate:m", press the "Rate:m" button ([7] in Fig. 5.4-10), then the window shown below opens.

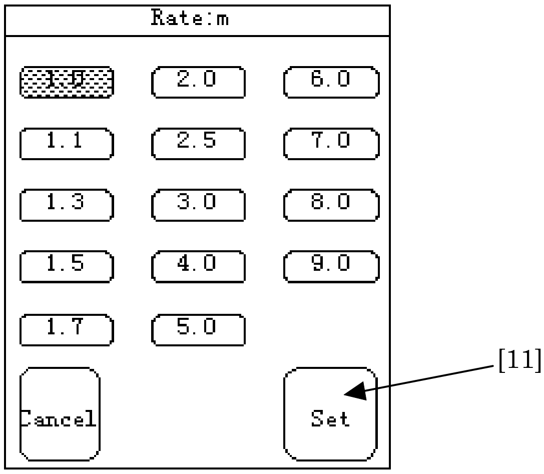


Fig. 5.4-11 ”Rate:m”Window

Since the "Type" of [6] in Fig. 5.4-10 is the same as the "Type" of [6] in Fig. 5.4-9, it need not be set, here.

(6) When the desired rate selection ended, press the "Set" button ([11] in Fig. 5.4-11).

(7) The "Rate:m" setting window is closed, automatically; and the setting of "Rate:m" is completed.

(8) Repeat the steps 5 to 7 to set "Rate:n".

(9) When all the settings completed, press the "Set" button ([10] in Fig. 5.4-9).

(10) The error-addition rate setting window is closed, automatically; and the setting is completed.

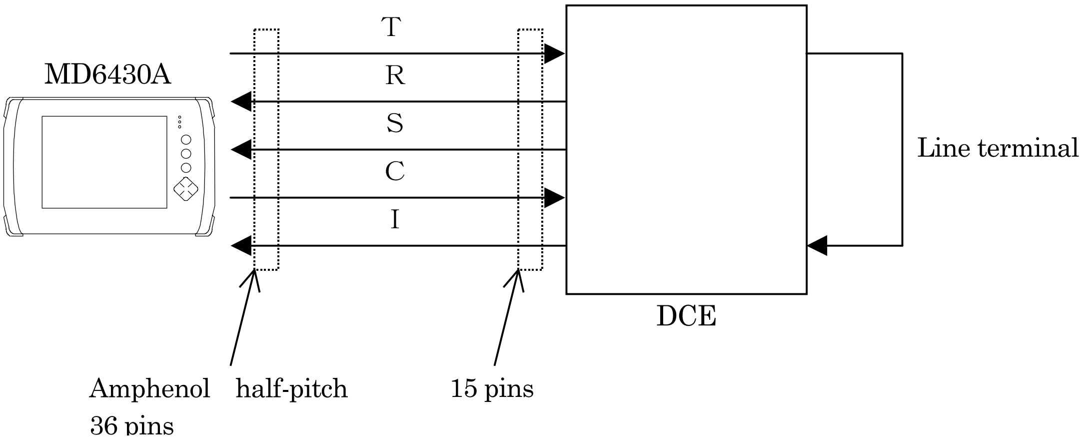
- When trying to stop the setting, press the "Cancel" button to reset the values to the previous values.

Section 6 Operation Example

6.1 Practical Examples of Measurement

6.1.1 Single unit test of X.21-interface synchronous DCE by error measurement

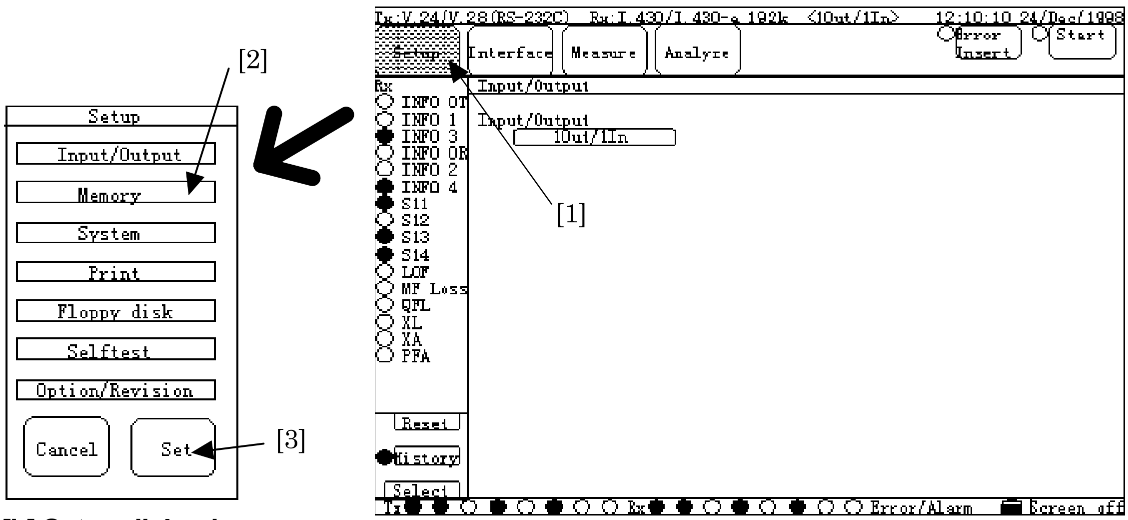
(1) Configuring and setting measurement system
Connect a conversion cable (15-pin at one end and Amphenol half-pitch 36-pin at the other end, see para. 3.3) to the V/X/TTL/CMOS interface connector on the top panel of the MD6430A, and connect the 15-pin end to DCE.
The setup diagram is as show below.



(2) Turning power switch on

(3) Initializing set condition

(3.1) Press the "Setup" button (Fig. 6.1-1, [1]) in the common area of the Setup screen. The Setup dialog box (Fig. 6.1-1, [b]) appears.



[b] Setup dialog box

[a] Common area

Fig. 6.1-1 Setup Screen

(3.2) Press the "Memory" button (Fig. 6.1-1, [2]) and the "Set" button (Fig. 6.1-1, [3]); and then the Setup:Memory sub-screen (Fig. 6.1-2) appears.

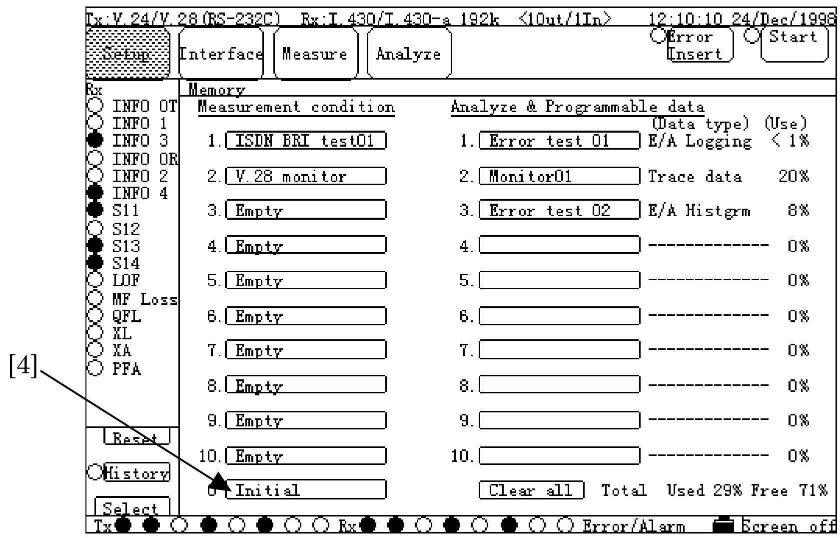


Fig. 6.1-2 Memory Sub-screen

(3.3) "Press the "Initial" button (Fig. 6.1-2, [4]). The Initial dialog box consisting of the Recall button only appears, and press the "Set" button.

(3.4) Now, setting conditions are initialized.

(4) Confirming MD6430A as DTE and connection destination as DCE

(4.1) Referring to steps 3-1 and 3-2 of the previous paragraph "Initializing set condition", open the Setup:System sub-screen (Fig. 6.1-3) by pressing the the "System" and the "Set" buttons.

(4.2) Press the "Interface" button (Fig. 6.1-3, [1]) and the screen shown in Fig. 6.1-4 (a) appears.

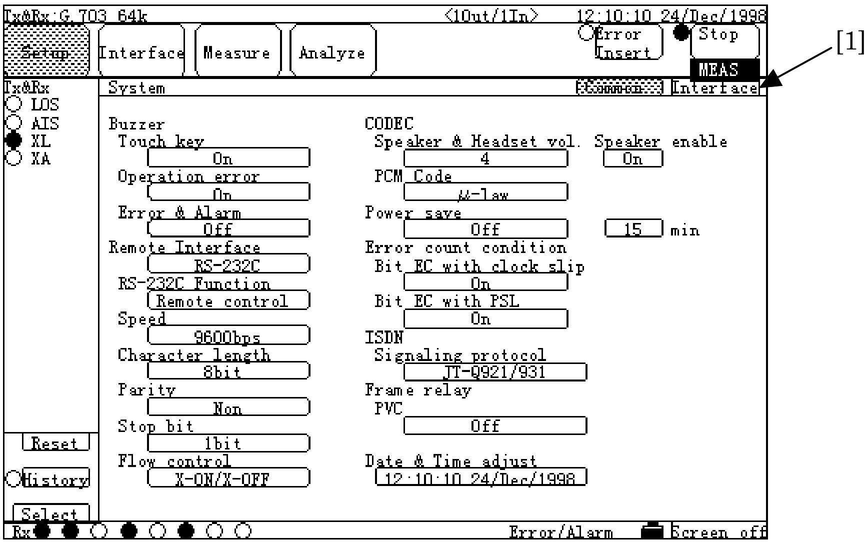
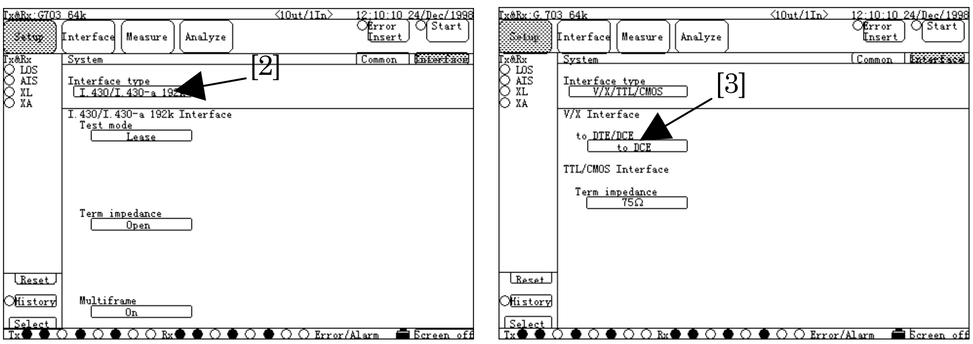


Fig. 6.1-3 System Sub-screen (Common)

(4.3) Press the "Interface type" button (Fig. 6.1-4, [2]). And then, on the dialog box, press the "V/X/TTL/CMOS" button, and press the "Set" button. The screen shown in Fig. 6.1-4 (b) appears.

(4.4) Check that "to DCE" is displayed in the "to DTE/DCE" button (Fig. 6.1-4, [3]).



(a) (b)

Fig. 6.1-4 System Sub-screen (Interface)

(4.5) Now, the MD6430A and the connection destination are recognized as DTE and DCE, respectively.

(6) Setting interface.

(6.1) Press the "Interface" button ([1]), and then the Interface sub-screen appears (Fig. 6.1-5).

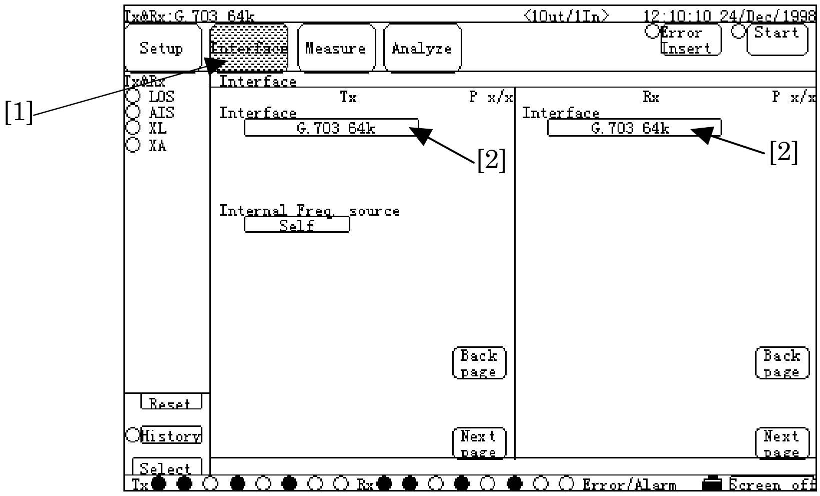


Fig. 6.1-5 Interface Sub-screen (G.703 64k)

(6.2) Press the "Interface" button (Fig. 6.1-5, [2]). And then, press the "X.21 (RS-422)" button on the Interface dialog box, and then press the "Set" button.
The screen as shown in Fig. 6.1-6 appears.

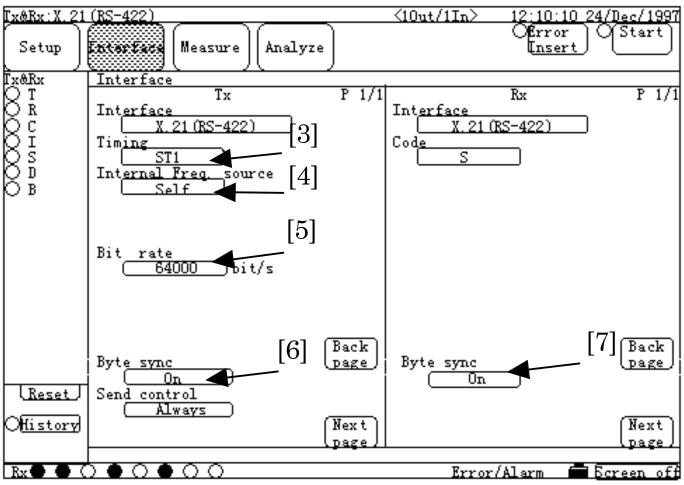


Fig. 6.1-6 Interface Sub-screen (X.21 (RS-422))

(6.3) Press the "Timing" button (Fig. 6.1-6, [3]). And then, press the "S" button on the Timing dialog box, and then press the "Set" button. The "Internal Freq. source" button (Fig. 6.1-6, [4]) and the "Bit rate" button (Fig. 6.1-6, [5]) are disappeared, and the "Byte Sync" button (Fig. 6.1-6, [6]) appears.

(6.4) Press both the "Byte Sync" buttons (Fig. 6.1-6, [6] and [7]), and then press both the "OFF" buttons on the Byte Sync dialog boxes, and then press both the "Set" buttons, respectively.

(6.5) Now, settings of the X.21 interface are completed.

(7) Setting measurement conditions

(7.1) Press the "Measure" button (Fig. 6.1-7, [1]), and then the Measure dialog box appears. Press the "Error/Alarm" button. The Setup:Error/Alarm sub-screen appears (Fig. 6.1-7).

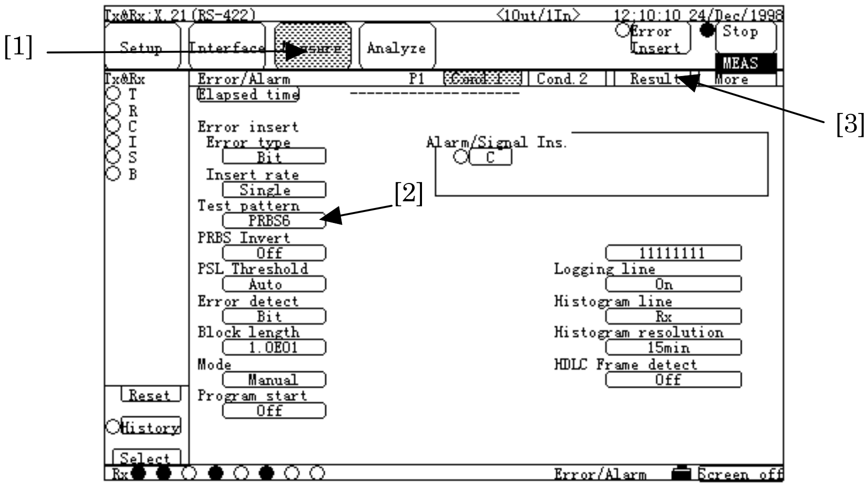


Fig. 6.1-7 Error/Alarm Sub-screen (Cond.1)

(7.2) Press the "Test pattern" button (Fig. 6.1-7, [2]), and on the Test pattern dialog box, press the "PRBS11" button.

(7.3) Press the "Result" button (Fig. 6.1-7, [3]). The screen shown in Fig. 6.1-8 appears.

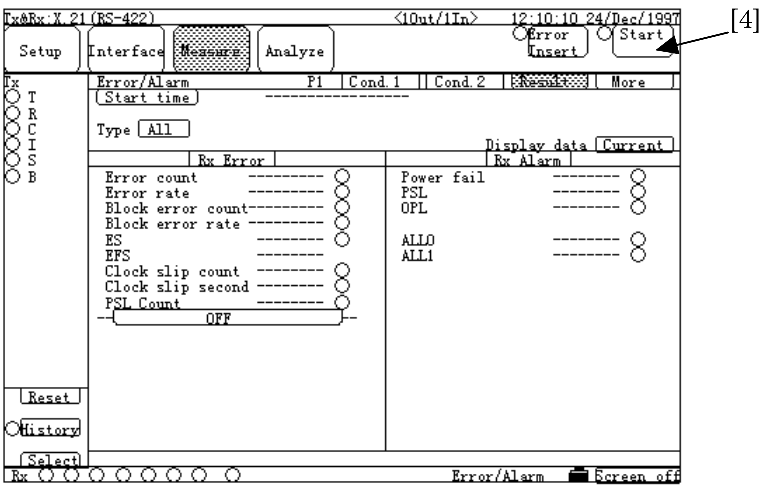


Fig. 6.1-8 Error/Alarm sub-screen (Result)

(7.4) Press the "Start" button (Fig. 6.1-8, [4]), and then measurement starts.

(7.5) If the circuit lines work correctly; all items in the Rx Error area and items of the Power fail, PSL and OPD in the Rx Alarm area are not counted.

6.1.2 Frame relay PVC loop-back test for I.430/I.430-a 192k interface

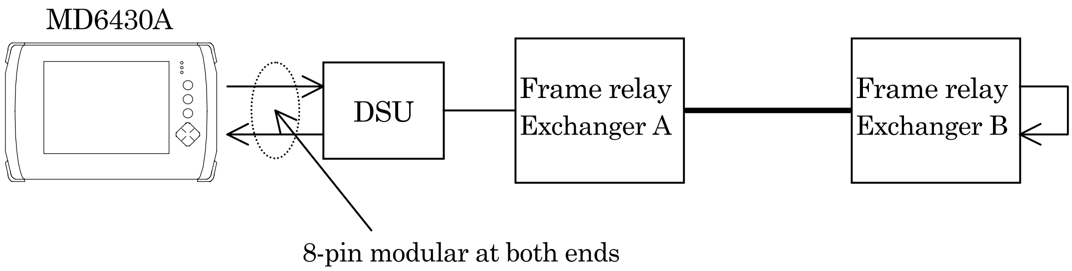
(1) Configuring and setting measurement system

This section describes how to perform a PVC loop-back test of Frame relay network under conditions listed in the table shown right.

Interface	I.430/I.430-a 192k
Data channel	B1
Data bit rate	64kbit/s

Connect one end of the cable (8-pin modular (RJ45) at both ends; see para. 3.2 "Connecting cable") to the 192k, Input/Output BAL interface connector on the top panel of the MD6430A, and connect the other end to the network side (DSU).

The setup diagram is as shown below.



(2) Turning power switch on

(3) Initializing set condition (See para. 6.1.1.)

(4) Setting PVC connection confirmation procedure ON

(4.1) Press the "Setup" button (Fig. 6.1-9, [1]), and then the Setup dialog box appears.
Press the "System" button, and then the Setup:System sub-screen shown in Fig. 6.1-9 appears.

(4.2) Press the "PVC" button (Fig. 6.1-9, [2]), and then the PVC dialog box appears.
Press the "ON" button and then , the PVC connection confirmation procedure is available.

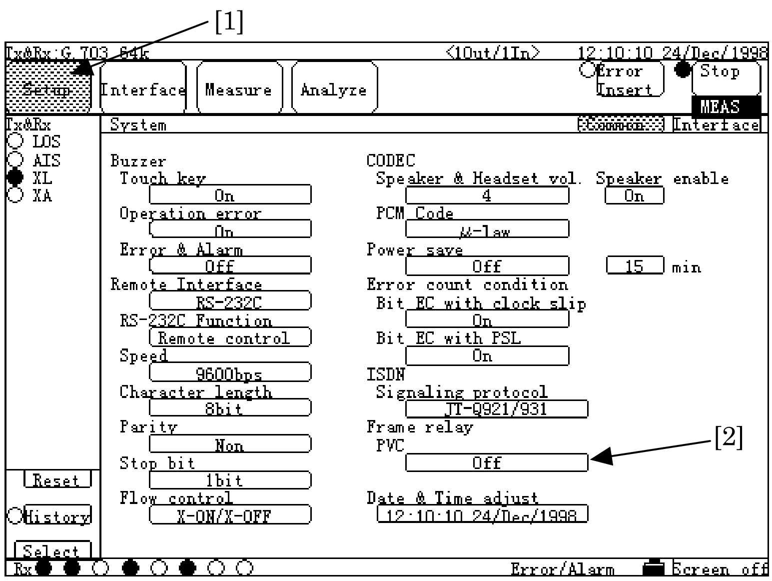


Fig. 6.1-9 Setup:System Sub-screen

(7) Setting interface condition
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-10 and Fig. 6.1-11.

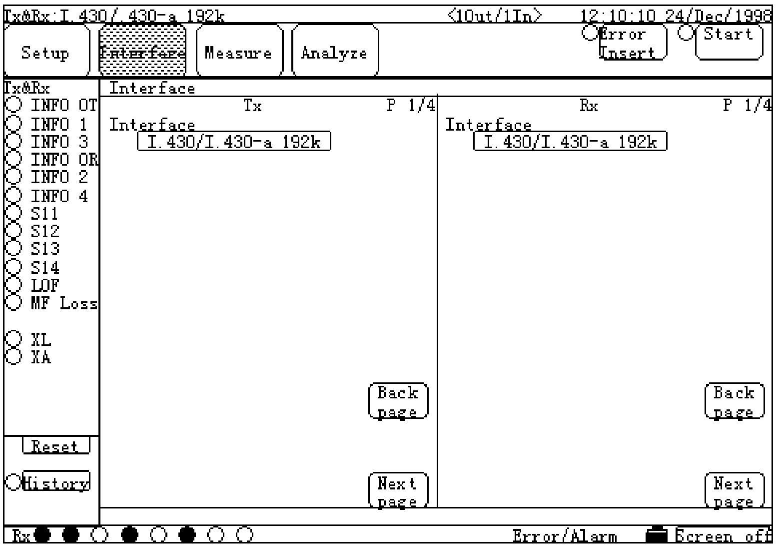


Fig. 6.1-10 Interface Sub-screen(1)

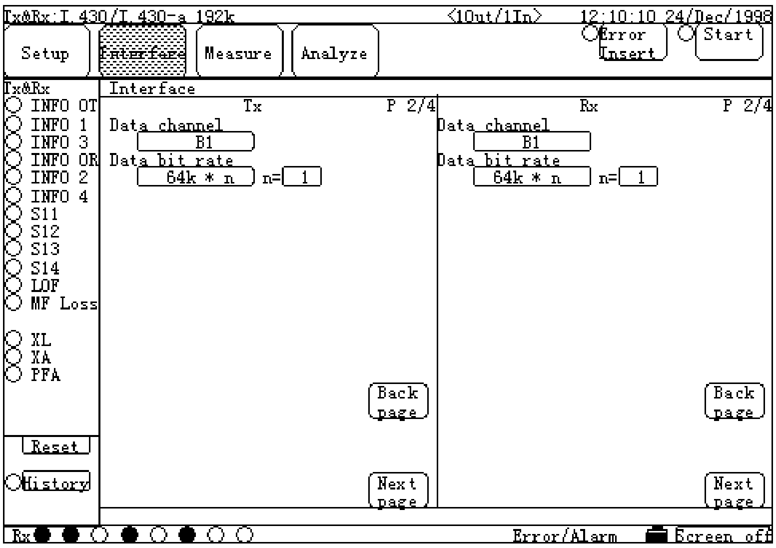


Fig. 6.1-11 Interface Sub-screen(2)

(8) Starting measurement

(8.1) Press the "Measure" button (Fig. 6.1-12, [1]), and then the Measure dialog box appears. Select the "Frame relay" button, and then press the "Set" button. The screen shown in Fig. 6.1-12 appears.

(8.2) Press the "DLCI" button (Fig. 6.1-12, [3]), and then the numeric-value entry (DLCI) dialog box appears (Fig. 6.1-13). Enter a DLCI value assigned to the exchanger, and then press the "Set" button.

(8.3) Press the "Start" button (Fig. 6.1-12, [2]). And then, measurement starts.

(8.4) Measured results are displayed in the measured results display area (Fig. 6.1-12, [4]). If the items (Incomplete CR sequence count, Incomplete DT sequence count, Incomplete CQ sequence count, Bad frame count and Abort frame count) are not counted, and the Test sequence count becomes the Complete sequence count; the PVC loop back is working, correctly.

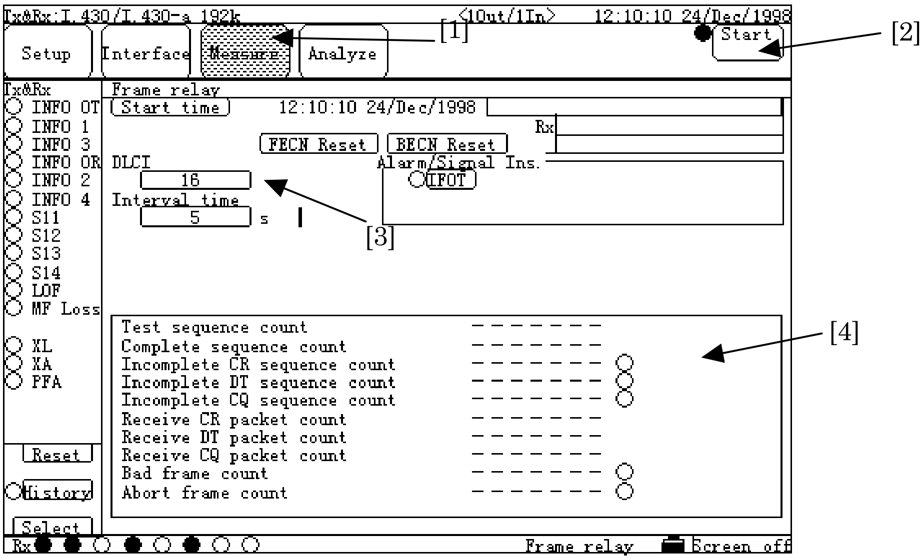


Fig. 6.1-12 Frame relay Sub-screen

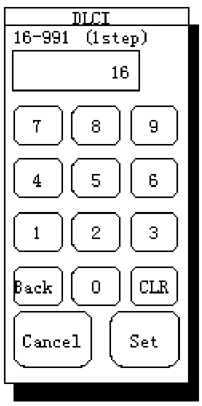


Fig. 6.1-13 Numeric-value Entry (DLCI) Dialog Box

6.1.3 Transmission delay time measurement with G.704/I.431 2.048M interface

(1) Configuring and setting measurement system

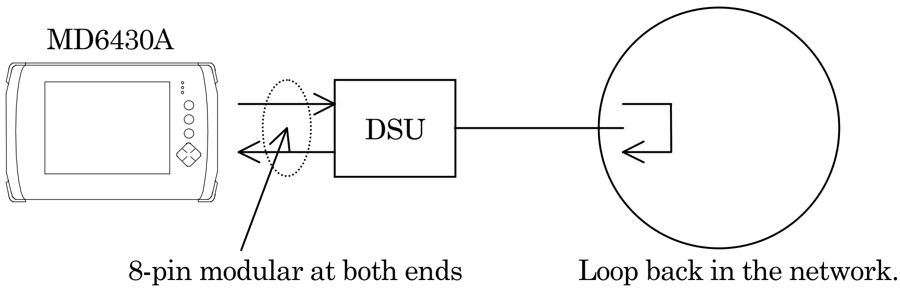
This section describes how to measure the transmission delay time under conditions listed in the table shown right.

Interface	G.704/I.431 2.048M
Code	HDB3
Frame	16MFP(30B+D)
Data bit rate	64kbit/s 1ch
Time slot	1

Connect one end of the cable (8-pin modular (ISO10173) at both ends; see para. 3.2 "Con necting cable".) to the 2M BPL/1.5M BPL Input/Output BAL interface connector on the to p panel of the MD6430A, and connect the other end to the network side (DSU).

Loop back the cable at the measurement point in the network.

The setup diagram is as shown below.



(2) Turning power switch on

(3) Initializing set condition (See para. 6.1.1.)

(4) Setting interface condition
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-14 and

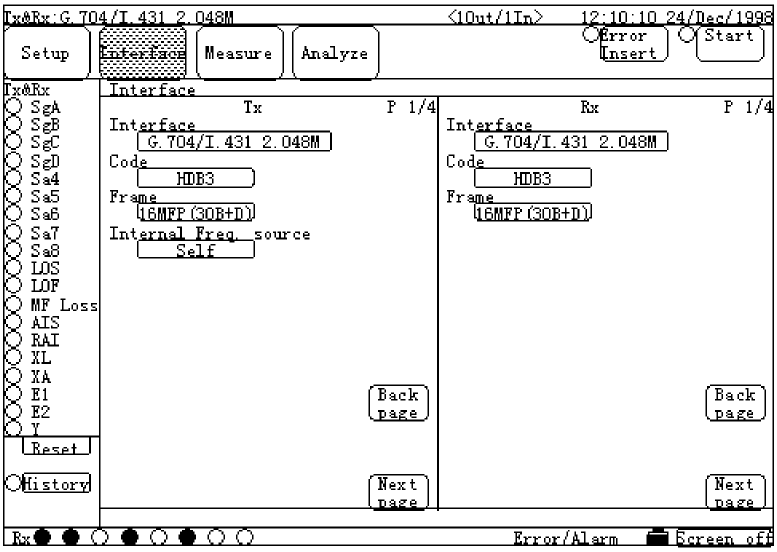


Fig. 6.1-14 Interface Screen (1)

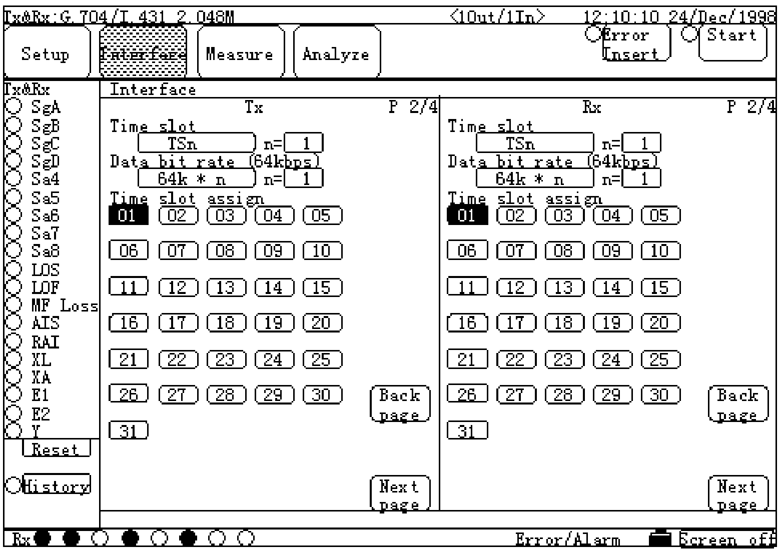


Fig. 6.1-15 Interface Screen(2)

(5) Starting measurement

(5.1) Press the "Measure" button (Fig. 6.1-16, [1]), and then the Measure dialog box appears. Select the "Delay" button, and then press the "Set" button.
The screen shown in Fig. 6.1-16 appears.

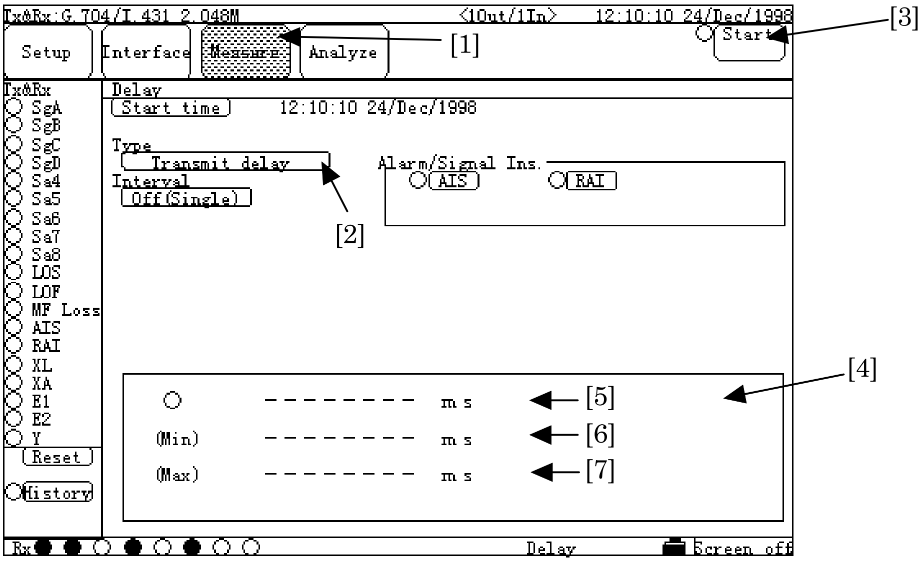


Fig. 6.1-16 Delay Sub-screen

(5.2) Press the "Type" button (Fig. 6.1-16, [2]), and then the Type dialog box appears. Select the "Transmit delay" button, and press the "Set" button.

(5.3) Press the "Start" button (Fig. 6.1-16, [3]). Measurement starts.

(5.4) Measured results are displayed in the measured results display area (Fig. 6.1-16, [4]). The latest measured result is shown in [5]. The minimum value among results measured from the start to the current time is shown in [6], and the maximum value is shown in [7].

6.1.4 Transmission delay time measurement of control signal with V.24/V.28 (RS-232C) interface

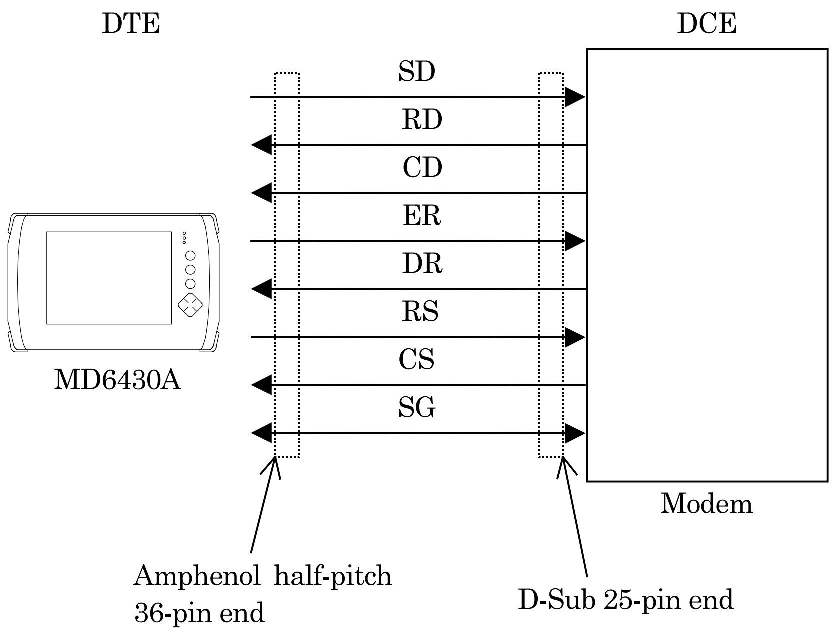
(1) Configuring and setting measurement system

This section describes how to measure the transmission delay time of control signal under conditions listed in the table shown right.

Interface	V.24/V.28(RS-232C)
Timing	Async
Start/Stop bit	On
Bit rate	9600bit/s
Data length	8bit
Parity	None
Stop bit	1bit

Connect a conversion cable (D-Sub 25-pin connector at one end and Amphenol half-pitch 36-pin connector at the other end, see para. 3.3) to the V/X/TTL/CMOS interface connector on the top panel of the MD6430A, and connect the D-Sub 25-pin end to the modem.

The setup diagram is as shown below.



(2) Turning power switch on

(3) Initializing set condition
(See para. 6.1.1.)

(4) Setting interface condition.
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-17.

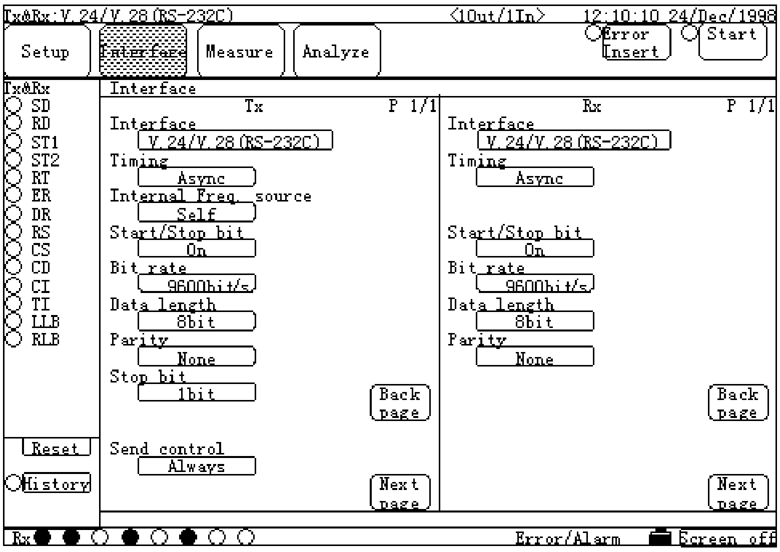


Fig. 6.1-17 Interface Screen

(5) Starting measurement

(5.1) Press the "Measure" button (Fig. 6.1-18, [1]), and then the Measure dialog box appears. Select the "Delay" button, and then press the "Set" button. The screen shown in Fig. 6.1-18 appears.

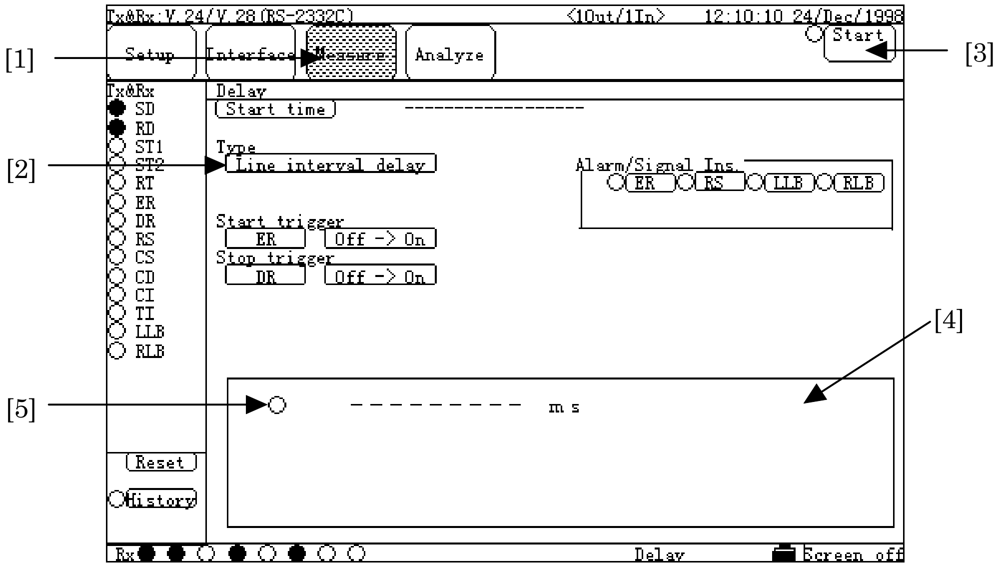


Fig. 6.1-18 Delay Screen

(5.2) Press the "Type" button (Fig. 6.1-18, [2]), and then the Type dialog box appears. Select the "Line Interval delay" button, and press the "Set" button.

(5.3) Press the "Start trigger" button, and then the Start trigger dialog box appears. Select the "ER" button, and press the "Set" button.

(5.4) Press the "Stop trigger" button, and then the Stop trigger dialog box appears. Select the "DR" button, and press the "Set" button.

(5.5) Press the button next to the "Start trigger" button, and then the Start trigger dialog box appears.
Select the "Off "→ "On" button, and press the "Set" button. Do the same as for the Stop trigger.

(5.6) Press the "Start" button (Fig. 6.1-18, [3]), and wait until ER control (shown in the Stop trigger dialog box) turns ON.

(5.7) Press the ER button of the Alarm/Signal Ins. items to change ER control from OFF to ON.
And then, measurement starts.

(5.8) Measured results are displayed in the measured results display area (Fig. 6.1-18, [4]).

6.1.5 Frequency measurement with G.704 6.312M interface

(1) Configuring and setting measurement system

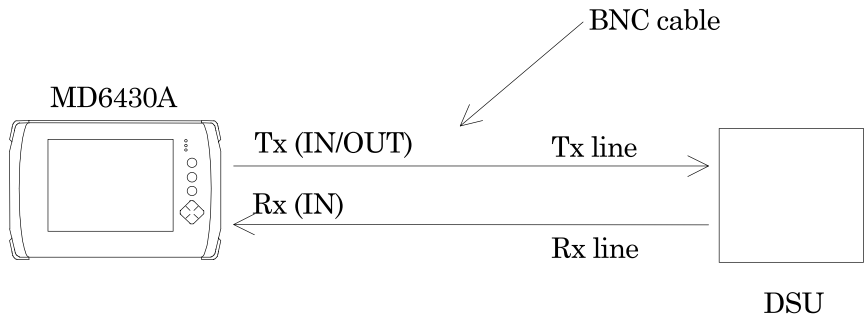
This section describes how to measure the frequencies under conditions listed in the table shown right.

Interface	G.704 6.312M
Input/Output	1Out/1In
Code	B8ZS
Frame	4MFP
Data bit rate	64kbit/s 1ch
Time slot	1

To the G.704 6.312M interface connector on the top panel of the MD6430A, connect the BNC cables from the Tx and the Rx lines.

As to the connection for 2In, refer to para. 3.2 "Connecting cable".

The setup diagram is as shown below.



(2) Turning power switch on.

(3) Initializing set conditions.
(See para. 6.1.1.)

(4) Setting interface condition.
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-19 and Fig. 6.1-20.

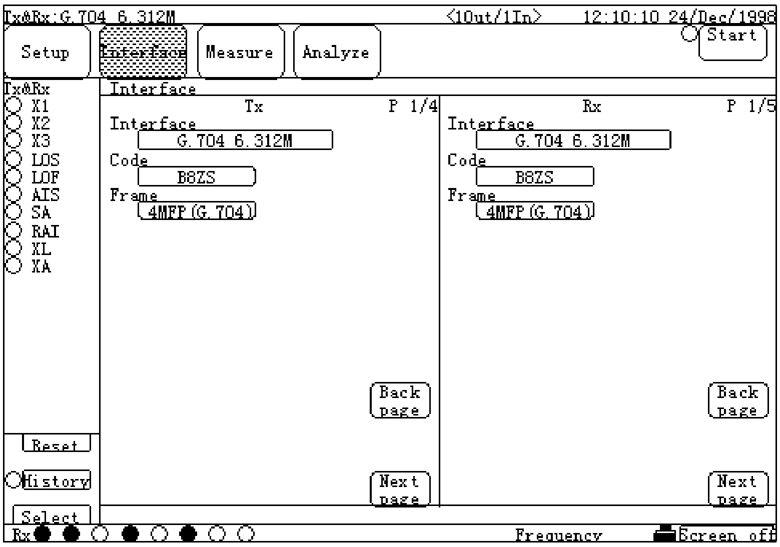


Fig. 6.1-19 Interface Screen

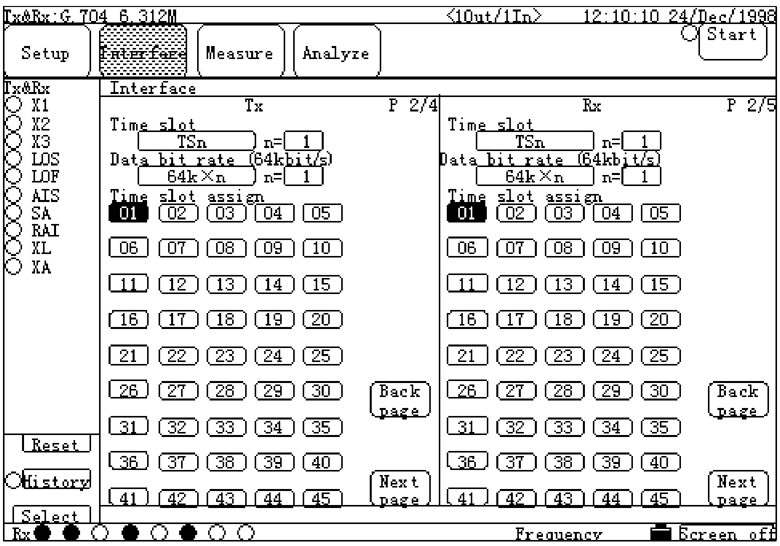


Fig. 6.1-20 Interface Screen

(5) Starting measurement

(5.1) Press the "Measure" button (Fig. 6.1-21, [1]), and then the Measure dialog box appears. Select the "Frequency" button, and press the "Set" button. The screen shown in Fig. 6.1-21 appears.

(5.2) Press the "Line" button (Fig. 6.1-21, [2]), and then the Line dialog box appears. Select the "RT (Tx)" button, and press the "Set" button.

(5.3) Press the "Start" button (Fig. 6.1-21, [3]). And then, measurement starts.

(5.4) Measured results are displayed in the measured results display area (Fig. 6.1-21, [4]). Each time the lamp (Fig. 6.1-21, [5]) lights up, measured results are up-dated. Interval of light (the period of measurement) depends on the Gate time (Fig. 6.1-21, [6]) and the Interval time (Fig. 6.1-21, [7]). Change the interval as appropriate for required precision and target signal.

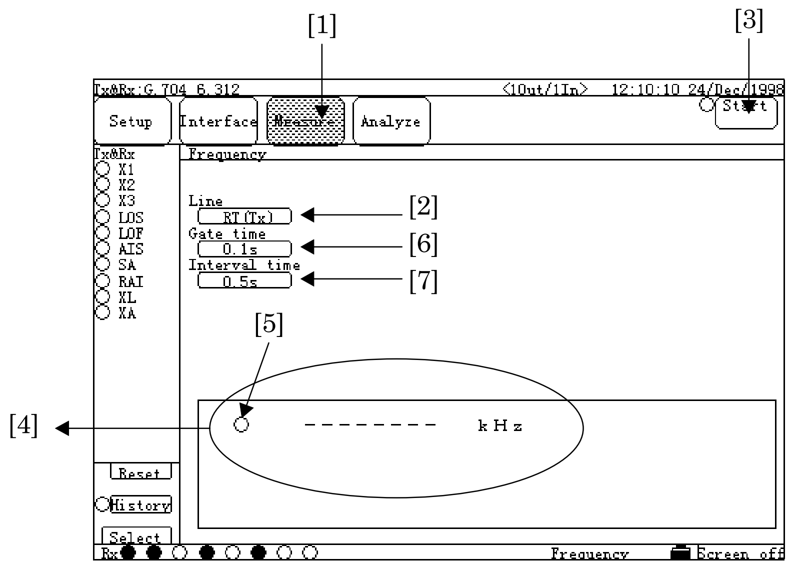


Fig. 6.1-21 Frequency Screen

6.1.6 Digital level measurement with G.704 6.312M interface

(1) Configuring and setting measurement system

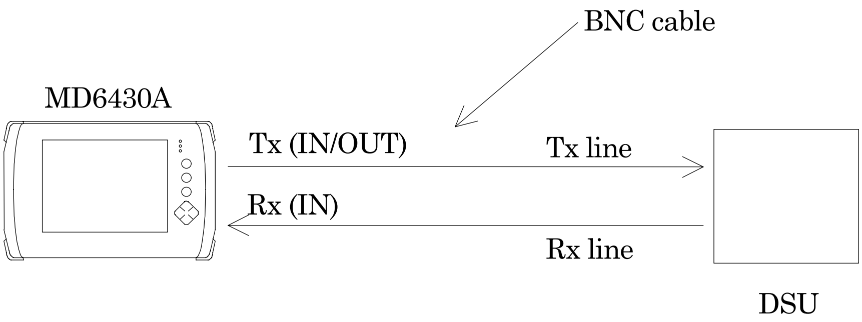
This section describes how to measure the digital levels under conditions listed in the table shown right.

Interface	G.704 6.312M
Input/Output	1Out/1In

To the G.704 6.312M interface connector on the top panel of the MD6430A, connect BNC cables from the Tx and the Rx lines.

As to the connection for 2In, refer to para. 3.2 "Connecting Cable".

The setup diagram is as shown below.



(2) Turning power switch on

(3) Initializing set conditions
(See para. 6.1.1.)

(4) Setting interface condition
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-22 and Fig. 6.1-23.

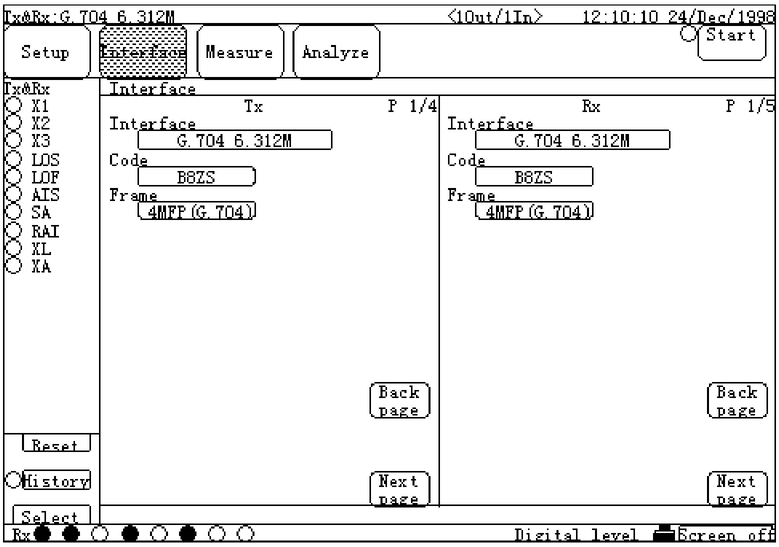


Fig. 6.1-22 Interface Screen

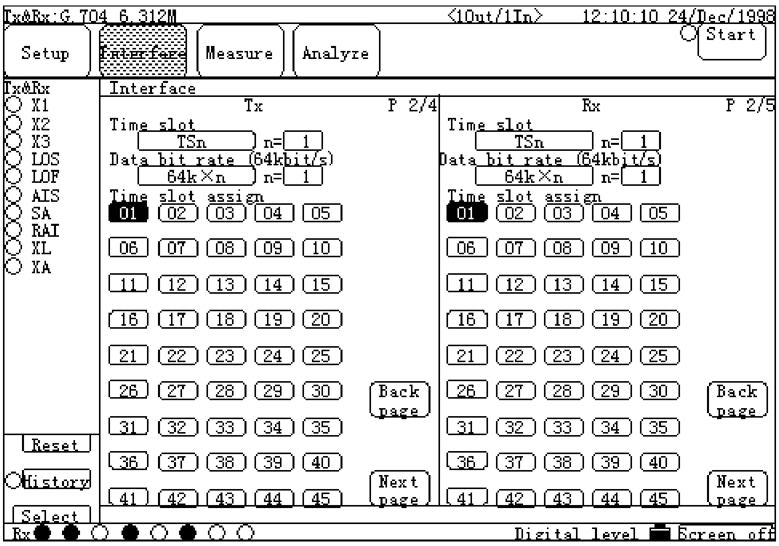


Fig. 6.1-23 Interface Screen

(5) Starting measurement

(5.1) Press the "Measure" button (Fig. 6.1-24, [1]), and then the Measure dialog box appears. Select the "Digital level" button, and press the "Set" button.

(5.2) Press the "Line select" button (Fig. 6.1-24,[2]), and then the Line select dialog box appears. Select the "Rx" button, and press the "Set" button.

(5.3) Press the "PCM Code" button (Fig. 6.1-24,[3]), and then the PCM Code dialog box appears. Select the "μ -law" button, and press the "Set" button.

(5.4) Press the "Start" button (Fig. 6.1-24,[4]), and then measurement starts.

(5.5) Measured results are displayed in the measured results display area (Fig. 6.1-24,[5]). Each time the lamp (Fig. 6.1-24,[6]) lights up, measured results are updated.

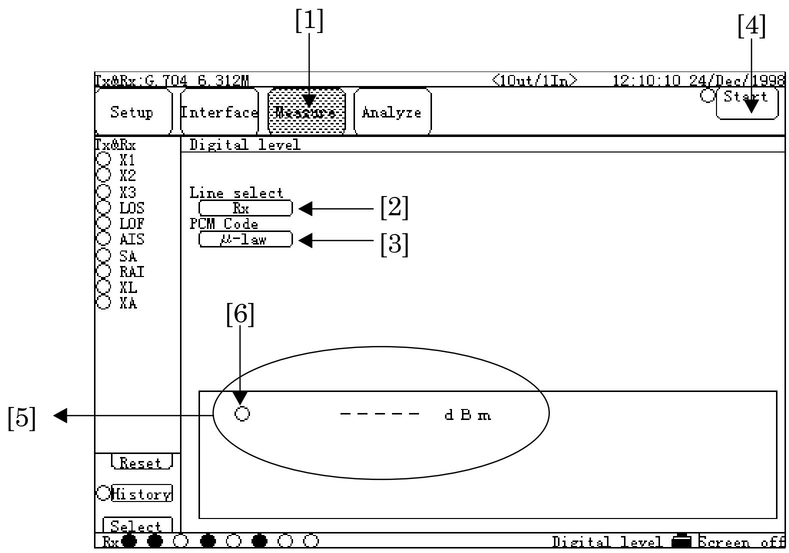


Fig. 6.1-24 Digital level Screen

6.1.7 Program data-pattern send/receive test with G.704/I.431 2.048M interface

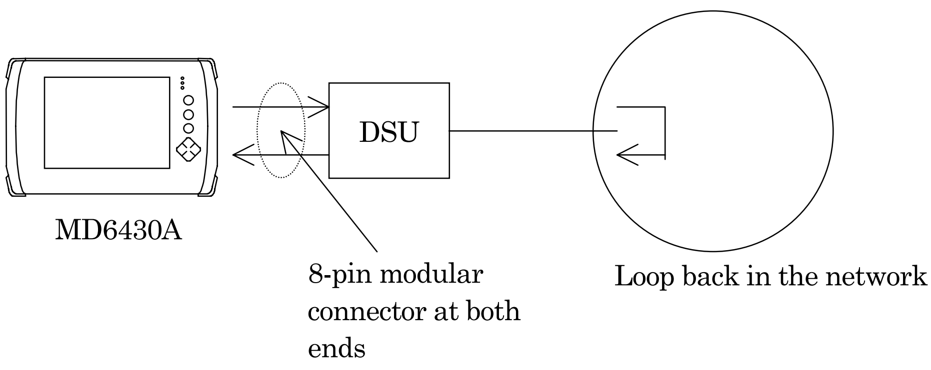
(1) Configuring and setting measurement system

This section describes how to measure the pattern send/receive under conditions listed in the table shown right.
The send pattern uses the data saved in the address range of 0 to 1000 of PRGM Data of the Measure:Word trace screen. Prior to measurement, edit the PRGM Data. Or, read the data from a floppy disk or the internal memory to the PRGM Data.

Interface（Tx）	G.704/I.431 2.048M
Code	HDB3
Frame	16MFP（30B+D）
Data bit rate	64kbit/s 1ch
Internal Freq. source	RD
Time slot	1
E/Si bit	00
Sa Bit	00000
TS16 Frame0 xyxx	1011
Sig. Bit	0001
MUX	Off

Interface（Rx）	G.704/I.431 2.048M
Code	HDB3
Frame	16MFP（30B+D）
Data bit rate	64kbit/s 1ch
Time slot	1
DEMUX	Off

Connect one end of the cable (8-pin modular (ISO10173) connector at both ends) to the 2M BPL/1.5M BPL Input/Output BAL interface connector on the top panel of the MD6430A, and connect the other end to the DSU.To receive data send from the MD6430A, loop back at the measured point in the network.



(2) Turning power switch on

(3) Initializing set conditions
(See para. 6.1.1.)

(4) Setting interface conditions
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-25, Fig. 6.1-26 and Fig. 6.1-27.

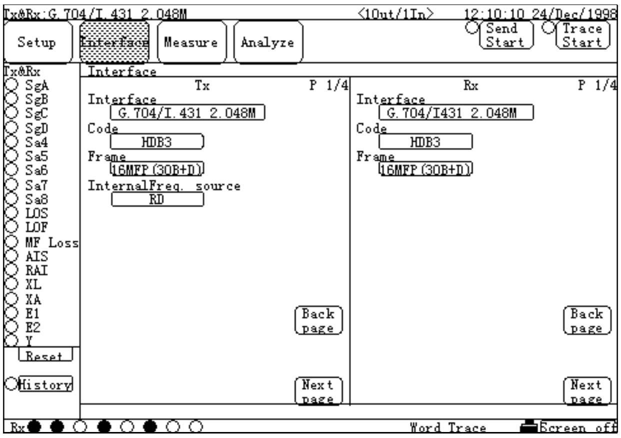


Fig. 6.1-25 Interface Screen（1/3）

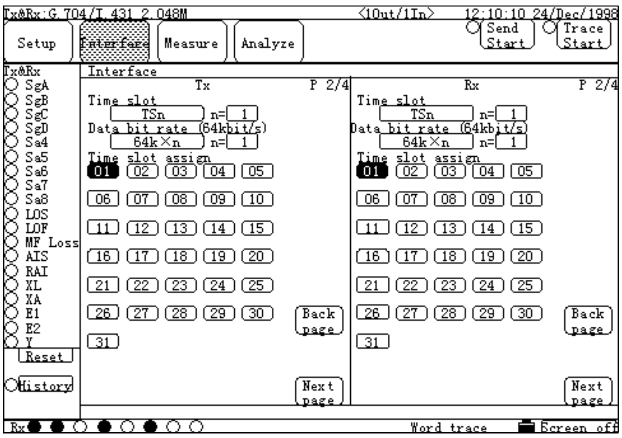


Fig. 6.1-26 Interface Screen（2/3）

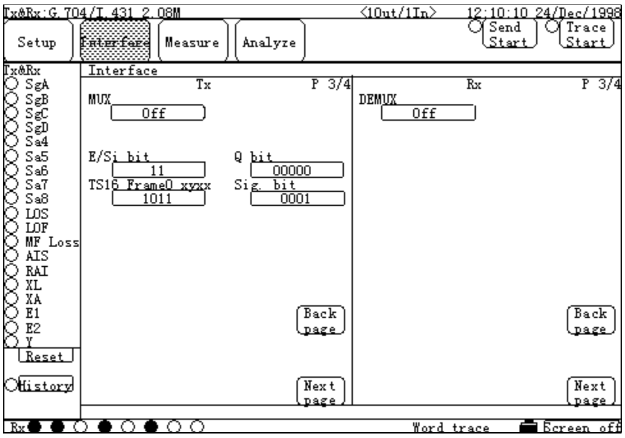


Fig. 6.1-27 Interface Screen（3/3）

(5) Setting send conditions

(5.1) Press the "Measure" button (Fig. 6.1-28, [1]), and then the Measure dialog box appears. Select the "Word trace" button, and press the "Set" button.
Press the "Condition" button, and then the Condition sub-screen appears.

(5.2) Press the "Idle code" button (Fig. 6.1-28,[3]), and then the Idle code dialog box appears. Press the "All0" button to change the display to "00000000", and press the "Set" button.

(5.3) Press the "Send data" button (Fig. 6.1-28,[4]), and then the Send data dialog box appears. Select the "Program" button, and press the "Set" button.

(5.4) Press the "Send method" button (Fig. 6.1-28,[5]), and then the Send method dialog box appears.
Select the "Manual" button, and press the "Set" button.

(5.5) Press the "PRGM Data" button(Fig. 6.1-28.[6]) to display the PRGM Data sub-screen (Fig. 6.1-29).

(5.6) Press the "Start address" button, and then the Start address dialog box appears.
Press the "0" button once to change the display to "0", and press the "Set" button.

(5.7) Press the "Stop address" button, and the Stop address dialog box appears. Press the "1", "0", "0" and "0" buttons in this order to change the display to "1000", and press the "Set" button.

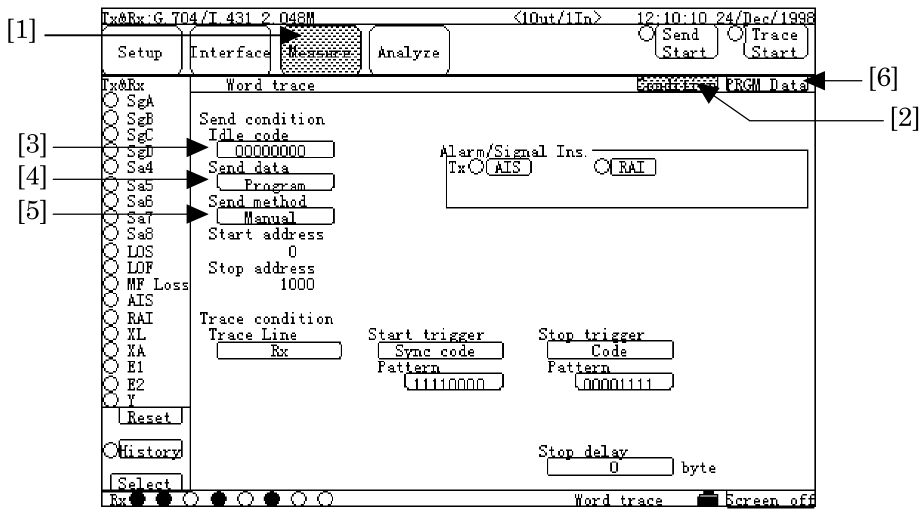


Fig. 6.1-28 Word Trace : Condition Screen

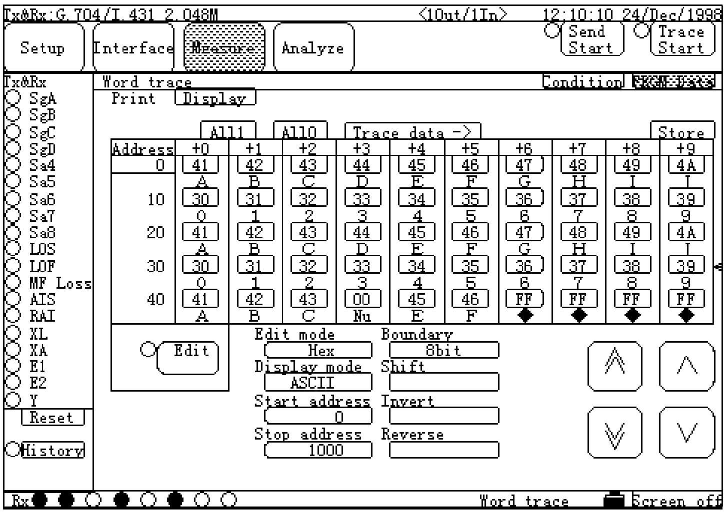


Fig. 6.1-29 Word Trace : PRGM Data Screen

(6) Setting receive conditions

(6.1) Press the "Measure" button (Fig. 6.1-30, [1]), and then the Measure dialog box appears. Select the "Word trace" button, and press the "Set" button. Press the "Condition" button, and then the Condition sub-screen appears.

(6.2) Press the "Trace Line" button (Fig. 6.1-30,[2]), and then the Trace Line dialog box appears. Select the "Rx" button, and press the "Set" button.

(6.3) Press the "Start trigger" button (Fig. 6.1-30,[3]), and then the Start trigger dialog box appears. Select the "Sync code" button, and press the "Set" button.

(6.4) Press the "Pattern" button (Fig. 6.1-30,[4]) under the "Start trigger" button, and then the Pattern (Start trigger) dialog box appears. Press the "All1" button once. And then, from left to right, press the white-letter buttons under numbers to change the display to "11110000". Press the "Set" button.

(6.5) Press the "Stop trigger" button (Fig. 6.1-30,[5]), and then the Stop trigger dialog box appears. Select the "Code" button, and press the "Set" button.

(6.6) Press the "Pattern" button (Fig. 6.1-30,[6]) under the "Stop trigger" button, and then the Pattern (Stop trigger) dialog box appears. Press the "All1" button once. And then, from right to left, press the white buttons under numbers to change the display to "00001111". Press the "Set" button.

(6.7) Press the "Stop delay" button (Fig. 6.1-30,[7]), and then the Stop delay dialog box appears. Press the "0" button once, and press the "Set" button.

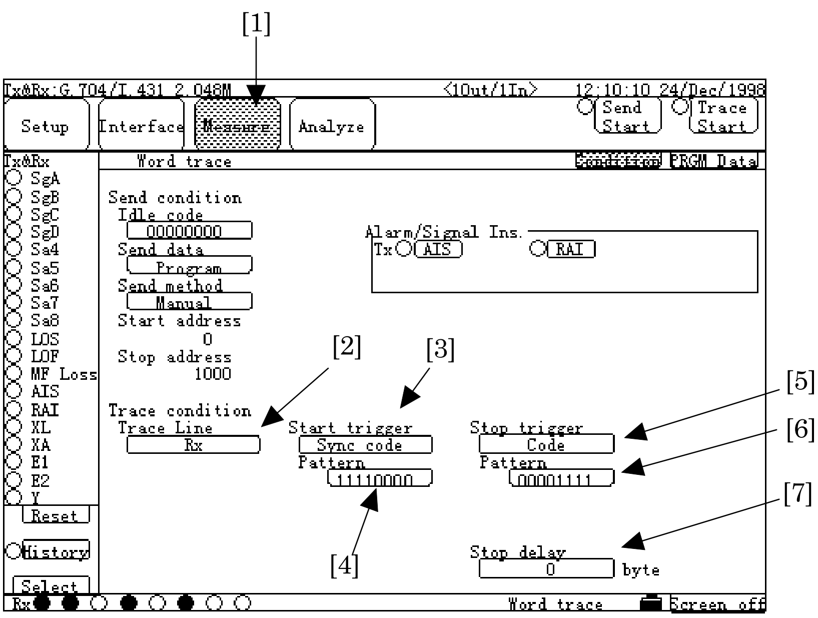


Fig. 6.1-30 Word trace : Conditon Screen

(7) Starting measurement

(7.1) Open the Measure:Word trace screen(Fig. 6.1-31).

(7.2) Press the "Send Start" button (Fig. 6.1-31,[1]). "Send" is displayed under the "Send Start" button, and the sending data is started.
(Data saved in the range of addresses 0 to 1000 of PRGM Data shown in the Measure:Word trace screen, is fed to the time slots (channel 1) selected by the Tx side of the Interface screen; and is sent out. During pattern sending, data in the addresses 0 to 1000 is sent repeatedly.)

(7.3) Press the "Trace Start" button (Fig. 6.1-31,[2]). "Wait" is displayed under the "Trace Start" button. And then, when "Trace" is displayed under the button, data reception is started.
(Data is fetched from the time slots (channel 1) selected by the Rx side of the Interface screen, and is saved into the memory, sequentialy.) Display is changed from "Wait" to "Trace" when the data "11110000" (which is selected as the Pattern of the Start trigger of the Measure:Word trace screen) is received from the time slot selected on the Interface screen.

(7.4) When the data "00001111" (which is selected as the Pattern of the Stop trigger of the Measure:Word trace screen) is received, "Trace" display under the "Trace Start" button is cleared, and data reception is completed.

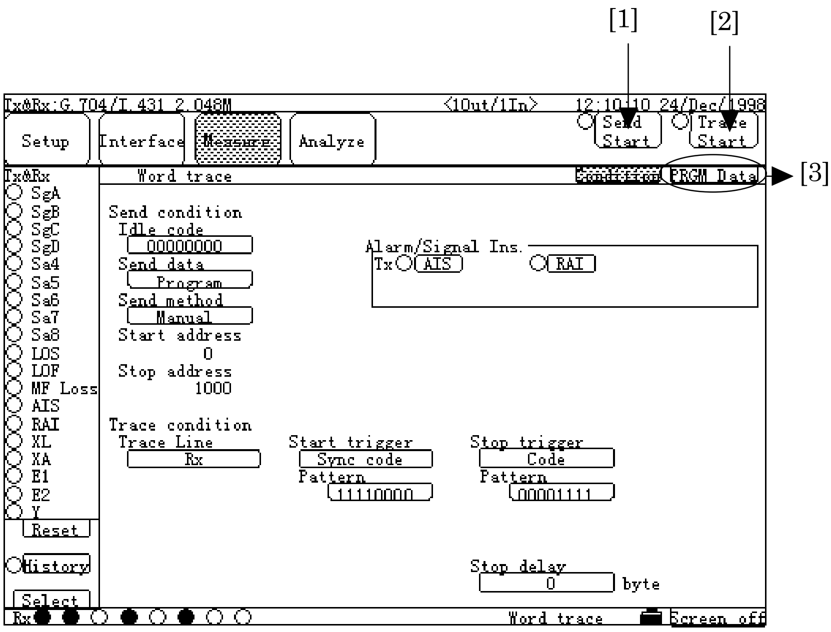


Fig. 6.1-31 Word Trace Measurement Screen

6.1.8 Error/Alarm measurement results display on Analyze screen (Histogram)

(1) Configuring and setting measurement system
This section describes the measurement example to display the measurement results (obtained from the example shown in para 6.1.1 " Single unit test of X.21-interface synchronous DCE by error measurement ") on the Analyze screen. The displayed content is a histogram of Count values of every seconds. Also, occurrence of Alarm is displayed on the histogram.
For the configuration of devices, connection of cables and setting of the interface; refer to para 6.1.1.

(2) Preparation before measurement

(2.1) Press the "Measure" button (Fig. 6.1-32, [1]), and then the Measure dialog box appears. Select the "Error/Alarm" button, and press the "Set" button.
The screen shown in Fig. 6.1-32 appears. Press the "Cond.1" button(Fig. 6.1-32,[2]), and then the Cond.1 sub-screen appears.

(2.2) Press the "Histogram line" button (Fig. 6.1-32,[3]), and then the Histogram line dialog box appears.
Select the "Rx" button, and press the "Set" button.

(2.3) Press the "Histogram resolution" button (Fig. 6.1-32,[4]), and then the Histogram resolution dialog box appears.
Set the time axis resolution (Fig. 6.1-33,[5]) of the histogram to be displayed.
In this example, select the "1s" button, and press the "Set" button.

(2.4) Press the "Analyze" button (Fig. 6.1-32,[6]), and then the Analyze dialog box appears. Select the "Error/Alarm" button, and press the "Set" button.
Press the "Histogram"(Fig. 6.1-33,[7]) to display the Histgram sub-screen(Fig. 6.1-33).

(2.5) Press the "Alarm1" button (Fig. 6.1-33,[8]), and then the Alarm 1 dialog box appears.
Items that can generate an alarm on the MD6430A measurement conditions, are displayed.
In this example, select the "All" button (the All Alarm items).
Do the same selection as for Alarm2 and Alarm3.

(2.6) Press the "Error Bit" button (Fig. 6.1-33,[9]), and then the Unit dialog box appears. Select the "Count" button, and press the "Set" button.

(2.7) Press the button (Fig. 6.1-33,[10]) on the lower right of the histogram, and then the Interval dialog box appears.
Select the "1s" button, and press the "Set" button.

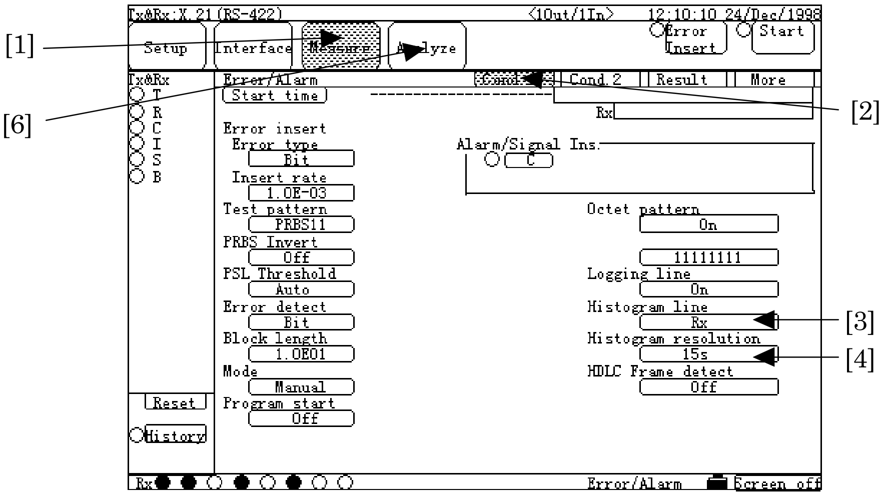


Fig. 6.1-32 Cond. 1 of Measure:Error/Alarm Screen

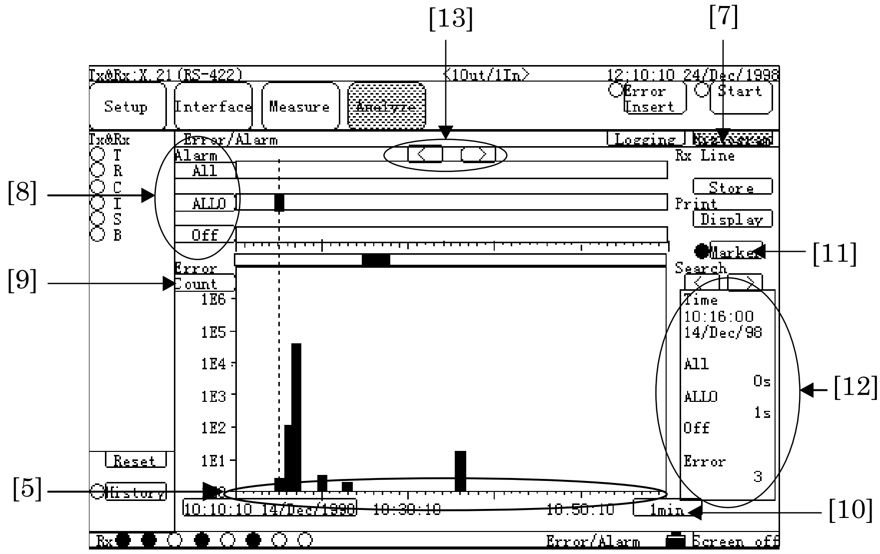


Fig. 6.1-33 Histogram of Analyze:Error/Alarm Screen

(3) Selecting display contents during/after measurement

When the Analyze:Error/Alarm screen selected during/after measurement, the measured results are displayed, as shown in Fig. 6.1-33.

When the "Alarm1", "Alarm2" or "Alarm3" button (Fig. 6.1-33,[8]) selected, a mark is recorded each occurrence of a selected alarm item.

When the "Error Bit" button (Fig. 6.1-33,[9]) selected, a histogram of the error counts or the error rate becomes selectable.

When the "Interval" button (Fig. 6.1-33,[10]) on the lower right of the histogram pressed, the current time resolution of the histogram can be changed.

When the "Marker" button (Fig. 6.1-33,[11]) pressed; the error counts (error rate) at the marker time on the histogram, and occurrence time of Alarm1 to Alarm3 alarms are displayed.(Fig. 6.1-33,[12])

The marker position can be moved using cursor keys.(Fig. 6.1-33,[13])

6.1.9 Error/Alarm measurement results display on Analyze screen (Logging)

(1) Configuring and setting measurement system.
This section describes the measurement example to display the measurement results (obtained from the example shown in para 6.1.1 " Single unit test of X.21-interface synchronous DCE by error measurement ") on the Analyze screen. The displayed content is the logging data of measurement start/stop and error/alarm measured results.
For the configuration of devices , connection of cables and setting of the interface ; refer to para, 6.1.1.

(2) Selecting display contents during/after measurement

(2.1) Press the "Analyze" button (Fig. 6.1-34, [1]), and then the Analyze dialog box appears.
Select the "Error/Alarm" button , and press the "Set" button.
The screen shown in Fig. 6.1-34 appears.
Press the "Logging" button(Fig. 6.1-34, [2]), and then the Logging sub-screen appears.

(2.2) Using scroll buttons(Fig. 6.1-34, [3]), select the desired log to be displayed.
The format of log is the same as that of print.
On the Setup:Print screen, select items of desired information to be recorded as log.
For details , refer to para , 6.2.2.

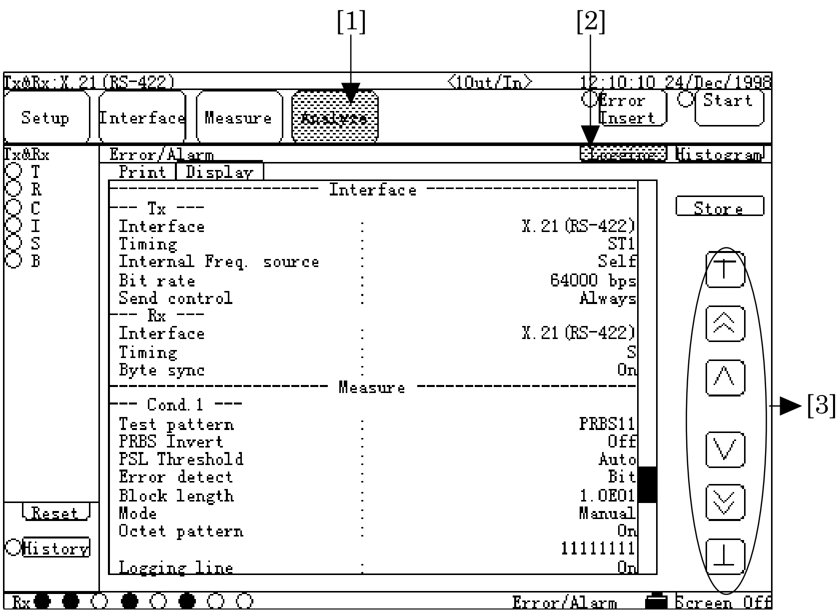


Fig. 6.1-34 Logging of Analyze:Error/Alarm Screen

6.1.10 Word trace measurement results display on Analyze screen

(1) Configuring and setting measurement system

This section describes the measurement example to display the measurement results (obtained from the example shown in para 6.1.7 "Program data-pattern send/receive test with G.704/I.431 2.048M interface") on the Analyze screen. The displayed content is the logging data of measurement start/stop and error/alarm measured results.

For the configuration of devices, connection of cables and setting of the interface; refer to para 6.1.7.

(2) Selecting display contents after measurement

(2.1) Press the "Analyze" button(Fig. 6.1-35,[1]), and then the Analyze dialog box appears.
Select the "Trace-data" button, and press the "Set" button.
The screen shown in Fig. 6.1-35 appears.

(2.2) Press the button(Fig. 6.1-35,[2]) under the Address, and then the Address dialog box appears.
Set the desired address, and press the "Set" button. Displaying data is updated so that the first address on the screen becomes the set address.

(2.3) When the "Trigger Search" button(Fig. 6.1-35,[3]) pressed, the Stop Trigger part (set on the Condition item in the Measure:Word trace screen) is displayed at first.
When the "Stop Search" button(Fig. 6.1-35,[4]) pressed, the last address data is displayed at first.When "Manual" is set to the Stop Trigger item or when "0 byte" is set to the Stop delay item of the Condition of the Measure:Word trace screen, the "Trigger Search" button and the "Stop Search" button may work the same.

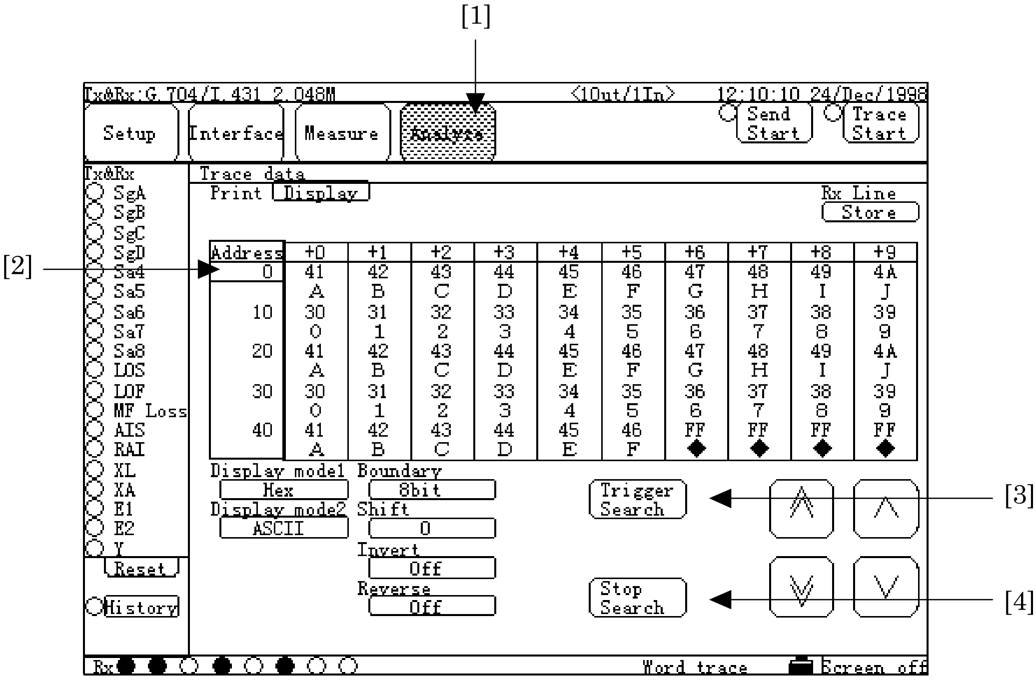


Fig. 6.1-35 Analyze:Word Trace Screen

6.1.11 MUX/DEMUX function with G704/I.431 1.544M interface

MUX function: Data received from the X.21 (RS-422) interface is stored to the time slot that is s pecified by a high-speed interface (G.703 64k, I430/I.430-a 192k, G.704/I.431 1.544M, G.704/I.431 2. 048M, 2M CMI or G.704 6.312M), and sent from the time slot.
DEMUX function: Data is fetched from the time slot specified by a high-speed interface, and sent to the X.21 interface.

(1) Configuring and setting measurement system

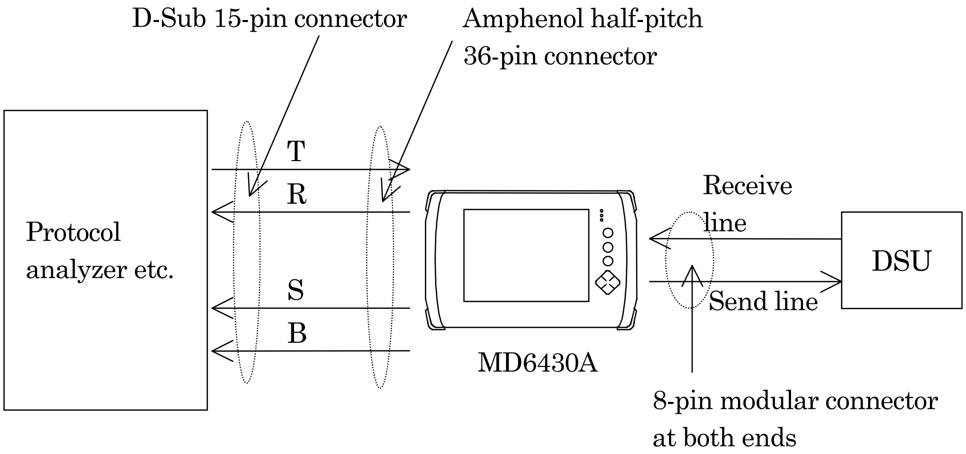
In this example , the MUX/DEMUX function allows the MD6430A to work as the connection point to the G.704/I.431 1.544M interface, in order to send/receive the data by connecting a equipment (such as protocol analyzer) between DTE and DSU. Set conditions of the MD6430A for connecting to the G.704/I.431 1.544M interface are listed in the table shown right.

Input/Output	1Out/1In

Interface（Tx)	G.704/I.431 1.544M
Code	B8ZS
Frame	24MFP（G.704)
Data bit rate	64kbit/s 2ch
Internal Freq. source	RD
Time slot	1
MUX	On

Interface（Rx)	G.704/I.431 1.544M
Code	B8ZS
Frame	24MFP（G.704)
Data bit rate	64kbit/s 2ch
Time slot	1
DEMUX	On

Connect one end of the cable (with 8-pin modular (RJ45) connector at both ends) to the G.704/I.431 1.544M interface connector on the top of the MD6430A (see paragraph 3.2); and connect the other end to the DSU. Also, connect one end of the conversion cable for cross measurement (with Amphenol half-pitch 36-pin connector at one end, and D-Sub15-pin connector at the other end, J0929) to the X.21 (RS-422) interface connector (see paragraph 3.3) with the Amphenol connector; and connect the other end to the protocol analyzer etc..



(2) Turning power switch on.

(3) Initializing set condition.
Setting interface condition.
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-36 , Fig. 6.1-37 and Fig. 6.1-38.

(4) When the DEMUX/MUX function is enabled, data is exchanged between the X.21 interface and the G.704/I.431 1.544M interface.
In this use example, data received at 128 kbit/s by the X.21 interface is divided to two sets of 64 kbit/s unit, and sent to the two channels: time slots 1 and 2 specified on the Tx side. On the Rx side, data of 128 kbit/s received from two channels of time slots 1 and 2 is sent to the X.21 side.

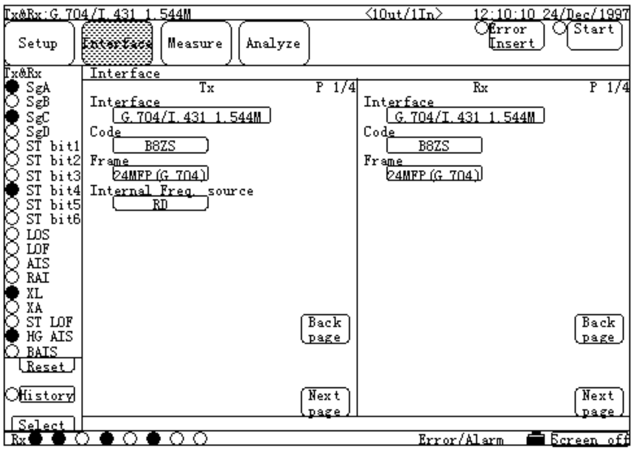


Fig. 6.1-36 Interface Screen（1/3）

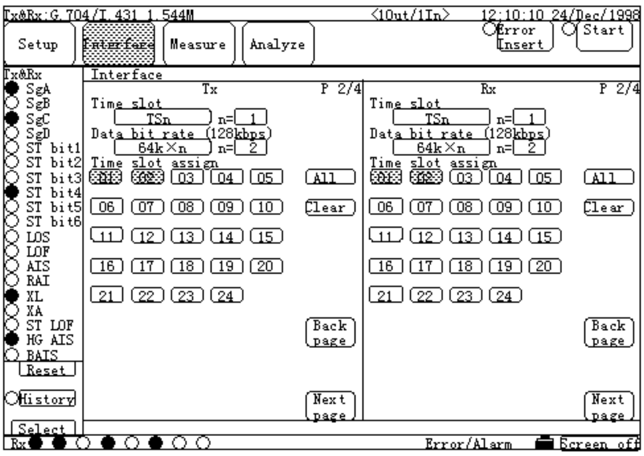


Fig. 6.1-37 Interface Screen（2/3）

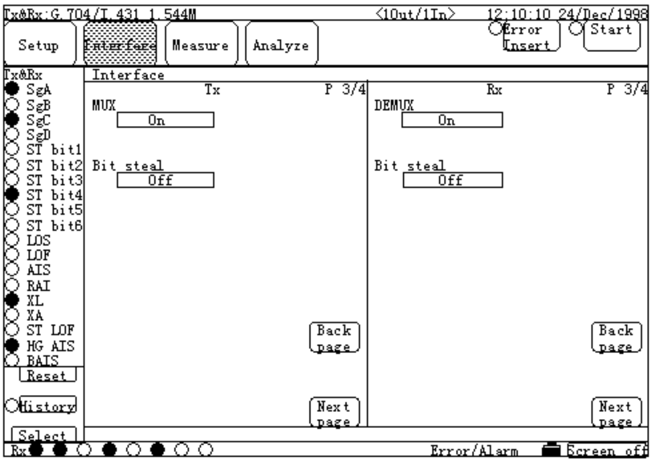


Fig. 6.1-38 Interface Screen（3/3）

6.1.12 Voice CODEC function with G.704 6.312M interface

Function by which the voice data from a head set is converted by A-law code rule or μ -law code rule, and fed to the time slots specified by a high-speed interface (G.703 64k, I430/I.431-a 192k, G.704/I.431 1.544M, G.704/I.431 2.048M, 2M CMI or G.704 6.312M), and then sent from these time slots. Function by which the voice data is fetched from the time slots specified by the high-speed interface, and converted into voice data by A-law code rule or μ -law code rule, and then output to a head set or speaker.

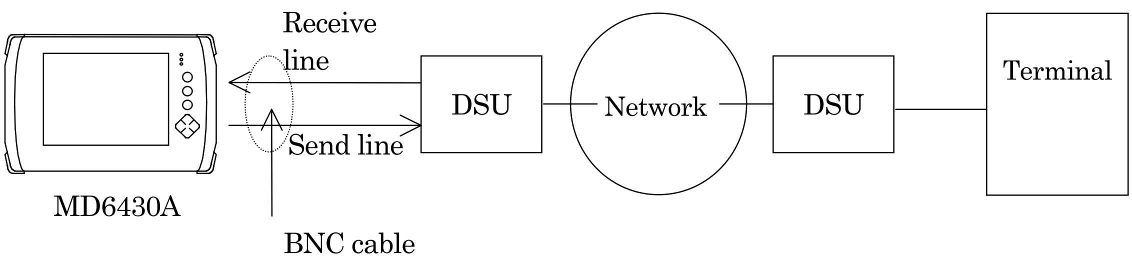
Input/Output	1Out/1In

Interface（Tx）	G.704 6.312M
Code	B8ZS
Frame	4MFP（G.704）
Data bit rate	64kbit/s 2ch
Internal Freq. source	RD
Time slot	1
Voice channel	2

Interface（Tx）	G.704 6.312M
Code	B8ZS
Frame	4MFP（G.704）
Data bit rate	64kbit/s 2ch
Internal Freq. source	RD
Time slot	1
Voice channel	2

(1) Configuring and setting measurement system

With a head set, this example sends/receives the voice data via the G.704 6.312M interface.Connect the G.704 6.312M interface connector on the top panel of the MD6430A to a DSU with BNC cables, and prepare a DSU and a terminal device through a network, as shown below.



(2) Turning power switch on

(3) Initializing set condition (See para. 6.1.1.)

(4) Setting interface condition.
Referring to para. 6.1.1, change the settings of the interface to those shown in Fig. 6.1-39 , Fig. 6.1-40 and Fig. 6.1-41.

(5) Connect the head set, referring to para 3.3 "Connecting peripheral devices". Then, voice data is sent and received.

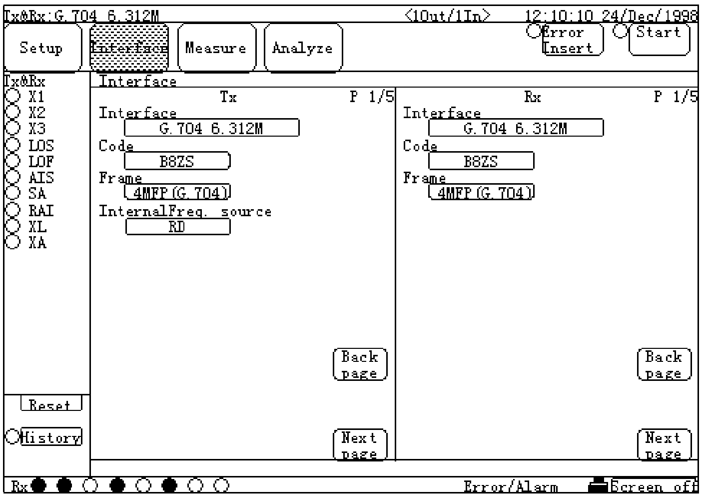


Fig. 6.1-39 Interface Screen（1/3）

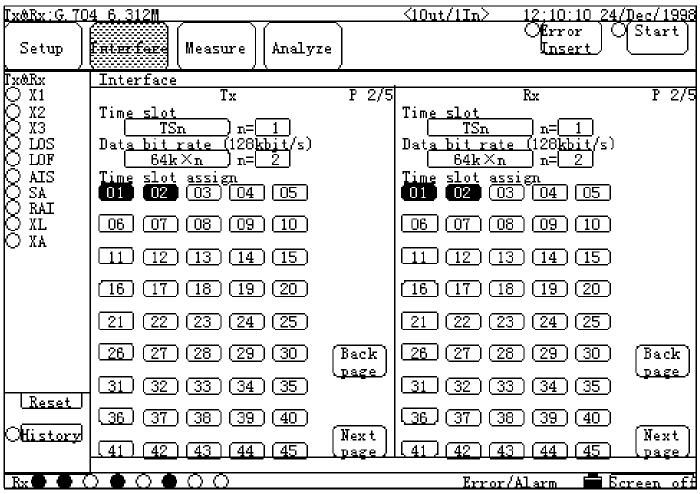


Fig. 6.1-40 Interface Screen（2/3）

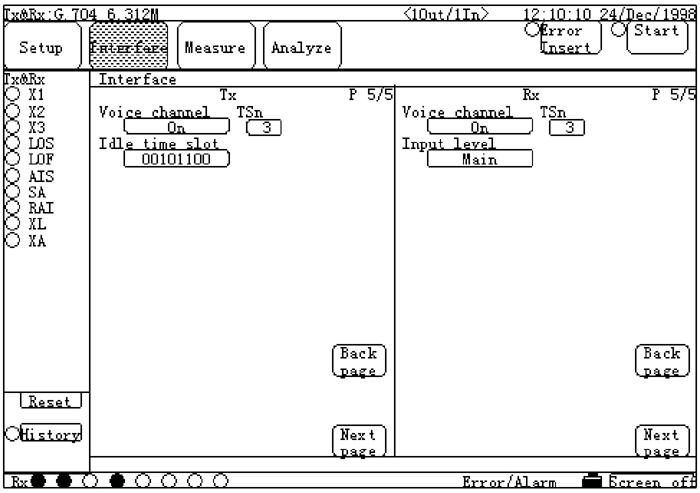


Fig. 6.1-41 Interface Screen（3/3）

6.1.13 Frame relay protocol monitor during Frame relay measurement

(1) Configuring and setting measurement system.

This section describes the example to display the protocol monitor data(obtained from the example shown in para.6.1.2"Frame relay PVC loop-back test for I.430/I/430-a 192k interface "on the Analyze screen.
Also , describes the example to output it to RS-232C .
For the configuration of devices , connection of cables and setting of the interface ; refer to para.6.1.2.
When output the data to RS-232C , connects the external connector to RS-232C with cross cable . refer to para.3.3.)

(2) Display the data during measurement

- Display the screen

(2-1) Press the "Analyze" button , and then the Analyze dialog box appears. Select the "Protocol monitor " button , and press the "Set" button.
The screen shown in Fig. 6.1-42 appears.

(2-2) When the "Enable" button (Fig. 6.1-42 , [1]) pressed ; display the monitoring data.

[1]

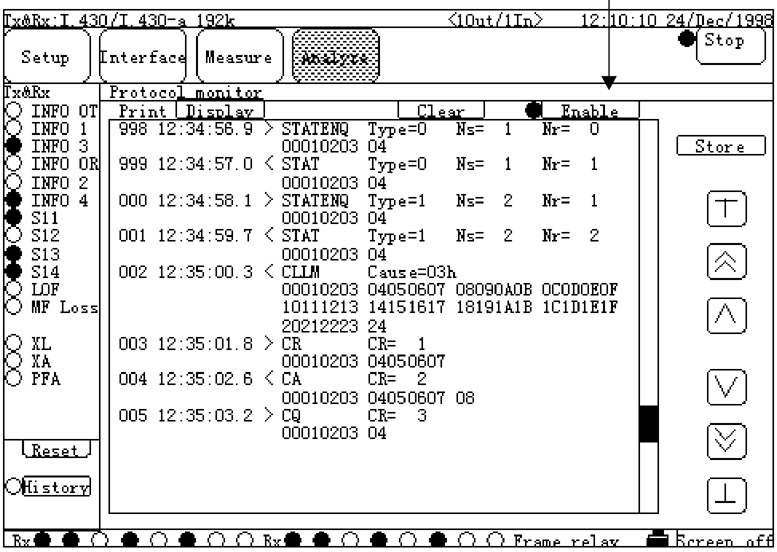


Fig. 6.1-42 Protocol monitor screen

- Output the data to RS-232C during measurement.

  (2-1) Display the Common of the Setup: System sub-screen.
  Confirm the setting is the same between the item other than "Function" of "RS-232C Interface" item and external controller condition.

  (2-2) Sets the "Function of "RS-232C Interface" items to "Protocol monitor".
  Then , start outputting the protocol data , refer to Appendix C.

6.1.14 ISDN protocol monitor

(1) Configuring and setting measurement system

This section describes the example to display the information of layer 3 during ISDN calling /being-called.

(obtained from the example shown in para.6.5 "ISDN Calling/ Being-called") on the Analyze screen.

Also , describes the example to output it to RS-232C .

For the configuration of devices , connection of cables and setting of the interface ; refer to para.6.1.-2.

When displays the data the on screen, connects the external controller to RS-232C with cross cable.(refer to para.3.3)

(2) Display the data during measurement.

- Display the screen

(2-1) Press the "Analyze" button , and then the Analyze dialog box appears.
Select the "Protocol monitor " button , and press the "Set" button .
The screen shown in Fig.6.1-43 appears.

(2-2) When the "Enable" button (Fig. 6.1-43, [1]) pressed; display the monitoring data.
For details of the display data, refer to Appendix C.

[1]

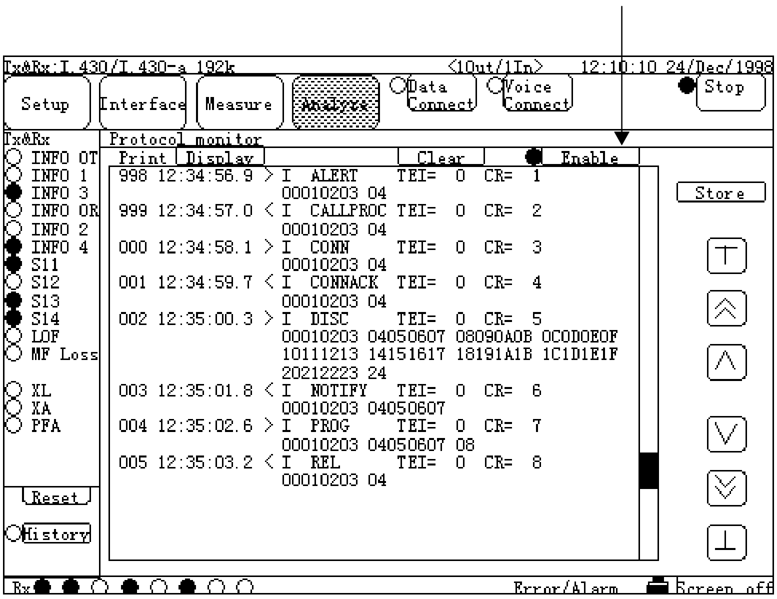


Fig. 6.1-43 Protocol monitor screen

- Output the data to RS-232C during measurement.

(2-1) Display the Common of the Setup:System sub-screen.
Confirm the setting is the same between the item other than "Function" of "RS-232C Interface" item and external controller condition.

(2-2) Sets the "Function" of "RS-232C Interface" items to "Protocol monitor ".
Then , start outputting the Protocol monitor data ,.
For details of the outputting data , refer to Appendix C.

6.2 Printing

The MD6430A provides the following two print functions.

- "Print Now" print
  Prints the setting information and measurement data by the Print Now key.

- Automatic print
  Prints the Error/Alarm measurement data, automatically.

This section describes the operation procedure for printing, and contains examples of printed results.

6.2.1 Print Now print of setting information and measurement data

To print the setting information and measurement data, display the screen which includes the data to be printed; and pressing the Print Now key, execute the print function, manually.

For the Print Now print function, there are the following basic operations and restrictions

- **During Print Now print**
  - The "Now printing..." message is displayed; and keys excluding the Print Now key and the Panel Lock/Local key, and touch panel operation become unavailable.
  - If the Print Now key pressed again, the printing is forced to stop.
  - Settings by remote set commands other than the Print Now print stop command, are not available.
  - If a voice call occurs, it is not received. When the current print is completed automatically or forced to stop, the receiving voice call is allowed (using an option).
  - During execution of the Print Now print of Analyze data (E/A Logging and E/A Histogram), if the data is changed for any reason such as automatic measurement; the printer is forced to stop the Print Now print prematurely, and ejects the current page to a new one.
- **Invalidity of Print Now key operation**
  - On the Setup:Print screen, if the Print out item is set to Off; the print operation by the Print Now key becomes invalid and the print does not start.
- **Priority of the Print Now key operation**
  - When the Print Now key pressed in automatic print mode (while Error/Alarm measurement is being executed); the printer is forced to stop the automatic print prematurely, ejects the current page to a new one, and starts the Print Now print. When the Print Now print completed, the automatic print is resumed.

From the next page, the examples of print by the Print Now key operation are shown.

Print example 1: Common area of Setup:System screen
Print example 2: Interface:G.704/I.431 1.544M display of Interface:Interface screen
Print example 3: Character display of Measure:Error/Alarm screen
Print example 4: Histogram display of Analyze:Error/Alarm screen

■ Print example 1: Common extension-screen of Setup:System screen

Operation procedure

(1) Switch to the Common extension-screen of the Setup:System screen.

(2) Press the Print Now key.
The printer stars printing.

```
MD6430A
Setup                       :       System(Common) -   P1
############################################################
 Buzzer
  Touch key                 :                          On
  Operation error           :                          On
  Error & Alarm             :                          On
 Date & Time                :         23:09:45 27/Sep/1998
 RS-232C Remote interface
  Function                  :              Remote control
  Speed                     :                  9600 bit/s
  Character length          :                       8 bit
  Parity                    :                        None
  Stop bit                  :                       1 bit
  Flow control              :                  X-ON/X-OFF
 CODEC
  Speaker & Headset vol.    :                           1
  Speaker enable            :                          On
  PCM Code                  :                       u-law
 Power save                 :                          On
                                                   15 min
 Error count condition
  Bit EC with clock slip    :                         Off
  Bit EC with PSL           :                         Off
 ISDN
  Signalling protocol       :
                                             JT-Q921/931
 Frame relay
  PVC                       :                          On
```

Fig. 6.2-1 Print Example of Common extension-screen of Setup:System Screen

■ Print example 2: Interface:G.704/I.431 1.544M display of Interface:Interface screen

Operation procedure

(1) Switch to the Interface:G.704/I.431 1.544M display of the Interface:Interface screen.

(2) Press the Print Now key.
The printer starts printing.

```
MD6430A                         Time 23:09:45 27/Sep/1998
Interface                  :          Interface -   P1
##############################################################
--- Tx ---
 Interface                 :            G.704/I.431 1.544M
 Code                      :                          B8ZS
 Frame                     :                  24MFP(G.704)
 Internal Freq. source     :                          Self
 Time slot                 :                           TSn
                                                    n =  1
 Data bit rate             :                  64 kbit/s * n
                                                    n =  1
                                                 (64 kbit/s)
 Time slot assign          :
                 1   2   3   4   5   6   7   8   9  10
               ---+---+---+---+---+---+---+---+---+---
             0  **  --  --  --  --  --  --  --  --  --
            10  --  --  --  --  --  --  --  --  --  --
            20  --  --  --  --
 MUX                       :                           Off
 Bit steal                 :                           Off
 Voice channel             :                           Off
 Idle time slot            :                      11111111
--- Rx ---
 Interface                 :            G.704/I.431 1.544M
 Code                      :                          B8ZS
 Frame                     :                  24MFP(G.704)
 Time slot                 :                           TSn
                                                    n =  1
 Data bit rate             :                  64 kbit/s * n
                                                    n =  1
                                                 (64 kbit/s)
 Time slot assign          :
                 1   2   3   4   5   6   7   8   9  10
               ---+---+---+---+---+---+---+---+---+---
             0  **  --  --  --  --  --  --  --  --  --
            10  --  --  --  --  --  --  --  --  --  --
            20  --  --  --  --
 DEMUX                     :                           Off
 Bit steal                 :                           Off
 Voice channel             :                           Off
 Input level               :                          Main
```

[1]

Fig. 6.2-2 Print Example of Interface:G.704/I.431 1.544M Display of Interface:Interface Screen

- **Time slot assign**
"**" represents the specified time slot and "--" represents the not-specified time slots.

■ Print example 3: Character extension-screen of Measure:Error/Alarm screen

Operation procedure

(1) Switch to the Character extension-screen of the Measure:Error/Alarm screen.

(2) Set the range of character patterns to be printed, using the "Print" buttons ([1] in Fig. 6.2-3), below.

Display	:Starting from the address displayed at the top left of the display, prints 50 byte characters.
Before	:Prints from the address 0 to the last displayed address.
After	:Prints from the first displayed address to the last address
All	:Prints from the address 0 to the last address.

[1]

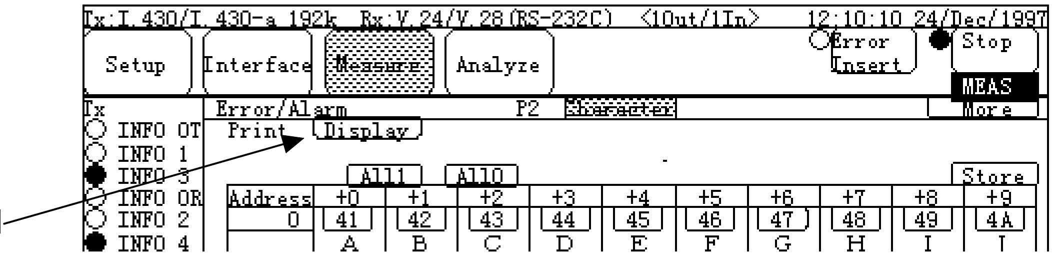


Fig. 6.2-3 Character extension-screen of Measure:Error/Alarm Screen

(3) Press the Print Now key.
The printer starts printing.

```
MD6430A                          Time 23:09:45 27/Sep/1998
Measure                      :Error/Alarm(Character) -   P1
##########################################################
 Print                       :                    Display   ◄── [1]
 Edit mode                   :                        Hex
 Display mode                :                      ASCII
 Start address               :                          0
 Stop address                :                         22
 Boundary                    :                      8 bit
              0   1   2   3   4   5   6   7   8   9
            +---+---+---+---+---+---+---+---+---+---+
         00|  44  45  46  47  48  49  4A  30  31  32
            D   E   F   G   H   I   J   0   1   2
         10|  33  34  35  36  37  38  39  41  42  43
            3   4   5   6   7   8   9   A   B   C
         20|  44  45  46  47  48  49  4A  30  31  32    ◄── [2]
            D   E   F   G   H   I   J   0   1   2
         30|  33  34  35  36  37  38  39  41  42  43
            3   4   5   6   7   8   9   A   B   C
         40|  00  45  46  FF  FF  FF  FF  FF  FF  FF
           --   E   F  --  --  --  --  --  --  --
```

Fig. 6.2-4 Print Example of Character extension-screen of Measure:Error/Alarm Screen

- **Character data**

For character data displayed in [2] in Fig. 6.2-4, only when "Edit mode" or "Display mode" is set to "ASCII" and the data is converted to any of the following characters; the printed characters become the same as those of the screen. Among the following characters, "SP" is printed as a blank. Also, characters other than the followings are printed as "--".

SP, !, , #, $, %, &, ’, (,), *, +, ”, ”, −, . , /, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, :, ;, <, =, >, ?, @,
A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, [, ¥,], ^, _, `,
a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, z, {, |, }, ~

■ Print example 4: Histogram extension-screen of Analyze:Error/Alarm screen

Operation procedure

1. Switch to the Histogram extension-screen of the Analyze:Error/Alarm screen.
2. Set the range of character patterns to be printed, using any of the "Print" button ([1]in Fig. 6.2-5) below

Display	: Prints from the first displayed data to the last displayed data.
Before	: Prints from the beginning of the saved measurement results to the last displayed data
After	: Prints from the first displayed data to the last measured data.
All	: Prints from the beginning of the saved measurement results to the last measured data.

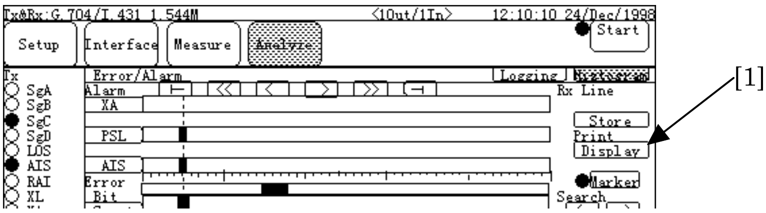


Fig. 6.2-5 Histogram extension-screen of Analyze:Error/Alarm Screen

(3) Press the Print Now key.
The printer starts printing.

```
MD6430A                      Time 23:09:45 24/Dec/1998
Analyze                  :    Analyze(Histogram) -   P1
########################################################
 Print                   :                          All
 Interval                :                       15 min
 Error                   :                        Count
 ------------------------------------------------------
 Marker                  :          2:10    24/Dec/1998
 Error count                                    9.99E06
 PSL                                          1.00E06 s
 AIS                                          1.00E06 s
 XA                                           1.00E06 s
 ------------------------------------------------------
 XA
 |PSL
 ||AIS
 |||   1E0  1E1  1E2  1E3  1E4  1E5  1E6  1E7  1E8  1E9
 ---+ ++----+----+----+----+----+----+----+----+----+
  *  |+|:    :    :    :    :    :    :    :    :    :
  ** |M|***********************************:    :    :
     | |*******   :    :    :    :    :    :    :    :
  *  |+|:    :    :    :    :    :    :    :    :    :
     | |:    :    :    :    :    :    :    :    :    :
     | |:    :    :    :    :    :    :    :    :    :
   * | |:    :    :    :    :    :    :    :    :    :
   * |+|:    :    :    :    :    :    :    :    :    :
   * | |*    :    :    :    :    :    :    :    :    :
     |+|:    :    :    :    :    :    :    :    :    :
     | |********  :    :    :    :    :    :    :    :
  *  | |************   :    :    :    :    :    :    :
  *  | |************   :    :    :    :    :    :    :
     |+|:    :    :    :    :    :    :    :    :    :
     | |:    :    :    :    :    :    :    :    :    :
 ---+ ++----+----+----+----+----+----+----+----+----+
 Top                                 10:09  24/Dec/1998
 Bottom                              14:54  24/Dec/1998
```

[1]

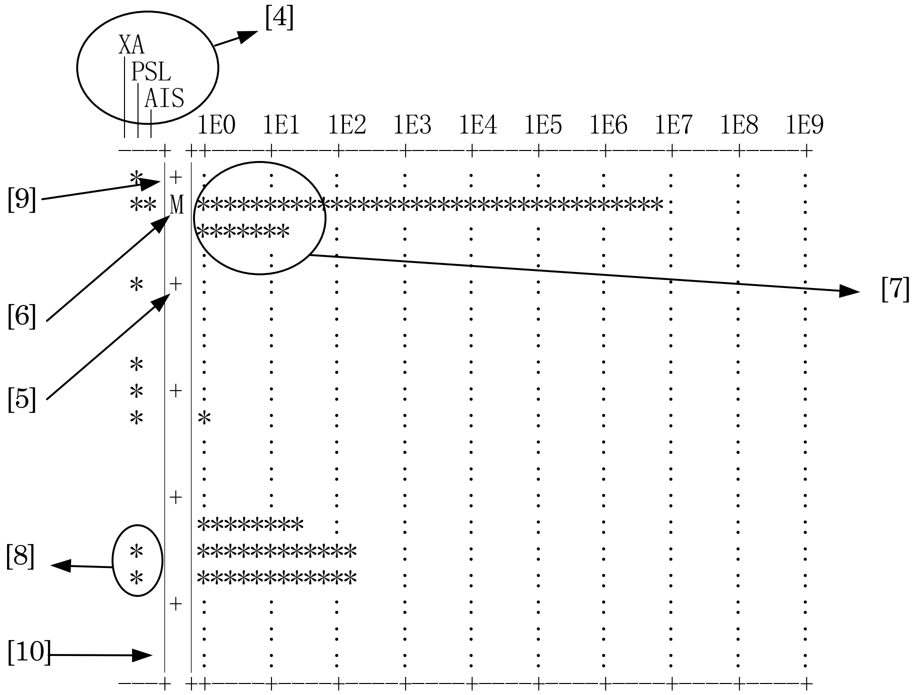
[3]

[2]

Fig 6-5 Print Example of Histogram Display of Analyze:Error/Alarm Screen

- **Top and Bottom items at [2]**
  The Top and the Bottom items displayed at [2] indicate the first time and the last time on the printed page, respectively. When the print line moves to the next new page, the first time and the last time on the new page are printed. Therefor, these printed times differ from the current time on the screen. The first time and the last time correspond to the positions at[9] and [10] of the graph shown below, respectively.

- **Histogram at [3]**
  Symbols in the graph shown at [3] indicates the followings ([4] to [10]).



- **Alarm title at [4]**
  Indicates the alarm selected on the screen of the MD6430A. The alarm items displayed from up to down in the screen are printed from left to right. When the alarm item is set to OFF, "OFF" is printed in the alarm title.

- **Sign of measurement time at [5]**
  "+" indicates the sign of measurement time. The interval between the "+" positions depends on the interval set value. The "+" print position corresponding to each interval value is as follows:

Interval=1s	: Printed at every five data items (every five seconds).
Interval=1min	: Printed at every five data items (every five minutes).
Interval=15min	: Printed at every four data items (every 60 minutes).
Interval=60min	: Printed at every six data items (every 360 minutes).

- **Marker at [6]**
  "M" indicates the marker position. However, if the "M" (maker) and "+" (measurement time) are overlapped, "M" is printed.

- **Error results at [7]**
  Indicates the Error Counts or the Error Rate. For the Count value, values in the range of 0 to 1E9 are represented by the number of "*"s. For the Rate value, values of 0 to 1E-1 are represented by the number of "*"s.
  The print resolution of "*"s to be printed is calculated by the following formula and truncation of the decimal point of the result.

  Error count

Error count = 0	: No print
0 < Error rate =< 1E9	: The number of "*"s = 5log(count value) + 1
1E9 < Error count	: The number of "*"s = 46

  Error rate

Error rate = 0	: No print
0 < Error rate =< 1E-1	: The number of "*"s = 5(9 + log(rate value)) + 2
1E-1 < Error count	: The number of "*"s = 46

  For an example, when the error count is 1560, the number of "*"s can be calculated by:

  $5\log(1560)+1 = 16.96 \rightarrow 16$

  As a result of the above, 16 pieces of "*"s are printed.

- **Alarm result at [8]**
  Corresponding to the occurrence of an alarm indicated in the Alarm title ([4]), "*" is printed. The example in the previous page shows "*" at PSL position which indicates that the PSL alarm occurs.

6.2.2 Automatic print of measurement data

The automatic print of measurement data function is used to output the measured results to the printer automatically in synchronization with Error/Alarm measured results.
The following six data items are output by the automatic print function.

[1] Measurement start data
At the beginning of automatic print, the start time is printed.

[2] Measurement condition
When the "Measurement condition" item of the Setup:Print screen is set to ON, this data is printed only once at the beginning of the automatic print.

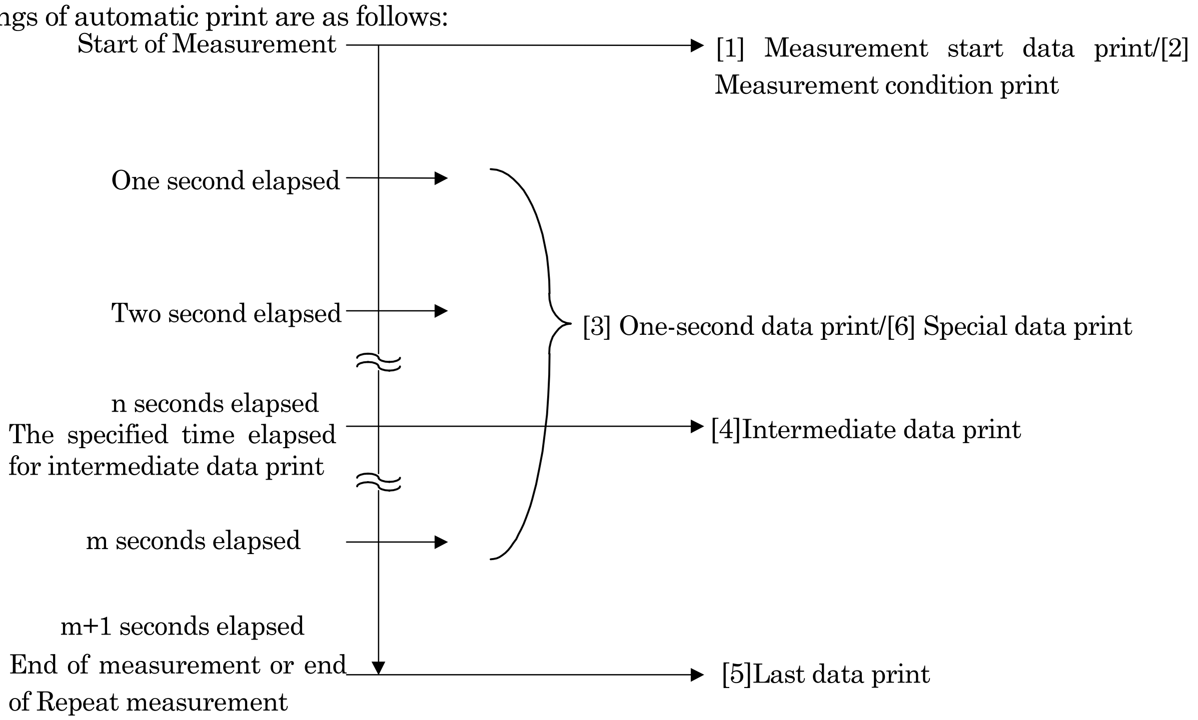
[3] One-second measurement data
For every one second during measurement; when an error occurs or when an alarm occurs or is cleared within the one second, the corresponding item is printed.

[4] Intermediate data
Data on errors/alarms (occurred after the previous intermediate data print or from the measurement start) is printed as accumulated values.

[5] Last data
This data is printed at the end of measurement or end of repeat-measurement.

[6] Special data
- Print save function
- Logging memory overflow
- Histogram memory overflow

Timings of automatic print are as follows:



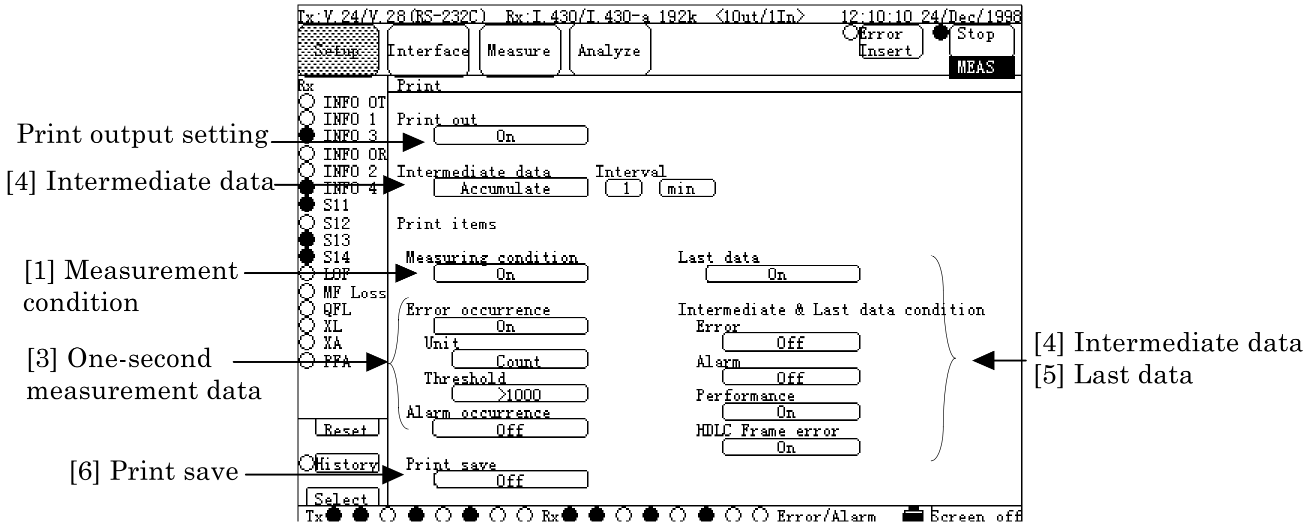


Fig. 6.2-6 Automatic Print / Printer Output Setting Screen

[1] Measurement condition

When the "Measuring condition" item of the Setup:Print screen is set to "ON", this data is printed only once at the beginning of automatic print.

The information to be printed is as follows:

- Input/Output extension-screen of the Setup:Input/Output screen
- Interface item of the Setup: System screen
  - V//X/TTL/CMOS Interface
  - G.703 64k Interface
  - I.430/I.430-a 192k Interface
  - G.704/I.431 1.544M Interface
  - G.704/I.431 2.048M Interface
- Cond.1 and Cond.2 extension-screen of the Measure:Error/Alarm screen

[2] Measurement start data

At the beginning of automatic print, the start time is printed.

[3] One-second measurement data

For every one second during measurement, when an error occurs or when an alarm occurs or is cleared within the one second, the corresponding item is printed. Settings of the "Error occurrence", "Unit", "Threshold", and "Alarm occurrence" items of the Setup:Print screen are printed.

- Error occurrence : ON/OFF of error print
  - Unit : The type of the target error (for "Count", "Error count" is printed for "Rate", "Error rate" is printed.)
  - Threshold : The threshold used for the error print (printed when it is the larger than the threshold.)
- Alarm occurrence : ON/OFF of alarm print

[4] Intermediate data

Data on errors/alarms (occurred after the previous intermediate data print or from the beginning of the measurement) is printed as accumulated values. Settings of the "Intermediate data", "Last data", "Error", "Alarm", "Performance", and "HDLC frame error" items of the Setup:Print screen are printed.

- Intermediate data : The type of print data and the print interval of intermediate data (for "Individual", an accumulated value from the previous intermediate data is printed; for "Accumulate", an accumulated value from the start point of measurement is printed.)
- Last data : ON/OFF of intermediate-data/last-data print
  - Error : ON/OFF of measurement intermediate/last error data print
  - Alarm : ON/OFF of measurement intermediate/last alarm data print
  - Performance :ON/OFF of measurement intermediate/last performance data print
  - HDLC Frame error: ON/OFF of measurement intermediate/last HDLC error data print

[5] Last data

This data is printed at the end of automatic print. Together with the end time, intermediate data is printed.

[6] Special data

- Print save function

  During error/alarm one-second print, when errors/alarms occur and continue for more than ten seconds; the print-out of all automatic print excluding special data print is stopped, and the stop time is printed. Print is performed after every ten seconds of one-second data print. ON/OFF of Print save function can be set in the Print save item of the Setup:Print screen. However, in the following cases, the working Print save function may be cleared:

  a. No one-second error/alarm data are generated for ten seconds.
  b. Setting of the Print save item is changed.
  c. Power failure is restored.

  Cleared as above, the time is printed when: For a, After every ten seconds of one-second data print For b and c, In change of setting and in power recovery

- Logging memory overflow

  When the Logging Line item of the Measure:Error/Alarm screen is set to ON and the Logging data becomes full, Logging-memory overflow is printed. However, although the Logging data is full, measurement and print is continued.

- Histogram memory overflow

  When the Histogram line item of the Measure:Error/Alarm screen is set to other than OFF, and the Histogram data becomes full; Histogram-memory overflow is printed. However, although the Histogram data is full, measurement and print is continued.

■ Print example: Automatic print

Operation procedure

(1) Switch the screen to the Setup:Print screen shown in the previous page. Set each item of automatic print.

(2) Switch the screen to the Measure:Error/Alarm screen, then press the "Start" button of common area to start measurement

(3) To stop measurement, press the "Stop" button of common area.

Start data

```
*******************************************************
* 23:05:50 27/Sep/1998     Start            MD6430A *
*******************************************************
```

Measurement conditions

```
*******************************************************
* Measuring condition                                 *
*******************************************************
------------------------ Setup ------------------------
--- Input/Output ---
 Input/Output           :                   1Out/1In
--- V/X/TTL/CMOS Interface ---
 V/X Interface
  to DTE/DCE            :                     to DTE
 TTL/CMOS Interface
  Term impedance        :                       High
--- G.703 64k Interface ---
 Type of interface      :          Centralized clock
--- I.430/I.430-a 192k Interface ---
 Test mode              :                      Lease
 Term impedance         :                    100 ohm
--- G.704/I.431 1.544M Interface ---
 Test mode              :                      Lease
--- G.704/I.431 2.048M Interface ---
 Test mode              :                      Lease
 Impedance              :                    120 ohm
---------------------- Interface ----------------------
--- Tx ---
 Interface              :         G.704/I.431 1.544M
 Code                   :                       B8ZS
 Frame                  :                24MFP(G.704)
 Internal Freq. source  :                       Self
```

```
 Performance            :                        Off
```

One-second data

```
 23:06:00 27/Sep/1998
 Power fail                                    Occur
   Tx Error count                          >9.99E15
   Tx Error rate                           <1.00E-15
   Tx PSL                                    Recover
   Tx LOS                                      Occur
   Tx LOF                                    Recover
   Tx AIS                                    Recover
```

```
*******************************************************
* 23:50:45 27/Sep/1998     Print saving               *
*******************************************************
*******************************************************
* 23:51:45 27/Sep/1998     Print saving OFF           *
*******************************************************
*******************************************************
* 23:55:45 27/Sep/1998     Logging memory full        *
*******************************************************
*******************************************************
* 23:55:45 27/Sep/1998     Histogram memory full      *
*******************************************************
*******************************************************
* 00:05:45 28/Sep/1998     Intermediate               *
*******************************************************
---------------------- Tx Error -----------------------
 Error count       >9.99E15  Error rate       <1.00E-15
 Block error count >9.99E15  Block error rate <1.00E-15
 ES                >9.99E15  EFS               >9.99E15

 RAI                                           >9.99E15
 Disconnection                                  Occured
*******************************************************
*******************************************************
* 00:05:50 28/Sep/1998     Stop                       *
*******************************************************
---------------------- Tx Error -----------------------
 Error count       >9.99E15  Error rate       <1.00E-15
 Block error count >9.99E15  Block error rate <1.00E-15
 ES                >9.99E15  EFS               >9.99E15

 RAI                                           >9.99E15
 Disconnection                                  Occured
```

Start of print save

Stop of print save

Logging-memory full

Histogram memory full

Intermediate data

Last data

6.3 Saving to Memory

Each data item of measurement conditions and analysis & pattern memory can be saved/recalled to the internal memory of the MD6430A. This section describes the operating procedure for saving/recalling data to the internal memory.

6.3.1 Manipulation of measurement condition memory

The measurement condition memory is manipulated on the Setup:Memory screen.

Up to ten measurement conditions can be registered in the memory. In the button with an unregistered memory number, "Empty" is displayed.

Also, in the button with a registered memory number, the registered name is displayed. In this paragraph, an example of the operation of saving the current measurement conditions to the memory numbered 5 (registered).

For other operations of manipulating memory (recalling data from memory, changing registration name of memory, clearing the registered contents of memory, and resetting to the factory setting), the method of operation only is described without an example.

■ **Operation procedure for saving (To save data to a registered memory 5)**

(1) Display the Seup:Memory screen.

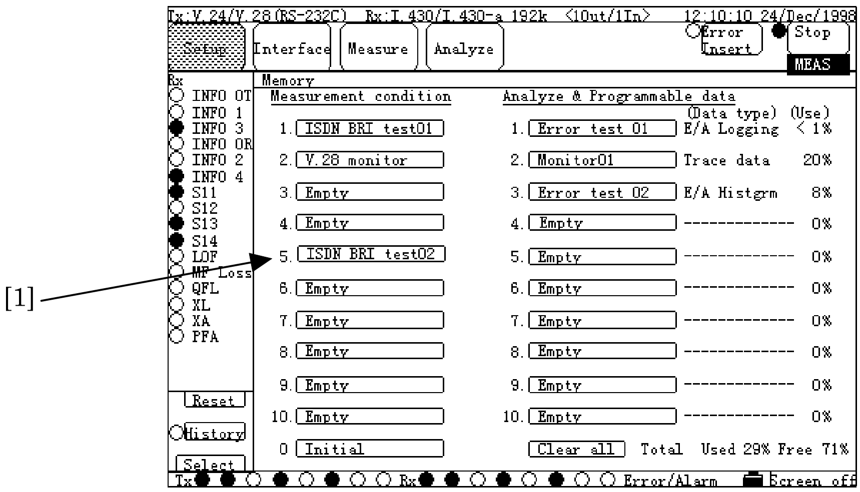


Fig. 6.3-1 Setup:Memory Screen

(2) From buttons listed in the "Measurement condition" item, select the button 5 (Fig. 6.3-1, [1]).

(3) The item selection window appears. Press the "Restore" button (Fig. 6.3-2, [2]) and also press the "Set" button (Fig. 6.3-2, [3]).

Note: When selecting the button displaying "Empty", press the "Store" button instead of "Restore" button.

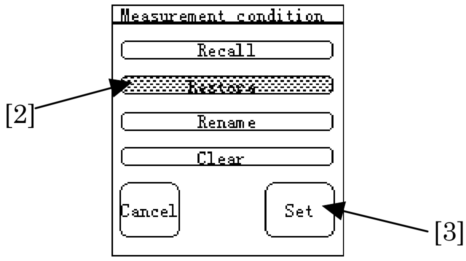


Fig. 6.3-2 Item Selection Window

(4) For setting a file name, the character string entry window appears. Enter the desired registration file name, and press the "Set" button (Fig. 6.3-3, [4]).

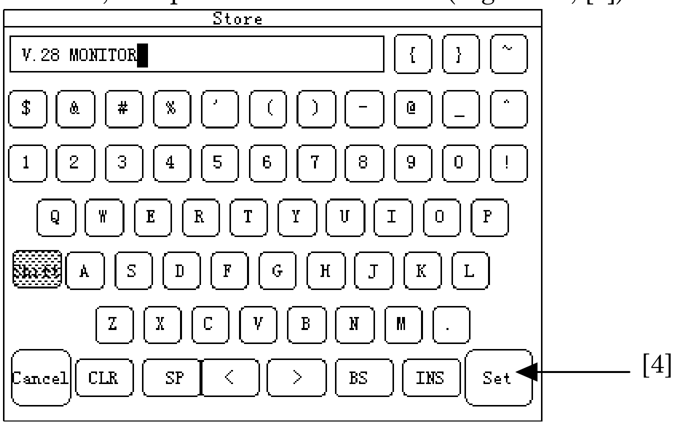


Fig. 6.3-3 Character String Entry Window

(5) The confirmation window for registration appears. After finishing confirmation, press "Yes" (Fig. 6.3-4, [5]) to overwrite the old name.

Note : When selecting the button displaying "Empty", the confirmation window does not appear.

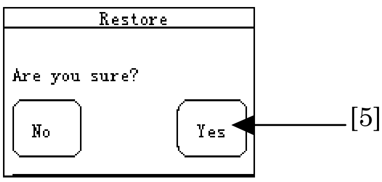


Fig. 6.3-4 Confirmation Window

(6) The current measurement condition is saved to the memory 5 with the registration name in Step 4.

■ Operation procedure for recalling memory

(7) Display the Setup:Memory screen.

(8) From buttons listed in the "Measurement condition" item, select the button with the desired memory number.

(9) The item selection window appears. Press the "Recall" button, and then press the "Set" button.

(10) The contents of the memory are recalled on the measurement conditions of the MD6430A.

Note: When selecting the button displaying "Empty", the "Recall" button is not available.

■ Operation procedure for changing registration name

(1) Display the Setup:Memory screen.

(2) From buttons listed in the "Measurement condition" item, select the button with the desired memory number.

(3) The item selection window appears. Press the "Rename" button, and then press the "Set" button.

(4) For renaming the file, the character string entry window appears. Enter the desired registration name, and press the "Set" button.

(5) The old name is replaced with the new name entered in Step 4.

Note: When selecting the button displaying "Empty", the "Rename" button is not available.

■ Operation procedure for clearing registration contents

(1) Display the Setup:Memory screen.

(2) From buttons listed in the "Measurement condition" item, select the button with the desired memory number.

(3) The item selection window appears. Press the "Clear" button, and then press the "Set" button.

(4) For clearing the registration contents, the confirmation window appears. When confirmation ended, press "Yes".

(5) The registered measurement conditions are cleared, and "Empty" is displayed in the corresponding button.

Note: When selecting the button displaying "Empty", the "Clear" button is not available.

■ Operation procedure for resetting registration contents to factory setting

(1) Display the Setup:Memory screen

(2) From buttons listed in the "Measurement condition" item, select the button numbered 0 (Initial).

(3) The item selection window appears. Press the "Recall" button, and then press the "Set" button.

(4) The current registered measurement conditions of the MD6430A return to the factory shipped settings.

6.3.2 Manipulating analyze & pattern memory

The analyze & pattern memory can be manipulated on the Setup:Memory screen and screens which contain each data item to be saved.
Up to ten data can be registered in the analyze & pattern memory. In the button with an unregistered memory number, "Empty" is displayed.
Also, in the button with a registered memory number, the registered name is displayed. In this paragraph, an example of the operation on how to save the current measurement conditions to the memory. For other operations of manipulating memory (recalling data from memory, changing the registered name of memory, clearing the registered memory contents, and clearing all the registered memory contents without an example.

■ Operation procedure for saving data to memory

(1) Display the screen containing the desired data. The following six data items can be registered:

(a)	Character pattern data	: The Character extension-screen of the Measure:Error/Alarm screen
(b)	Error/alarm log data /histogram data	: The Logging/Histogram extension-screen of the Analyze: Error/Alarm screen
(c)	Program data	: The PRGM Data extension-screen of the Measure:Word Trace screen
(d)	Trace data	: Analyze:Trace data screen
(e)	Protocol monitor data	: The Analyze:Protocol monitor screen

In this example, "Character pattern data" is saved.
Display the Character extension-screen of the Measure:Error/Alarm screen.

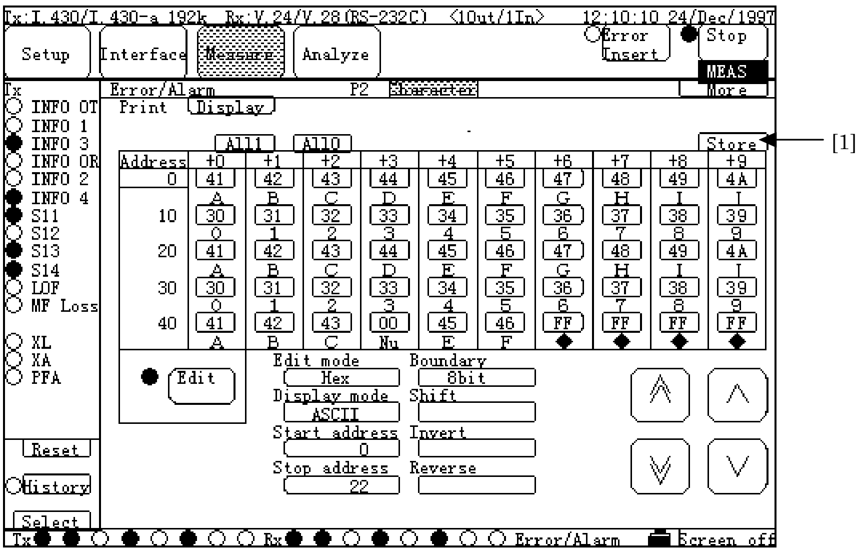


Fig. 6.3-5 Character extension-screen of Measure:Error/Alarm Screen

(2) Press the "Store" button (Fig. 6.3-5, [1]).

(3) For setting the file name, the character string entry window appears. Specify the desired registration file name, and press the "Set" button.

(4) The character pattern data with the specified file name is saved.

Note. ・The Analyze & Program data are saved in the analyze & pattern memory from the first number of the Analyze & Program data item of the Setup:Memory screen.

・When the data capacity of memory to be registered exceeds the free space of the memory or when the ten memories already have been registered, an error message is displayed and a beep sound is heard to notify that the data cannot be saved any more.

■ Operation procedure for recalling memory contents

(1) Display the Setup:Memory screen.

(2) From buttons listed in the "Analyze & Programmable data" item, select the button numbered 3 (In this example).

(3) The item selection window appears. Press the "Recall" button , and then press the "Set" button .

(4) The memory contents are recalled on the Analyze:Recall screen.

■ Operation procedure for changing registration file name

(5) Display the Setup:Memory screen.

(6) From buttons listed in the "Analyze & Programmable data" item, select the button with the desired memory number.

(7) The item selection window appears. Press the "Rename" button, and then press the "Set" button.

(8) For renaming the file, the character string entry window appears. Specify the desired registration name, and press the "Set" button.

(9) The old name is replaced with the new name specified in Step 4.

Note: When selecting the button displaying "Empty", the "Rename" button is not available.

■ Operation procedure for clearing registration contents

(1) Display the Setup:Memory screen.

(2) From buttons listed in the "Analyze & Programmable data" item, select the button with the desired memory number.

(3) From buttons listed in the "Analyze & Programmable data" item, select the button with the desired memory number.

(4) The item selection window appears. Press the "Clear" button, and then press the "Set" button.

(5) For confirming to clear the registered contents, the confirmation window appears. After confirmation, press "Yes".

Note: When selecting the button displaying "Empty", the "Clear" button is not available.

■ Operation procedure for clearing all registration contents

(1) Display the Setup:Memory screen.

(2) From buttons listed in the "Analyze & Programmable data" item, select the "Clear all" button .

(3) For confirming to clear all the registration contents, the confirmation window appears. After confirming to clear them, press "Yes".

(4) All of the registered contents is cleared, and "Empty" is displayed in all the memory buttons.

Note: When all memory items are empty and trying to execute the above operation; an error message appears, and a beep sound is heard to notify that the operation cannot be executed.

6.4 Recording with FD

For the recorded data of FD, the following six types of data can be saved/recalled to/from a floppy disk (FD), respectively. The procedure is described in this section.

- Measurement condition data
- Character pattern data
- Error/alarm log-data/graph-data
- Program data
- Trace data
- Protocol monitor data

6.4.1 Recording operation of FD

Measurement condition, Measurement condition data, character pattern data, error/alarm log-data/graph-data, program data, and trace data can be saved or recalled on the Setup:Floppy disk screen.

■ **Save format of FD**

The following seven types of data can be saved to FD.

Table 6.4-1 Saving Data

Data type	Relevant screen	Save format	File extension
Measurement condition data	All the setting items related to measurement by the MD6430A.	Binary	CND
Charaacter pattern data	Character of Measure:Error/Alarm screen	Binary	CHR
		Text	TXT
Error/Alarm Log data	Logging of Analyze:Error/Alarm screen E/A Logging of Analyze:Recall screen *1	Binary	LOG
		Text	TXT
Error/alarm graph data	The Histogram of the Analyze:Error/Alarm screen The E/A Histogram of the Analyze:Recall screen *1	Binary	HST
		Text	TXT
Program data	PRGM Data of Measure:Word trace screen	Binary	PRG
		Text	TXT
Trace data	Analyze:Trace data screen Trace data of Analyze:Recall screen *1	Binary	TRC
		Text	TXT
Protocol monitor data	Analyze:Protocol monitor screen	Text	TXT

*1 : If the Analyze:Recall screen does not have data, ineffective.

- Two types of file formats (Binary format and Text format) can be used (excluding measurement condition data and protocol monitor data). Contents saved with the Text format can be read into and edit by an Editor or a spread-sheet software.

■ Operation procedure for saving to FD(character pattern data)

(1) Insert a floppy disk into the floppy disk drive (FDD) on the upper panel of the MD6430A.

(2) Switch the screen to the Setup:Floppy disk screen.

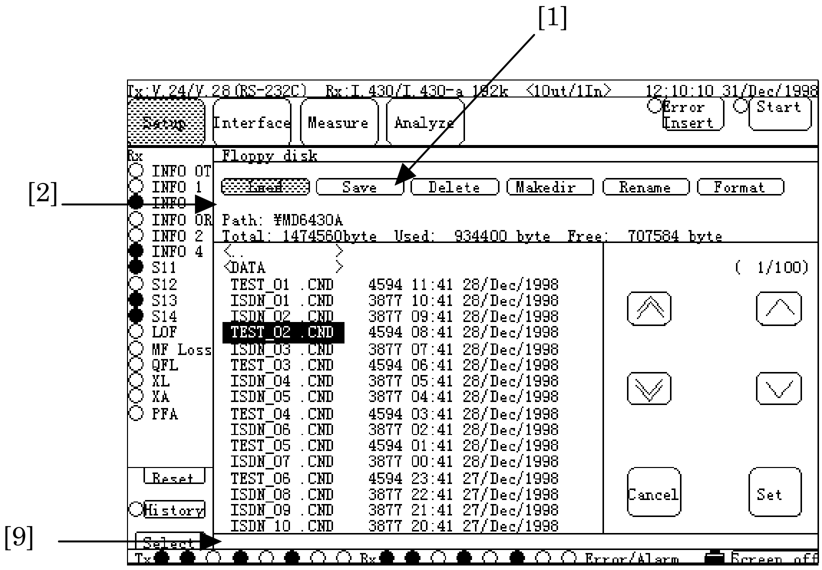


Fig. 6.4-1 Setup:Floppy Disk Screen

(3) Press the "Save" button (Fig. 6.4-1, [1]).

(4) In the function display area (Fig. 6.4-1, [2]), "Save" is displayed and the FD save selection window appears.
Press the "Binary/Text" button of the "Type" item (Fig. 6.4-2, [3]), and then "Type" selection window appears.
Select either the "Binary" button (Fig. 6.4-2, [4]) or the "Text" button, and press the "Set" button (Fig. 6.4-2, [5]).

(5)

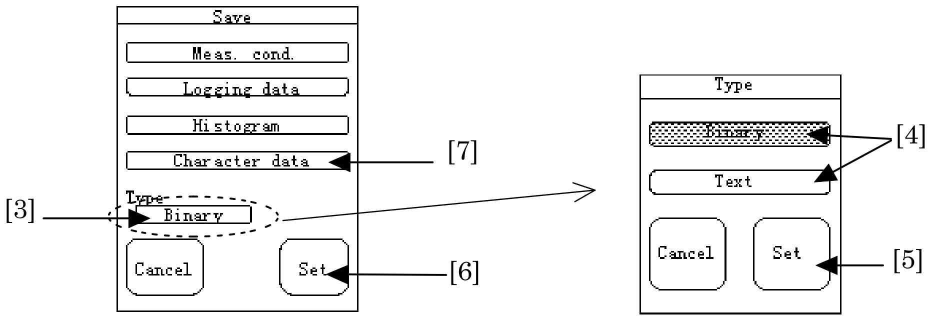


Fig. 6.4-2 Save Selection Window and Type Selection Window

(5) Then, returns to the FD save selection window. Press "Character data" button (Fig. 6.4-2, [7]) and then press the "Set" button (Fig. 6.4-2, [6]).

- Items displayed in the FD save selection window depend on the settings and stored data of the MD6430A.

(6) For setting file name, the character string entry window(Fig. 6.5-3) appears. Enter the desired registration name, and press the "Set" button (Fig. 6.4-3, [8]).

Note: The file name is composed of "name" + "." + "extension". Total 12 max. characters (up to eight characters for "name", up to three characters for "extension", and period) can be used. The extension is not needed to be entered; because the extension is set, automatically, according to the save format of the file,

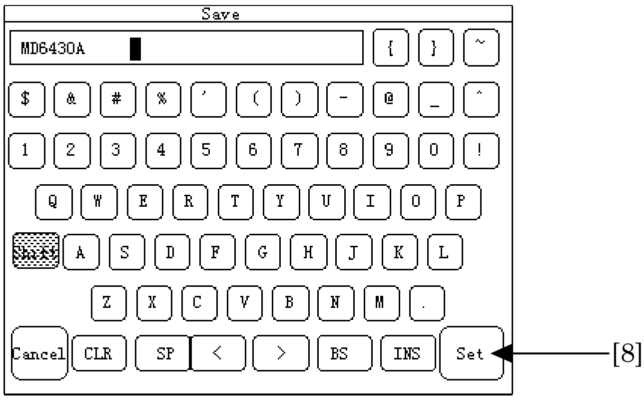


Fig. 6.4-3 Character String Entry Window

(7) When "Now executing..." displayed in the message display area (Fig. 6.4-1, [9]) is cleared, saving the character pattern is completed.

- While "Now executing..." is displayed in the message display area(Fig. 6.4-1, [9]), do not eject the floppy disk from the FDD. Otherwise, data of the floppy may be damaged.

■ Recall format

Recalls (reads) the file saved with the saved format so that it is set to the MD6430A.
The following table shows the correspondence between the recalled file and the registered screen in which the contents of the recalled file is contained.

Table 6.4-2 Recalling Data

Data type	File extension	Relevant screen of recalling
Measurement condition data	CND	
Character pattern data	CHR	Character of Measure:Error/Alarm screen
	TXT *1	
Error/alarm log data	LOG	E/A Logging of Analyze:Recall screen
Error/alarm graph data	HST	E/A Histogram of Analyze:Recall screen
Program data	PRG	PRGM Data of Measure:Word trace screen
	TXT *1	
Trace data	TRC	Trace data of Analyze:Recall screen

*1 The character pattern data area and program data area can recall the following files that are saved in the Text format.

- Character pattern data
- Program data
- Trace data
- Files described in the format shown in Appendix

Where, the MD6430A recalls 1-Kbyte character pattern data and 128-Kbyte program data, at a time, to be set. Therefore, the difference between the set size of the MD6430A and the file size is adjusted by the following actions.

- When the set size of the MD6430A > file size: Adds "FF" to the shortage.
- When the set size of the MD6430A < file size: Truncates the data exceeding the set size of the MD6430A.

■ Operation procedure for recalling data

The example shown below explains the operation by which character pattern is recalled in Binary format (extension: CHR).

(1) Insert a floppy disk into the floppy disk drive (FDD) on the top panel of the MD6430A.

(2) Switch the screen to the Setup:Floppy disk screen.
Press the "Load" button (Fig. 6.4-4, [1]).

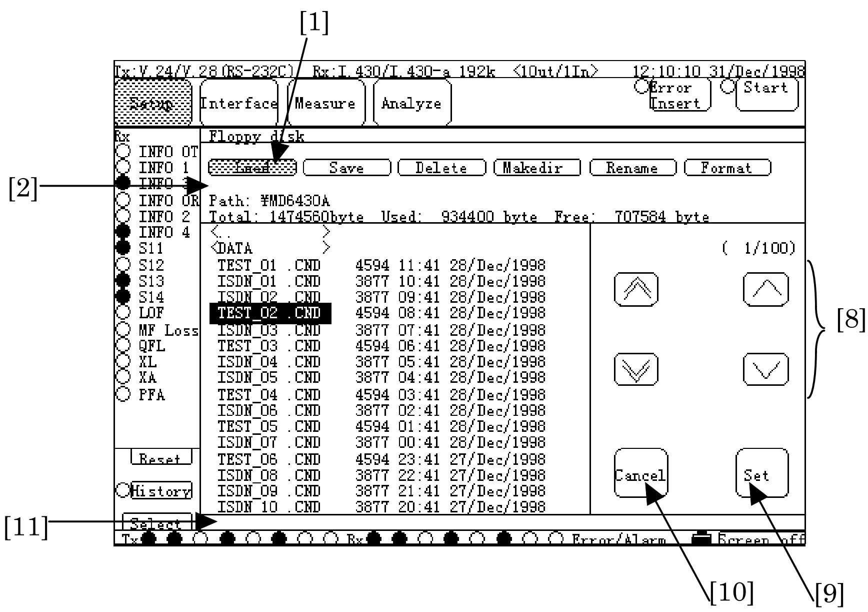


Fig. 6.4-4 Setup:Floppy Disk Screen

(3) "Load" is displayed in the function display area (Fig. 6.4-4, [2]) and the FD read selection window appears. Press the "Binary/Text" button (Fig. 6.4-5, [3]) of the "Type" item. The Type selection window appears. To recall (read) data in the Binary format; press the "Binary" button (Fig. 6.4-5, [4]), and then press the "Set" button (Fig. 6.4-5, [5]).

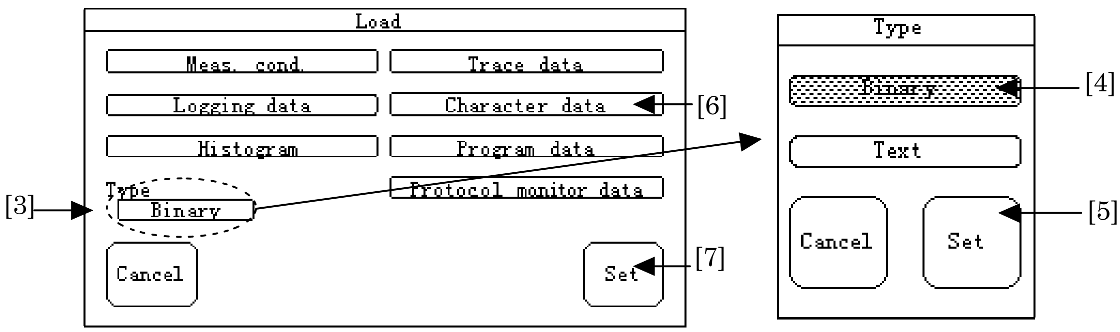


Fig. 6.4-5 FD Read Selection Window and Type Selection Window

(4) Then , returns to the FD read selection window appears again. To recall the character data, press the "Character data" button (Fig. 6.4-5, [6]) and also press the "Set" button (Fig. 6.4-5, [7]).

(5) Binary format files in character pattern data (extension: CHR) are sorted and listed in the screen. Use the cursor buttons (Fig. 6.4-4, [8]), and select the desired file, then press the "Set" button (Fig. 6.4-4, [9]).

- If a file with the specified extension is not found in the floppy disk, it is identified as an error and the recall operation is stopped.
- In the state where "Load" is displayed in the function display area (Fig. 6.4-4, [8]) and the list of files is displayed; the buttons other than the cursor buttons (Fig. 6.4-4, [8]), the "Set" button (Fig. 6.4-4, [9]) and the "Cancel" button (Fig. 6.4-4, [10]) are not available.
  When the "Cancel" button pressed (Fig. 6.4-4, [10]), other buttons become available.

(6) "Now executing..." in the message display area (Fig. 6.4-4, [11]) is cleared, and character pattern data is recalled from the FD to the Character area of the Measure:Error/Alarm screen of the MD6430A.

■ Operation procedure for deleting data

(1) Insert a floppy disk into the floppy disk drive (FDD) on the top panel of the MD6430A.

(2) Switch the screen to the Setup:Floppy disk screen.
Press the "Delete" button (Fig. 6.4-6, [1]).

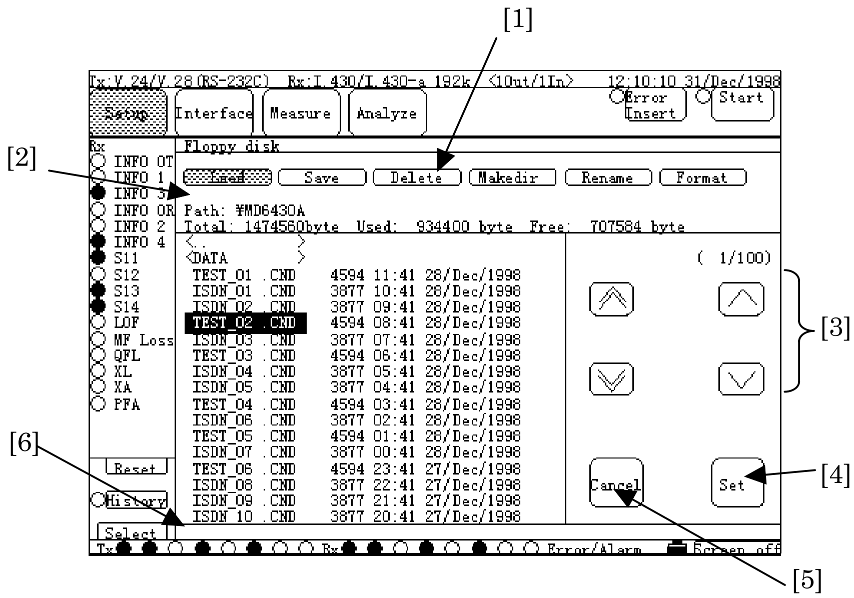


Fig. 6.4-6 Setup:Floppy Disk Screen

(3) "Delete" is displayed in the function display area (Fig. 6.4-6, [2]). Select the desired file to be deleted from the list of files using the cursor buttons (Fig. 6.4-6, [3]), and press the "Set" button (Fig. 6.4-6, [4]).

- In the state where "Delete" or "Rename" is displayed in the function display area (Fig. 6.4-6, [2]) and the list of files is displayed; the buttons other than cursor buttons (Fig. 6.4-6, [3]), the "Set" button (Fig. 6.4-6, [4]) and the "Cancel" button (Fig. 6.4-6, [5]) are not available. When the "Cancel" button (Fig. 6.4-6, [5]) pressed, other buttons become available.

---

(4) The confirmation window appears. Press the "Set" button .

(5) When "Now executing..." in the message display area (Fig. 6.4-6, [2]) is cleared, the selected file is deleted from the FD.

- While "Now executing..." is displayed in the message display area (Fig. 6.4-6, [2]), do not eject the floppy disk from the FDD. Otherwise, data in the floppy disk may be damaged.

■ Operation procedure for renaming file

(1) Insert a floppy disk into the floppy disk (FDD) on the top panel of the MD6430A.

(2) Switch the screen to the Setup:Floppy disk screen. Press the "Rename" button .

(3) "Rename" is displayed in the function display area . Select the desired file to be renamed from the list of files using the cursor buttons , and press the "Set" button .

(4) For renaming the file name, the character string entry window appears. Enter the desired registration name, and press the "Set" button .

(5) When "Now executing..." in the message display area is cleared, the rename operation is completed.

- The file name is composed of "name" + "." + "extension". Total 12 max. characters (up to eight characters for "name", up to three characters for "extension", and period) is used. The extension is not needed to be entered; because the extension is set, automatically, according to the save format of the file,

6.4.2 Other operations of FD

Operations such as creating directory, renaming file, moving cursor among directories, and formatting FD are performed on the Setup:Floppy disk screen.

■ **Operation procedure for creating directory**

(1) Insert a floppy disk into the floppy disk drive (FDD) on the top panel of the MD6430A.

(2) Switch the screen to the Setup:Floppy disk screen. Press the "Makedir" button (Fig. 6.4-7, [1]).

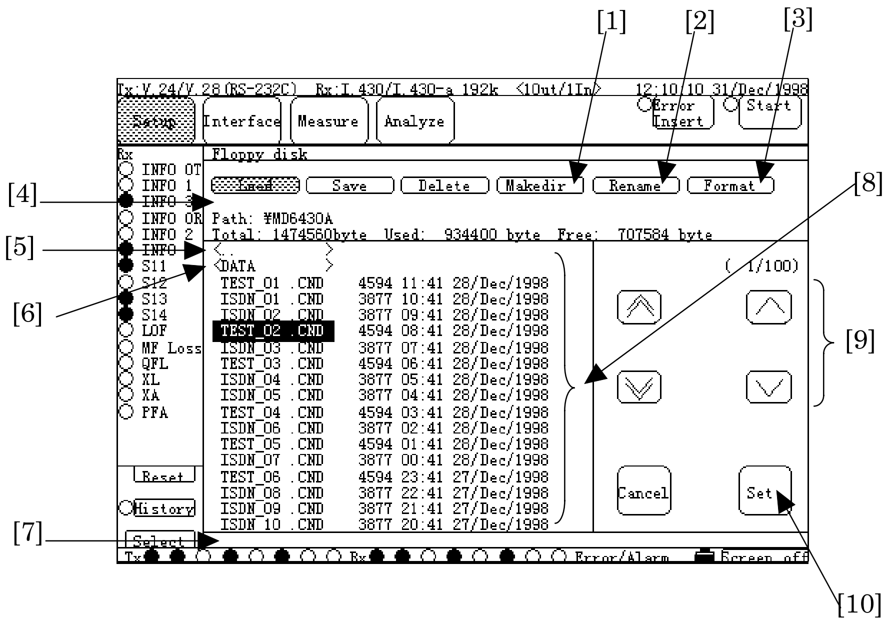


Fig. 6.4-7 Setup:Floppy Disk Screen

(3) "Makedir" is displayed in the function display area (Fig. 6.4-7, [2]). For setting a new directory name, the character string entry window appears. Enter the desired registration name, and then press the "Set" button (Fig. 6.4-7, [3]).

- The directory name is made of "name" + "." + "extension". Total 12 max. characters (up to eight characters for "name", up to three characters for "extension", and period) is used.
  In general, when making a directory name, specify only the name of the directory.

---

(4) A new directory with the specified name is created in the FD.

■ Operation procedure for moving cursor among directories

(1) From the list of names displayed in the file list display area of the Setup:Floppy disk screen, select a name enclosed with "<" and ">" by cursor buttons , and press the "Set" button .

- Names enclosed with "<" and ">" indicate directory names.
  Also the following two directories are shown:
  "<" + "name" + "." + "extension" + ">": Sub-directory below the current directory
  (Ex.) <DATA>
  "<.. >" : Parent directory above the current directory

---

(2) The Cursor moves to the selected directory, and the file names in it are displayed.

■ Operation procedure for formatting FD

(1) Insert a floppy disk into the floppy disk drive (FDD) on the top panel of the MD6430A.

(2) Switch the screen to the Setup:Floppy disk screen.
Press the "Format" button .

(3) "Format" is displayed in the function display area . The confirmation window appears. Press the "Set" button .

(4) Format operation starts. "Now executing..." is displayed in the message display area .

(5) When "Now executing..." in the message display area is cleared, the format operation is completed.

- When "Now executing..." is displayed in the message display area , do not eject the floppy disk. Otherwise, data in the floppy disk may be damaged.

■ Operation procedure for updating file name by changing FD

(1) Insert a new floppy disk into the floppy disk drive (FDD) on the top panel of the MD6430A.

(2) Display the Setup:Floppy disk screen, again.

(3) Now, new information is displayed on the screen.

6.5 ISDN Calling/Being-called

Using optional ISDN calling/being-called (JT-Q921/Q931 ISDN Signalling/ETSI ISDN Signalling), connect the MD6430A to public networks (192k interface, 1.5M interface and 2M interface). In the following paragraphs, the basic operations is described.

- Calling/Being-called operation
  Connection to/from networks by manual operation

- Call loop test
  Loop-back test by self-calling

- Program start operation
  Automatic connection to exchangers for a start of the program.

6.5.1 Calling/being-called operation

In this paragraph, we detail manual operation of calling/being-called to/from a network. For description, it is assumed that two MD6430As are connected via a network. And the procedure for calling on the originator and the procedure for being-called on the partner are explained.
For details of connection of connectors, refer to para. 3.2 "Connecting cables".

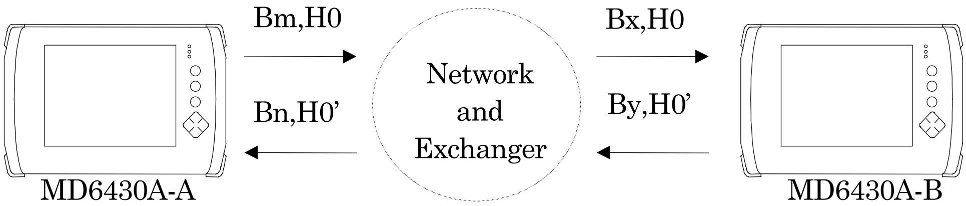


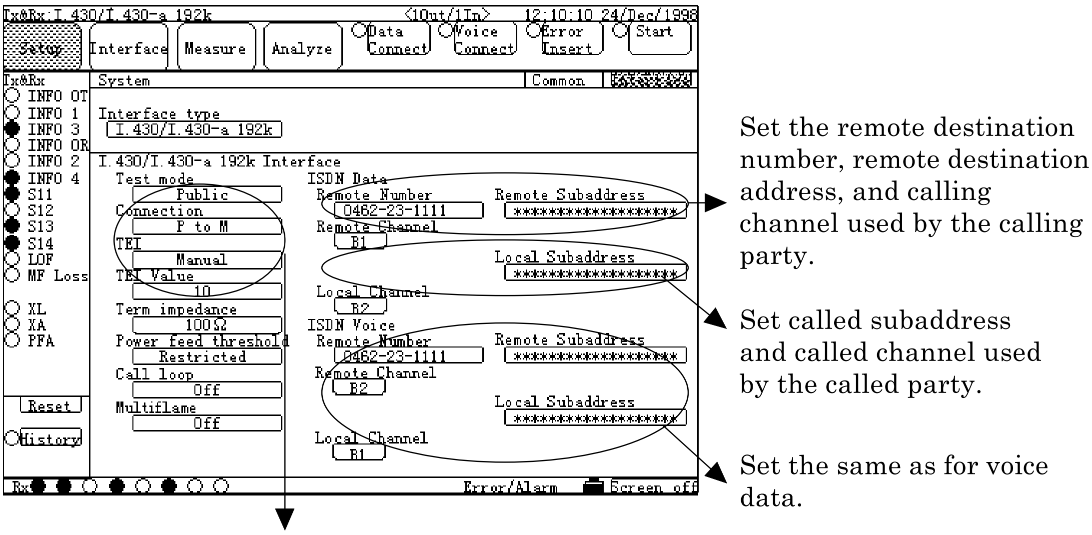
Fig. 6.5-1 Example of Manual Operation of Calling/Being-called

■ Preparation for connection to the public network （Interface : I.430/I.430-a 192k）

First, make preparation to perform calling from the MD6430A-A and connection to the MD6430A-B in the same manner as shown in Fig. 6.5-1.

1. To connect the MD6430A-A to the public network, set the Connection, TEI and TEI Value items on the Interface extension-screen of the Setup:System screen to specify the connection point to which the MD6430A-A is connected.

2. On the MD6430A-A, set the ISDN Data Remote Number (remote destination number), Subaddress (remote destination address) and Channel (calling channel) [1] to connect to the MD6430A-B.
   On the MD6430A-B, set the ISDN Data Local Subaddress (called subaddress) and Channel (called channel) [1] to connect to the public network.



Connection : Select the type of connection between the MD6430A and the network
(used by the calling party and the called party):
P to P : Used when a fixed connection point is available from termination of the network. Since TEI is specified, enter the value.
P to M : Used when several connection points are available from termination of the network. Select either the method by which the desired point is set manually as TEI or the Auto method.

Fig. 6.5-2 Setting of Connection to Network and Remote Destination Party

---

*1 : For the I.430/I.430-a 192k interfaces, select the calling channel from among Any, B1 and B2. When "Any" selected, either available one of B1 and B2 is selected automatically.

■ Procedure for connecting/disconnecting data call

1. .On the MD6430A-A, press the Data Connect button in the operation instruction button area.

   The connection confirmation window appears. When the connection procedure to be continued, select "Yes". The lamp on the left blinks and the connection channel is displayed below, and then connection starts.

   When connection becomes active, the lamp lights up and "Data channel is connected" message is displayed.

   When connection becomes inactive, the lamp goes off and "Data channel is disconnected" message is displayed.

   On the MD6430A-B, when connection becomes active, the lamp, which is next to the Data Connect button in the operation instruction button area, lights up and the connection channel is displayed, and then connection to the MD6430A-A is established.

On the MD6430A-A **On the MD6430A-B**

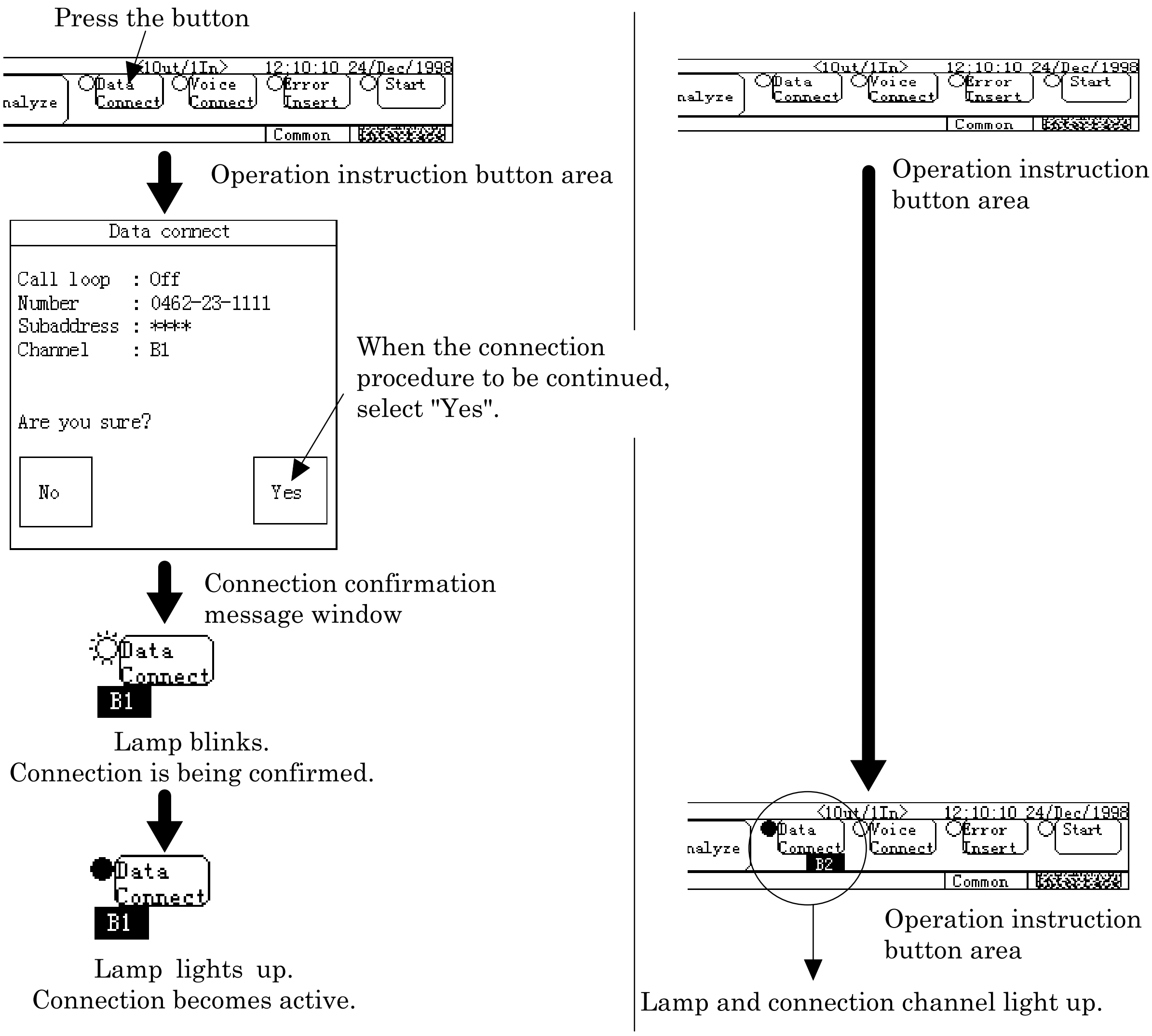


Fig. 6.5-3 Procedure for Connecting Data Call

2. When disconnecting the MD6430A-A from the network, press the Data Connect button.
   The disconnection confirmation message window appears. To deactivate connection, select "Yes". The lamp goes off and the displayed connection channel is cleared, and then disconnection from the network completes.
   On the MD6430A-B, when the disconnection procedure is performed on the MD6430A-A, the lamp, which is next to the Data Connect button in the operation instruction button area, goes off and the displayed connection channel is cleared, and then disconnection completes.
   The same disconnection procedure can be used as for the called party (MD6430A-B).

On the MD6430A-A **On the MD6430A-B**

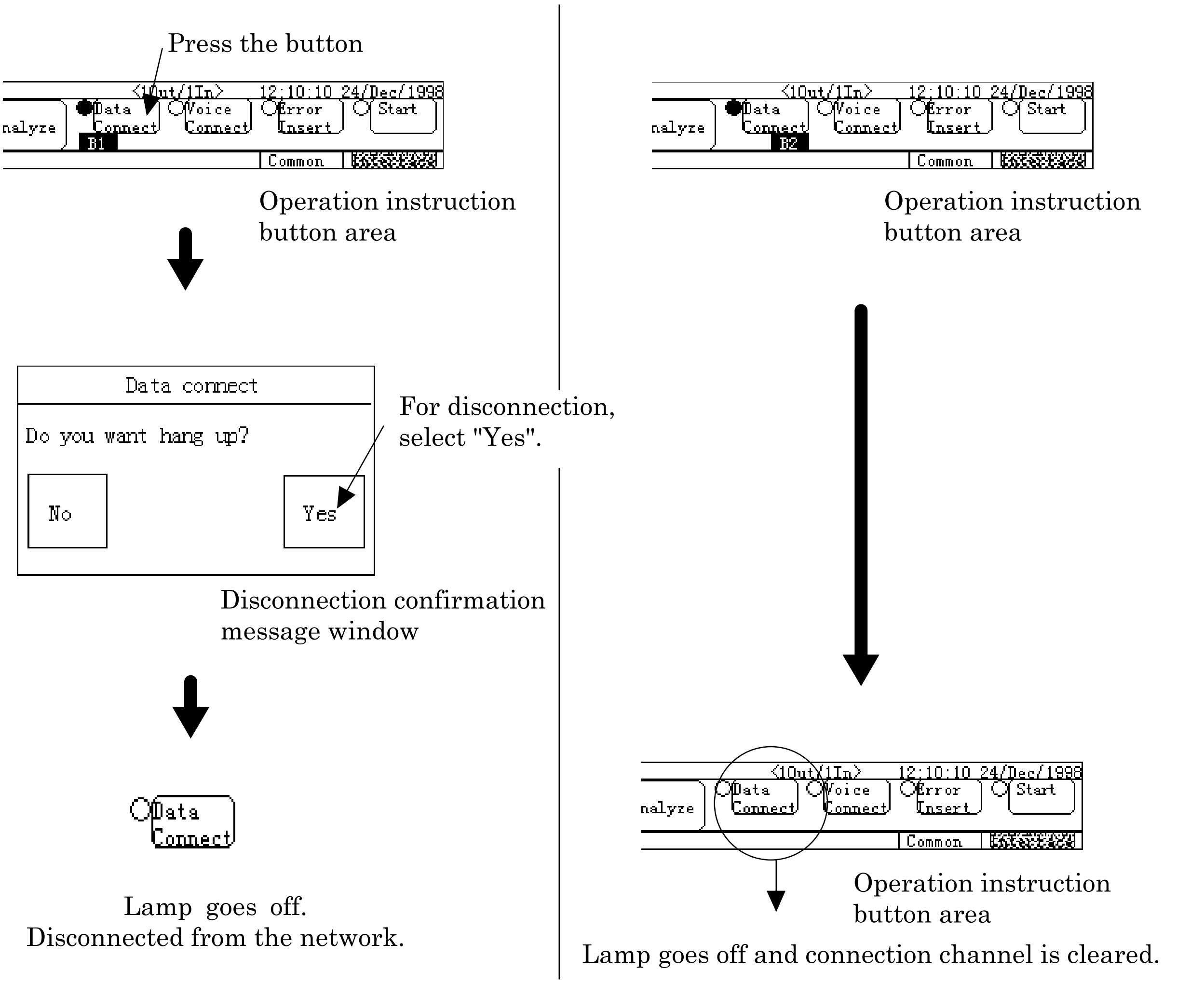


Fig. 6.5-4 Procedure for Disconnecting Data Call

■ Procedure for connecting/disconnecting voice call

1. On the MD6430A-A, press the Voice Connect button in the operation instruction button area.The connection confirmation window appears.
   When the connection procedure to be continued, select "Yes". The lamp on the left blinks and the connection channel is displayed below, and then connection starts.
   When connection becomes active, the lamp lights up and "Voice channel is connected" message is displayed.
   When connection becomes inactive, the lamp goes off and "Voice channel is disconnected" message is displayed.
   When the lamp is blinking on the MD6430A-A and connection is being confirmed, on the MD6430A-B, the lamp on the left of Voice Connect button blinks and the connection confirmation message is displayed.
   If connection request to be received, select "Yes".
   If connection request to be rejected, select "No".
   If neither "Yes" nor "No" selected, the MD6430A-B is disconnected by the network or by the timer of the MD6430A-A

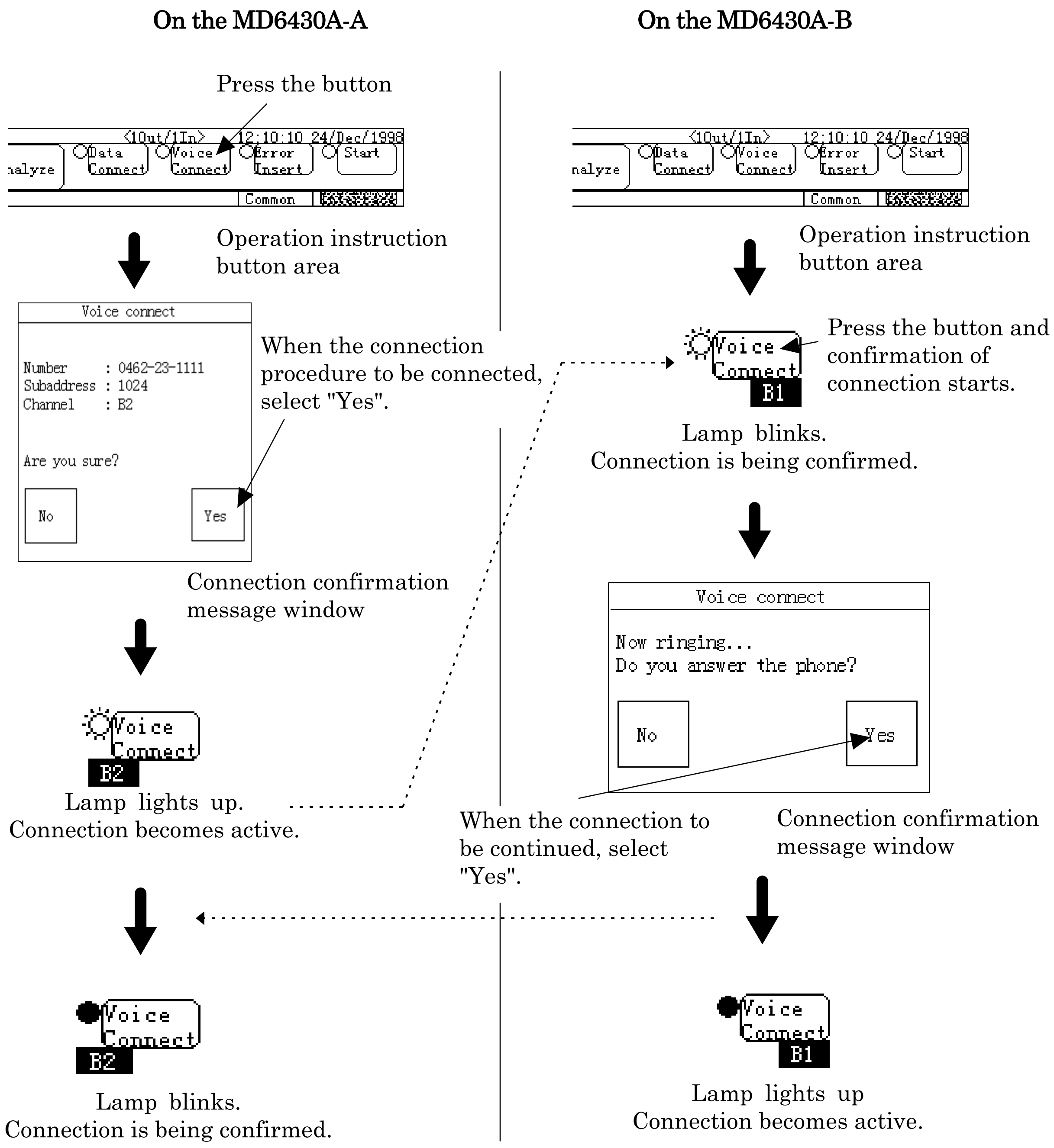


Fig. 6.5-5 Procedure for Connecting Voice Call

2. When the MD6430A-A from the network to be disconnected, press the Voice Connect button.
   The disconnection confirmation window appears. To deactivate connection, select "Yes". The lamp goes off and the displayed connection channel is cleared, and then disconnection from the network completes.

   On the MD6430A-B, when the disconnection procedure is performed on the MD6430A-A, the lamp, which is next to the Voice Connect button in the operation instruction button area, goes off and the displayed connection channel is cleared, and then disconnection completes. The same disconnection procedure can be used as for the called party (MD6430A-B).

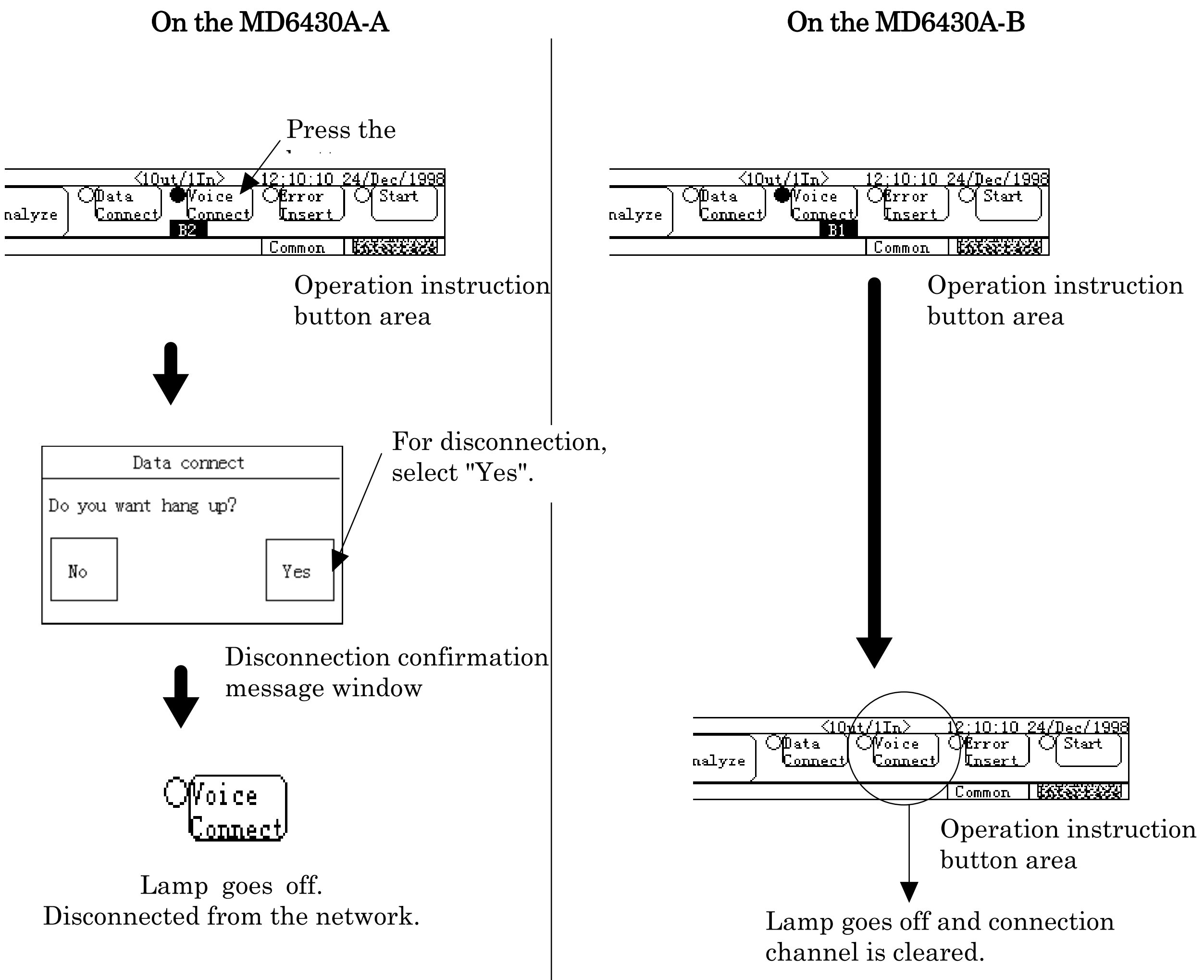


Fig. 6.5-6 Procedure for Disconnecting Voice Call

6.5.2 Call loop test

The Call loop function allows the MD6430A to call/be-called by itself. The Call loop function eliminates loop-back setting in networks and allows two-channel simultaneous measurement. In this paragraph, we set the Call loop function as preparation, and perform the procedure for calling/being-called of the Call loop function.

For details of connection of connectors, refer to para. 3.2 "Connecting cables".

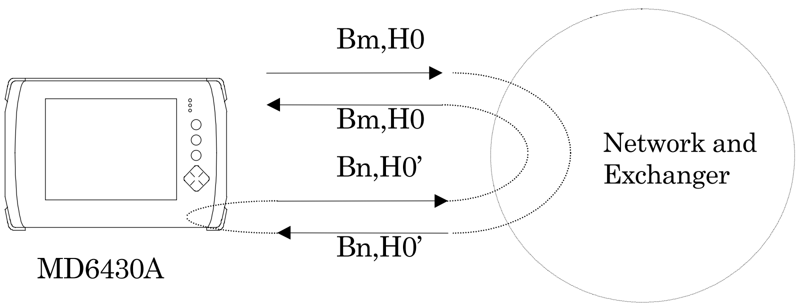


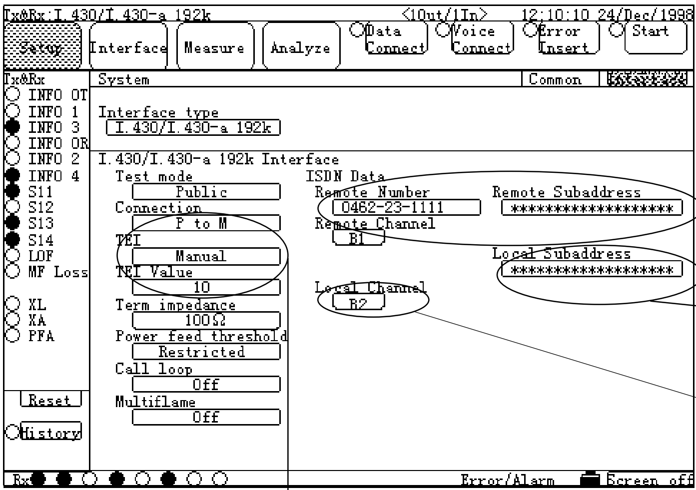
Fig. 6.5-7 Automatic Loop-back Operation by Called Channel

■ Preparation for connection to public network (Interface : I.430/I.430-a 192k)

First, make preparation to connect the MD6430A to the network in the same manner as shown in Fig. 6.5-8.

1. To connect the MD6430A to the public network, set the Connection, TEI and TEI Value items on the Interface display of the Setup:System screen to specify the connection point which the MD6430A is connected to.

2. Set the ISDN Data Remote Number (remote destination number), Subaddress (remote destination address), Channel (calling channel) *1 and Local Subaddress at the MD6430A connection point.
   In addition, set "Any" to the Local Channel (called channel).



As the destination is the calling party (MD6430A) itself, set the number, subaddress and channel of the MD6430A.

Set called subaddress used by the called party.

Set Any to the called channel.

Connection: Select the type of connection between the MD6430A and the network.

P to P: Used when a fixed connection point is available from termination of the network. Since TEI is specified, enter the value.

P to M: Used when several connection points are available from termination of the network. Select either the method by which the desired point can be set as TEI or the Auto method.

Fig. 6.5-8 Setting of Connection to Network and MD6430A

---

*1 : For the I.430/I.430-a 192k interfaces, select the calling channel from among Any, B1 and B2.When "Any" selected, either available one of B1 and B2 is selected automatically.

---

3. Press the Data Connect button in the MD6430A operation instruction button area.
   The connection confirmation window appears.When the connection procedure to be continued, select "Yes". The lamp on the left blinks and the connection channel is displayed below, and then connection starts.
   When connection becomes active, the lamp lights up and "Data channel is connected" message is displayed.
   When connection becomes inactive, the lamp goes off and "Data channel is disconnected" message is displayed.

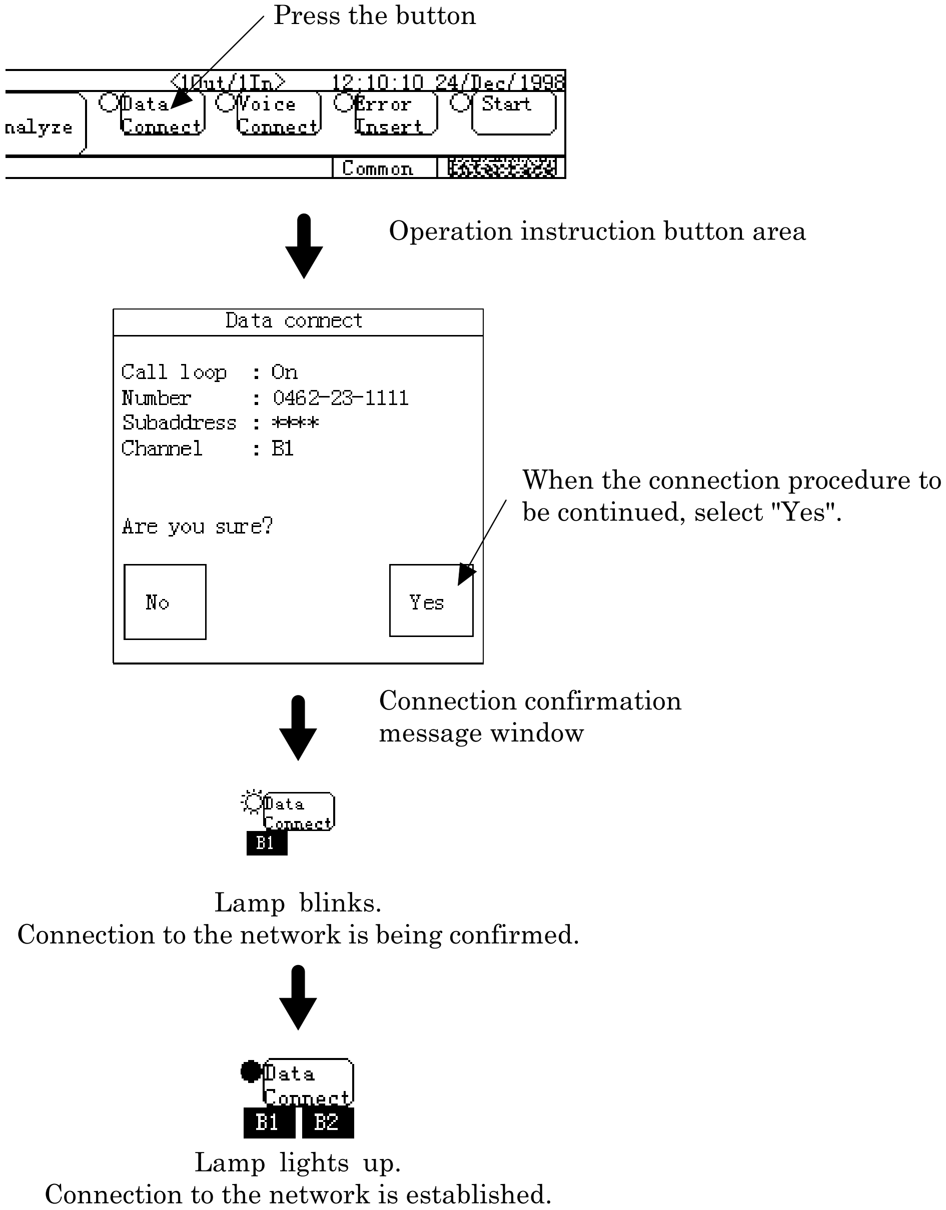
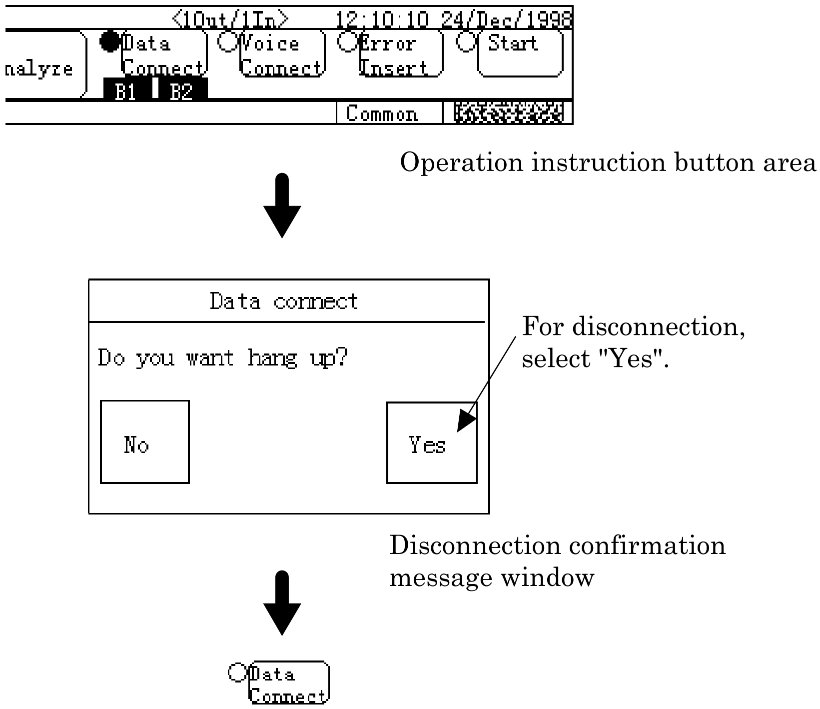


Fig. 6.5-9 Procedure for Connecting Data Call

4. When the MD6430A from the network to be disconnected, press the Data Connect button. The disconnection confirmation window appears. To deactivate connection, select "Yes". The lamp goes off and the displayed connection channel is cleared, and then disconnection from the network completes.



Lamp goes off.
Disconnected from the network.

Fig. 6.5-10 Procedure for Disconnecting Data Call

6.5.3 Program start operation

This paragraph describes the procedure for setting program start operation that is used for Error/Alarm measurement. For description, it is assumed that two MD6430As are connected via a network. And the procedure through which measurement is started by calling at a specified time and the procedure through which automatic measurement is started by being-called are explained.

For details of connection of connectors, refer to para. 3.2 "Connecting cables".

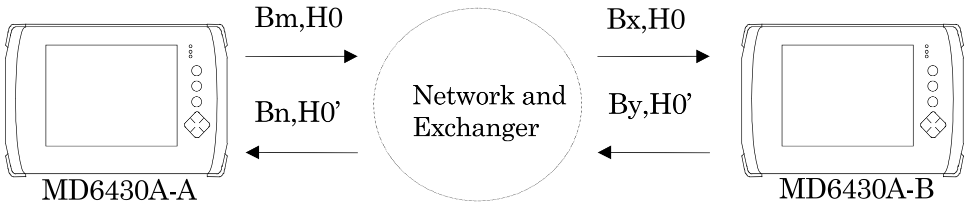


Fig. 6.5-11 Example of Program Start Operation by Calling/Being-called

■ Procedure for connecting to public network and setting program start operation

First, make preparation to perform calling from the MD6430A-A, connection to the MD6430A-B, and program start operation in the same manner as described in para. 6.5.1"Calling/being-called operation".

1. To connect the MD6430A-A to the public network, set the connection point to which the MD6430A-A is connected on the Interface of the Setup:System screen and set the number, subaddress and channel for connection from the MD6430A-A to MD6430A-B. For details of setting, refer to the description on preparation for connection to the public network in para. 6.4.1 "Calling/being-called operation".
2. Set all measured items. (Interface condition, error insertion , error measurement , error performance measurement and so on)
3. Set the program start operation.
   On the MD6430A-A : Set the Program start item of the Cond.1 display of the Measure:Error/Alarm screen to ON and set the start time. Set the Master/Slave item to "Master".

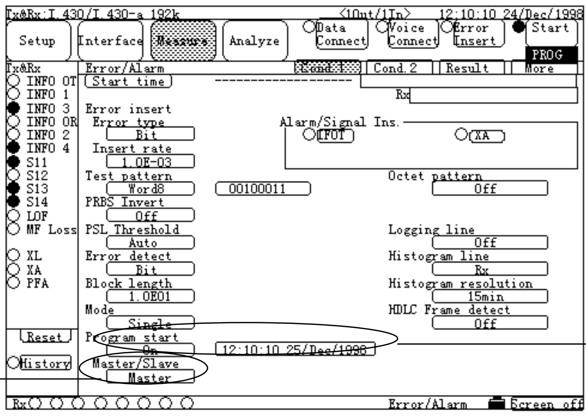


Fig. 6.5-12 Setting on MD6430A-A

On the MD6430A-B : Set the Program start item of the Cond.1 display of the Measure:Error/Alarm screen to ON.
Set the Master/Slave item to "Slave".

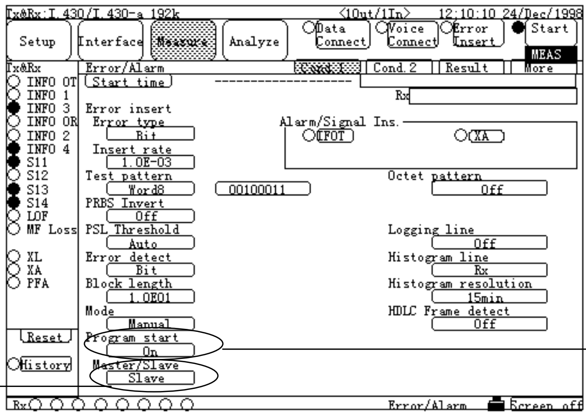


Fig. 6.5-13 Setting on MD6430A-B

4. The MD6430A-A starts calling at the specified time. When connection to the MD6430A-B is established, measurement starts automatically *1.
   The MD6430A-B is automatically connected to the network by called request, and measurement starts.

5. When measurement is finished or stopped, connection becomes inactive. If connection becomes inactive during measurement, the measurement is terminated.

---

*1 : If the MD6430A-A (calling party) cannot be connected to the network because the specified number is not correct or connectors are not connected, the measurement-start wait state continues. In this case, re-execute calling by screen operation or remote operation and connect to the MD6430A-B, and then measurement starts.

SECTION 7 PRINCIPLES OF OPRATION

7.1 V.24/V.28 Interface

7.1.1 Receiver/Driver

7.1.1.1 Receiver

Figure 7.1-1 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below:

RD, ST2, RT, CS, DR, CD, CI, TI

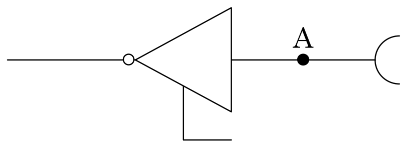


Fig. 7.1-1

The input conditions conform to ITU-T recommendation for V.28 interfaces. When the voltage at point A is less than –3 V, the signal is said to be in the binary "1" state. When the voltage (V_A) is greater than +3 V, the signal is said to be in the binary "0" state.
In the control line and timing circuits, when the voltage (V_A) is more than +3 V, the signal is said to be "ON". Conversely when less than –3 V, the signal is said to be "OFF".

Table 7.1-1

	V_A < –3 V	V_A > +3 V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.1.1.2 Driver

Figure 7.1-2 shows an output-circuit block diagram. The signal lines that use this type of circuit are listed below:

SD, ST1, RS, ER, RLB, LLB

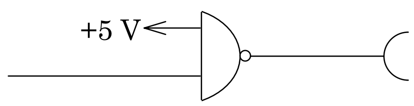


Fig. 7.1-2

The output conditions conform to ITU-T recommendations for V.28 interfaces. As regards the 3 to 7 kΩ unbalanced load resistor, a voltage of more than 5 V but less than 15 V must occur.

7.1.2 Circuit connection

7.1.2.1 When the measuring equipment MD6430A is DTE

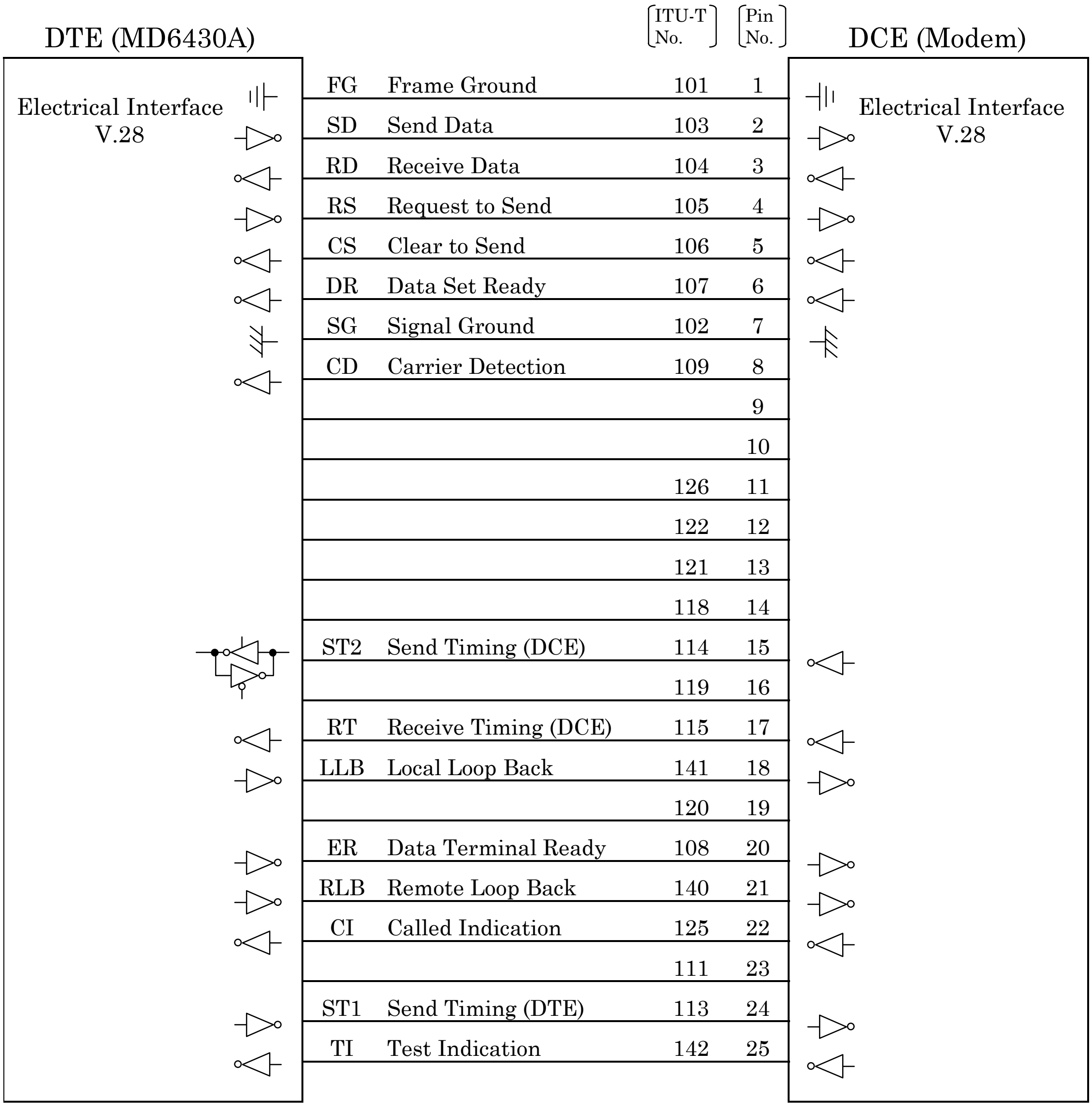


Fig. 7.1-3 DTE/DCE Connection Diagram

7.1.2.2 When the measuring equipment MD6430A is DCE

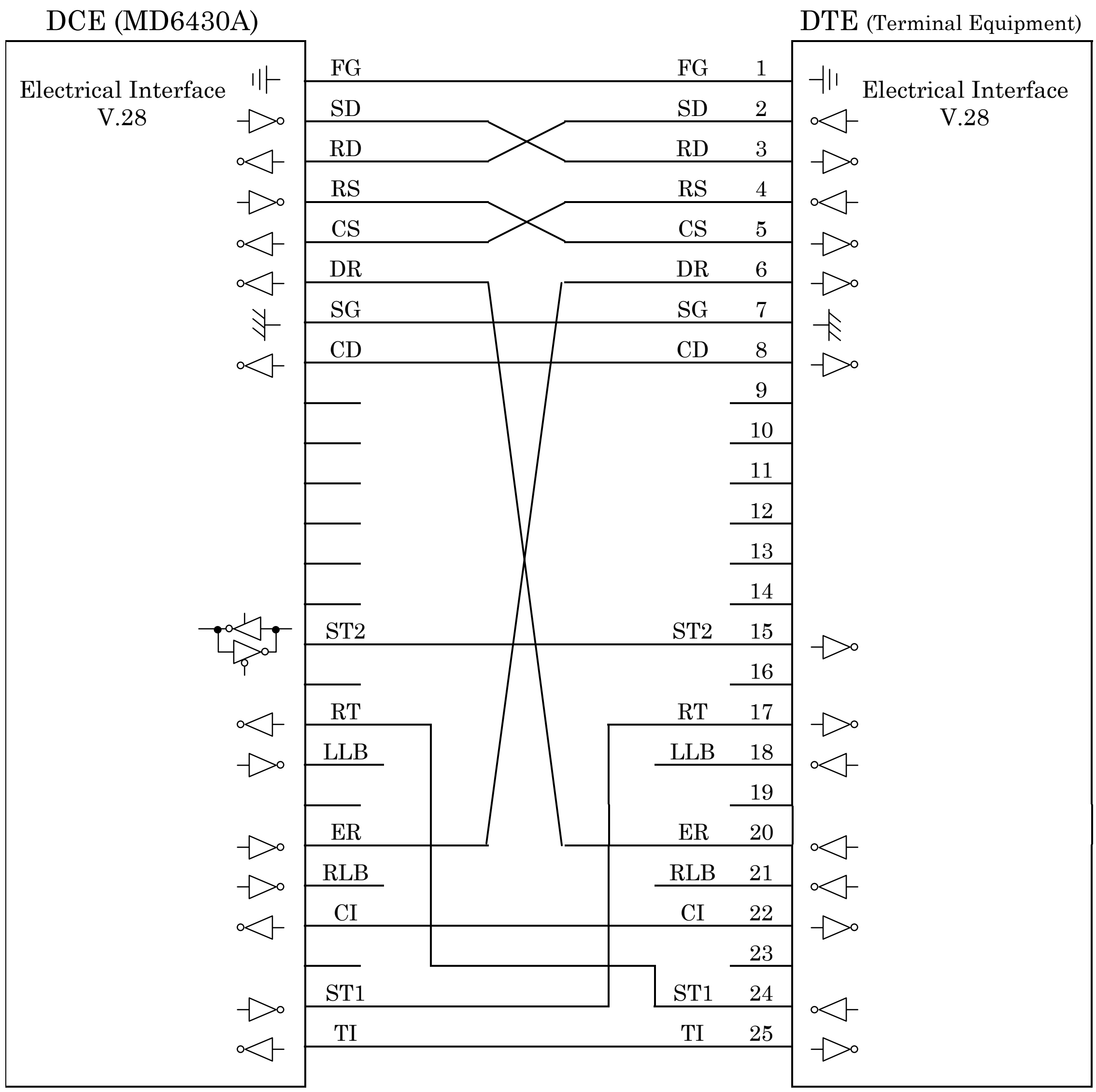


Fig. 7.1-4 DCE/DTE Connection Diagram

7.1.3 Send Timing

7.1.3.1 ST1 mode

When the ST1 synchronous mode is selected, the ST1 signal is used as the master clock source for the MD6430A.

Figure 7.1-5 shows the block diagram for ST1 and SD, while Figure 7.1-6 shows the phase relationship.

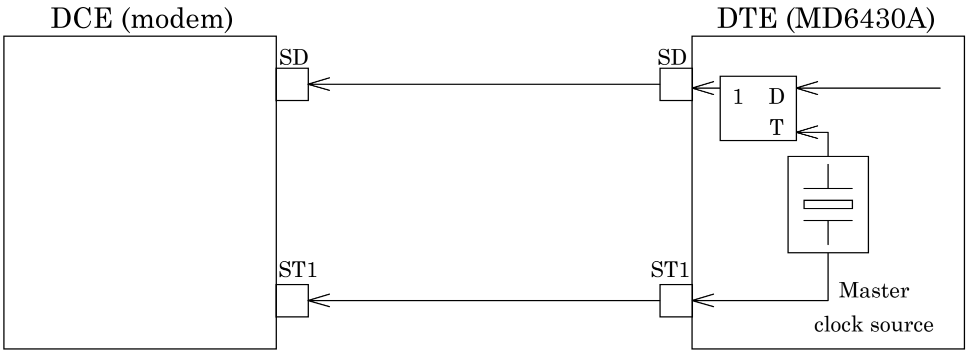


Fig. 7.1-5

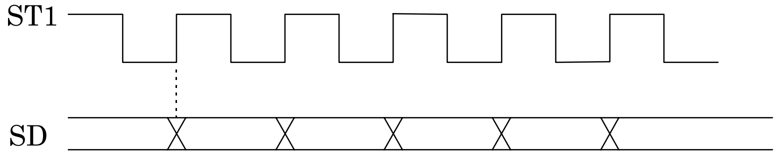


Fig. 7.1-6

7.1.3.2 ST2 mode

When the ST2 synchronous mode is selected, the ST2 clock supplied by the DCE is used as the send timing signal.
Figure 7.1-7 shows the block diagram for ST2 and SD, while Figure 7.1-8 shows the phase relationship.

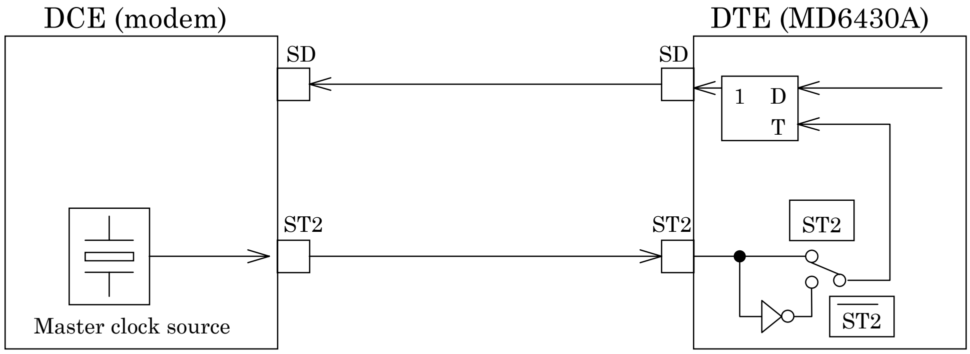


Fig. 7.1-7

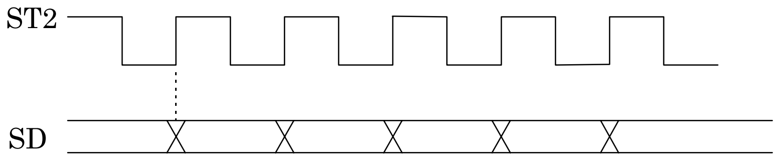


Fig. 7.1-8

7.1.3.3 $\overline{\text{ST2}}$ mode

When the inverted ST2 mode is set, the inverted ST2 clock is used as the send timing signal.
Figure 7.1-7 shows the block diagram for $\overline{\text{ST2}}$ and SD, while Figure 7.1-9 shows the phase relationship.

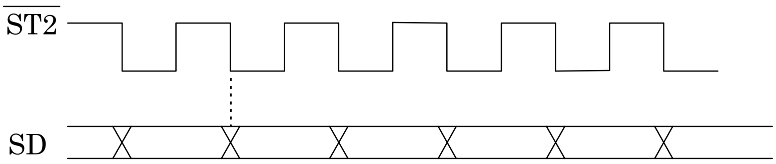


Fig. 7.1-9

7.1.3.4 ASYNC mode

(1) Start/Stop bit: Off

When the asynchronous mode is set, the MD6430A internal clock is used for both send and receive timing.
Figure 7.1-10 shows the block diagram for SD, RD and the clock source.

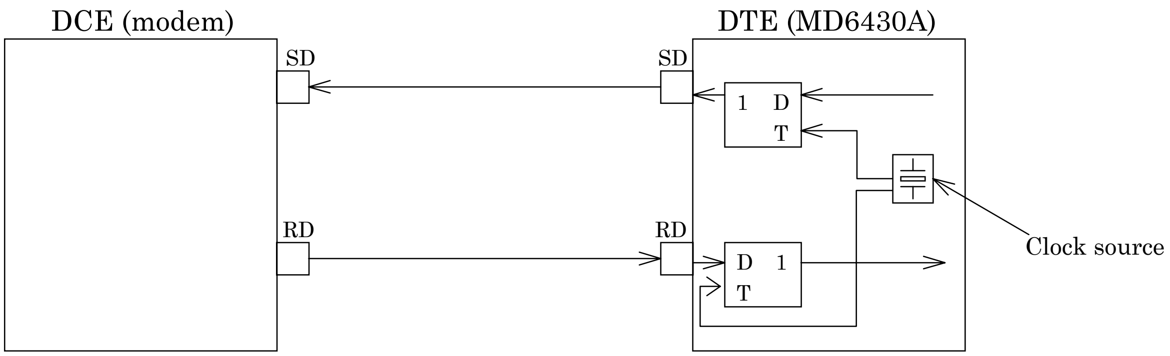


Fig. 7.1-10

(2) Start/Stop bit: On

When the start/stop mode is set, the MD6430A internal clock is used for both the send and receive timing.
Figure 7.1-11 shows the block diagram for SD, RD and the clock source.

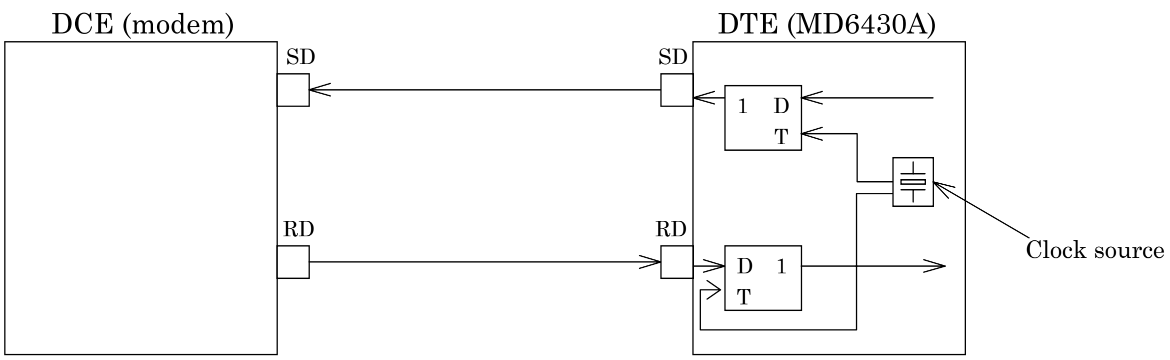


Fig. 7.1-11

7.1.3.5 RT mode

When the RT synchronous mode is used, the RT (receive timing) clock supplied by the DCE is used as the send timing signal.
Figure 7.1-12 shows the block diagram for RT and SD, while Figure 7.1-13 shows the phase relationship.

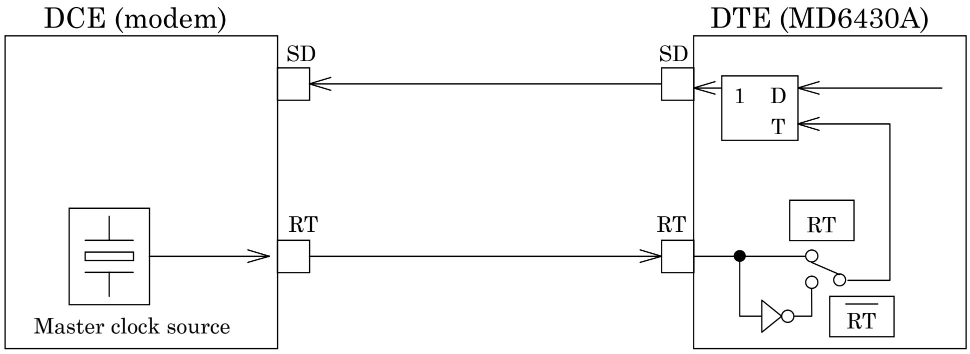


Fig. 7.1-12

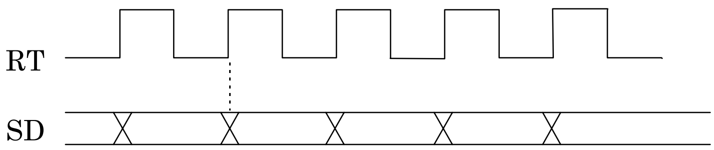


Fig. 7.1-13

7.1.3.6 $\overline{\text{RT}}$ mode

When the inverted RT mode is set, the inverted RT clock is used as the send timing signal.
Figure 7.1-12 shows the block diagram for $\overline{\text{RT}}$ and SD, while Figure 7.1-14 shows the phase relationship.

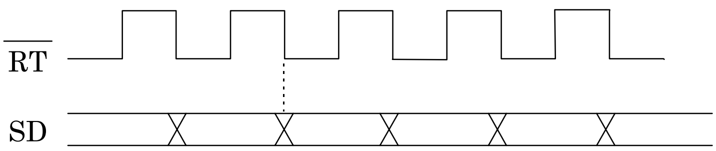


Fig. 7.1-14

7.1.4 Receive Timing

7.1.4.1 RT mode

When the RT synchronous mode is selected, the RT clock supplied by the DCE is used as the receive timing signal.
Figure 7.1-15 shows the block diagram for RT and RD, while Figure 7.1-16 shows the phase relationship.

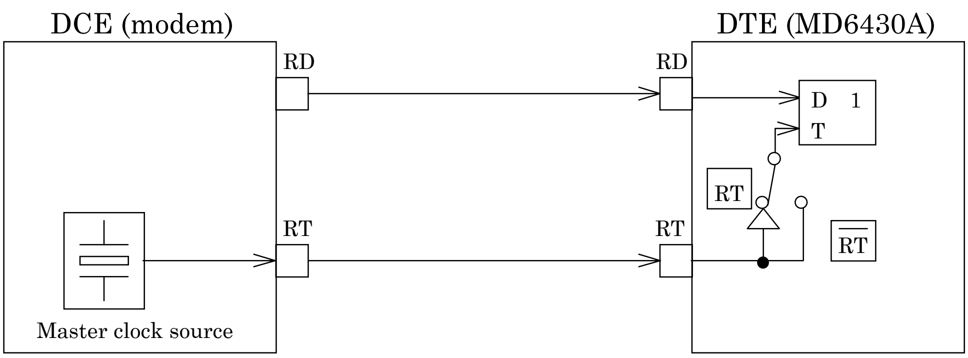
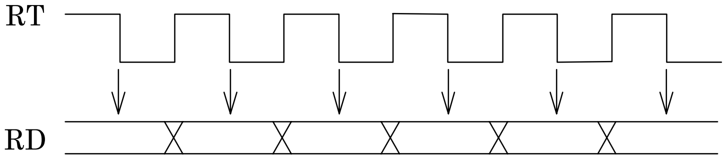


Fig. 7.1-15

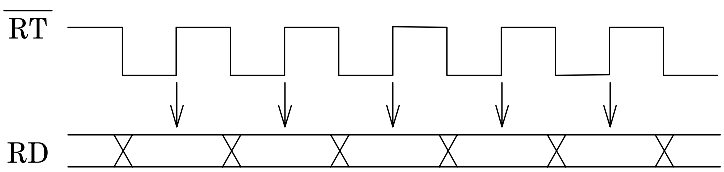


(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.1-16

7.1.4.2 $\overline{RT}$ mode

When the RT synchronous mode is set, the inverted RT clock is used as the receive timing signal.
Figure 7.1-15 shows the block diagram for $\overline{RT}$ and RD, while Figure 7.1-17 shows the phase relationship.



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.1-17

7.1.4.3 ST mode

When the ST synchronous mode is set, the MD6430A internal clock is used as the receive timing signal.
Figure 7.1-18 shows the block diagram for ST1, SD, and RD. Figure 7.1-19 shows the block diagram for ST2, SD, and RD. Figure 7.1-20 shows the phase relationship between ST and RD.

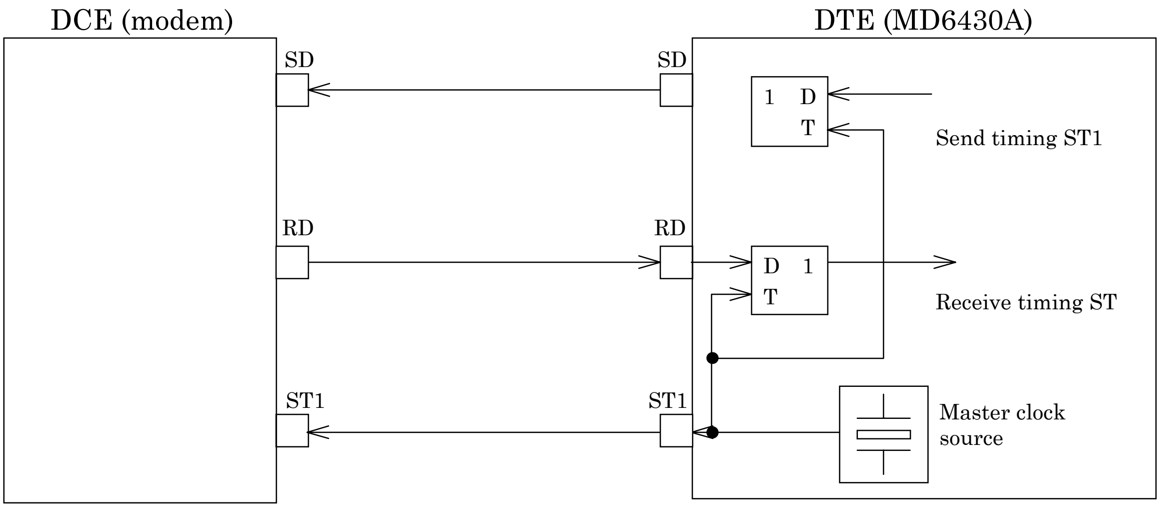


Fig. 7.1-18

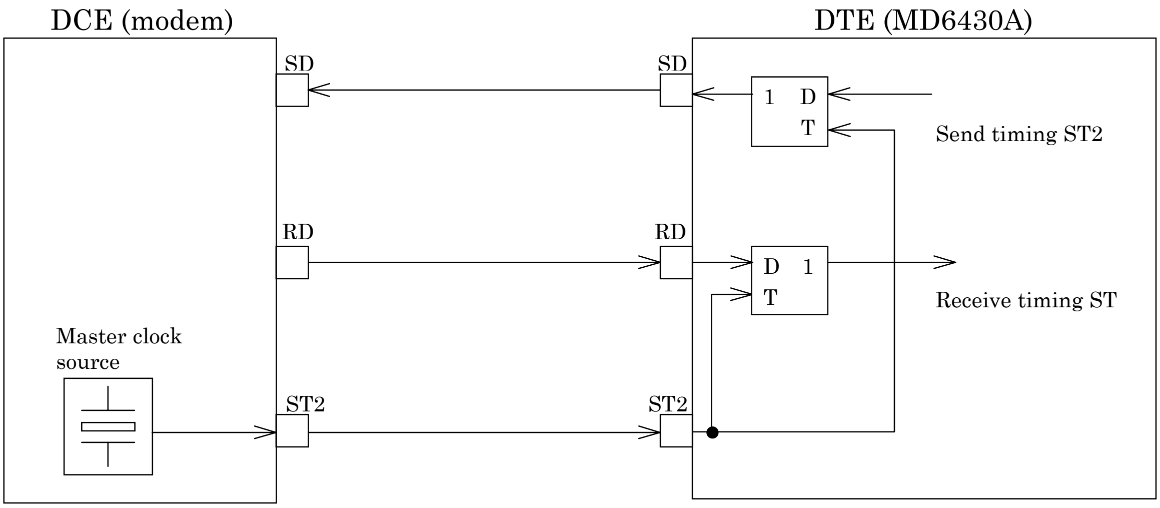
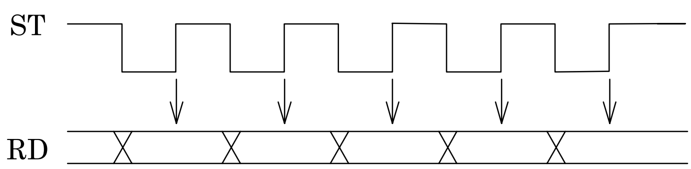


Fig. 7.1-19



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.1-20

7.2 V.35 Interface

7.2.1 Receiver/Driver

7.2.1.1 Receiver

[1] Figure 7.2-1 shows the receive-circuit block diagram. The signal lines that use this type of circuit are listed below:

RD, ST2, RT

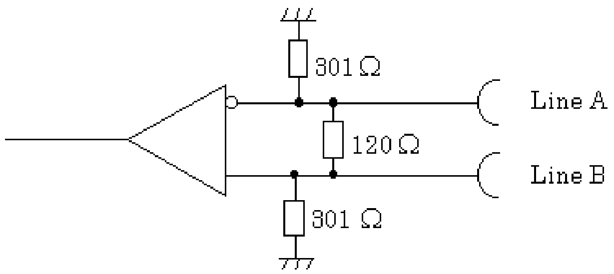


Fig. 7.2-1

The input conditions conform to ITU-T recommendation for V.35 interfaces. When the voltage between LineA and LineB is $V_A > V_B$, the signal is said to be in the binary "0" state. When the voltage is $V_A < V_B$, the signal is said to be in the binary "1" state.

[2] Figure 7.2-2 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below:

CS, DR, CD, CI, TI

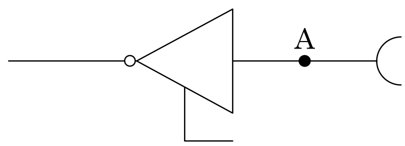


Fig. 7.2-2

The input conditions conform to ITU-T recommendation for V.28 interfaces. When the voltage at point A is less than –3 V, the signal is said to be in the binary "1" state. When the voltage (V_A) is greater than +3 V, the signal is said to be in the binary "0" state.
In the control line and timing circuits, when the voltage (V_A) is more than +3 V, the signal is said to be "ON". Conversely when less than –3 V, the signal is said to be "OFF".

Table 7.2-1

	V_A < –3 V	V_A > +3 V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.2.1.2 Driver

[1] Figure 7.2-3 shows the output-circuit block diagram. The signal lines that use this type of circuit are listed below:

SD, ST1

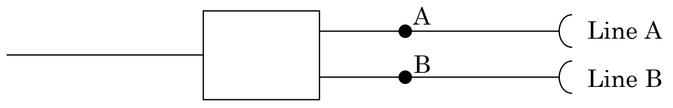


Fig. 7.2-3

The output conditions conform to ITU-T recommendations for V.35 interfaces. The voltage between the terminals of a 100 Ω parallel load is 0.55 V ±0.11 V. When a binary "0" is sent, the voltage at terminal A is positive relative to terminal B. For binary "1", the voltage at terminal A is negative relative to terminal B.

[2] Figure 7.2-4 shows the output-circuit block diagram. The signal lines that use this type of circuit are listed below:

RS, ER

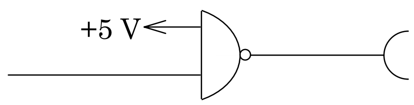


Fig. 7.2-4

The output conditions conform to ITU-T recommendations for V.28 interfaces. As regards the 3 to 7 kΩ unbalanced load resistor, a voltage of more than 5 V but less than 15 V must occur.

7.2.2 Circuit connection

7.2.2.1 When the measuring equipment MD6430A is DTE

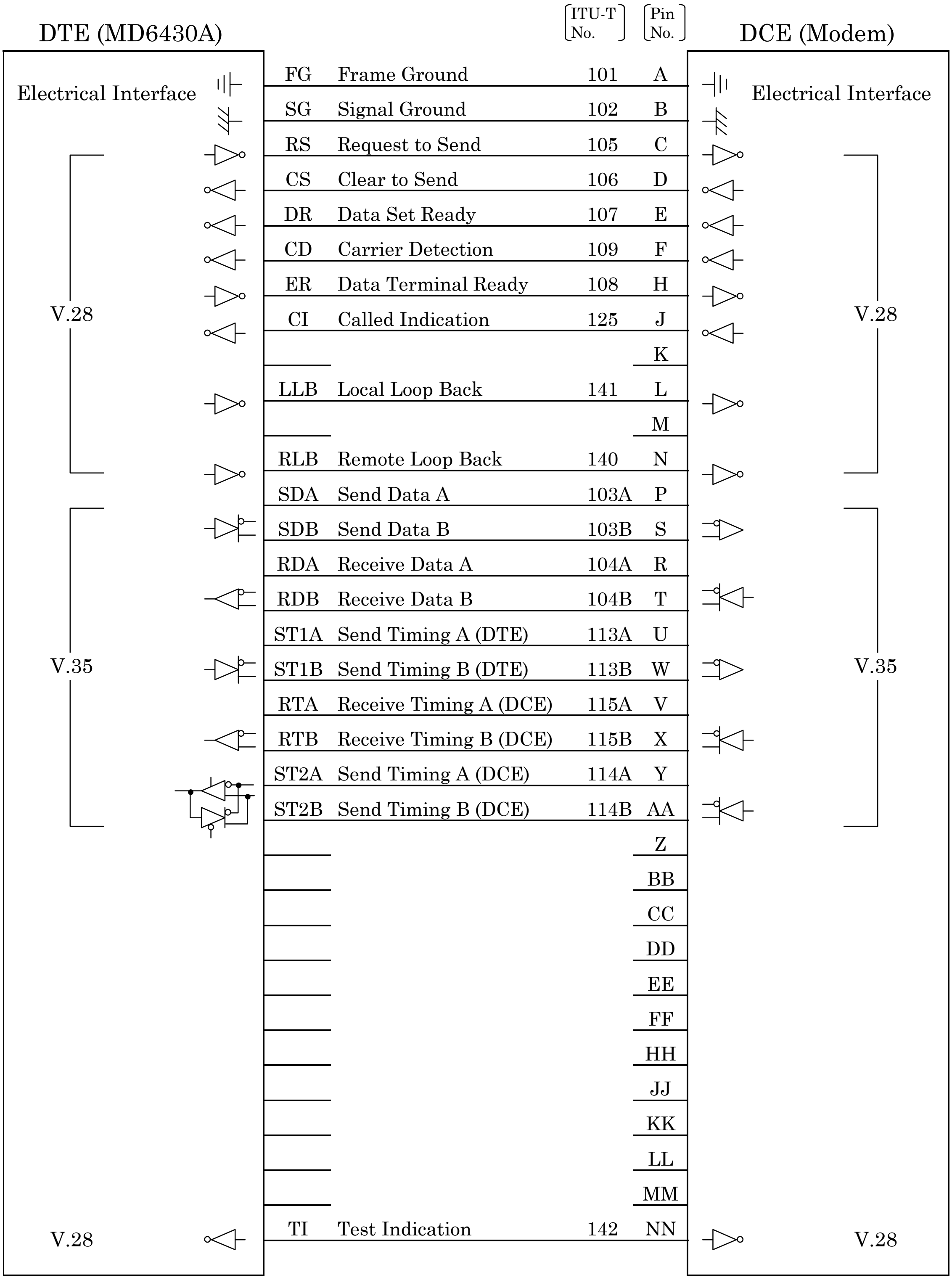


Fig. 7.2-5 DTE/DCE Connection Diagram

7.2.2.2 When the measuring equipment MD6430A is DCE

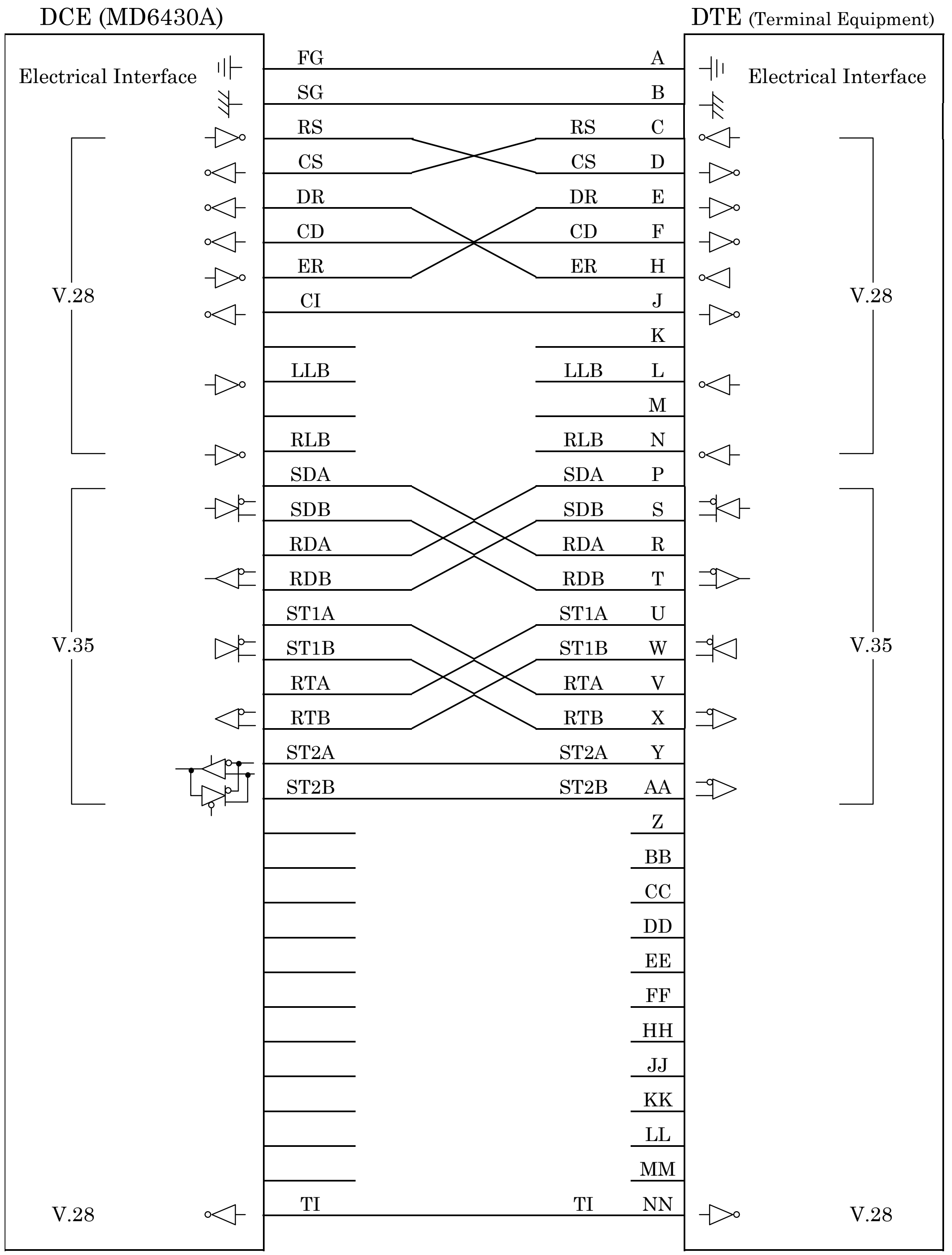


Fig. 7.2-6 DCE/DTE Connection Diagram

7.2.3 Send Timing

7.2.3.1 ST1 mode

When the ST1 synchronous mode is selected, the ST1 signal is used as the master clock source for the MD6430A.

Figure 7.2-7 shows the block diagram for ST1 and SD, while Figure 7.2-8 shows the phase relationship.

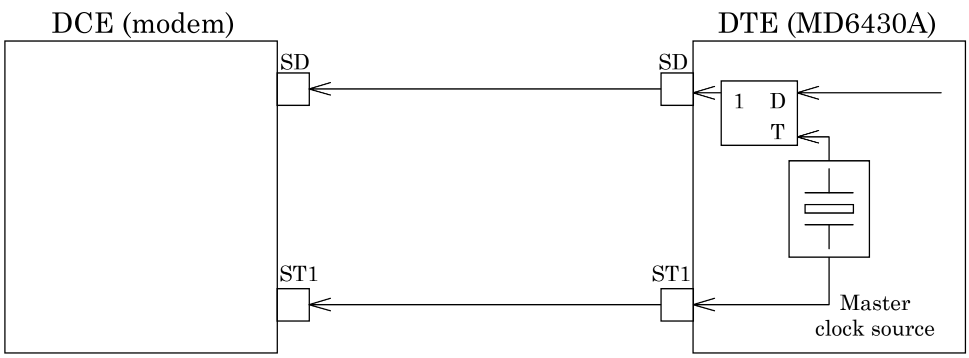


Fig. 7.2-7

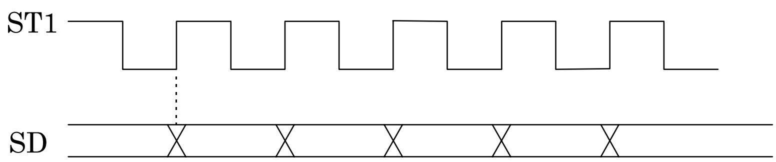


Fig. 7.2-8

7.2.3.2 ST2 mode

When the ST2 synchronous mode is selected, the ST2 clock supplied by the DCE is used as the send timing signal.
Figure 7.2-9 shows the block diagram for ST2 and SD, while Figure 7.2-10 shows the phase relationship.

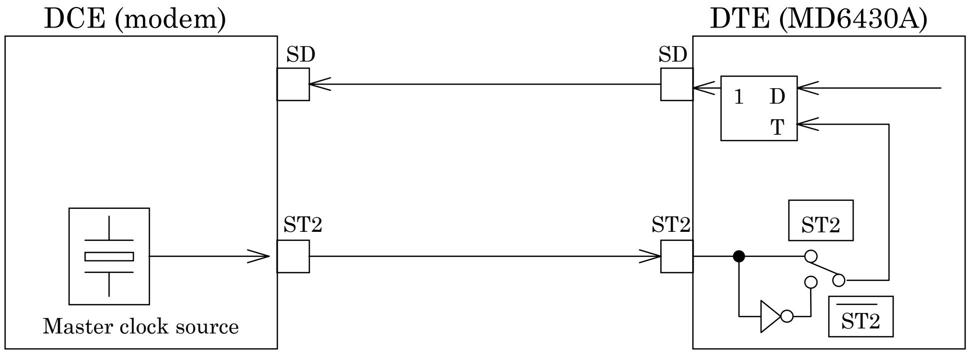


Fig. 7.2-9

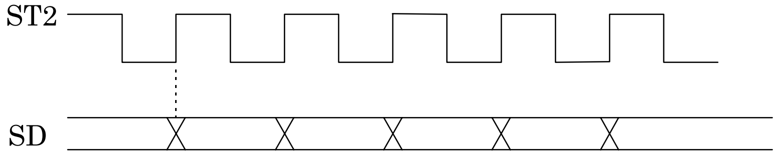


Fig. 7.2-10

7.2.3.3 $\overline{\text{ST2}}$ mode

When the ST2 mode is set, the inverted ST2 clock is used as the send timing signal.
Figure 7.2-9 shows the block diagram for $\overline{\text{ST2}}$ and SD, while Figure 7.2-11 shows the phase relationship.

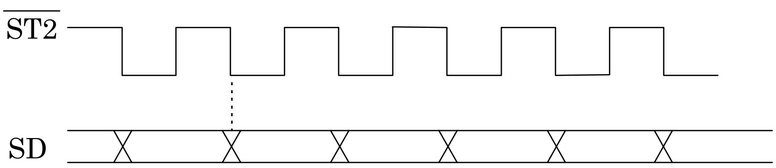


Fig. 7.2-11

7.2.3.4 RT mode

When the RT synchronous mode is used, the RT (receive timing) clock supplied by the DCE is used as the send timing signal.
Figure 7.2-12 shows the block diagram for RT and SD, while Figure 7.2-13 shows the phase relationship.

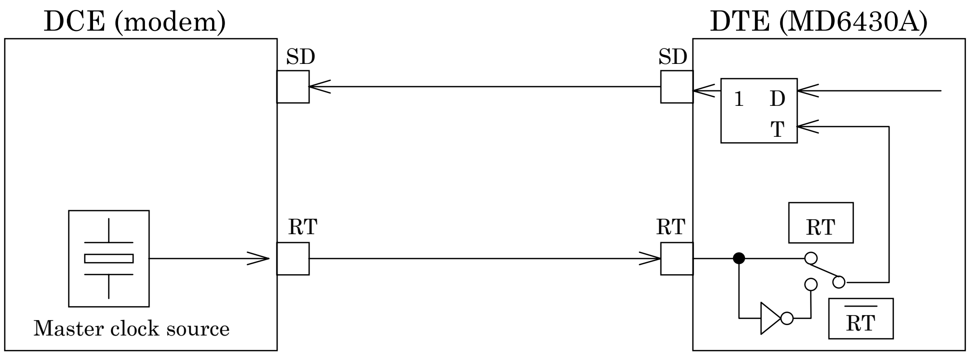


Fig. 7.2-12

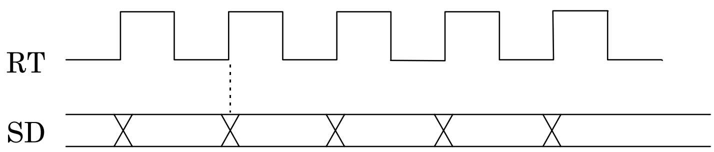


Fig. 7.2-13

7.2.3.5 $\overline{\text{RT}}$ mode

When the inverted RT mode is set, the inverted RT clock is used as the send timing signal.
Figure 7.2-12 shows the block diagram for $\overline{\text{RT}}$ and SD, while Figure 7.2-14 shows the phase relationship.

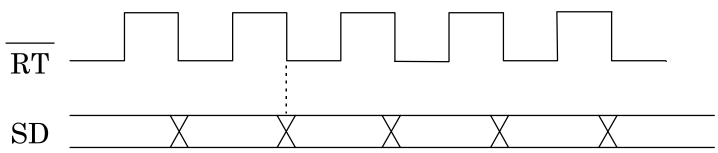


Fig. 7.2-14

7.2.4 Receive timing

7.2.4.1 RT mode

When the RT synchronous mode is selected, the RT clock supplied by the DCE is used as the receive timing signal.
Figure 7.2-15 shows the block diagram for RT and RD, while Figure 7.2-16 shows the phase relationship.

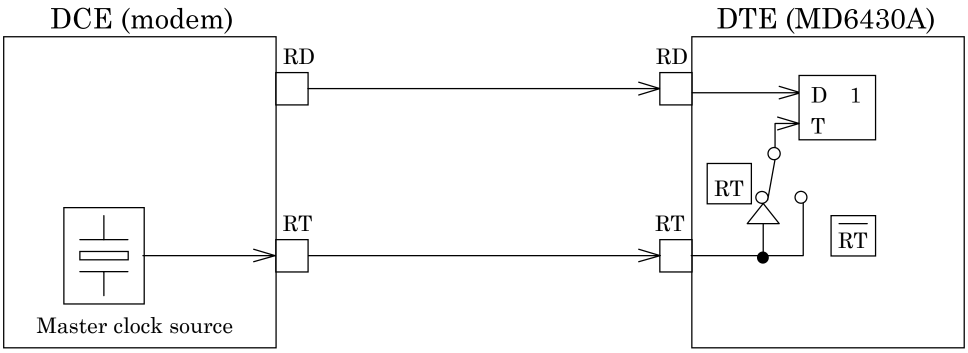
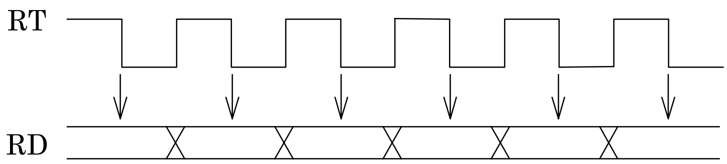


Fig. 7.2-15

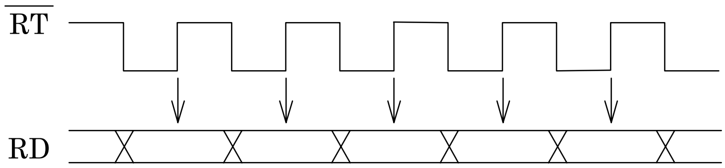


(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.2-16

7.2.4.2 $\overline{\text{RT}}$ mode

When the inverted RT synchronous mode is set, the inverted RT clock is used as the receive timing signal.
Figure 7.2-15 shows the block diagram for $\overline{\text{RT}}$ and RD, while Figure 7.2-17 shows the phase relationship.



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.2-17

7.2.4.3 ST mode

When the ST synchronous mode is set, the MD6430A internal clock is used as both the receive and send timing signal.

Figure 7.2-18 shows the block diagram for ST1, SD, and RD. Figure 7.2-19 shows the block diagram for ST2, SD, and RD. Figure 7.2-20 shows the phase relationship between ST,and RD.

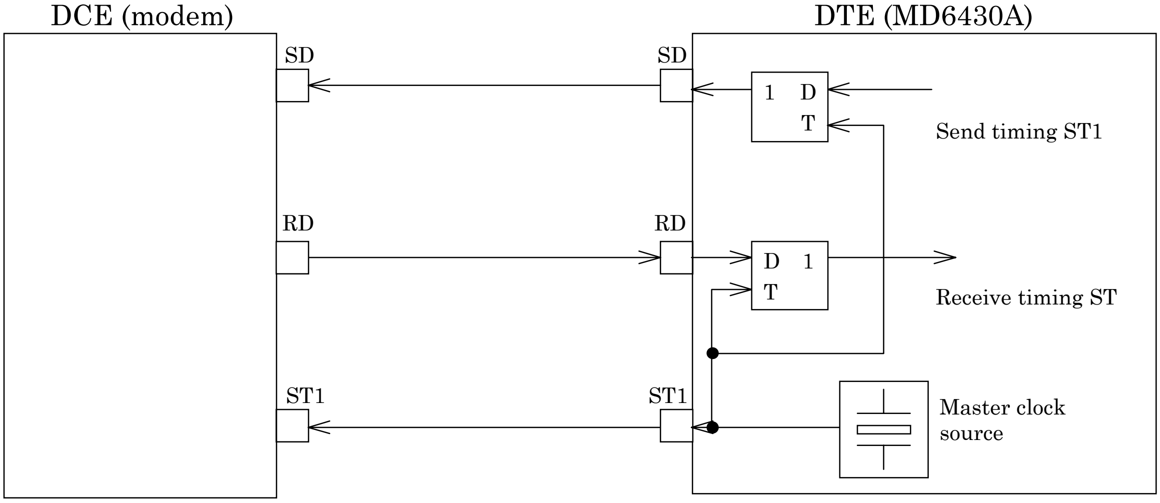


Fig. 7.2-18

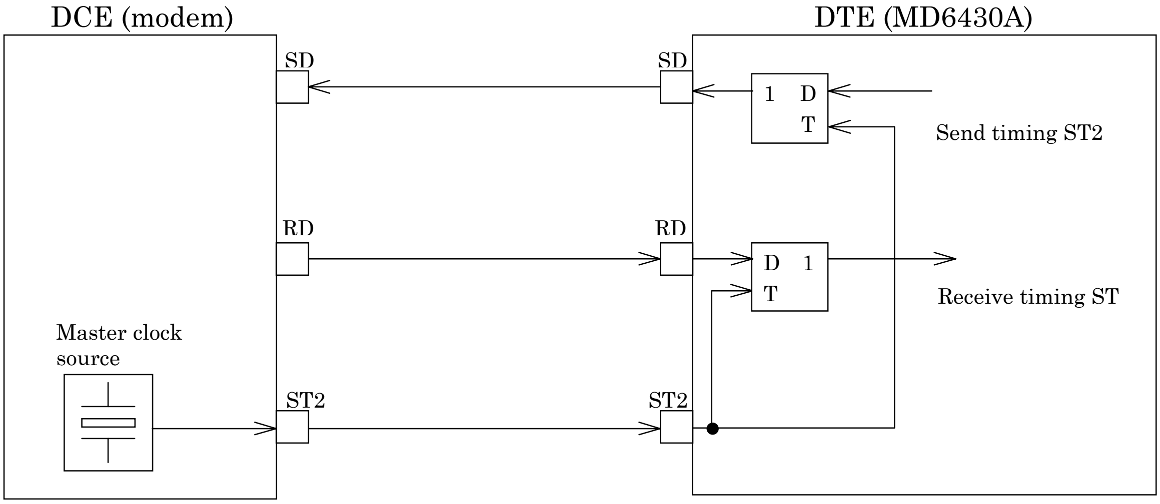
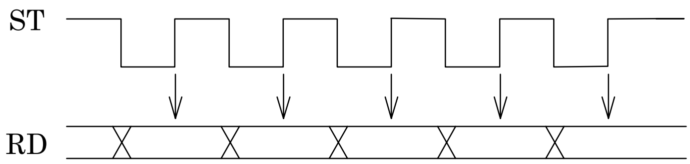


Fig. 7.2-19



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.2-20

7.3 V.36 Interface

7.3.1 Receiver/Driver

7.3.1.1 V.11 receiver

Figure 7.3-1 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below :

RD, ST2, RT

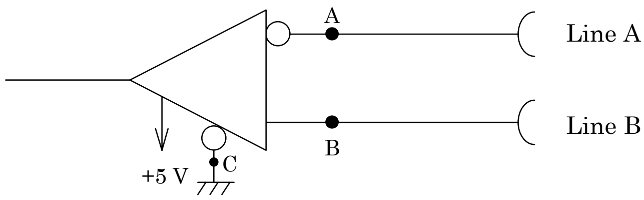


Fig. 7.3-1

The input conditions conform to ITU-T recommendations for V.11 interfaces. The input voltage ranges are as shown below:

Between lines: 0.3 to 10.0 V

To ground: ≤10.0 V

In addition, Table 7.3-1 shows the threshold levels for the receiver. Where, V_A and V_B are the voltages at points A and B, respectively, relative to point C.

Table 7.3-1

	V_A–V_B < –0.3 V	V_A–V_B > +0.3 V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.3.1.2 V.11 driver

Figure 7.3-2 shows an output-circuit block diagram. The signal lines that use this type of circuit are listed below:

SD, ST1

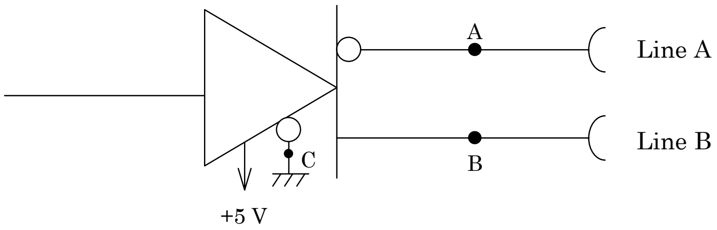


Fig. 7.3-2

The output conditions conform to ITU-T recommendations for V.11 interfaces. While connecting a 3.9 kΩ resistor between points A and B, the open-circuit differential voltage must not exceed 6.0 V for either binary condition 0 or 1.

7.3.1.3 V.10 receiver

Figure 7.3-3 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below:

DR, CS, CD, CI, TI

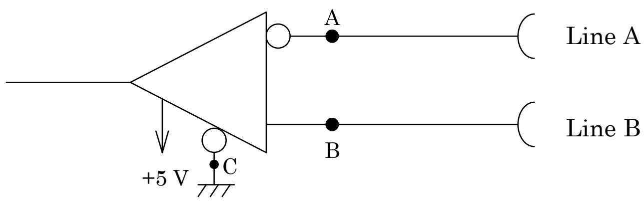


Fig. 7.3-3

The input conditions conform to ITU-T recommendations for V.10 interfaces. The input voltage ranges are as shown below:

Between lines: 0.3 to 10.0 V
To ground: ≤10.0 V

In addition, Table 7.3-2 shows the threshold levels for the receiver. Where, V_A and V_B are the voltages at points A and B, respectively, relative to point C.

Table 7.3-2

	V_A–V_B < –0.3 V	V_A–V_B > +0.3 V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.3.1.4 V.10 driver

Figure 7.3-4 shows an output-circuit block diagram. The signal lines that use this type of circuit are listed below:

ER, RS, LLB, RLB

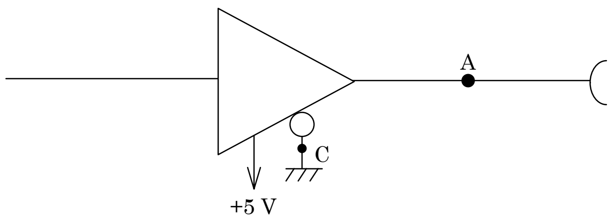


Fig. 7.3-4

The output conditions conform to ITU-T recommendations for V.10 interfaces. While connecting a 3.9 kΩ resistor between points A and C, the open-circuit signal voltage is equal to a 4.0 V or more and does not exceed 6.0 V for either binary condition 0 or 1.

7.3.2 Circuit connection

7.3.2.1 When the measuring equipment MD6430A is DTE

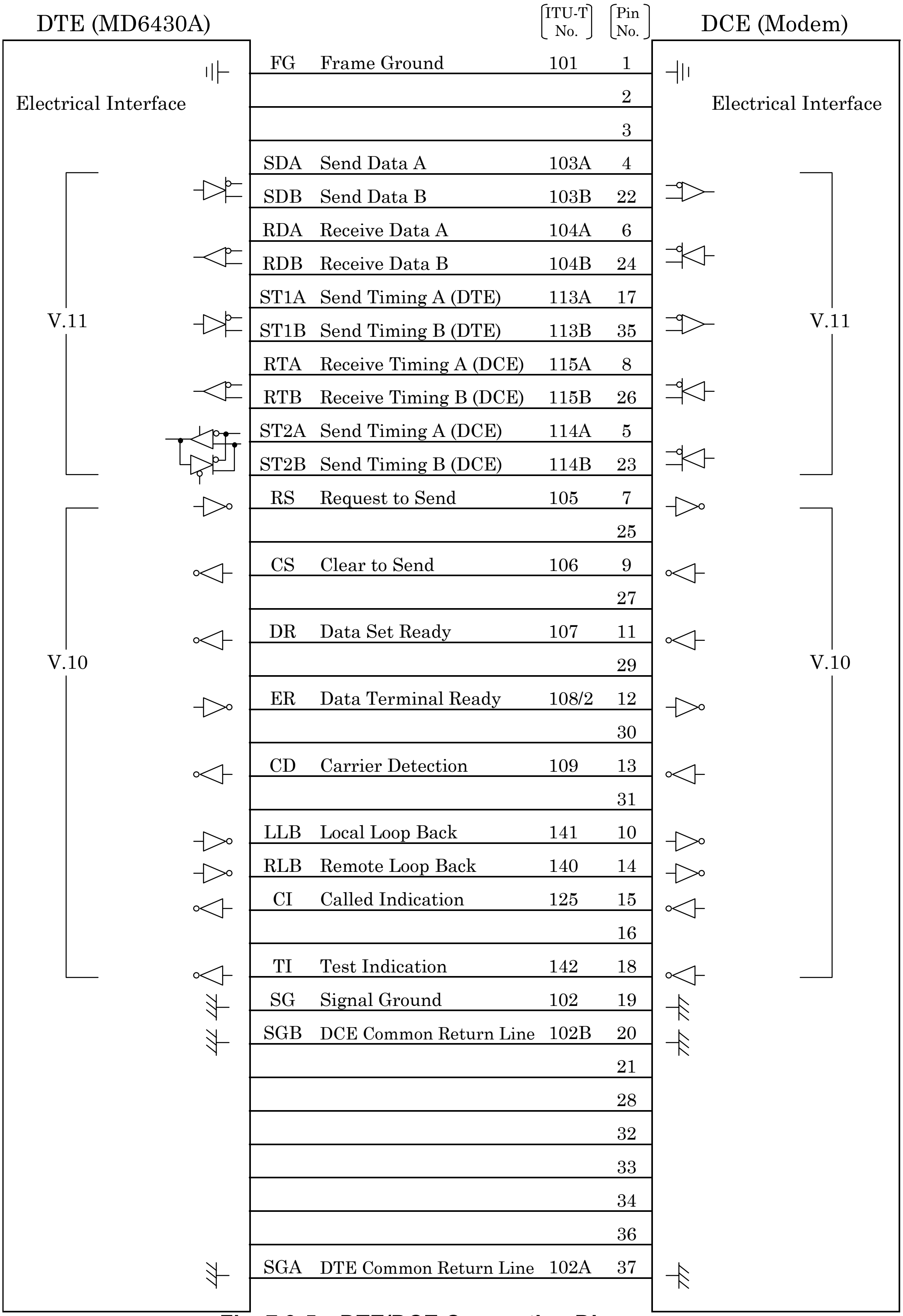


Fig. 7.3-5 DTE/DCE Connection Diagram

7.3.2.2 When the measuring equipment MD6430A is DCE

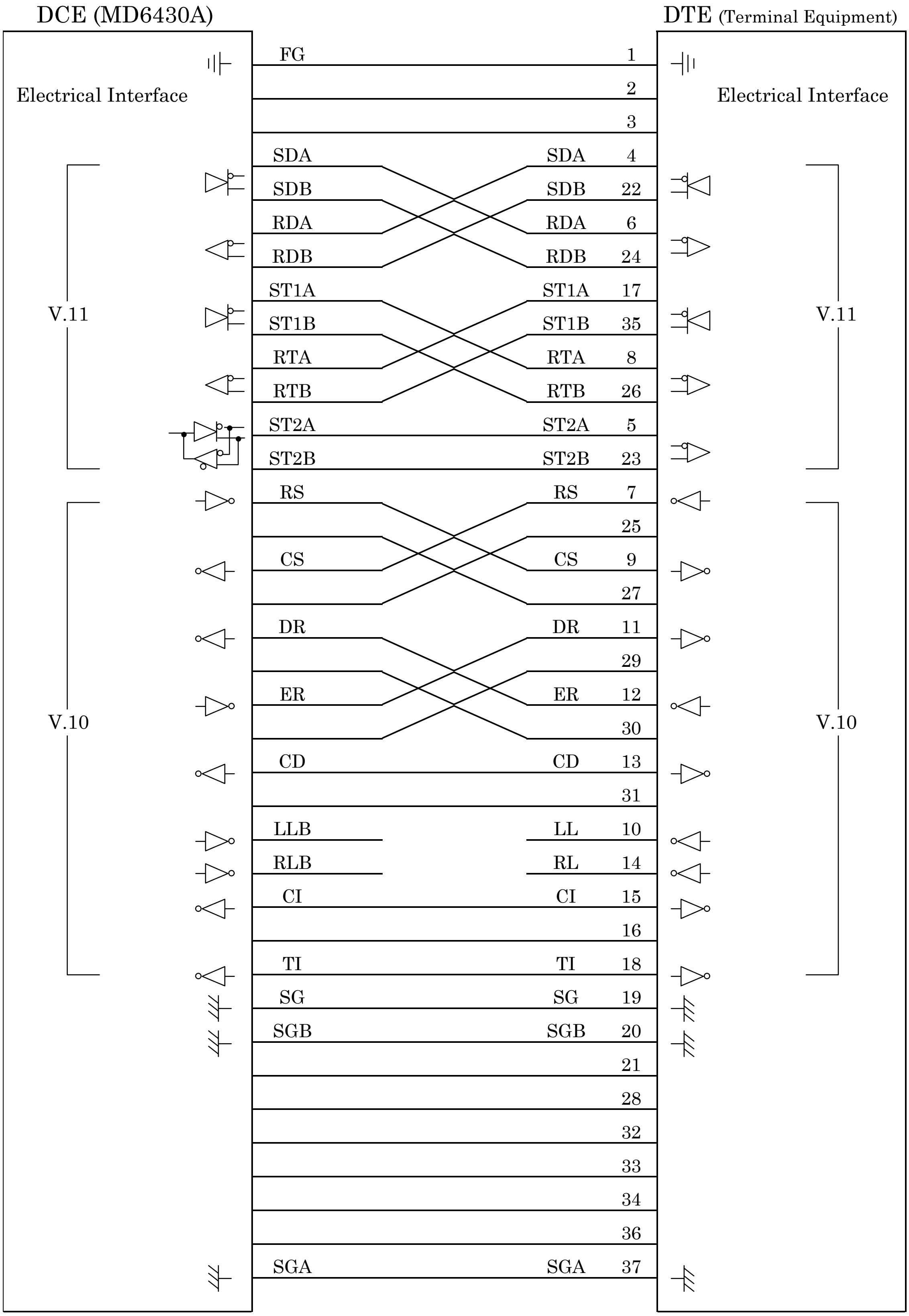


Fig. 7.3-6 DCE/DTE Connection Diagram

7.3.3 Send Timing

7.3.3.1 ST1 mode

When the ST1 synchronous mode is selected, the ST1 signal is used as the master clock source for the MD6430A.

Figure 7.3-7 shows the block diagram for ST1 and SD, while Figure 7.3-8 shows the phase relationship.

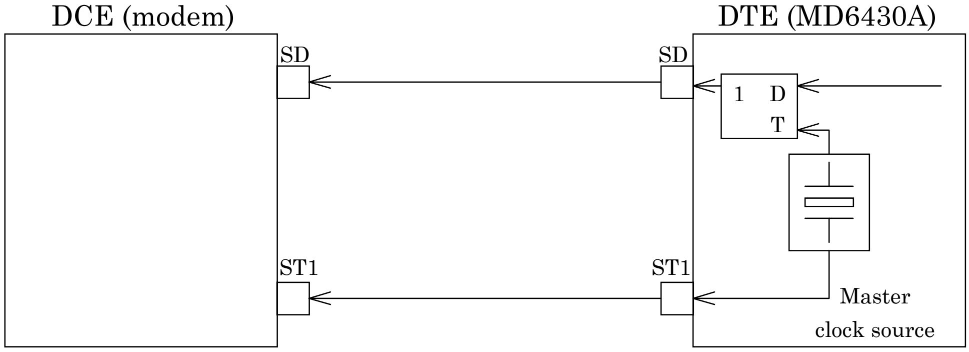


Fig. 7.3-7

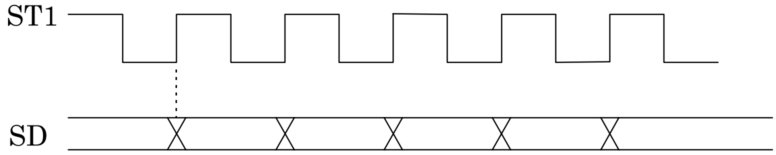


Fig. 7.3-8

7.3.3.2 ST2 mode

When the ST2 synchronous mode is selected, the ST2 clock supplied by the DCE is used as the send timing signal.
Figure 7.3-9 shows the block diagram for ST2 and SD, while Fig. 7.3-10 shows the phase relationship.

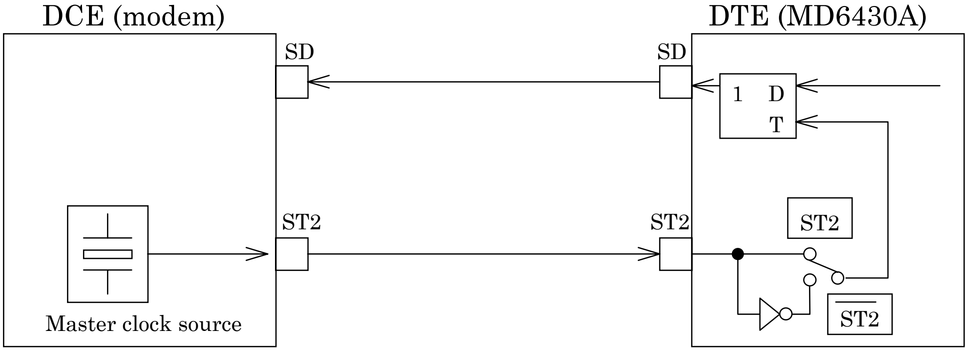


Fig. 7.3-9

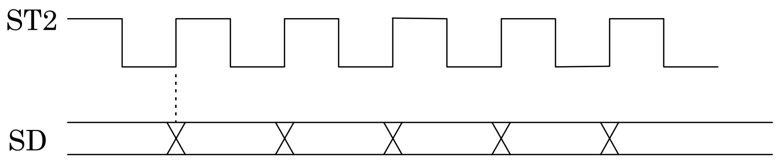


Fig. 7.3-10

7.3.3.3 $\overline{\text{ST2}}$ mode

When the inverted ST2 mode is set, the inverted ST2 clock is used as the send timing signal.
Figure 7.3-9 shows the block diagram for $\overline{\text{ST2}}$ and SD, while Figure 7.3-11 shows the phase relationship.

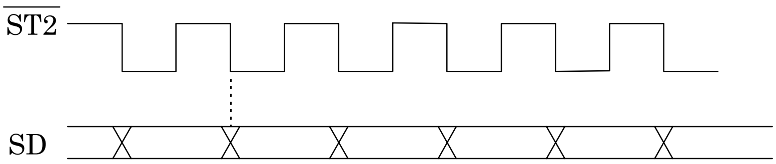


Fig. 7.3-11

7.3.3.4 RT mode

When the RT synchronous mode is used, the RT (receive timing) clock supplied by the DCE is used as the send timing signal.

Figure 7.3-12 shows the block diagram for RT and SD, while Figure 7.3-13 shows the phase relationship.

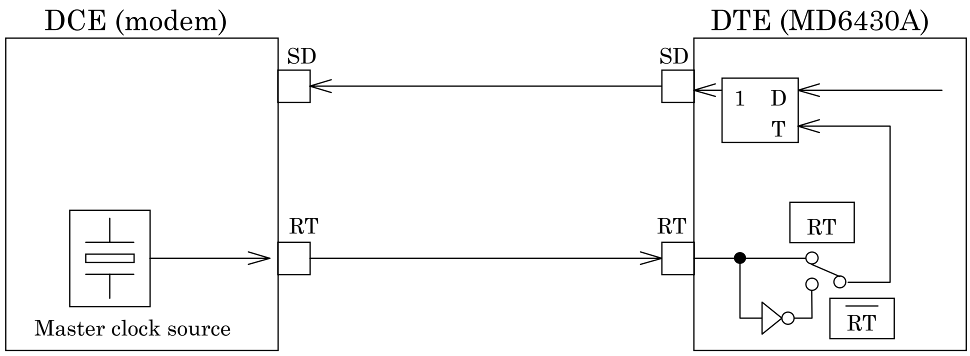


Fig. 7.3-12

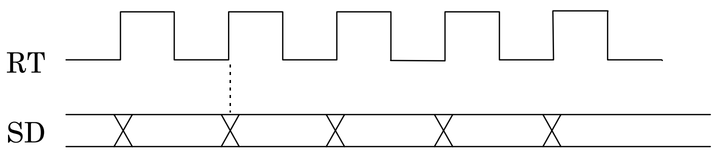


Fig. 7.3-13

7.3.3.5 $\overline{RT}$ mode

When the inverted RT mode is set, the inverted RT clock is used as the send timing signal.

Figure 7.3-12 shows the block diagram for $\overline{RT}$ and SD, while Figure 7.3-14 shows the phase relationship.

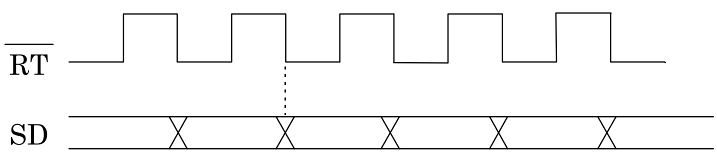


Fig. 7.3-14

7.3.4 Receive Timing

7.3.4.1 RT mode

When the RT synchronous mode is selected, the RT clock supplied by the DCE is used as the receive timing signal.

Figure 7.3-15 shows the block diagram for RT and RD, while Figure 7.3-16 shows the phase relationship.

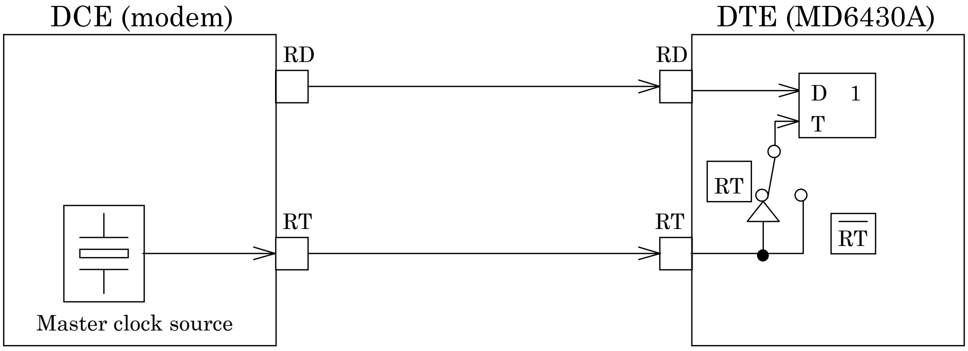
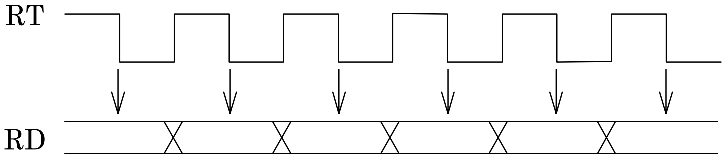


Fig. 7.3-15



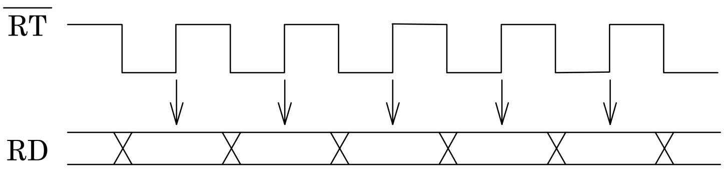
(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.3-16

7.3.4.2 $\overline{RT}$ mode

When the inverted RT synchronous mode is set, the inverted RT clock is used as the receive timing signal.

Figure 7.3-15 shows the block diagram for $\overline{RT}$ and RD, while Figure 7.3-17 shows the phase relationship.



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.3-17

7.3.4.3 ST mode

When the ST synchronous mode is set, the MD6430A internal clock is used as both the receive and send timing signal.

Figure 7.3-18 shows the block diagram for ST1, SD, and RD. Figure 7.3-19 shows the block diagram for ST2, SD, and RD. Figure 7.3-20 shows the phase relationship between ST and RD.

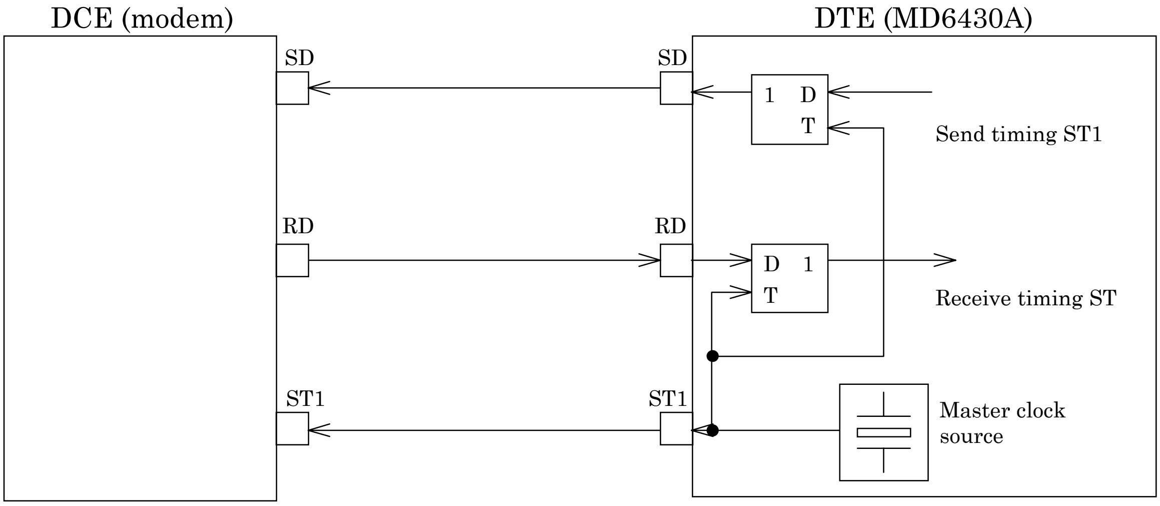


Fig. 7.3-18

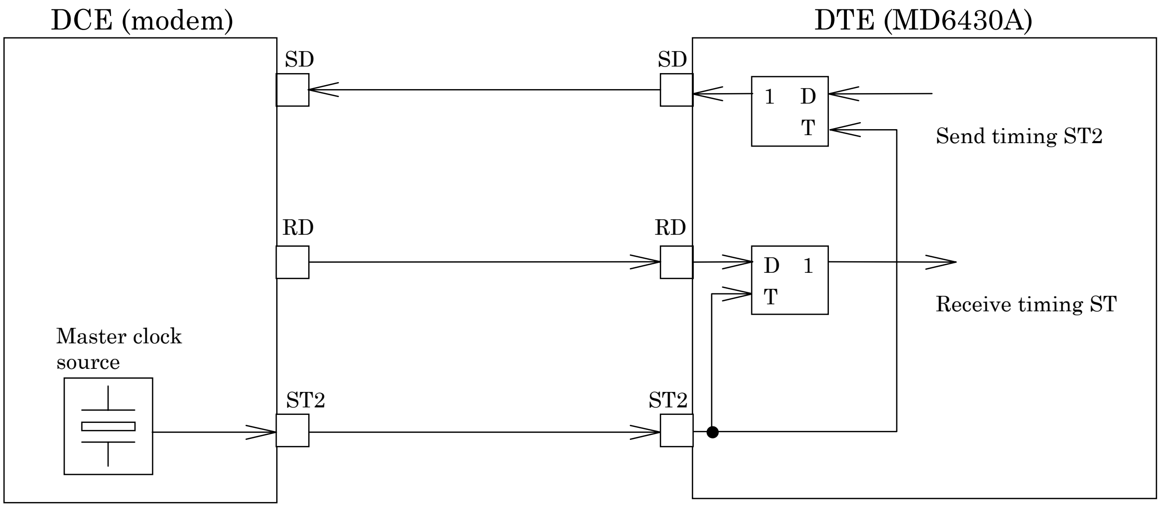
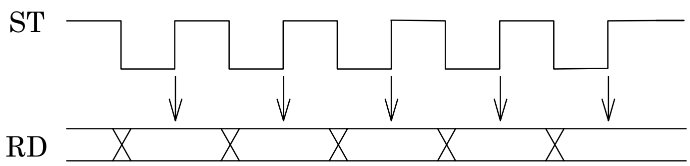


Fig. 7.3-19



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.3-20

7.4 RS-449 Interface

7.4.1 Receiver/Driver

7.4.1.1 V.11 receiver

Figure 7.4-1 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below:

RD, ST2, RT, DR, CS, CD

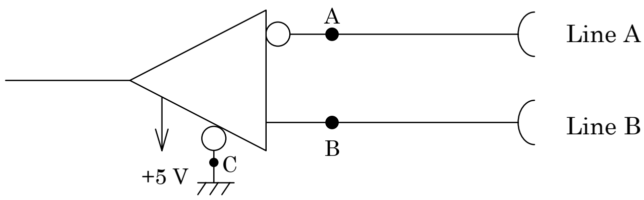


Fig. 7.4-1

The input conditions conform to ITU-T recommendations for V.11 interfaces. The input voltage ranges are as shown below:

Between lines: 0.3 to 10.0 V

To ground: ≤10.0 V

In addition, Table 7.4-1 shows the threshold levels for the receiver. Where, V_A and V_B are the voltages at points A and B, respectively, relative to point C.

Table 7.4-1

	$V_A – V_B < –0.3$ V	$V_A – V_B > +0.3$ V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.4.1.2 V.11 driver

Figure 7.4-2 shows an output-circuit block diagram. The signal lines that use this type of circuit are listed below:

SD, ST1, ER, RS

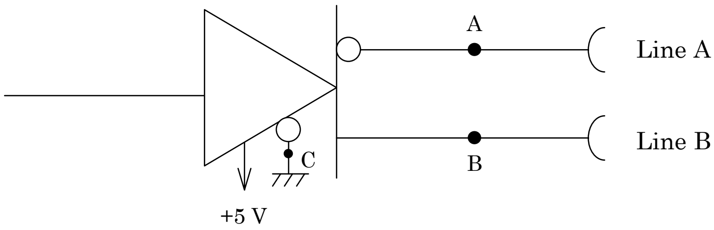


Fig. 7.4-2

The output conditions conform to ITU-T recommendations for V.11 interfaces. While connecting a 3.9 kΩ resistor between points A and B, the differential open-circuit voltage must not exceed 6.0 V for either binary condition 0 or 1.

7.4.1.3 V.10 receiver

Figure 7.4-3 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below:

CI, TI

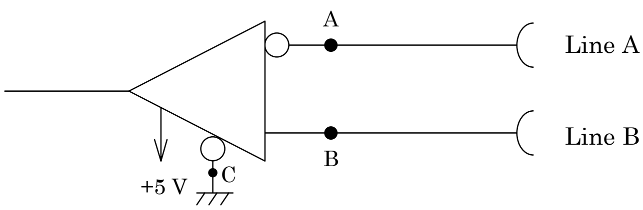


Fig. 7.4-3

The input conditions conform to ITU-T recommendations for V.10 interfaces. The input voltage ranges are as shown below:

Between lines: 0.3 to 10.0 V
To ground: ≤10.0 V

In addition, Table 7.4-2 shows the threshold levels for the receiver. Where, V_A and V_B are the voltages at points A and B, respectively, relative to point C.

Table 7.4-2

	$V_A – V_B < –0.3$ V	$V_A – V_B > +0.3$ V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.4.1.4 V.10 driver

Figure 7.4-4 shows an output-circuit block diagram. The signal lines that use this type of circuit are listed below:

LLB, RLB

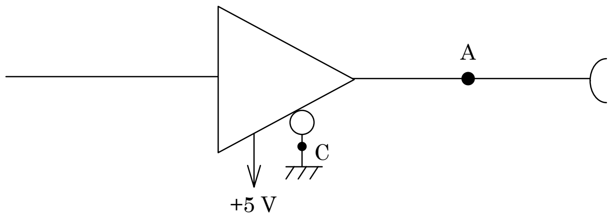


Fig. 7.4-4

The output conditions conform to ITU-T recommendations for V.10 interfaces. While connecting a 3.9 kΩ resistor between points A and C, the differential open-circuit signal voltage is equal to a 4.0 V or more and does not exceed 6.0 V for either binary condition 0 or 1.

7.4.2 Circuit connection

7.4.2.1 When the measuring equipment MD6430A is DTE

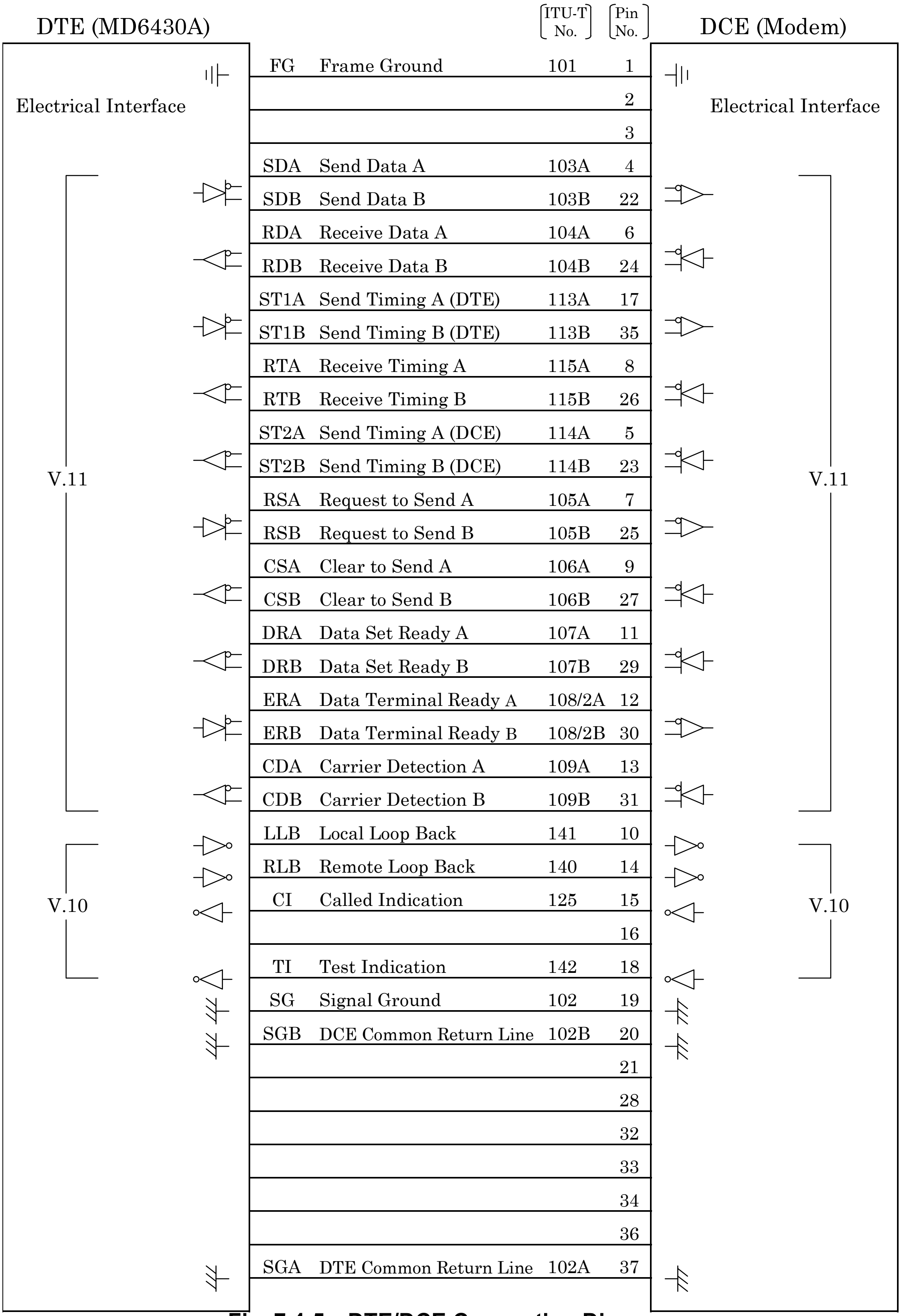


Fig. 7.4-5 DTE/DCE Connection Diagram

7.4.2.2 When the measuring equipment MD6430A is DCE

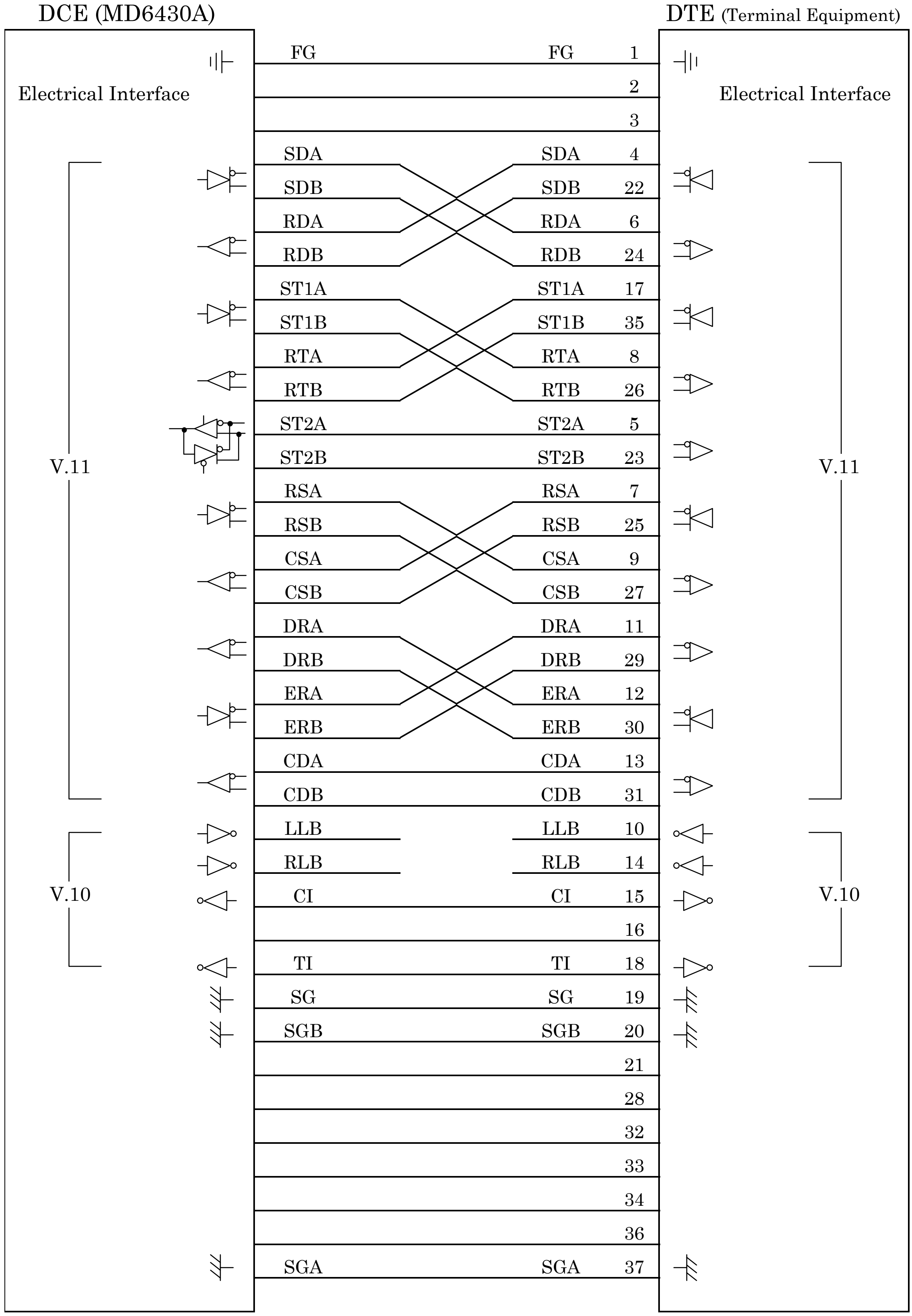


Fig. 7.4-6 DCE/DTE Connection Diagram

7.4.3 Send Timing

7.4.3.1 ST1 mode

When the ST1 synchronous mode is selected, the ST1 signal is used as the master clock source for the MD6430A.

Figure 7.4-7 shows the block diagram for ST1 and SD, while Figure 7.4-8 shows the phase relationship.

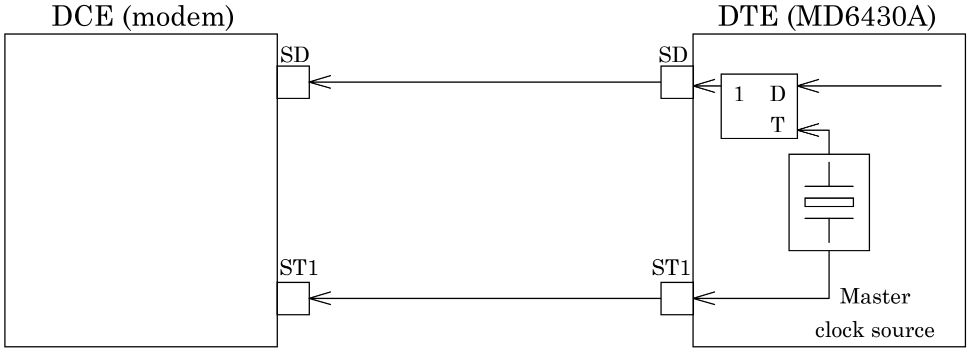


Fig. 7.4-7

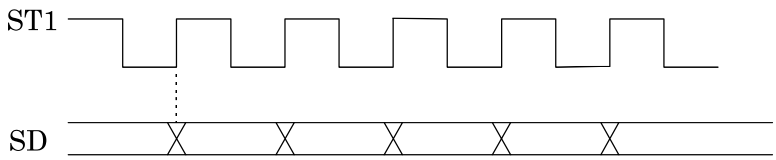


Fig. 7.4-8

7.4.3.2 ST2 mode

When the ST2 synchronous mode is selected, the ST2 clock supplied by the DCE is used as the send timing signal.
Figure 7.4-9 shows the block diagram for ST2 and SD, while Figure 7.4-10 shows the phase relationship.

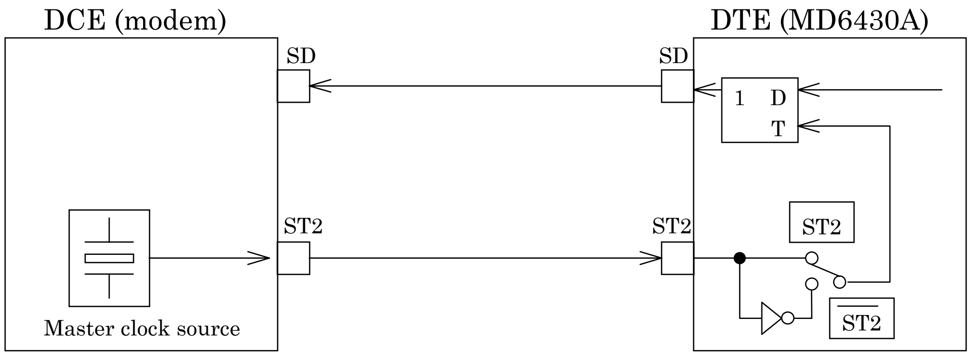


Fig. 7.4-9

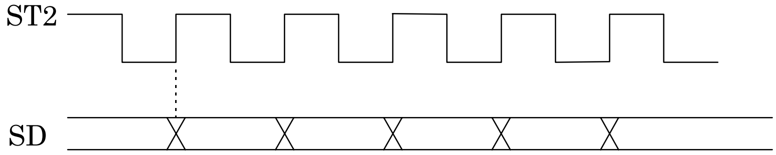


Fig. 7.4-10

7.4.3.3 $\overline{\text{ST2}}$ mode

When the inverted ST2 mode is set, the inverted ST2 clock is used as the send timing signal.
Figure 7.4-9 shows the block diagram for $\overline{\text{ST2}}$ and SD, while Figure 7.4-11 shows the phase relationship.

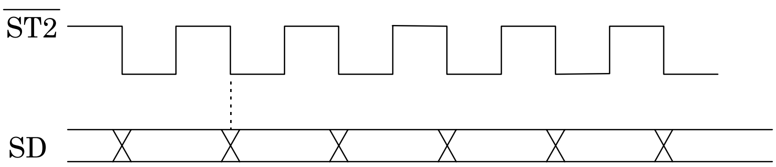


Fig. 7.4-11

7.4.3.4 RT mode

When the RT synchronous mode is used, the RT (receive timing) clock supplied by the DCE is used as the send timing signal.

Figure 7.4-12 shows the block diagram for RT and SD, while Figure 7.4-13 shows the phase relationship.

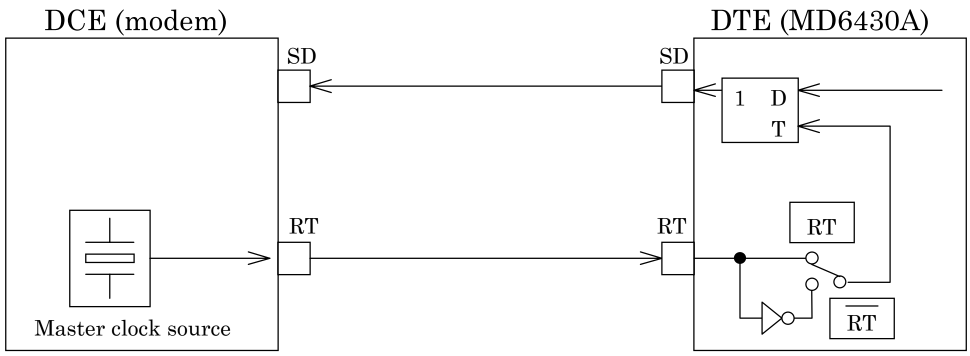


Fig. 7.4-12

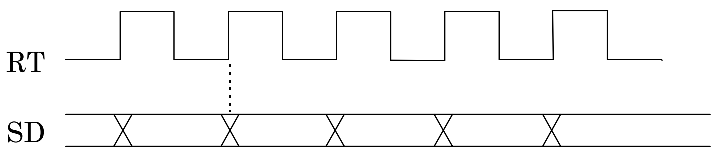


Fig. 7.4-13

7.4.3.5 $\overline{\text{RT}}$ mode

When the inverted RT mode is set, the inverted RT clock is used as the send timing signal.

Figure 7.4-12 shows the block diagram for $\overline{\text{RT}}$ and SD, while Figure 7.4-14 shows the phase relationship.

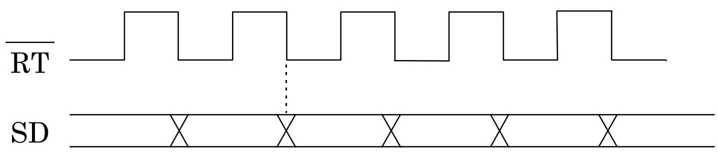


Fig. 7.4-14

7.4.4 Receive Timing

7.4.4.1 RT mode

When the RT synchronous mode is selected, the RT clock supplied by the DCE is used as the receive timing signal.
Figure 7.4-15 shows the block diagram for RT and RD, while Figure 7.4-16 shows the phase relationship.

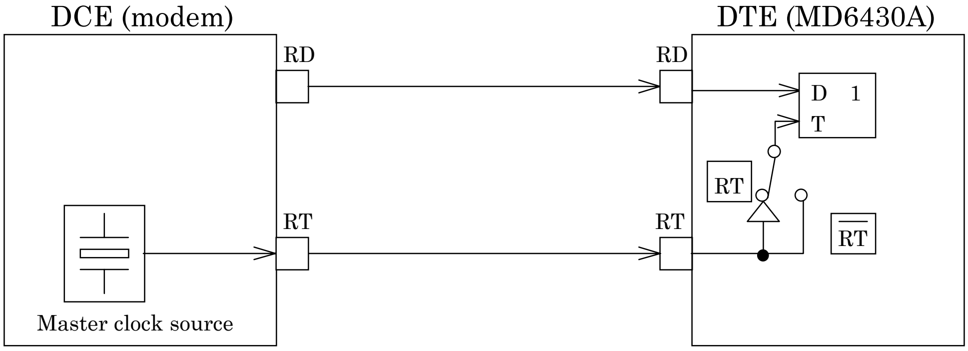
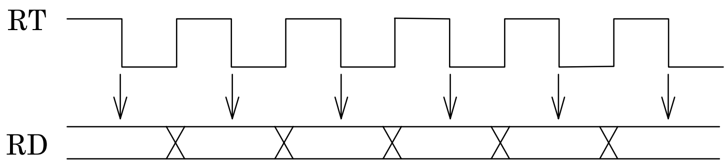


Fig. 7.4-15

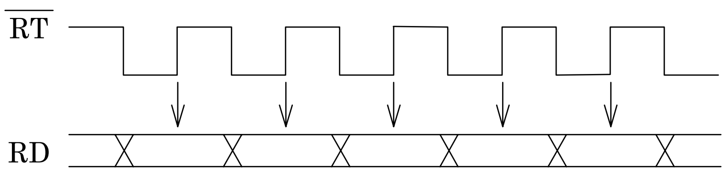


(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.4-16

7.4.4.2 $\overline{RT}$ mode

When the inverted RT synchronous mode is set, the inverted RT clock is used as the receive timing signal.
Figure 7.4-15 shows the block diagram for $\overline{RT}$ and RD, while Figure 7.4-17 shows the phase relationship.



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.4-17

7.4.4.3 ST mode

When the ST synchronous mode is set, the MD6430A internal clock is used as both the receive and send timing signal.
Figure 7.4-18 shows the block diagram for ST1, SD, and RD. Figure 7.4-19 shows the block diagram for ST2, SD, and RD. Figure 7.4-20 shows the phase relationship between ST and RD.

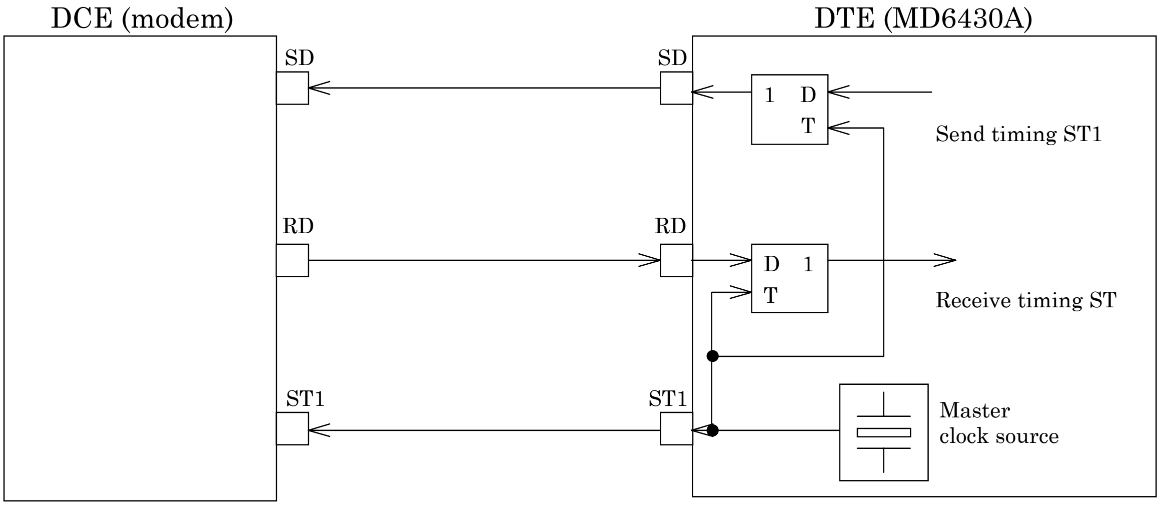


Fig. 7.4-18

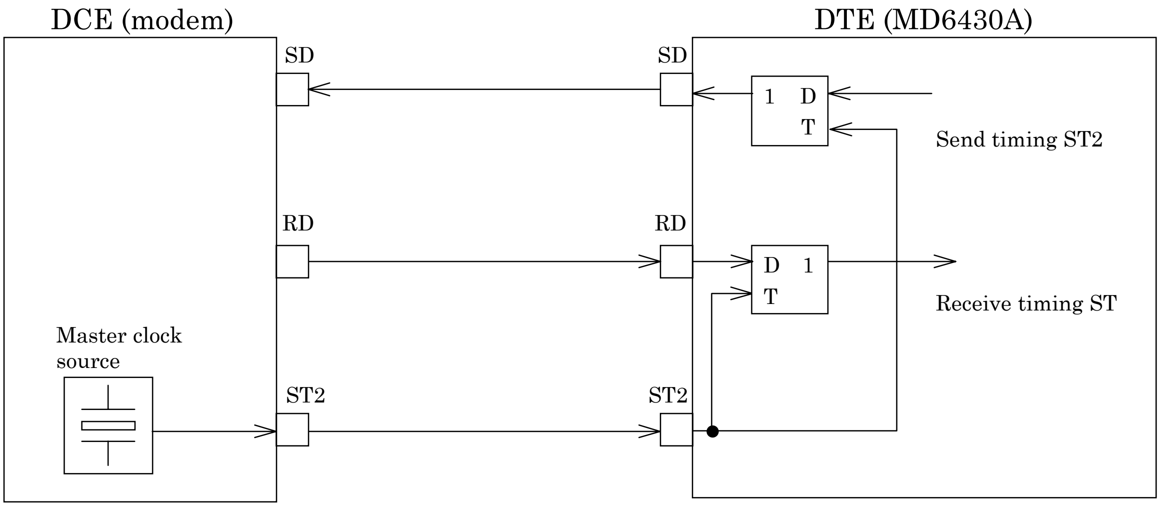


Fig. 7.4-19

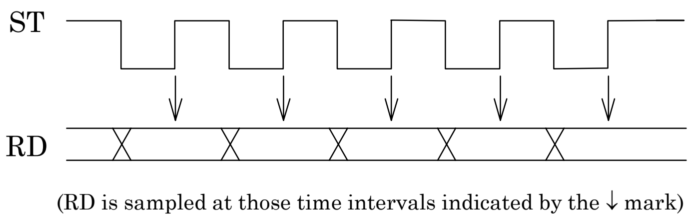


Fig. 7.4-20

7.5 X.20 Interface

7.5.1 Receiver/Driver

7.5.1.1 Receiver

Figure 7.5-1 shows an input-circuit block diagram.
The signal lines that can be received are listed below:

For V.10: R

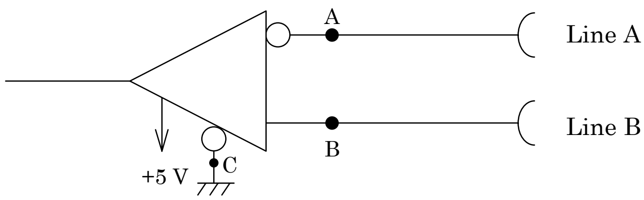


Fig. 7.5-1

Table 7.5-1 shows the threshold levels for the receiver.
Where, V_A and V_B are the voltages at points A and B, respectively, relative to point C.

Table 7.5-1

	V_A–V_B < –0.3 V	V_A–V_B > +0.3 V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.5.1.2 V.10 driver

Figure 7.5-2 shows an output-circuit block diagram.
The signal lines that can be sended are listed below:

T

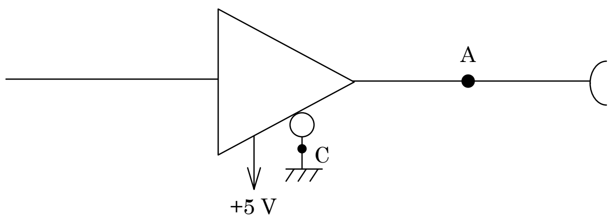


Fig. 7.5-2

The output conditions conform to ITU-T recommendations for V.10 interfaces. While connecting a 3.9 kΩ resistor between points A and C, the differential open-circuit signal voltage is equal to a 4.0 V or more and does not exceed 6.0 V for either binary condition 0 or 1.

7.5.2 Circuit connection

7.5.2.1 When the measuring equipment MD6430A is DTE

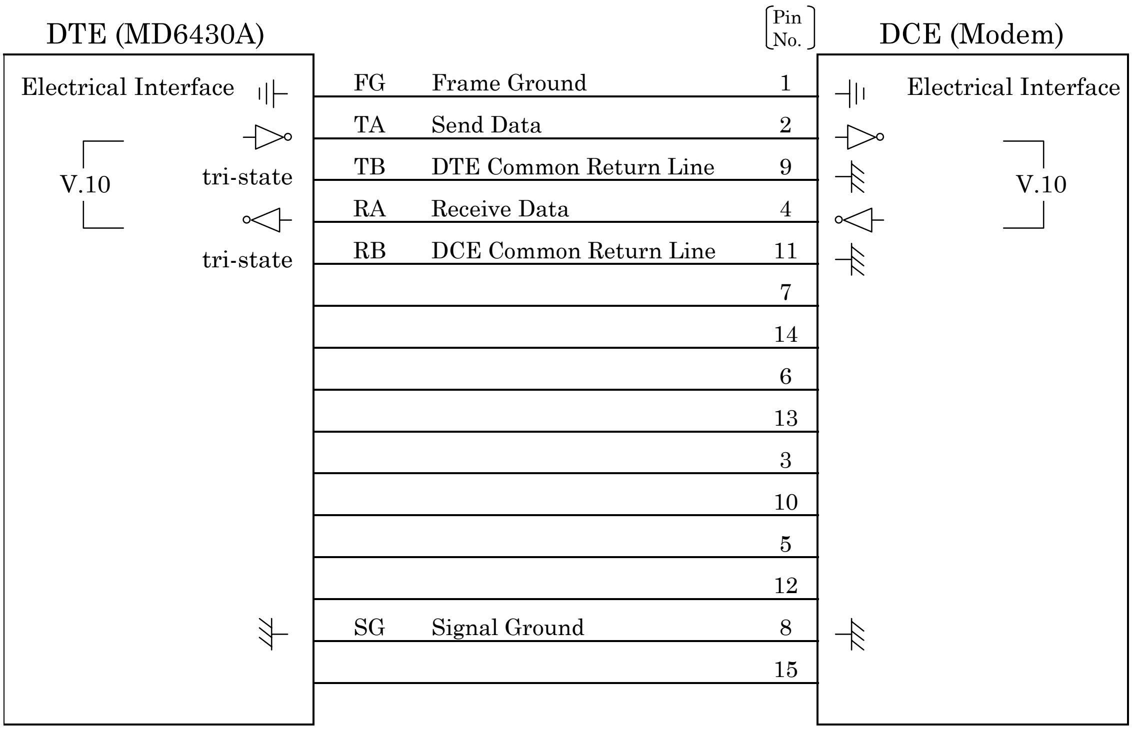


Fig. 7.5-3 DTE/DCE Connection Diagram

7.5.2.2 When the measuring equipment MD6430A is DCE

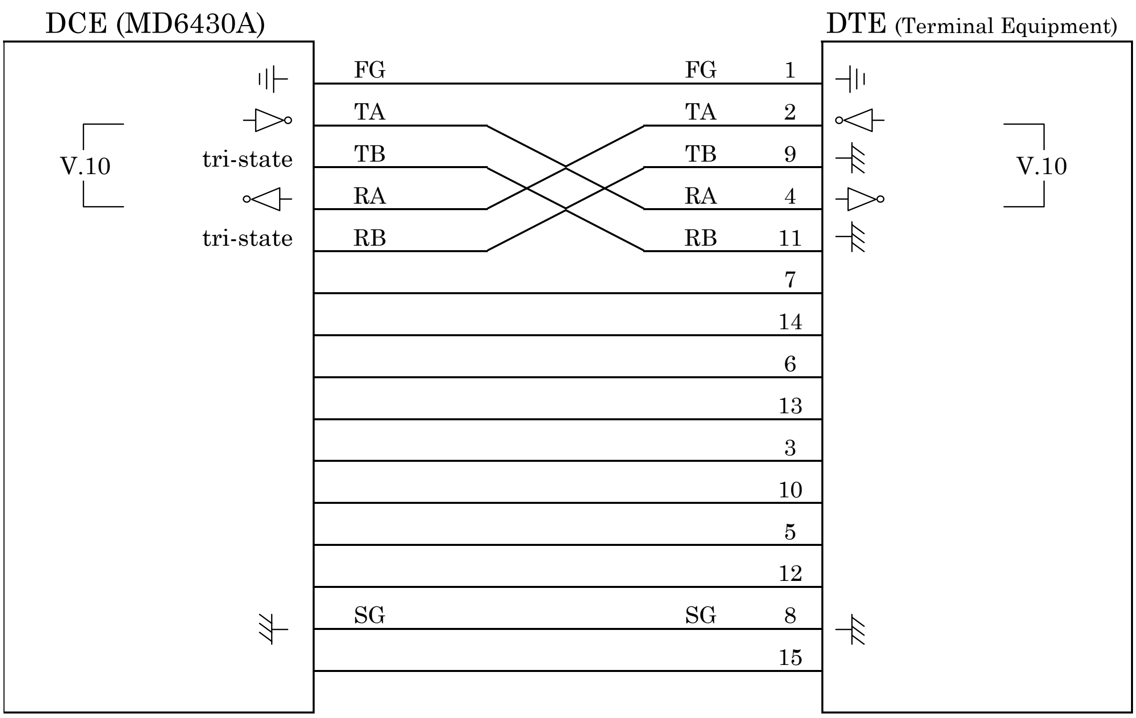


Fig. 7.5-4 DCE/DTE Connection Diagram

7.5.3 Send Timing

7.5.3.1 ASYNC mode

(1) Start/Stop bit: Off

When the asynchronous mode is set, the MD6430A internal clock is used for both the send and receive timing.
Figure 7.5-5 shows the block diagram for T, R and the clock source.

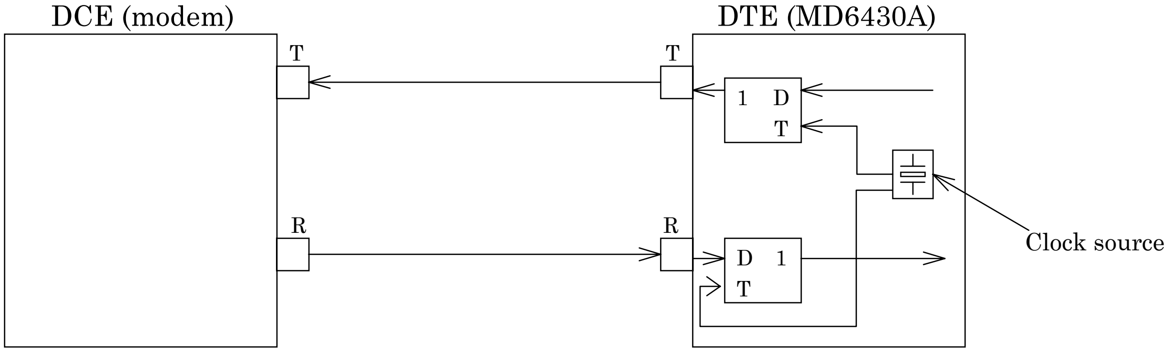


Fig. 7.5-5

(2) Start/Stop bit: On

When the start/stop mode is set, the MD6430A internal clock is used for both the send and receive timing.
Figure 7.5-6 shows the block diagram for T, R and the clock source.

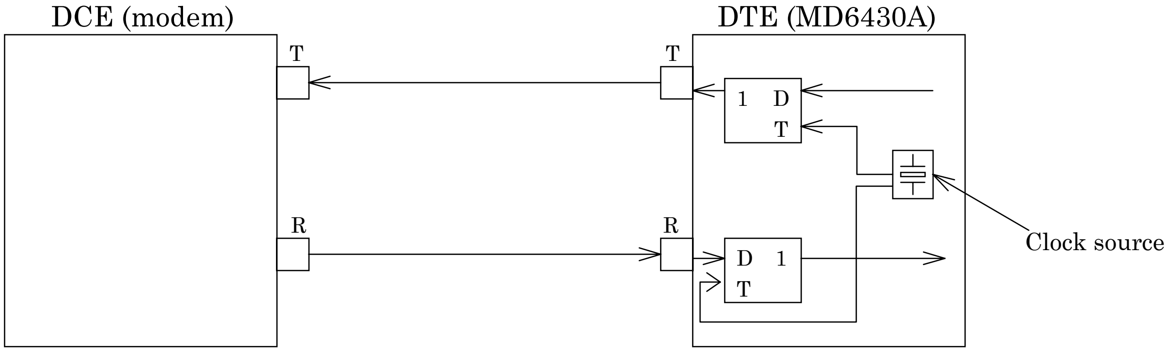


Fig. 7.5-6

7.6 X.21 Interface

7.6.1 Receiver/Driver

7.6.1.1 Receiver

Figure 7.6-1 is shown an input-circuit block diagram.
The signal lines that can be received are listed below:

For V.11: R, I, S, B

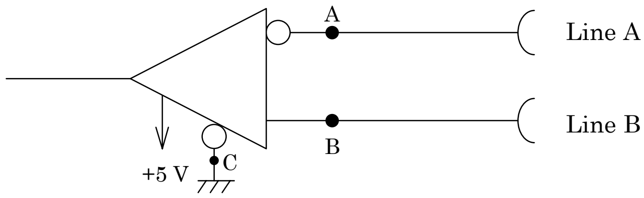


Fig. 7.6-1

Table 7.6-1 shows the threshold levels for the receiver.
Where, V_A and V_B are the voltages at points A and B, respectively, relative to point C.

Table 7.6-1

	V_A–V_B < –0.3 V	V_A–V_B > +0.3 V
Data circuit	1	0
Control and timing circuits	OFF	ON

7.6.1.2 V.11 driver

Figure 7.6-2 shows an output-circuit block diagram.
The signal lines that can be sended are listed below:

T, C

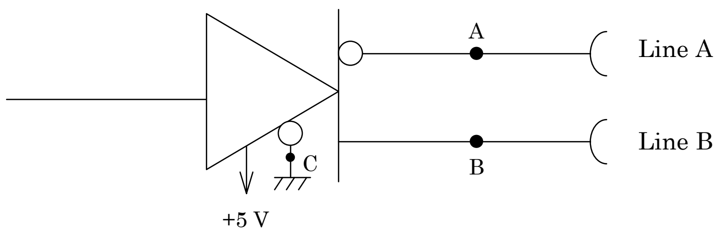


Fig. 7.6-2

The output conditions conform to ITU-T recommendations for V.11 interfaces. While connecting a 3.9 kΩ resistor between points A and B, the differential open-circuit voltage must not exceed 6.0 V for either binary condition 0 or 1.

7.6.2 Circuit connection

7.6.2.1 When the measuring equipment MD6430A is DTE

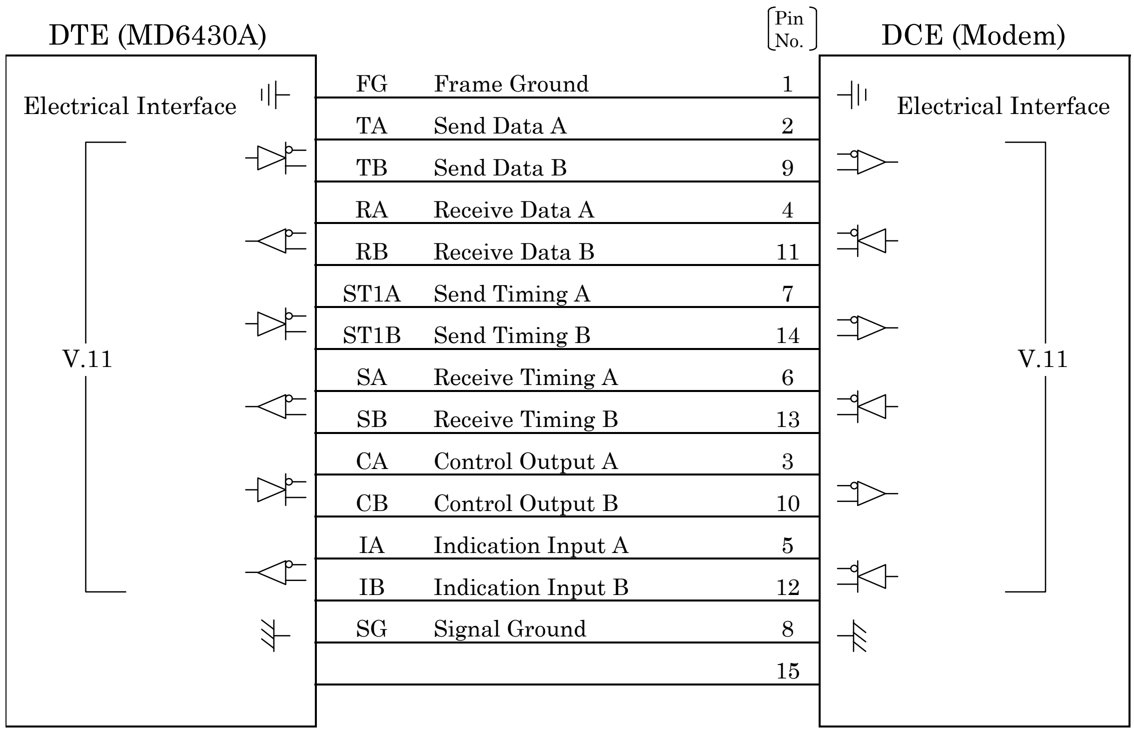


Fig. 7.6-3 DTE/DCE Connection Diagram

7.6.2.2 When the measuring equipment MD6430A is DCE

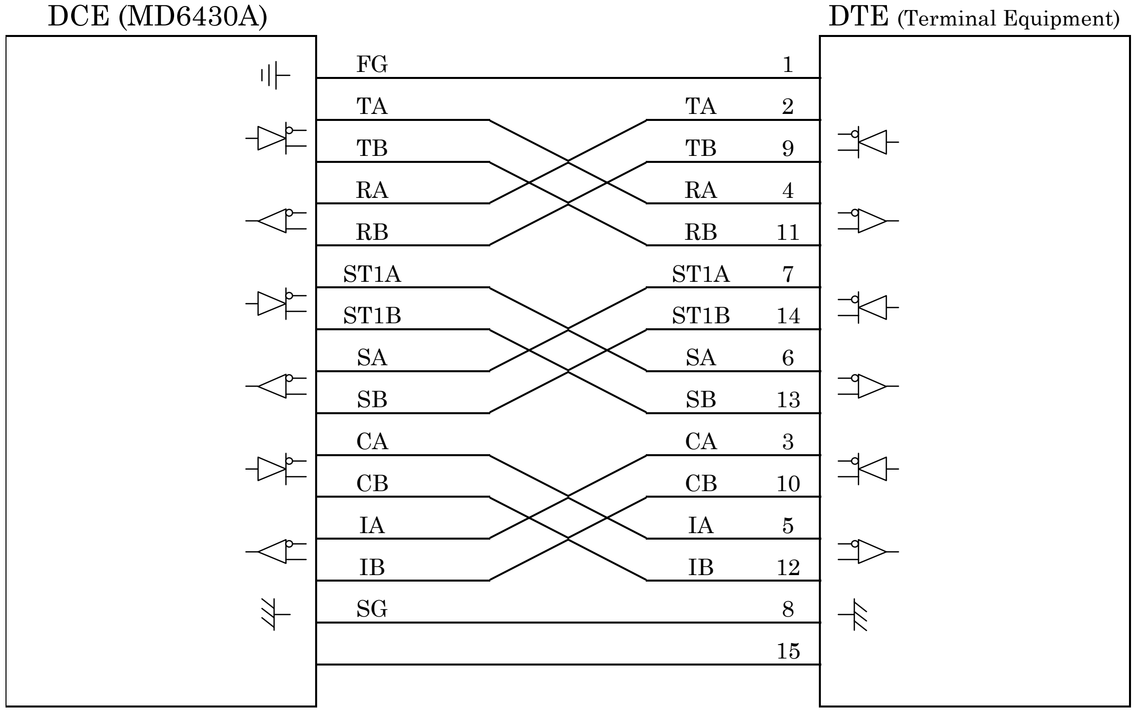


Fig. 7.6-4 DCE/DTE Connection Diagram

7.6.3 Send Timing

7.6.3.1 ST1 mode

When the ST1 synchronous mode is selected, the ST1 signal is used as the master clock source for the MD6430A.

Figure 7.6-5 shows the block diagram for ST1 and T, while Figure 7.6-6 shows the phase relationship.

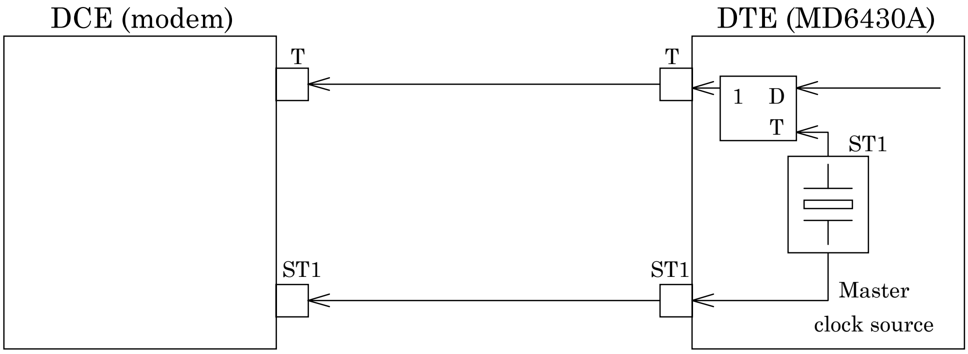


Fig. 7.6-5

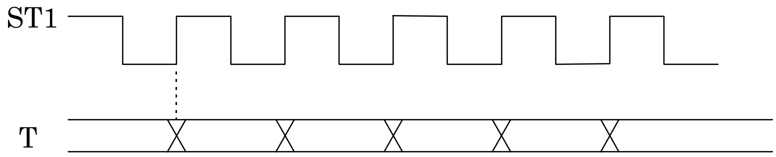


Fig. 7.6-6

7.6.3.2 ST2 mode

When the ST2 synchronous mode is selected, the ST2 clock supplied by the DCE is used as the send timing signal.
Figure 7.6-7 shows the block diagram for ST2 and T, while Figure 7.6-8 shows the phase relationship.

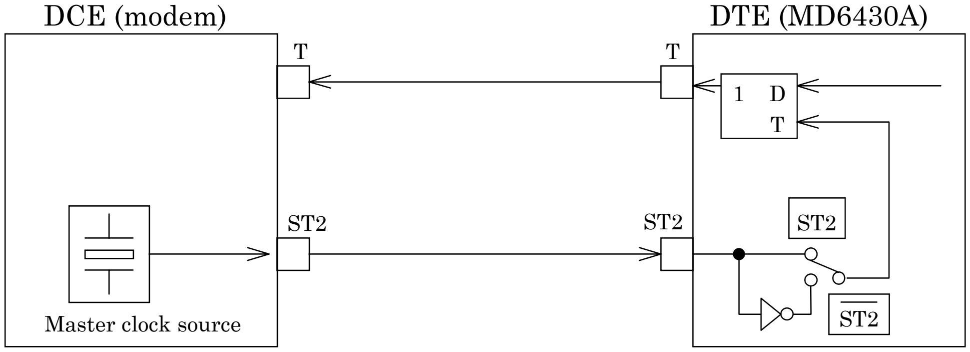


Fig. 7.6-7

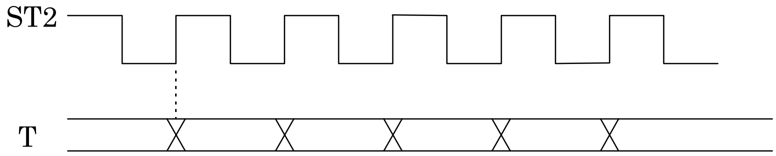


Fig. 7.6-8

7.6.3.3 $\overline{\text{ST2}}$ mode

When the inverted ST2 mode is set, the inverted ST2 clock is used as the send timing signal.
Figure 7.6-7 shows the block diagram for $\overline{\text{ST2}}$ and T, while Figure 7.6-9 shows the phase relationship.

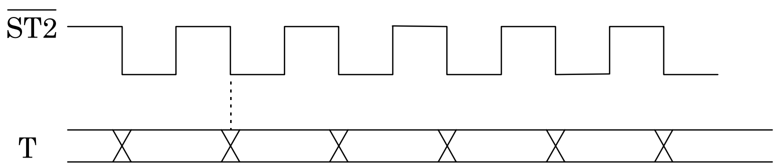


Fig. 7.6-9

7.6.3.4 S mode

When the S synchronous mode is selected, the S clock supplied by the DCE is used as the send timing signal.
Figure 7.6-10 shows the block diagram for S and T, while Figure 7.6-11 shows the phase relationship.

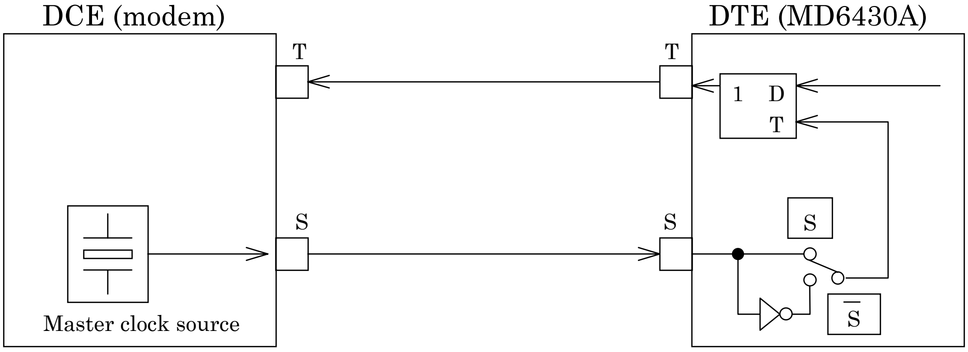


Fig. 7.6-10

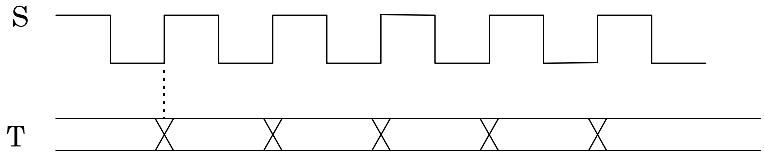


Fig. 7.6-11

7.6.3.5 $\overline{S}$ mode

When the inverted S mode is set, the inverted S clock is used as the send timing signal.
Figure 7.6-10 shows the block diagram for $\overline{S}$ and T, while Figure 7.6-12 shows the phase relationship.

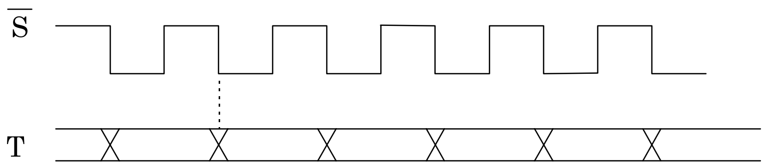


Fig. 7.6-12

7.6.4 Receive Timing

7.6.4.1 S mode

When the S synchronous mode is selected, the S clock supplied by the DCE is used as the receive timing signal.
Figure 7.6-13 shows the block diagram for S and R, while Figure 7.6-14 shows the phase relationship.

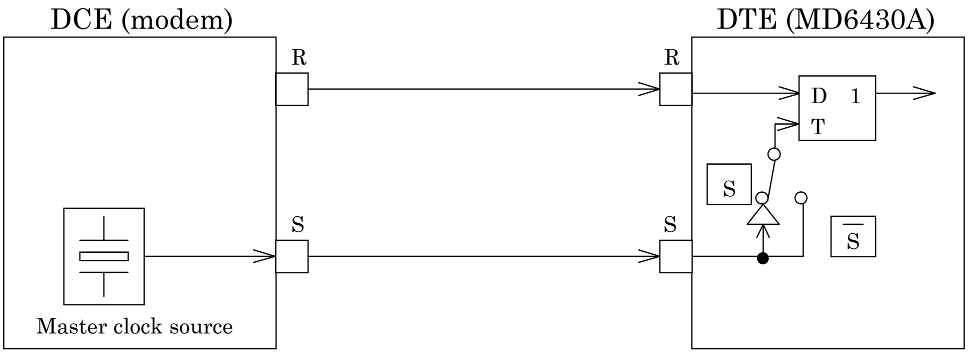
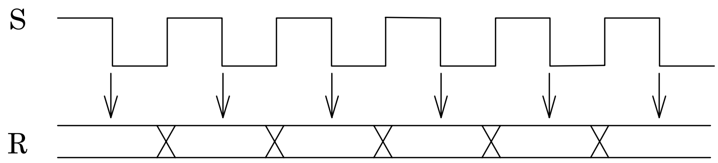


Fig. 7.6-13

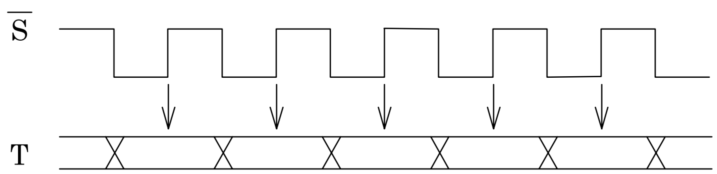


(R is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.6-14

7.6.4.2 $\overline{S}$ mode

When the inverted S synchronous mode is set, the inverted S clock is used as the receive timing signal.
Figure 7.6-13 shows the block diagram for $\overline{S}$ and T, while Figure 7.6-15 shows the phase relationship.



(T is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.6-15

7.6.4.3 ST mode

When the ST synchronous mode is set, the MD6430A internal clock is used as both the receive and send timing signal.
Figure 7.6-16 shows the block diagram for ST1, T, and R. Figure 7.6-17 shows the block diagram for ST2, T, and R. Figure 7.6-18 shows the phase relationship between ST and R.

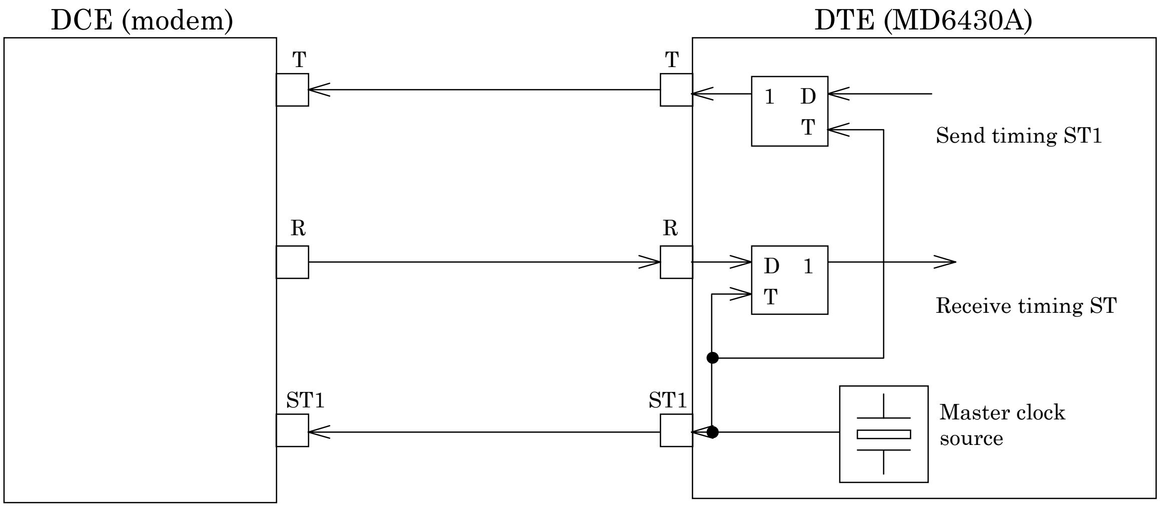


Fig. 7.6-16

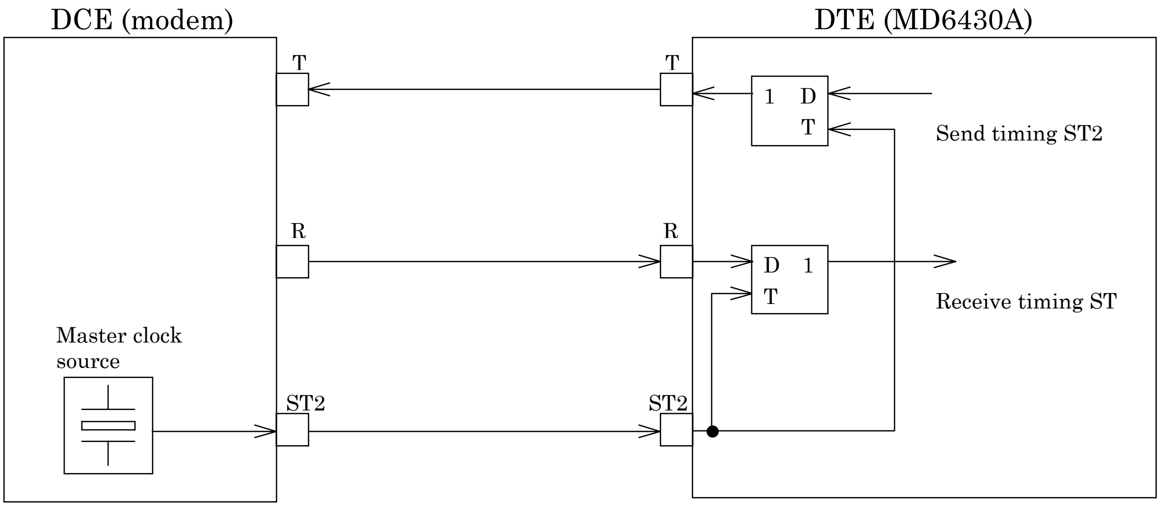


Fig. 7.6-17

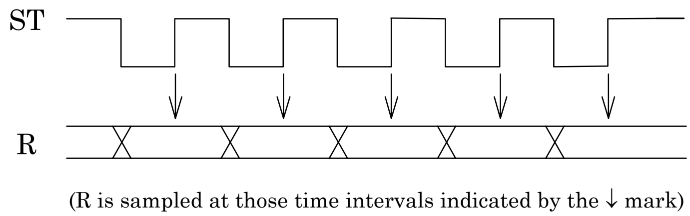


Fig. 7.6-18

7.7 TTL/CMOS Interface

7.7.1 Receiver/Driver

7.7.1.1 Receiver

Figure 7.7-1 shows an input-circuit block diagram. The signal lines that use this type of circuit are listed below:

RD, ST2, RT

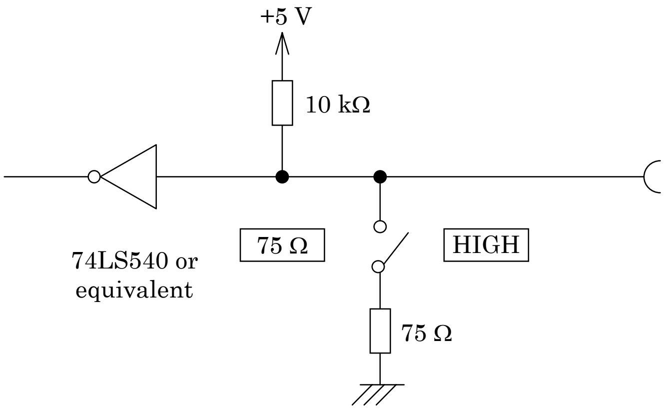


Fig. 7.7-1

7.7.1.2 Driver

Figure 7.7-2 shows an output-circuit block diagram. The signal lines that use this type of circuit are listed below:

SD, ST1

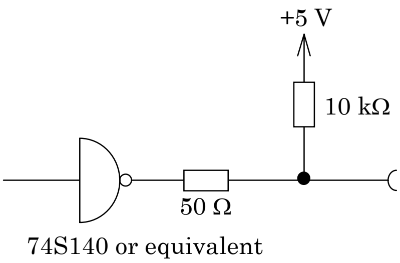


Fig. 7.7-2

7.7.2 Circuit connection

A connection example using TTL/CMOS interface is shown below.

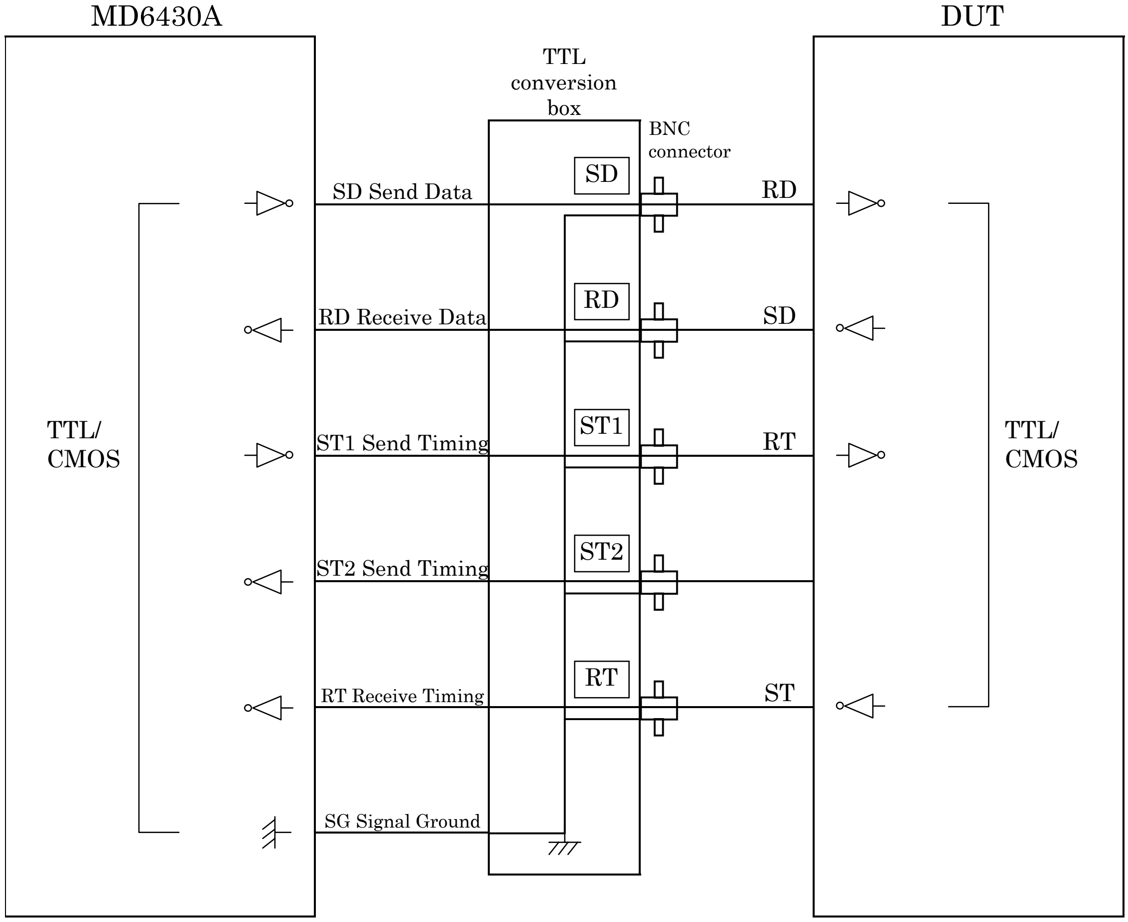


Fig. 7.7-3 TTL/CMOS Interface Connection Diagram (Example)

7.7.3 Send Timing

7.7.3.1 ST1 mode

When the ST1 synchronous mode is selected, the ST1 signal is used as the master clock source for the MD6430A.

Figure 7.7-4 shows the block diagram for ST1 and SD, while Figure 7.7-5 shows the phase relationship.

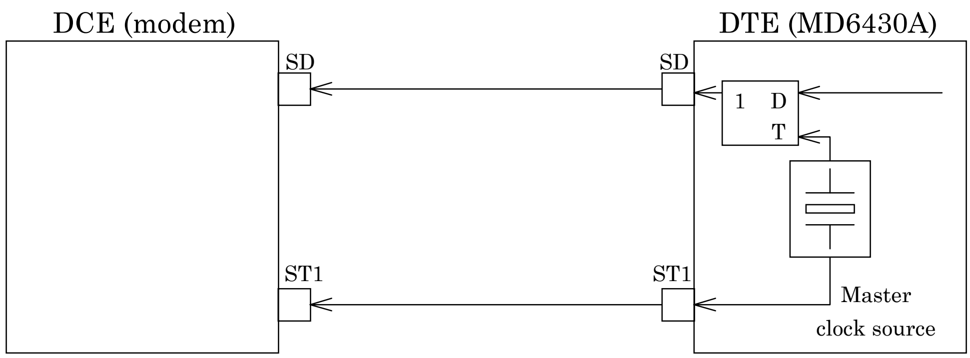


Fig. 7.7-4

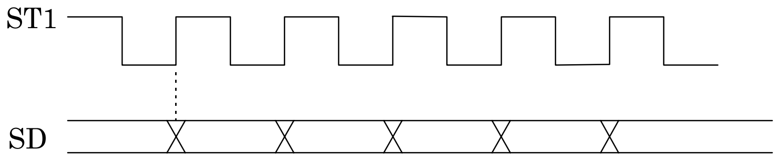


Fig. 7.7-5

7.7.3.2 ST2 mode

When the ST2 synchronous mode is selected, the ST2 clock supplied by the DCE is used as the send timing signal.
Figure 7.7-6 shows the block diagram for ST2 and SD, while Figure 7.7-7 shows the phase relationship.

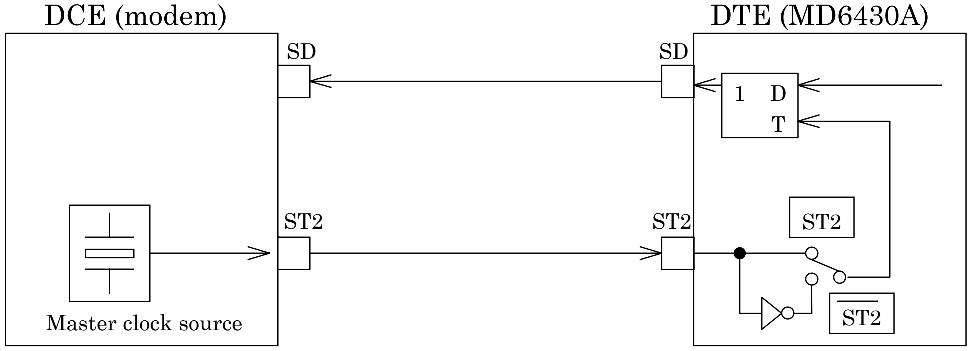


Fig. 7.7-6

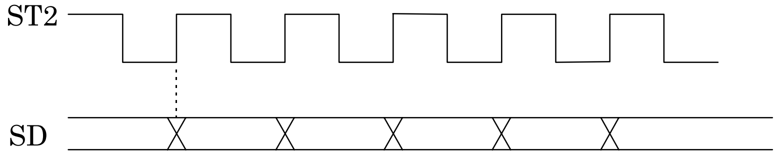


Fig. 7.7-7

7.7.3.3 $\overline{\text{ST2}}$ mode

When the inverted ST2 mode is set, the inverted ST2 clock is used as the send timing signal.
Figure 7.7-6 shows the block diagram for $\overline{\text{ST2}}$ and SD, while Figure 7.7-8 shows the phase relationship.

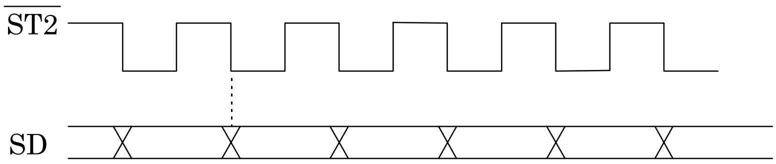


Fig. 7.7-8

7.7.3.4 ASYNC mode

(1) Start/Stop bit: Off

When the asynchronous mode is set, the MD6430A internal clock is used for both the send and receive timing.

Figure 7.7-9 shows the block diagram for SD, RD and the clock source.

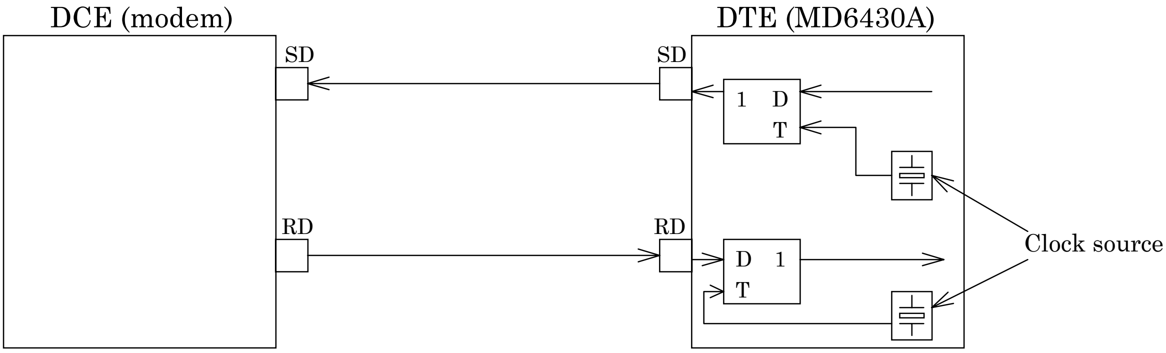


Fig. 7.7-9

(2) Start/Stop bit: On

When the start/stop mode is set, the MD6430A internal clock is used for both the send and receive timing.

Figure 7.7-10 shows the block diagram for SD, RD and the clock source.

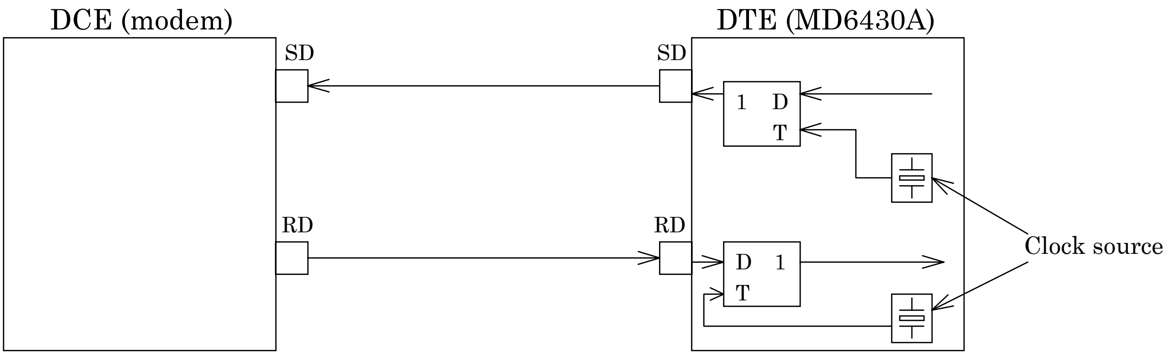


Fig. 7.7-10

7.7.3.5 RT mode

When the RT synchronous mode is used, the RT (receive timing) clock supplied by the DCE is used as the send timing signal.
Figure 7.7-11 shows the block diagram for RT and SD, while Figure 7.7-12 shows the phase relationship.

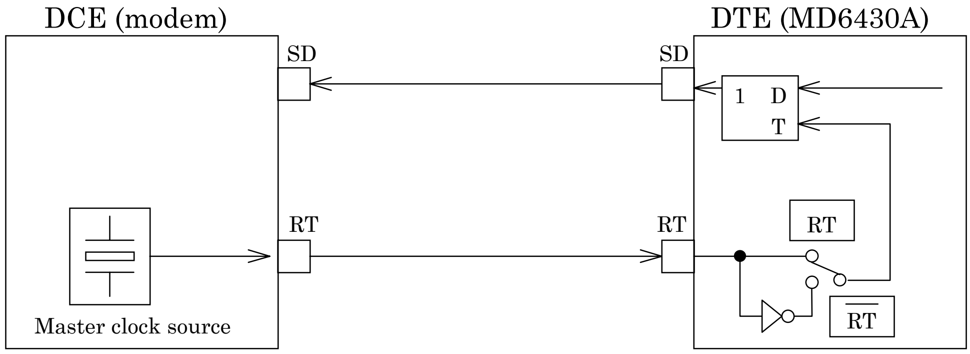


Fig. 7.7-11

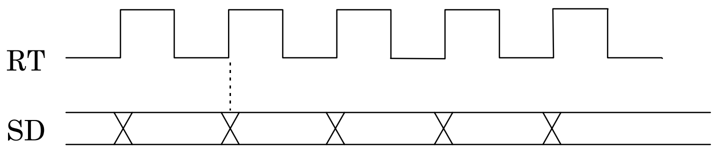


Fig. 7.7-12

7.7.3.6 $\overline{RT}$ mode

When the inverted RT mode is set, the inverted RT clock is used as the send timing signal.
Figure 7.7-11 shows the block diagram for $\overline{RT}$ and SD, while Figure 7.7-13 shows the phase relationship.

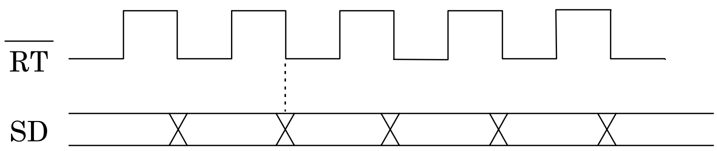


Fig. 7.7-13

7.7.4 Receive Timing

7.7.4.1 RT mode

When the RT synchronous mode is selected, the RT clock supplied by the DCE is used as the receive timing signal.

Figure 7.7-14 shows the block diagram for RT and RD, while Figure 7.7-15 shows the phase relationship.

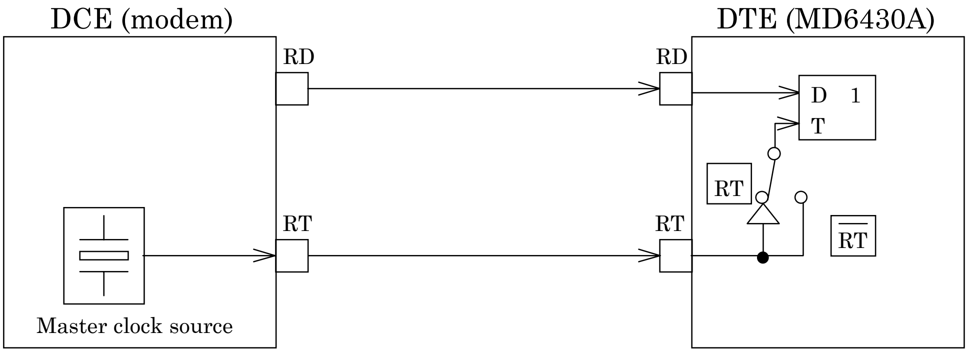
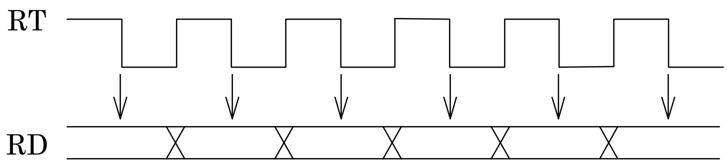


Fig. 7.7-14



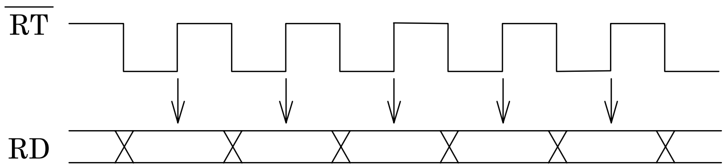
(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.7-15

7.7.4.2 $\overline{RT}$ mode

When the inverted RT synchronous mode is set, the inverted RT clock is used as the receive timing signal.

Figure 7.7-14 shows the block diagram for $\overline{RT}$ and RD, while Figure 7.7-16 shows the phase relationship.



(RD is sampled at those time intervals indicated by the ↓ mark)

Fig. 7.7-16

7.8 Send Control

7.8.1 V-series send control

This paragraph describes the relationship between signal lines "RS" and "CS" when CS-ON is set via the SEND CONTROL interface setting.
The MD6430A "RS" is signal line used to request data transfers to the modem. When the RS signal is received, the modem sends the carrier signal to the circuit to which the MD6430A is connected. After the carrier signal output by the modem has stabilized, "CS" is turned ON. After CS has been turned ON, the pattern to be measured is sent by the MD6430A to the measuring instrument.

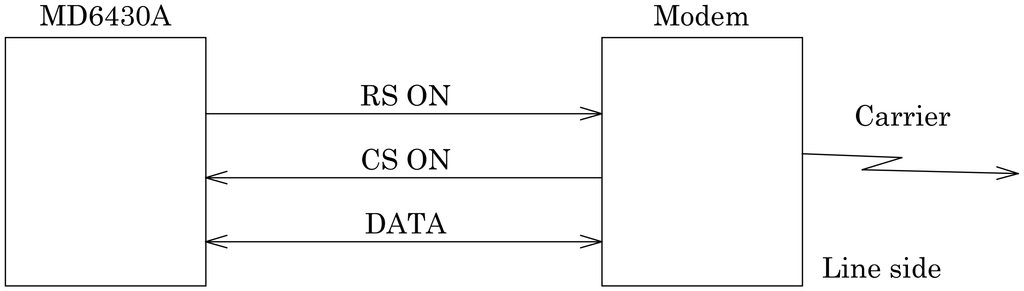


Fig. 7.8-1 "RS" ON and "CS" ON State

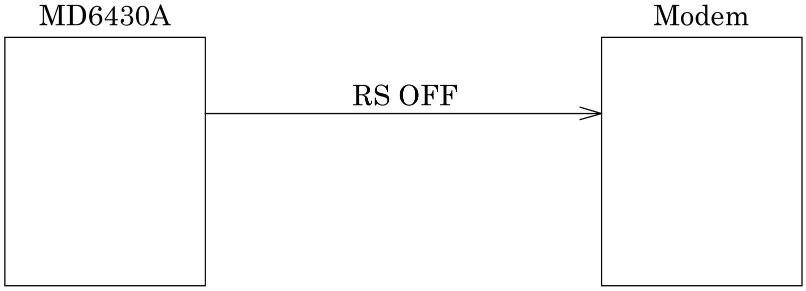


Fig. 7.8-2 "RS" OFF State

7.8.2 X-series send control

The following explains the conditions for outputting the word-pattern send-conditions during error measurement using Send Control settings on interface condition.

- ALWAYS ········· The pattern is continuously output from the MD6430A.
- C-ON ················ The pattern is output only when line C is ON.
  When line C is OFF, the pattern is not output.

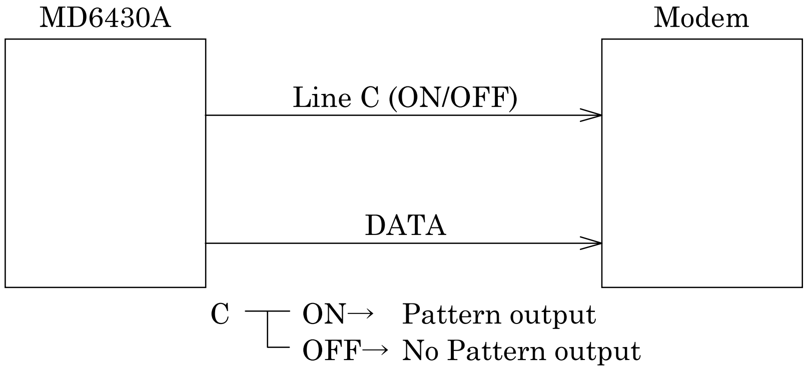
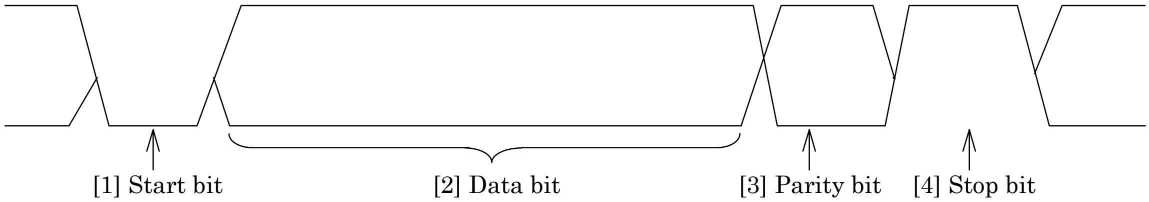


Fig. 7.8-3 Data Send Control via Line C

7.9 Start/Stop Synchronization

In the synchronous start/stop mode, synchronization is established by inserting data between the start and stop bits.
The figure below shows the format of the bit pattern.



[1] Start bit

A "0" bit signifies the start of the data transmission.

[2] Data bit

A bit length of 5 to 8 bits can be set as the length of the data code.

The codes below correspond to the data bit lengths.

5 bit length ····· Baudot code

6 bit length ····· EBCD code

7 bit length ····· ASCII code

8 bit length ····· EBCDIC code, etc.

[3] Parity bit

Even, odd or no parity can be set for error detection.

[4] Stop bit

This bit is appended at the data end. The number of bits to be appended can be selected from 1 bit, 1.5 bits and 2 bits.

7.10 G.703 64 kbit/s Interface

The following two types of interfaces can be used with the G.703, 64 kbit/s interface and are based on the ITU-T, G.703, 64 kbit/s interface.

(1) Codirectional interface

This is a method of data transmission in which a 64 k clock and an 8 k clock are transmitted along with the send and receive data signals.

(2) Centralized clock interface

This is data transmission method in which the DCS (centralized clock) supplies the 64 k + 8 k violation clock used to send and receive data.

7.10.1 Codirectional interface

(1) Composition

The following diagram shows the configuration of the codirectional interface.

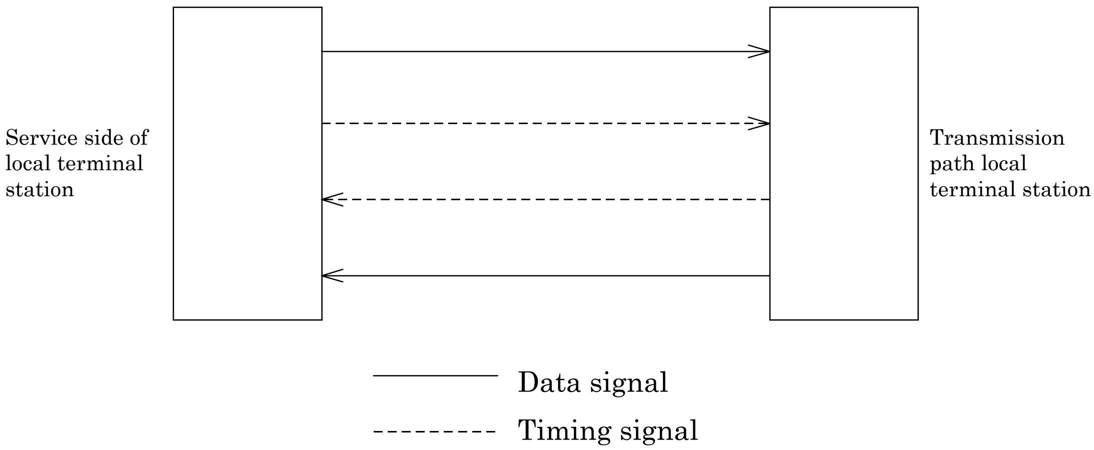


Fig. 7.10-1 Codirectional Interface

(2) Code conversion rules

[1] ·············· Divides bit repeat period of 64 kbit/s into 4 unit intervals.

[2] ·············· Encodes binary 1 as 4 bit block with value 1100

[3] ·············· Encodes binary 0 as 4 bit block with value 1010

[4] ·············· Alternately changes polarity of adjoining blocks and converts binary signal to three levels.

[5] ·············· Violates the change in polarity for each 8th block. The violation block indicates the last bit of an octet.

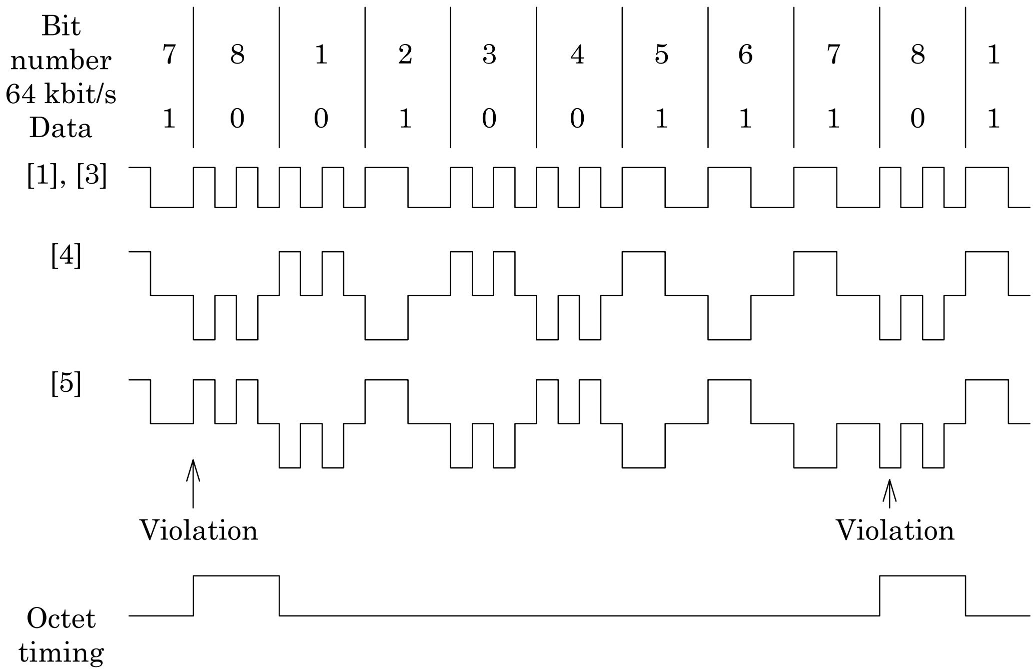


Fig. 7.10-2 Configuration of 64 kb/s Codirectional Interface Signal

7.10.2 Centralized clock interface

(1) Composition

The following diagram shows the configuration of the centralized clock interface.

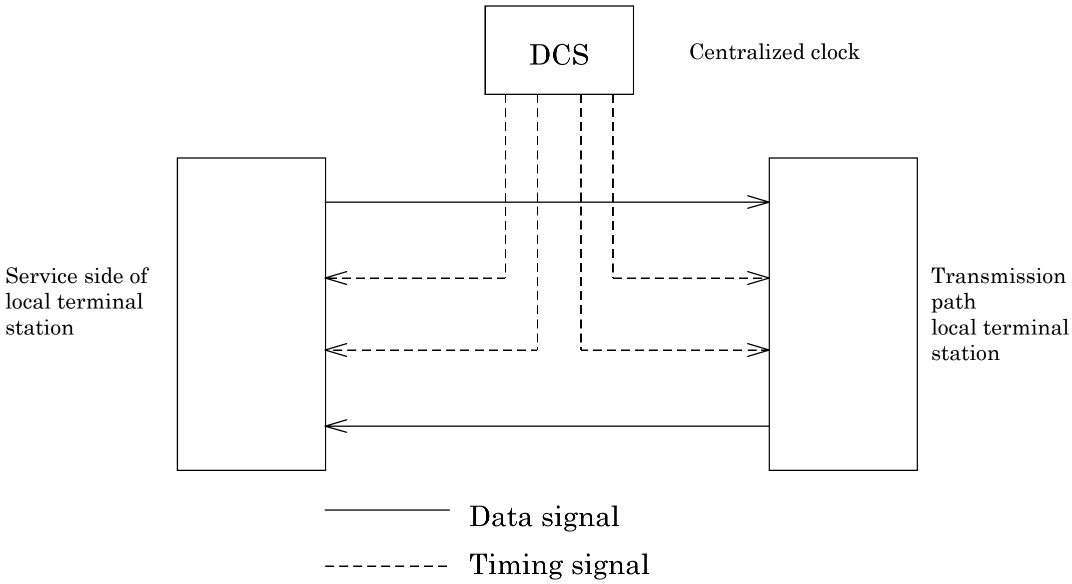


Fig. 7.10-3 Configuration of Centralized Clock Interface

(2) Code conversion rules

Data signals are encoded as 100% duty AMI code signals. In the case of complex timing signals, 50 to 70% duty AMI codes are used to send 64 kHz bit timing signals which are used to synchronize 8 kHz octet signals in which violations have been encoded. Then, the phase information of the 8 kHz octet can be transmitted. Signal configuration and nominal phase relationships are shown in Fig. 7.10-4.

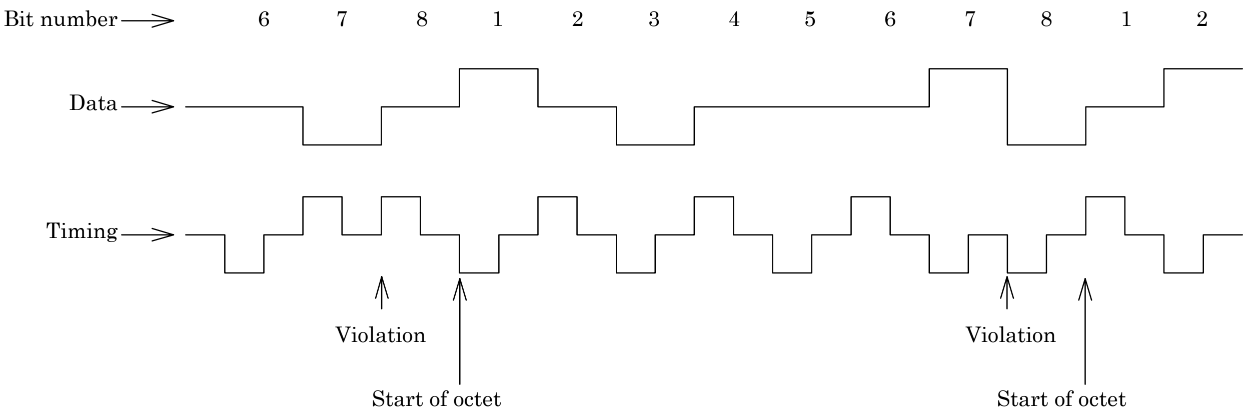


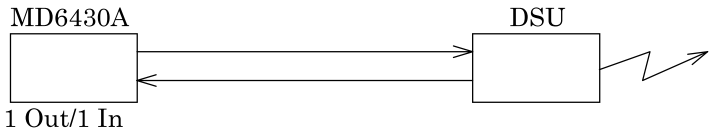
Fig. 7.10-4 Configuration of Centralized Clock Interface Signal

7.11 I.430/I.430-a 192 k Interface

7.11.1 Input/Output Mode

In the I.430/I.430-a 192 kbit/s interface, three types of input/output modes can be used, depending on the manner in which the unit is connected to the device under test (DUT).
These three types of input/output modes are explained below:

(1) 1 Out/1 In

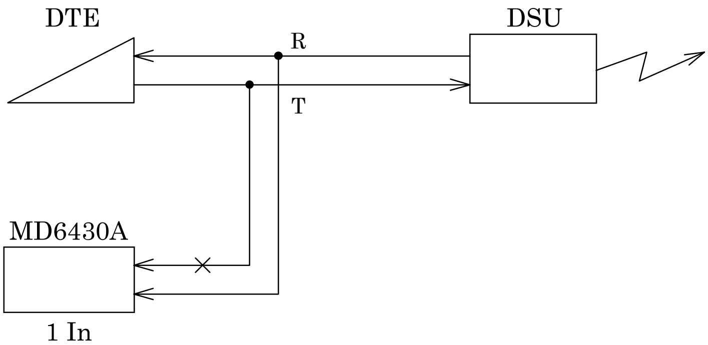


The MD6430A is used as an artificial terminal (TE side) for testing the circuit side.

The MD6430A is used as a slave unit and is slave-synchronized to the clock provided by the circuit side.

A calling/being called function is also provided, and the ISDN exchanger can be accessed in accordance with the LAPD (a type of protocol).

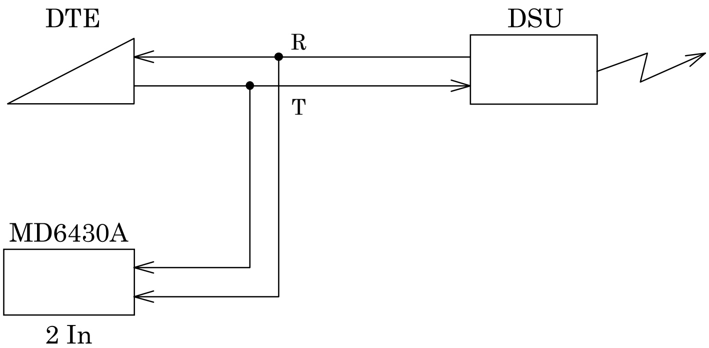
(2) 1 In



Connect the MD6430A in parallel between the DTE and DSU, and monitor the R line.

The T line of the MD6430A is high impedance.

(3) 2 In

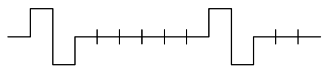


Connect the MD6430A in parallel between the DTE and DSU, and monitor the T and R lines.

7.11.2　INFO Sequence

Signal sending and receiving begin depending on the INFO sequence when the communications begin between the terminal and the network specified by the I.430.
The INFO sequence is described below:

Table 7.11-1　Regulations for I.430 INFO Signal (See Note 1 below)

Signal in NT-to-TE direction (R)		Signal in TE-to-NT direction (T)	
INFO 0	No signal	INFO 0	No signal
INFO 2 (See Note 3 below.)	The frame in which all bits of B, D, and D echo channels have been set to binary "0". Bit A is set to binary "0".　Bits N and L are set in compliance with the code rule.	INFO 1 (See Note 2 below.)	Continuous signal in the following format: Positive 0, Negative 0, Six "1"s  Nominal bit rate = 192 kbit/s
		INFO 3	The synchronization frame in which general data is included in channels B and D.
INFO 4 (See Note 3 below.)	The frame in which general data is included in the B, D, and D echo channels. Bit A is set to binary "1".		

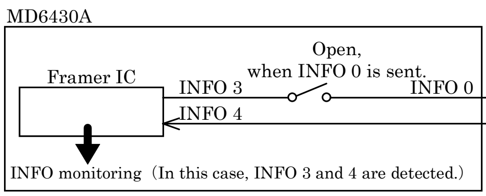
Notes:

(1) For the configuration in which the interface-line polarity is inverted, signals are received in the state with the inverted polarity of the binary "0".　Therefore, all NT and TE receivers must be designed so that the polarity of the interface line can be reversed.

(2) In the TE that does not require the function for activating a deactivated interface (e.g. the TE which handles only incoming call), there is no need for function of sending INFO 1.
In the point-to-multipoint configuration, more than one TE Send Units can simultaneously generate any bit pattern.　In such circumstances, the signal received at the NT differs from those described above.
(For example, the case in which more than two (asynchronous) INFO 1 are overlapped.)

(3) During transmission of INFO 2 or INFO 4, the FA and M bits sent by the NT give instruction for the Q-bit pattern.

The MD6430A can monitor these INFO and send INFO 0.
The framer IC of exclusive use performs INFO monitoring.　And INFO 0 sending is performed by disconnecting the output signal from this framer IC by the switch.
Therefore, if INFO 0 is sent and INFO 4 continues being received when INFO 3 is sent and INFO 4 is received, INFO 0T is not detected because the output signal from the framer IC is INFO 3.

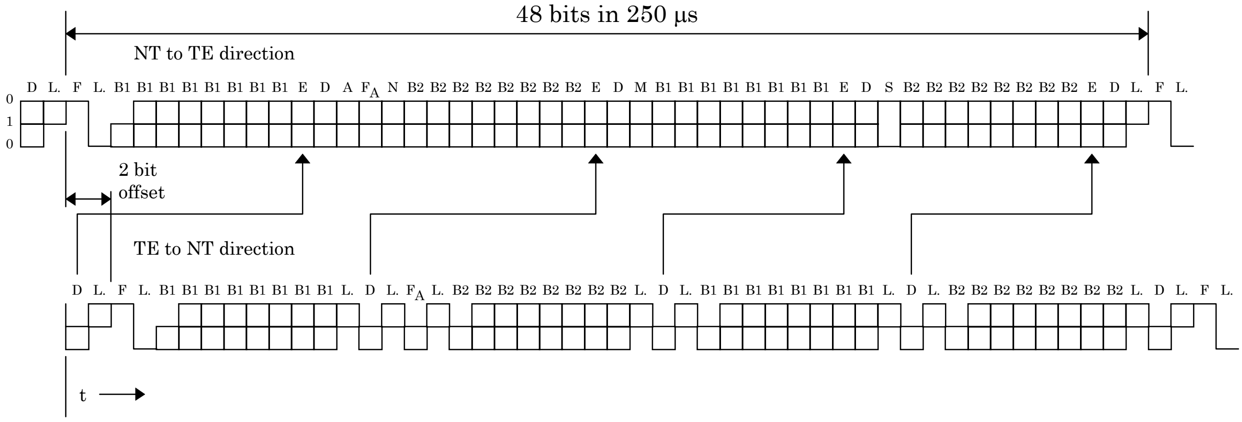


7.11.3 Frame Format

The I.430/I.430-a 192 k interface operates in accordance with the 2B+D frame format specified in ITU-T I.430.

Next, let's consider the composition of the I.430 2B+D frame:

The frame is composed as follows:



F = framing bit	N = Bit in binary that is set to $\overline{FA}$ (in the NT-to-TE direction)
L = DC balancing bit	B1 = Bit at channel B1
D = D channel bit	B2 = Bit at channel B2
E = D echo channel bit	A = Bit to be used for activation
F_A = Auxiliary frame bit	S = Reserved bit for future standardization
	M = Multiframing bit

Notes:

(1) A point (•) is displayed at each portion of the frame whose DC balance is achieved independently.

(2) When the Q channel is being used, the FA bit from the TE to the NT is used as the Q bit every five frames.

(3) The nominal 2-bit difference is assumed to occur at the TE output point. The corresponding difference at NT may be made larger by change of the interface-cable delay or connection configuration.

Fig. 7.11-1 Frame Composition at I.430 S/T Reference Point

7.11.4 The Multiframe Format

The I.430/I.430-a 192k interface performs sending/receiving of signals in accordance with the multiframe defined in ITU-T I.430.

The composition of the multiframe is explained below:

The Multiframe is composed as follows:

Table 7.11-2 Identification and Multiframe Composition of the I.430 Q-Bit Position

Frame No.	NT → TE FA bit position	TE → NT FA bit position (See Notes 1, 2 below)	NT → TE S bit	M bit
1	ONE	Q1	SC11	ONE
2	ZERO	ZERO	SC21	ZERO
3	ZERO	ZERO	SC31	ZERO
4	ZERO	ZERO	SC41	ZERO
5	ZERO	ZERO	SC51	ZERO
6	ONE	Q2	SC12	ZERO
7	ZERO	ZERO	SC22	ZERO
8	ZERO	ZERO	SC32	ZERO
9	ZERO	ZERO	SC42	ZERO
10	ZERO	ZERO	SC52	ZERO
11	ONE	Q3	SC13	ZERO
12	ZERO	ZERO	SC23	ZERO
13	ZERO	ZERO	SC33	ZERO
14	ZERO	ZERO	SC43	ZERO
15	ZERO	ZERO	SC53	ZERO
16	ONE	Q4	SC14	ZERO
17	ZERO	ZERO	SC24	ZERO
18	ZERO	ZERO	SC34	ZERO
19	ZERO	ZERO	SC44	ZERO
20	ZERO	ZERO	SC54	ZERO
1	ONE	Q1	SC11	ONE
2	ZERO	ZERO	SC21	ZERO
etc.				

Multiframe

Notes:

(1) When the TE does not used the Q bit, the Q bit is set to binary "1".

(2) When the Q-bit position can be identified, but the multiframe cannot be identified because binary "1" has not been assigned to the correct position within the M-bit; Q bits 1 thru 4 cannot be distinguished.

7.11.5 192 k Code Rule

As shown in Fig. 7.11-2, a pseudo three-value code (AMI code) with a 100% duty factor is used for both transmission directions, NT → TE and TE → NT. In concrete terms, the binary "0" means that a positive or negative pulse occurred, while a binary "1" means that no pulse occurred (i.e. there is no signal on the transmission line). After the frame DC-balance bit, the first binary "0" is set to have the same polarity as the frame DC-balance bit. The polarity of all subsequent binary "0"s is alternately inverted between the two polarities. The DC-balance bit becomes binary "0" whenever the total number of binary "0"s after the previous DC-balance bit is odd, and binary "1" whenever the total number of binary "0"s is even.

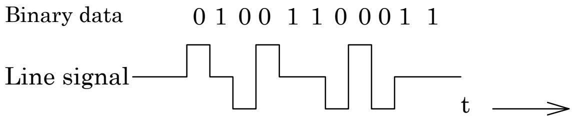


Fig. 7.11-2 Example of a Pseudo 3-Value Coding System

7.11.6 Power-reception detection

The MD6430A has a function that monitors the status of power reception.

(1) Circuit configuration for power reception

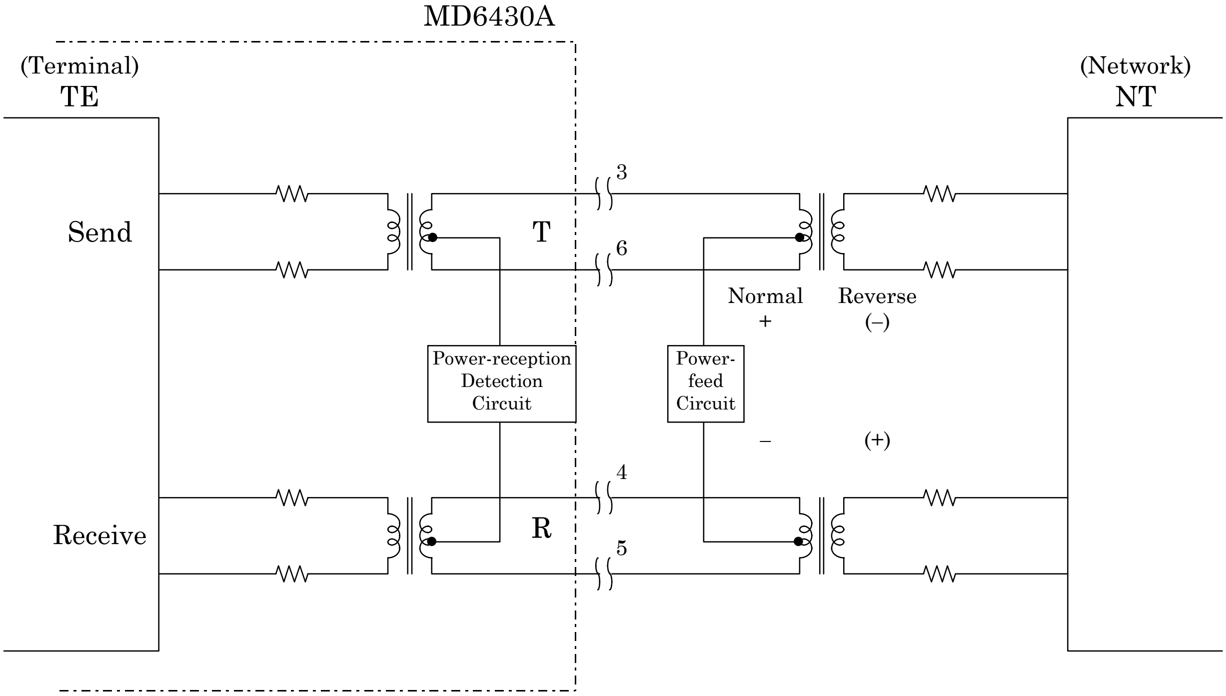


Fig. 7.11-3 Circuit Configuration for Power Reception

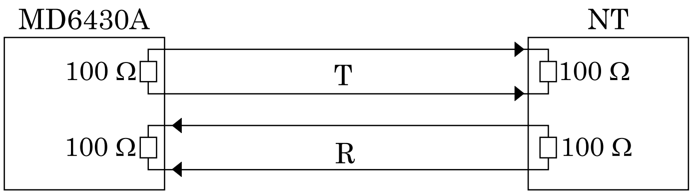
(2) Range of power reception

- With the normal power feed: 24 V to 42 V
- With the limited power feed: 32 V to 42 V

7.11.7 Terminal Registance

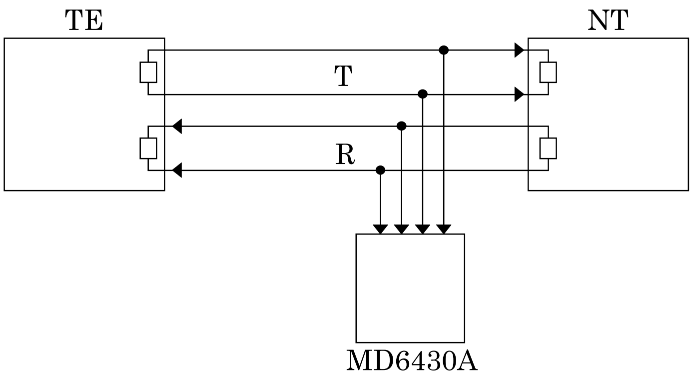
Ideally speaking, the T line and R line between TE ↔ NT are always terminated with 50 Ω.
In the MD6430A, three kinds of terminal resistance can be set between the TE and NT in accordance with the terminal status.
These three types of terminal resistance are explained below:

(1) Example for using a 100 Ω terminal resistance



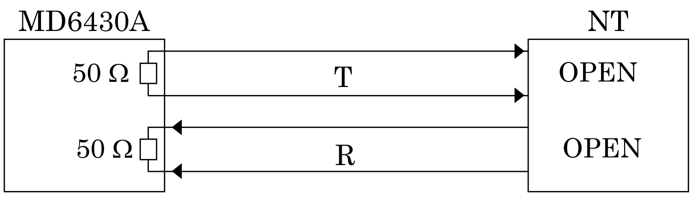
Normally, both TE and NT sides are terminated with 100 Ω; so the line is terminated with 50 Ω, electrically.

(2) Example for using an OPEN terminal resistance



This is used when both TE and NT are terminated with 100 Ω.

(3) Example for using a 50 Ω terminal resistance



7.12 G.704/I.431 1.544 M Interface

7.12.1 Frame Format

The G.704/I.431 1.544 M interface has three types of 1.544 Mbps frames.
This paragraph outlines these three types of frame formats.

(1) 24 multiframe pattern (24MFP G.704)

This is the 24 multiframe pattern recommended by ITU-T G.704, and used by ISDN1500, HDV2 (NTT), EFS (U.S.), etc.

(2) 24 multiframe pattern (24MFP NTT)

The frame synchronization pattern is the same as 24MFP (G.704), but the CRC calculation method and SEND alarm generation and detection methods are different.
This frame is used by Nippon Telegraph and Telephone Corporation (NTT).

(3) 12 multiframe pattern (12MFP G.704)

This is the 12 multiframe pattern recommended by ITU-T G.704, and used by PCM-24B (NTT).

(4) ST frame pattern (12ST G.704, 24ST NTT, 12ST G.704)

This is the frame pattern with 1.544M interface used between the composite multiplexed terminal station and digital terminal station in the transmission system of Ministry of Construction in Japan.

7.12.1.1 24 multiframe patterns

The frame structure for the 24 multiframe patterns, 24MFP (G.704) and 24MFP (NTT), is shown below:

(1) 24MFP (G.704)

F	CH1	CH2	CH3	......	CH22	CH23	CH24

	Multiframe No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F bit:	FP	–	–	–	0	–	–	–	0	–	–	–	1	–	–	–	0	–	–	–	1	–	–	–	1
	CRC	–	C	–	–	–	C	–	–	–	C	–	–	–	C	–	–	–	C	–	–	–	C	–	–
	D	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–

FP: Frame sync pattern (001011)
D: The pattern 1111111100000000 is repeatedly sent during SENE ALARMs.
Under normal conditions, the flag pattern 01111110 is repeatedly sent.
C: CRC bit (X^6+X+1)

Fig. 7.12-1 24MFP (G.704) Frame Structure

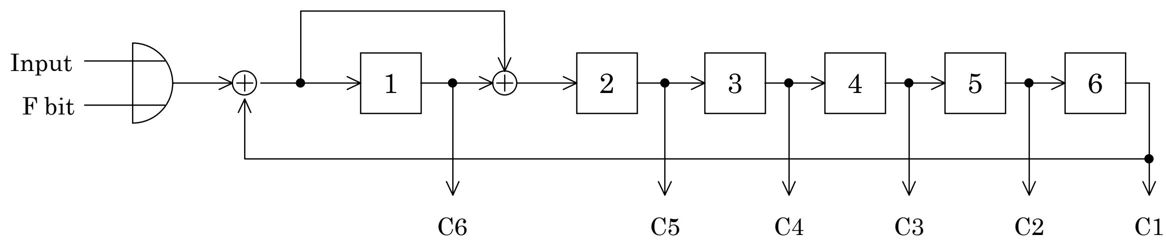


Fig. 7.12-2 24MFP CRC-6 Calculator (G.704)

(2) 24MFP (NTT)

F	CH1	CH2	CH3		CH22	CH23	CH24

Multiframe No.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
F bit:	FP	–	–	–	0	–	–	–	0	–	–	–	1	–	–	–	0	–	–	–	1	–	–	–	1
	CRC	–	C	–	–	–	C	–	–	–	C	–	–	–	C	–	–	–	C	–	–	–	C	–	–
	D	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–	D	–

FP: Frame sync pattern (001011)
D: All "1" pattern is sent during SEND ALARMs.
Under normal conditions, all "0" pattern is sent.
C: CRC bit (X^6+X+1)

Fig. 7.12-3 24MFP (NTT) Frame Structure

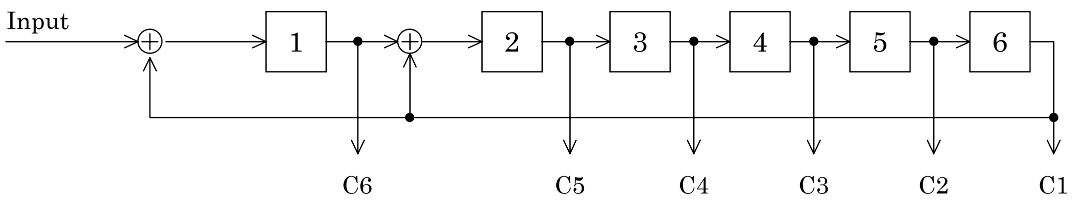


Fig. 7.12-4 24MFP CRC-6 Calculator (NTT)

7.12.1.2 12 multiframe patterns

The frame structure for the 12 multiframe patterns, 12MFP (G.704), is shown below:

12MFP (G.704)

F	CH1	CH2	CH3		CH22	CH23	CH24

Multiframe No.		1	2	3	4	5	6	7	8	9	10	11	12
F:	FT	1	–	0	–	1	–	0	–	1	–	0	–
	FS	–	0	–	0	–	1	–	1	–	1	–	SA

SA: SEND ALARM (alarm: 1, normal: 0)

Fig. 7.12-5 12MFP (G.704) Frame Structure

7.12.2 Bit steal

The following example shows the bit steal for I.431 1.544 Mbit/s 24 multiframe.

(Example) Specified time slot: CH2
For Data bit rate: 128 kbit/s

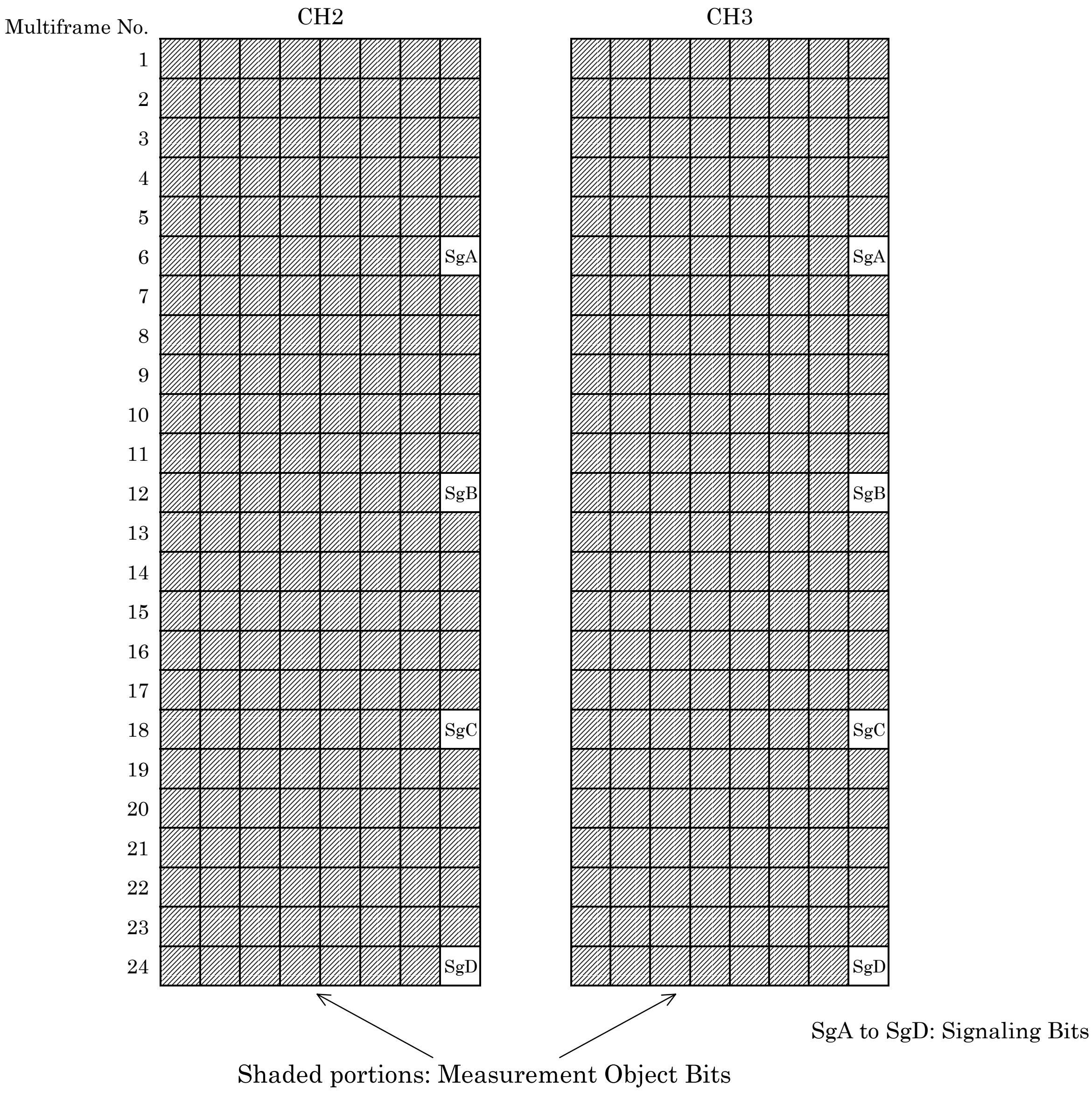


Fig. 7.12-6 Example of Composition of Bit Steal

When the bit steal is ON, the 8th bit of the specified time slot is allocated as a signaling bit for every 6 multiframes. Measurement object bits are all bits except the signaling bits.
When multiple time slots are specified, signaling bit is inserted into the respective signaling bit in each time slot.
Signaling bits are monitored only in the first time slot.

The following example shows the bit steal for G.703 1.544 Mbit/s 12 multiframe.

(Example) Specified time slot: CH2
Data bit rate: 128 kbit/s

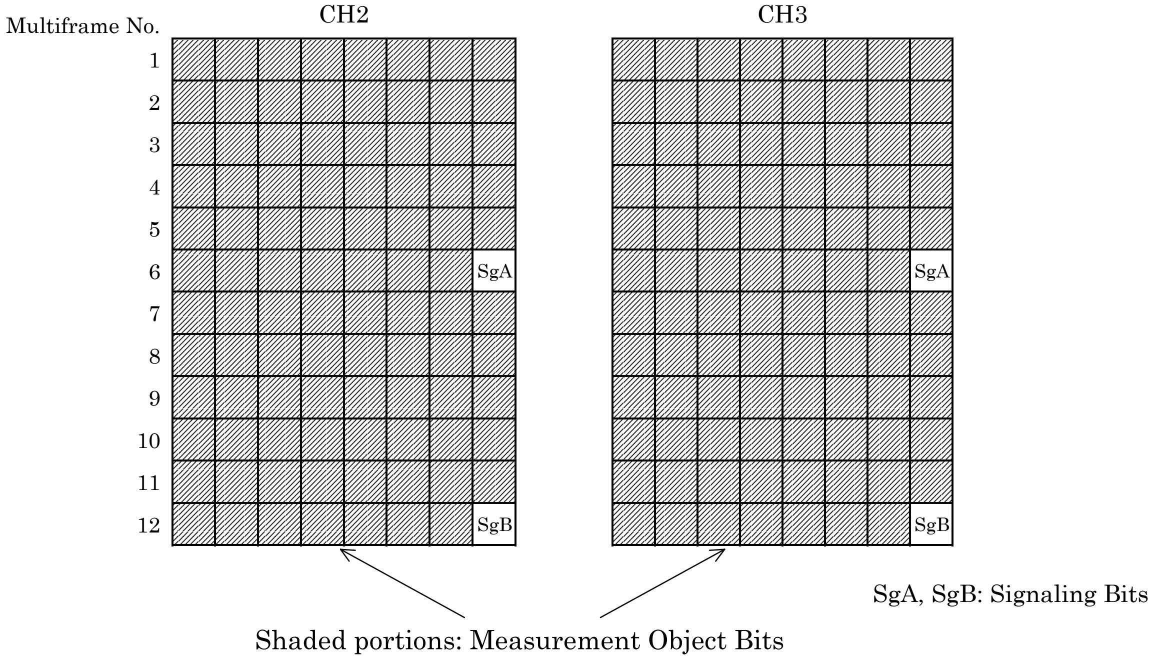


Fig. 7.12-7 Example of Composition of Bit Steal

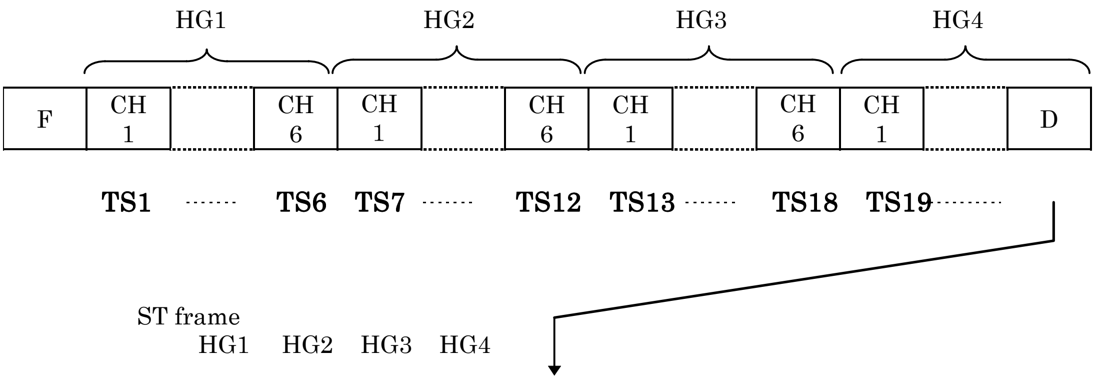
When the bit steal is ON, the 8th bit of the specified time slot is allocated as signaling bit for every 6 multiframes. Measurement object bits are all bits except the signaling bits.
When multiple time slots are specified, signaling bit is inserted into the respective signaling bit in each time slot.
Signaling bits are monitored only in the first time slot.

7.12.3 ST frame format (MU643000K used)

In this section, the frame configuration of ST frame (for 24ST(G.704), 24ST(NTT) and 12ST(G.704)) is described.

(1) 24ST (G.704)

Configurations of F bit are the same as for 24MFP(G.704). (See 7.12.1.1.)
ST frame is inserted in TS24.



ST frame

HG1	HG2	HG3	HG4				
ST1	2	3	4	5	6	7	8
F	F	F	F				
1	7	13	19				
2	8	14	20				
3	9	15	21				
4	10	16	22				
5	11	17	23				
6	12	18					
B	B	B	B				

The phase relation of receive ST frame is free.

· F : Alternate pattern of 1 and 0
· 1 to 23 : Signaling of corresponding CH (ST bit)
· B : Normal 1, HG BAIS 0
· Blank : Spare 1
· Under HG AIS : Sets all the corresponding ST frames to All "1".

Fig. 7.12-8 Frame Configuration for 24ST (G.704)

(2) 24ST (NTT)

Configurations of F bit are the same as for 24MFP (NTT). (See 7.12.1.1.)
Configurations of other parts are the same as for 24ST (G.704).

(3) 12ST (G.704)

Configurations of F bit are the same as for 12MFP (G.704). (See 7.12.1.2.)
Configurations of other parts are the same as for 24ST (G.704).

7.13 G.704/I.431 2.048 M Interface

7.13.1 Frame Format

There are 4 types of 2.048 Mbps system frames available for the G.704/I.431 2.048 M Interface. The following is a simple description of the formats of the 4 types of frames.

(1) 16MFP (30B+D)

This has 16 multiframe pattern listed in the ITU-T G.704 recommendations.
This multiframe includes CRC and corresponds to primary group interfaces of European systems.

TS 0	1	2	3		15	16	17		29	30	31
	CH1	CH2	CH3		CH15		CH16		CH28	CH29	CH30

Frame number								
0	C1	0	0	1	1	0	1	1
1	0	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
2	C2	0	0	1	1	0	1	1
3	0	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
4	C3	0	0	1	1	0	1	1
5	1	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
6	C4	0	0	1	1	0	1	1
7	0	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
8	C1	0	0	1	1	0	1	1
9	1	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
10	C2	0	0	1	1	0	1	1
11	1	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
12	C3	0	0	1	1	0	1	1
13	E1	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8
14	C4	0	0	1	1	0	1	1
15	E2	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8

Frame number	SIG CH							
0	0	0	0	0	x	y	x	x
1	S1				S16			
2	S2				S17			
3	S3				S18			
4	S4				S19			
5	S5				S20			
6	S6				S21			
7	S7				S22			
8	S8				S23			
9	S9				S24			
10	S10				S25			
11	S11				S26			
12	S12				S27			
13	S13				S28			
14	S14				S29			
15	S15				S30			

RAI: Remote Alarm Indication
In alarm 1
Normal 0
C1 to C4: CRC (CRC-4)
Sa4 to Sa8: Spare Bits
E1, E2: CRC, ERROR bit

xyxx: TS16 Frame0 xyxx
S1 to S30: SIG BIT which corresponds to CH1 to CH30.
Each expressed by SigA, SigB, SigC, or SigD
* MFL mult-frame monitor monitors 0000 of TS16 multi-frame No. 0

Fig. 7.13-1 Frame Format for 16MFP 30B+D

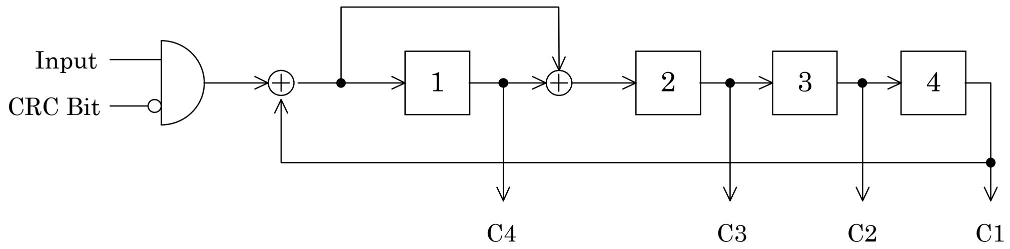


Fig. 7.13-2 CRC-4 Arithmetic Circuitry of 16MFP (30B+D) in the G.704

(2) 16MFP (31B)

A frame pattern has the same frame synchronous pattern as the 16MFP 30B+D type and, in addition, is capable of inserting data into TS16 (signaling channel).
Used with lease line.

TS 0	1	2	3		15	16	17		29	30	31
	CH1	CH2	CH3		CH15	CH16	CH17		CH29	CH30	CH31

(Multiframe pattern and CRC Arithmetic operation are the same as for 16MFP 30B+D)

Fig. 7.13-3 Frame Format for 16MFP (31B)

(3) 2MFP (30B+D)

This has 2 multiframe pattern listed in the ITU-T G.704 recommendations.
This multiframe corresponds to primary group interfaces of European systems.

TS 0	1	2	3		15	16	17		29	30	31
	CH1	CH2	CH3		CH15		CH16		CH28	CH29	CH30

Frame number								
0	Si1	0	0	1	1	0	1	1
1	Si2	1	RAI	Sa4	Sa5	Sa6	Sa7	Sa8

Frame number	SIG CH							
0	0	0	0	0	x	y	x	x
1	S1				S16			
2	S2				S17			
3	S3				S18			
4	S4				S19			
5	S5				S20			
6	S6				S21			
7	S7				S22			
8	S8				S23			
9	S9				S24			
10	S10				S25			
11	S11				S26			
12	S12				S27			
13	S13				S28			
14	S14				S29			
15	S15				S30			

RAI: Remote Alarm Indication
In alarm 1
Normal 0

Sa4 to Sa8: Spare Bits

Si1, Si2: Bits reserved for international use

xyxx: TS16 Frame0 xyxx

S1 to S30: SIG BIT which corresponds to CH1 to CH30.
Each expressed by SigA, SigB, SigC, or SigD

* MFL mult-frame monitor monitors 0000 of TS16 multi-frame No. 0

Fig. 7.13-4 Frame Format for 2MFP 30B+D

(4) 2MFP (31B)

A frame pattern with the same frame synchronous pattern as the 2MFP 30B+D type and, in addition, is capable of inserting data into TS16 (signaling channel).
Used with lease line.

TS 0	1	2	3		15	16	17		29	30	31
	CH1	CH2	CH3		CH15	CH16	CH17		CH29	CH30	CH31

(Multiframe pattern is same as for 2MFP 30B+D)

Fig. 7.13-5 Frame Format for 2MFP 31B

7.13.2 H0, H11, or H12 Selection

The continuous time slot as those to be measured can be selected at 64×N of the MD6430A. The measurement time slot can also be selected by the following four methods:

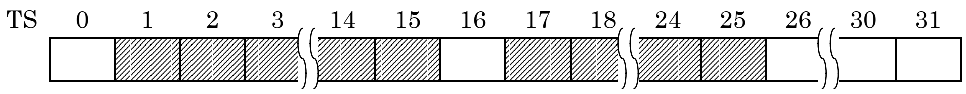
(1) H0

H0 channel	a	b	c	d	e
Time slot	1-2-3 17-18-19	4-5-6 20-21-22	7-8-9 23-24-25	10-11-12 26-27-28	13-14-15 29-30-31

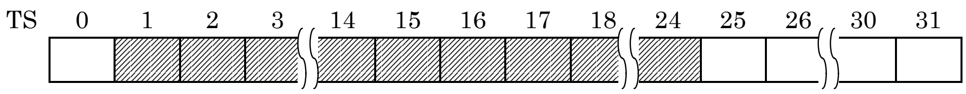
H0 channel	a	b	c	d	e
Time slot	1-7-11 17-23-27	3-9-15 19-25-31	4-8-12 20-24-28	5-10-13 21-26-29	2-6-14 18-22-30

(2) H11

For 30B+D Time slot 1 to 15, 17 to 25

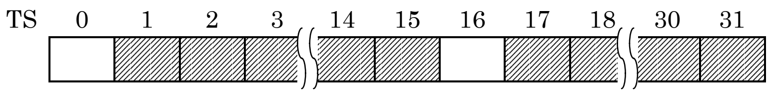


For 31B Time slot 1 to 24

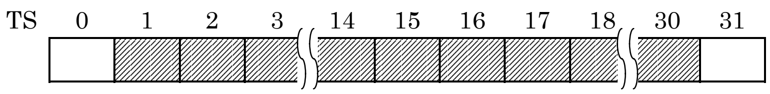


(3) H12

For 30B+D Time slot 1 to 15, 17 to 31



For 31B Time slot 1 to 30



7.13.3 E-Bit Sending or Detection

E bit of the 1st bit of FAS frame (No. 13, 15) can be manually set at 0 or 1.

AUTO setting can also be done. At this time, when CRC error is detected in the receive signal, an appropriate E bit becomes 0, and send respectively. (At this time, selection of CODE, FNG on the ERROR screen is disabled.)

In addition, when an E bit error is selected on the ERROR measurement screen, E bit is detected whether it is 0 or not.

0	C1
1	0
2	C2
3	0
4	C3
5	0
6	C4
7	0
8	C1
9	0
10	C2
11	0
12	C3
13	E1
14	C4
15	E2

If CRC error is found here, set E1 to 0

If CRC error is found here, set E2 to 0

7.14　2 M　CMI Interface

7.14.1　Frame Format

There are 2 types of 2.048 Mbit/s CMI system frames available for the 2 M CMI interface.
The following is a simple description of the formats of the two types of frames.

(1) PBX

This is a frame listed in the TTC recommendation.　This frame is used in the interface between TDM and PBX in the subscriber's office.

(2) CRV

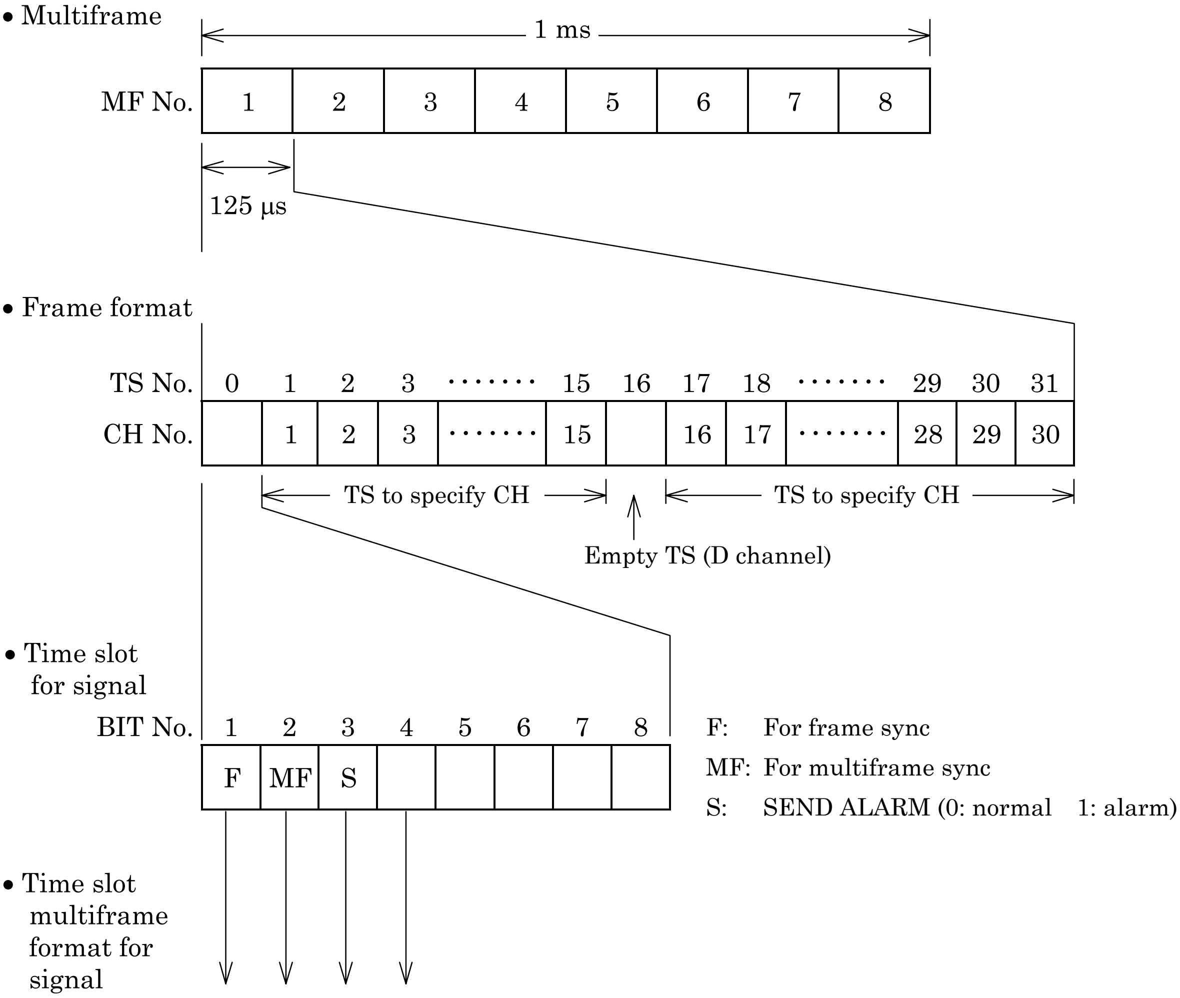
This is a frame listed in the intra-office interface of NTT.　This frame is used for M20 MUX etc.

(3) ST

This is an interface used in the communication network of Japanese domestic electric power companies, which is used between the exchanger facilities.

7.14.1.1 PBX frame and ST frame

The frame format of the PBX frame is described here.



BIT No.	1	2	3	4	5	6	7	8
MF No. 1	F	0	S	1*	1*	1*	1*	1*
2	F	1	S	A1	A2	A3	A4	A5
3	F	1	S	A6	A7	A8	A9	A10
4	F	1	S	A11	A12	A13	A14	A15
5	F	1	S	A16	A17	A18	A19	A20
6	F	1	S	A21	A22	A23	A24	A25
7	F	1	S	A26	A27	A28	A29	A30
8	F	1	S	1	1	1	1	1

*: 0/1 alternate pattern for ST frame (Sender only)

Ai: signaling bits (signal corresponding to CH)

For frame sync (violation of "1" = CRV bit)

Fig. 7.14-1 PBX Frame Format

7.14.1.2 CRV frame

The frame format of the CRV frame is described here.

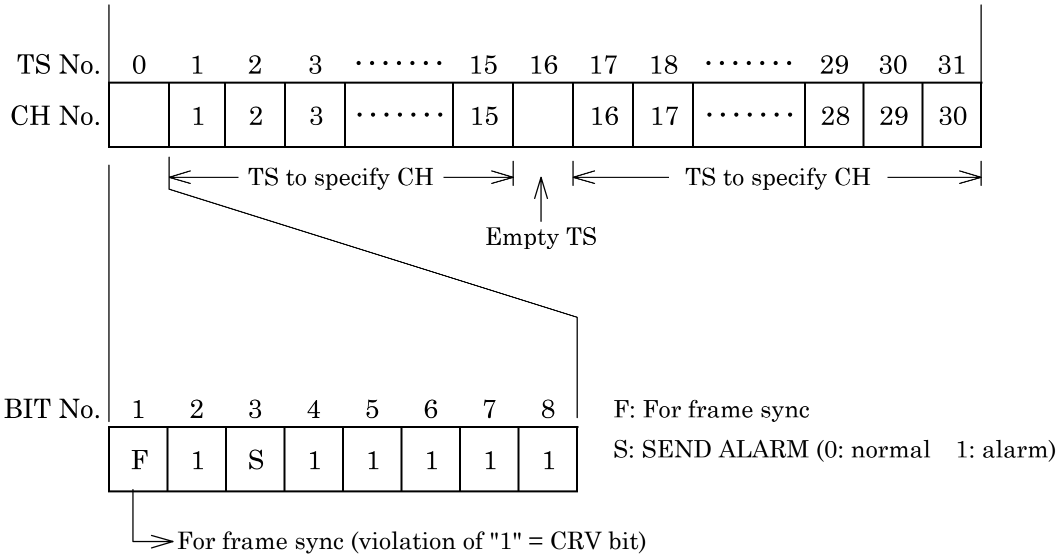


Fig. 7.14-2 CRV Frame Format

7.14.1.3 ST frame

This section describes the frame configurations of ST frame.

•Frame configurations

HGNo.		1	2	3	4	5	1	2	···	4	5		1	2	···	4	5	1	2	3	4	5
TS No.	0	1	2	3	4	5	6	7	····	14	15	16	17	18	···	25	26	27	28	29	30	31

← TS for CH specification → (TS1 to TS15) Blank TS (D channel) (TS16) ← TS for CH specification → (TS17 to TS31)

The relation between handling group (HG) and time slot (TS) is as follows.

HG1 : TS1,TS6,TS11,TS17,TS22,TS27
HG2 : TS2,TS7,TS12,TS18,TS23,TS28
HG3 : TS3,TS8,TS13,TS19,TS24,TS29
HG4 : TS4,TS9,TS14,TS20,TS25,TS30
HG5 : TS5,TS10,TS15,TS21,TS26,TS31

•Time slot for signals

BIT No.	1	2	3	4	5	6	7	8
	F	MF	S					

F : For frame synchronization
MF : For multi-frame synchronization
S : SEND ALARM (0 : normal 1 : alarm)
1/0 : Alternate pattern of 1 and 0
ST1 to ST6 : Signaling bit of corresponding channel
B : HG BAIS 0, Normal 1
Under HG AIS : Sets the corresponding ST frames to All "1".

•Time-slot multi-frame configurations for signals

				HG1	HG2	HG3	HG4	HG5
BIT No.	1	2	3	4	5	6	7	8
MF No. 1	F	0	S	1/0	1/0	1/0	1/0	1/0
2	F	1	S	ST1	ST1	ST1	ST1	ST1
3	F	1	S	ST2	ST2	ST2	ST2	ST2
4	F	1	S	ST3	ST3	ST3	ST3	ST3
5	F	1	S	ST4	ST4	ST4	ST4	ST4
6	F	1	S	ST5	ST5	ST5	ST5	ST5
7	F	1	S	ST6	ST6	ST6	ST6	ST6
8	F	1	S	B	B	B	B	B

The phase relation between the received ST frames is free.

Signaling bits ST1 to ST6 of corresponding channel in HG unit.

For frame synchronization (violation of "1" = CRV bit)

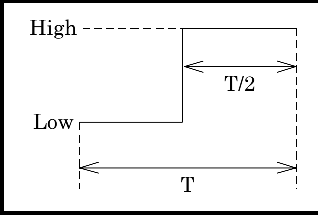
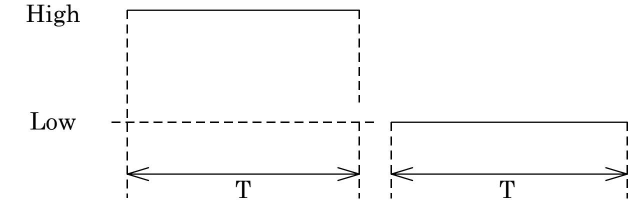
Fig. 7.14-3 ST Frame Configurations

7.14.2 CMI Code Rule

The CMI code rule is described here.

(1) CMI code

CMI (Coded Mark Inversion) is a code format by the conversion rule; the waveform is "LH" when the logic value is "0", and "HH" and "LL" are reversed alternately when the logic value is "1" (L and H represent Low and High respectively) as shown in the Fig.7.14-3.

Logic value	**"0"**	**"1"**
Waveform		

<Example>

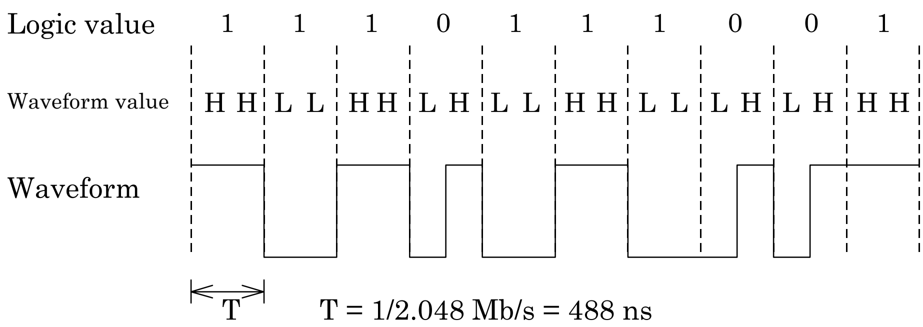


Fig. 7.14-3 CMI Code Rule

(2) CRV

CRV (Code Rule Violation) means a CMI code rule error, and CRV of "1" is detected and frame sync is established in the CMI interface.
CRV detected at a bit except for the frame bit is counted as a CRV error.

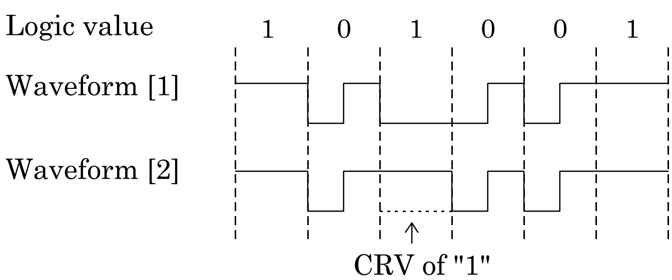


Fig. 7.14-4 An Example of CRV

(3) Transmission of CMI code

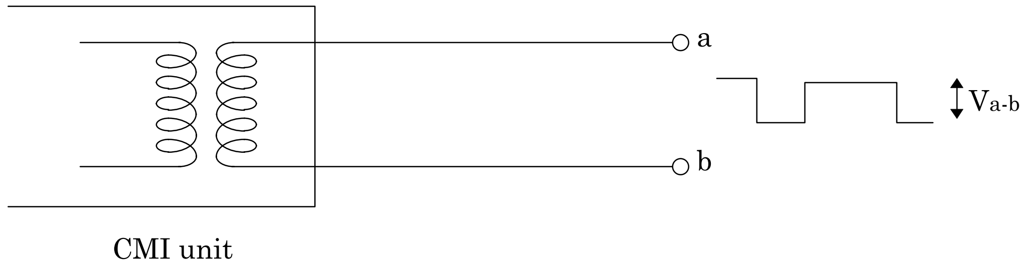


Fig. 7.14-5 CMI Input/output Circuit

The CMI unit is transformer-coupled to interrupt DC signal component.
The signals "0" and "1" are distinguished as follows:
"1" ······ when Va-b (Fig.7.14-5) is more than the specified level,
"0" ······ when Va-b (Fig.7.14-5) is less than the specified level

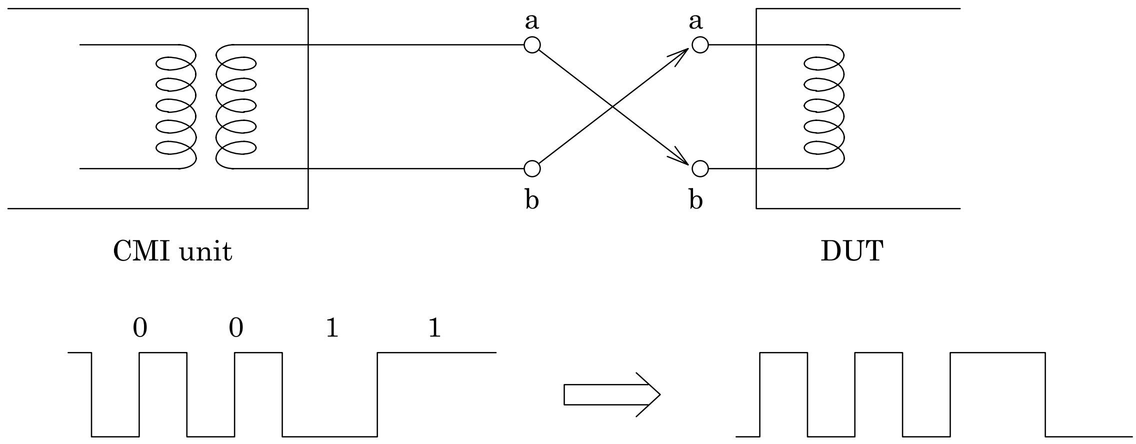


Fig. 7.14-6 Receive Waveform when a-line and b-line are Connected Inversely

Also, CMI is balance-transmitted using two lines of the a-line and b-line. If the a-line and b-line are inversely connected at the receive side, the sent "LH" as "0" data becomes "HL" and normal operations are not performed. Be careful to this when connecting.

7.15 G.704 6.312 M Interface

7.15.1 Frame Format

The G.704 6.312 M Interface has the 6.312 Mbit/s four-multiframe frame format.
This frame format is explained here.

(1) Four-multiframe patterns (4MFP G.704)

This is the synchronous pattern recommended by ITU-T G.704 for secondary-group interfaces.
It is used in Japanese secondary-group interface.
The composition of the frame pattern is shown below:

CH1	CH2	CH3	CH4	---------------------------------------	CH95	CH96	CH97	CH98	F

1	1	0	0	m
1	0	1	0	0
X1	X2	X3	a	m
e1	e2	e3	e4	e5

m: In the MD6430A, the data link bit is called the DL BIT. A measurement pattern can be inserted in both send and receive patterns and the error can be measured. Also used as the RAI bit. When RAI is ON or OFF; "1111111100000000" or "01111110" pattern is inserted, respectively. In the MD6430A, ON/OFF setting and monitoring is available.

a: In the MD6430A, the remote end alarm bit is called SA and can be set to 1 or 0 for receive monitoring.

ei: In the MD6430A, the error detection code bit (i=1 to 5), CRC-5 ($X^5+X^4+X^2+1$), is called CRC and can be used to perform the error measurement by send and receive CRC operation.

xi: In the MD6430A, spare bits are called SP BITs and are set to 1 when not used. (i = 1 to 3)

Fig. 7.15-1 4MFP (G.704) Frame Composition

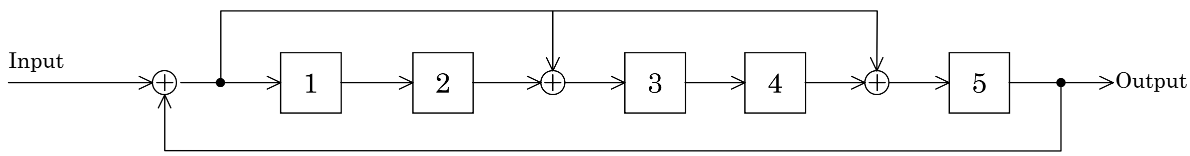


Fig. 7.15-2 4MFP (G.704) CRC-5 Arithmetic Operation Circuit

7.15.2 ST frame format (MU643000K used)

This section describes the ST frame format of G.704 6.312M interface.
This is a frame pattern for 6.312M interface used between the composite multiplexed terminal station and digital terminal station in the transmission system of Ministry of Construction in Japan.

(1) 4-multi ST frame pattern (4ST G.704)

Configurations of F bit are the same as for 4MFP (G.704).
ST frame is inserted in TS97 and ST98.

HG1	HG2	HG3	HG4	-------- HG16 ----------------	HG15	HG16			
TS1	TS2	TS3	TS4	---------------------------------------	TS95	TS96	TS97	TS98	F

ST1	ST2	......	ST16	
SF	SF	......	SF	← The phase relation between the received ST frames is free
S1	S2	......	S16	Si (i = 1 to 96) Signaling bit (ST bit) of corresponding CH
S17	S18	......	S32	
S33	S34	......	S48	
S49	S50	......	S64	
S65	S66	......	S80	
S81	S82	......	S96	
SP	SP	......	SP	

SF	: Flag (Alternate of 1 and 0)
Si	: Signaling of CH (i = 1 to 96)
SP	: Backward (Normal 1, BAIS 0)
Under HG AIS	: Sets the corresponding ST frames to All "1".

· The relation between handling group (HG) and time slot (TS) is as follows.

HG1	: TS1,TS17,TS33, TS49,TS65,TS81	HG9	: TS9,TS25,TS41, TS57,TS73,TS89
HG2	: TS2,TS18,TS34, TS50,TS66,TS82	HG10	: TS10,TS26,TS42, TS58,TS74,TS90
HG3	: TS3,TS19,TS35, TS51,TS67,TS83	HG11	: TS11,TS27,TS43, TS59,TS75,TS91
HG4	: TS4,TS20,TS36, TS52,TS68,TS84	HG12	: TS12,TS28,TS44, TS60,TS76,TS92
HG5	: TS5,TS21,TS37, TS53,TS69,TS85	HG13	: TS13,TS29,TS45, TS61,TS77,TS93
HG6	: TS6,TS22,TS38, TS54,TS70,TS86	HG14	: TS14,TS30,TS46, TS62,TS78,TS94
HG7	: TS7,TS23,TS39, TS55,TS71,TS87	HG15	: TS15,TS31,TS47, TS63,TS79,TS95
HG8	: TS8,TS24,TS40, TS56,TS72,TS88	HG16	: TS16,TS32,TS48, TS64,TS80,TS96

Fig. 7.15-3 4ST (G.704) Frame Configurations

7.16 Bipolar Code Rule

The code rules (AMI, B8ZS, and HDB3) are explained here.

(1) AMI code

Binary input 0 is converted to 0 level and binary input 1 is converted alternately to the +1 and –1 levels.

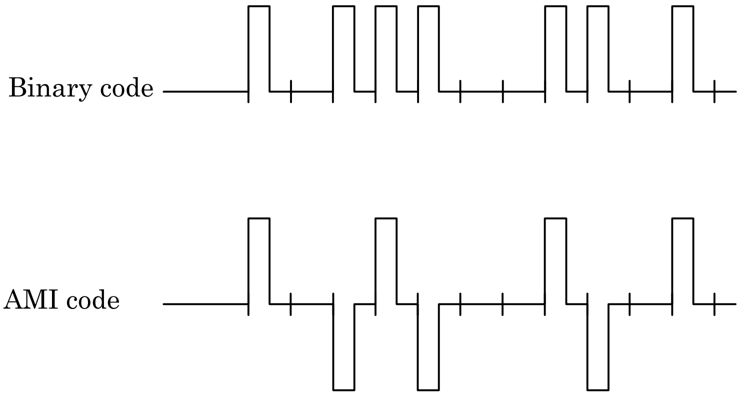


Fig. 7.16-1 AMI Code Conversion Example

(2) B8ZS code

Codes in which eight consecutive zeros occur are replaced by a special pattern (000VB0VB) that includes bipolar violations.

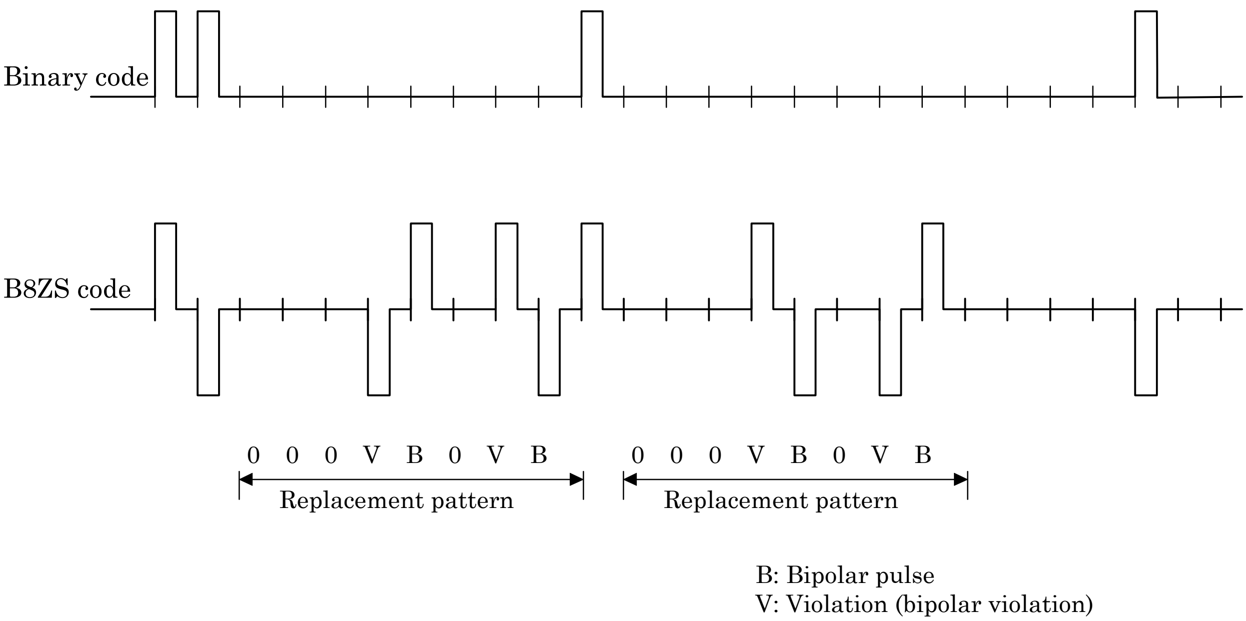


Fig. 7.16-2 B8ZS Code Conversion Example

(3) HDB3 code

Codes in which four consecutive zeros occur are replaced by a special pattern (B00V or 000V) that includes bipolar violations.

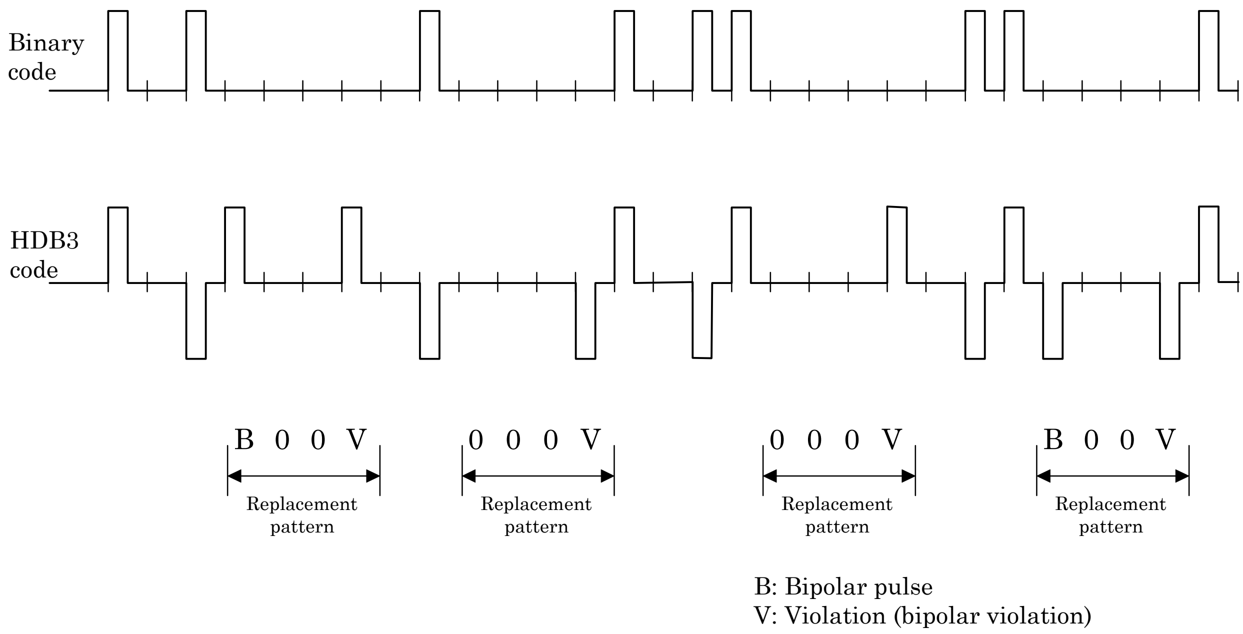
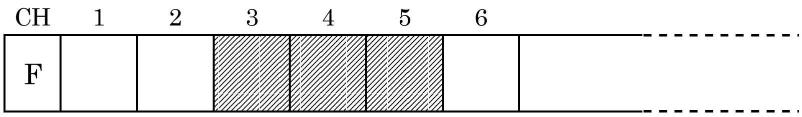


Fig. 7.16-3 HDB3 Code Conversion Example

7.17 Data Bit Rate

7.17.1 64 k × N

A 64 kbit/s is equivalent to the one channel of time slot on the MD6430A. When the number of channels to be measured is N, set the data bit rate to 64 kbit/s × N. Set the head of measurement object channels by the time slot. (In this case, measurement object becomes the successive time slots.)



When the respective measurement is performed for the channels on the above shaded portions, select as follows:

Specified time slot: CH3
Data bit rate: 192 kbit/s

Fig. 7.17-1 Example of 64 k × N CH Composition

7.17.2 56 k (1 to 7)

The 1st to 7th bits of a channel selected in the time slot are the bits to be measured.
(The 8th bit is available for being set to 1, 0, or 0/1 alternate pattern.)

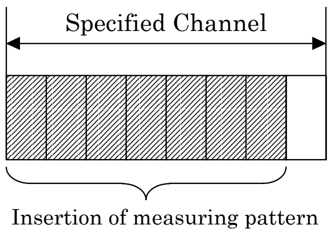


Fig. 7.17-2 56 k (1 to 7) Bit Composition

7.17.3 56 k (2 to 8)

The 2nd to 8th bits of a channel selected in the time slot are the bits to be measured.
(The 1st bit is available for being set to 1, 0, or 0/1 alternate pattern.)

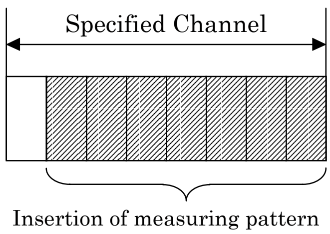
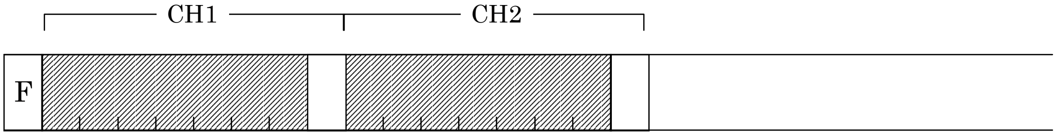


Fig. 7.17-3 56 k (2 to 8) Bit Composition

7.17.4 56 k × N

When 56 kbit/s is set to be equivalent to the one channel of time slot, and the number of channels to be measured is N; set the data bit rate to 56 kbit/s × N, and set the head of measurement object channel by the time slot. (In this case, measurement object becomes the successive time slots.)



When the respective measurement is performed for the above shaded portions, select as follows:

Specified time slot: CH1
Data bit rate: 112 kbit/s

Fig. 7.17-4 Example of 56 k × N CH Composition

7.17.5 32 kbit/s, 16 kbit/s, 8 kbit/s

The specified bit length within the 8 bits of a channel selected in the time slot becomes the measurement object, as follows.

For 8 kbit/s: 1 bit length, For 16 kbit/s: 2 bit length, For 32 kbit/s: 4 bit length

Object bits are determined by specifying the data bit rate and the data channel.

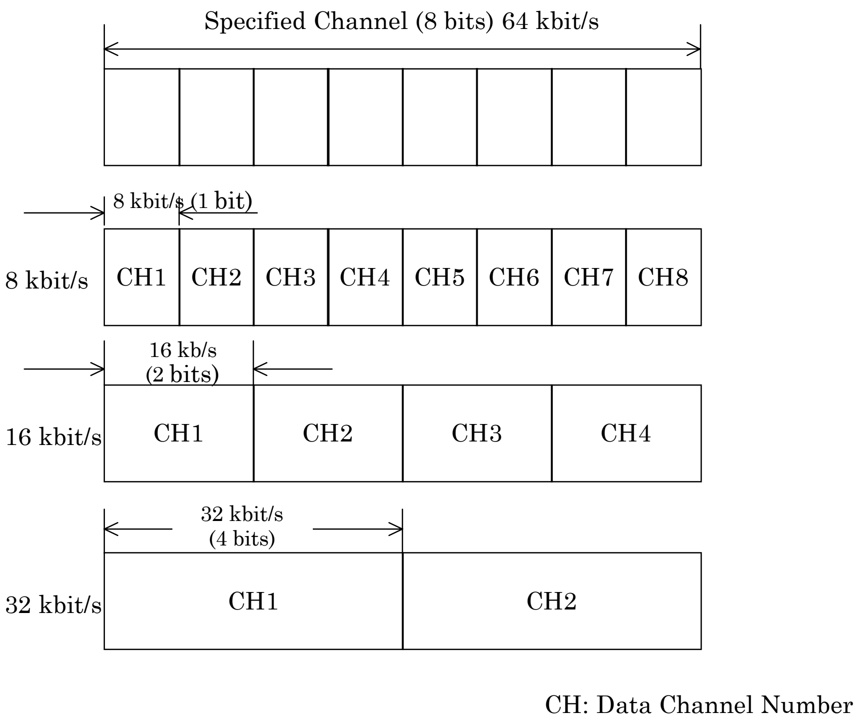


Fig. 7.17-5 32 kbit/s, 16 kbit/s, and 8 kbit/s CH Compositions

7.17.6 SIGNALING 1

Signaling bit in a channel selected by the time slot becomes measurement object bit.
The following example shows the case for I.431 1.544 Mbit/s 24 multiframe.

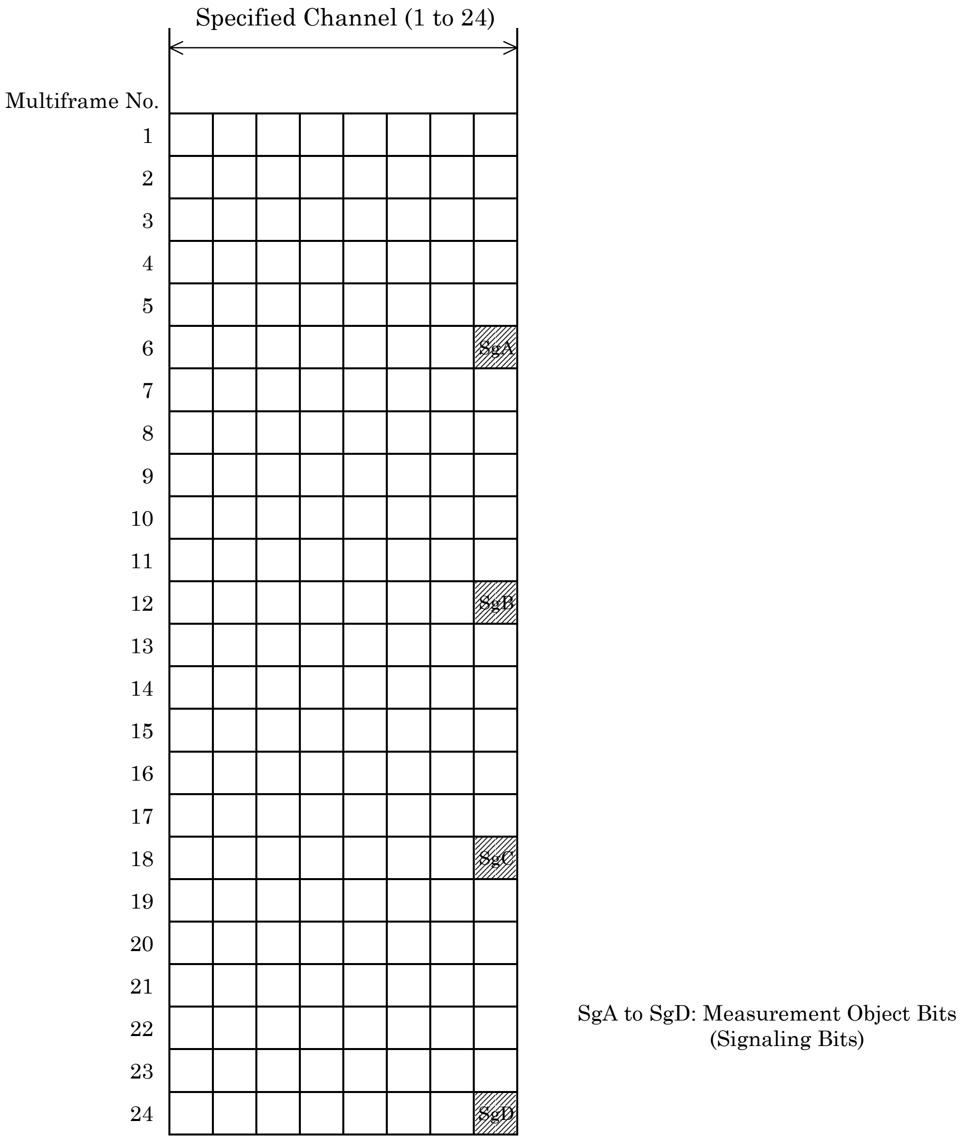


Fig. 7.17-6 Composition of Signaling Bits (1)

7.17.7 SIGNALING 2

Signaling bit in a channel selected by the time slot becomes the measurement object bit.
The following describes a case for G.703 1.544 Mbit/s 12 multiframe.

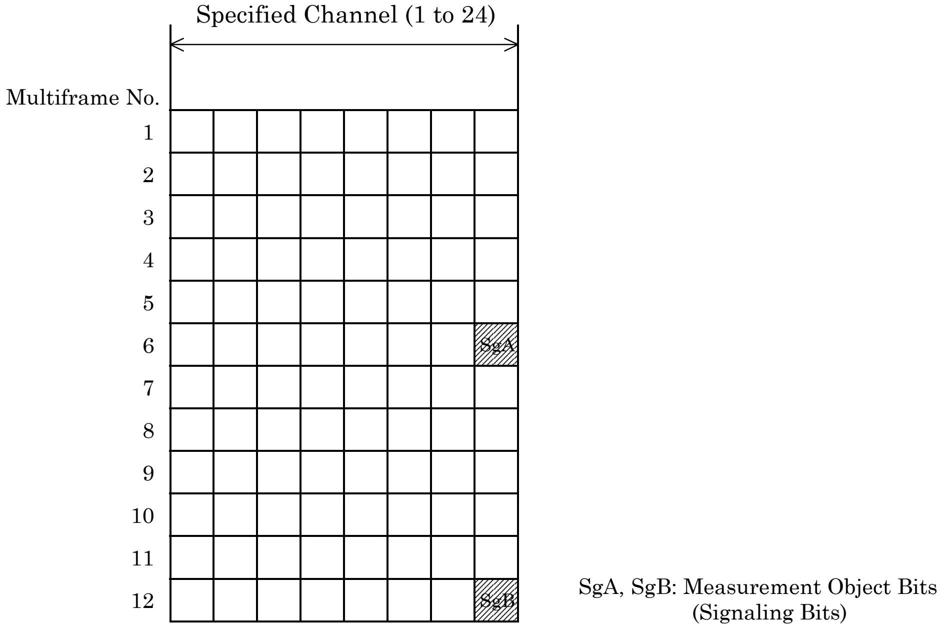


Fig. 7.17-7 Composition of Signaling Bits (2)

7.17.8 SIGNALING 3

The following shows the signaling bits in case of I.431 2.048 Mbit/s 30B+D 16-multi/2-multi frame. For multiple time slots, a measurement pattern is inserted into all the signaling bits in the respective time slot. Monitoring is done only in the first time slot.

(Example) Frame: 16MFP 30B+D
Specified time slot: TS5
Data bit rate: SIGNALING

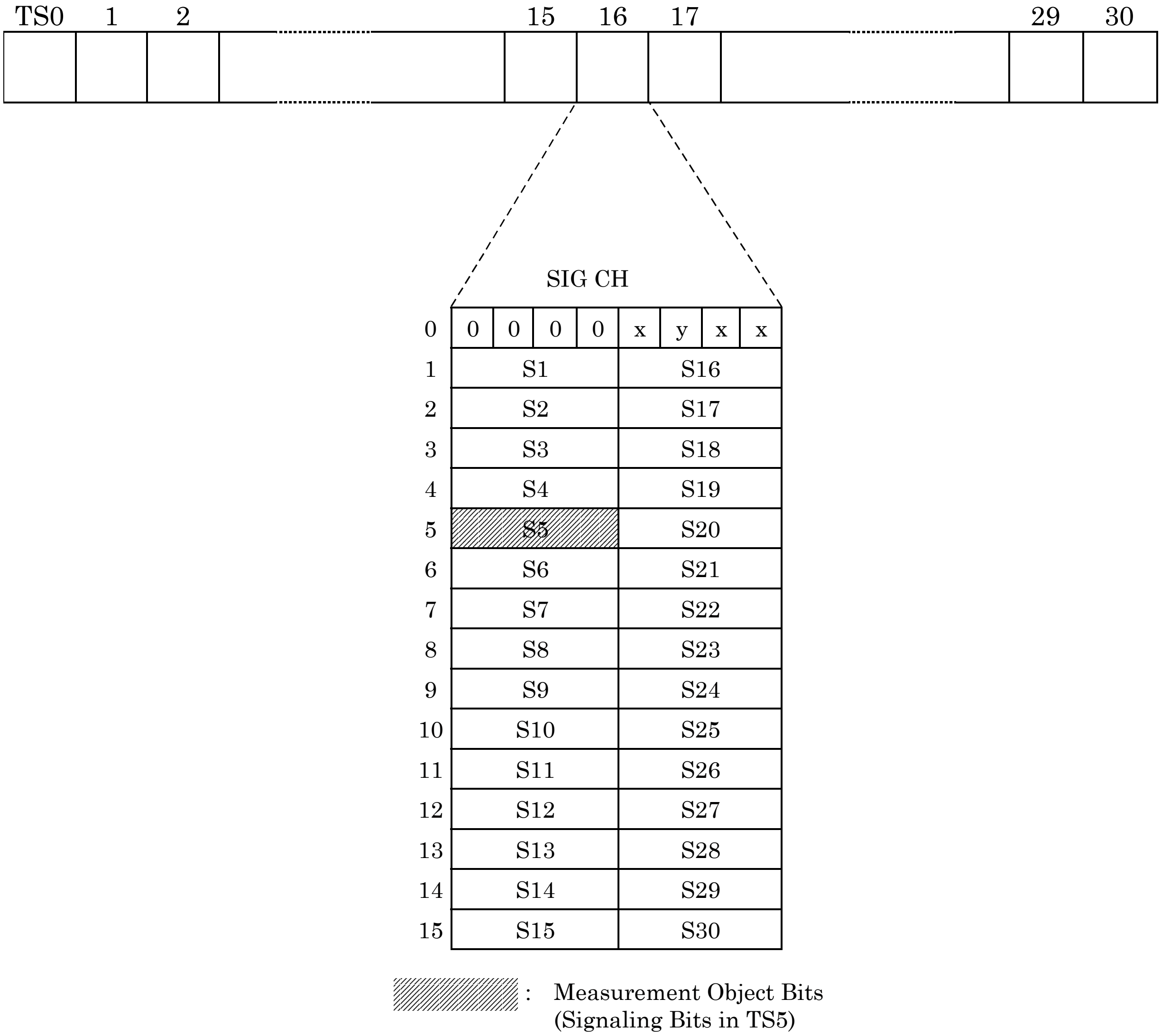


Fig. 7.17-8 Composition of Signaling Bits (3)

7.17.9 SIGNALING 4

The following shows the signaling bit in case of 2 M CMI PBX frame.
For multiple time slots, measurement pattern is inserted into all the signaling bits in the respective time slot. Monitoring is done only in the first time slot.

(Example) Frame: PBX
Specified time slot: TS5
Data bit rate: SIGNALING

TS No.	0	1	2	3	·······	15	16	17	18	·······	30	31
CH No.		1	2	3	·······	15		16	17	·······	29	30

Empty TS (D Channel)

BIT No.	1	2	3	4	5	6	7	8

BIT No.	1	2	3	4	5	6	7	8
MF No. 1								
2				A1	A2	A3	A4	A5
3				A6	A7	A8	A9	A10
4				A11	A12	A13	A14	A15
5				A16	A17	A18	A19	A20
6				A21	A22	A23	A24	A25
7				A26	A27	A28	A29	A30
8								

Shaded portion: Measurement Object Bit (Signaling Bit in TS5)

Fig. 7.17-9 Composition of Signaling Bit (4)

7.17.10 1st/8th bits

When either 56 kbit/s (1-7) or 56 kbit/s (2-8) is selected as the receive data bits, the error measurement of the empty bit (8th or 1st) is available.
The error measurement has three kinds of patterns: 0, 1 and 0/1 alternate patterns.

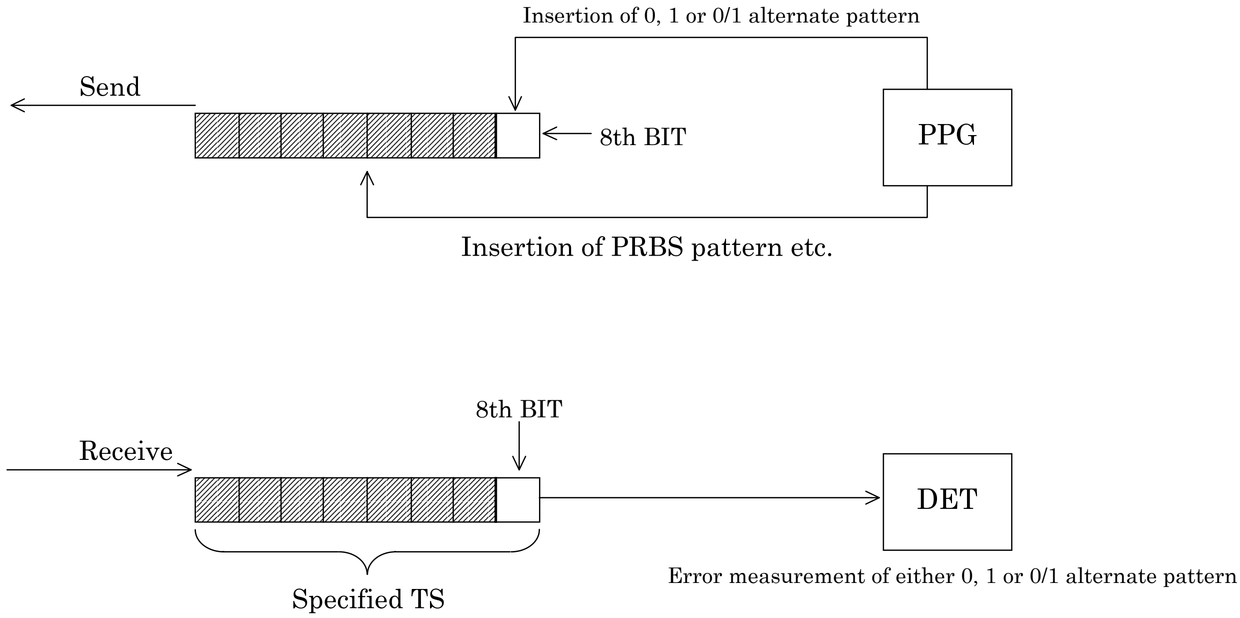


Fig. 7.17-10 Composition of 1st and 8th Bits

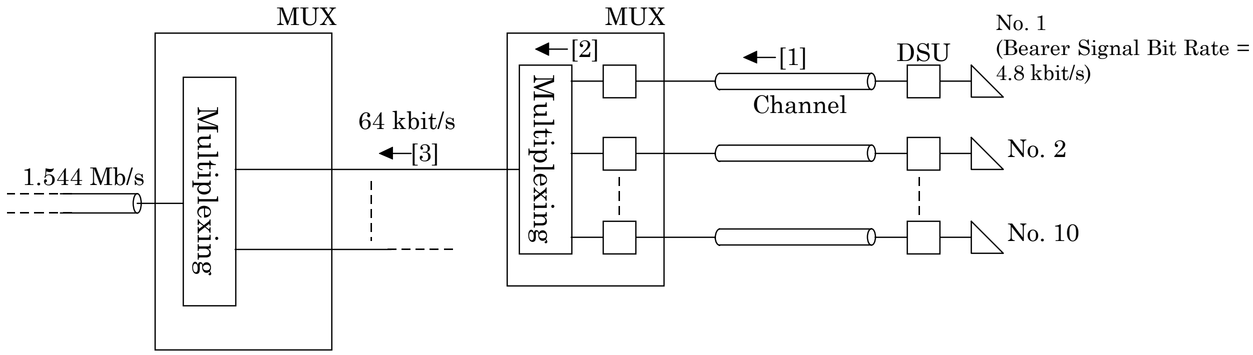
7.18 Data Frame

7.18.1 Composition of data frame multiplexity

The data frames used for data bit rates of 48 kbit/s or less are described here.

The X.50 20-multiframe and universal frame are data frames used either when 48 kbit/s, 9.6 kbit/s, 4.8 kbit/s, and 2.4 kbit/s data are multiplexed into 64 kbit/s data or when 64 kbit/s data is demultiplexed into 48 kbit/s, 9.6 kbit/s, 4.8 kbit/s and 2.4 kbit/s data.

The structure for data-frame multiplexing is shown below.



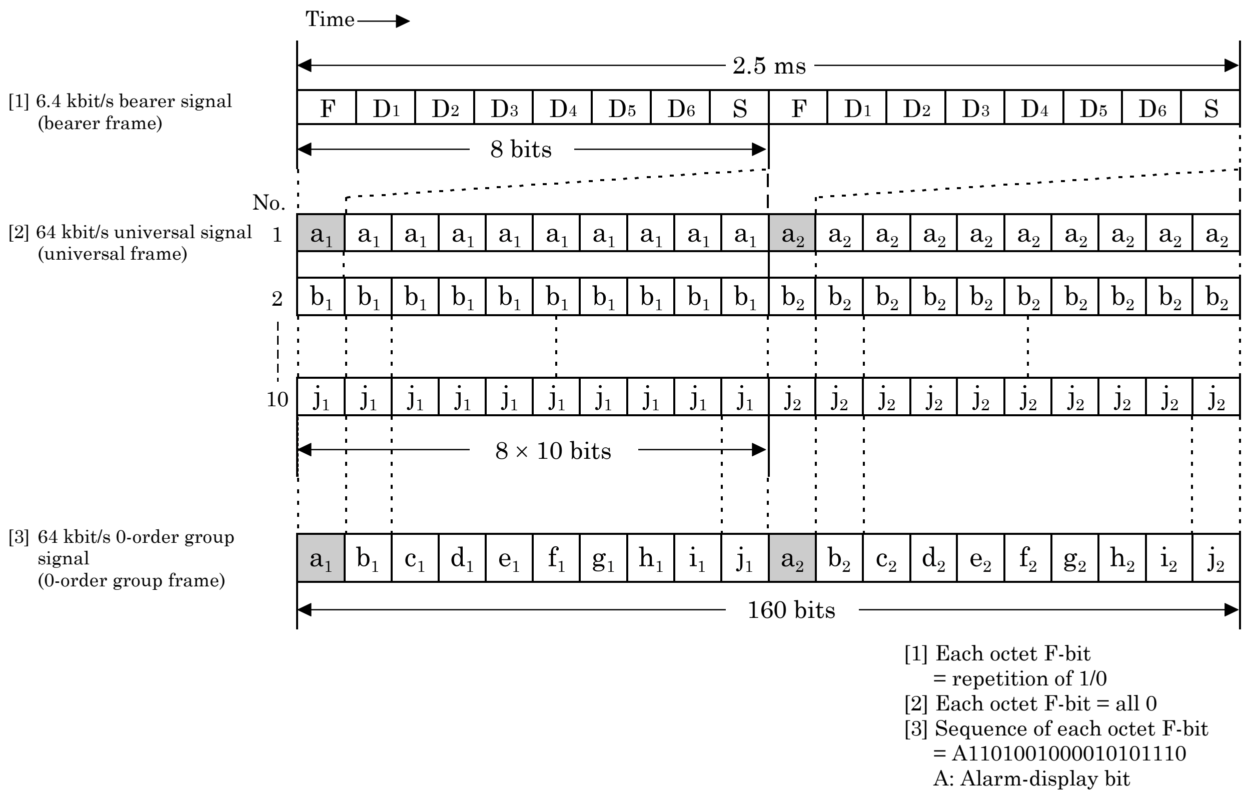


Fig. 7.18-1 Bearer Signal/0-Order Group Signal Multiplexing and Frame Structure

7.18.2 X.50 20-multiframe pattern

This section shows the composition of the X.50 20 multiframe.

(1) Composition of X.50 20 multiframe

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

F	D_1	D_2	D_3	D_4	D_5	D_6	S

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
X.50 Frame Pattern	A	1	1	0	1	0	0	1	0	0	0	0	1	0	1	0	1	1	1	0

A: Send alarm (1: Normal, 0: Alarm)
(Referred to as XA in the MD6430A).

Fig. 7.18-2 X.50 Frame Structure

(2) Relationship between the X.50 frame No. and multiplex CH No.

• Multiplexing depth

Data bit rate	2.4 kbit/s	4.8 kbit/s	9.6 kbit/s	48 kbit/s
Bearer bit rate	3.2 kbit/s	6.4 kbit/s	12.8 kbit/s	64 kbit/s
Multiplexing depth	20	10	5	1

• Relationship between the frame No. and multiplex CH No.

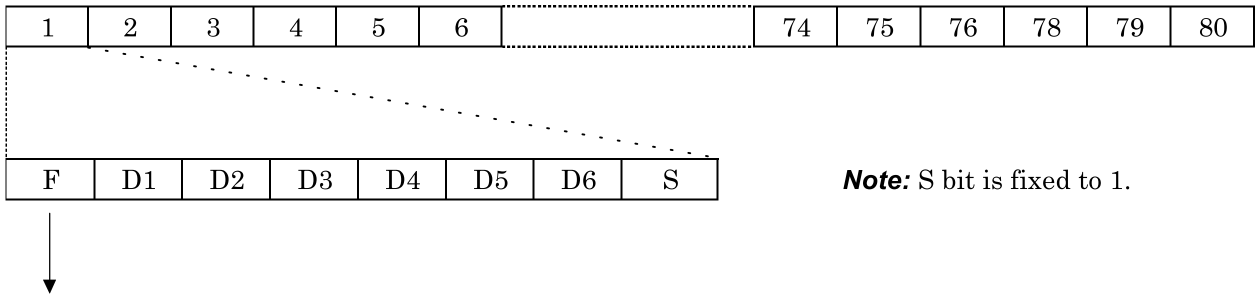
Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
3.2 kbit/s bearer CH No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
6.4 kbit/s bearer CH No.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10
12.8 kbit/s bearer CH No.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

7.18.3 X.50 80-multiframe pattern

This section shows the composition of the X.50 80 multiframe.

Note: The X.50 80 multiframe pattern is also called X.50 Div 2 pattern since it is explained in the Division 2 of X.50 Recommendation.

(1) Composition of X.50 80 multiframe



Note: S bit is fixed to 1.

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Frame Pattern	A	1	0	0	0	1	1	1	1	1	B	1	0	0	0	0	1	1	1	0

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
C	1	1	1	0	0	1	0	1	1	D	0	1	0	0	1	0	0	0	0

41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
E	0	1	0	0	0	1	0	0	1	F	0	0	0	1	0	1	1	1	0

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
G	0	1	1	0	1	1	0	0	0	H	0	1	1	0	0	1	1	0	1

A: When alarming: 0 (XA ON), When not alarming: 1 (XA OFF)

B: 1, C: 1, D: 0, E: 0, F: 1, G: 1, H: 0

The B to H are used as housekeeping information bits. Those values are fixed.

The 8 bits (11001101) of the frame numbers from 73 to 80 becomes the forced pattern of $1+X^4+X^7$ for synchronization.

(2) Relationship between the X.50 frame No. and multiplex CH No.

Data bit rate	600 bit/s	2.4 kbit/s	4.8 kbit/s	9.6 kbit/s	48 kbit/s
Bearer bit rate	800 bit/s	3.2 kbit/s	6.4 kbit/s	12.8 kbit/s	64 kbit/s
Multiplexing depth	80	20	10	5	1

(3) Relationship between the frame No. and multiplex CH No.

• 600 bit/s

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CH No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40

41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80

• 2.4 kbit/s

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CH No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

• 4.8 kbit/s

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CH No.	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6	7	8	9	10

• 9.6 kbit/s

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
CH No.	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

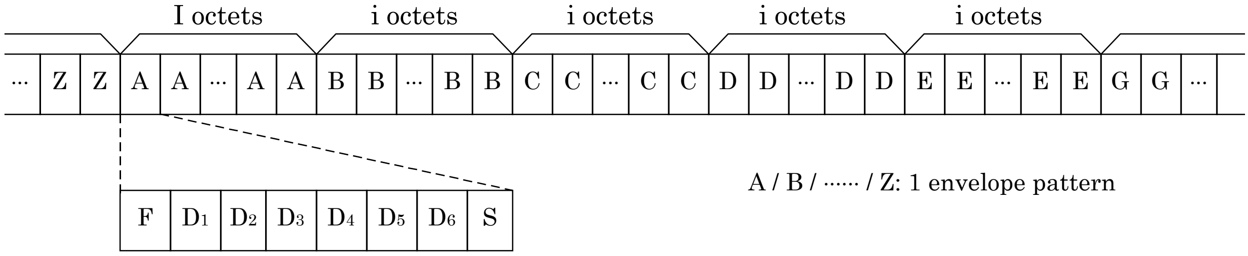
21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
1	2	3	4	5	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5

7.18.4 Universal pattern

The universal frame structure is shown below:



A / B / ······ / Z: 1 envelope pattern

F: 0
S: 1

Data bit rate	Bearer bit rate	i
2.4 kbit/s	3.2 kbit/s	20
4.8 kbit/s	6.4 kbit/s	10
9.6 kbit/s	12.8 kbit/s	5
48 kbit/s	64 kbit/s	1

Fig. 7.18-3 Universal Frame Structure

7.19 Data Channels and Voice Channels

Data channels and voice channels are described here for the I.430/I.430_a 192 k interface.

(1) Data channels

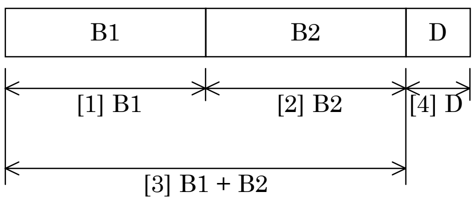
In the MD6430A, the following data channels can be selected and used for error measurement by inserting a send pattern.

[1] B1 [Corresponds to 64 kbit/s]

[2] B2 [Corresponds to 64 kbit/s]

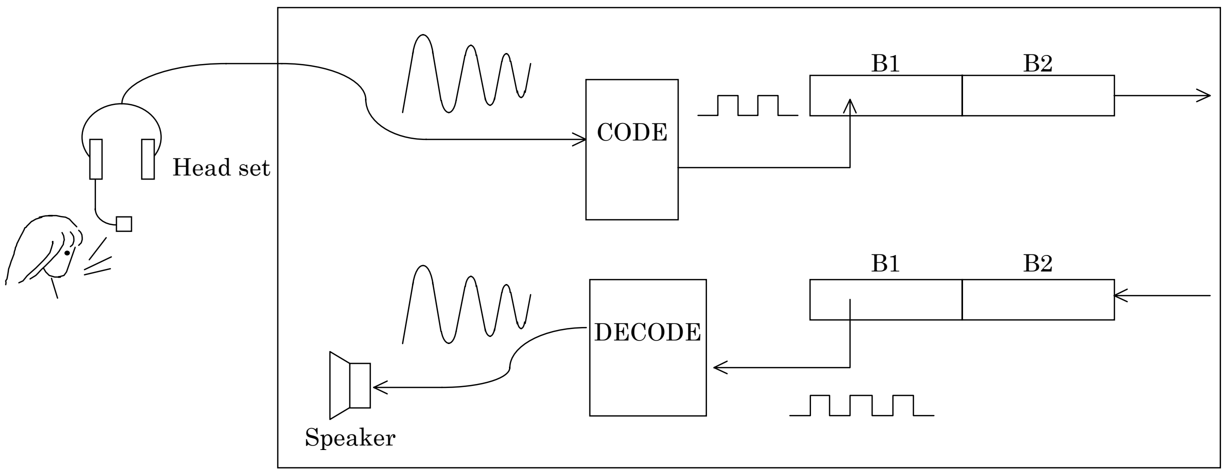
[3] B1+B2 [Corresponds to 128 kbit/s]

[4] D [Corresponds to 16 kbit/s]



(2) Voice channels

In the MD6430A, a voice channel can be selected for voice sending and receiving. Specifically, either B1 or B2 can be selected. If both B1 and B2 are selected to the data channel, as described in paragraph (1) above, no voice channel can be selected.



MD6430A

PCM compression/expansion rules conform to A-law and μ-law.

7.20 THROUGH Mode

The operation when the send interface is set to THROUGH is described here.
When the send time slot is set to THROUGH, the receive data is sent as is (Figure 7.20-1).
When a channel is specified as the send time slot, the pattern generated by the MD6430A is inserted at the specified channel of the send data as those data are sent. For all other time slots, the unmodified receive signal is sent as is (Figure 7.20-2).
In the THROUGH mode, the received data is retransmitted using the MD6430A internal clock. Therefore, when the MD6430A is used in this mode, the MD6430A must be synchronized with the DUT clock.

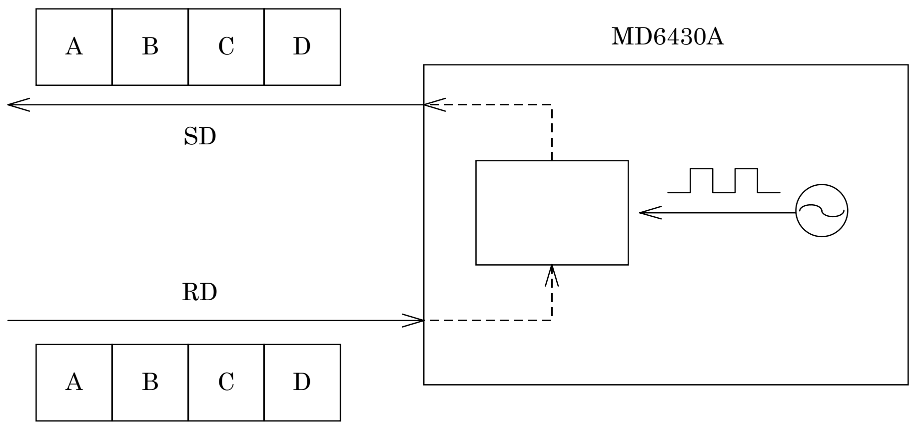


Fig. 7.20-1 When Time Slot is Set to THROUGH

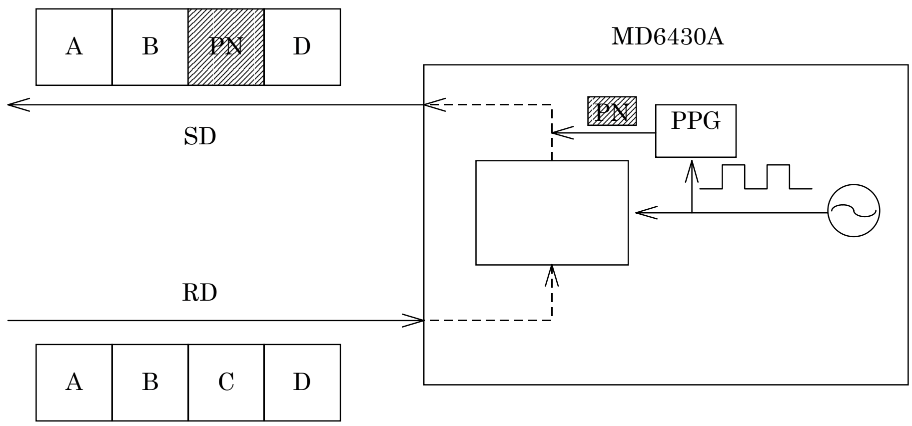


Fig. 7.20-2 When Time Slot is Set to a Specific Channel

7.21 Input Level

This paragraph describes the input level modes (Main, Monitor, Bridge).

(1) Main

This mode is used when receiving data whose voltage levels are specified by main signal. In this mode, receive data does not pass through an attenuator and amplifier, but is input directly into the input circuit.

(2) Monitor

This mode is used when receiving data whose voltage levels are attenuated by 26 dB from the voltage specified by main signal. In this mode, the receive data is input to the input circuit via an amplifier.

(3) Bridge

This mode is used when data are received with HIGH impedance. In this mode, the receive data are input to the input circuit via the attenuator and amplifier.

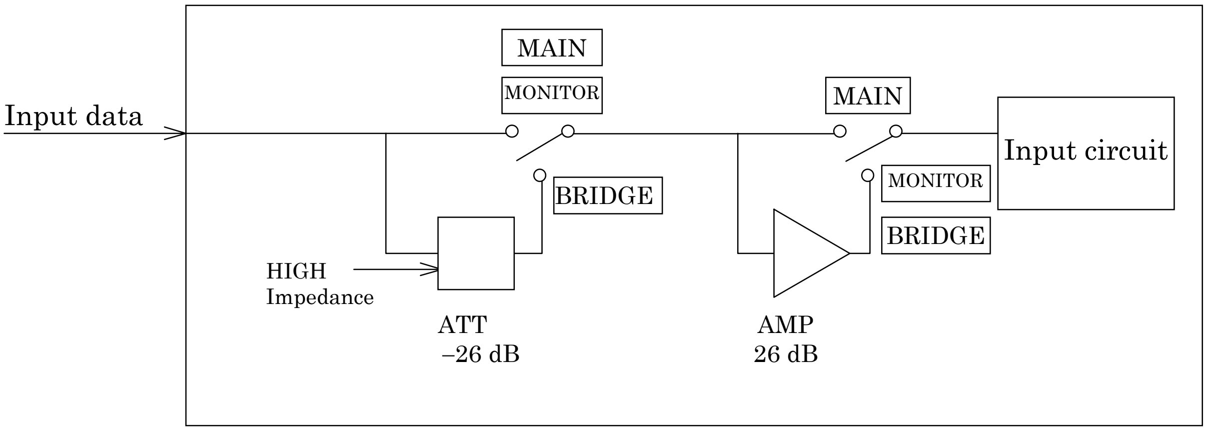


Fig. 7.21-1 Input Signal Level Switching

7.22 Clock Sources

Clock sources to w hich the internal send clock source is slave-synchronized are described below.

(1) SELF

The internal clock source oscillates by itself.

(2) EXT 64 k + 8 k

Slave-synchronizing to the external input clock 64 k + 8 k, the internal send clock source oscillates.

(3) RD

Slave-synchronizing to the clock in the data received by the receive unit, the internal send clock source oscillates.

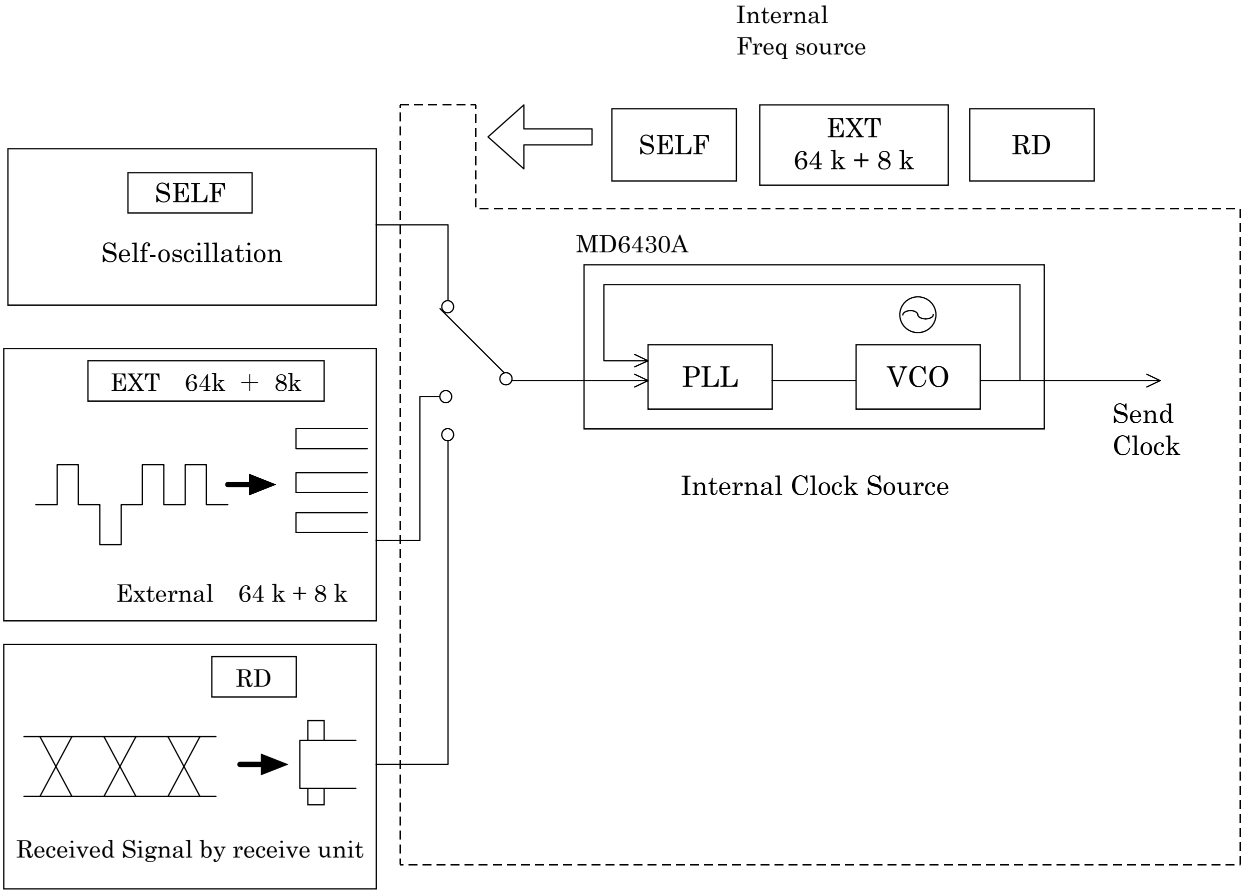


Fig. 7.22-1 Composition of Clock Source

7.23 Self Loop

7.23.1 High speed interface self loop

In this mode, the High speed interface send pattern is loop backed and received as the receive pattern by the internal circuit of the MD6430A.
Error measurement can be performed using this configuration. The operations of the MD6430A is considered to be normal when an error is not generated.
When the DUT is connected to the input and output terminals of the MD6430A, the input and output terminals are effectively connected together. (I.430/I.430-a 192k interface not included)

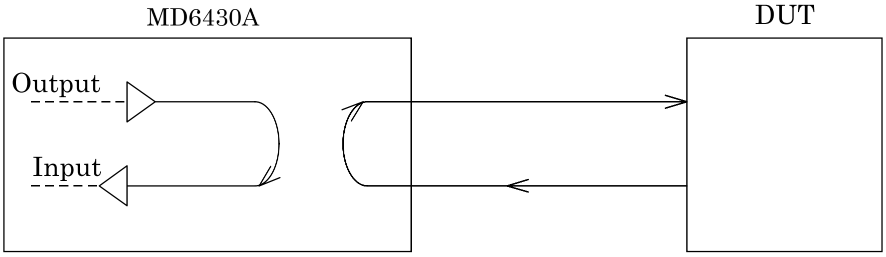


Fig. 7.23-1 High Speed Interface Self Loop

7.23.2 V-series interface self loop

In this state, output data are looped back to the input side. This mode is used to perform self checks.

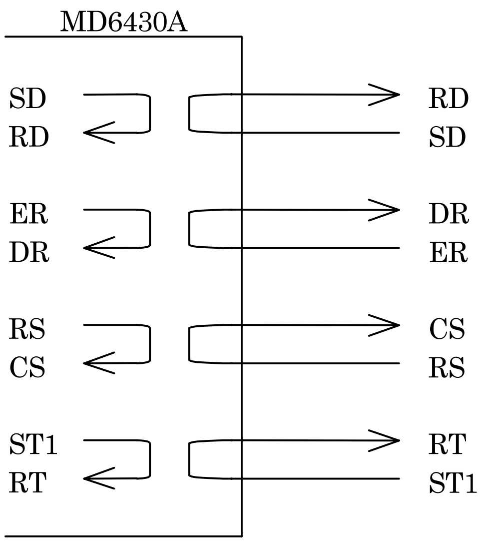


Fig. 7.23-2 V-Series Interface Self Loop

7.23.3 X-series interface self loop

In this mode, the send pattern of the X.20 or X.21 Interface is looped back and received as the receive pattern by the internal circuit of the MD6430A.
This can be used to test error measurement capabilities. An absence of errors confirms that the MD6430A is functioning properly.

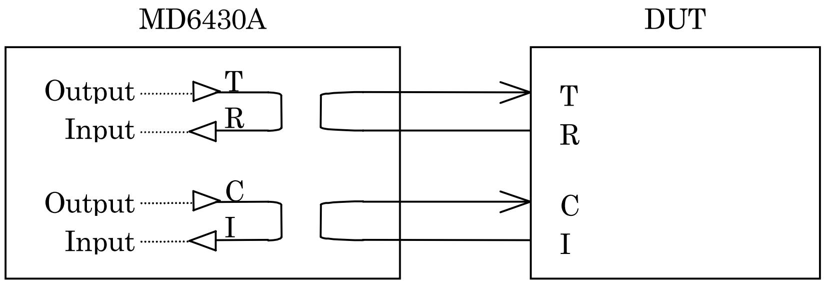


Fig. 7.23-3 X-Series Interface Self Loop

7.23.4 TTL/CMOS interface self loop

In this state, output data are looped back to the input side. This mode is used to perform self checks.

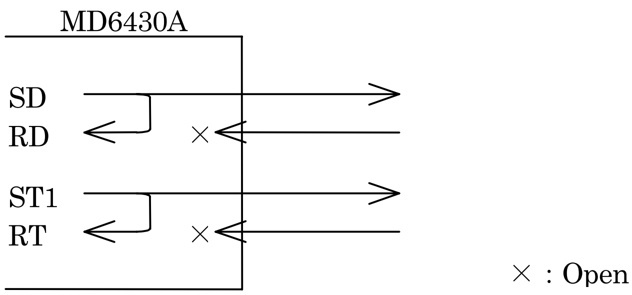


Fig. 7.23-4 TTL/CMOS Interface Self Loop

7.24 HDLC Measurement

7.24.1 Number of BAD frame detections and its occurrence rate

Detects either of the following bad frames, and counts the number of the detections.

[1] Short frame

Frames where the interval between flags is 3 bytes or less.

[2] Long frame

Frames where the length of information field is over 4096 bytes.
The length of its address field is assumed to be two bytes.

[3] FCS error frame

Frames where the FSC error is detected (FCS16).

[4] Fraction frame

Frames where their length is not defined in byte unit.

7.24.2 Number of abort frame detections and its occurrence rate

Detects the frames including seven or more consecutive "1"s, and counts the number of the detections.

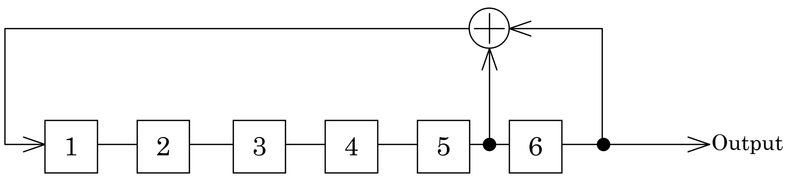
7.25 Error Measurement

7.25.1 Pseudorandom pattern

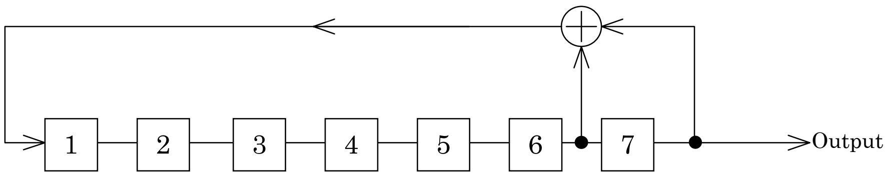
The MD6430A has a pseudorandom pattern generation circuit that conforms to ITU-T (NORMAL) and its reverse (REVERSE).

The block diagram for the pseudorandom pattern generator is shown below.

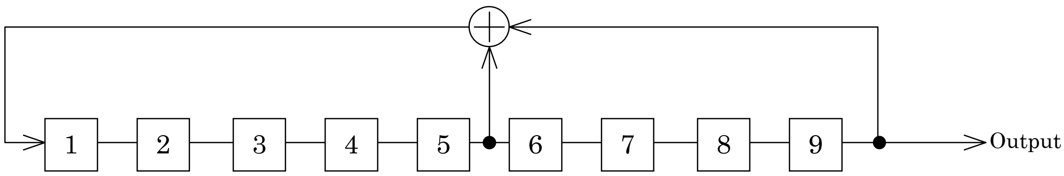
[1] PRBS6 (63 patterns), $1+X^5+X^6$



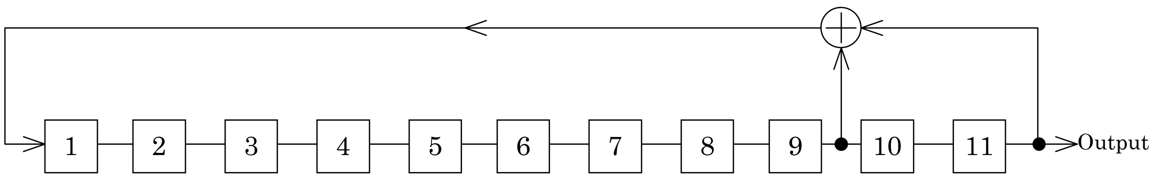
[2] PRBS7, $1+X^6+X^7$ (conforms to ITU-T V.29)



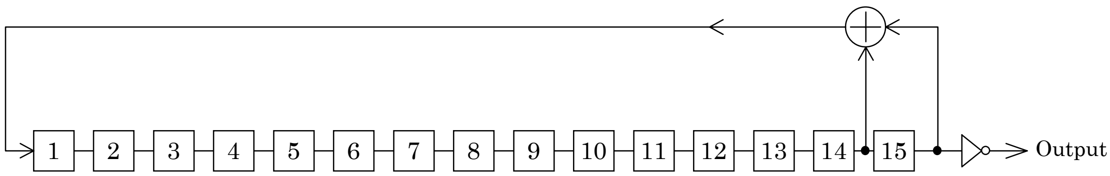
[3] PRBS9 (511 patterns), $1+X^5+X^9$ (conforms to ITU-T V.52)



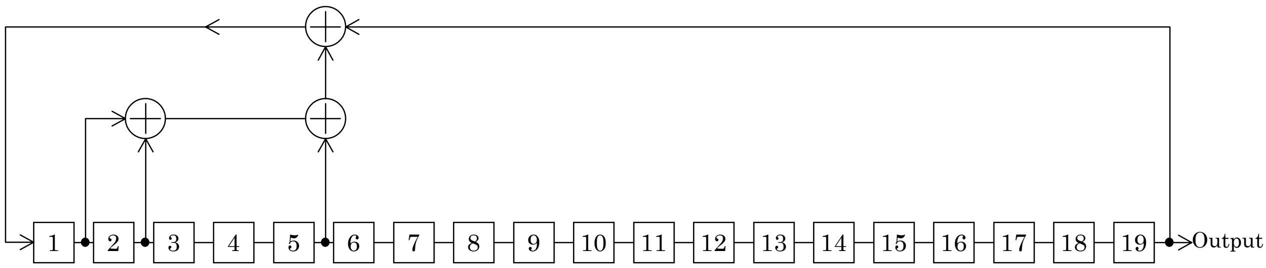
[4] PRBS11 (2047 patterns), $1+X^9+X^{11}$ (conforms to ITU-T O.152)



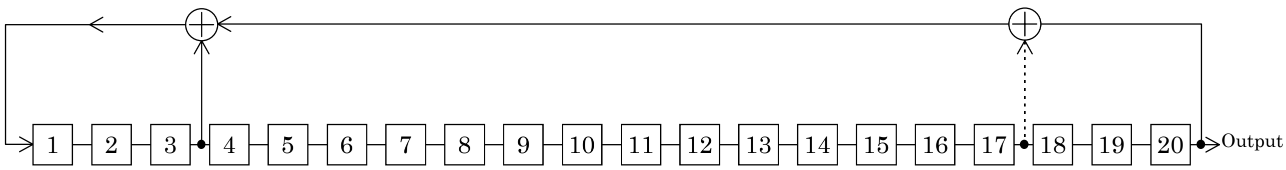
[5] PRBS15, $1+X^{14}+X^{15}$ (conforms to ITU-T O.151)



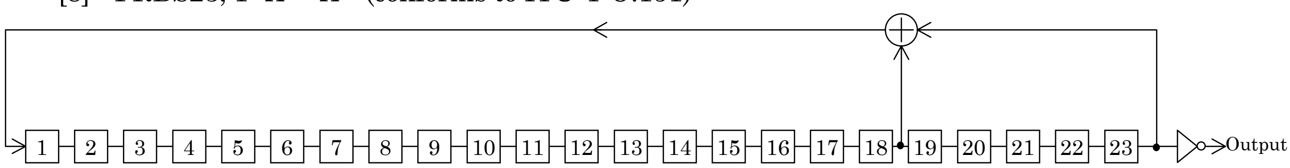
[6] PRBS19, $1+X+X^2+X^5+X^{19}$ (conforms to ITU-T I.430)



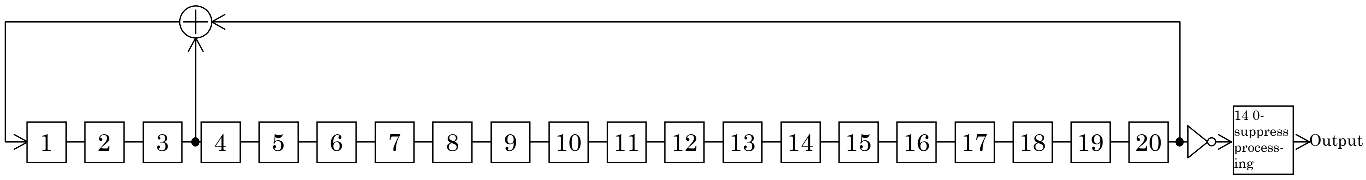
[7] PRBS20, $1+X^3+X^{20}$ (conforms to ITU-T V.57)
RPRBS20 (dotted line)



[8] PRBS23, $1+X^{18}+X^{23}$ (conforms to ITU-T O.151)



[9] QRSS (14 0-suppress processing using inversion of $(1+X^3+X^{20})$)



7.25.2 0-suppress processing

The ITU-T G.703 2.5 (successive-0 maximum length 14) specifies the successive-0 maximum length.
To satisfy the above regulation, the MD6430A conforms to ITU-T 0.151 2.3 to generate the QRSS pattern (14 0-suppress processed using $1+X^{17}+X^{20}$).
The 14 0-suppress processing is described below.

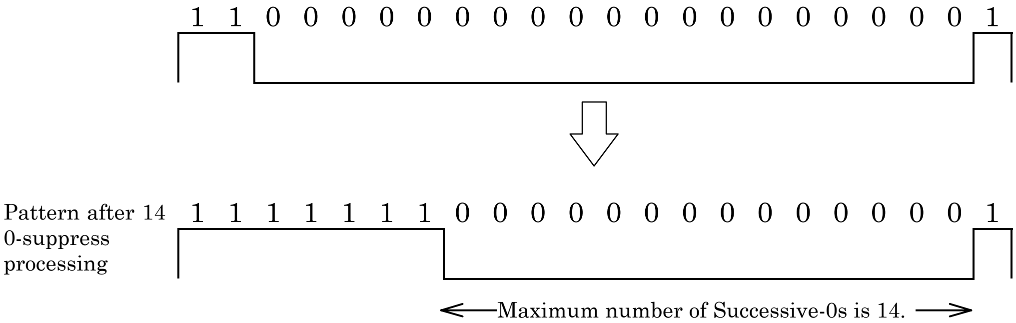


Fig. 7.25-1 Patterns before/after 14 0-suppress Processing

Note: The 14 0-suppress processing is required when connecting to the device of DS1 (1.544 Mb/s) in USA. For estimating the DS1 device, the quasi-random pattern of 14 0-suppress processed using ITU-T Reverse $2^{20}-1$ is used. (This pattern is called QRSS pattern.)

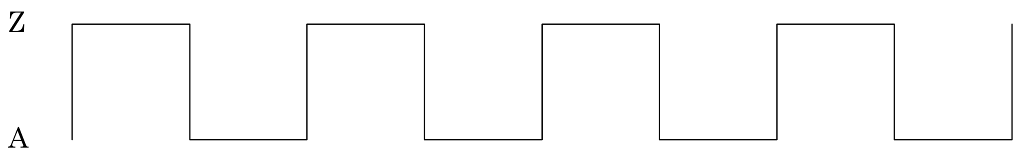
7.25.3 Fixed pattern

The MD6430A can generate All 0s, All 1s, or 1:1 fixed patterns in accordance with ITU-T V.52.

[1] Z: All 1s

[2] A: All 0s

[3] 1:1 Repetition of 10



7.25.4 Pseudorandom pattern sync establishment conditions

The MD6430A synchronizes pseudorandom pattern by reading.

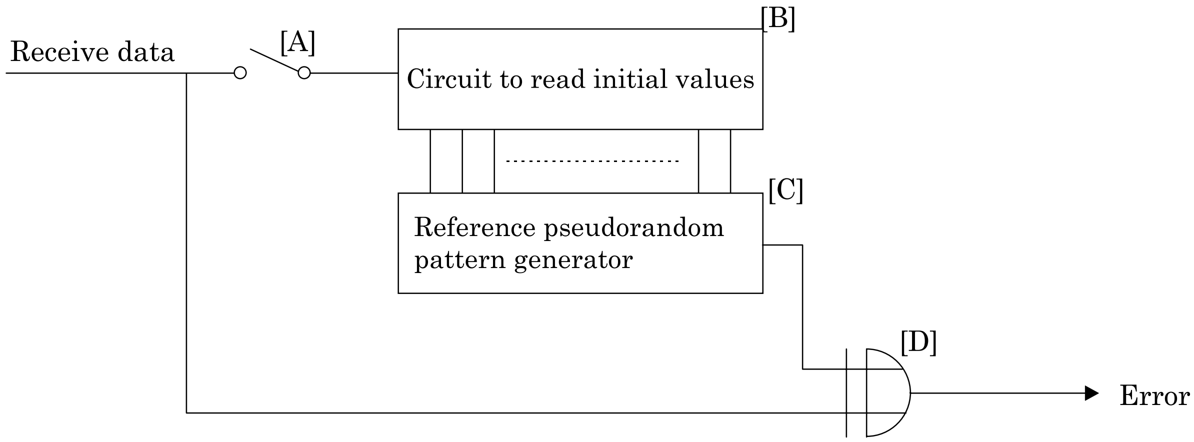


Fig. 7.25-2 Pseudorandom Pattern Synchronization Establishment Circuit Block Diagram

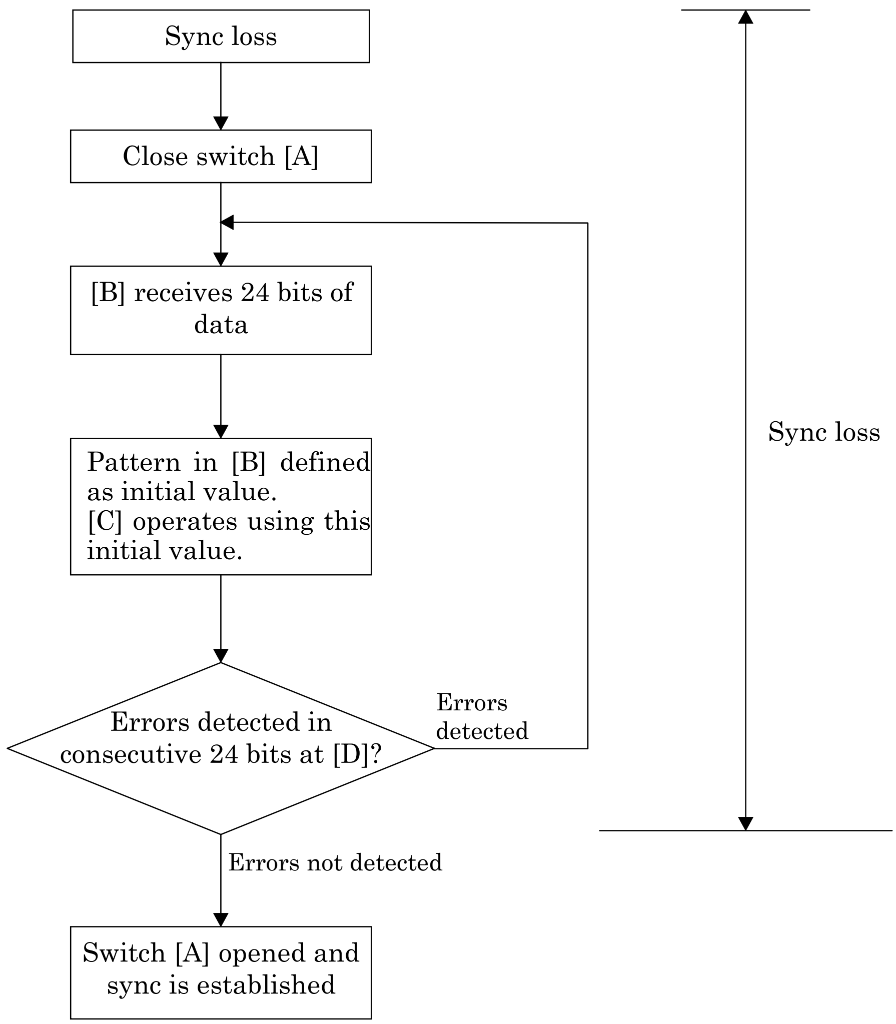


Fig. 7.25-3 Pseudorandom Pattern Sync Establishment Flowchart

7.25.5 Pseudorandom pattern sync loss detection conditions

If there are n or more bit errors in the m bits of the receive clock, pseudorandom pattern synchronization is assumed to be lost.
(Sync loss is assumed to be occurred when n bit errors are counted. The error bit count is cleared when the receive clock has counted m bits.)
During sync loss, both bit counters stop. After synchronization is established, counting starts from 0.

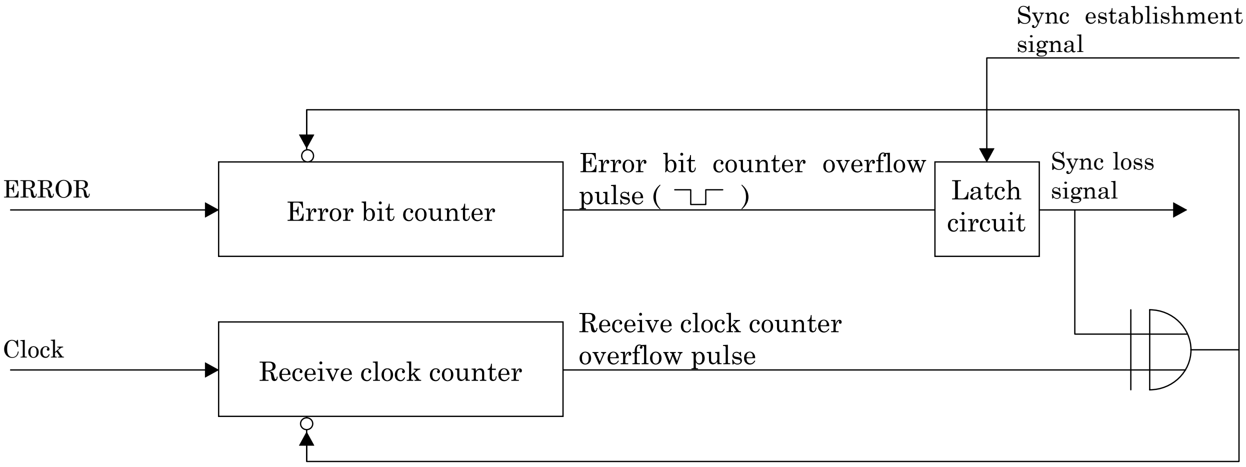


Fig. 7.25-4 Sync Loss Detection Circuit Block Diagram

In the MD6430A, 16 values of n/m, between 10/100 and 100000/300000, can be set.
The n/m setting in the AUTO mode is shown below.

[1] For data bit rate set to 64 kbit/s × N

$m = 512 \times N$, $n = 200 \times N$

$$\frac{200 \times N}{512 \times N}$$

N is specified as follows according to the bit rate.

N = 1 (Bit rate: 2.4 to 80 kb/s)
N = 2 (Bit rate: 128 to 192 kb/s)
N = 4 (Bit rate: 256 to 384 kb/s)
N = 8 (Bit rate: 448 to 768 kb/s)
N = 16 (Bit rate: 832 to 1544 kb/s)
N = 32 (Bit rate: 1600 to 3072 kb/s)
N = 64 (Bit rate: 3136 to 8448 kb/s)

[2] Other data bit rate

$$\frac{200}{512}$$

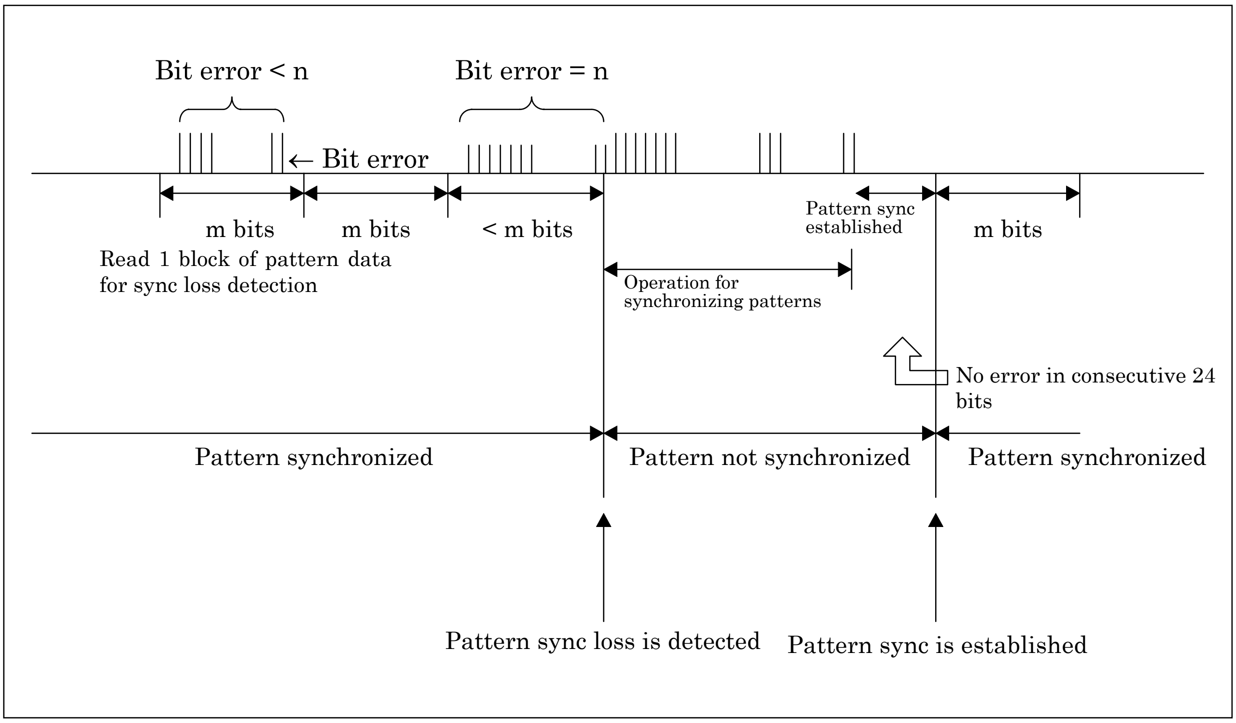
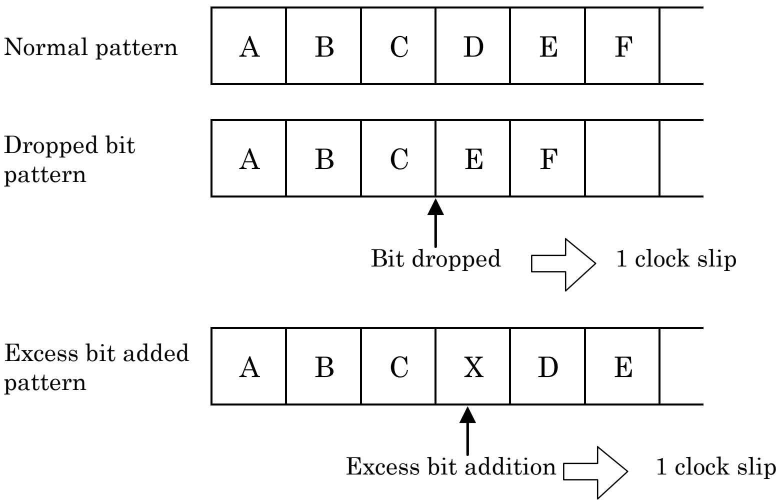


Fig. 7.25-5 Time Sequence of Pattern Sync and Sync Loss States

7.25.6 Clock slip

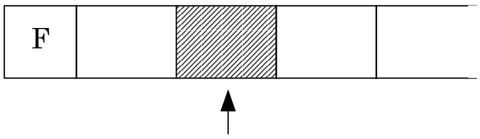
At bit error measurement using pseudorandom pattern, a dropped bit or an excess bit are detected as clock slip.



In addition, the second (in which the clock slip was generated 1 or more times in 1 second interval) counts as a clock slip second.

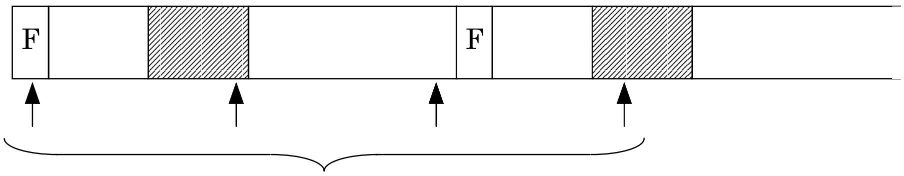
7.25.7 Error insertion

[1] Single or Repeat (1 s) inserts an error at the specified channel



Error insertion at specified channel

Cyclic inserts errors uniformly into the send data. Therefore, an error may also be inserted at the frame bit.



Cyclic error insertion at send data

Note 1: When call loop function is available, test data is sent twice.

Consequently, if cyclic error is inserted, bit error rate measured by error/alarm measurement indicates two times bit error rate against inserted error rate.

For example, if cyclic error in bit error rate of 1.0E-04 is insered, measured bit error rate indicates 2.00E-04.

Note 2: For cyclic, error may occur between error rate to be set and error rate to be inserted. (ex.: When 8.0E-02 is set as error rate, errors are inserted at the rate of one bit per thirteen bits (that is, 7.69E-02).)

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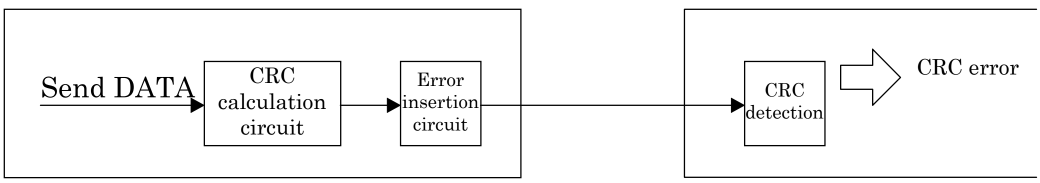
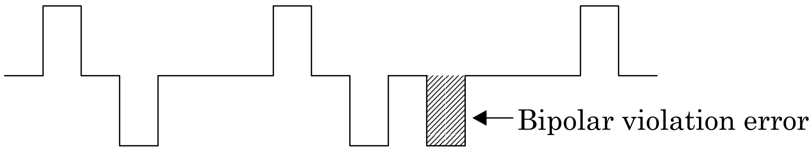
[2] Errors are inserted into the data after CRC and parity calculation. Therefore, at the receiving side, they are also detected as CRC errors and parity errors, as well as bit errors.

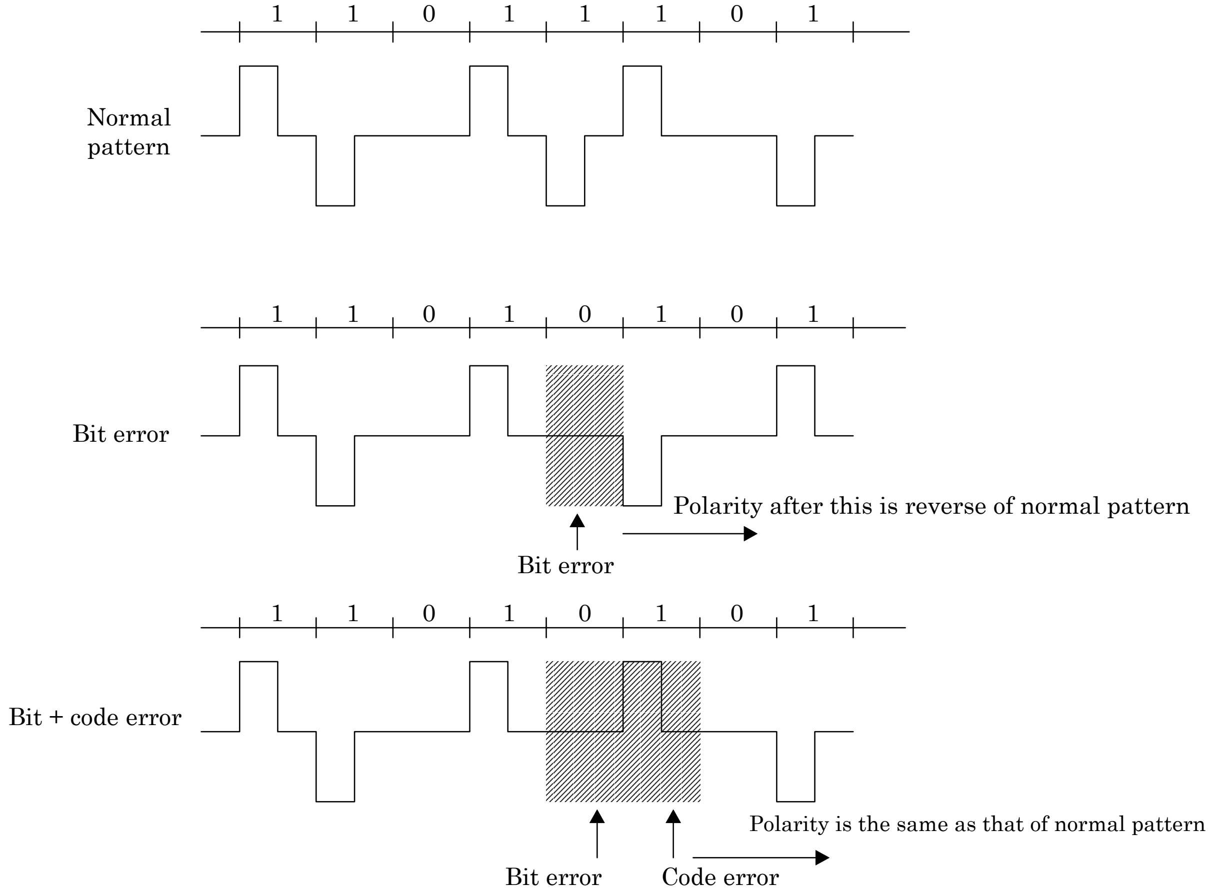


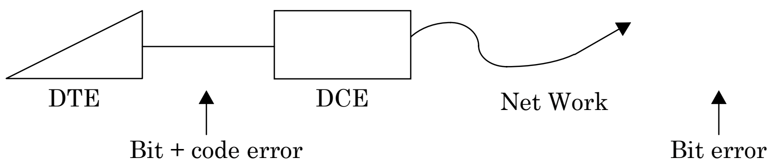
MD6430A Receiver

[3] When an code error is inserted, a bipolar violation error is recognized.



The difference in the output pattern when the output signal is a bipolar pattern and a bit error or bit + code error is inserted is shown below.





Bit + code error is considered to occur when an error is generated between the DTE and DCE, and a bit error is considered to occur when an error is generated at the network.

7.25.8 Fixed pattern synchronization

With the MD6430A, 8-bit fixed pattern synchronization is established by the following method:

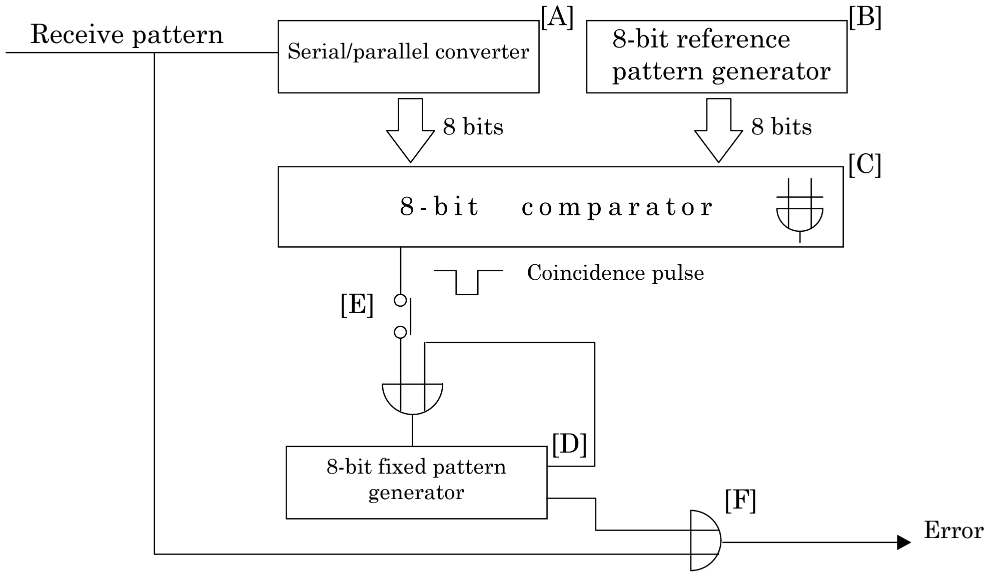


Fig. 7.25-6 Fixed Pattern Synchronization Establishment Circuit Block Diagram

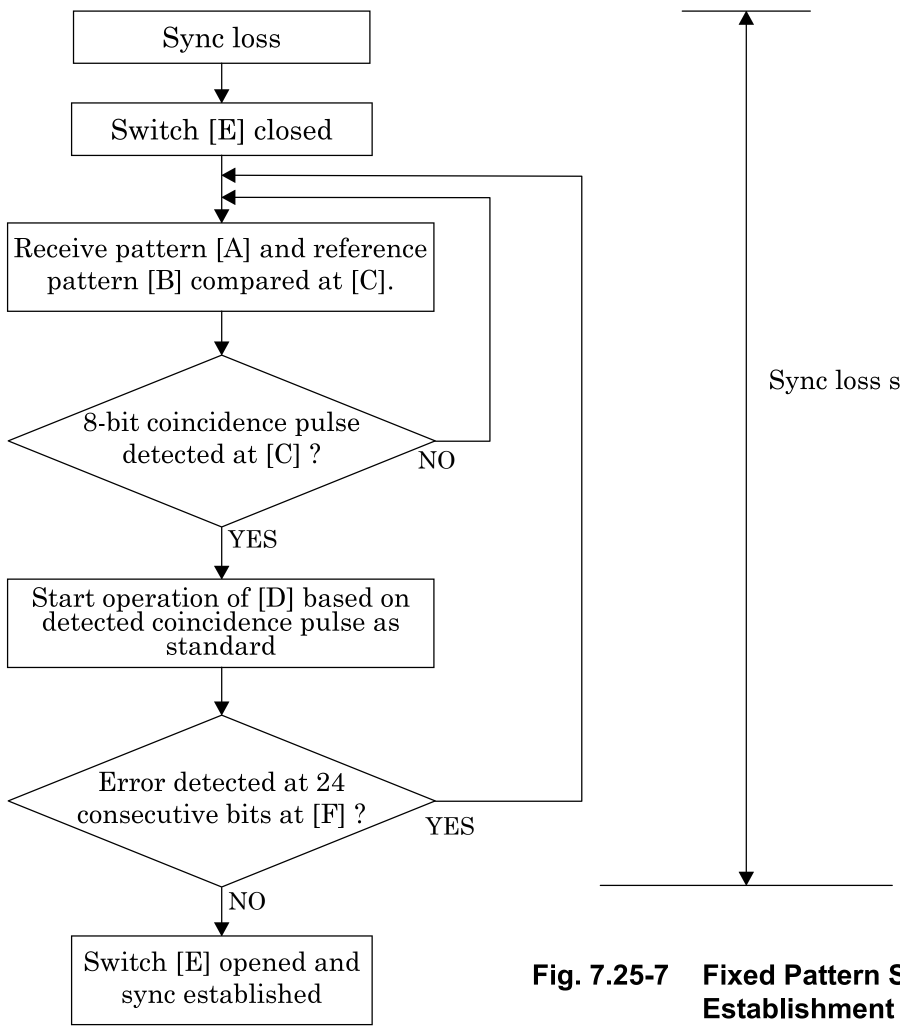


Fig. 7.25-7 Fixed Pattern Synchronization Establishment Flowchart

7.26 Transmission Delay Time Measurement

The MD6430A performs transmission delay time measurement in the line loopback mode. Sending pattern is PRBS11. Measurement start indication adds a continuous 4-bit error, and sends the signal for measurement start trigger ([1]). At the receiving side, the continuous 4-bit error is detected and is made the measurement stop trigger ([2]).

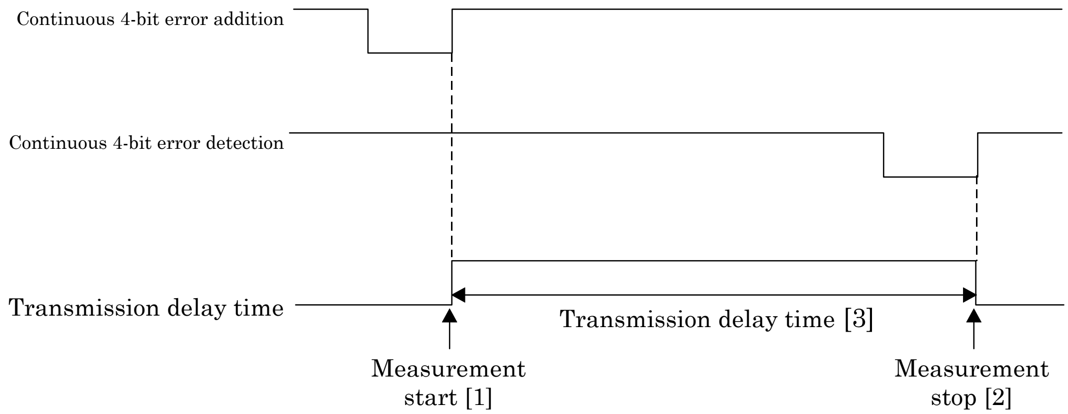


Fig. 7.26-1 Transmission Delay Time Measurement Timing Chart

[3] of Figure 7.26-1 is the round-trip transmission delay time.

7.27 PRGM Data Generation

7.27.1 Setting and sending the PRGM data

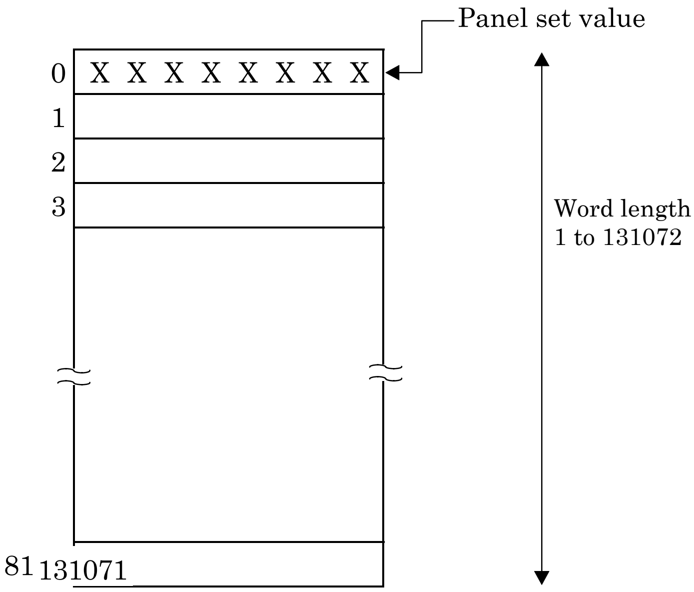


Fig. 7.27-1 Internal Memory for PRGM Data Generation

PRGM data used for word trace measurement are stored in the MD6430A internal memory as shown in Figure 7.27-1. When the word pattern send is specified, patterns are sent sequentially from start address to the stop address.
(Set value is backed-up by battery.)

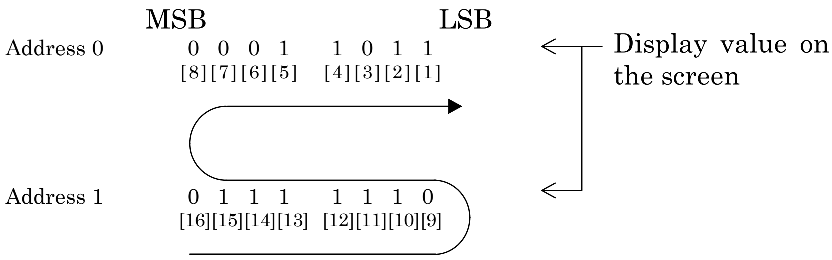


Fig. 7.27-2 Word Pattern Sending Order

Outputting the idle pattern and PRGM data is performed starting from the LSB of the value displayed on the screen.
For example, the PRGM data is transmitted from the LSB bit of each address in order as shown in Figure 7.27-2. (In the order from [1] to [16].)
Further, the received bit is displayed in the order from D1 bit in the MD6430A 8-bit data monitor display.
Therefore, on the WORD TRACE measurement, the displays have inverted relation between the PRGM data monitor screen display and 8-bit data monitor display.

SECTION 8 PERFORMANCE TEST

8.1 General

This section describes the method to test the performance of the MD6430A Network Data Analyzer to ensure that it operates reliably. The test items described in this section are as follows:

- Pulse mask in the high-speed system interface
- Accuracy of send clock
- Reception amplifier in the high-speed system interface
- Voice CODEC

An oscilloscope, a frequency counter and attenuators are used in the test described in this section. Instruments with the following performances are required.

- Oscilloscope
  Use an oscilloscope with an analog band greater than 500 MHz.

- Frequency counter
  Use a frequency counter with the measurement range greater than 10 MHz, the resolution greater than 0.1 Hz, and the indication in ppm unit.

- Attenuator
  Prepare attenuators with the impedance of 75Ω(unbalance) and 110Ω(balance), and with the attenuation range greater than 26 dB.

8.2 Pulse Mask

8.2.1 Pulse mask for G.703 64k interface

This paragraph describes the method to test the pulse mask for the G.703 64k interface.

8.2.1.1 When Centralized clock is set:

(1) Setup

Setup the MD6430A and a oscilloscope as shown in Fig. 8.2-1.
Terminate the 64k output signal from the mini-bantam connector, and then connect the signal to the oscilloscope.
Refer to para. 3.2.4 " Pin layout" for the pin layout of connectors and cables.

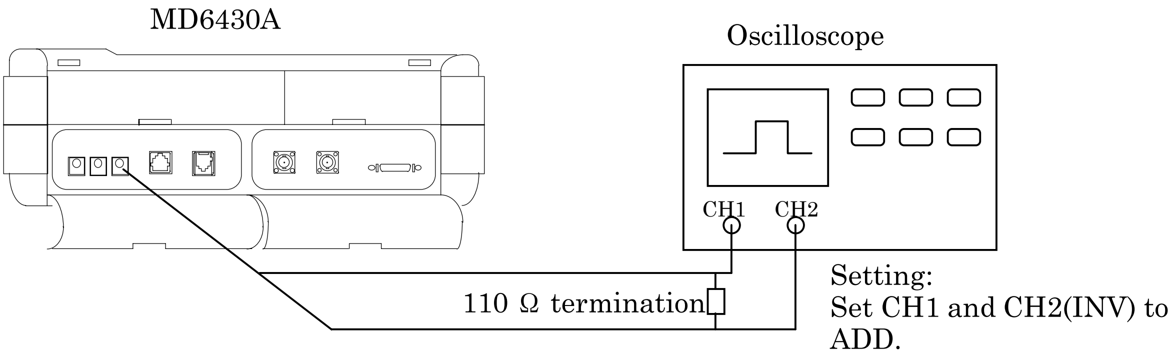


Fig. 8.2-1 Setup for Pulse Mask Test (G.703.64)

(2) Setting MD6430A

Press the "Initial" button on the Setup:Memory sub-screen to initialize the setting conditions.
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items:

- Interface on Setup:System sub-screen
  Interface type : G.703 64k
  Type of Interface : Centralized clock
- Interface screen
  Tx Interface : G.703 64k
- Measure:Error/Alarm sub-screen
  Test pattern : Word8 1000 0000

(3) Testing send level

Adjust the oscilloscope to display the output waveform. Ensure that the waveform is within the pulse mask. Refer to Section 2 " Specifications" for the pulse mask.

Verify that the waveform level is within the range of 1 $V_{0\text{-}p}$ ±10%, as shown in Fig. 8.2-2.

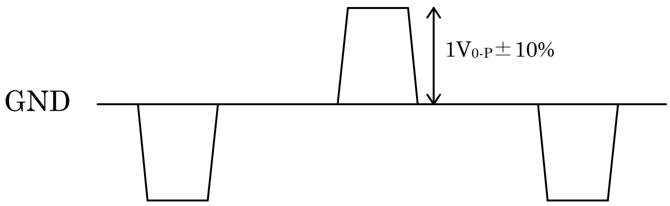


Fig. 8.2-2 Specification of Output Waveform (G.703 64k)

8.2.1.2 When Codirectional is set :

(1) Setup

Setup the MD6430A and the oscilloscope using the same procedure as in para. 2.1 (a) " When Centralized clock is set".

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).

If the current settings are required, save them in the memory before initialization.

After initialization, set the following items:

- Interface on Setup:System sub-screen
  - Interface type : G.703 64k
  - Type of Interface : Codirectional
- Interface screen
  - Tx Interface : G.703 64k
- Measure:Error/Alarm sub-screen
  - Test pattern : ALL 1 (for the double pulse), ALL 0 (for the single pulse)

(3) Testing send level

Adjust the oscilloscope to display the output waveform.

Ensure that the waveform is within the pulse mask.

Refer to Section 2 " Specifications" for the pulse mask.

Verify that the waveform level is within the range of 1 $V_{0\text{-}p}$±10%, as shown in Fig. 8.2-2.

8.2.2 Pulse mask for I.430/I.430-a 192k interface

This paragraph describes the method to test the pulse mask for the I.430/I.430-a 192k interface

(1) Setup

Setup the MD6430A and an oscilloscope as shown in Fig. 8.2-3.
Refer to para. 3.2.4 " Pin layout" for the pin layout of connectors and cables.

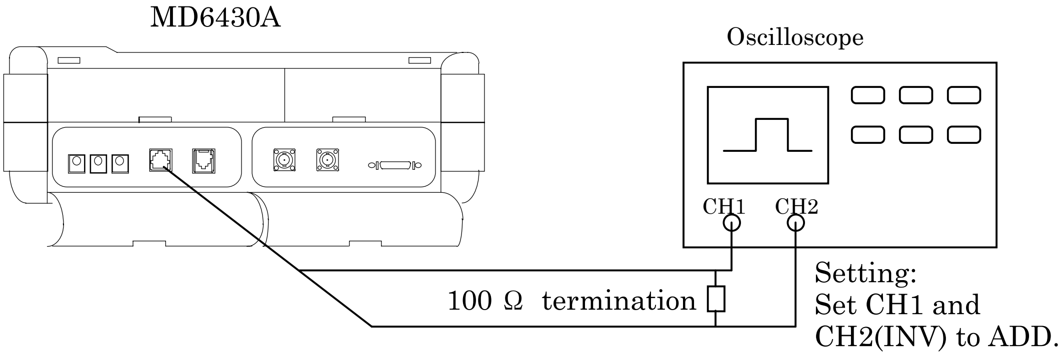


Fig. 8.2-3 Setup for Pulse Mask Test （I.430/I.430-a 192k）

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
After initialization, select the interface of Tx Interface:I430/I.430-a 192k on Interface screen. Then, set the following items:

・Setup:Selftest sub-screen
  Test mode : INFO1 Send

After setting, press the "Start" button to start outputing INFO1.
Press the "Stop" button to stop outputing the INFO1, automatically.

(3) Testing send level

Adjust the oscilloscope to display the output waveform.
Ensure that the waveform is within the pulse mask.
Refer to Section 2. " Pin layout" for the pulse mask.
Verify that the waveform level is within the range of 0.75 $V_{0\text{-}p}$ ±10%, as shown in Fig. 8.2-4.

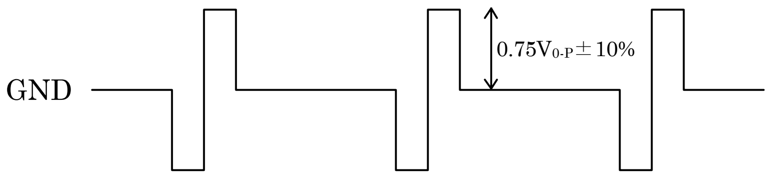


Fig. 8.2-4 Specification of Output Waveform （I.430/I.430-a 192k）

8.2.3 Pulse mask for G.704/I.431 1.544M interface

This paragraph describes the method to test the pulse mask for the G.704/I.431 1.544M interface.

(1) Setup

Setup the MD6430A and an oscilloscope as shown in Fig. 8.2-5.

Terminate the 1.544M output signal from the 8-pin modular connector, and then connect the signal to the oscilloscope.

Refer to para. 3.2.4 " Pin layout" for the pin layout of connectors and cables.

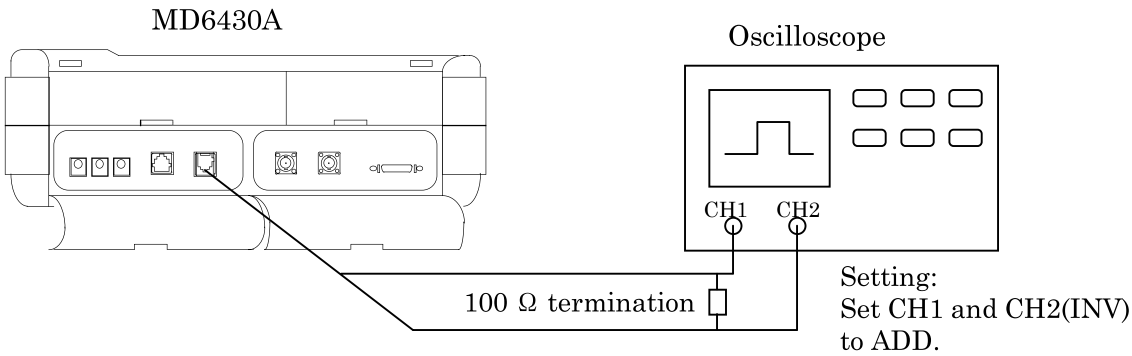


Fig. 8.2-5 Setup for Pulse Mask Test （G.704/I.431 1.544M）

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).

If the current settings are required, save them in the memory before initialization.

After initialization, set the following items.

- Interface screen
  - Tx Interface : G.704/I.431 1.544M
    - Frame : Unframe
    - Code : AMI
- Measure: Error/Alarm sub-screen
  - Test pattern : word8 1000 0000

(3) Testing send level

Adjust the oscilloscope to display the output waveform.

Ensure that the waveform is within the pulse mask.

Refer to Section 2. " Specification" for the pulse mask. Verify that the waveform level is within the range of 3 V $_{0\text{-}p}$ ±10% as shown in Fig. 8.2-6.

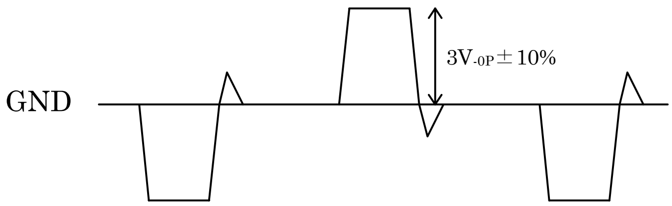


Fig. 8.2-6 Specification of Output Waveform (G.704/I.431 1.544M)

8.2.4　Pulse mask for G.704/I.431 2.048M interface

This paragraph describes the method to test the pulse mask for the G.704/I.431 2.048M interface.

8.2.4.1 When impedance is set at 120Ω (balance):

(1) Setup

Setup the MD6430A and an oscilloscope as shown in Fig. 8.2-7.

Terminate the 2.048M output signal from the 8-pin modular connector, and then connect the signal to the oscilloscope.

Refer to para. 3.2.4 " Pin layout" for the pin layout of connectors and cables.

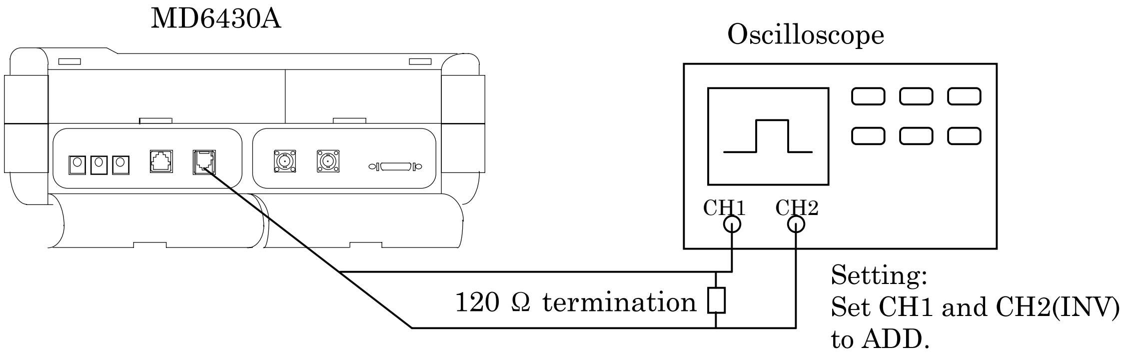


Fig. 8.2-7　Setup for Pulse Mask Test　(G.704/I.431 2.048M)

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).

If the current settings are required, save them in the memory before initialization.

After initialization, set the following items.

- Interface on Setup:System sub-screen
  - Interface type　: G.704/I.431 2.048M
  - Impedance　: 120Ω
- Interface screen
  - Tx Interface : G.704/I.431 2.048M
    - Frame　: Unframe
    - Code　: AMI
- Measure:Error/Alarm sub-screen
  - Test pattern　: Word8　1000 0000

(3) Testing send level

Adjust the oscilloscope to display the output waveform.
Ensure that the waveform is within the pulse mask.
Refer to Section 2. " Specifications" for the pulse mask.
Verify that the waveform level is within the range of 3 $V_{0\text{-}P}$ ±10%, as shown in Fig. 8.2-8.

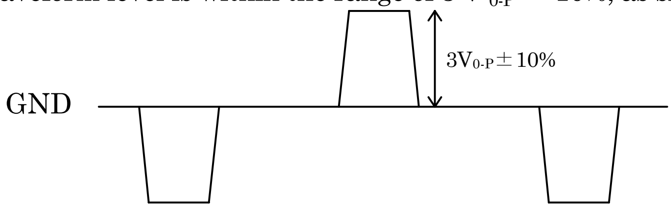


Fig. 8.2-8 Specification of Output Waveform (G.704/I.431 2.048M)

8.2.4.2 When impedance is set at 75Ω (unbalance):

(1) Setup

Setup the MD6430A and an oscilloscope as shown in Fig. 8.2-9.

Terminate the output signal from the BNC connector, and then connect the signal to the oscilloscope.

Refer to para. 3.2.4 " Pin layout" for the pin layout of connectors and cables.

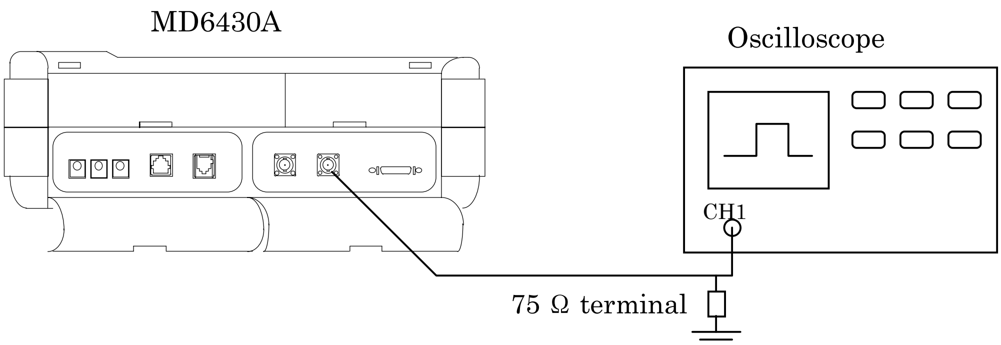


Fig. 8.2-9 Setup for Pulse Mask Test （G.704/I.431 2.048M）

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).

If the current settings are required, save them in the memory before initialization.

After initialization, set the following items.

- Interface on Setup:System sub-screen
  - Interface type : G.704/I.431 2.048M
  - Impedance : 75Ω
- Interface screen
  - Tx Interface : G.704/I.431 2.048M
    - Frame : Unframe
    - Code : AMI
- Measure:Error/Alarm sub-screen
  - Test pattern : Word8 1000 0000

(3) Testing send level

Adjust the oscilloscope to display the output waveform.

Ensure that the waveform is within the pulse mask.

Refer to Section 2. " Specifications" for the pulse mask. Verify that the waveform level is within the range of 2.37 $V_{0\text{-}p}$ ±10%, as shown in Fig. 8.2-10.

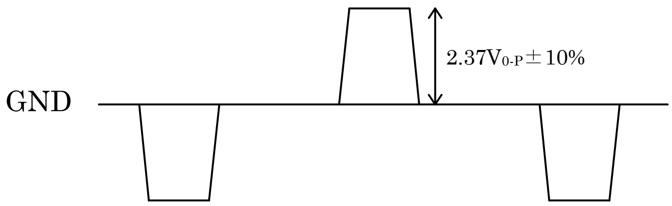


Fig. 8.2-10 Specification of Output Waveform (G.704/I.431 2.048M)

8.2.5 Pulse mask for G.704 6.312M interface

This paragraph describes the method to test the pulse mask for the G.704 6.312M interface.

(1) Setup

Use the same procedure as that for the G.704/I.431 2.048M interface (75Ω impedance).
Setup the MD6430A and an oscilloscope as shown in Fig. 8.2-9.

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.2.1 (2).
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items.

- Interface screen
  - Tx Interface : G.704 6.312M
  - Frame : Unframe
- Measure:Error/Alarm sub-screen
  - Test pattern : ALL 1

(3) Testing send level

Adjust the oscilloscope to display the output waveform.
Ensure that the waveform is within the pulse mask.
Refer to Section 2. " Specifications" for the pulse mask. Verify that the waveform level is within the range of 2 $V_{0\text{-}p}$ ±10%, as shown in Fig. 8.2-11.

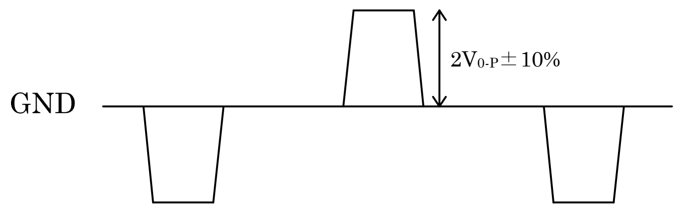


Fig. 8.2-11 Specification of Output Waveform (G.704 6.312M)

8.3 Testing Send Clock

This section describes the methods to test the accuracy of the internal clock of the MD6430A. The low-speed systems use the common ICs to generate the internal clock. Thus, the clock test of V.35 interface is described as a sample representing the others.
The clock test of the high-speed system is described for the following interfaces: G.703 64k, I.430/I.430-a 192k, G.704/I431 1.544M, G.704/I.431 2.048M and G.704 6.312M.

8.3.1 V.35 Interface

This section describes the method to test the accuracy of the internal clock used in the low-speed interface.

(1) Setup

As shown in Fig. 8.3-1, connect either one of the followings to the frequency counter: the 15th pin (the 4th pin from the left on the upper row, on the amphenol half-pitch 36-pin connector on the MD6430A), or the ST1 connector (when the amphenol half-pitch 36-pin connector is connected with the TTL/CMOS connection box). (Refer to para. 3.2 " Connecting Cables" for the connection procedure.)
Refer to para. 3.2.4 " Pin layout" for the pin layout of the connectors and cables.

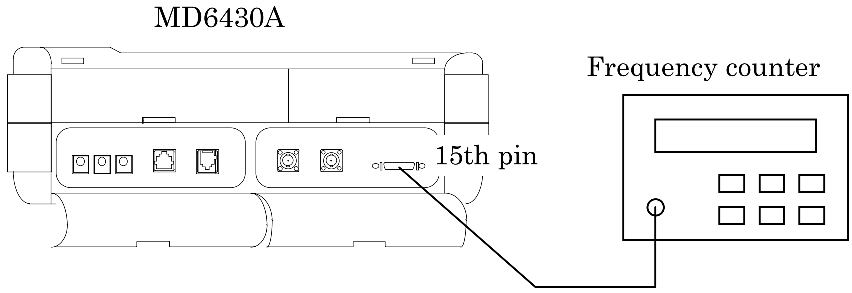


Fig. 8.3-1 Setup for Send Clock Measurement

(2) Setting MD6430A

Press the "Initial" button on the Setup:Memory sub-screen to initialize the setting conditions.
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items.

・Interface screen

Tx Interface : V.35

Timing : ST1

Data bit rate : 10000000bit/s

(3) Testing frequency accuracy

Connect the connector (Fig. 8.3-1) to the frequency counter to display the clock frequency. Change the unit indication, which is displayed on the frequency counter, to the ppm.
Make sure that the counter reading (accuracy) does not exceed the range of ±5ppm.

8.3.2 G.703 64k Interface

This section describes the methods to test the accuracy of the internal clock used in the G.703 64k interface.

(1) Setup

As shown in Fig. 8.3-2, connect the 35th pin (the 2nd pin from the left on the lower row, on the amphenol half-pitch 36-pin connector on the MD6430A) to the frequency counter.
Refer to Section 2 " Specifications" for the pin layout of the connectors.

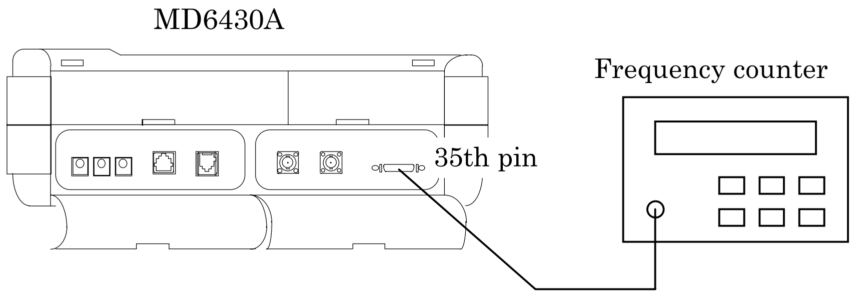


Fig. 8.3-2 Setup for Send Clock Measurement

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 7.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
Set the interface to G.703 64k.

(3) Testing frequency accuracy

Connect the connector (Fig. 8.3-2) to the frequency counter to display the clock frequency. Change the unit indication, which is displayed on the frequency counter, to ppm.
Make sure that the counter reading (accuracy) does not exceed the range of ±5ppm.

8.3.3 G.704/I.431 1.544M Interface

This section describes the methods to test the accuracy of the internal clock used in the G.704/I.431 1.544M interface.

(1) Setup

Use the same procedure as that for the G.703 64k interface. Connect the 35th pin (on the amphenol half-pitch 36-pin connector on the MD6430A) to the frequency counter, as shown in Fig. 3.3-2.

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
Set the interface to G.704/I.431 1.544M.

(3) Testing frequency accuracy

Connect the connector (Fig. 8.3-2) to the frequency counter to display the clock frequency.
Change the unit indication, which is displayed on the frequency counter, to ppm.
Make sure that the counter reading (accuracy) does not exceed the range of ±5ppm.

8.3.4 G.704/I.431 2.048M Interface

This section describes the methods to test the accuracy of the internal clock used in the G.704/I.431 2.048M interface.

(1) Setup

Use the same procedure as that for the G.703 64k interface.

Connect the 35th pin (on the amphenol half-pitch 36-pin connector on the MD6430A) to the frequency counter, as shown in Fig. 8.3-2.

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).

If the current settings are required, save them in the memory before initialization.

Set the interface to G.704/I.431 2.048M.

(3) Testing frequency accuracy

Connect the connector (Fig. 8.3-2) to the frequency counter to display the clock frequency.

Change the unit indication, which is displayed on the frequency counter, to ppm.

Make sure that the counter reading (accuracy) does not exceed the range of ±5ppm.

8.3.5 G.704 6.312M Interface

This section describes the methods to test the accuracy of the internal clock used in the G.704 6.312M interface.

(1) Setup
Use the same procedure as that for the G.703 64k interface.
Connect the 35th pin (on the amphenol half-pitch 36-pin connector on the MD6430A) to the frequency counter, as shown in Fig. 8.3-2.

(2) Setting MD6430A
Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
Set the interface to G.704 6.312M.

(3) Testing frequency accuracy
Connect the connector (Fig. 8.3-2)to the frequency counter to display the clock frequency.
Change the unit indication, which is displayed on the frequency counter, to ppm.
Make sure that the counter reading (accuracy) does not exceed the range of ±5ppm.

8.4 Testing reception amplifier

This section describes the methods to test the performance of the reception amplifier on the MD6430A.
A send output level from the MD6430A, which is attenuated with an external attenuator, is received for testing the performance of the amplifier.
Thus, prior to the testing, ensure that the send output level is supplied as defined, by testing the level with the pulse mask.
The test is described for the following interfaces: G.703 64k, G.704/I.431 1.544M, G.704/I.431 2.048M, 2MCMI and G.704 6.312M.

8.4.1 G.703 64k Interface

(1) Setup
Setup the MD6430A and an external attenuator as shown in Fig. 8.4-1.
Use the attenuator with an impedance of 110Ω, which is same as that of the G.703 64k interface.
Attenuate the level of the send output by 26 dB, by adjusting the attenuator.

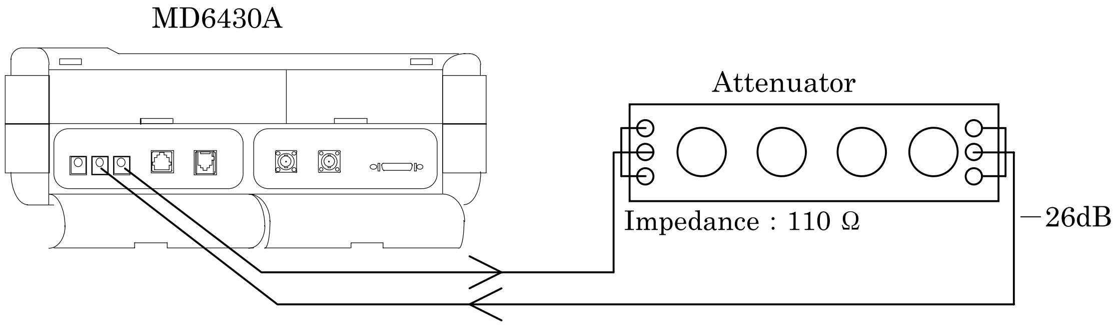


Fig. 8.4-1 Setup for Reception Amplifier Test

(2) Setting MD6430A
Press the "Initial" button on the Setup:Memory sub-screen to initialize the setting conditions.
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items.

- Interface screen
  Interface Tx : G.703 64k, Rx : same
  Rx Input level : Monitor
- Measure : Error/Alarm sub-screen
  Measurement Item : Same as the initial settings

(3) Testing reception level
Start the error measurement.
Ensure that the Error count is 0 in Result display on Measure:Error/Alarm sub-screen.

8.4.2 G.704/I.431 1.544M Interface

(1) Setup
Setup the MD6430A and an external attenuator as shown in Fig. 8.4-2.
Use the attenuator with an impedance of 110 Ω.
Attenuate the level of the send output by 26 dB, by adjusting the attenuator.

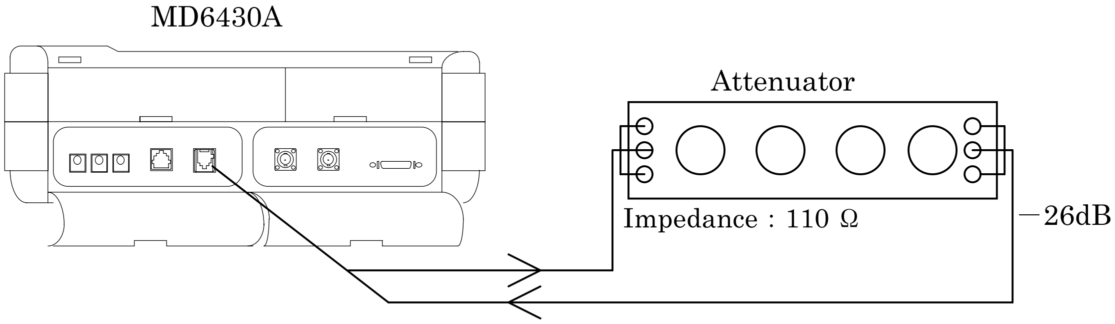


Fig. 8.4-2 Setup for Reception Amplifier Test

(2) Setting MD6430A
Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items.

- Interface screen
  Interface Tx : G.704/I.431 1.544M, Rx : same
  Rx Input level : Monitor
- Measure : Error/Alarm sub-screen
  Measurement Item : Same as the initial settings

(3) Testing reception level
Start the error measurement.
Ensure that the Error count is 0 in Result display on Measure:Error/Alarm sub-screen

8.4.3 G.704/I.431 2.048M Interface

For this interface, 120Ω (balance) and 75Ω (unbalance) impedances are available.
Since the same amplifier is used at both interfaces, this section describes the test using the 75Ω (unbalance) impedance.

(1) Setup
Setup the MD6430A and an external attenuator as shown in Fig. 8.4-3.
Use the attenuator with an impedance of 75Ω, which is same as that of the G.704/I.431 2.048M interface.
Attenuate the level of the send output by 26 dB, by adjusting the attenuator.

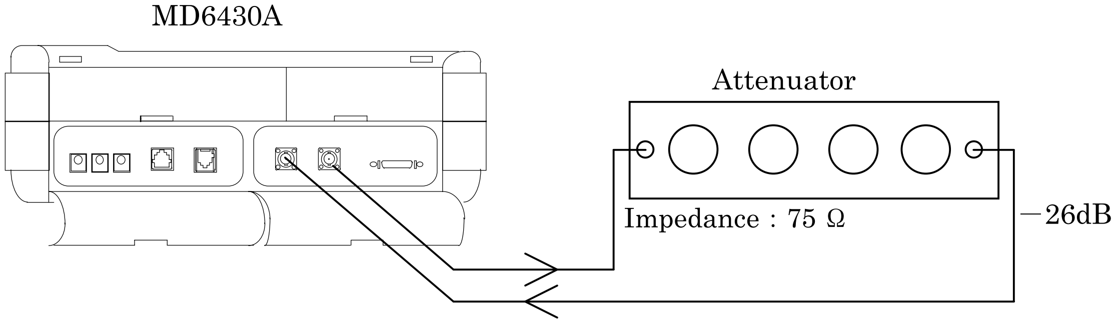


Fig. 8.4-3 Setup for Reception Amplifier Test

(2) Setting MD6430A
Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items.

- Interface on Setup:System sub-screen
  - Interface type : G.704/I.431 2.048M
  - Impedance : 75Ω
- Interface screen
  - Interface Tx : G.704/I.431 2.048M, Rx : same
    - Rx Input level : Monitor
- Measure:Error/Alarm sub-screen
  - Measurement Item : Same as the initial settings

(3) Testing reception level
Start the error measurement.
Ensure that the Error count is 0 in Result display on Measure:Error/Alarm sub-screen.

8.4.4 2M CMI

(1) Setup

The connectors are common between the 2M CMI interface and the G.703 64k interface. Thus, as done in para. 4.1, setup the MD6430A and an external attenuator as shown in Fig. 8.4-3. Use the attenuator with an impedance of 110 Ω, which is same as that of the 2M CMI interface. Attenuate the level of the send output by 26 dB, by adjusting the attenuator.

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2). If the current settings are required, save them in the memory before initialization.

・Interface screen
  Interface Tx : 2M CMI, Rx : same
  Rx Input level : Monitor
・Measure : Error/Alarm sub-screen
  Measurement Item : Same as the initial settings

(3) Testing reception level

Start the error measurement.
Ensure that the Error count is 0 in Result display on Measure:Error/Alarm sub-screen.

8.4.5 G.704 6.312M

(1) Setup

The connectors are common between the G.704 6.312M interface and the G.704/I.431 2.048M (75 Ω) interface. Thus, as done in para. 4.3, connect the MD6430A to an external attenuator as shown in Fig. 8.4-3.
Use the attenuator with an impedance of 75 Ω, which is same as that of the 6.312M interface. Attenuate the level of the send output by 26 dB, by adjusting the attenuator.

(2) Setting MD6430A

Initialize the setting conditions using the same procedure as in para. 8.2.1.1 (2).
If the current settings are required, save them in the memory before initialization.
After initialization, set the following items.

・Interface screen
  Interface Tx : G.704 6.312M, Rx : same
  Rx Input level : Monitor

・Measure : Error/Alarm sub-screen
  Measurement Item : Same as the initial settings

(3) Testing reception level

Start the error measurement.
Ensure that the Error count is 0 in Result display on Measure:Error/Alarm sub-screen.

8.5 Testing Voice CODEC

(1) Setup

Setup the MD6430A and a headset as shown in Fig. 8.5-1.

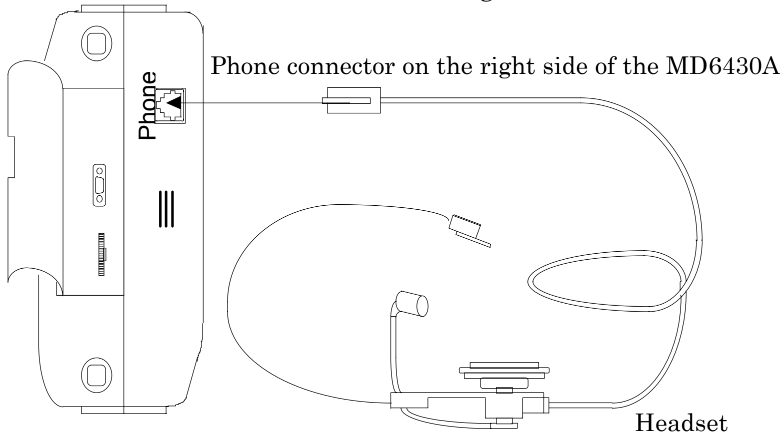


Fig. 8.5-1 Setup for Voice CODEC Test

(2) Setup

Press the "Initial" button on the Setup:Memory sub-screen to initialize the setting conditions.
If the current settings are required, save them in the memory before initialization.
After initializing, set the Tx interface as follows:

・Interface screen

Interface : G.704/I.431 1.544M

Frame	: 24MFP (G.704)
Time slot	: TSn n : any number between 1 and 24 inclusive
Data bit rate	: 64＊n n＝1
Voice channel	: On TSn a slot other than those specified in the Time slot

After setting the Tx interface, set the Rx interface to Self loop.
Set the other items as follows:

・Common on Setup:System sub-screen

CODEC Speaker & Headset vol.	: 4
Speaker enable	: On
PCM Code	: μ-law

(3) Checking voice

Speak some words toward the microphone while putting the headset on.
Make sure that you can hear the voice from both the headphone and the speaker.
Also make sure that you cannot hear the voice from the speaker at Speaker enable: Off. Finally, verify that you can hear the voice at PCM Code: A-law.

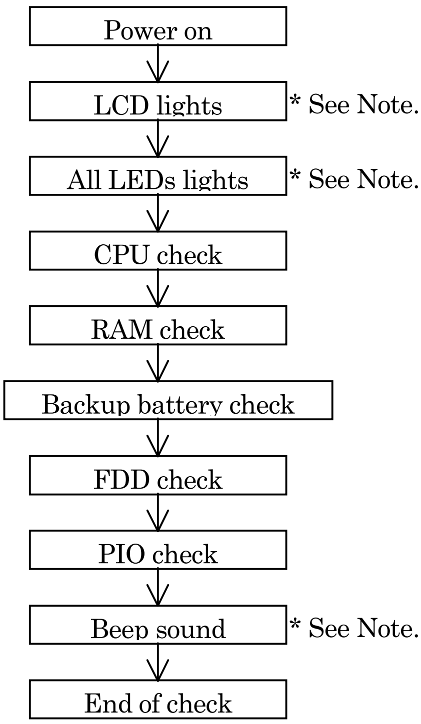
8.6 Self Test

■ Structure of selftest

The MD6430A can perform the following two types of selftests.

- **Checking CPU and peripheral devices**
  Check is performed immediately when the MD6430A is powered on.
  CPU, RAM, FDD, PIO and others are checked.
- **Checking functions of MD6430A**
  Check is performed on the selftest sub-screen of the Setup main screen.
  Functions provided by the MD6430A are checked.

(1) Checking CPU and peripheral devices
When powered on, the MD6430A performs a check in the following procedure.



*Note : Because the LCD and LED lighting checks are not performed, automatically; look them by your eyes. Also, hear the beep sound by your ears.

(2) Checking functions of MD6430A
This check is performed for the following items of the MD6430A functions.

- **Interface test**
  - V.24/V.28(RS-232C)
  - V.35
  - V.36
  - RS-449
  - X.20(RS-423)
  - X.21(RS-422)
  - TTL/CMOS
  - G.703 64k
  - I.430/I.430-a 192k
  - G.704/I.431 1.544M
  - G.704/I.431 2.048M
  - 2.0M CMI
  - G.704 6.312M
- **Measurement test**
  - Character error measurement
  - Frame relay measurement
  - Transmit Delay measurement
  - Line interval delay measurement
  - Frequency measurement
  - Digital level measurement
  - Word Trace measurement (Program pattern)
  - LAPD control measurement

(3) Perform self test

Press the "Setup" button , and then the Setup dialog box appears.
Select the "selftest" button , and then press the "Set" button.
The screen shown in Fig. 8.6-1 appears.
Set "Test mode " item (Fig.8.6-1 ,[1]) and "Test item" item (Fig.8.6-1 , [2])to the interface and measurement system required test.
Press the "Start " button (Fig. 8.6-14 ,[3]),then start selftest.

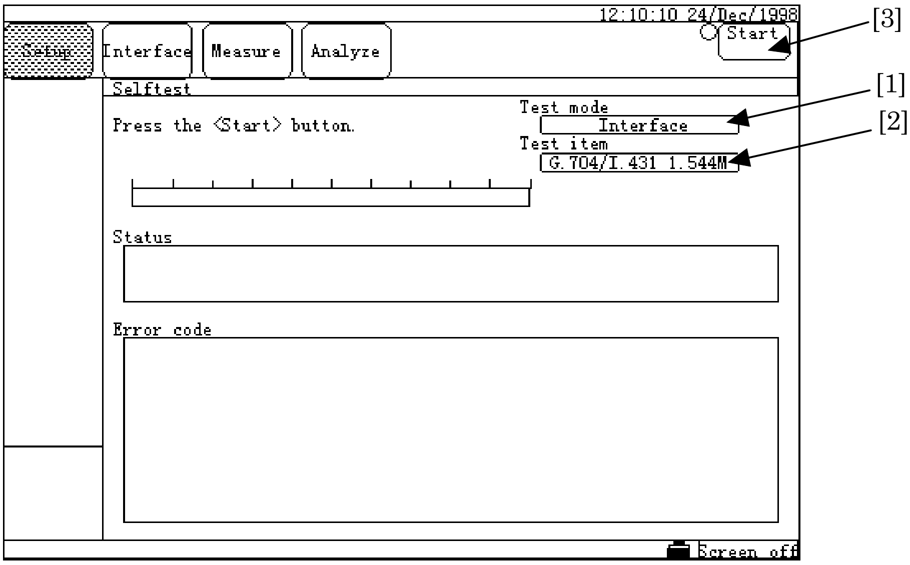


Fig. 8.6-1 Selftest Sub-screen

(4) Result of Selftest
After the specified Selftest item is completed ,display the screen shown in Fig.8.6-2 ,
If the display (Fig. 8.6-2 ,[4]) is "Pass", indicate normal termination.
If the display (Fig. 8.6-2 , [4]) is "Fail" , indicate abnormal termination.
When the selftest result is "Fail", display Error code in Fig.8.6-2,[5].
Error code indicates initial two alphanumeric characters express the test item detected error and next three-digit number express the detail consists of its test item.

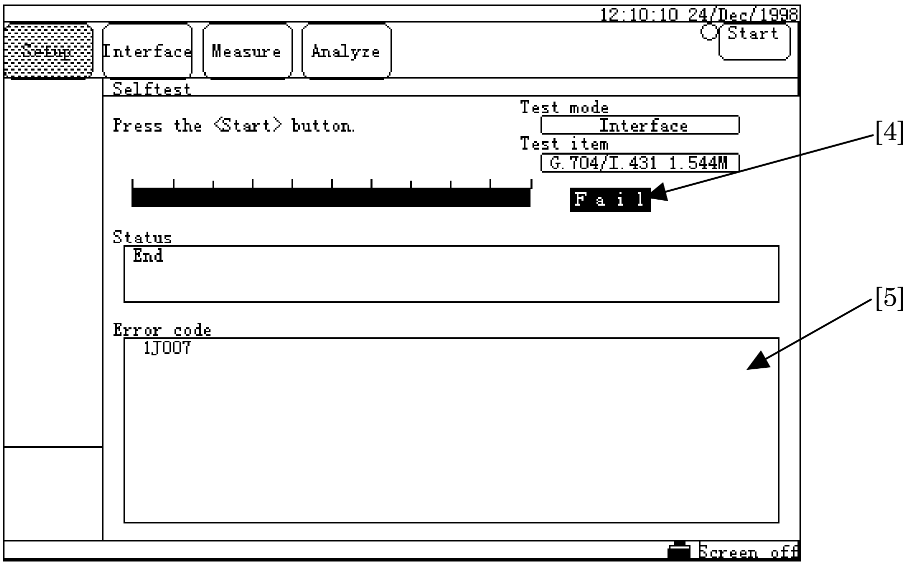


Fig. 8.6-2 Selftest sub-screem

Section 9 Maintenance

9.1 Daily Maintenance

(1) Wipe the dirt on the equipment off with a cloth and neutral detergent.

(2) Vacuum the dust attracted on the equipment with a cleaner.

(3) If attachments are not fixed securely, screw them up with a designated tool.

9.2 Caution on Store

In long-term store of the MD6430A, the following cautions must be taken.

(1) Remove dust and dirt from the equipment before store.

(2) Avoid the followings:
High temperature (≧ 60 ℃), low temperature (≦ 20 ℃) and high humidity (≧ 80%)

(3) Avoid direct sun-light and heavy dust.

(4) Avoid water drops and activated gas.

(5) Avoid oxidation and fluttering.

Recommended conditions for store

In addition to the above, we recommend the following environment when storing the MD6430A for a long time.

(1) Temperature: 5℃ to 30℃

(2) Humidity: 40% to 75%

(3) Changes in temperature and humidity in a day are not so sharp.

9.3 Transportation

For transfer, use the package shipped with the MD6430A, if any. Otherwise, pack the equipment according to the following procedure. Also, with your hands clean and wearing groves, handle the equipment carefully to prevent scratch and blow.

(1) Wipe the dirt and dust on the equipment off with a dry cloth.

(2) Check that there is not loose or missed screw.

(3) Give protection to projections or distortable parts, and cover the equipment with a polyethylene sheet. Moreover, cover it again with a moisture-proofing sheet.

(4) Place the covered equipment in the box, and seal it with sticky tape. In addition, depending on the distance and the way of transfer, put the boxed equipment in a wooden box.

9.4 Adjusting touch panel

■ When you need adjustment

The MD6430A provides the touch panel. Sometimes, the function of a place where you press on the touch panel does not work because the MD6430A cannot identify the place correctly. If it happens, you must adjust the panel through the following procedure.

■ Screen for adjustment

Press the Panel Lock/Local button with powering on. About ten seconds later, the Panel adjust screen shown in Fig. 9.4-1 appears.
Continue to press the Panel Lock/Local button until this screen appears.

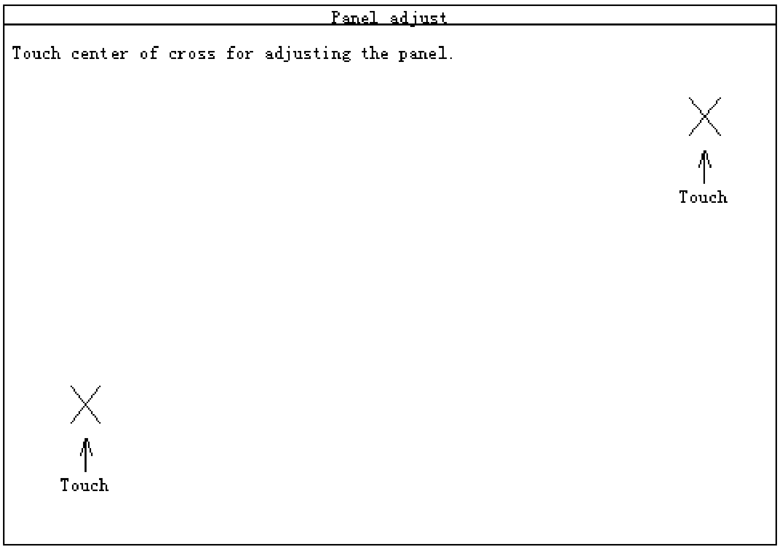


Fig. 9.4-1 Panel Adjust Screen

■ Adjustment procedure

Press marks (x) shown in Fig. 9.4-1 one by one. Any order is available. When you finish pressing both of two marks, the touch panel automatically becomes active. Now, adjustment of the touch panel completes.

9.5 Adjusting time

There are two items used to set time: item for setting time and year/month/date, and item for setting time and date. Here, as shown below, we describe how to set time of the MD6430A.

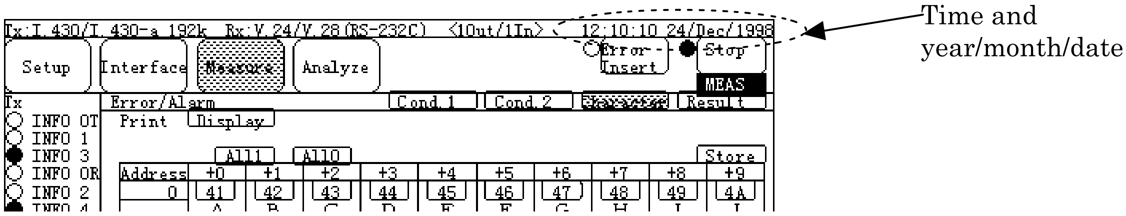


Fig. 9.5-1 The Displayed Place of Time

■ To set time

Items for time and year/month/date of the MD6430A can be set on the Common display of the Setup:System screen.

(1) Switch to the Setup:System screen.

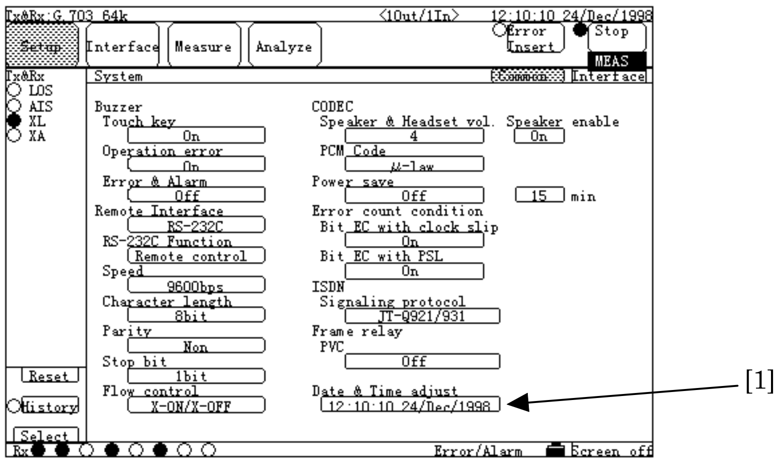


Fig. 9.5-2 Setup:System Screen

(2) To set time, press the "Date & Time adjust" button (Fig. 9.5-1, [1]). The following window appears.

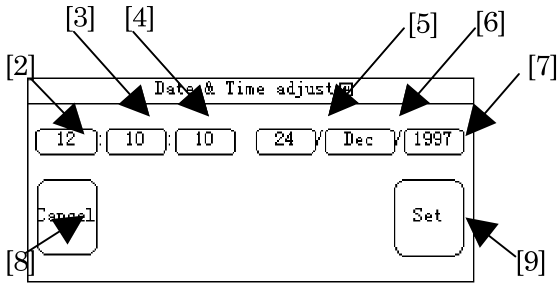


Fig. 9.5-3 Time Setting Window

(3) Press one of the "Time" (Fig. 9.5-3, [2]), "Minute" (Fig. 9.5-3, [3]), "Second" (Fig. 9.5-3, [4]), "Date" (Fig. 9.5-3, [5]), "Month" (Fig. 9.5-3, [6]) and "Year" (Fig. 9.5-3, [7]) buttons. Here, press the "Year" button (Fig. 9.5-3, [7]). The following window appears.

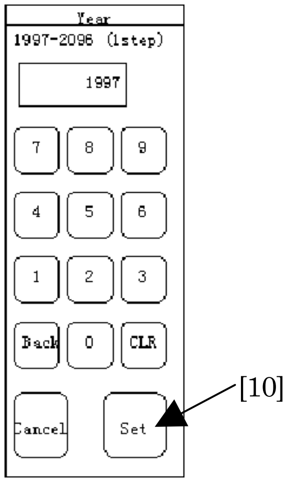


Fig. 9.5-4 Year Setting Window

(4) Enter the desired year.

(5) Next, press the "Set" button (Fig. 9.5-4, [10]).

(6) The year setting window closes and setting of a year completes.

(7) Repeat Steps 4 to 7 to set the "Time", "Minute", "Second", "Date", and "Year" items (the method of entering items other than "Month" is the same as that of the Binary entry window described in 5.4.1 "Entering numeric value". The method for "Month" is the same as that of the "item selection window" described in 5.4.3 "Selection entry". If you need, refer to these paragraphs.)

(8) When you complete, press the "Set" button (Fig. 9.5-3, [9]).

(9) The time set window closes and setting completes.

- When you stop setting, press the "Cancel" button (Fig. 9.5-3, [8]) to reset to the previous setting.

9.6 LCD

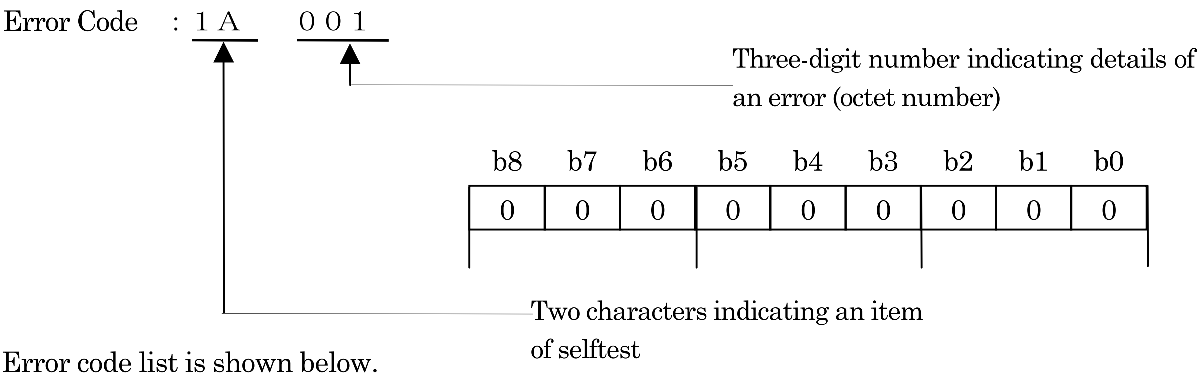
The LCD (Liquid Crystal Display) is likely to get exhausted. When the display becomes dark or difficult to see (in the worst case, cannot see), please contact nearest dealer or our offices listed at the end of this manual and receive support to change the LED.

Appendixes

Appendix A Selftest Error Code List

The selftest of the MD6430A displays error codes for the interface test and the measurement test.

Error codes can be displayed either on the screen of the MD6430A or the response message in remote mode. These codes are consists of two alphanumeric characters and a three-digit number, indicating the item of selftest and the details of the error, respectively, as shown below.
If any error is detected, error code is displayed whenever each test item is completed.



Error code list is shown below.

Table A-1 Error Codes for Interface Test

Alphanumerics	Displayed message	Bit	Error details
1 A	V.24/V.28(RS232C)(Error/Alarm)		Errors are detected in the following tests.
		b0	BERT measurement
		b1	Error insertion
		b2	Signal line send/detect
1 B	V.35(Error/Alarm)		Errors are detected in the following tests.
		b0	BERT measurement
		b1	Error insertion
		b2	Signal line send/detect
1 C	V.36(Error/Alarm)		Errors are detected in the following tests.
		b0	BERT measurement
		b1	Error insertion
		b2	Signal line send/detect
1 D	RS-449 (Error/Alarm)		Errors are detected in the following tests.
		b0	BERT measurement
		b1	Error insertion
		b2	Signal line send/detect
1 E	X.20(RS-423) (Error/Alarm)		Errors are detected in the following tests.
		b0	BERT measurement
		b1	Error insertion
1 F	X.21(RS-422) (Error/Alarm)		Errors are detected in the following tests.
		b0	BERT measurement
		b1	Error insertion
		b2	Signal line send/detect

1 G	TTL/CMOS(Error/Alarm)	 b0 b1	Errors are detected in the following tests. BERT measurement Error insertion
1 H	G.703 64k(Error/Alarm)	 b0 b1 b2	Errors are detected in the following tests. BERT measurement Error insertion Alarm send/detect
1 I	I.430/I.430-a 192k (Error/Alarm)	 b0 b1	Errors are detected in the following tests. BERT measurement Error insertion
1 J	G.704/I.431 1.544M (Error/Alarm)	 b0 b1 b2	Errors are detected in the following tests. BERT measurement Error insertion Alarm send/detect
1 K	G.704/I.431 2.048M (Error/Alarm)	 b0 b1 b2	Errors are detected in the following tests. BERT measurement Error insertion Alarm send/detect
1 L	2M CMI(Error/Alarm)	 b0 b1 b2	Errors are detected in the following tests. BERT measurement Error insertion Alarm send/detect
1 M	G.704 6.312M(Error/Alarm)	 b0 b1 b2	Errors are detected in the following tests. BERT measurement Error insertion Alarm send/detect

Table A-2 Error Codes for Measurement Test

Alphanumerics	Displayed message	Bit	Error details
2 A	Character Error	b0	An error is detected in the following test. BERT measurement
2 B	Frame relay	b0	An error is detected in the following test. Frame relay measurement
2 C	Transmit Delay	b0	An error is detected in the following test.Transmit delay measurement
2 D	Line interval delay	b0	An error is detected in the following test. Line interval delay measurement
2 E	Frequency	b0	An error is detected in the following test. Frequency measurement
2 F	Digital level	b0	An error is detected in the following test. Digital level measurement
2 G	Word trace	b0	An error is detected in the following test. Word trace measurement
2 H	LAPD	b0	An error is detected in the following test. LAPD control check

Appendix B Definition of Measurement Items

■ Error measurement

● Error count

Definition	Measurement range
Number of errors (select one from target errors: Bit, Parity, Code, CRC, Frame, X.50 Frame, 1/8 and E bit.)	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● Error rate

Definition	Measurement range
Error rate Calculated from the error count EC and the received clock count CC, as below. $\text{Error rate} = \dfrac{EC}{CC}$ EC: Error count (number of errors) CC: Received clock count (number of errors clocks) (For the error rate, round the resulted exponent part to the second decimal place.)	“---------“ “<1.00E-15” “0.00E+00” “0.00E-XX” “1.00E-15” to ”9.99E-01” “1.00E+00”

● Block error count

Definition	Measurement range
The number of block errors The user-specified bit length is treated as one block. When one or more errors are detected in a block; the block is counted as a errored block. These errors are summed as a block error count.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● Block error rate

Definition	Measurement range
Rate of block errors Calculated from the block error count BEC and the received block count BC, as below. $\text{Block error rate} = \dfrac{BEC}{BC}$ BEC :Block error count BC :Received block count (For Block error rate, round the resulted exponent part to the second decimal place.)	“---------“ “<1.00E-15” “0.00E+00” “0.00E-XX” “1.00E-15” to ”9.99E-01” “1.00E+00”

● **ES**

Definition	Measurement range
Error Second (ES) The number of seconds during which one or more Error counts occurred.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● **EFS**

Definition	Measurement range
Error Free Second (EFS) The number of seconds during which no Error counts occurred.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● **Clock slip count**

Definition	Measurement range
The number of clock slips A fallen bit and a surplussed bit in a pseudo random pattern are counted for the clock slip. With the read method, when errors in 64 bits are more than 15 bits, and with the scramble method, when errors in 64 bits are less than 3 bits; it is determined as a clock slip. 80 bits (precedent to the bit that is determined as a clock slip) are not counted as bit errors.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● **Clock slip second**

Definition	Measurement range
Clock slip second The number of seconds during which one or more clock slips occurred.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● **PSL Count**

Definition	Measurement range
PSL(Pattern Sync Loss)count When m or more bit errors in n bits are detected, it is counted as a pattern synchronization loss. m/n can be set as follows: Auto,10/100,20/100.25/100,100/300,100/1.0E03,200/1.0E03 250/1.0E03,1.0E03/3.0E03,1.0E03/1.0E04,2.0E03/1.0E04 2.5E03/1.0E04,1.0E04/3.0E04,1.0E04/1.0E05,2.0E04/1.0E05, 2.5E04/1.0E05,1.0E05/3.0E05 When AUTO is set, m/n is set depending on the interface, as follows: For V.24, X.20, and TTL interfaces :100/256 For V.35, X.36, and X.21 64K interfaces :200/512 For the interface with frame :(200 x N)/(512 x N) N is set depending on the speed, as follows: For ≦ 64 kbps: N = 1 For ≦ 192 kbps: N = 2 For ≦ 384 kbps: N = 4 For ≦ 768 kbps: N = 8 For ≦ 1,536 kbps: N = 16 For ≦ 3,072 kbps: N = 32 For ≦ 8,448 kbps: N = 64	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● **Character error**

Definition	Measurement range
The number of character errors When one or more errors in one character are detected, it is counted as one character error.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

■ Error performance measurement

◎Definition of term

- S_{Total} :The total measurement time. This is the total time of measurement excluding the time of power failure.
- S_{Avail} :The available time of measurement. Calculated from the following formula:
  $S_{Avail} = S_{Total} - S_{Unavail}$
- $S_{Unavail}$:The unavailable time of measurement. Same as the US (see below).

● G.821

G.821(1/3)

Item	Definition	Measurement range
ES	Errored Second Within S_{Avail}, the number of seconds during which one or more errors occurred.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
EFS	Error Free Second Within S_{Avail}, the number of seconds during which no errors occurred.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
SES	Severely Errored Second Within S_{Avail}, the number of seconds during which any of the following is detected: ・>10^{-3}Error ・LOS ・LOF	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
US	Unavailable Second The unavailable time of measurement When >10^{-3} error, LOS or LOF continues for ten secon ds, US starts from the beginning of the time. When an item other than SES continues for ten seconds, US ends at one second before the tim e. First, the time (when determining the start of US) is not counted as US, and then if determined, the US is recounted. First, the time (when determining the end of US) is counted as US, and then if determined, the US is recounted. In a word, the value of US may be reduced later. The same is applied to other items. When the current measurement is completed during determination of US, and the next measurement starts; the counter for determination is reset at the beginning of the next measurement.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"

G.821(2/3)

Item	Definition	Measurement range
AT	Available Time The available time of measurement (S_{Avail}) $S_{Avail} = S_{Total} - S_{unavail}$	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”
%ES	The ratio of errored seconds in S_{Avail} $\%ES = \dfrac{ES}{S_{Avail}} \times 100$	“-------“ “0.00%” to ”100.00%”
%EFS	The ratio of no-errored seconds in S_{Avail} $\%EFS = 100 - \%ES$	“-------“ “0.00%” to ”100.00%”
%SES	The ratio of SES occurred seconds in S_{Avail} $\%SES = \dfrac{SES}{S_{Avail}} \times 100$	“-------“ “0.00%” to ”100.00%”
%US	The ratio of unavailable seconds in S_{Total} $\%US = \dfrac{US}{S_{Total}} \times 100$	“-------“ “0.00%” to ”100.00%”
%AT	The ratio of available time in S_{Total} $\%AT = \dfrac{AT}{S_{Total}} \times 100$	“-------“ “0.00%” to ”100.00%”
%DM	The ratio of degrade minute in S_{Avail} $M_{Avail} = \left[\dfrac{S_{Avail}}{60} \right] INT$ []INT means to raise the decimal part to an integer. $\%DM = \dfrac{DM}{M_{Avail}} \times 100$	“-------“ “0.00%” to ”100.00%”

G.821(3/3)

Item	Definition	Measurement range
AnD%ES	%ES converted by 64 kbps basis, according to ITU-T G.821 Annex D *1 $$ESa = \sum_{i=1}^{i=j} (n/N)\,i$$ $$AnD\%ES = \frac{ESa}{S_{Avail}} \times 100$$ $j = S_{Avail}$ n : The number of one-second errors occurred during the i-th second of S!!!Avail!!! N: The number of bits for error measurement per one second, converted by 64 kbps basis *1) $0 < n < N \;:\; \frac{n}{N}$ $n \geqq N \;:\; 1$	"-------" "0.00%" to "100.00%"

- **G.826**

G.826(1/2)

Item	Definition	Measurement range
EB	Errored Block When one or more errors in a block are detected during S_{Avail}, the block is counted as EB.	"--------" "0"to "999999" "1.00E06" to "9.99E15" ">9.99E15"
ES	Error Second Within S_{Avail}, the number of seconds during which one or more EBs occurred.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
SES	Severely Errored Second The number of seconds during which any of the followings is detected: ・EB ≧ 30% ・More than one SDP (Severely Disturbed Period) Note: SDP is the period during which LOS, AIS or LOF occurred.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
BBE	Background Block Error EB that excludes blocks which are determined as SES or US.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
ESR	Errored Second Ratio The ratio of ES in S_{Avail} $ESR = \frac{ES}{S_{Avail}}$	"---------" "<1.00E-15" "0.00E+00" "0.00E-XX" "1.00E-15" to "9.99E-01" "1.00E+00"
SESR	Severely Errored Second Ratio The ratio of SES in S_{Avail} $SESR = \frac{SES}{S_{Avail}}$	"---------" "<1.00E-15" "0.00E+00" "0.00E-XX" "1.00E-15" to "9.99E-01" "1.00E+00"
BBER	Background Block Error Ratio The ratio of BBE to all blocks (excluding SES) in S_{Avail} $BBER = \frac{BBE}{(S_{Avail} - SES) \times BNo}$ BNo : Number of Blocks in a second	"---------" "<1.00E-15" "0.00E+00" "0.00E-XX" "1.00E-15" to "9.99E-01" "1.00E+00"

G.826(2/2)

Item	Definition	Measurement range
US	Unavailable Second The unavailable time of measurement (sec.) When ≧ 30% EB, or one or more SDP continues for ten seconds, US starts from the beginning of the time. When an item other th an SES continues for ten seconds, US ends at one second before the time. First, the time (when determining the start of US) is not counted as US, and then if determined, the US is recounted. First, the time (when determining the end of US) is counted as US, and then if determined, the US is recounted. In a word, the value of US may be reduced later. The same is applied to other items. When the current measurement is completed during determination of US, and the next measurement starts; the counter for determination is reset at the beginning of the next measurement.	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
AT	Available Time The available time of measurement (S_{Avail}) $S_{Avail} = S_{Total} - S_{unavail}$	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"

- **M.2100**

M.2100

Item	Definition	Measurement range
ES	Receive Errored Second The same as that of the G.821	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
SES	Receive Severely Errored Second The same as that of the G.821	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
US	Receive Unavailable second The same as that of the G.821	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
AT	Available Time The available time of measurement (S_{Avail}) $S_{Avail} = S_{Total} - S_{unavail}$	"--------" "0" to "999999" "1.00E06" to "9.99E15" ">9.99E15"
Test	Receive Test Determined results are displayed, based on the thresholds (S1 and S2) that are set for ES, SES and US, as follows: ・When measured result < S1 : Acceptable ・When S1 ≦ measured result ≦ S2 : Degraded ・When S2 < measured result : Unacceptable The Test displays the worst one among the determined results of ES, SES and US.However, when thresholds for ES, SES and US are all off, this item is not displayed.	"------------" "Acceptable" "Degraded" "Unacceptable"

■ HDLC measurement

● Bad frame count

Definition	Measurement range
Any of the following frames is detected and counted: ・Short frame ・Long frame ・FCS error frame ・Fragment frame	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

● Abort frame count

Definition	Measurement range
Frames including more than six successive "1"s are detected, and counted.	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

■ Alarm measurement

● Power fail

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Occurrence time of power failure (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>All interfaces</td><td>When power failure (including power switch off) is detected.</td><td>When power recovery (including power switch on) is detected.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● PSL

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Pattern Sync Loss
Occurrence time of pattern synchronization loss (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>All interfaces</td><td>The same as that of synchronization loss</td><td>24-bit successive error free</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● OPD

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Octet Pattern Detect
Detection time of octet pattern matching (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>All interfaces</td><td>When more than 4 bytes of the OPD pattern are detected.</td><td>When 10 bits of errors in 100 bits are detected.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● FLGL

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>HDLC FLaG Loss
Occurrence time of HDLC flag synchronization loss (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>All interfaces</td><td>When no flags in 3 bytes of long flame is detected.</td><td>In the flag idle state or when one or more GOOD frames are received.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **ALL0**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Occurrence time of specified-length or more "0" pattern of measurement signal (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>All interfaces</td><td>When 64 successive 0s are detected.</td><td>When one or more 1s are detected.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **ALL1**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Occurrence time of specified-length or more "1" pattern of measurement signal
(in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>All interfaces</td><td>When 64 successive 1s are detected.</td><td>When one or more 0s are detected.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **LOS**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Loss Of Signal
Occurrence time of signal loss (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>64k</td><td>When no pulses are detected for 64 clocks.</td><td>When one or more pulses are detected.</td></tr>
<tr><td>I.430 192k
(Detection of INFO 0)</td><td>When no pulses are detected for 48 clocks.</td><td>When one or more pulses are detected.</td></tr>
<tr><td>G.704/I.431
1.544M</td><td>When 175 spaces are received, successively.</td><td>When 12.5% mark density is detected.</td></tr>
<tr><td>G.704/I.431
2.048M</td><td>When 32 spaces are received, successively.</td><td>When 12.5%-mark density is detected.</td></tr>
<tr><td>2M CMI</td><td>When no pulses are detected for 2048 clocks.</td><td>When one or more pulses are detected.</td></tr>
<tr><td>G.704 6.312M</td><td>When data 0 is detected for 20 to 32 clocks.</td><td>When return of receive signal is detected.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **LOF**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>
Loss Of Frame
Occurrence time of frame synchronization loss (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>I.430 192k</td><td>When code violation is detected successively for three frames.</td><td>When no code violations are detected within the time equivalent to three frames.</td></tr>
<tr><td>G.704/I.431
1.544M 24MFP
*24ST</td><td>When erroneous multiframes are detected successively for four frames.</td><td>When normal multiframes are detected successively for two frames.</td></tr>
<tr><td>G.704/I.431
1.544M 12MFP
*12ST</td><td>When erroneous multiframes are detected successively for four frames.</td><td>When normal multiframes are detected successively for two frames.</td></tr>
<tr><td>G.704/I.431
2.048M 16MFP</td><td>When erroneous multiframes are detected successively for three frames.</td><td>When normal multiframes are detected successively for one frame.</td></tr>
<tr><td>G.704/I.431
2.048M 2MFP</td><td>When erroneous multiframes are detected successively for three frames.</td><td>When normal multiframes are detected successively for one frame.</td></tr>
<tr><td>2M CMI PBX</td><td>When erroneous multiframes are detected successively for two frames.</td><td>When normal multiframes are detected successively for one frame.</td></tr>
<tr><td>2M CMI CRV</td><td>When erroneous multiframes are detected successively for two frames.</td><td>When normal multiframes are detected successively for one frame.</td></tr>
<tr><td>G.704 6.312M
4MFP
*4ST</td><td>When erroneous multiframes are detected successively for seven frames.</td><td>When normal multiframes are detected successively for three frames.</td></tr>
</table>
</td><td>
“--------“
“0” to ”999999”
“1.00E06” to ”9.99E15”
“>9.99E15”
</td></tr>
</table>

* : For MU643000K

● **MF Loss**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Multi Frame Loss
Occurrence time of multiframe synchronization loss (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>G.704/I.431
2.048M 30B+D</td><td>When erroneous multiframes are detected successively for two frames.</td><td>When normal multiframes are detected successively for one frame.</td></tr>
<tr><td>I.430 192k</td><td>When it is detected that the M bit of the first multi-frame is 0.Or when it is detected that one or more of the M bits of other than the first multi-frame is 1.</td><td>When it is detected that the M bit of the first multi-frame is 1, and also when it is detected that all the M bits of other than the first multi-frame are 0.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06”
to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **AIS**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>
Alarm Indicator Signal
Occurrence time of AIS alarm (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>64k</td><td>When less than three 0s in 512 bits are detected.</td><td>When more than two 0s in 512 bits are detected.</td></tr>
<tr><td>G.704/I.431 1.544M (24MFP,12MFP, *24ST, *12ST Unframe)</td><td>When less than two 0s in 24 frames (4,632 bits) are detected.</td><td>When more than one 0 in 24 frames (4,632 bits)is detected.</td></tr>
<tr><td>G.704/I.431 2.048M (16MFP,2MFP, Unframe)</td><td>When less than three 0s in 2 frames (512 bits) are detected.If patterns other than FSA are all 1, it is not determined as AIS.</td><td>When more than two 0s in 2 frames (512 bits) are detected.Or, FAS is recovered.</td></tr>
<tr><td>2M CMI(PBX,CRV, Unframe)</td><td>When less than three 0s in 8 frames (2,048 bits) are detected.If patterns other than FSA are all 1, it is not determined as AIS.</td><td>When more than two 0s in 8 frames (2,048 bits) are detected.Or, FAS returns.</td></tr>
<tr><td>G.704 6.312M (4MFP, *4ST, Unframe)</td><td>When less than three 0s in 4 frames (3,156 bits) are detected.</td><td>When more than two 0s in 4 frames (3,156 bits) are detected.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06” to ”9.99E15”
“>9.99E15”</td></tr>
</table>

* : For MU643000K

● **XL**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>
X.50 frame Loss
Occurrence time of X.50 frame synchronization loss (in unit of second)
<table>
<tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr>
<tr><td>X.50 20 multi-interface</td><td>When more than 15 of F bits in 32 bits are not match.</td><td>When six F bits are matched successively.</td></tr>
<tr><td>X.50 80 multi-interface</td><td>Error rate < 10!!!-4!!!.</td><td>Synchronization established within 120 envelopes.</td></tr>
</table>
</td><td>“--------“
“0” to ”999999”
“1.00E06” to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **XA**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>X.50 Alarm
Occurrence time of X.50 alarm (in unit of second)
<table><tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr><tr><td>X.50 20/80 multi-interfaces</td><td>When A bit is detected as 0.</td><td>When A bit is detected as 1.</td></tr></table></td><td>“--------“
“0” to ”999999”
“1.00E06” to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **SA**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Send Alarm
Occurrence time of Send Alarm (in unit of second)
<table><tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr><tr><td>2M
CMI(PBX,CRV)</td><td>When the SA bit is detected as 1.</td><td>When the SA bit is detected as 0.</td></tr><tr><td>G.704 6.312M
4MFP</td><td>When the SA bit is detected as 1.</td><td>When the SA bit is detected as 0.</td></tr></table></td><td>“--------“
“0” to ”999999”
“1.00E06" to ”9.99E15”
“>9.99E15”</td></tr>
</table>

● **RAI**

<table>
<tr><th>Definition</th><th>Measurement range</th></tr>
<tr><td>Remote Alarm Indication
Occurrence time of RAI alarm (in unit of second)
<table><tr><th>Interface</th><th>Detection condition</th><th>Reset condition</th></tr><tr><td>G.704/I.431 1.544M
24MFP(G.704)
*24ST(G.704)</td><td>When 1111111100000000 is detected 16 times, successively.</td><td>When 1111111100000000 is not matched four times, successively.</td></tr><tr><td>G.704/I.431 1.544M
24MFP(NTT)
*24ST(NTT)</td><td>When the M bit is detected as 1.</td><td>When the M bit is detected as 0.</td></tr><tr><td>G.704/I.431 1.544M
12MFP
*12ST</td><td>When the SA bit is detected as 1.</td><td>When the SA bit is detected as 0.</td></tr><tr><td>G.704/I.431 2.048M
16MFP
2MFP</td><td>When the RAI bit is detected as 1.</td><td>When the RAI bit is detected as 0.</td></tr><tr><td>G.704 6.312M
4MFP
*4ST</td><td>When 1111111100000000 is detected 16 times successively.</td><td>When 1111111100000000 is not matched four times successively.</td></tr></table></td><td>“--------“
“0” to ”999999”
“1.00E06” to ”9.99E15”
“>9.99E15”</td></tr>
</table>

* : For MU643000K

● **Disconnection**

Definition	Measurement range
Indicates whether disconnection of ISDN call occurs or not during measurement.	“-------“ “ ” “Occured”

Interface	Detection condition	Reset condition
I. 430 192k G.704/I.431 1.544M G.704/I.431 2.048M	When call is disconnected during measurement.	—

● **ST LOF***

Definition	Measurement range
ST frame Loss Of Frame Occurrence time of ST frame synchronization loss (in unit of second)	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

Interface	Detection condition	Reset condition
G.704/I.431 1.544M 24ST 12ST 2M CMI ST G.704/I.431 6.312M 4ST	When continuous 4 abnormal ST frames are detected.	When continuous 4 normal ST frames are detected.

* : For MU643000K

● **HG AIS***

Definition	Measurement range
Handling Group Alarm Indication Signal Occurrence time of AIS alarm for ST frame in the corresponding HG (in unit of second)	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

Interface	Detection condition	Reset condition
G.704/I.431 1.544M 24ST 12ST 2M CMI ST G.704/I.431 6.312M 4ST	When "1" for continuous 16 bit in ST frame of corresponding HG are detected.	When "0" in ST frame of corresponding HG is detected.

* : For MU643000K

● **BAIS***

Definition	Measurement range
handling group Backward Alarm Indication Signal Occurrence time of BAIS alarm for ST frame in the corresponding HG (in unit of second)	“--------“ “0” to ”999999” “1.00E06” to ”9.99E15” “>9.99E15”

Interface	Detection condition	Reset condition
G.704/I.431 1.544M 24ST 12ST 2M CMI ST	When "0" at B bit in ST frame of corresponding HG is detected.	When "1" at B bit in ST frame of corresponding HG is detected.
G.704/I.431 6.312M 4ST	When "0" at SP bit in ST frame of corresponding HG is detected.	When "1" at SP bit in ST frame of corresponding HG is detected.

* : For MU643000K

Appendix C　Format of Protocol-Monitor Data

Indicates the format of the protocol-monitor data (to show on screen, print, and save to FD) during ISDN connection and Frame relay measurement.

- A example of protocol-monitor data showing on screen during ISDN connection.

```
[1]      [2]      [3][4]  [5]       [6]       [7]
998 12:34:56.9 > I  ALERT    TEI=  0  CR=  1
               00010203 04                          [8]
999 12:34:57.0 < I  CALLPROC TEI=  0  CR=  2
               00010203 04
000 12:34:58.1 > I  CONN     TEI=  0  CR=  3
               00010203 04
001 12:34:59.7 < I  CONNACK  TEI=  0  CR=  4
               00010203 04
002 12:35:00.3 < I  DISC     TEI=  0  CR=  5
               00010203 04050607 08090A0B 0C0D0E0F
               10111213 14151617 18191A1B 1C1D1E1F
               20212223 24
003 12:35:01.8 > I  NOTIFY   TEI=  0  CR=  6
               00010203 04050607
004 12:35:02.6 < ?? ????????
               00010203 04
                      .
                      .
                      .
                      .
```

[1]Frame Number

Repeats the number from 000 to 999.

No function to set the number 0.(function to reset)

No function of 0-suppress processing.

[2]Received Time

Hour, Minute, Second (Unit of 100ms)

[3]Direction

>	: Sent message (MD6430A → NW)
<	: Received message (MD6430A ← NW)

[4]Type of Frame

I	: I frame
UI	: UI frame
??	: others

[5]Types of message

～Layer 3 message～

ＡＬＥＲＴ	：ALERTING
ＣＡＬＬＰＲＯＣ	：CALL PROCEEDING
ＣＯＮＮ	：CONNECT
ＣＯＮＮＡＣＫ	：CONNECT ACKNOWLEDGE
ＰＲＯＧ	：PROGRESS
ＳＥＴＵＰ	：SETUP
ＳＥＴＵＰＡＣＫ	：SETUP ACKNOWLEDGE
ＲＥＳ	：RESUME
ＲＥＳＡＣＫ	：RESUME ACKNOWLEDGE
ＲＥＳＲＥＪ	：RESUME REJECT
ＳＵＳＰ	：SUSPEND
ＳＵＳＰＡＣＫ	：SUSPEND ACKNOWLEDGE
ＳＵＳＰＲＥＪ	：SUSPEND REJECT
ＵＳＥＲＩＮＦＯ	：USER INFORMATION
ＤＩＳＣ	：DISCONNECT
ＲＥＬ	：RELEASE
ＲＥＬＣＯＭ	：RELEASE COMPLETE
ＲＥＳＴ	：RESTART
ＲＥＳＴＡＣＫ	：RESTART ACKNOWLEDGE
ＳＥＧＭＥＮＴ	：SEGMENTING
ＣＯＮＧ	：CONGESTION CONTROL
ＩＮＦＯ	：INFORMATION
ＦＡＣＩＬＩＴＹ	：FACILITY
ＮＯＴＩＦＹ	：NOTIFY
ＳＴＡＴ	：STATUS
ＳＴＡＴＥＮＱ	：STATUS ENQUIRY
？？？？？？？？	：OTHERS

[6]TEI Value (TEI)

0 to 127 (decimal data)

Shows the data right justified and done 0-suppress processing

If the TEI value cannot confirm,this term isn't shown.

[7]Call number (CR)

1 to 127 (decimal data)

Shows the data right justified and done 0-suppress processing

If the call number cannot confirm, this term isn't shown.

[8]Indicates firsthand data

Show the (hexadecimal) data of the information field.

If the information field cannot confirm, this term isn't shown.

- A example of the protocol-monitor data showing on screen during Frame relay measurement.

```
[1]       [2]       [3] [4]       [5]       [6]       [7]

998 12:34:56.9 > STATENQ  Type=0   Ns=  1   Nr=  0
                 00010203 04
999 12:34:57.0 < STAT     Type=0   Ns=  1   Nr=  1
                 00010203 04
000 12:34:58.1 > STATENQ  Type=1   Ns=  2   Nr=  1
                 00010203 04
001 12:34:59.7 < STAT     Type=1   Ns=  2   Nr=  2
                 00010203 04
002 12:35:00.3 < CLLM     Cause=03h                [8]
                 00010203 04050607 08090A0B 0C0D0E0F
                 10111213 14151617 18191A1B 1C1D1E1F
                 20212223 24
003 12:35:01.8 > CR       CR=  1                   [9]
                 00010203 04050607
004 12:35:02.6 < ????????
                 00010203 04                       [10]
                      .
                      .
                      .
```

[1]Frame Number

Repeats the number from 000 to 999.

No function to set the number 0.(function to reset)

No function of 0-suppress processing.

[2]Received Time

Hour, Minute, Second (Unit of 100ms)

[3]Direction

＞　　　　　　　　: Sent message (MD６４３０A　→　NW)

＜　　　　　　　　: Received message (MD６４３０A　←　NW)

[4]Types of message

～Message for Frame Relay(FR)～

ＣＲ	：CALL REQUEST
ＣＡ	：CALL ACCEPTANCE
ＣＱ	：CLEAR REQUEST
ＣＦ	：CLEAR CONFIRMATION
ＳＩ	：RESTART INDICATION
ＲＩ	：RESET INDICATION
ＤＴ	：DATA

～Message for CLLM～

ＣＬＬＭ	：CLLM Message

～Message for PVC status confirmation～

ＳＴＡＴＥＮＱ	：STATUS ENQUERY
ＳＴＡＴ	：STATUS INDICATION

～Other Messages～

？？？？？？？？	：OTHERS

[5]Types of Report (Type)

0	：Indecates that status is full(enough).
1	：Confirms that link is completely.
2	：Indicates that single PVC is the unsyncronize state.

If the types of report cannot confirm, this term isn't shown.

[6]Sent sequence Number(Ns)

1 to 255 (decimal number)

Shows the data right justified and done 0-suppress processing

If the sent sequence number cannot confirm,this term isn't shown.

[7]Received sequence Number(Nr)

1 to 255 (decimal number)

If the received sequence number cannot confirm, this term isn't shown.

[8]Indecates Cause (Cause)

Indecates the (Hexdecimal) number corresponding to cause.

If the Cause cannot confirm, this term isn't shown.

[9]Call number (ＣＲ)

1 to 127 (decimal number)

Shows the data right justified and done 0-suppress processing

If the call number cannot confirm, this term isn't shown.

[10]Indicates firsthand data

Shows the (hexdecimal) data from address field to information field.

If the data from address field to information field cannot confirm, this term isn't shown.

Appendix D　Format of file contents saved in FD

Data formats for character pattern data, program data, trace data and Error/Alarm graph data saved with the Text format are as follows.

- **Character pattern data (Text format)**

```
[1] ;MD6430A Character data <Copyright ANRITSU Corp.>↓
    ;Boundary = 8↓
[2] data: ↓
[3] 41,42,43,44,45,46,47,48,49,4A,4B,4C,4D,4E,4F,50,51,52,53,54,55,56,57,58,59↓
    30,31,32,33,34,35,36,37,38,39, ・・・・・・
    ・・・・,03,04,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF↓
```

[1] Comment line

[2] Key line

[3] Data line

Notation : Hexadecimal with each byte separated by a comma, 25-byte data per line

Total data amount : 1 kbytes, fixed data length

- **Program data (Text format)**

```
[1] ;MD6430A Program data <Copyright ANRITSU Corp.>↓
    ;Boundary = 8↓
[2] data:↓
[3] 41,42,43,44,45,46,47,48,49,4A,4B,4C,4D,4E,4F,50,51,52,53,54,55,56,57,58,59↓
    30,31,32,33,34,35,36,37,38,39, ・・・・・・
    ・・・・,03,04,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF↓
```

[1] Comment line

[2] Key line

[3] Data line

Notation : Hexadecimal with each byte separated by a comma, 25-byte data per line

Total data amount : 128 kbytes, fixed data length

- **Trace data (Text format)**

```
[1] ;MD6430A Trace data <Copyright ANRITSU Corp.>↓
    ;Boundary = 8↓
    ;Shift = 0↓
    ;Invert = Off↓
    ;Reverse = Off↓
    ;Stop trigger address = 123↓
[2] ;Stop address = 456↓
[3] data:
    41,42,43,44,45,46,47,48,49,4A,4B,4C,4D,4E,4F,50,51,52,53,54,55,56,57,58,59↓
    30,31,32,33,34,35,36,37,38,39,・・・・・・
    ・・・・,03,04↓
```

[1] Comment line

;Stop triger address : Trace stop trigger address
(when there is no trace stop trigger address, this item is not displayed.)

;Stop address : Trace stop address
(when there is no trace stop address, this item is not displayed.)

[2] Key line

[3] Data line

Notation : Hexadecimal with each byte separated by a comma, 25-byte data per line

Total data amount : 128 kbytes, fixed data length

- **Protocol monitor data（Text format）**

```
[1] ;MD6430A Protocol monitor <Copyright ANRITSU Corp.>↓
[2]  009 12:35:07.1 < I  STAT     TEI=  0  CR= 12↓
                    00010203 04050607 08090A0B 0C0D0E0F↓
                    10111213 14151617 18191A1B 1C1D1E1F↓
                                  ・
                                  ・
```

[1] Comment line

[2] Data line

Notation :The same as format on Appendix C.

- **Error/Alarm graph data (Text format)**

```
[1] "MD6430A Histogram <Copyright ANRITSU Corp.>","1 sec","","","","","","",
    "","","","","","","","","","","","",""↓
[2] "Date","Time","Bit Error count","Bit Error rate","All","P-fail","PSL","OPD",
    "FLGL","ALL0","ALL1","LOS","LOF","MF Loss","AIS","SA","XL","XA","RAI",
    "Discon.","M-Full"↓
[3] "27/Sep/1998","12:10:23",326,1.26E07,">9.99E15",">9.99E15",">9.99E15",
    ">9.99E15",">9.99E15",">9.99E15",">9.99E15",">9.99E15",">9.99E15",">9.99E15",
    ">9.99E15",">9.99E15",">9.99E15",">9.99E15",">9.99E15",">9.99E15",">9.99E15"↓
                                        .
                                        .
```

[1] Data type and settings

Total two items: The data type and the Histogram resolution item of the Measure:Error/Alarm screen

[2] Data format

Total 21 items: Date (1), time (1), Bit Error count (1), Bit Error rate (1) and alarm (17)

[3] Data line

Date: Day/Month/Year

Time: Hour:Minute:Second

Bit error count

For 0 ≦ value ≦ 999999 : Displayed by Integer.

For 1.00E06 ≦ value ≦ 9.99E-01 : Displayed by "X.XXE-XX" .

For 9.99E15 < value : Displayed by ">9.99E15"

No data : Displayed nothing.("")

Bit error rate

Value = 0: Displayed by "0.00E-XX"

Value < 1.00E-15: Displayed by "1.00E-15"

1.00E-15 ≦ value ≦ 9.99E-01 :Displayed by "X.XXE-XX"

Count = 0 and population parameter = 1:Displayed by "00E+00"

No data :Displayed nothing("")

Alarm (Discon and M-Full)

Alarm occurred : "Occurred"

No alarm occurred : "_______"

No data : Displayed nothing ("")

Alarm (others)

For 0 ≦ value ≦ 999999 : Displayed by Integer.

For 1.00E06 ≦ value ≦ 9.99E-01 : Displayed by "X.XXE-XX"

For 9.99E15 < value : Displayed by ">9.99E15"

No data : Displayed nothing("")

Appendix E

Performance Test Results Entry Sheet

Tested at : ______________________　　Report No.　: ______________________

______________________________　　Date　: ______________________

______________________________　　Tested by　: ______________________

Instrument name:　MD6430A　Network Data Analyzer

Serial No. : ______________________　　Ambient temperature　: ________ ℃

Power frequency : __________ Hz　　Relative humidity　: ________ %

Remarks :

____

____

____

MD6430A　NETWORK DATA ANALYZER　　No. 1／2　　Date________

Test item Pulse mask	Specifications Minimum value	Results	Specifications Maximum value	Passed/Failed
Interface　64k Output level : $1V_{0-p}$	$0.9V_{0-p}$		$1.1V_{0-p}$	
Interface　192k Output level : $0.75V_{0-p}$	$0.68V_{0-p}$		$0.83V_{0-p}$	
Interface　1.544M Output level : $3V_{0-p}$	$2.7V_{0-p}$		$3.3V_{0-p}$	
Interface　2.048M (120Ωbalance) Output level : $3V_{0-p}$	$2.7V_{0-p}$		$3.3.V_{0-p}$	
Interface　2.048M (75Ωunbalance) Output level : $2.37V_{0-p}$	$2.13V_{0-p}$		$2.61V_{0-p}$	
Interface　6.312M Output level : $2V_{0-p}$	$1.8V_{0-p}$		$2.2V_{0-p}$	

MD6430A NETWORK DATA ANALYZER No. 2／2 Date________

Test item Send Clock Test	Specifications Minimum value	Results	Specifications Maximum value	Passed/Failed
Interface V. 35 bit rate 10000000bit/s 10000000Hz	−5ppm		+5ppm	
Interface 64k 64kHz	−5ppm		+5ppm	
Interface 1.544M 1.544MHz	−5ppm		+5ppm	
Interface 2.048M 2.048MHz	−5ppm		+5ppm	
Interface 6.312M 6.312MHz	−5ppm		+5ppm	
Test item Reception Amplifier Test	Specifications Minimum value	Results	Specifications Maximum value	Passed/Failed
Interface 64k 26dBMonitor				
Interface 1.544M 26dBMonitor				
Interface 2.048M 26dBMonitor				
Interface 2M CMI 26dBMonitor				
Interface 6.312M 26dBMonitor				
Test item Voice CODEC Test	Specifications Minimum value	Results	Specifications Maximum value	Passed/Failed
Interface 1.544M μ-law				
Interface 1.544M A-law				

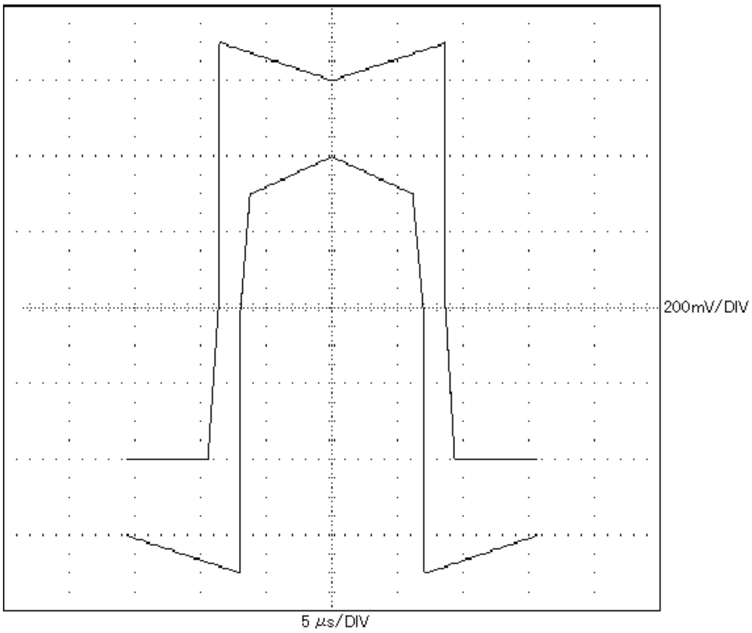


Fig. E-1　G.703 64k Centralized clock Interface

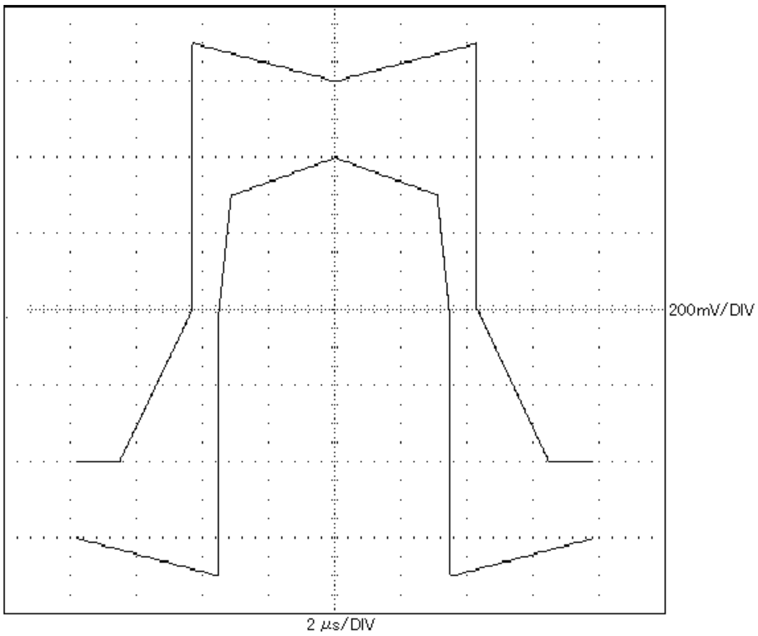


Fig. E-2　G.703 64k Codirectional Interface（Double pulse）

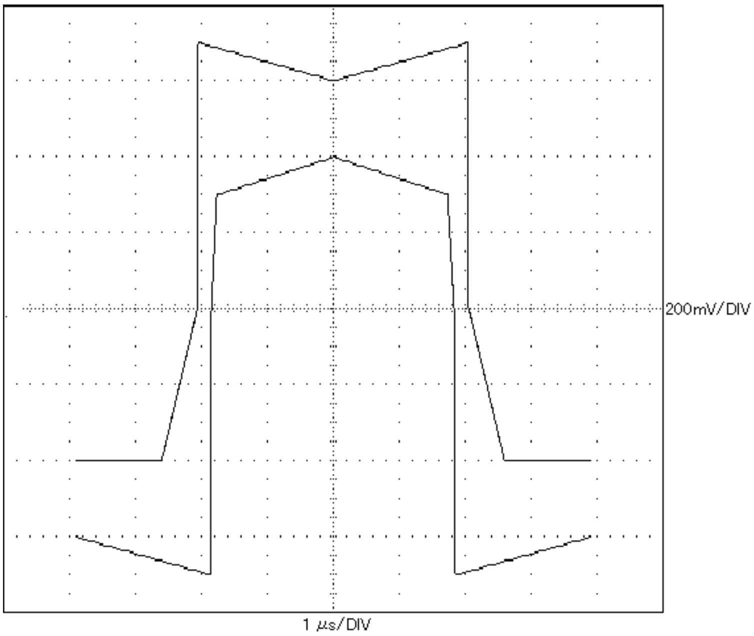


Fig. E-3 G.703 64k Codirectional Interface（Single pulse）

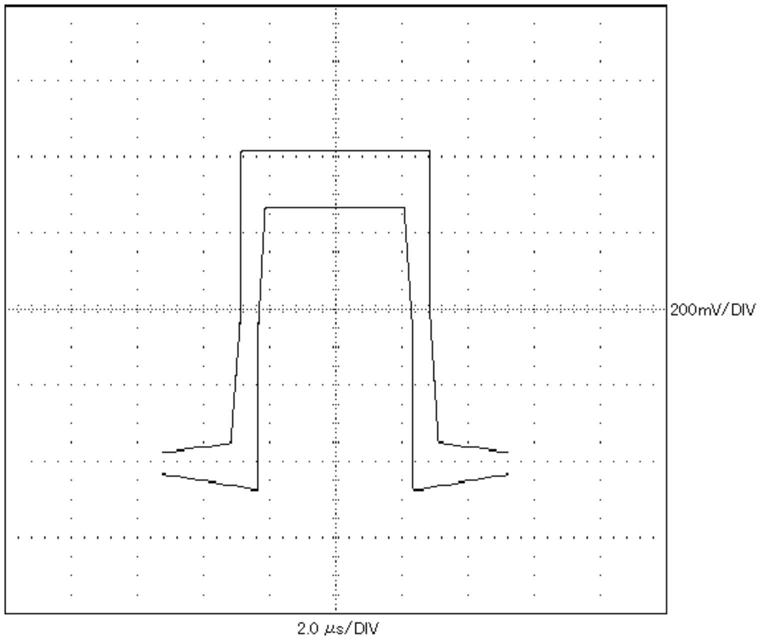


Fig. E-4 I.430/I.430-a 192k Interface

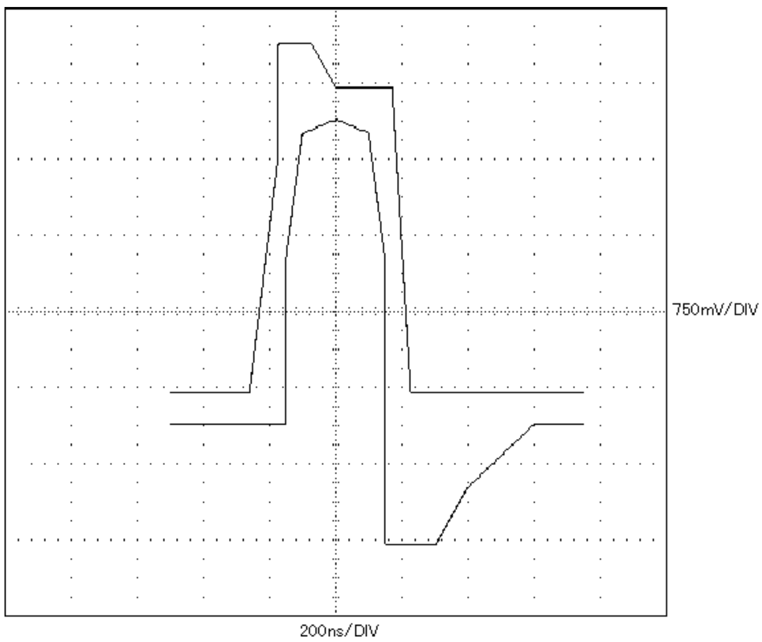


Fig. E-5 G.704/I.431 1.544M Interface

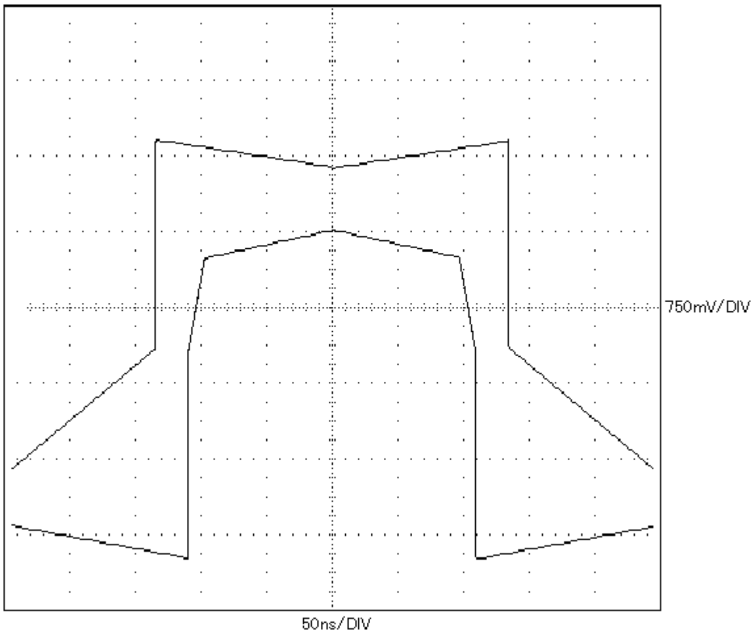


Fig. E-6 G.704/I.431 2.048M Interface（Impedance120Ω）

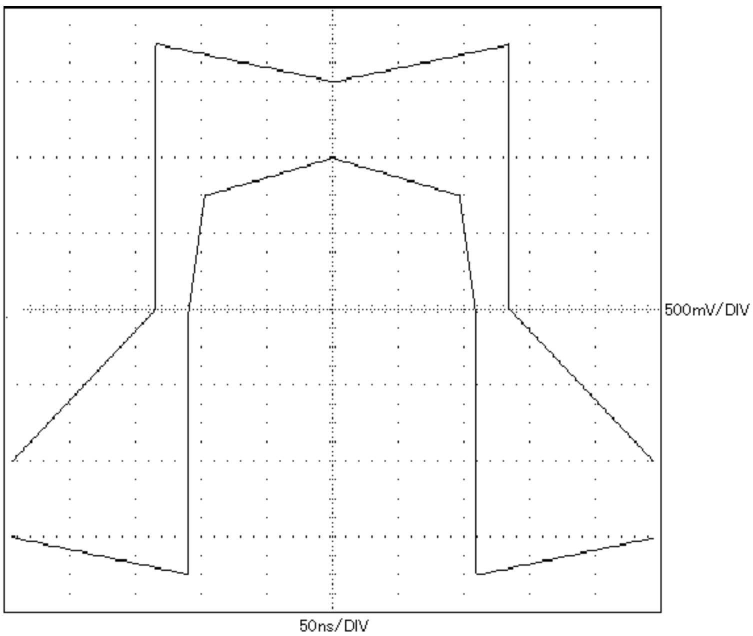


Fig. E-7 G.704/I.431 2.048M Interface（Impedance75Ω）

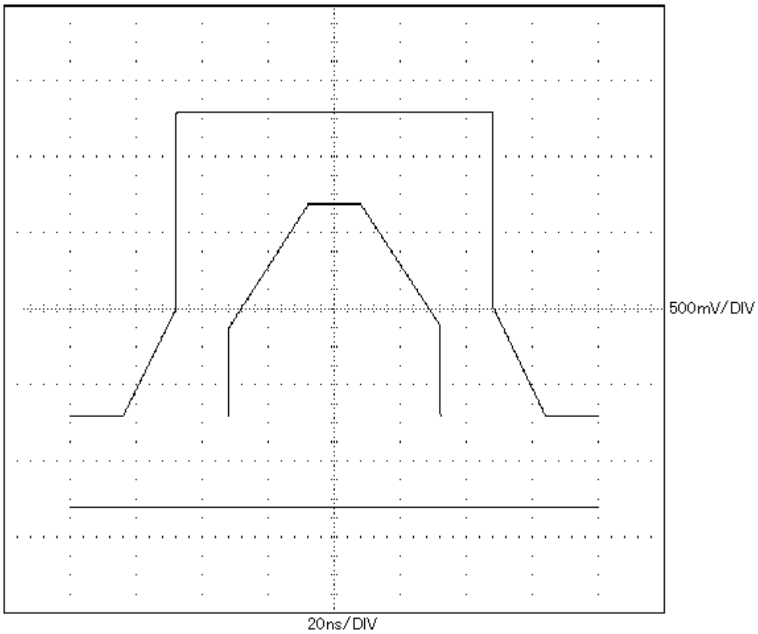


Fig. E-8　G.704 6.312M Interface

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