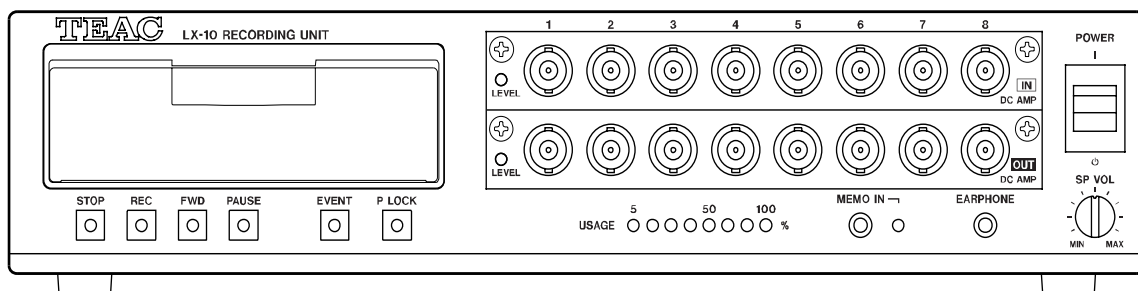


RECORDING UNIT

LX Series

Instruction Manual

Please read this manual before using the product, and keep the manual handy.



CAUTION:

- Read all of these Instructions.
 - Save these Instructions for later use.
 - Follow all Warnings and Instructions marked on the product.
- 1) Read instructions -- All the safety and operating instructions should be read before the product is operated.
 - 2) Retain instructions -- The safety and operating instructions should be retained for future reference.
 - 3) Heed Warnings -- All warnings on the product and in the operating instructions should be adhered to.
 - 4) Follow instructions -- All operating and use instructions should be followed.
 - 5) Cleaning -- Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
 - 6) Attachments -- Do not use attachments not recommended by the product manufacturer as they may cause hazards.
 - 7) Water and Moisture -- Do not use this product near water -- for example, near a bath tub, wash bowl, kitchen sink, or laundry tub; in a wet basement; or near a swimming pool; and the like.
 - 8) Accessories -- Do not place this product on an unstable cart, stand, tripod, bracket, or table. The product may fall, causing serious injury to a child or adult, and serious damage to the product. Any mounting of the product should follow the manufacturer's instructions, and should use a mounting accessory recommended by the manufacturer.
 - 9) Ventilation -- Slots and openings in the cabinet are provided for ventilation and to ensure reliable operation of the product and to protect it from overheating, and these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface. This product should not be placed in a built-in installation such as a bookcase or rack unless proper ventilation is provided or the manufacturer's instructions have been adhered to.
 - 10) Power Sources -- This product should be operated only from the type of power source indicated on the marking label. If you are not sure of the type of power supply to your home, consult your product dealer or local power company. For products intended to operate from battery power, or other sources, refer to the operating instructions.
 - 11) Grounding or Polarization -- This product may be equipped with a polarized alternating-current line plug (a plug having one blade wider than the other). This plug will fit into the power outlet only one way. This is a safety feature. If you are unable to insert the plug fully into the outlet, try reversing the plug. If the plug should still fail to fit, contact your electrician to replace your obsolete outlet. Do not defeat the safety purpose of the polarized plug.
 - 12) Power-Cord Protection -- Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the product.
 - 13) Lightning -- For added protection for this product during a lightning storm, or when it is left unattended and unused for long periods of time, unplug it from the wall outlet. This will prevent damage to the product due to lightning and power-line surges.
 - 14) Overloading -- Do not overload wall outlets, extension cords, or integral convenience receptacles as this can result in risk of fire or electric shock.
 - 15) Object and Liquid Entry -- Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short-out parts that could result in a fire or electric shock. Never spill liquid of any kind on the product.
 - 16) Servicing -- Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

SAFETY INSTRUCTIONS

17) Damage Requiring Service -- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:

- a) when the power-supply cord or plug is damaged.
- b) if liquid has been spilled, or objects have fallen into the product.
- c) if the product has been exposed to rain or water.
- d) if the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions as an improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
- e) if the product has been dropped or damaged in any way.
- f) when the product exhibits a distinct change in performance -- this indicates a need for service.

18) Replacement Parts -- When replacement parts are required, be sure the service technician has used replacement parts specified by the manufacturer or have the same characteristics as the original part. Unauthorized substitutions may result in fire, electric shock, or other hazards.

19) Safety Check -- Upon completion of any service or repairs to this product, ask the service technician to perform safety checks to determine that the product is in proper operating condition.

20) Heat -- The product should be situated away from heat sources such as radiators, heat registers, stoves, or other products (including amplifiers) that produce heat.

FCC Part 15

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Caution

Changes or modifications to this equipment not expressly approved by TEAC CORPORATION for compliance could void the user's authority to operate this equipment.

For the customers in Europe**WARNING**

This is a Class A product. In a domestic environment, this product may cause radio interference in which case the user may be required to take adequate measures.

Pour les utilisateurs en Europe**AVERTISSEMENT**

Il s'agit d'un produit de Classe A. Dans un environnement domestique, cet appareil peut provoquer des interférences radio, dans ce cas l'utilisateur peut être amené à prendre des mesures appropriées.

Für Kunden in Europa**Warnung**

Dies ist eine Einrichtung, welche die Funk-Entstörung nach Klasse A besitzt. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen ; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen.

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This agreement is governed by the laws of Japan.

Should you have any questions concerning this Agreement, or if you desire to contact TEAC for any reason, please write to the address set forth below:

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Overview

Overview

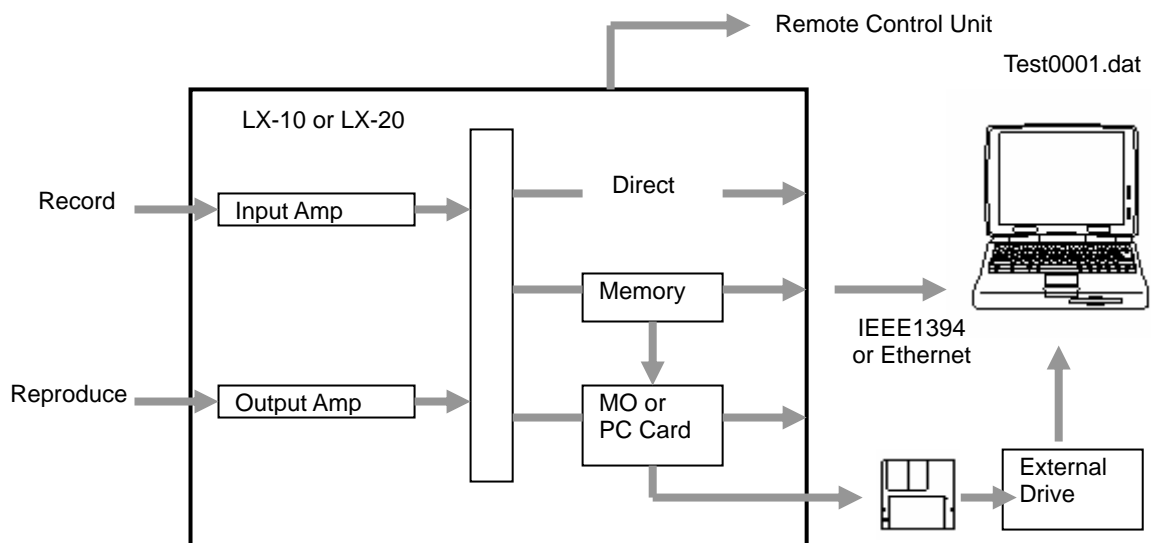
The LX series instrumentation data recorders can record and reproduce signals of a maximum 48 kHz sampling frequency via 8 channels onto MO (Magneto Optical Disk) or PC card media. Recorded data on the media is stored as PC files. The maximum input channels are 32 channels by using the selectable types of the 8 channels input cards and the optional channel expansion unit.

You can choose the recording media among the followings: Recording to the internal memory, 3.5 inch MO, PC card, and a PC.

The file format is TEAC's proprietary TAFFmat format. TAFFmat files can be loaded into commercially available analysis software.

From a PC you can use the supplied LX Navi software to set recording conditions such as the input range or sampling frequency. The interface with a PC is hot-pluggable and compatible with IEEE 1394, so after setup you can disconnect the LX while the power is still on, and start or stop recording by using control buttons on the main unit. You can also use LX Navi to record or reproduce while connected to a PC. You can chose the 100BASE-TX Ethernet interface as alternative.

An optional color LCD remote control unit is available to set recording conditions, to record and reproduce, and to monitor by using bar meters.



Features

- Input/Output Amps

The LX main unit equips 2 slots and the optional expansion unit provides additional 2 slots for installing the input amps and/or the output amps. The input/output amp provides 8 channels inputs/outputs from the below selections.

DC input amp card: Use to connect voltages and/or to connect signals of external amplifiers.

Another DC input amp card for meeting lower sampling frequencies is available.

PA amp input card: Addition to voltage inputs, use to connect IEPE (Integrated Electronics Piezoelectric) type accelerometers. Another PA amp card for providing A/C weighting filter is available.

ST amp input card: Use to connect strain gauges and/or gage-type sensors, also voltages.

Analog output amp card: Use to reproduce analog signals.

- Recording Modes

You can select either MO drive or PC card drive for data recording on to a removable media.

Memory recording: Recording to 64MB (add up to 512 MB as option) internal memory.
Stored data can be transferred to the removable media or the PC.

MO recording: Recording to 1.3GB MO.
Stored data on the MO can be loaded into the PC by using an MO drive mounted.

PC card recording: Stored data on the PC card can be loaded into the PC by using the PC card slot.

PC recording: Recording directly into the PC.

You can also transfer data to a PC while recording to memory or the media, or automatically save to the media after recording to memory.

- Sampling Frequency Series

In addition to the LX-10/10L providing with 96 kHz sampling frequency series, the LX-20/20L provide with the selections of the sampling frequency series of 102.4 kHz, 100 kHz, 96 kHz, or 65.536 kHz and the tachometer pulse inputs.

- Interface to PC

You can select either IEEE1394 (LX-10/20) for higher speed data transfer or 100BASE-TX (LX-10L/20L) for LAN configuration on an interface to communicate with a PC.

- Real Time Monitor

You can monitor the data as formats of wave forms, bar graphs, and digital displays on the PC display while recording. You can reproduce the recorded data on the internal memory or the media.

Features

A Variety of Recording Triggers

Manual: Starts recording manually.

Level Trigger: Starts recording by detecting level changes in a specified channel.

External Trigger: Starts recording by using an external signal as the trigger.

Pre-trigger: A pre-trigger can record the data that was read into a buffer before a recording-startcondition (based on a level trigger or external trigger) was satisfied.

Post-trigger: Continues to record for a set period even after a recording-stop condition (based on a level trigger or external trigger) was satisfied.

Interval operation: Repeatedly starts and stops recording for a specified number of times, during a specified period.

- Event Marks

You can mark data during recording, and search for such event marks when you want to reproduce some recorded data.

- Recording and Reproducing Voice Memos

A microphone amp and a speaker are built in, so you can record and reproduce (listen to) voice memos.

About TAFFmat

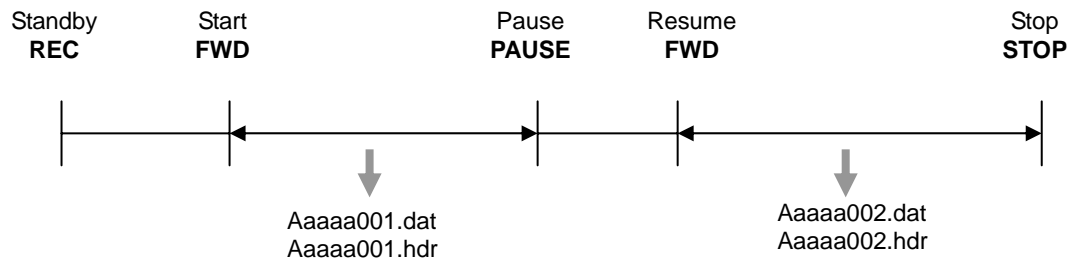
TAFFmat (an acronym for Teac Data Acquisition File Format) is a file format composed of the following:

- a data file containing A/D (analog to digital) converted data. The file is in binary format with the extension dat.
- a header file containing information such as recording conditions. The file is in text format with the extension hdr.

This document uses the term ID to refer to a collection of data collected from the start of recording on the LX series until the recording is stopped or paused. For each ID, one data file and one header file is recorded.

A voice memo is recorded as a WAV file with the extension wav.

The above files share a common file name, to which is appended an ID number. When a new file name is specified, this ID number becomes 1. Each time recording starts, this number is incremented by 1.



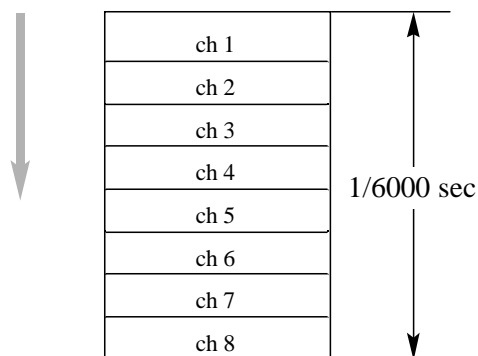
A/D-converted data is recorded as 2-byte integers from -32768 to +32767. Negative numbers are expressed as complements of 2. The byte order is from the lower bytes to the higher bytes. The data order is as follows: first sampling channel order -> second sampling channel order ->...-> last sampling channel order. At the LX series, ADC value +/- 25000 represents +/- 100 % of the input range.

This document uses the term scan to refer to a collection of data resulting from one sampling. A data file is a collection of scan repetitions.

Example:

Data of 1 scan when the sampling frequency is 6 kHz:

Order of recorded data



Notes on Usage

Notes on Usage

- Use of a UPS is Recommended

We recommend that you use a UPS (Uninterruptible Power Supply) whenever you use an AC adapter. This can protect important data during a power stoppage. If power is turned off while a media is in a drive, data recorded on that media might become unreadable. Use an optional battery unit to back up the operation at the power stoppage.

- Use Specified Media Only

Use 1.3 GB, 3.5 inch MO disks from Fujitsu Ltd.

Use PC cards checked by TEAC in advance (contact us for information).

Other media might be unable to record or reproduce correctly.

PC Cards Checked by TEAC for Correct Operations (As of August 2005)

Sun Disk Compact Flash		Buffalo Compact Flash		Micro Drive	
128MB	SDCFB-128-801	64MB	RCF-X64MY	340MB	DMDM-10340
256MB	SDCFH-256-903	256MB	RCF-G256M	1GB	DSCM-11000
512MB	SDCFB-512-801	1GB	RCF-G1G		
	SDCFH-512-801	2GB	RCF-G2G		
1GB	SDCFB-1000-801	Lexar Media Compact Flash		Rnesas PCMCIA TYPE Flash memory card	
	SDCFB-1024-J60				
	SDCFH-1024-903	1GB	CF1GB-80-380	128MB	HB288128A5
2GB	SDCFB-2000-801	2GB	CF2GB-40-380	512MB	HB28B512A6
	SDCFH-2048-J60	I·O Data Compact Flash		1GB	HB28B1000A6
Hagiwara sys-com Compact Flash				2GB	HB28B2000A8H
			256MB	CFX-256M	
1GB	HPC-CF1GZP	1GB	CF40-1G		

- Remove Media Before Powering Off the LX

Remove the media before you power off the LX. If you power off the LX while data is being written, data recorded on that media might become unreadable. Also, remove the media before moving the LX main unit. Moving the unit while the media is inserted might result in damage, in particular on a MO disk.

- Remove Media

Remove the media only at the STOP state of the REC mode.

- Never Remove Recorded File, Never Rename File/Folder Name of Recorded File By Windows Operation

If you manipulate the recorded files on the media by Windows operation, such as partially removing the file, or renaming the file/folder name, the link between the data file and the header file will be lost or the writing speed to the media to support the specifications cannot be assured, and then the data will become unreadable on the PC when such media is re-inserted in the LX.

Write-protect an MO disk before inserting it into a PC drive.

- Clean Disk and Lens

Dust might collect on an MO disk or lens after they have been used for a long time. This dust might cause errors. To prevent this problem, clean the MO disk and lens using a cleaning kit (separate purchase). The period after which cleaning is required depends on the environment but, as a general rule, clean once every three months.

- ✓ To clean an MO disk, use the cleaning kit TZ-381 (separate purchase). To clean a lens, use the lens cleaner 0240470 (separate purchase).
- ✓ For details on how to clean, see the explanation supplied with the cleaning kit.

- Handling PC Card

To discharge static electricity from your body, touch a metallic surface near you before handling the unit. Never touch the media being inserted to the PC card slot while recording and playing back.

- Make Sure to Select FAT16 When Formatting Media by Windows Operation

The LX file format does not support FAT32, use FAT16 format before using.

- About No MO/PC Card Drive

The drive is not installed. Naturally, the functions concerning the recording to the media are disabled.

- About No Output Amp Model

The output amplifier is not installed. Naturally, the functions concerning the output amp are disabled. However, you can view the reproduced data on a PC.

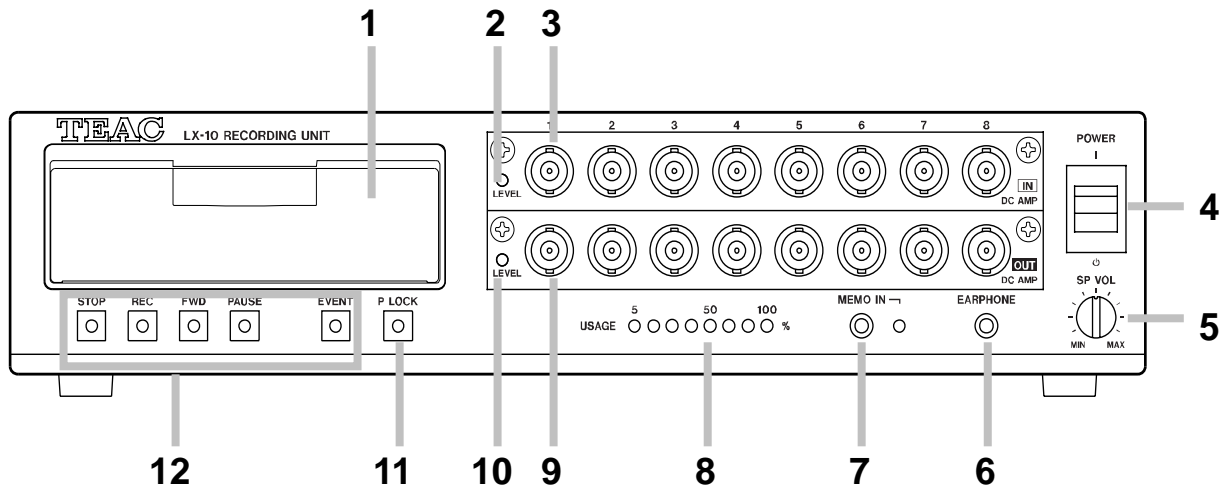
- Power OFF While Amp Calibration State

When turning on the power of the LX unit, the unit goes into the calibration of the installed amps automatically (Input level LED on each amp are flashing in red), and then goes to the ready state for operations (Input level LED turns on green). Turning the power OFF while the amp calibration state initializes the setting parameters.

Names and Parts

Names and Parts

Front



1 Drive

Opening the cover reveals the disk slot.

2 Input level LED

When the input signal for some channel is larger than +/- 10 % of a set input range, the LED glows green.

When the signal exceeds +/- 115 % of the range, the LED glows red.

3 Input connector

Inputs the signal to be measured.

4 Power switch

Pushing the switch up turns on the power. Pushing the switch down turns off the power.

5 Volume knob

Adjust the volume for reproducing voice memos.

6 EARPHONE jack

Connects to an earphone when you are using the earphone to listen to voice memos.

When an earphone is inserted, sound does not come from the speaker.

7 MEMO IN jack

Connects to a microphone used for voice memos.

8 USAGE LEDs

Indicates the usage rate of the recording device. During recording to memory, these LEDs indicate what percentage of the total memory is being used. During recording to a media, these LEDs indicate what percentage of the total media capacity is being used. During recording to a PC, these LEDs indicate what percentage of memory is being used as the buffer for transmitting data. From the left, the LEDs indicate the percentages of 5, 10, 20, 35, 50, 70, 90, and 100%.

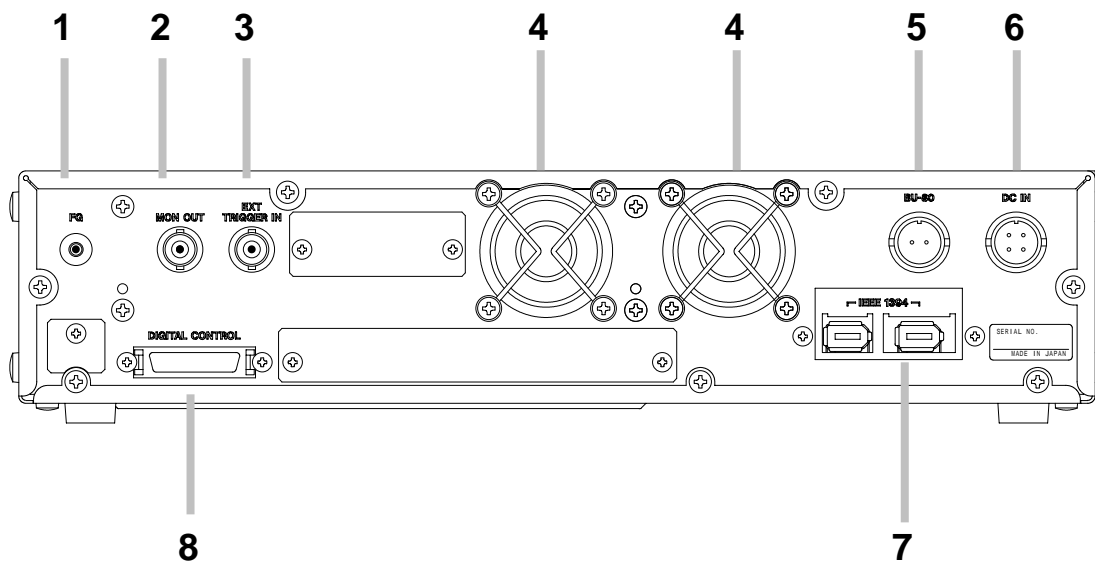
These LEDs also function as a low-voltage alarm, and blink when the power voltage falls to 11 V or less. In such a situation, recording or reproduction stops.

- 9 Output connector (When the analog playback amp card is installed into the slot.)
Outputs the reproduced signal. Outputs the input signal during recording-standby status or during recording. You can set the output range in 0.1 V steps, from 1 V to 5 V.
- 10 Output level LED (When the analog playback amp card is installed into the slot.)
When the output signal for some channel is larger than +/-10% of a set output range, the LED glows green. When the signal exceeds +/-115% of the range, the LED glows red.
- 11 P LOCK button
Pressing this button for 3 seconds causes the lamp to glow and disables the five buttons on the left: STOP, REC, FWD, PAUSE, and EVENT. To release the lock, again press the button for 3 seconds.
- 12 Recording/reproduction control buttons
Buttons used for recording or reproduction. Details are given later.

Names and Parts

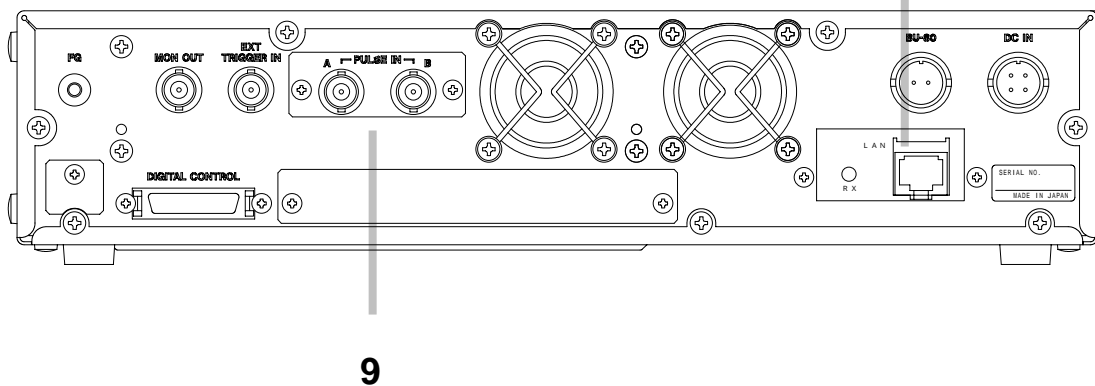
Rear

LX-10 IEEE 1394 Version



The LX-10L LAN version has an interface (at 7) shown below.

LX-20L LAN Version



The LX-20 IEEE 1394 version has an interface (at 7) shown above.

1 FG terminal

Connects the grounding wire.

2 MON OUT connector

Outputs in analog format, the signal of a channel during recording-standby status, recording, or reproduction. You use the supplied LX Navi software to select the channel you want to monitor. You can set the output range in 0.1 V steps, from 1 V to 5 V. The same filter as for the output amp is applied to this monitor output.

Outputs the generator output signal at the LX-20/20L.

3 EXT TRIGGER IN connector

Inputs the trigger signal when using an external contact signal as the trigger to start recording.

4 Cooling fan

Exhaust fans used for cooling the main unit. Do not cover the outlet vent.

5 BU-80 connector

Uses to connect the optional battery unit.

6 DC IN connector

Inputs power in the range from +11 to 30 V.

7 IEEE 1394 connector (LX-10/20 IEEE 1394 version)

Connects to a PC. Use a recommended interface card on the PC.

100BASE-TX connector (LX-10L/20L LAN version)

Connects to a PC. LED located side of the connector flashes while communications.

8 DIGITAL CONTROL connector

Use when using a contact signal to control recording or reproduction.

9 PULSE IN A/B connector (LX-20/20L version)

Connects tachometer pulse inputs.

Recording Times

Recording Times

- Recording to Memory, 8 channels, 64 MB standard memory (when not recording voice memos)

Sampling frequency (Value in brackets is the recording bandwidth with tolerances of +/-0.5 dB)	Recording time
96 kHz (40 kHz)	40 s
48 kHz (20 kHz)	80 s
24 kHz (10 kHz)	160 s
12 kHz (5 kHz)	320 s
6 kHz (2.5 kHz)	640 s (approx. 10 min)
3 kHz (1.25 kHz)	1,280 s (approx. 21 min)
1.5 kHz (625 Hz)	2,560 s (approx. 42 min)

- Recording to MO, 8 channels (when not recording voice memos)

* This recording time at a 48 kHz sampling frequency is the value when using an MO disk on which nothing is recorded after formatting.

Sampling frequency (Value in brackets is the recording bandwidth with tolerances of +/-0.5 dB)	Recording time
48 kHz (20 kHz)	1,600 s (approx. 26 min) *
24 kHz (10 kHz)	3,200 s (approx. 53 min)
12 kHz (5 kHz)	6,400 s (approx. 106 min)
6 kHz (2.5 kHz)	12,800 s (approx 213 min)
3 kHz (1.25 kHz)	25,600 s (approx. 7 h)
1.5 kHz (625 Hz)	51,200 s (approx. 14 h)

- Recording to PC card, 8 channels, 1 GB PC card is used (when not recording voice memos)

* This recording time at a 48 kHz sampling frequency is the value when using an MO disk on which nothing is recorded after formatting.

Sampling frequency (Value in brackets is the recording bandwidth with tolerances of +/-0.5 dB)	Recording time
48 kHz (20 kHz)	1,230 s (approx. 20 min) *
24 kHz (10 kHz)	2,470 s (approx. 41 min)
12 kHz (5 kHz)	4,940 s (approx. 82 min)
6 kHz (2.5 kHz)	9,890 s (approx. 164 min)
3 kHz (1.25 kHz)	19,790 s (approx. 329 m)
1.5 kHz (625 Hz)	39,360 sec (approx. 11 h)

- Media recording time can be calculated as follows (result by approximately times.):

Recording Time (seconds) = (Media Capacity (Bytes) x 0.9) / [(Number of Analog Input Channels + Number of Tachometer Input Channels) x Sampling Frequency (Hz) x 2 + 8000]

Media Capacity x 0.9: Considering recording overhead of the media and an additional capacity needed for the header files, multiply 0.9 (90%) for the used capacity for data files.

Refer the tables later for a combination of the Sampling Frequency vs. the number of analog input channels can be selected in each recording mode.

Number of tachometer input channels: use "2" in 16 bits mode, "2" for 32 bits/1 channel mode, or "4" for 32 bits/2 channels mode. Use "0" instead of 8000 when the memo voice recording turns to OFF.

Sampling Frequency and Number of Channels

Sampling Frequency and Number of Channels

A combination of the sampling frequency vs. the number of analog input channels is varied depending on the selected recording mode, such as, the type of the recording media and the number of tachometer input channels.

Recording Condition 1

Recording Mode: Media recording to MO or PC card, while transferring data to PC

Memo Voice Recording: ON or OFF

Interface to PC: IEEE1394 or Ethernet

102.4 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*102.4	42	4	2	2	N/A
*51.2	21	8	4	4	4
25.6	10	16	8	8	8
12.8	5	32	24	24	24
5.12	2	32	32	32	32
2.56	1	32	32	32	32
1.28	0.53	32	32	32	32

100 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*100	41	4	2	2	N/A
*50	20	8	4	4	4
20	8	16	8	8	8
10	4.1	32	24	24	24
5	2	32	32	32	32
2	0.8	32	32	32	32
1	0.4	32	32	32	32

96 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*96	40	4	2	2	N/A
*48	20	8	4	4	4
24	10	16	8	8	8
12	5	32	24	24	24
6	2.5	32	32	32	32
3	1.25	32	32	32	32
1.5	0.625	32	32	32	32

65.536 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*65.536	27	4	2	2	N/A
*32.768	13	8	4	4	4
16.384	6	16	8	8	8
8.192	3	32	24	24	24
4.096	1.7	32	32	32	32
2.048	0.8	32	32	32	32
1.024	0.4	32	32	32	32

Remarks: Cannot select the moving average other than 1 (one) at the Sampling Frequency settings shown with *(asterisk).

Sampling Frequency and Number of Channels

Recording Condition 2

Recording Mode: Memory recording

Memo Voice Recording: ON or OFF

Interface to PC: IEEE1394 or Ethernet

102.4 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*102.4	42	8	4	4	N/A
*51.2	21	16	8	8	8
25.6	10	32	24	24	24
12.8	5	32	32	32	32
5.12	2	32	32	32	32
2.56	1	32	32	32	32
1.28	0.53	32	32	32	32

100 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*100	41	8	4	4	N/A
*50	20	16	8	8	8
20	8	32	24	24	24
10	4.1	32	32	32	32
5	2	32	32	32	32
2	0.8	32	32	32	32
1	0.4	32	32	32	32

96 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*96	40	8	4	4	N/A
*48	20	16	8	8	8
24	10	32	24	24	24
12	5	32	32	32	32
6	2.5	32	32	32	32
3	1.25	32	32	32	32
1.5	0.625	32	32	32	32

65.536 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*65.536	27	8	4	4	N/A
*32.768	13	16	8	8	8
16.384	6	32	24	24	24
8.192	3	32	32	32	32
4.096	1.7	32	32	32	32
2.048	0.8	32	32	32	32
1.024	0.4	32	32	32	32

Remarks: Cannot select the moving average other than 1 (one) at the Sampling Frequency settings shown with *(asterisk).

Sampling Frequency and Number of Channels

Recording Condition 3

Recording Mode: PC direct recording

Memo Voice Recording: ON or OFF

Interface to PC: IEEE1394

102.4 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*102.4	42	8	4	4	N/A
*51.2	21	16	8	8	8
25.6	10	32	24	24	24
12.8	5	32	32	32	32
5.12	2	32	32	32	32
2.56	1	32	32	32	32
1.28	0.53	32	32	32	32

100 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*100	41	8	4	4	N/A
*50	20	16	8	8	8
20	8	32	24	24	24
10	4.1	32	32	32	32
5	2	32	32	32	32
2	0.8	32	32	32	32
1	0.4	32	32	32	32

96 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*96	40	8	4	4	N/A
*48	20	16	8	8	8
24	10	32	24	24	24
12	5	32	32	32	32
6	2.5	32	32	32	32
3	1.25	32	32	32	32
1.5	0.625	32	32	32	32

65.536 kHz Series		Max. number of analog input channels based on the tachometer input setting			
Sampling Frequency (kHz)	Bandwidth (kHz)	No	16bits 2ch	32bits 1ch	32bits 2ch
*65.536	27	8	4	4	N/A
*32.768	13	16	8	8	8
16.384	6	32	24	24	24
8.192	3	32	32	32	32
4.096	1.7	32	32	32	32
2.048	0.8	32	32	32	32
1.024	0.4	32	32	32	32

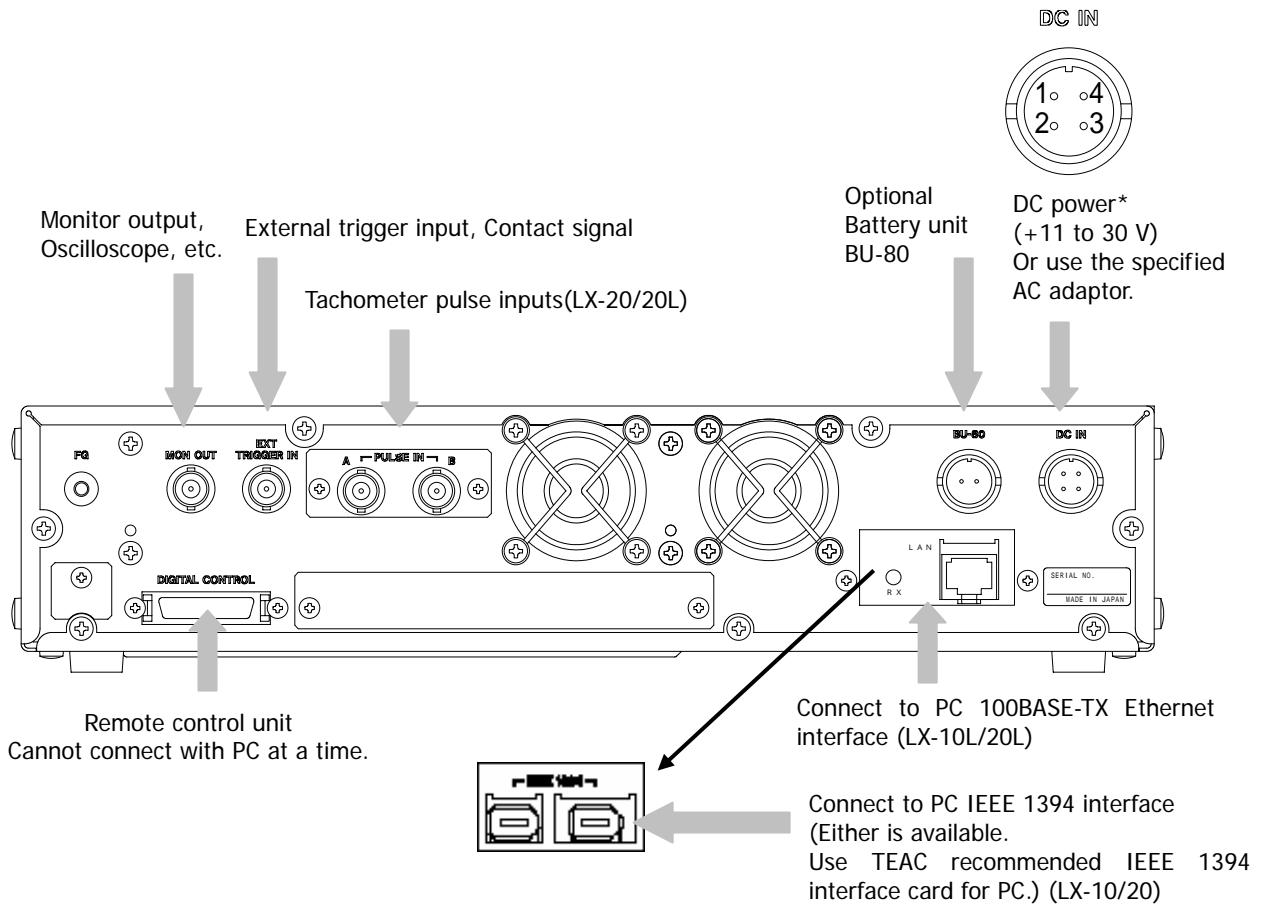
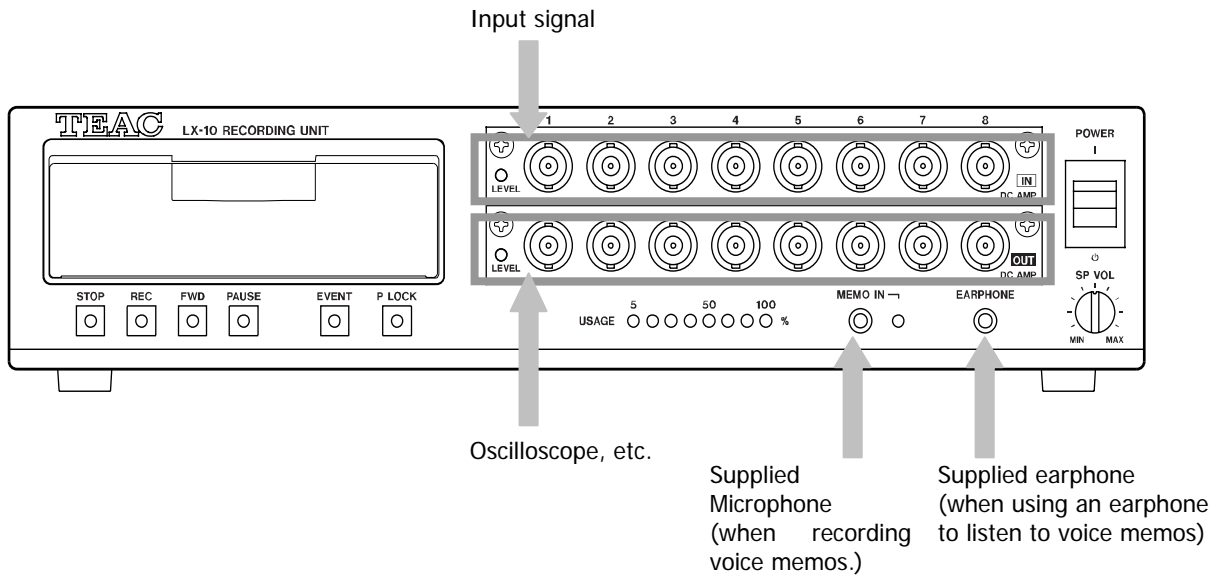
Remarks: Cannot select the moving average other than 1 (one) at the Sampling Frequency settings shown with *(asterisk).

Section 2 Installation

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Connections

Connections

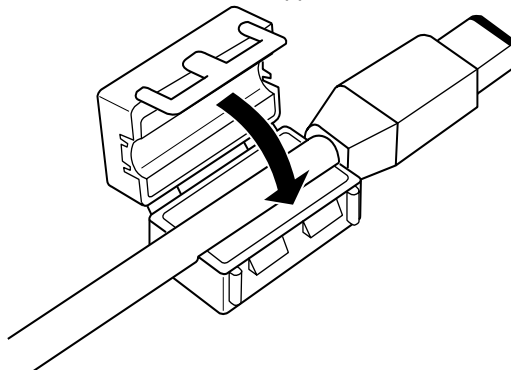


When the DC power voltage falls to +11V or less, the USAGE LEDs flash and recording and reproduction stops.

If you are recording to memory, quickly copy the data to a media or to a PC.

Notes on Connections

- Attaching Ferrite Core on IEEE 1394 Interface cable (LX-10/20 IEEE 1394 version)
To reduce the radio noise, attach the supplied ferrite cores on both ends of the IEEE 1394 cable.



- Only PC to IEEE 1394 Connector (LX-10/20 IEEE 1394 version)
Do not connect other devices than the PC to the IEEE 1394 connector. If any other devices are daisy-chained, the specified performance may not be achieved.
- Grounding
To prevent noise, establish a common ground for the LX and all the measuring instruments connected to it.

PC System Requirements

We recommend use of a PC that satisfies the following requirements:

OS: Windows XP / Windows 2000 / Windows 98SE / Windows Me

CPU: Pentium III 600 MHz or faster

Screen Resolution: 800×600 dpi or better

Memory: 128 MB or more (256 MB or more for Windows XP/2000)

Free space on hard disk: 2 GB or more

CD-ROM drive: Present (for the program installation)

LX-10/20 IEEE 1394 version use the specified IEEE 1394 interface card:

For a note PC (PC card model): From RATOC Systems, Inc.: CBFW3

For a desktop PC (PCI bus): From RATOC Systems, Inc.: PCIFW3

LX-10L/20L(LAN 100BASE-TX version, use your PC on-board 100BASE-TX interface

- Use the IEEE 1394 interface card specified above. Other interface cards might not operate correctly. Please contact us for availability. When installing and setting up the interface card, read the documentation supplied with the card and set up the card in accordance with that documentation and this manual.
- Use the on-board type 100BASE-TX interface of your PC, do not use the PC card type interface.
- File sizes and the total number of files may be limited depending on the operation systems.

Installing LX-10/20 IEEE 1394 Version

Installing LX-10/20 IEEE 1394 Version

Overview of the LX-10/20 IEEE 1394 version installation is explained below.

Follow the installation procedures explained later on each operation system.

1. Attach the interface card to your PC.
2. Install the OHCI driver.
3. Install the LX Series device driver.
4. Install the LX Navi.

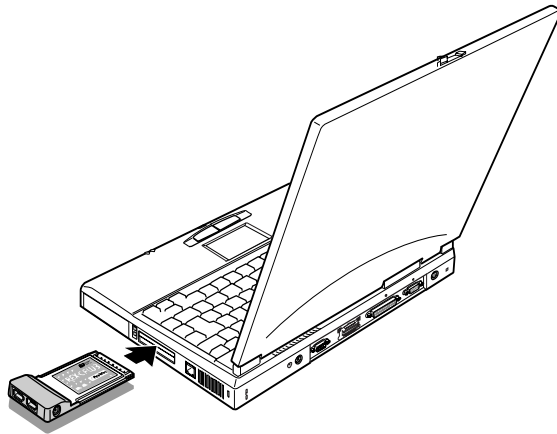
Installing Interface Card

Attach the PC card to your note PC

Insert the IEEE 1394 interface card CBFW3 to your PC card slot met the CardBus specification.

Check with your PC manual on the PC card slot information.

- You may not insert the IEEE 1394 interface card with other types of the PC card at a time.
- You may not install it to the upper slot.
- Be careful to insert it to your PC. The interface card or your PC may be damaged, if you enforce to insert it.



Attach the PCI card to your desktop PC

Insert the PCI type interface card PCIFW3 to the PCI slot of your desktop PC.

Check with your PC manual on the PCI slot information.

- Replace a standard bracket to the supplied low profile one when installing the PCIFW3.
- Be careful to insert it to your PC. The interface card or your PC may be damaged, if you enforce to insert it.

Installing OHCI Driver

For Windows 2000/XP

The following screen examples are for Windows 2000. Follow the same procedures for Windows XP.

1. Insert the CBFW3 to the CardBus PC card slot, or insert the PCIFW3, then turning on your PC. The standard Windows driver will be automatically installed. Follow the below procedures to confirm the driver has been installed correctly.

2. Double click [Control Panel] from [My Computer] .

Double click [System] to open the dialog box.

3. Click [Hardware] tab, and then click [Device Manager(D)] .

4. Double click [1394Bus Host Controller], and confirm "Texas Instruments OHCI Compliant IEEE 1394 Host Controller" is added to indicate the driver software has been correctly installed.

Now the OHCI driver installation has been completed, next proceed to the LX Series device driver installation.

Installing LX-10/20 IEEE 1394 Version

For Windows 98SE

1. Insert the CBFW3 to the CardBus PC card slot, or insert the PCIFW3, then turning on your PC. You will see the "Update Device Driver Wizard" dialog box.

Click [Next].

2. Click "Search for a better driver than the one your device is using now. (Recommended)", then click [Next].

3. Remove all checks of the selection boxes, then click [Next].

4. Click "Updated driver (Recommended)", then click [Next].

5. Click [Next] .

6. Click [Finish] to complete the driver software installation.

You can confirm that driver has been installed correctly as follows:

Double click [Control Panel] from [My Computer] to open the dialog box.

Double click [System] .

Click [Device Manager] , then double click [1394 Bus Controller] . Confirm "Texas Instruments OHCI Compliant IEEE 1394 Host Controller" is added to indicate the driver software has been correctly installed.

Download the 1394 Storage Supplement Program

From the Microsoft site, download the 1394 Storage Supplement program.

1. From the Windows Start menu, click Windows Update.

After the Microsoft site is displayed, click PRODUCT UPDATES on the left.

2. Select "Windows 98 Second Edition 1394 Storage Supplement", and download it.

(For details, click Read this first.)

Now the OHCI driver installation has been completed, next proceed to the LX Series device driver installation

For Windows Me

1. Insert the CBFW3 to the CardBus PC card slot, or insert the PCIFW3, then turning on your PC. You will see the "Update Device Driver Wizard" dialog box.

Click [Next] .

2. Click [Finish] .

3. Now you complete the driver software installation.

You can confirm that driver has been installed correctly as follows:

Double click [Control Panel] from [My Computer] to open the dialog. Then double click [System] .

Click [Device Manager] , then double click [1394 Bus Controller] . Confirm "Texas Instruments OHCI Compliant IEEE 1394 Host Controller" is added to indicate the driver software has been correctly installed.

Now the OHCI driver installation has been completed, next proceed to the LX Series device driver installation

Installing LX-10/20 IEEE 1394 Version

Installing LX Series Device Driver

For Windows 2000/XP

The following screen examples are for Windows 2000. Follow the same procedures for Windows XP.

1. When the LX-10/20 is first connected to the PC, the following dialog box is displayed.



Click [Next] .

2.



In the dialog box, click "Search for a suitable driver for my device (recommended)" and then click [Next] .

3.



Insert the supplied CD-ROM, select "Specify a location", and then click [Next] .

4.



Specify the driver folder of the inserted CD-ROM, and click [OK] .

5.



Click [Next] .

6.



In the dialog box, click [Finish] . This completes installation of the device driver.

Installing LX-10/20 IEEE 1394 Version

For Windows 98SE

1. When the LX-10/20 is first connected to the PC, the following dialog box is displayed.
(If not displayed, proceed to the later page.)



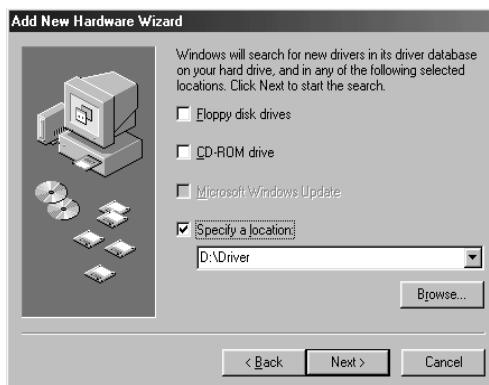
Click [Next].

- 2.



In the dialog box, click “Search for the best driver for your device (Recommended)” and then click [Next].

- 3.



Insert the supplied CD-ROM and select “Specify a location”. Specify the driver folder of the inserted CD-ROM, and click [Next].

4.



Click [Next] .

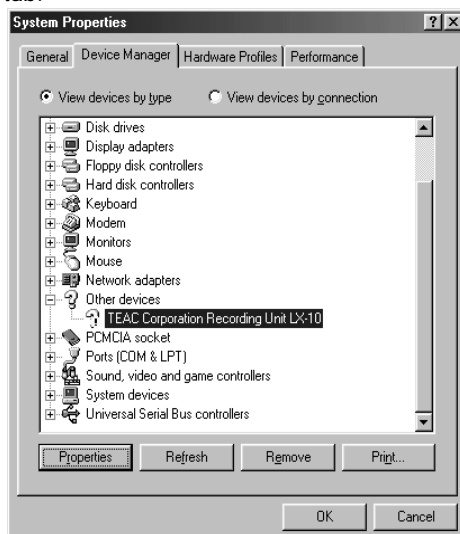
5.



In the dialog box, click [Finish] . This completes installation of the device driver.

If the Add New Hardware Wizard dialog box is not displayed when the LX-10/20 is first connected to the PC, install the driver following the steps below:

1. From the Windows Start menu choose Settings, Control Panel, [System], and then click [Device Manager] tab.



Select "TEAC Corporation Recording Unit LX-10" and click [Properties].

Installing LX-10/20 IEEE 1394 Version

2.



Click [Reinstall Driver].

3.



Click [Next] .

4.



Click "Search for a better driver than the one your device is using now. (Recommended)" and then click [Next].

5.



Insert the supplied CD-ROM and select "Specify a location". Specify the Driver folder of the inserted CD-ROM, and click [Next].

6.



Click [Next] .

7.



In the dialog box, click [Finish]. This completes installation of the device driver.

Installing LX-10/20 IEEE 1394 Version

For Windows Me

1. When the LX-10/20 is first connected to the PC, the following dialog box is displayed.



Insert the supplied CD-ROM, and select "Automatic search for a better driver (Recommended)". Then click [Next].

2.

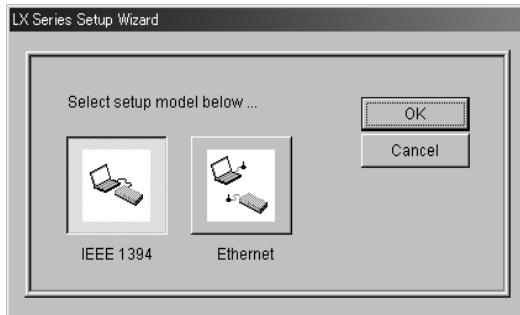


In the dialog box, click [Finish]. This completes installation of the device driver.

Installing LX Navi

To install the supplied LX Navi software:

1. Execute "Setup.exe", which is in the supplied CD-ROM.
2. Follow the displayed instructions and proceed with setup.



Click **IEEE1394** at the dialog box to be appeared in the middle of installation when using the LX-10/20 IEEE 1394 version, then click **OK**.

3. After installation, restart the PC.

Installing LX-10L/20L LAN Version

Installing LX-10L/20L LAN Version

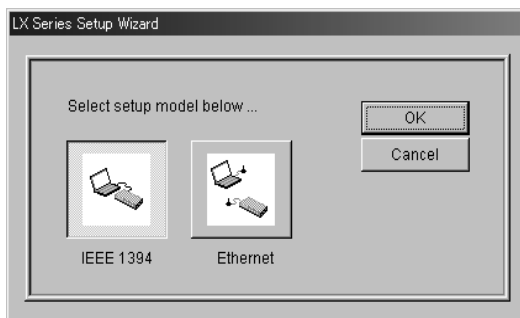
To install the LX-10L/20L LAN version:

1. Install LX Navi.
2. Set the IP address of the PC to be connected and the LX-10L/20L.
 - Use an on-board type 100BASE-TX LAN interface of your PC.
 - If your PC does not have a LAN interface, use the following LAN cards:
CBET100-CL from I-O DATA
FNW-3603-TX from PLANEX COMMUNICATIONS
Transmission rate: 10 M, full duplex (fixed)
One-to-one connection with LX-10L/20L using a cross cable

Installing LX Navi

To install the supplied LX Navi software:

1. Execute "Setup.exe", which is in the supplied CD-ROM.
2. Follow the displayed instructions and proceed with setup.



Click **Ethernet** at the dialog box to be appeared in the middle of installation when using the LX-10L/20L LAN version, then click **OK**.

3. After installation, restart the PC.

About IP Address Settings

Consult your network administrator when connecting the LX-10L/20L to your network per the following information.

It is required the basic knowledge about Windows network system to set the network connection parameters.

- At shipping time, the LX-10L/20L has the factory settings shown below. Modify the settings (such as the IP address) as necessary.
 - IP address: 192.168.0.10
 - Subnet mask: 255.255.255.0
 - Gateway: 0.0.0.0
 - DHCP client: DISABLE
- To communicate at 100 Mbps, all devices that exist in the path from the LX-10L/20L to the controller PC must support 100 Mbps. Use a cable that is Category 5 or better. To ensure communications quality, we recommend that you use STP cables and a switching hub that supports STP cables.
- Depending on the network environment being used, it is possible you will encounter delays in data transmission or congestion processing. In such a case, try the following to improve the situation:
 - 1) If a repeater hub is being used, change to a switching hub instead.
 - 2) As much as possible, reduce the number of broadcast packets.
 - 3) As much as possible, use a communications path that does not pass through a router.
- However, in a situation such as when the LX-10L/20L is in a remote location and communications are constrained by low-speed paths, use the LX-10L/20L with a reduced sampling rate.
- The LX-10L/20L Ethernet interface carries out TCP connection continuous communications; however, if a packet from the other party does not arrive within 180 seconds, a timeout occurs and the other party is automatically disconnected. So in the event that a normal termination was not possible because of some problem such as a PC hangup or disconnected cable, wait 180 seconds and then try reconnecting.
- If the PC enters the standby status while LX Navi is being used, communications will cease, and a timeout will cause a disconnection. If you are using the PC for a long time, make sure the system standby setting in the Windows power options is not selected.
- With the LX-10L/20L Ethernet interface, the LX-10L/20L can be operated as a DHCP (Dynamic Host Configuration Protocol) client, but if an IP address cannot be obtained within 30 seconds after startup, the LX-10L/20L starts usual operations with a fixed IP address.
- If you set a firewall on your PC or install an virus check software, you may not connect the LX. Check the security level of the program on your PC.

For other settings, such as IP address parameter settings and network usage, consult your network administrator before using the LX-10L/20L.

Starting Program

Starting Program

After installing the drivers and LX Navi and connecting the PC and the LX, start LX Navi.

- Do not run LX Navi together with application software that uses a lot of memory.

To start LX Navi:

1. On the LX-10 main unit, push up the power switch to |.

When power is turned on, the input amp is automatically calibrated. During calibration, the input amp LED will blink. When calibration ends the LED will turn off.

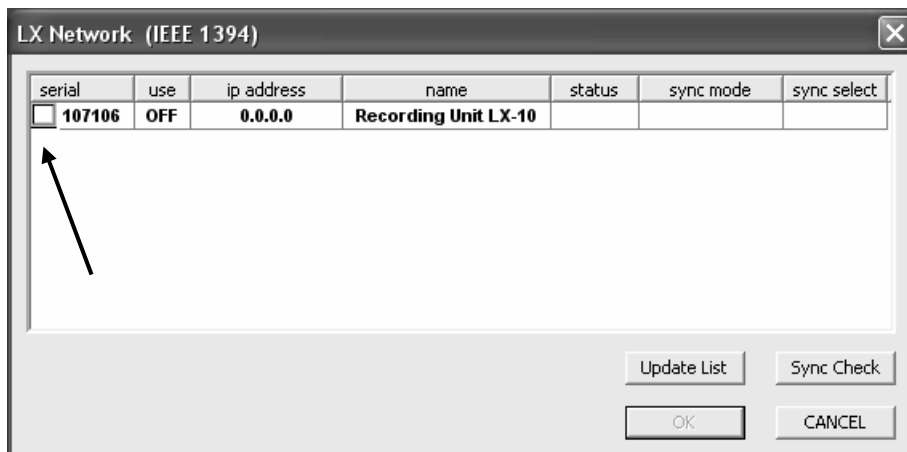
2. Start LX Navi.

After LX Navi starts, if you power off the LX-10/20 main unit or remove the IEEE 1394 cable, LX Navi will display an error message and terminate. In such a case, if you turn the power back on or reconnect the cable, and then restart LX Navi, the LX-10/20 can again be recognized.

In case of the LX-10L/20L, if you power off the LX-10L/20L main unit or remove the LAN cable, not only the communications fail, but also the congestion processing is caused to the network. Make sure to close LX Navi first to detach the LX-10L/20L from the network. Do not power off the LX-10L/20L before closing LX Navi.

- If it is taking an excessively long time for the LED to turn off.
After you power on the main unit, if it takes an excessively long time for the input amp LED to turn off, the amp might not have been recognized. In such a case, turn the power on again.
- Do not put the PC into sleep mode.
Set your PC's sleep mode to OFF. If the PC goes into sleep mode, an error occurs on the LX Navi. Note that some notebook PCs automatically go into sleep mode just by folding the display.

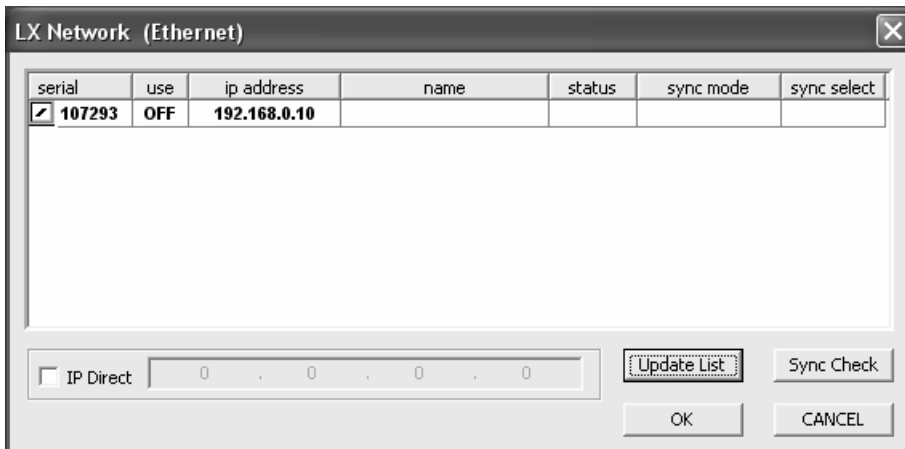
For LX-10/20 IEEE 1394 version



Check the box at the **serial** field of the **LX Network** dialog box by confirming the correct serial number is displayed, and then click **OK**. In addition, a previously used serial number will automatically contain a check in the box.

For LX-10L/20L LAN version

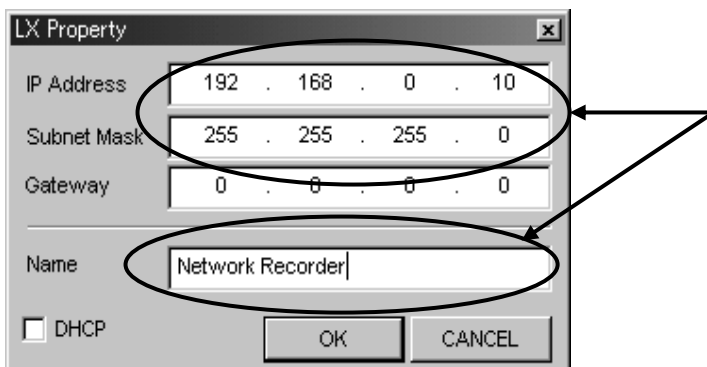
The following dialog box is displayed when LX Navi starts.



Check the box at the **serial** field **LX Network** dialog box by confirming the white-out box is appeared and the correct serial number is displayed, and then click **OK**. In addition, a previously used serial number will automatically contain a check in the box.

If the white-out box is not appeared, follow the next pages for a proper set up.

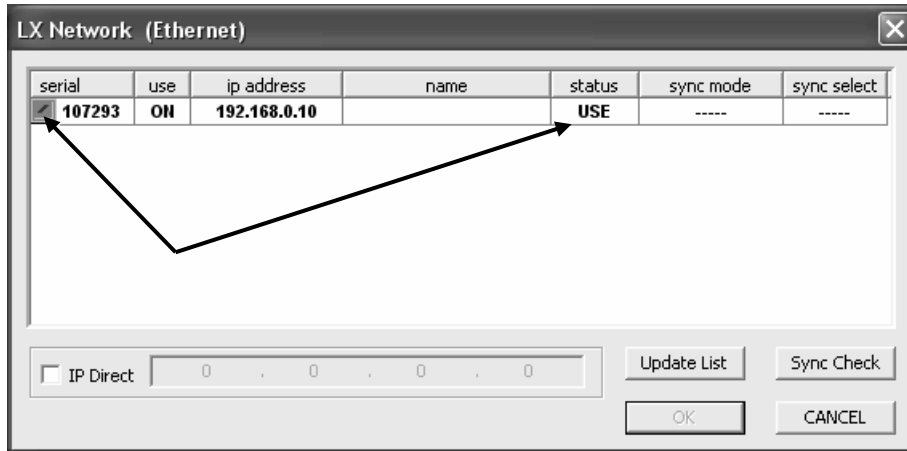
The upper part lists the LXs that exist in the same segment. If you click where **IP address** or **name** is displayed in the list area, the **LX Property** dialog box appears. In this dialog box, you specify settings such as the IP address parameters and the recorder name (**Name**). Enter the address parameters that match the network environment you are using. For **Name**, you can use any string up to 32 characters. This name is displayed in the list at startup, so use a name that identifies the particular LX-10L/20L from any others.



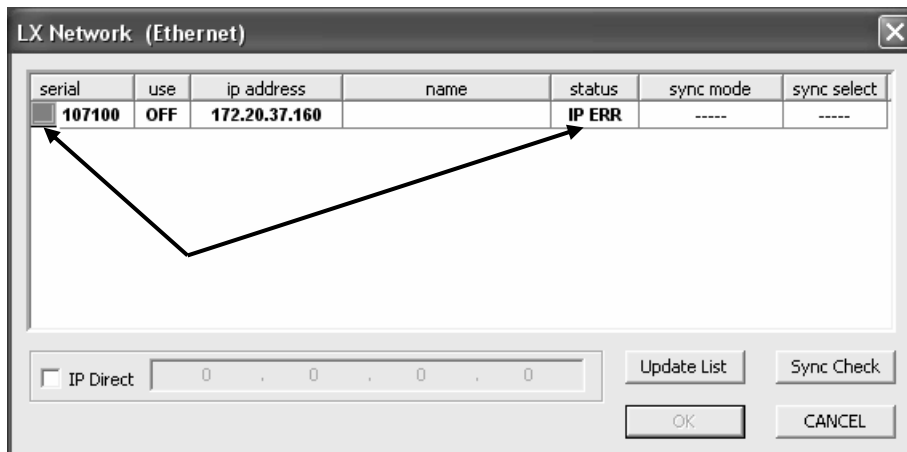
Click the **OK** button to apply the IP address parameters for the LX-10L/20L. It is not necessary to restart the LX-10L/20L, but it takes a few seconds for the changed settings to actually take effect so wait for at least 5 seconds and then connect to the LX-10L/20L. If the list is not updated or the entry disappears from the list, click the **Update List** button to update the list.

Starting Program

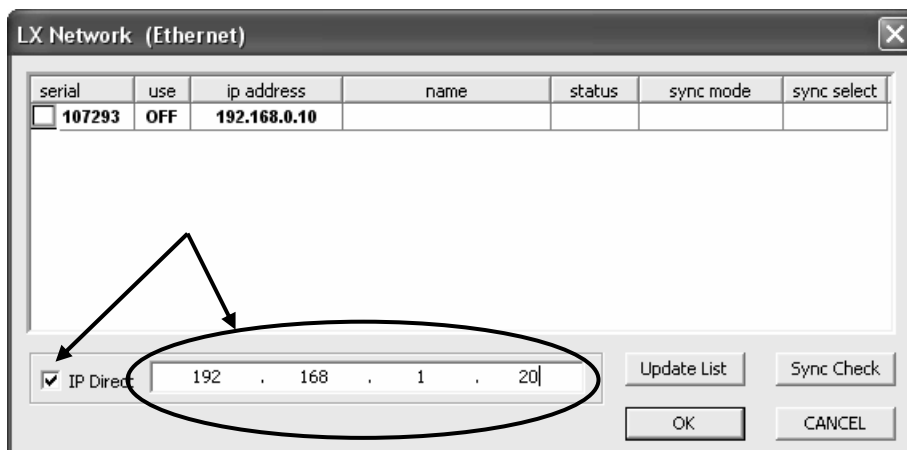
Note that if the LX-10L/20L is already being used from another PC, a red check mark is displayed and **USE** is displayed in the **status** field. In such a case, you cannot connect to that LX-10L/20L.



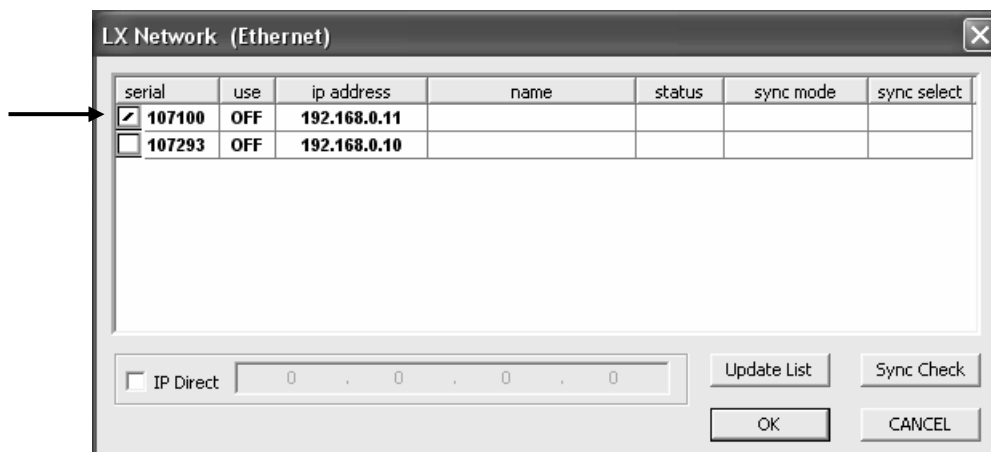
If a TCP connection is not possible because of a problem such as an incorrect IP address for the same segment, a grey check box is displayed along with IP ERR in the **status** field. In such a case, specify an appropriate IP address or check the IP address settings (Subnet mask, Gateway, etc.) between the PC and the LX-10L/20L, and then connect to the LX-10L/20L.



When connecting to an LX-10L/20L that exists in a different segment (and, for example, going beyond the router), select the **IP Direct** check box, enter the address of the device to be connected, and then click **OK**.



When multiple LX-10L/20Ls are found in the same segment, the dialog box appears as shown below. In such a case, select the check box of the LX-10L/20L to be connected, and click the **OK** button.



On the real time PC recording of the LX-10L/20L, the speed of the data transfer cannot catch up to the recording throughput per a time unit. In this scenario, the recording will stop automatically when the memory buffer of the LX is getting full with the un-transferred data. It is caused by depending on the PC specifications and the network traffic; however, the following sampling setting is not applicable for the real time PC recording.

Sampling Frequency 96 kHz x 8 ch (Memo voice ON/OFF)

If multiple LX units by using LX Navi are connected to a single PC (regardless with IEEE 1394 or LAN), the wave form settings and the data folder settings of each LX may cause conflict to others because the LX Navi shares the common save area. Use each LX for each PC.

The Main Window will be displayed by starting LX Navi when the connection completes.

See Section 3 Introduction to LX Navi.

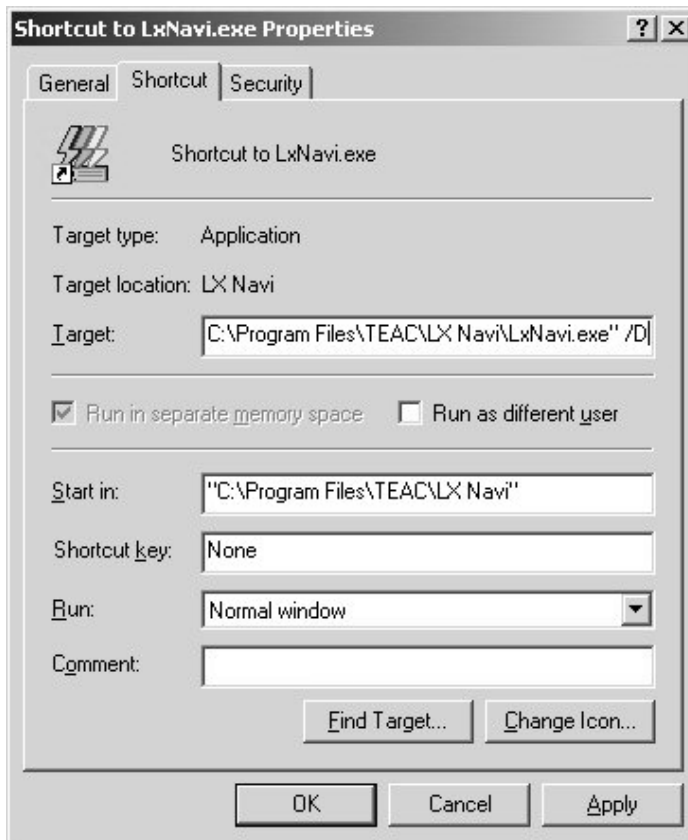
Starting Program

Starting Navi directly without the LX Network dialog box displayed

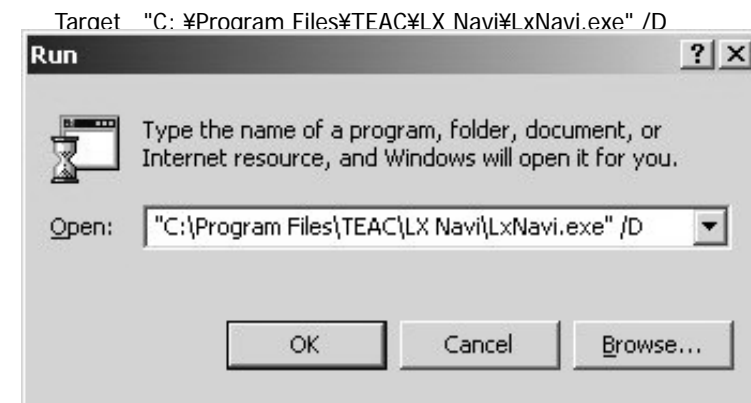
Specify the "/D" option when starting LxNavi with reference to the following methods. If previously used serial numbers of LX are connected to I/F, Navi will launch directly without the LX Network dialog box displayed. The LX Network dialog box is displayed if previously used serial numbers of LX are connected to I/F.

(Example 1) Open the LxNavi shortcut properties and specify "/D" where **Target** is displayed.

Target "C:\Program Files\TEAC\LX Navi\LxNavi.exe" /D



(Example 2) from the **start** menu click **Run...**, specify LxNavi/exe and enter option "/D" after that, and click **OK**.



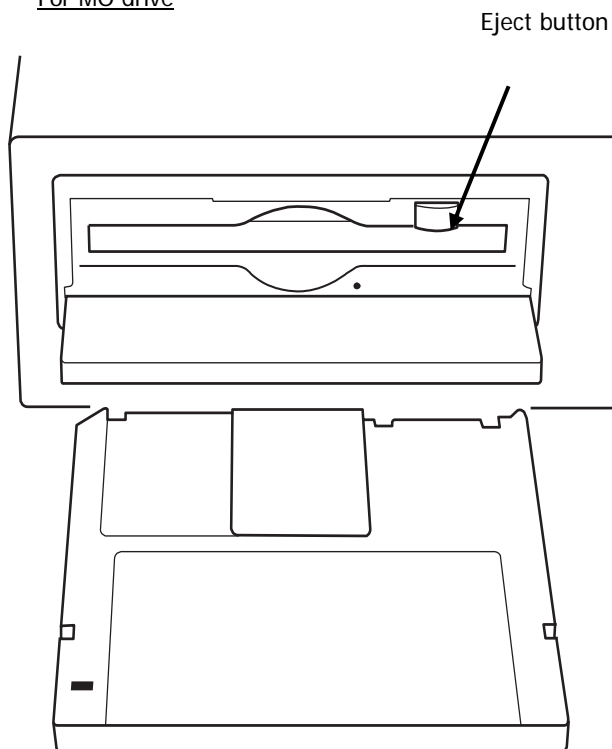
Inserting and Ejecting Media

Inserting Media

- Insert or eject the media when the LX is at the STOP state of the REC mode.
- To discharge static electricity from your body, touch a metallic surface near you before handling the unit. Never touch the PC card being inserted to the PC card slot while recording and playing back.

1. Power on the LX main unit. Wait until the STOP lamp glows before proceeding to the next step.
2. Open the cover of the drive.
3. Insert the media, with the label facing up, into the slot.
4. Close the cover of the drive.

For MO drive



- Use Specified MO Disks Only

MO

Use 1.3 GB, 3.5 inch MO disks from Fujitsu Ltd. Other MO disks might be unable to record or reproduce correctly.

PC Card

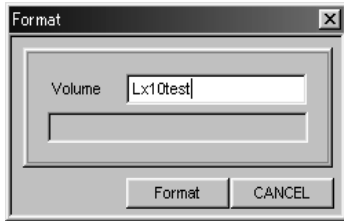
To ensure the recording performance of the main unit, use the PC cards specified in section 1-6 'Verified PC cards'.

Inserting and Ejecting Media

- Formatting Media

MO

A specified MO disk is not formatted. If you insert an unformatted MO disk into the drive, the MO disk will not be recognized as a recording device, and recording will not be possible. To format an MO disk, from the **File** menu of LX Navi choose **Format**. Type the volume name and then click **Format**.



PC Card

From the **File** menu of LX Navi choose **Format**. Or format the PC card to FAT16 by PC. The LX cannot use the PC card formatted by FAT32, re-format by FAT16 to use such card.


Ejecting Media

- Turn off the power after you eject the media

Remove the media before powering off the LX. If the power is turned off during writing, data recorded on the media might become unreadable. Also, eject the media before moving the LX main unit. Moving the unit while the media is inserted might result in damage.

- Insert or eject the media when the LX is at the STOP state of the REC mode.
- To discharge static electricity from your body, touch a metallic surface near you before handling the unit.

Never touch the PC card being inserted to the PC card slot while recording and playing back.

1. Open the cover of the drive.
2. For MO disk, click the  button on the toolbar of LX Navi to eject the MO disk. For PC card, push the eject lever of the drive to eject the PC card.
3. Remove the media.
4. Close the cover of the drive.

- While LX Navi is running, the Eject button on the MO drive has no effect.
- You cannot remove the media during recording or reading. The data will be corrupted.

About Data on Media

In a PC's drive, the data recorded on a media can be recognized as files in TAFFmat format. Therefore, the files can be read by commercially available analytical software. However, write-protect an MO disk before inserting it into a PC drive. If the MO disk is not write-protected and you perform a file operation such as moving, deleting, or renaming a file or folder, the link between the data file and the header file might be lost, and the data might become unreadable on the PC. Also, the data might be unreadable when such media is re-inserted in the LX.

About Expansion Unit

When the expansion unit AU-LXEPIO(for DC amp/Output amp) or AU-LXEPIOP(PA amp/ST amp/Output amp) is added, install input/output amps in the following combinations:

16 inputs + 16 outputs

(From the upper slot to the lower)

Slot 1: Input amp

Slot 2: Input amp

Slot 3: Output amp

Slot 4: Output amp

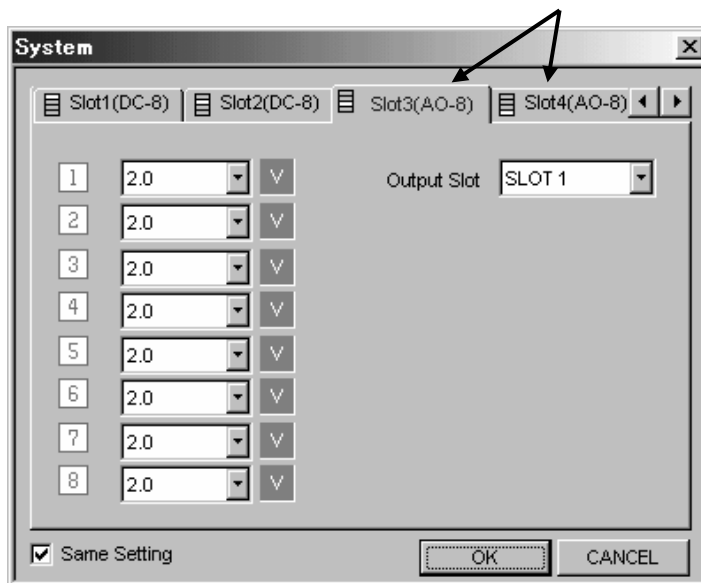
32 inputs

Install input amps into all slots.

About Slot Settings

When the expansion unit is added, tabs are added to the System dialog. Click the tab and set for each slot.

Tabs added by the expansion unit.



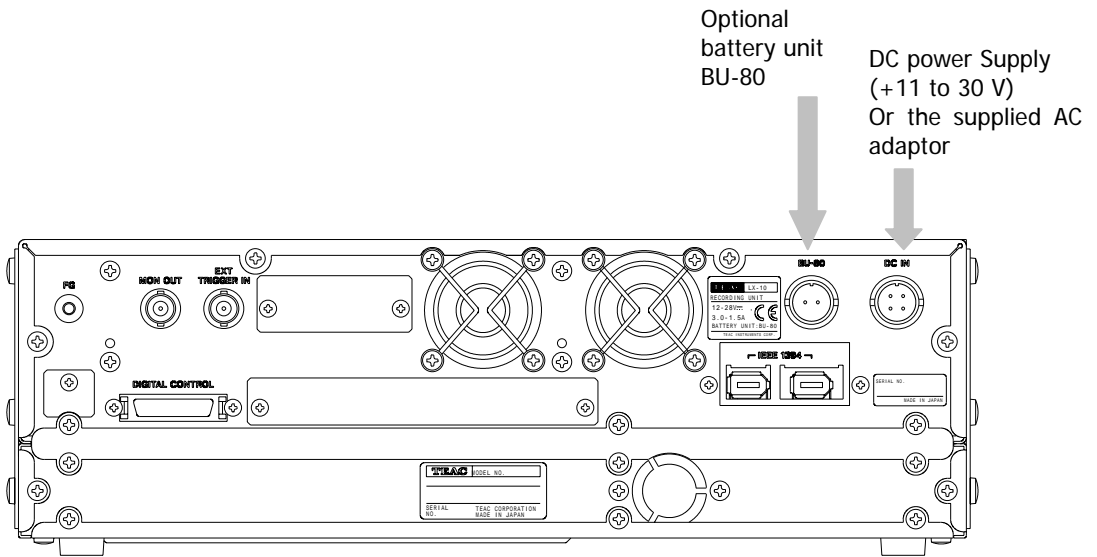
About Maximum Sampling Frequency When Using Expansion Unit

Channels	Memory Recording	Media Recording (MO/PC card)
2 ch	96 kHz	96 kHz
4 ch	96 kHz	96 kHz
8 ch	96 kHz	48 kHz
16 ch	48 kHz	24 kHz
32 ch	24 kHz	12 kHz

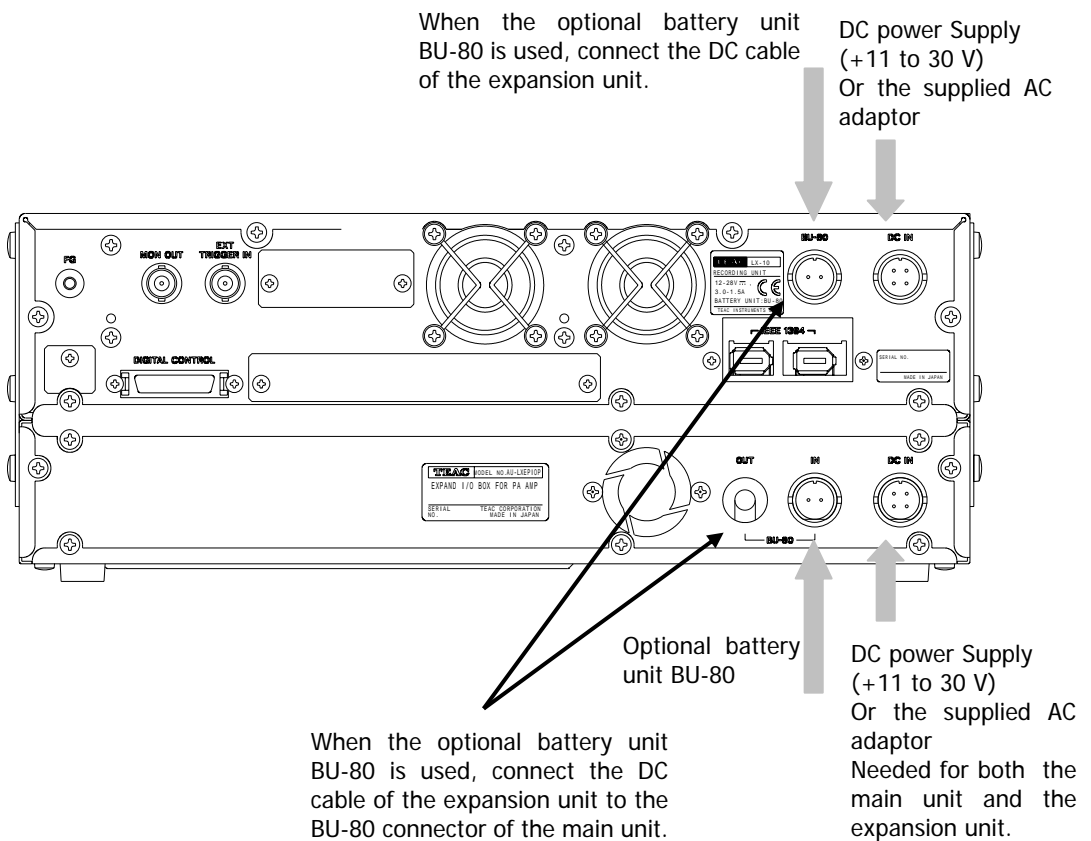
About Expansion Unit

About Power Supply Connection

LX Main Unit + AU-LXEPIO



LX Main Unit + AU-LXEPIOP



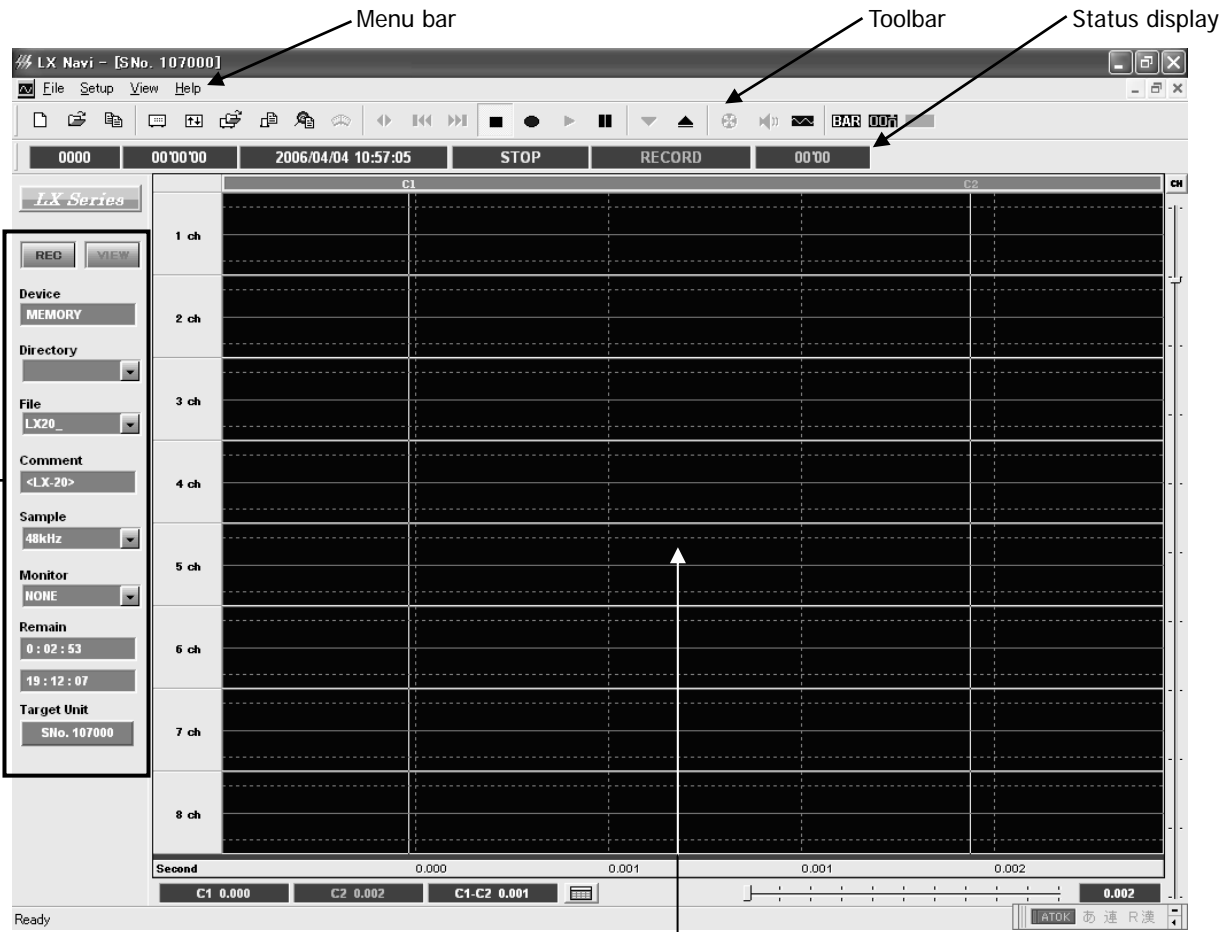
Section 3 Introduction to LX Navi

Outline of Main Window	3-2
Overview of Steps in Recording and Reproduction	3-4

Outline of Main Window

Outline of Main Window

Start LX Navi program, the following main window will be displayed.



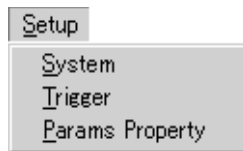
These enables you to switch between the Recording mode(REC) and the view mode(VIEW), check the name of a recording file, select the name of a recording file, select the files to be reproduced, etc.

Area for displaying waveforms

Menu bar



File Setup View

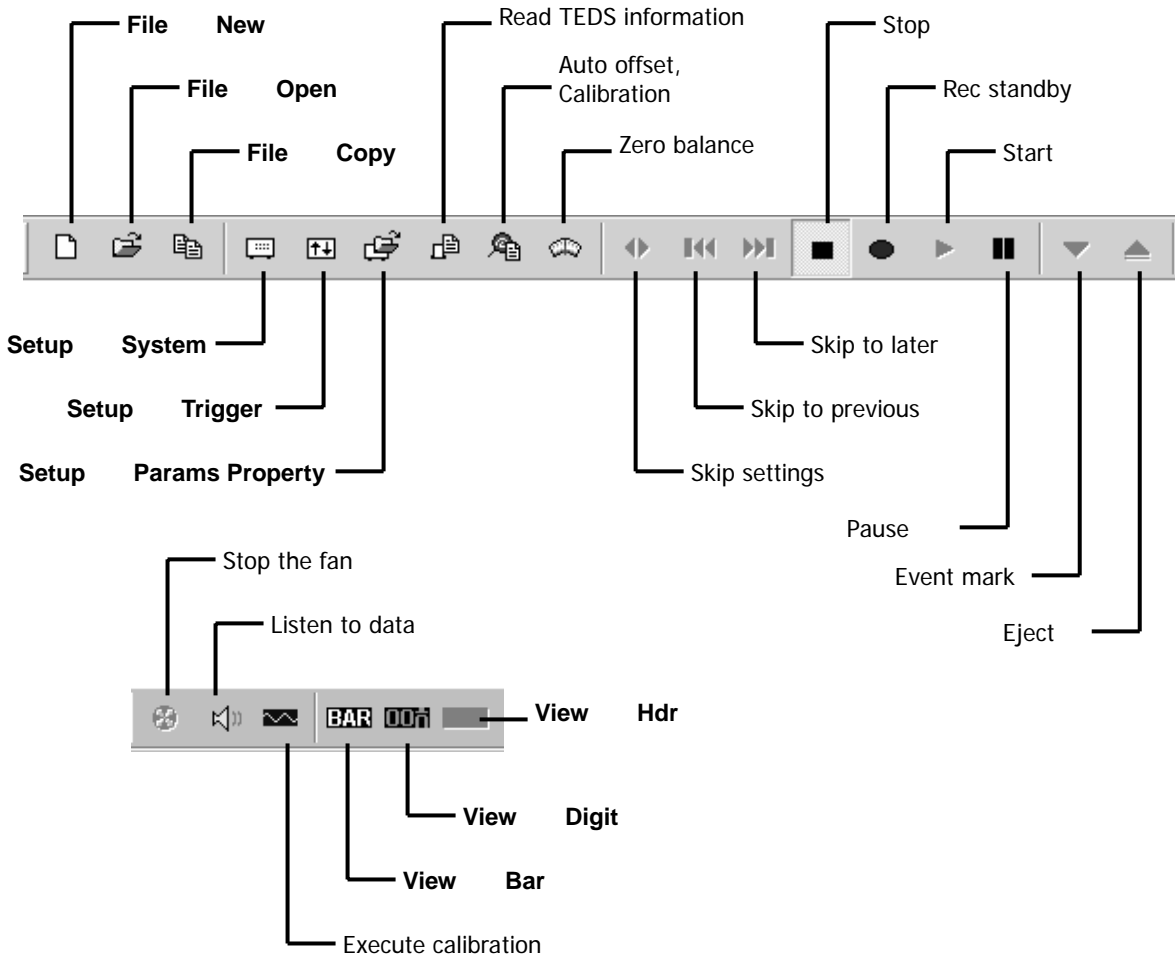


New: Select the device on which data is to be recorded, and specify the file name.
Open: Select data to be reproduced.
Copy: Copy data.
Format: Format a media.
Exit: Quit the application.

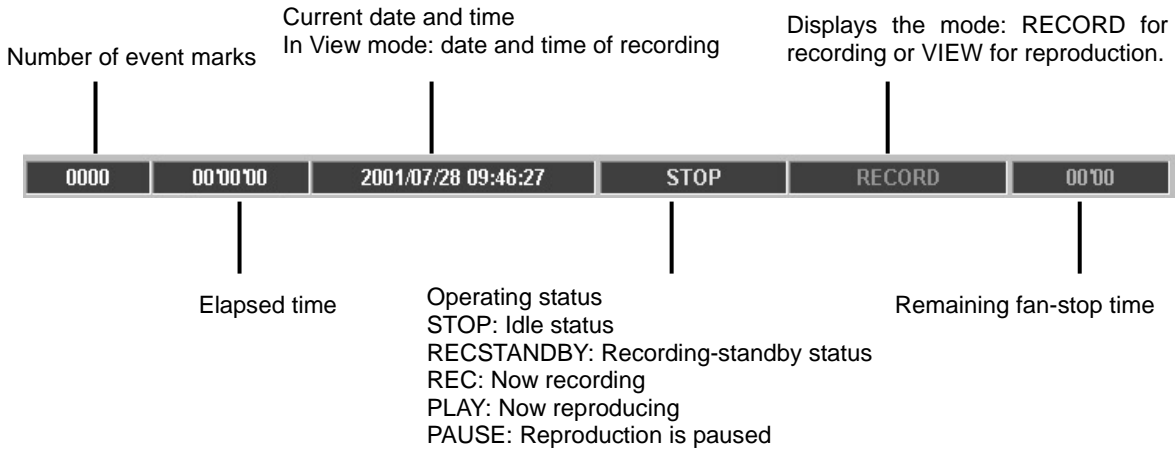
System: Set operations, recording conditions, and reproduction conditions.
Trigger: Set trigger actions.
Params: Property: Save or load settings.

Toolbar: Display or hide the toolbar.
Status Bar: Display or hide the status bar.
Bar: Display or hide bar meters.
Digit: Display or hide digital values.
Hdr: Display or hide header information.

Toolbar



Status display

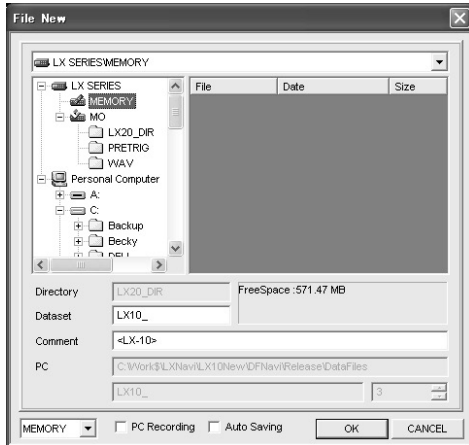


Overview of Steps in Recording and Reproduction

Overview of Steps in Recording and Reproduction

Start LX Navi

Recording
File, New



Specify the recording device and file name.

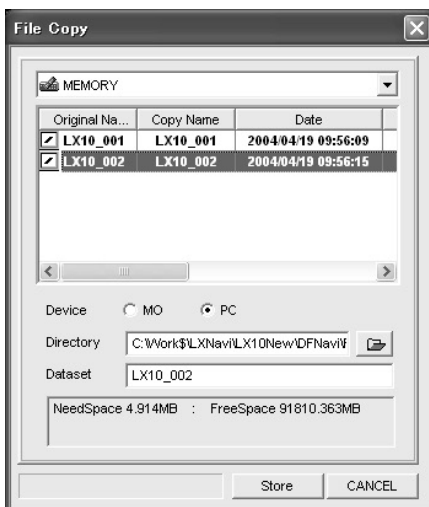
Mode becomes the recording mode.

Operations to control recording

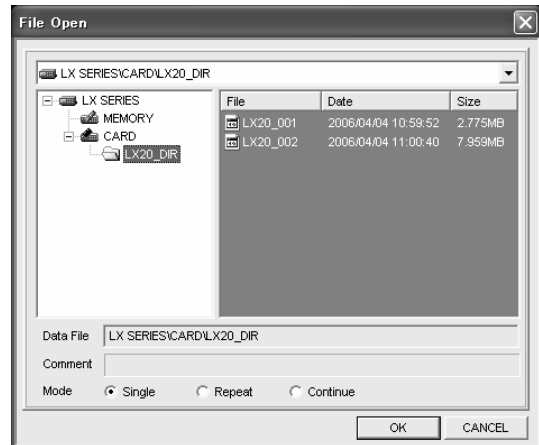


When the memory recording is selected

After finishing recording to memory, store on media or PC.



Reproducing
File, Open



Select the file to be reproduced.

Mode becomes the view mode.

Operations to control reproduction



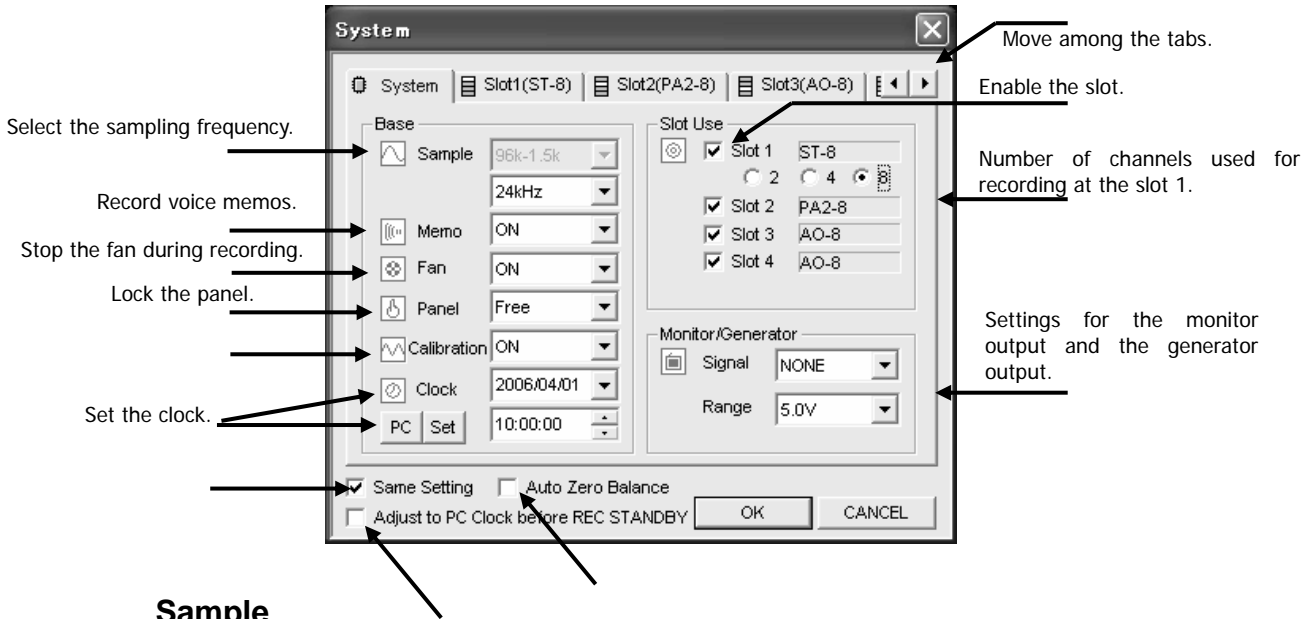
Section 4 Settings

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System Settings

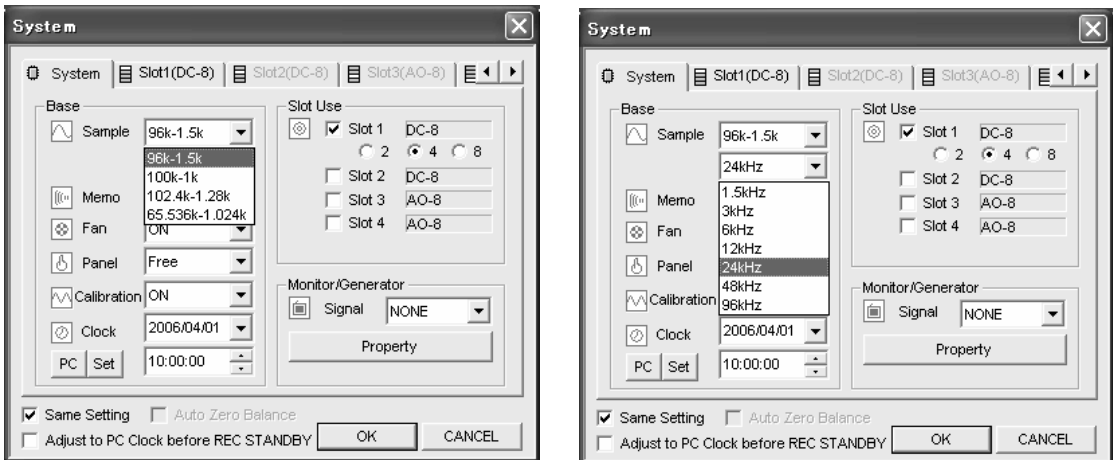
System Settings

To specify settings for the LX operations, from the **Setup** menu choose **System**.



Sample

Select the sampling frequency. Select the sampling frequency series including the sampling frequency to be selected at the upper row, then select the sampling frequency within the list shown at the lower row. They are to be limited based on the selected recording media and the tachometer pulse input channels. See “1-13 Sampling Frequency and Number of Channels”.



LX-10/10L

You can select the sampling frequency series of 96k-1.5k only at the upper row for the sampling frequency of 96 kHz, 48 kHz, 24 kHz, 12 kHz, 6 kHz, 3 kHz, or 1.5 kHz at the LX-10/10L.

LX-20/20L

You can select the sampling frequency from the followings;

96k-1.5k for 96 kHz, 48 kHz, 24 kHz, 12 kHz, 6 kHz, 3 kHz, or 1.5 kHz

100k-1k for 100 kHz, 50 kHz, 20 kHz, 10 kHz, 5 kHz, 2 kHz, or 1 kHz

102.4k-1.28k for 102.4 kHz, 51.2 kHz, 25.6 kHz, 12.8 kHz, 5.12 kHz, 2.56 kHz, or 1.28 kHz

65.536k-1.024k for 65.536 kHz, 32.768 kHz, 16.384 kHz, 8.192 kHz, 4.096 kHz, 2.048 kHz, or 1.024 kHz.

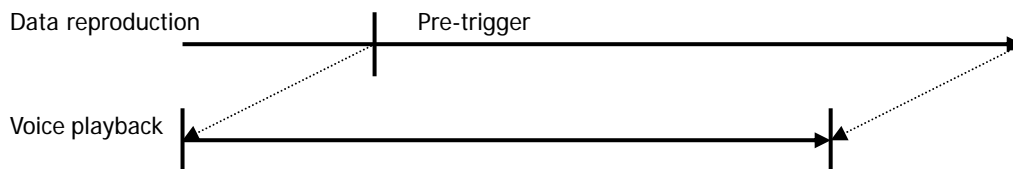
AR-LXDC2


You can select 1k-1/60 for 1 kHz, 500 Hz, 200 Hz, 100 Hz, 50 Hz, 20 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz, 1/2 Hz, 1/5 Hz, 1/10 Hz, 1/30 Hz, or 1/60 Hz when the low-speed sampling DC amp card is installed.

Memo

Set to ON when recording or reproducing a voice memo. Voice memo data is recorded as a WAV file separately from the data and header files, using 8,000 bytes per second. Note that this data increases even when the microphone is removed from the jack.

- Voice memo is not recorded during the pre-trigger period. In playback, the voice is played back from the beginning of data. So, the voice and data are not synchronized.



- When recording the voice memo under the (only) PC direct recording, click  or press the PAUSE button of the main unit to pause before recording stop.

Fan

When you set this to **OFF**, you can stop the cooling fan on the LX-10 for a period of 10 minutes from the start of recording. This is useful for recording noise. If you have already stopped the fan and recorded data, wait for about 10 minutes before you again stop the fan and record.




When you set this to **ON**, the cooling fan is turned to on. However, by clicking the fan stop button on the toolbar, you can stop the fan while recording. Click again to restart the fan. An accumulated time to stop the fan within a single recording (from recording start to stop) is 10 minutes. The remaining time to stop the fan is displayed at the status display. (See 3-3 Outline of Main Window, Toolbar and Status Display.)

Panel

When you set this to **Lock**, you can disable the control buttons on the front of the main unit.

Clock

Use this to adjust the internal clock on the main unit. The current date and time according to the internal clock are displayed here.

To change the date, click the  button on the right of the date. A calendar will appear. In the calendar, click the desired date. To change the time, click the digits you want to change and then either type the desired time or click the  or  button on the right of the time to increment or decrement the time value. After you have changed the date or time values, click **Set** to apply the new settings.

Click **PC** to set the date and time of the PC connected.

Slot Use

Turn on a check box to enable the corresponding slot to be used for recording or reproduction. For Slot 1, you can choose the number of channels to be used for recording from 2, 4, and 8.

Use the slot tab of the **System** dialog for the settings of the input and output amps enabled here.

At the LX-20/20L, turn on **Tacho** check box to enable the tachometer pulse input channels.

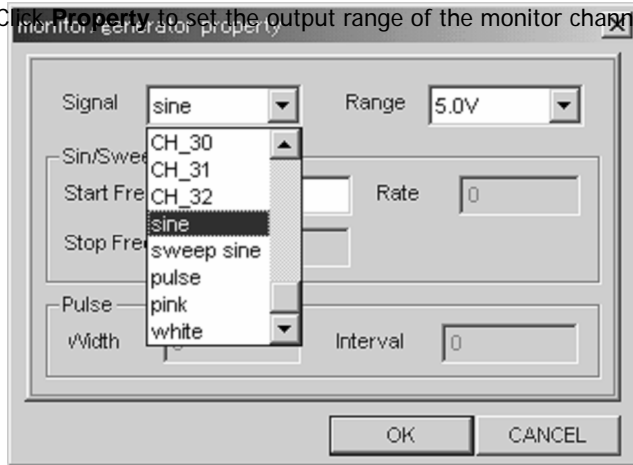
- You cannot use the tachometer pulse input channels and the generator output function at the time.

Monitor/Generator

In **Signal**, select the monitor channel or the type of the generator output signals (only for the LX-20/20L) to be output from the MON OUT connector on the rear panel. If you don't want to monitor any channel, set NONE.

In Range set the output range. You can set the output range in 0.1 V steps, from 1 V to 5 V.

Click **Property** to set the output range of the monitor channel or the details of the generator output signal.



In **Signal**, select the monitor channel or the type of the generator output signals (sine, sweep sine, pulse, pink noise, or white noise) from the MON OUT connector of the LX-20/20Ls).

When you select the generator output signal, you can select the following parameters show at the dialog. (The parameters can be set are automatically appeared depending on the selection of the output signal.)

Sin/Sweep

Start Freq: Set the start frequency (Hz) when <sine> or <sweep sine> is selected at **Signal**.

Stop Freq: Set the stop sweep frequency (Hz) when <sweep sine> is selected at **Signal**.

Rate: Set the sweep rate when <sweep sine> is selected at **Signal**.

Pulse

Pulse Width: Set the pulse width when <pulse> is selected at **Signal**.

Pulse Interval: Set the pulse interval when <pulse> is selected at **Signal**.

Select the output range at **Range** from 1 V to 5 V at 0.1 V steps.

See Section 6 for the specifications of the generator output.

- You cannot use the tachometer pulse input channels and the generator output function at the time.
- You cannot use the monitor output of the analog signal when recording at the low-speed sampling (1 kHz to 1/60 Hz).

Input Amp Settings

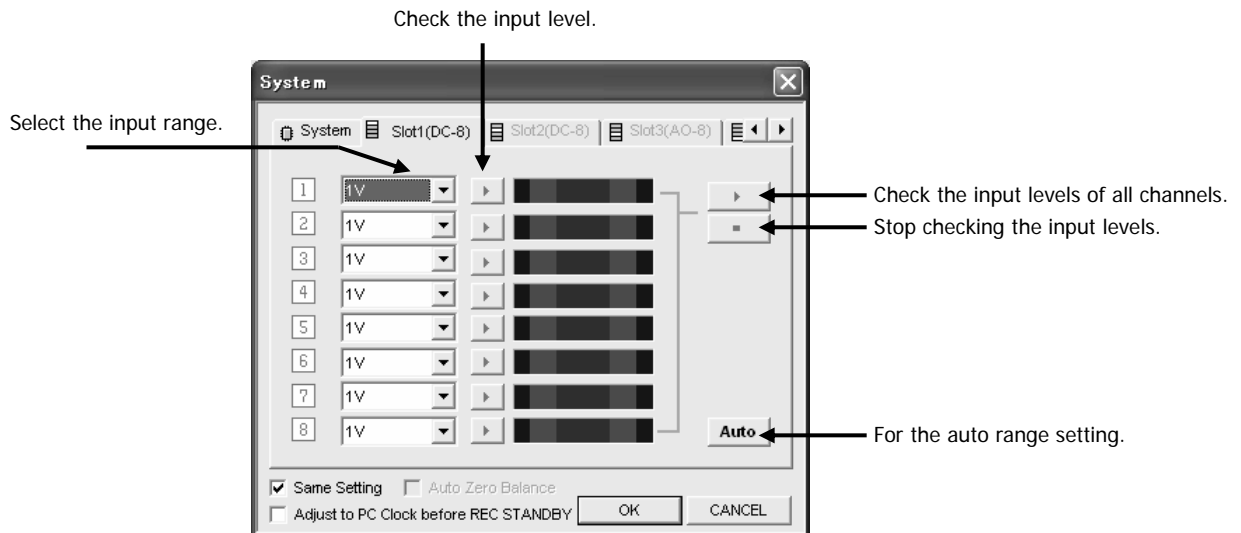
In the **System** dialog, click the tab of the slot in which the input amp is installed. The setting parameters are valid depending on the type of the amps installed.

DC Amp AR-LXDC/DC2

<DC-8> is shown at the **Slot** tab.

The AR-LXDC2 is a DC input amp equipped the low-speed samplings (1 kHz to 1/60 Hz) addition to the functions that the AR-LXDC supports.

See Section 6 for the specifications.



Range Settings

You can select from +/- 0.5, 1, 2, 5, 10, 20, or 50 V. A range of +/- 131% of the selected range can be obtained for A/D (analog to digital) conversion value; however, the input margin level is approximately +/- 120%. Input the signal, then click ► button on the right and specify the setting while checking the level.

Auto

When you input the signal and click **Auto**, the optimum input range is set automatically.

Same Setting

Check to apply the same settings to the channels later than the channel changed.

- You cannot use the analog output signal of the monitor output and/or the analog output amp when recording at the low-speed sampling (1 kHz to 1/60 Hz).
- You can reproduce the data recorded at the low-speed sampling from the analog output amp by changing the reproduce sampling speed at 1.5 kHz or higher.

Input Amp Settings

PA Amp AR-LXPA1/PA3

Two types of the PA amps for a voltage output accelerometer input are available for the LX series.

<PA-8> is shown at the **Slot** tab for the AR-LXPA1.

<PA3-8> is shown at the **Slot** tab for the AR-LXPA3.


The AR-LXPA3 is an amp equipped +/- 50 V input range and A and C weighting filters addition to the functions that the AR-LXDC supports.

See Section 6 for the specifications.

Cautions on Using PA Amp

- Calibration

It is suggested to use 0.01 V range of the LX PA amp after turning on the power for 10 minutes or more, and then executing manual calibration.

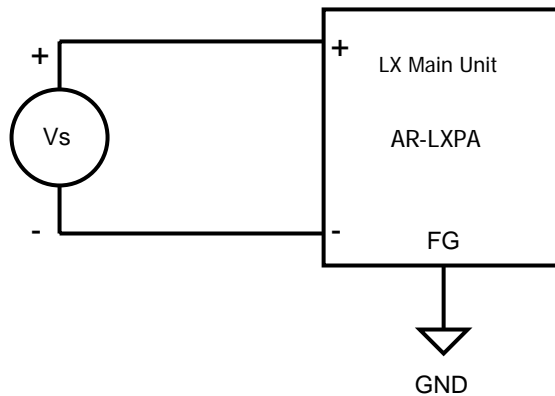
In order to execute the manual calibration for precisely measurement, click  button on the toolbar of the LX Navi. Also it is recommended to use the balanced input mode for precisely measurement.

- Input Connection and Grounding

When using many sensors or circuit signals of operations powered by a battery:

Input Mode: Balanced (Bal) mode

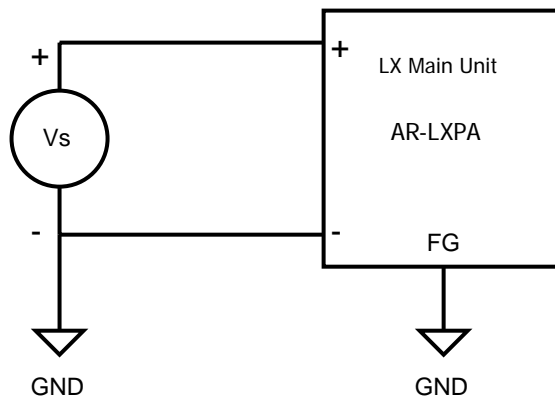
Whenever possible, connect the LX frame ground (FG) to ground.



When using circuit signals (AC, ICP, DC) of operations powered by an AC power source:

Input Mode: Balanced (Bal) mode

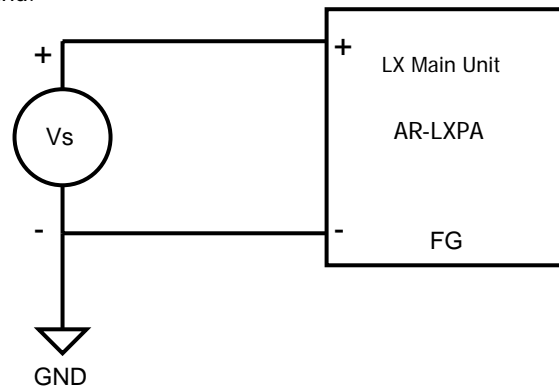
Always connect the frame ground (FG) of the input signal source and the LX frame ground (FG) to ground.



When using circuit signals (DC) of operations powered by an AC power source:

Input Mode: Unbalanced (Unbal) mode

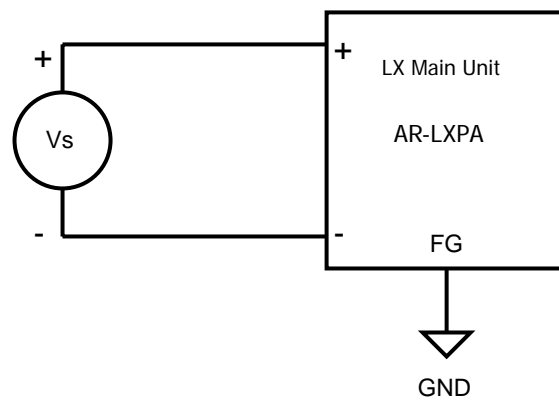
If the frame ground (FG) of the input signal source is connected to ground, do not connect the LX frame ground (FG) to ground.



When using circuit signals (DC) of operations powered by an AC power source:

Input Mode: Unbalanced (Unbal) mode

If there is no frame ground (FG) of the input signal source, connect the LX-10 frame ground (FG) to ground.



Input Amp Settings

AR-LXPA1 Setting Dialog

Select the input range (0.01 V, 0.0316 V, 0.1 V, 0.316 V, 1 V, 3.16 V, 10 V)

Select Balanced or Unbalanced input.
Bal: Balanced
Unbal: Unbalanced
Automatically set to DC coupling for all 8 channels when the balanced input is selected.

Select the coupling mode.
AC: AC coupling
DC: DC coupling

Select turning ON or OFF of the power supply to the sensor connected.
OFF: No supply
4mA: Supply 4 mA constant current

AR-LXPA2 Setting Dialog

Select the weighting filter.
A: A filter
C: C filter
FLAT: Flat

Select HPF (High Pass Filter).
OFF: No
10Hz: 10 Hz
20Hz: 20 Hz

Only combination of DC/OFF/FLAT selections is applicable at **Bal/Unbal**: **Unbal**.

- At the AR-LXPA2 amp, you can select between 28 V DC and 24 V DC on the sensor power supply at the internal dip switch. The factory default is 28 V DC. Contact TEAC for 24 V DC setting.

ST Amp AR-LXST1

<ST1-8> is shown at the **Slot** tab for the AR-LXST1.


The AR-LXST1 is an input amp applied for strain gauges and strain gauge type sensors and DC inputs.

See Section 6 for the specifications.

Cautions on Using ST Amp

- Calibration

It is suggested to use the LX ST amp after turning on the power for 5 minutes or more, and then executing manual calibration.

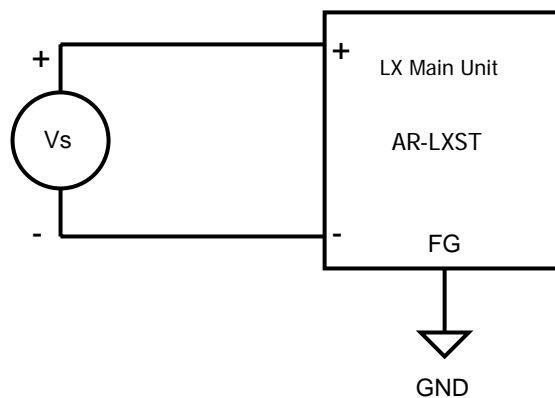
In order to execute the manual calibration for precisely measurement, click  button on the toolbar of the LX Navi. Also it is recommended to use the balanced input mode for precisely measurement.

- Input Connection and Grounding

When using sensors:

Input Mode: Balanced (Bal) mode

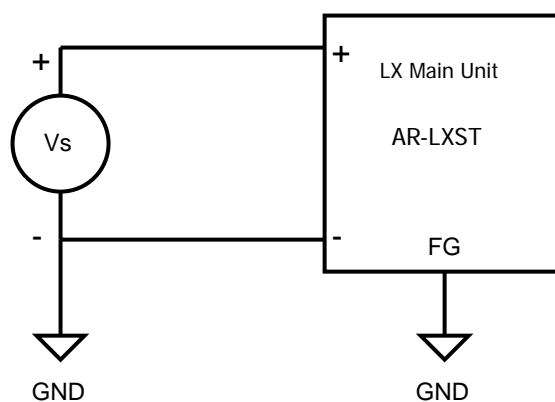
Whenever possible, connect the LX frame ground (FG) to ground.



When using circuit signals (DC) of operations powered by an AC power source:

Input Mode: Balanced (Bal) mode

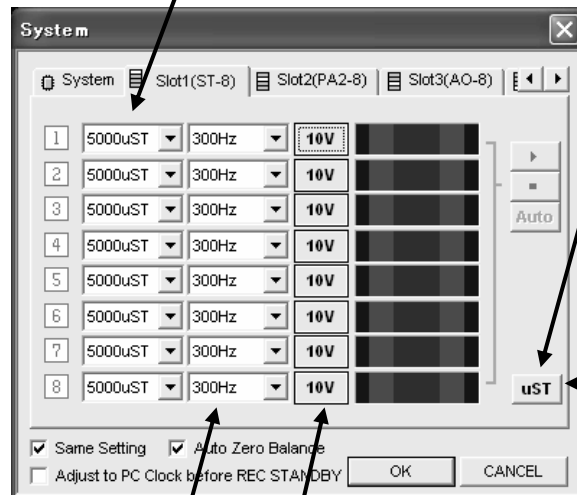
Always connect the frame ground (FG) of the input signal source and the LX frame ground (FG) to ground.



Input Amp Settings

AR-LXST1 Setting Dialog

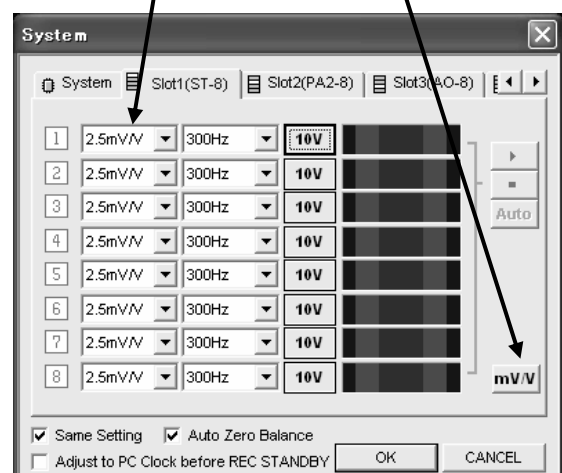
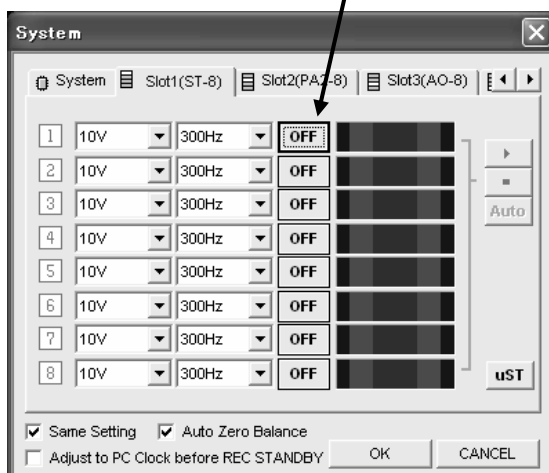
Select the input range.
Click **uST** to turn the button at the right bottom to **mV/V**.



Change the input range display between **uST** and **mV/V**.

Set the low pass filter.

Change the bridge voltage.
Turn to **OFF** to set the DC input range.

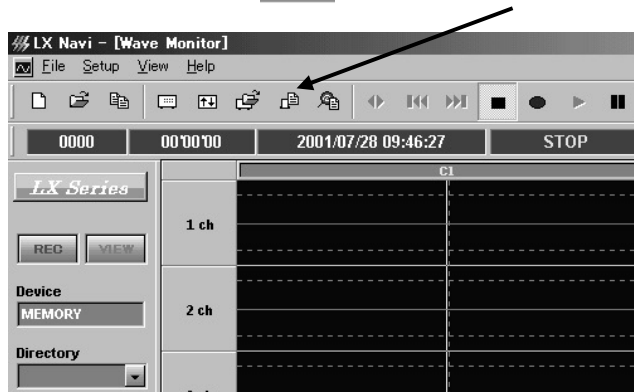


Sensitivity Setting Using TEDS Functions

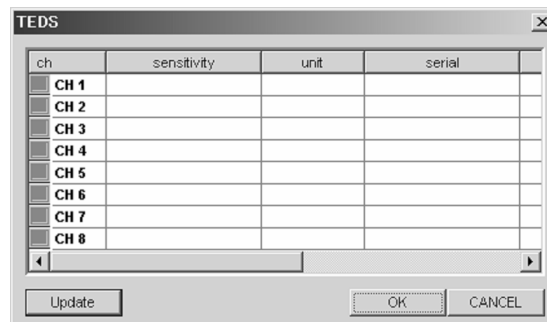
When a transducer/sensor conforms to the IEEE Std 1451 A SMART TRANSDUCER INTERFACE is connected to the AR-LXPA1/AR-LXPA2, the LX can read its Transducer Electronic Data Sheet (TEDS) information, then can display the information and set the acquired sensitivity coefficient automatically to the channel that the transducer is connected.

- If the information of the transducer is not complied with the IEEE TEDS standard template, the LX cannot read and display the information correctly.

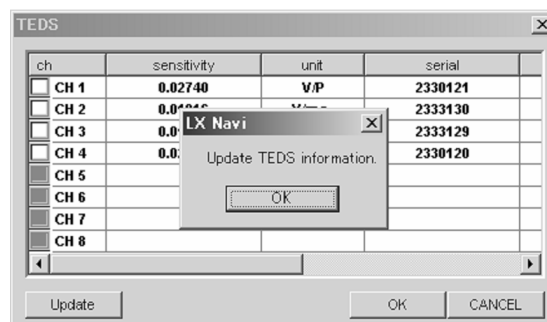
1. Click the toolbar icon  in the main window.



2. The **TEDS** dialog is displayed. If you turn ON the power of the LX after connecting the TEDS transducers, the TEDS information is automatically loaded at the initial calibration stage, and the LX displays the following window shown at the following step.



3. Click **Update** to read the TEDS transducer information. If you turn ON the power of the LX after connecting the TEDS transducers, the TEDS information is automatically loaded at the initial calibration stage, and the LX displays this window.

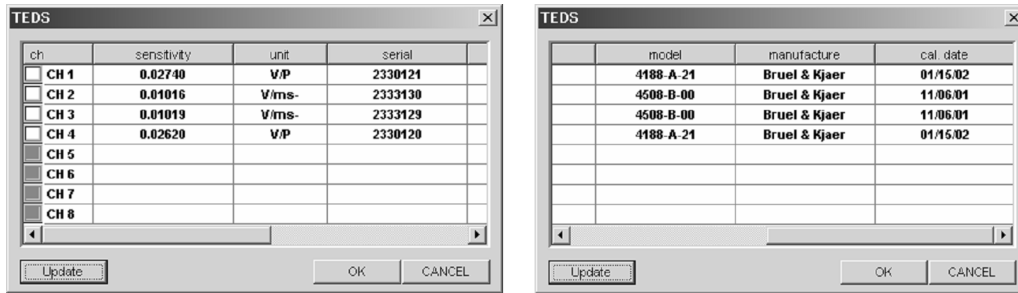


Sensitivity Settings Using TEDS Functions

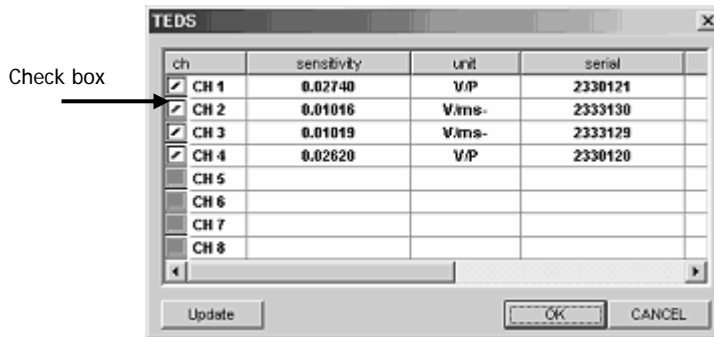
4. Click OK when <Update TEDS information> message is displayed.

You can view the list of the TEDS transducer information connected to the amp, such as;

Sensitivity (**sensitivity**), Unit (**unit**), Serial number (**serial**), Manufacturer name (**manufacturer**), and Calibration date (**cal date**).



Turn on the check box of the channel to reflect the sensitivity of the loaded TEDS information.




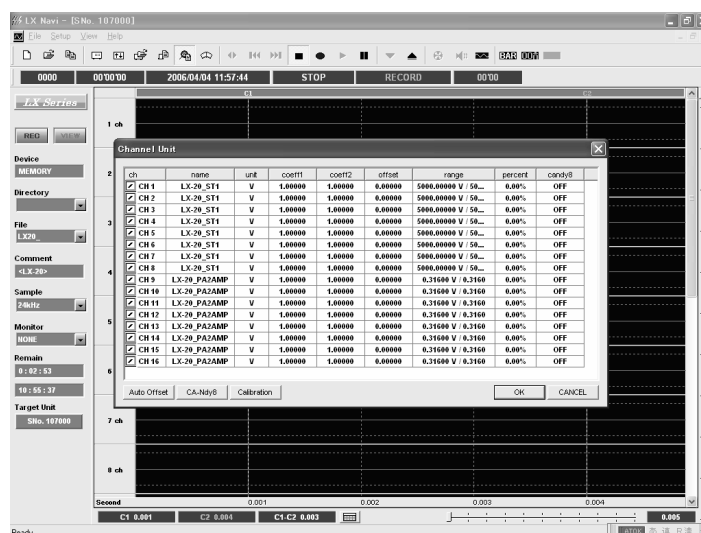
5. Click **OK** to write the applicable slope value (reciprocals of the loaded sensitivity) to the header file, then the window is closed. Open the channel property list at the main window to confirm the slope value is updated based on the loaded TEDS information.

(See 5-16 Channel Property.)

Auto Offset

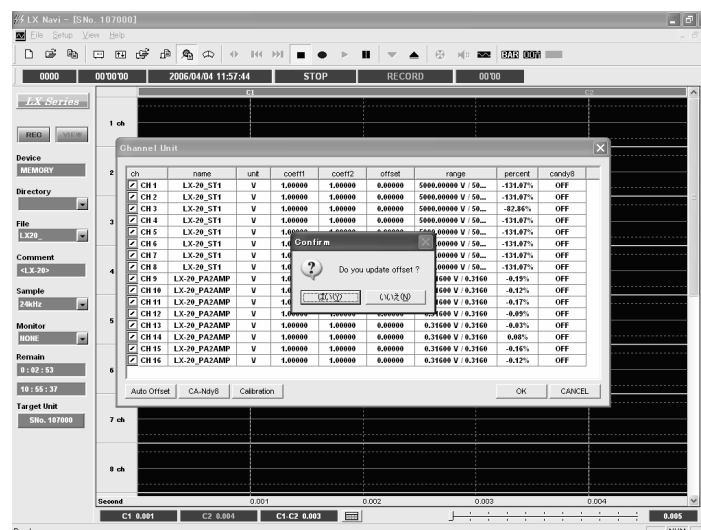
The auto offset function of the LX Navi measures the voltage of each channel when clicking the **Auto Offset** icon, then reflects its voltage value to the header file. The waveform data in the LX Navi displays Y-axis data by adjusting to zero by using this offset value.

1. Click  on the toolbar at the stop state of the LX main unit.
2. The **Channel Unit** table is displayed.



3. Click **Auto Offset** on the **Channel Unit** table at the timing to execute the offset. The LX measures the voltages of the channels at the click timing and displays these values on the **offset** field.


4. Click **OK** to apply the offset voltages displayed on the channels turning on their check boxes. The **Confirm** dialog is displayed and then click **Yes** to set the values.



Calibration By Using Calibrator

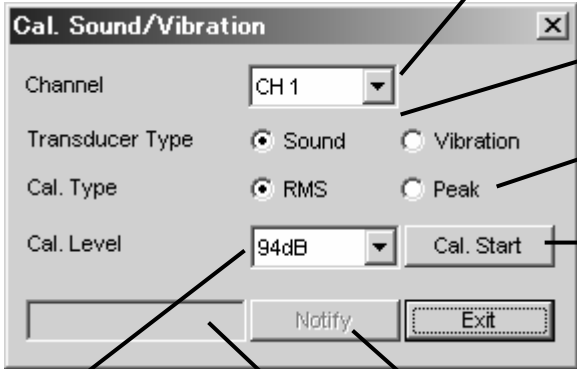
Calibration By Using Calibrator

You can use a calibrator or a pistonphone to apply a sensor sensitivity based on the actual measurement at the PA amp.

1. Click  on the toolbar at the stop state of the LX main unit.
2. The **Channel Unit** table is displayed.


ch	name	unit	coeff1	coeff2	offset	range	percent	candy8	
<input checked="" type="checkbox"/>	CH 1	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 2	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 3	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 4	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 5	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 6	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 7	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF
<input checked="" type="checkbox"/>	CH 8	LX-20_PA2AMP	V	1.00000	1.00000	0.00000	0.31600 V / 0.3160	0.00%	OFF

3. Click **Calibration**.
4. The **Cal. Sound/Vibration** dialog is displayed.




The **Cal. Sound/Vibration** dialog box contains the following elements and annotations:

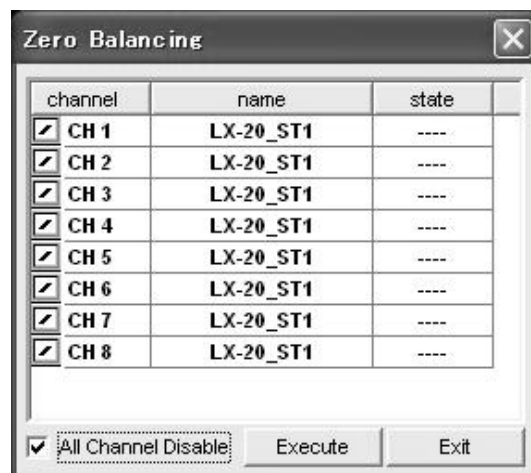
- Channel:** A dropdown menu currently set to **CH 1**. Annotation: "Select the channel."
- Transducer Type:** Radio buttons for **Sound** (selected) and **Vibration**. Annotation: "Select the type of the sensor to use."
- Cal. Type:** Radio buttons for **RMS** (selected) and **Peak**. Annotation: "Select to use RMS or Peak value for calibration."
- Cal. Level:** A dropdown menu currently set to **94dB**. Annotation: "Set the output level to match to the calibrator to be used."
- Cal. Start:** A button to initiate calibration. Annotation: "Start calibration."
- Notify:** A button to apply the calibration result to the slope value. Annotation: "Apply the calibration result to the slope value."
- Exit:** A button to close the dialog. Annotation: "Being displayed the progress of the calibration."

5. After the calibration is done, click **Exit** or click  to return to the main window.

Zero Balance

Whenever turning on the power, use the zero balance function at the ST amp.

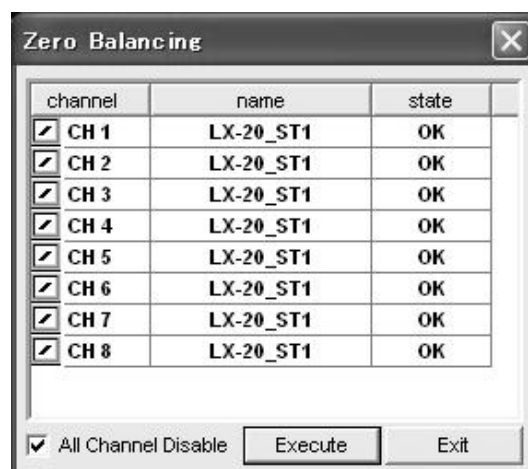
1. Click  on the toolbar at the stop state of the LX main unit.
2. The **Strain Zero Balance** dialog is displayed to start the zero balance.



3. **Start Zero Balance ...** is displayed while implementing the zero balance of all ST amp channels at the time.



4. **Completed** is displayed when the zero balance has been completed.



5. After the zero balance is completed, click **Exit** or click  to return to the main window.

Setting Tachometer Pulse Inputs

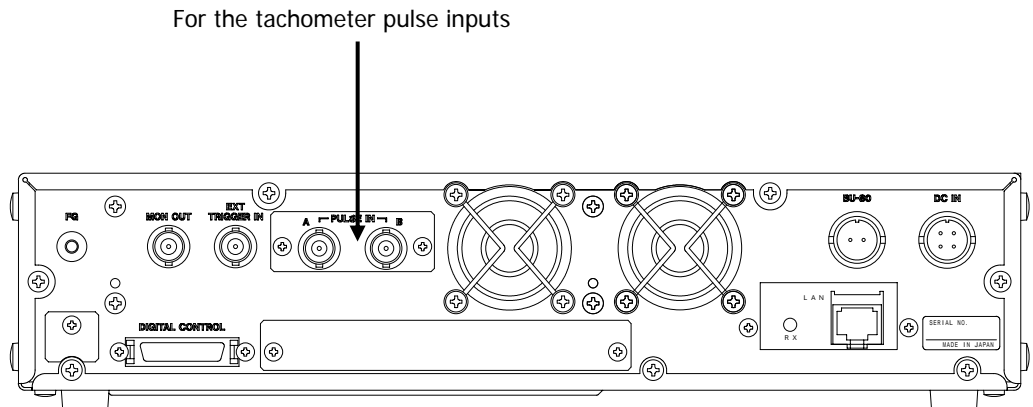
Setting Tachometer Pulse Inputs

The LX-20/20L equips two of the tachometer pulse input channels in separate of analog input channels. Their input connectors are located on the rear panel.

Either 16 bits or 32 bits mode can be selected. When you select the 16 bits mode for one channel, another channel is automatically effective at 16 bits mode. In 32 bits mode, you may select only one channel.

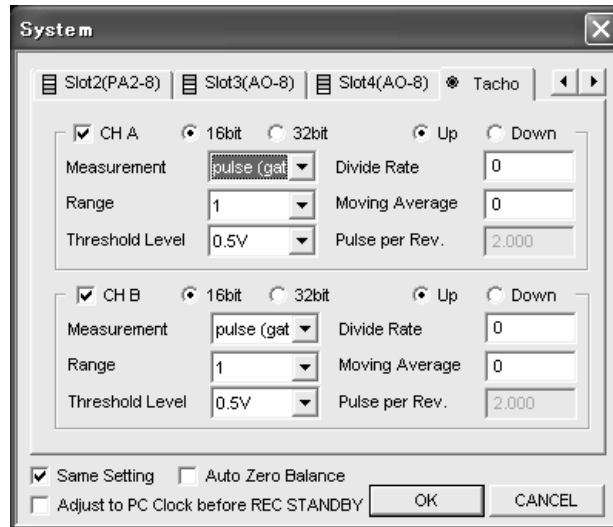
See Section 6 for the specifications.

- 1 x 16 bits tachometer pulse input channel is equivalent to 1 x analog input channel. 1 x 32 bits tachometer pulse input channel is equivalent to 2 x analog input channels. Therefore, if you turn ON tachometer pulse input channel(s), in order keep the same analog input channels, lower the sampling frequency is required by following the setting of tachometer pulse input channel(s).
- Set **Moving Average** to [1] only, when the sampling frequency of 102.4 kHz, 100 kHz, 96 kHz, 65.536 kHz, 51.2 kHz, 50 kHz, 48 kHz, or 32.768 kHz is selected.
- Only 1 x 32 bits tachometer pulse input can be selected when the sampling frequency of 102.4 kHz, 100 kHz, 96 kHz, or 65.536 kHz is selected.
- The LX Navi cannot monitor the tachometer pulse input in wave form display. Use the distal display to monitor.
- The LX cannot playback the recorded tachometer pulse input signals. Process the data as digital data file.
- You cannot use the tachometer pulse inputs and the generator output function at the time.



Setting Tachometer Pulse Inputs

At the **System** dialog, click the **Tacho** tab to set the tachometer pulse input channel parameters.



Turn on the check box for the tachometer pulse input channel to be used and select **16bit** or **32bit**. If you turn on both channels, the number of the bits to be set must be the same. Other parameters are show below.

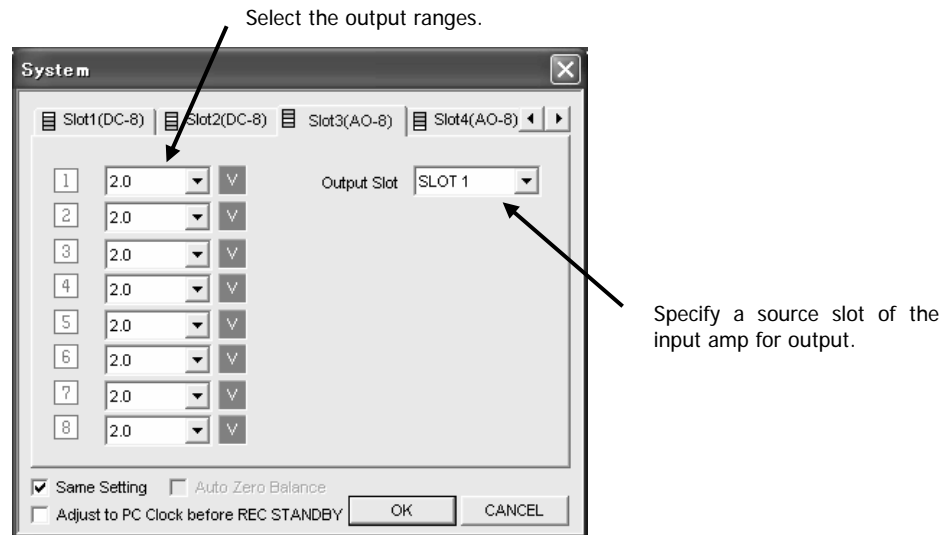
Parameters (Note to refer the articles mentioned at the previous page.)

Parameters	Details
Measurement	Measurement mode
pulse (gate)	Pulse count mode within the gate time
pulse (total)	Total counts from measurement start to stop
Period	Cycle count mode
Frequency	Frequency measurement mode
Rpm	RPM measurement mode
Range	Measurement range
at pulse (gate) mode	1 to 255 times of the sampling frequency
at period mode	1m, 5m, 10m, 50m, 100m, 500m, 1 sec
at frequency mode	10, 20, 50, 100, 200, 500, 1k, 2k, 5k, 10k, 20 kHz
at rpm mode	1500, 3000, 6000, 9000, 12000, 15000, 18000, 24000 rpm
Threshold Level	Threshold level setting +0.5, +1, +2.5, +5, +10, +20 V
Divide Rate	Divide rate 1 to 255
Moving Average	Moving average setting 1 to 16
Pulse per Rev.	Pulse per revolution 1 to 255

Output Amp Settings

Output Amp Settings

In the **System** dialog, click the tab of the slot in which the output amp is installed to set the output ranges. <AO-8> is shown at the **Slot** tab.



Output Range Setting

You can select the output range from 1 V to 5 V at 0.1 V steps.

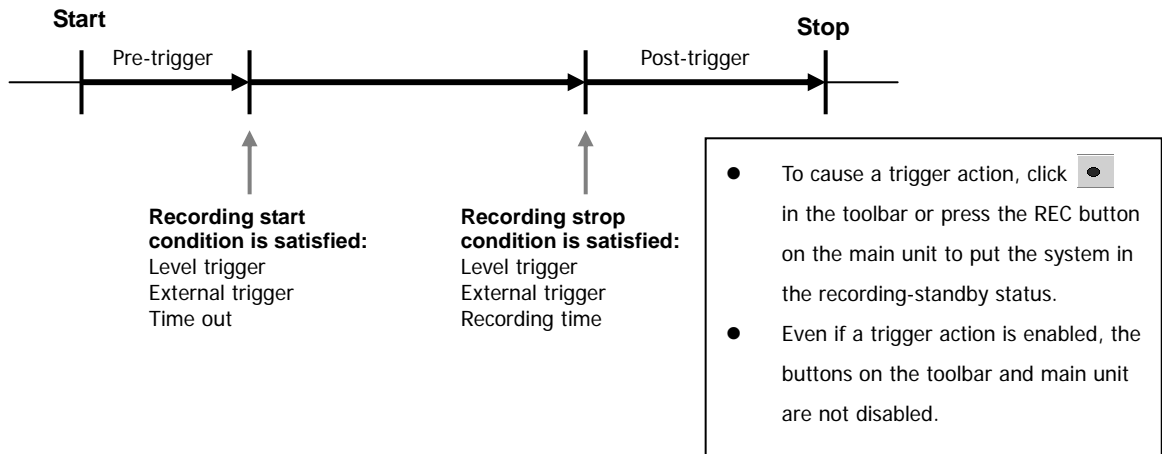
- In the recording at the low-speed sampling mode (1 kHz to 1/60 Hz), you cannot use the analog output at the output amp.
- You can playback the data recorded at the low-speed sampling mode (1 kHz to 1/60 Hz) by changing the playback sampling frequency at 1.5 kHz or higher.
- Make sure to specify the source slot installed the input amp at the **Output Slot**.
- At the LX series, the AD value of +/- 25000 is correspondent to +/- 100 % of the input range. So that the output amp outputs the signal at the scale of +/- 100% as the specified output range. For example, if you record + 1V signal at the 1 V input range and you set the output range at 2 V, you will obtain +2 V signal correspondent to the recorded 1 V signal.

Outline of Trigger Recording

In addition to manual operation, you can also start or stop recording automatically in the following modes.

Repeat Mode

Repeats the recording operation for a specified number of times, as shown in the following diagram. Recording once is also possible.



<Recording-Start Conditions>

- Level trigger

The trigger is a change in level in a specified channel.

- External trigger

The trigger is a contact signal to the EXT TRIGGER IN connector on the rear of the LX. (L level: starts if 0.6 V or less) If the level is already L when the system enters the recording-standby status, recording starts at once in memory/MO recording. In PC recording, however, recording starts when the signal changes from H to L after the system enters the recording-standby status.

- Time-out

Recording is forced to start when the specified recording- start condition is not satisfied during a set period.

- Pre-trigger

A pre-trigger also records the data that was read into a buffer before one of the above recording-start conditions was satisfied. The voice memo is not recorded during the pre-trigger period.

<Recording-Stop Conditions>

- Level trigger

The trigger is a change in level in a specified channel.

- External trigger

The trigger is a contact signal to the EXT TRIGGER IN connector on the rear of the LX. (H level: stops if open or 2 V or more)

- Recording time

Records for a specified period only.

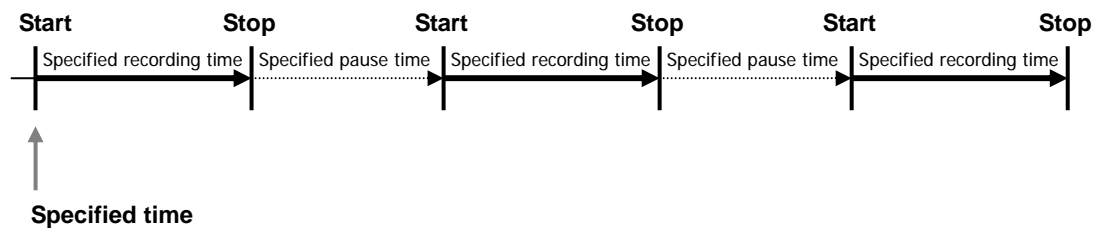
- Post-trigger

Continues to record for a set period even after a recording-stop condition is satisfied.

Outline of Trigger Recording

Interval Mode

Repeats the starting and stopping of recording for a specified number of times, during a specified period. Recording once is also possible.



(Example: When repeating 3 times)

Repeat Mode Settings

To specify trigger action settings, from the **Setup** menu choose **Trigger**.

Switch between seconds and scans.

Enable pre- and post-triggers.

Specify the length of the pre-trigger.

Enable the repeat mode.

Use a level trigger to start recording.

Use an external trigger to stop recording.

Number of repetitions.

Set the recording time.

Set the level trigger (next page).

The settings in the above dialog box use a level trigger to start recording and an external trigger to stop recording. A 10-second pre-trigger is specified, and recording is done once.

Pre/Post

Select this to enable a pre-trigger or post-trigger. When Pre/Post is selected but the lower **Repeat** is not selected, the pre-trigger is enabled for starting recording by operations that use the toolbar or the buttons on the LX main unit. (The post-trigger is not enabled for stopping recording by operations that use the toolbar or the buttons on the LX main unit.)

Start PreTrig/Stop PostTrig

Specify the length of the pre-trigger or post-trigger in seconds or in scan units. To switch the units, click a button on the right. When 0 is entered, the pre- or post-trigger is disabled. Specify a value that does not exceed the time possible using available free memory.

Repeat Mode Settings

Repeat

Select this to enable the Repeat mode.

Start Condition

Specify a recording-start condition. If multiple conditions are set, the first condition satisfied will start recording.

Level: Select this to enable a level trigger. You can set level trigger details in the dialog box displayed by choosing **Level Trig** and then **Property**. (See the next page.)

External: Select this to enable an external trigger.

Timeout: If a level trigger or external trigger has been enabled, you can force recording to start if a specified recording-start condition is not satisfied during a specified period. Specify the period in seconds. When 0 is entered, **Timeout** is disabled.

Stop Condition

Specify a recording-stop condition. If multiple conditions are set, the first condition satisfied will stop recording.

Level: Select this to enable a level trigger. You can set level trigger details in the dialog box displayed by choosing **Level Trig** and then **Property**. (See the next page.)

External: Select this to enable an external trigger.

RecTime: Enables you to stop recording after a set period has elapsed from the start of recording. You can set the period in the dialog box displayed by clicking the button. After you have entered a period, the period is displayed in this area.

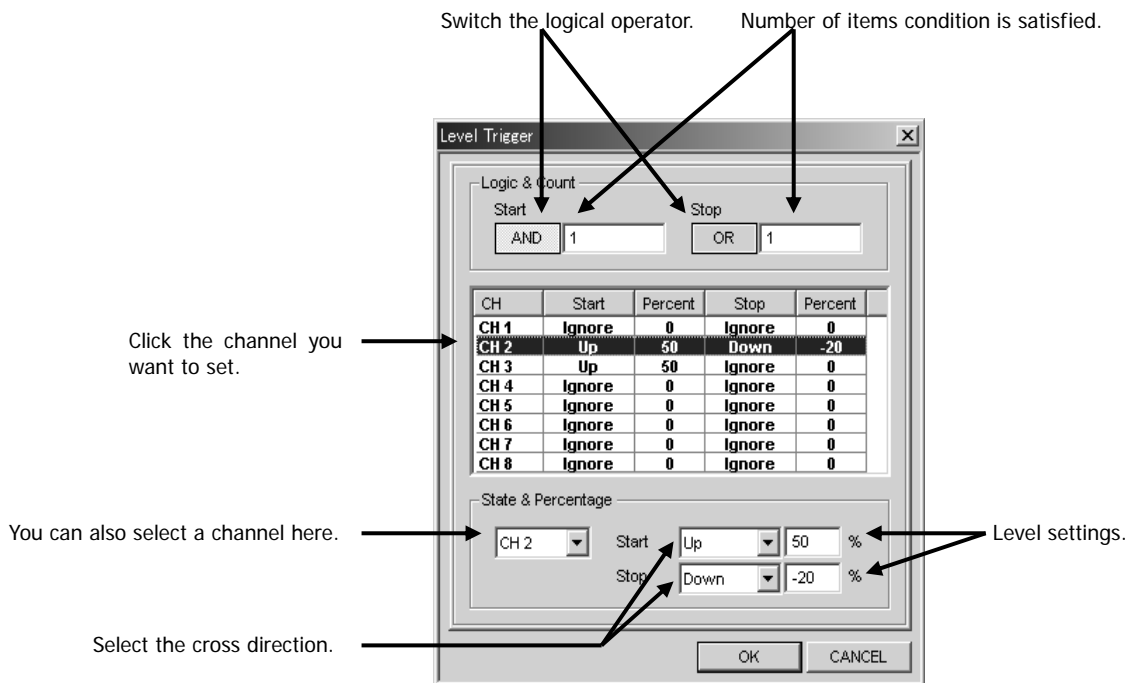
- Make sure to turn the trigger signal level to High before the next start, when you are using an external trigger for start with a repeat recording by using REC TIME.

Repeat Count

Specify the number of times the trigger recording operation specified above is to be repeated. A file is made for each of the specified number of times. You can also specify 1 time only. Specifying 0 will result in an unlimited number of repetitions (repetitions until you manually stop recording).

Level Trigger Settings

To specify the details of the level trigger, click **Level Trig – Property**.



The settings in the above dialog box are such that recording starts when the input signal of channel 2 crosses from lower than +50% of the specified input range to higher than +50%, AND, the channel 3 signal crosses from lower than +50% to higher. Recording stops when the input signal of channel 2 crosses from higher than -20% of the specified input range to lower than -20%.

Channel selection

In the list of channels, click the desired channel. Alternatively, select the channel from the drop-down list box in the lower left of the window.

Select the cross direction:

Up: The condition is regarded as having been satisfied when the input signal crosses from lower than the specified level to higher. The condition is regarded as not having been satisfied if the specified level was already higher when the recording-standby status was entered.

Down: The condition is regarded as having been satisfied when the input signal crosses from higher than the specified level to lower. The condition is regarded as not having been satisfied if the specified level was already lower when the recording-standby status was entered.

Ignore: The channel is not monitored for the level trigger.

Level settings

The full scale of the specified input range is set to 100% on both the plus and minus sides. You set the monitoring level for these in the range from -99% to +99%. Enter a minus sign (-) for minus values. In the above dialog box, when the input range is 10 V, 50% becomes 5 V and -20% becomes -2 V.

Logic

When multiple channels are monitored for **Start** and **Stop**, specify whether these are combined using a logical **AND** or logical **OR**.

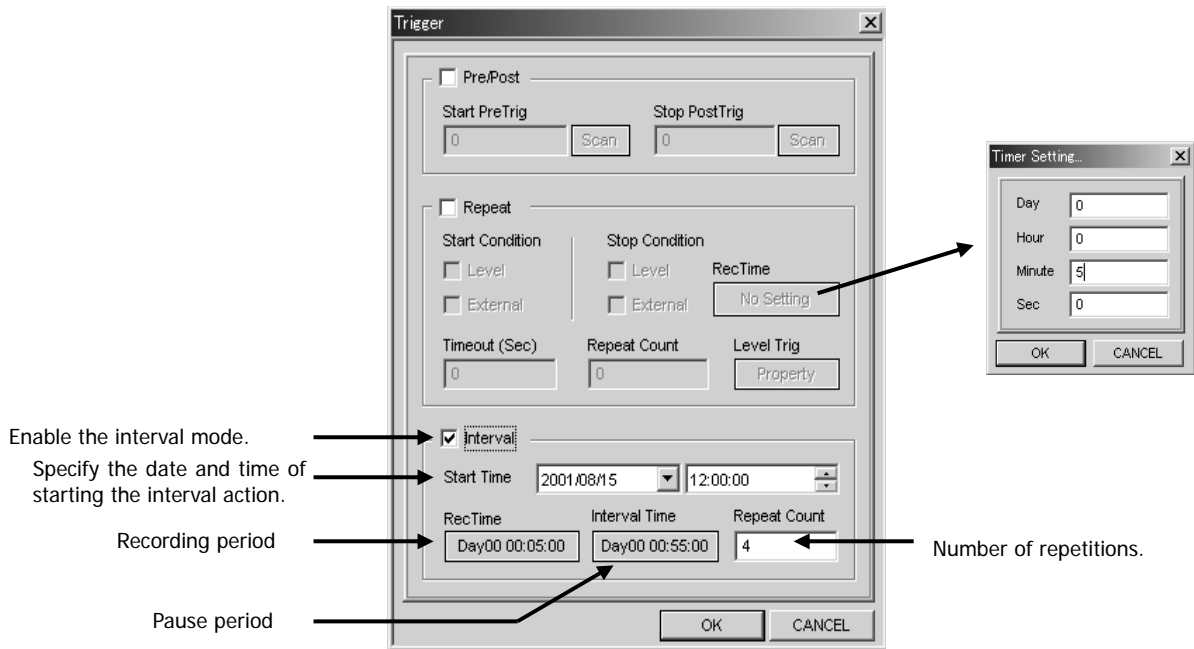
Number of times condition is satisfied

Specifies how many times a condition is regarded as having been established when a condition specified above (including the logical operator) is satisfied multiple times.

Interval Mode Settings

Interval Mode Settings

You can set trigger-action details in the dialog box displayed by choosing the **Setup** menu and then **Trigger**.



The settings in the above dialog box specify that there are to be 4 recordings, each of which shall begin every hour on the hour from noon on August 15, 2001 and end in 5 minutes.

Interval

Select this to enable the Interval mode.

Start Time

Specify the date and time when the interval action is to start.

Rec Time

Clicking this displays a dialog box in which you can specify the recording period. The value you set is displayed in this area.

Interval Time

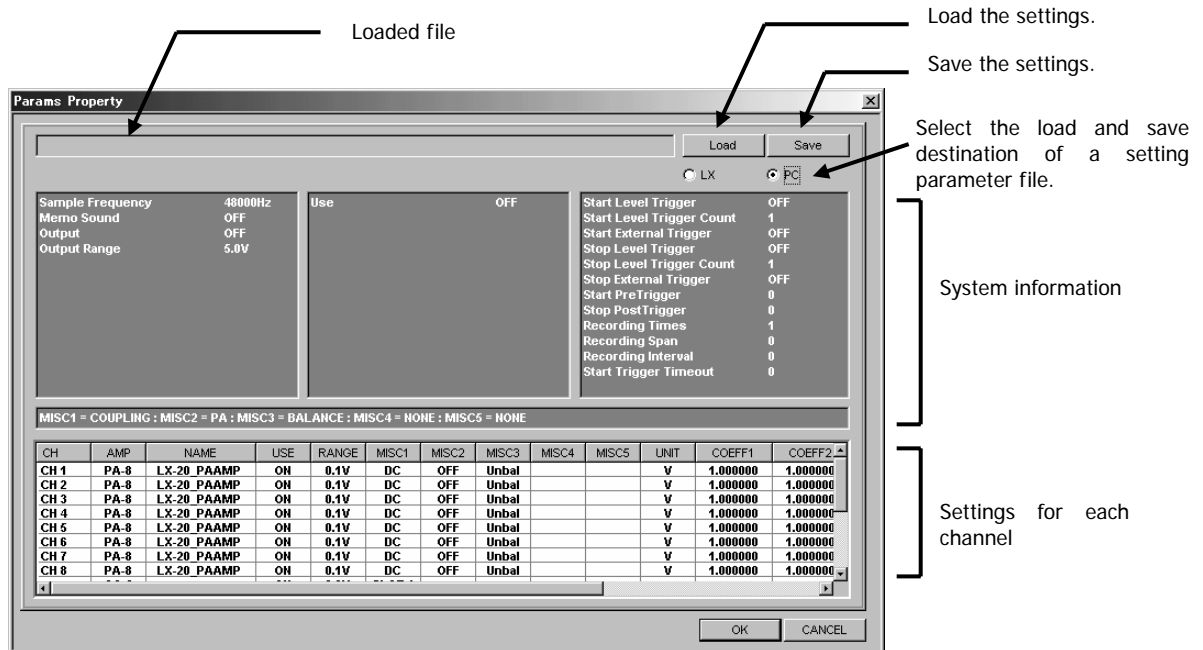
Specify the interval to wait before recordings. (Note that this is not the cycle period.) Clicking this displays a dialog box in which you can specify the interval. When recording to the media, the interval must be three seconds or longer; to memory or a PC, one second or longer. The value you set is displayed in this area.

Repeat Count

Specify the number of times recording is to be repeated. A file is made for each of the specified number of times. You can also specify 1 time only. Specifying 0 will result in an unlimited number of repetitions (repetitions until you manually stop recording).

Saving and Loading Settings

The parameters that you set after choosing the **Setup** menu and then **System** and **Trigger** can be saved to a file and then loaded whenever required. When you choose **Params Property** from the **Setup** menu, the following dialog box is displayed.



Saving Settings

You save the set parameters as a file that has a .prm extension. We recommend that you save your settings to avoid potential problems.

1. Click **Save** at the **Params Property** dialog.
2. When you select the **LX** (the media loaded into the LX main unit) for the destination to save, the **LX Parameter File List** dialog will be displayed. Enter the file name to save the setting parameters at the bottom of the dialog, or select the file name to be changed its parameters, and then click **OK**.



2. When you select the **PC** for the destination to save, the **Save As** dialog will be displayed. Enter the folder to save and the file name, and then click [Save(S)].

- The setting parameter file is saved as ASCII format, so that you can open the file by using the word pad program of Windows. Never replace the contents, otherwise you cannot load the file at the LX.

Saving and Loading Settings

Loading Settings

Load the prm file once saved.

1. Click **Load** at the **Params Property** dialog.
2. When you select the **LX** (the media loaded into the LX main unit) for the destination to load, the **LX Parameter File List** dialog will be displayed. Select the file name to load its parameters, and then click **OK**.



The loaded file name is displayed at **Params Property** dialog.

2. When you select the **PC** for the destination to load, the Open dialog will be displayed. Enter the folder to load and the file name, and then click [Open(O)].

The loaded file name is displayed at **Params Property** dialog.

3. Click **OK** at the **Params Property** dialog.
The LX will be set at the contents of the loaded file.

Section 5 Operations

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Specifying Recording Devices and File Names

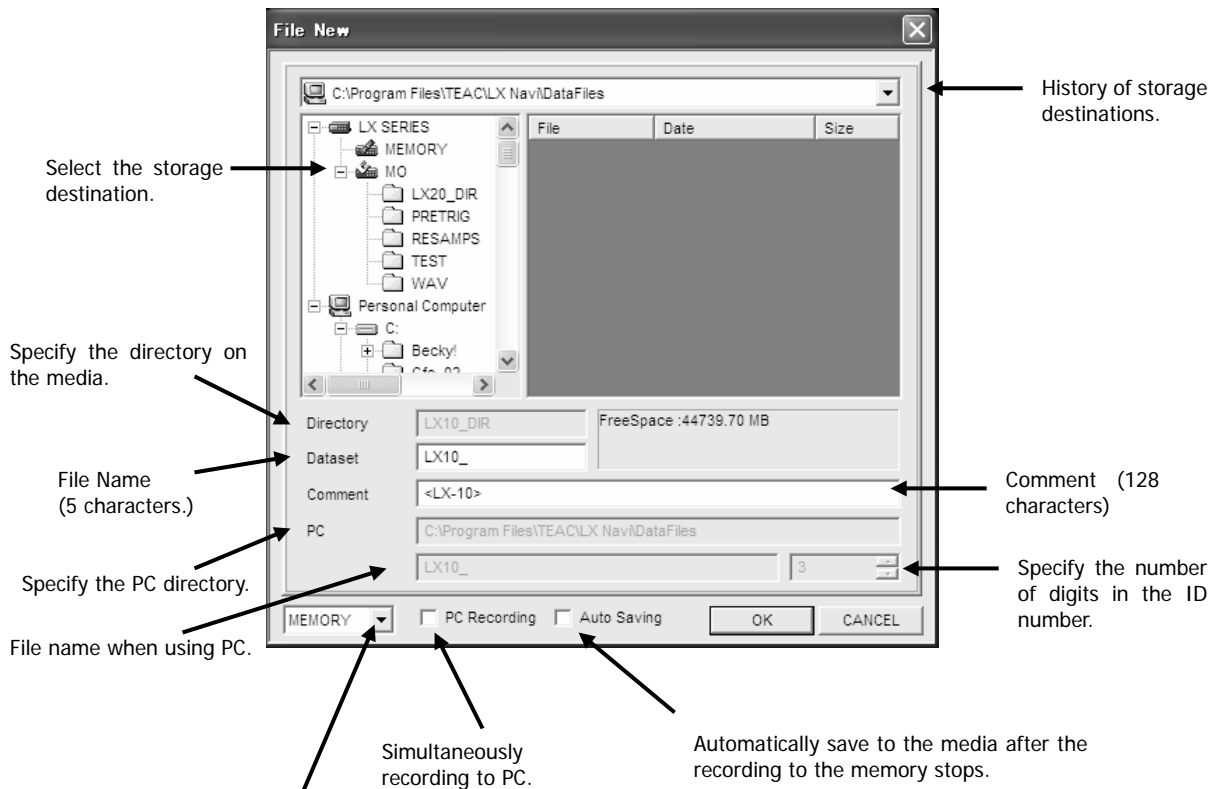
Specifying Recording Devices and File Names

The general procedure for recording is as follows:

1. Choose **File New**, and specify the recording device and the file name. (The mode becomes the recording mode.)
2. Use the toolbar or the buttons on the main unit to record.
3. If you are recording to the memory, use the **Copy** dialog to copy to the media (MO/PC card).

A combination of the sampling frequency vs. the number of analog input channels is varied depending on the selected recording mode, such as, the type of the recording media and the number of tachometer input channels. See "1-13 Sampling Frequency and Number of Channels".

File New



You can also select the recording device here.

Specifying Recording Devices and File names

- About File Names

When Recording to Memory or to Media

To specify a file name, use 5 alphanumeric characters. The following characters cannot be used :

. , ; : < > [] * ? = " / \ |

The system attaches a 3-digit ID number (starting from 001) to these 5 characters to make a total of 8 characters. If you specify 4 or fewer characters, the system changes the total number of characters to 8 by using a 0 before the 3-digit ID number to pad each of the missing locations.

- When Recording to a PC

When recording to a PC, or when recording to a PC while recording to memory or media, there is no restriction on the length of the file name. The following characters cannot be used :

. , ; : < > [] * ? = " / \ |

In the entry box on the right of the file name, you can choose how many digits to use for the ID numbers appended to the file name. Use up to 8 digits for the ID number. For example, if you enter 2 in the entry box, Data files have the extension .dat. Header files have the extension .hdr.

- Data files have the extension .dat. Header files have the extension .hdr.
- Do not add numeric characters to the end of a file name. If you do so, the following problem might occur.

Example:

Suppose you specify the file name as "LX10", the 8-character file names are constructed as follows:

```
LX100001
      Increment
LX100002
      Increment
LX100003
```

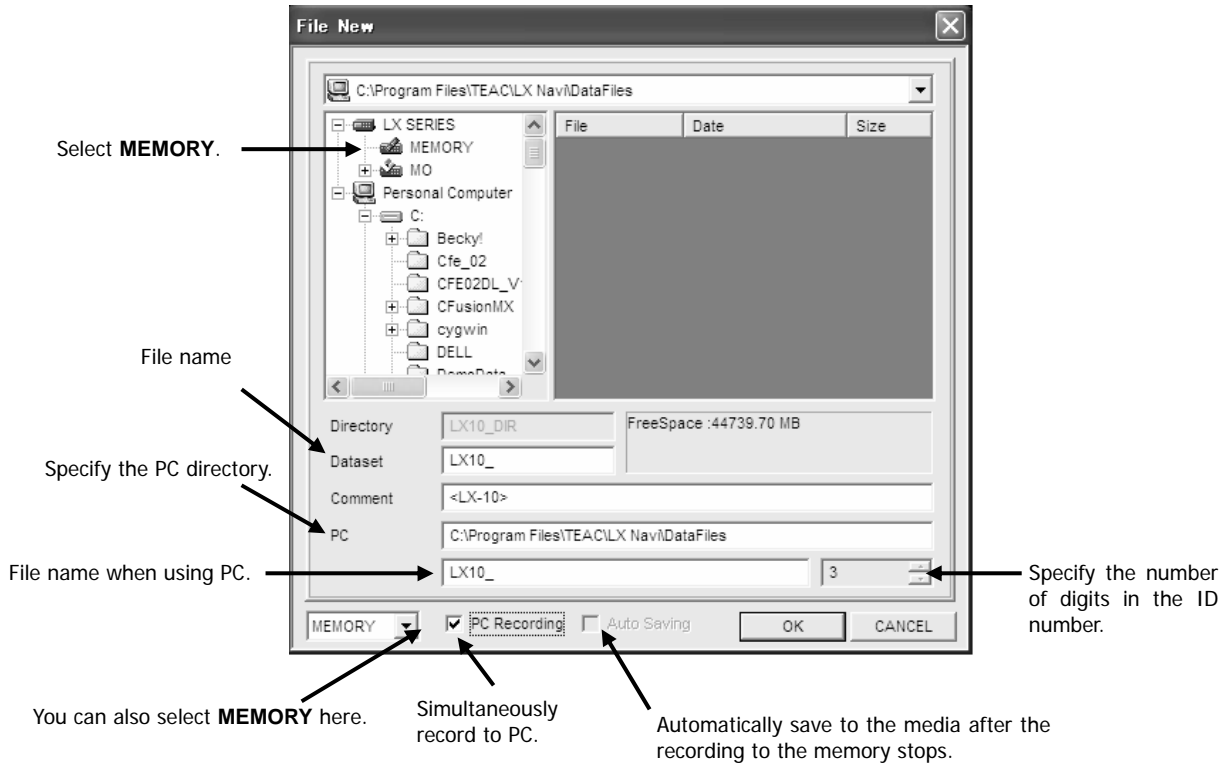
If you then specify a new file as "LX1" and record it to the same folder, the system will find that there is an existing file called LX100001 and so, to prevent overwriting this file, the system will use LX100004 as the new file name.

- About Comments

You can enter a comment using up to 128 alphanumeric characters. This comment is written into the header file.

Specifying Recording Devices and File Names

Recording to Memory



When you are recording to memory, the message **Do you copy data?** is displayed after recording stops. If you click **Yes**, the **Copy** dialog box is displayed. Use this dialog box to copy the data to the media or PC. If you again record data or power off the main unit before copying, the data in memory will be lost.

If you click **No** for the message **Do you copy data?**, you can choose **File** then **Copy** to copy the data before again recording or powering off the main unit.

1. Select **New** from the **File** menu.
2. Select **<MEMORY>** as the storage destination.
3. Type a file name within 5 characters at **Dataset**.
4. Click **OK**.

Specifying Recording Devices and File Names

- When Memory Becomes Full

If memory becomes full during recording, recording stops and a message is displayed on the PC screen.

- Recording to a PC While Recording to Memory

To record to a PC while recording to memory, select **PC Recording**, enter the storage-destination directory in PC, and then type the file name in the entry box below that. Also specify the number of digits in the ID number.

Dropouts may occur in the data recorded on the PC if the PC cannot keep up with the transfer speed. Even in this case, the data recorded in memory is not lost. If the data transfer rate of the PC does not catch up the data transfer rate of the LX, the dropout will occur. The data transfer rate of the PC required for continuing the data transfer to the PC can be estimated that the PC needs to receive approximately 1.5 times of 10 seconds data generating by the data transfer rate of the LX within 10 seconds.

Data transfer rate of the LX = Sampling frequency x Number of channels x 2bytes/second

The voice memo is not recorded on the PC though it is kept in memory.

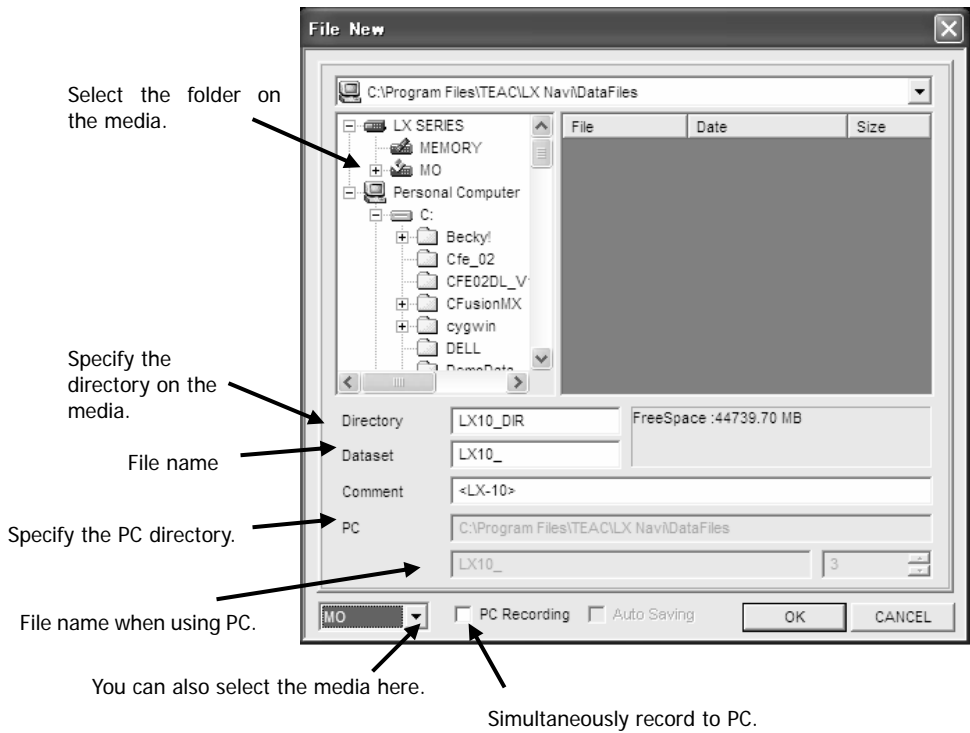
- Automatically Save Data to Media

You can specify that data is to be automatically saved to the media after recording to memory stops. Before opening this **New** dialog box, insert the media. Select **Auto Saving** and enter the folder name in **Directory**. Use up to 8 characters for the folder name, with upper case used for alphabetic characters. However, if you forget to insert the media before recording starts, you will be unable to copy automatically even if you insert the media later. In such a case, use **File** and then **Copy** to copy.

Even if **Auto Saving** is selected, when the LX is powered off the setting is disabled. So select **Auto Saving** each time you turn the power on. Do not use this function when using the LX as a stand-alone device because, in such a situation, the system does not know how much free space is left on the media.

Specifying Recording Devices and File Names

Recording to Media (MO/PC Card)



When recording with a maximum sampling frequency can be set under the selected channel configuration, use a formatted media that has not been used for recording. If you use the media that has already been recorded on, recording might stop.

1. Make sure that a formatted media is inserted in the main unit.
 2. From the **File** menu choose **New**.
 3. Select a folder on the media as the storage destination. When using the media for the first time, enter a folder name in **Directory**. For the folder name, use up to 8 characters (alphabetic characters are upper-case).
 4. In **Dataset**, enter a file name. Use up to 5 characters.
 5. Click **OK**.
- Recording to the media cannot start if no media has been inserted. (The REC button has no effect.)

Specifying Recording Devices and File Names

- Recording to a PC While Recording to Memory

To record to a PC while recording to memory, select **PC Recording**, enter the storage-destination directory in PC, and then type the file name in the entry box below that. Also specify the number of digits in the ID number.

Dropouts may occur in the data recorded on the PC if the PC cannot keep up with the transfer speed. Even in this case, the data recorded in memory is not lost. If the data transfer rate of the PC does not catch up the data transfer rate of the LX, the dropout will occur. The data transfer rate of the PC required for continuing the data transfer to the PC can be estimated that the PC needs to receive approximately 1.5 times of 10 seconds data generating by the data transfer rate of the LX within 10 seconds.

Data transfer rate of the LX = Sampling frequency x Number of channels x 2bytes/second

The voice memo is not recorded on the PC though it is kept in memory.

- When Media Becomes Full

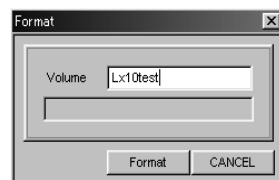
If media becomes full during recording, recording stops and a message is displayed on the PC screen.

- Formatting Media

A specified MO disk is not formatted. Use the following procedure to format the MO disk the first time you use it. You cannot record to the MO disk by overwriting files. If the MO disk becomes full and the data is not needed, reformat the MO disk.

You can also format the PC card as same as you format the MO disk.

1. From the **File** menu of LX Navi, choose **Format**. The following dialog box appears.



2. In **Volume**, enter the volume name. Use up to 8 characters.

3. Click **Format**.

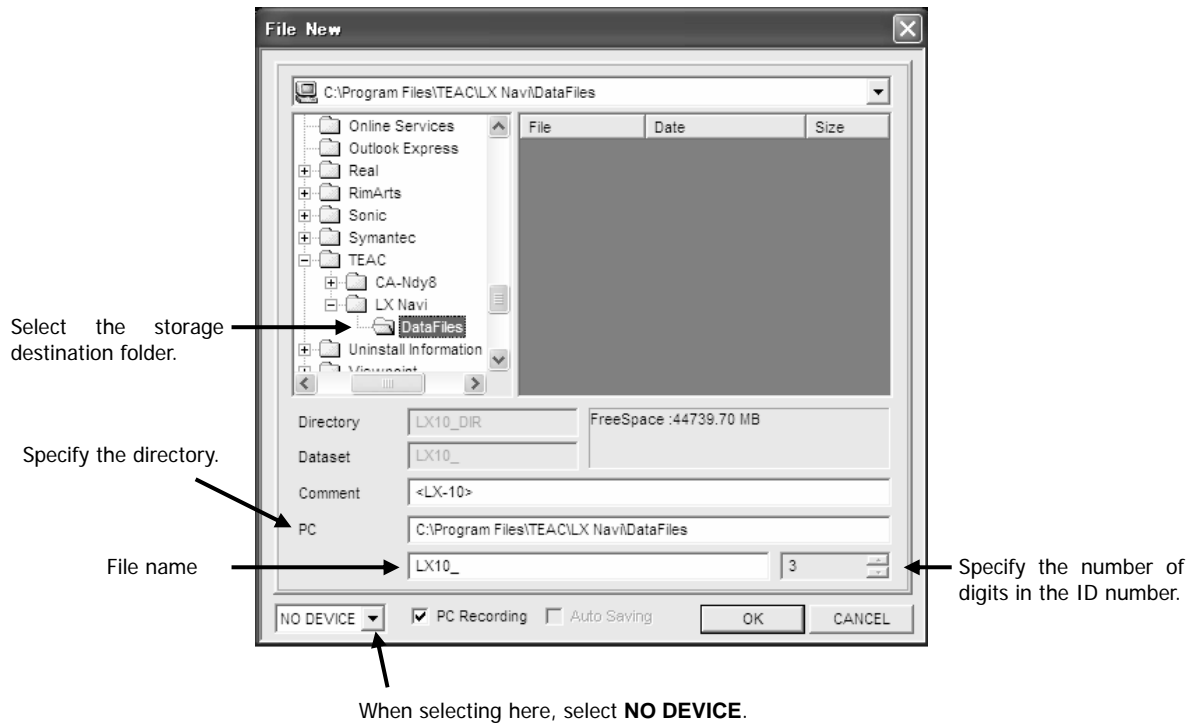
4. When the displayed status changes from Now Formatting to Complete, formatting has finished. Close the dialog box.

Use FAT16 option whenever formatting the PC card under Windows operation.

Do not use FAT32 option for formatting the card.

Specifying Recording Devices and File Names

Recording to PC



1. From the **File** menu, select **New**.
2. Select a PC folder as the storage destination.
3. Type the file name.
4. Specify the number of digits in the ID number.
5. Click **OK**.

Specifying Recording Devices and File Names

Caution on reproducing files recorded to a PC using the LX main unit

Follow the procedure below in order to record using a PC, to copy recorded files inside a PC to an MO or PC card and to reproduce recorded data properly, using the LX main unit.

1. When the PC recorded file has a long file name, change it to a short file name on the PC HDD (8 letters + 3 extension characters for the file name). Change 1 group of recorded data (data file, header file, web file) to the same file name, and leave the extension name as it is. Half-width alphanumeric characters and half-width sign characters may be used for file names. The following characters cannot be used :

. , ; : < > [] * ? = " / \ |

2. Create a directory on the PC HDD, inputting an 8 character or less directory name, (e.g. "LX10_DIR"), and copy the short file name of the LX recorded data file.

3. After formatting media on an MO or PC card using the LX main unit, place the media into the MO drive or PC card slot connected to the PC.

4. There is a sub directory in the root directory of the MO or PC card called "TEAC_LX"
Copy each directory made in step 2 under the "TEAC_LX" directory here.

```
\ (Media root directory)
|
| TEAC_LX (automatic created when formatted using the LX main unit)
| |
| | LX10_DIR (copy the directory on the PC)
| | (multiple directories possible)
```

The total size of files you wish to copy (data files, header files, and web files) may be larger than the MO or CF card capacity, in which case, reproducing may not be possible using the LX main unit.

Data recorded with the LX-20 tach channel enabled, may corrupt reproducing data, in which case, normal waveform regeneration is not possible using LX10 (F). (This also applies to direct recording using LX main unit media)

Immediately after purchasing a PC card use a PC to format the file system to FAT (FAT16) before use. If formatting is not carried out, normal use may not be possible under LX.

Recording Operations


Recording Operations

When you choose **File** and **New**, and then select the recording device and the file name, the mode becomes the recording mode and you can start recording.

The following procedure shows how to record two IDs. Also, during recording, we will mark data by adding event marks to the data.

1. Ensure that the mode shown in the status display is RECORD. If it is VIEW, click the REC button on the far left of the window to change the mode to RECORD.


2. If data is saved automatically to the media after recording to memory stops (that is, **Auto Saving** is selected), or when recording to the media, ensure that the media is inserted.

3. Click the  button on the toolbar. Alternatively, press the **REC** button on the main unit.


The action display will show RECSTANDBY, and the input waveform will be displayed in the waveform display area.

4. After 3 seconds, click  on the toolbar. Alternatively, press the FWD button on the main unit.

The action display shows REC and recording starts. When recording to memory or recording to the media, the USAGE LEDs show the percentage of the total capacity used.


5. Click  on the toolbar. Alternatively, press the **EVENT** button on the main unit.

The display of the event mark count will show 0001. The number of scans at this instant is recorded in the header file. If a new event mark is not separated by the previous mark by 2 or more seconds, the mark is not valid.


6. Click  on the toolbar. Alternatively, press the **PAUSE** button on the main unit.

The recording of the first ID ends, and the system enters the pause status. The action display shows RECSTANDBY.


When recording to the media, you cannot perform another recording until the system has finished writing to the media.

7. Click  on the toolbar. Alternatively, press the **FWD** button on the main unit.

Recording of the second ID starts.

8. Click  on the toolbar after 3 seconds or more. Alternatively, press the STOP button on the main unit.

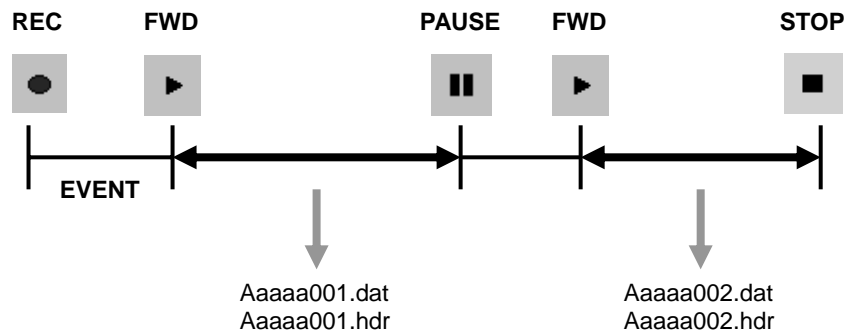
Recording stops.

If you record a voice memo in PC recording, put the system in the recording-standby status by clicking  or pressing the PAUSE button before you stop recording. Otherwise, the voice is not recorded.

9. When recording to memory, the message Do you copy data? is displayed after recording stops. If you click **Yes**, the **Copy** dialog box is displayed. Use this dialog box to copy the data to the media or PC. (See the next page for details.) If you again record data or power off the main unit before copying, the data in memory will be lost. Or the data in memory will be lost if you playback.

If you have selected the **Auto Saving** option (after choosing **File** and then **New**) and the media has been inserted, the above message is not displayed and the data in memory is automatically saved to the media.

The above procedure records the files shown in the following diagram.



Exchanging Media

- When Recording to Media

When the media becomes full during recording, a message is displayed and recording stops. The file up to that point is made. You can replace the media and again start recording.

- When "Auto Saving" Is Selected

When the media becomes full during copying, a message is displayed and copying stops. The file up to that point is made. If you then replace the media, the remaining data will not be copied automatically. In such a case, use the **Copy** dialog box to copy the remaining data. After replacing the media, you can again start recording.

- Directory and ID Number After Media is Replaced

When the media is replaced, the directory and file name specified in the **New** dialog box are made on the media and data is recorded; however, the ID number again starts from 1. Also if the directory or file name specified in the **New** dialog box already exists on the media, the last ID number is incremented by 1 and the new sequential ID number is used.

Copying

Copying

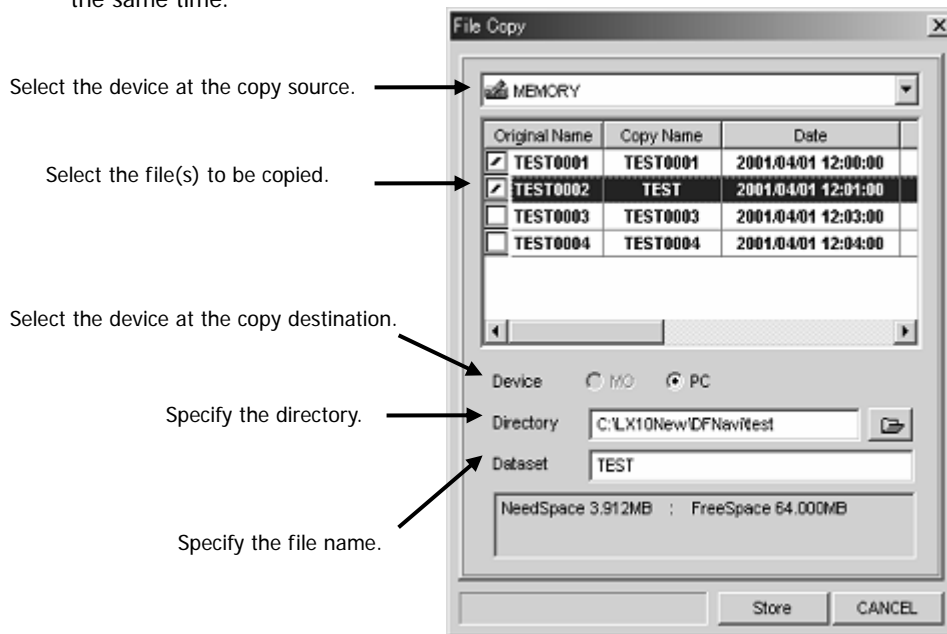
Recorded data files can be copied in the following three directions:

Memory to Media

Memory to PC

Media to PC

- When a data file is copied, the header file paired with the data file and also the sound file are copied at the same time.

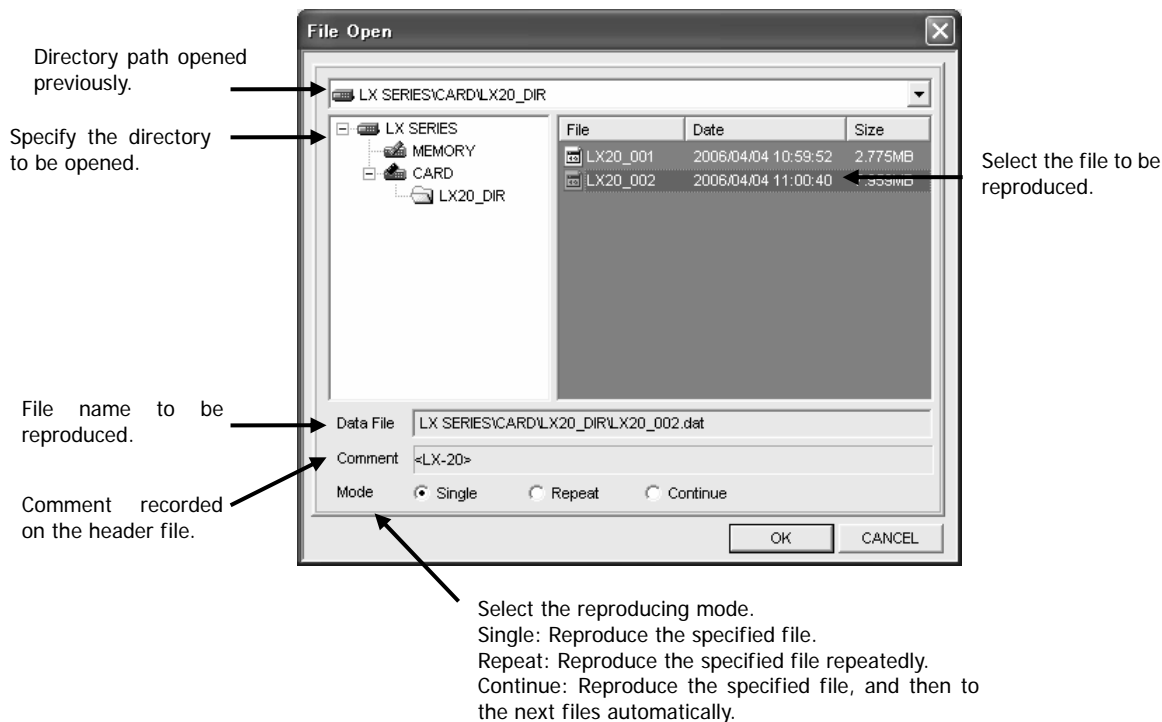



1. From the **File** menu, choose **Copy**.
2. Select the copy source device or folder to be copied.
3. Select the data file to be copied by turning the check box of the data file ON.
4. In **Device**, click **MEDIA** to copy to the media and click **PC** to copy to the PC.
5. In **Directory**, specify the copy destination directory.
6. Click **Store**.

- If you are copying from memory, data will remain in memory even after copying has finished, so the USAGE LEDs will remain lit.
- Changing File Name When Copying (Valid only when copying to the PC)
When changing a file name, click the file that you want to change. The file will be highlighted. In Dataset, type the name of the file after the change. The name of the file after the change is displayed in **Copy Name**.
- The DATASET in the copied header file keeps the original file name. See Section 6 File Formats for details of the header file.

Reproducing

You can reproduce data that has been recorded to memory or media.



1. From the **File** menu choose **Open**.
2. Select the file to be reproduced.
3. Click **OK**. (The mode in the status display becomes VIEW.)
4. Click  on the toolbar. Alternatively, press the FWD button on the main unit.

The action display changes to PLAY, and reproduction begins.

● Changing Reproduction Rate

You can reproduce data at a different rate from recording rate. To change the rate, first open the file by following the steps described on the left, and then change **Sample** setting on the left of the main window, or from **Setup** menu choose **System** and change **Sample** setting.

Changing the reproduction rate does not change the sampling frequency setting for recording.

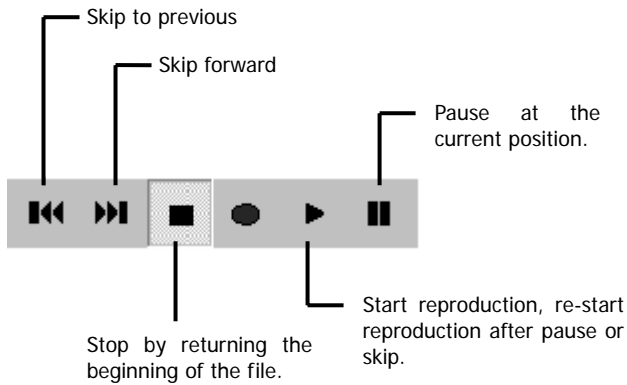
The rate of voice memo reproduction is not changed even when **Sample** setting is changed. In this case, the data and the voice do not synchronize.

At the LX-20/20L, changing the reproduction rate is possible within the same sampling frequency series.

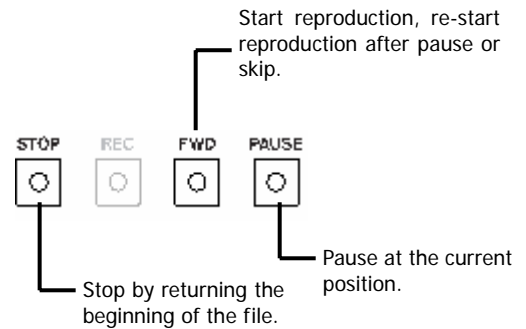
The recorded file under the low-speed sampling (1 kHz to 1/60 Hz) can be reproduced by changing the reproduction rate at 1.5 kHz or higher.

Reproducing Operations

At the LX Navi



At the LX main unit



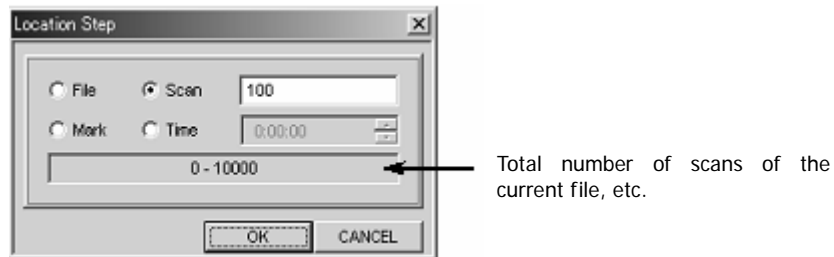
The skip functions are available during a pause or in the stopped status. For details, see the next.

Moving Reproducing Point (Skip)

Skipping enables you to move the reproduction point. The skip function is available in the paused or stopped status. When you click the button, the reproduction point moves from the current location to the previous point. When you click the button, the reproduction point moves from the current location to the following point. (Displaying of a waveform is from the start or restart of reproduction after a skip.)

You can specify the range of the movement by one click.

To specify the range of the movement click on the toolbar. The following dialog box is displayed.



You can select from the following 4 options:

File

Moves from the current file to the older file (determined by ID number) in the same folder.

Scan

Moves the specified number of scans only. When you select **Scan**, the lower box displays the total number of scans of the current file.

Mark

Moves to the preceding or following event mark. When you select **Mark**, the lower box displays the total number of event marks in the current file.

Time

Moves the selected time (hours:minutes:seconds). When you select **Time**, the lower box displays the time when recording to the current file started, and the time when recording to the current file ended.

Searches

You can narrow searches by using the status display area.

1. With the View mode set in the paused or stopped status, click on any of the status-display boxes indicated by arrows in the following diagram. After the color of the characters changes, click again.



2. Specify the goal of the search.

Event search

Searches for the specified event mark.

The lower 2 boxes show the range of values that can be searched.



Count search

Searches for times (hours: minutes: seconds) from the start of recording.

The lower 2 boxes show the range of values that can be searched.

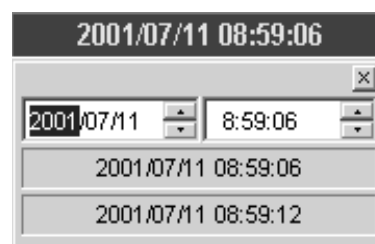


Time search


Searches using your specified recording date and time.

Enter the date (year/month/day) and time (hour: minute: second).

The lower 2 boxes show the range of values that can be searched.



3. After specifying the goal of the search, click the close button to close the dialog box. At the goal point, the system enters the stopped status.

4. Click  on the toolbar. Data is reproduced starting from the goal point.

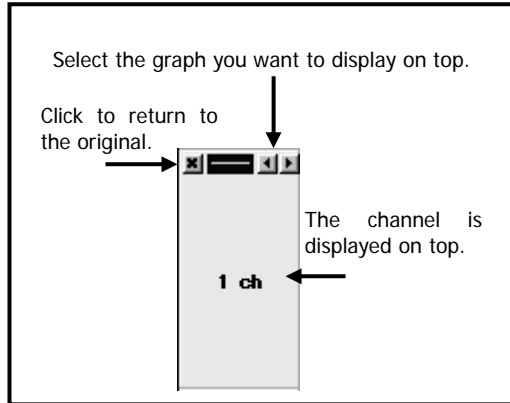
Convenient Features

Convenient Features

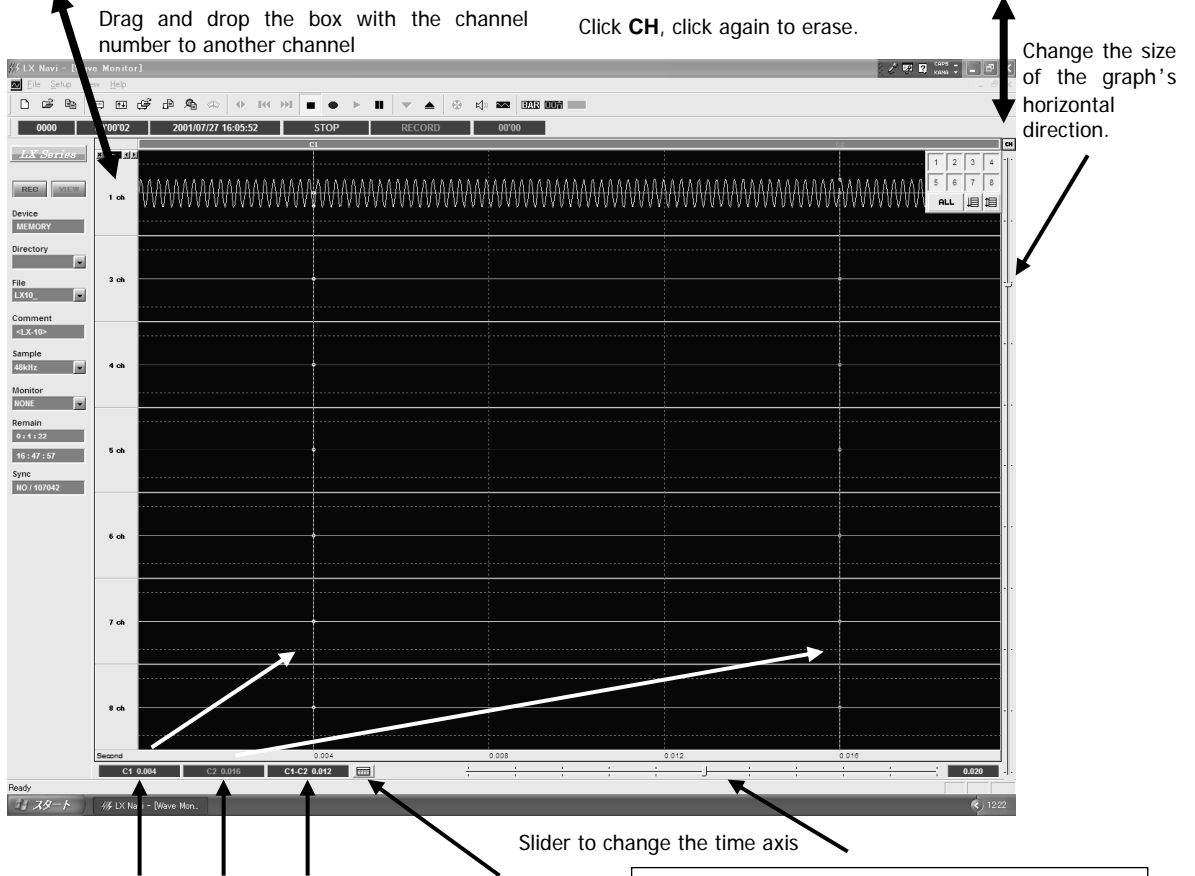
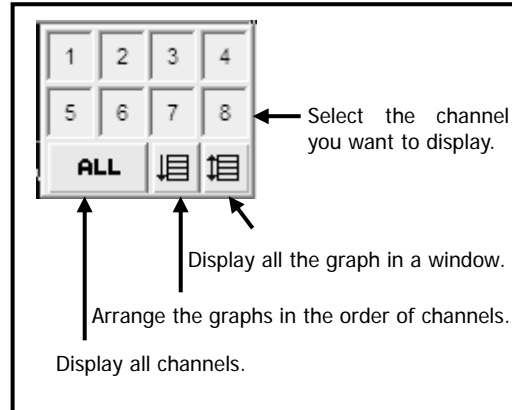
Displaying Waveform

You may see the decimated plots on the viewing waveform depending on the sampling frequency settings and/or the display time scale.

View overlapping waveforms



Select the channel to display



Display the time axis grid of the cursor location. **C1-C2** is the time difference. During a pause, you can move this by dragging the cursor.

Click here to display the list on the next page, click again to erase.

Sampling Frequency	Display Period
1.5 kHz	Up to 10 s
3 kHz	Up to 5 s
6 kHz	Up to 2 s
12 kHz	Up to 1 s
24 kHz	Up to 500 ms
48 kHz	Up to 200 ms
96 kHz	Up to 100 ms

(In case 1.5 kHz to 96 kHz sampling frequencies are selected.)

Channel Property

Value of cursor position Differences between 2 cursor position values

Channel	Range	DispRange	Offset	Cursor (C1)	Cursor (C2)	Abs (C1-C2)	Channel Name
1 ch	2.00000V	2.00000V	0.00000V	-0.94152V	0.99560V	1.93712V	LX-10_DC100K
2 ch	2.00000V	2.00000V	0.00000V	0.00040V	0.00040V	0.00000V	LX-10_DC100K
3 ch	2.00000V	2.00000V	0.00000V	0.00064V	0.00056V	0.00008V	LX-10_DC100K
4 ch	2.00000V	2.00000V	0.00000V	-0.00032V	-0.00040V	0.00008V	LX-10_DC100K
5 ch	2.00000V	2.00000V	0.00000V	0.00000V	0.00000V	0.00000V	LX-10_DC100K
6 ch	2.00000V	2.00000V	0.00000V	0.00040V	0.00040V	0.00000V	LX-10_DC100K

Double click the desired channel.

Coefficient value and units

Unit conversion expression

Channel name

Graph line color

Graph back ground color

Offset value

Return to the default.

Return to the default.

Change the display range.

Reset the graph color settings to the default.

Converting Units

You can use engineering units instead of the physical units to be written in the VERT_UNITS line of the header file. The coefficient (SLOPE value) is accordingly converted and written in the header file.

In the above dialog box, the entered conversion expression is for the situation where you are recording a signal from an acceleration sensor outputting an acceleration of 9.8 m/s² by 1 V. When there is an offset value for when the input is 0 V, type the value in Offset value. When these are changed, in the header file the units for VERT_UNITS and the SLOPE and Y_OFFSET values change.

Disp Range

Dragging the slider changes the waveform graph range.

Channel Name

You can name each channel.

Line Color

Selects the color of the graph lines. Clicking **Same** changes the graph lines of all graphs to the same color.

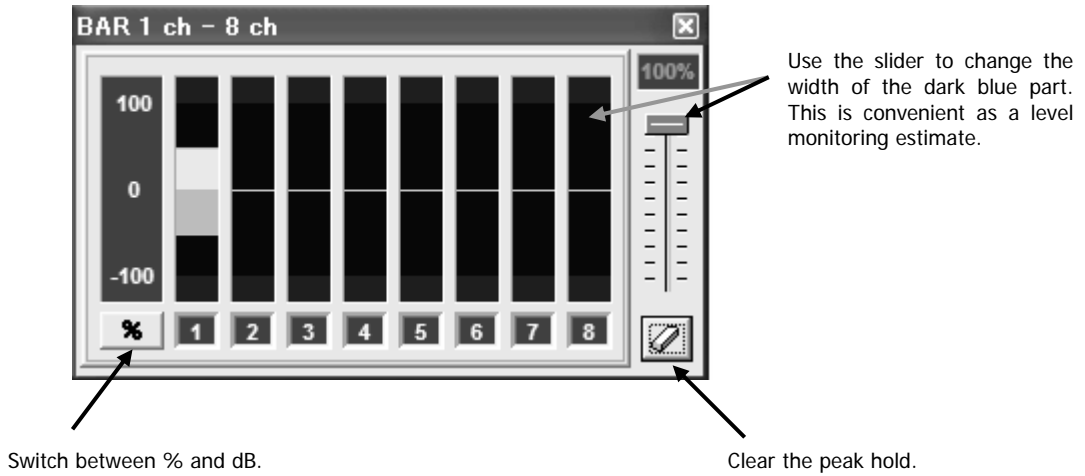
Back Color

Select the background color of a graph. Clicking **Same** changes the background of all graphs to the same color.

Convenient Features

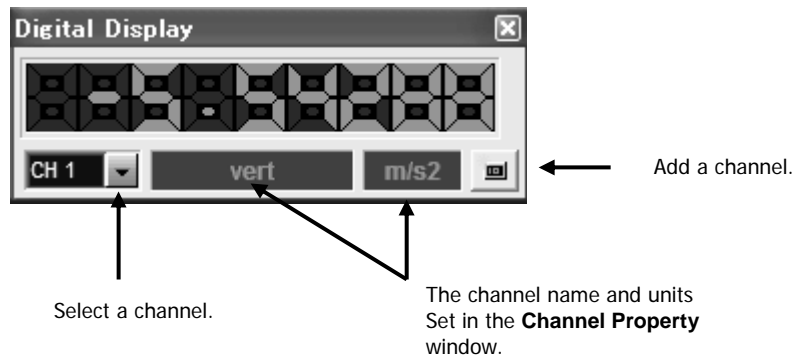
Displaying Bar Meter

To display the bar meter, choose **View** and then **Bar**.



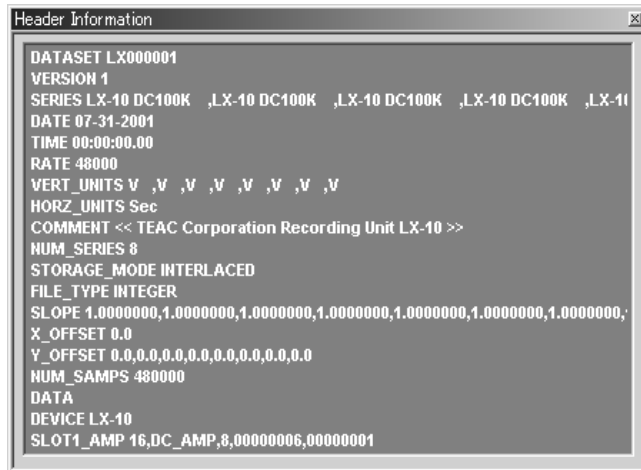
Displaying Digital Values

To display digital values, choose **View** and then **Digit**.



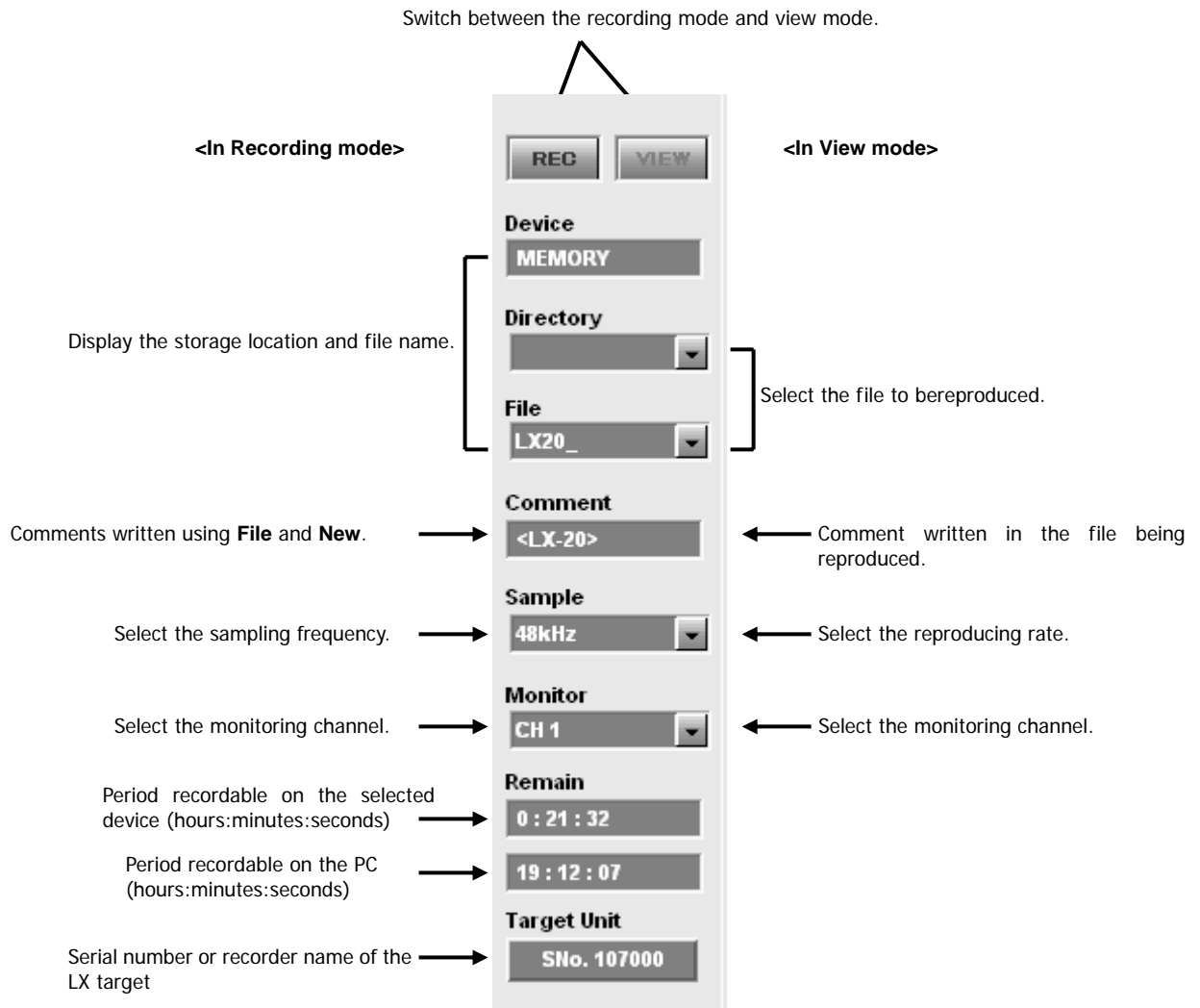
Viewing Header Information

To display header information, choose **View** and then **Hdr**. This takes effect after you select a file in the View mode.



Changing Modes

In the lower left of the main window, you can see the recording device and the file name, and select the file to be reproduced.



Stopping Fan

You can stop the cooling fan on the LX by clicking the fan button on the toolbar. (If you have already stopped the fan and recorded data, wait for about 10 minutes before you again stop the fan and record.) This button behaves differently depending on the **Fan** setting in the **System** dialog.



- When **Fan** is set to **ON**

The fan button is enabled after the recording-standby status is established. By clicking the button you can stop the fan from that moment until you click it again. You can repeat this until the total fan-stop time is 10 minutes. The remaining fan-stop time is shown on the status display.

- When **Fan** is set to **OFF**

The fan button is enabled only during the recording-standby status. By clicking the button you can stop the fan only once for the maximum of one minute. The remaining fan-stop time is shown on the status display. After you start recording, the fan button is disabled and the cooling fan is stopped for 10 minutes.

Listening to Data by Sound

You can play back the data of the monitored channel as sound by clicking the speaker button on the toolbar. When you click this button during reproduction, the data of the monitored channel instead of a voice memo is played back from the speaker.



LX Stand-alone Operations

The last settings specified by LX Navi (such as the recording device, file name, and other settings) are stored in the LX main unit even if the power is turned off. When the LX is removed from the PC, the LX operates according to those settings.

- Cautions on Operating as a Stand-Alone Device

IEEE 1394 enables hot-pluggable connections, so the LX-10/20 main unit can be connected or disconnected while the PC is powered on. (However, do not disconnect the LX-10/20 main unit while it is communicating with the PC.) When the LX-10/20 is disconnected, LX Navi outputs an error message and terminates. In such a case, if you reconnect the LX-10/20 and restart LX Navi, the LX-10/20 can again be recognized.

When moving the LX main unit, remove the media before turning off the power. Moving the unit while the media is inserted might result in damage.

When recording to the media, insert a formatted media before opening (**File** then **New**) the **New** dialog box. Also ensure that the same media is inserted before recording starts. If no media is inserted, recording cannot start (the REC button has no effect).

When recording to memory, after recording stops and while the power is still turned on, connect to a PC and copy the data to the media or PC. If you again record data, reproduce data, or power off the main unit before copying, the data in memory will be lost.

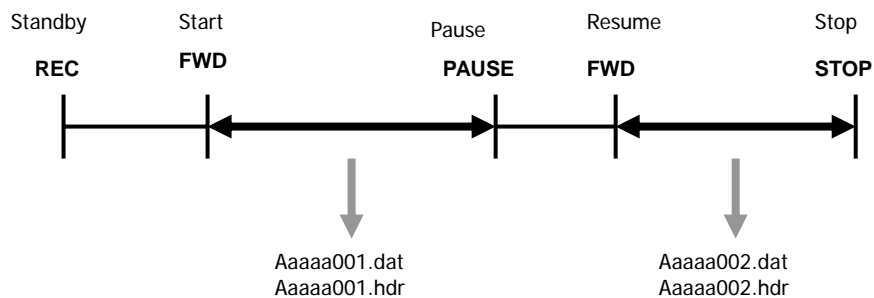
- When recording to memory using LX as a stand-alone device, do not select the Auto Saving option (**File**, **New**, and then **Auto Saving**). When recording to memory, the system does not know how much free space is left on the media, so there is a danger that some data might be lost when saving. Also note that, even if the **Auto Saving** option is selected, powering off the LX resets this option to the disabled status.

LX Stand-alone Operations

Recording to Media

1. Insert the media in the LX.
2. In the LX Navi, from the **File** menu choose **New**.
3. Select the **MO/PC CARD** as the recording device, specify the directory and file name, and then click **OK**.
4. Eject the media, and terminate the LX Navi.
5. Power off the LX, remove the IEEE 1394/LAN cable from the rear, and move the LX to the place where you want to take measurements.
6. Power on the LX and insert the same media.
7. Press the REC button and then the FWD button. Recording will start.
8. Press the PAUSE button.
Recording will pause. Recorded data will be grouped into one ID.
After this, each time the FWD and PAUSE buttons are pressed, an ID will be recorded, and the ID numbers will be incremented automatically.
9. To stop recording, press the STOP button.
10. When writing to the media finishes, the eject button eject usable. When moving the main unit, first press the eject button and remove the MO media. Remove manually on the PC card media.

- After the above, if you turn off the power and then turn it back on and record to the same media, the ID number will be automatically incremented and data will be recorded to the same file name. In the example illustrated in the diagram below, the file will become Aaaaa003.



When the media becomes full

When the media becomes full during recording, the recording stops and the data up to that point is made into a file. You can then replace the media and restart recording. If you are using the LX as a stand-alone device, you cannot format the media so prepare formatted media beforehand. On the new media, the system will make the directory specified in the **New** dialog box and use the specified file name; however, the ID number will again begin from 1. Also if the directory or file name specified in the **New** dialog box already exists on the media, the last ID number is incremented by 1 and the new sequential ID number is used.

Recording to Memory

When recording to memory while using LX as a stand-alone device, after recording stops keep the LX powered on, connect to a PC, and transfer the data in memory to an MO disk or the PC.

1. In the LX Navi, from the **File** menu select **New**.
2. Specify memory as the recording device, specify the file name, and then click **OK**.
3. Terminate the LX Navi.
4. Power off the LX, remove the IEEE 1394/LAN cable from the rear, and move the LX to the place where you want to take measurements.
5. Power on the LX.
6. Press the REC button, and then press the FWD button. Recording starts.
7. Press the PAUSE button.
Recording will pause. Recorded data will be grouped into one ID.
After this, each time the FWD and PAUSE buttons are pressed, an ID will be recorded, and the ID numbers will be incremented automatically.
8. To stop recording, press the STOP button.
 - Take care in this situation because the data in memory will be lost if you again press the REC button, start reproducing, or power off the LX.
9. Use an IEEE 1394/LAN cable to connect to the PC.
10. Start the LX Navi.
11. From the **File** menu choose **Copy**, and copy the data recorded to memory to the PC.
 - When recording to memory using LX as a stand-alone device, do not select the Auto Saving option (**File**, **New**, and then **Auto Saving**). When recording to memory, the system does not know how much free space is left on the media, so there is a danger that some data might be lost when saving. Also note that, even if the **Auto Saving** option is selected, powering off the LX resets this option to the disabled status.

LX Stand-alone Operations

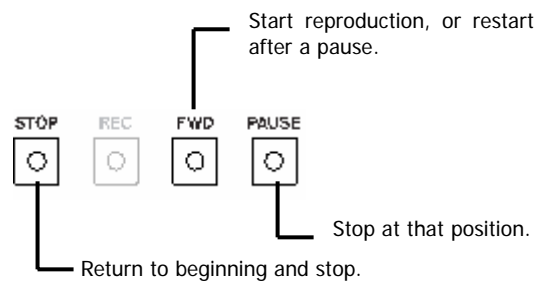
Reproducing

Even when using the LX as a stand-alone device, you can reproduce and output the last data (last ID) recorded to memory or to the media. However, when the power is turned off, any data in memory will be lost and you will be unable to reproduce such data.

To reproduce data, press the FWD button on the front of the LX.

To pause reproducing data, press the PAUSE button.

To stop reproducing data, press the STOP button.



Recording Synchronization

This section explains the optional recording synchronization function of the LX multiple units.

The LX Navi sets a master unit and up to 3 slave units connected with the recording synchronization cable within the total of 10 m (as of November 2005) for recording synchronization recording.

- The following PC (personal computer) system specifications are necessary for the recording synchronization function.

OS: Windows XP / Windows 2000

CPU: Pentium 2.0GHz or better

Memory: 256Mbyte or more

Free HDD space: 2Gbyte or more

LX Navi version: V1.71H or later,

- If you use the IEEE1394 interface model of the LX and you need to update the LX Navi, update the device driver to the latest (see Section 2).
- You cannot use the IEEE1394 interface model and the Ethernet interface model mixed for the recording synchronization.
- When the recording synchronization function is enabled and LxNavi is started up, the reproducing operation cannot be used. Before using the reproducing operation, re-launch LxNavi, disabling the master/slave settings and execute it as an independent unit.
- Change the settings of the sampling frequency of recording and the recording media destination (Memory, MO, PC card) to that of the master unit and slave unit. When controlling the master unit and slave unit using a single PC, (simultaneously launching multiple units with LxNavi using recording synchronization) set the directory name and file name of the file to be recorded, so they do not duplicate.
- When controlling the master unit and slave unit using a single PC, limitations may occur in the operation of the maximum sampling frequency and in the save function of Lx Navi settings content.
- When using recording synchronization, launch LxNavi operations in order; master unit, slave 1, slave 2, etc. When ending the program, end operations in the opposite order to which they were started and lastly close the LxNavi master unit.
- Use the optional LX View PL-S1001 wave monitor software or the AFC NEO PL-S1002 file converter software to merge the multiple files recorded.
- Keep minimum numbers to open the main windows of the slave units; otherwise the real time monitor cannot be processed depending on the selected sampling frequency.

Recording Synchronization

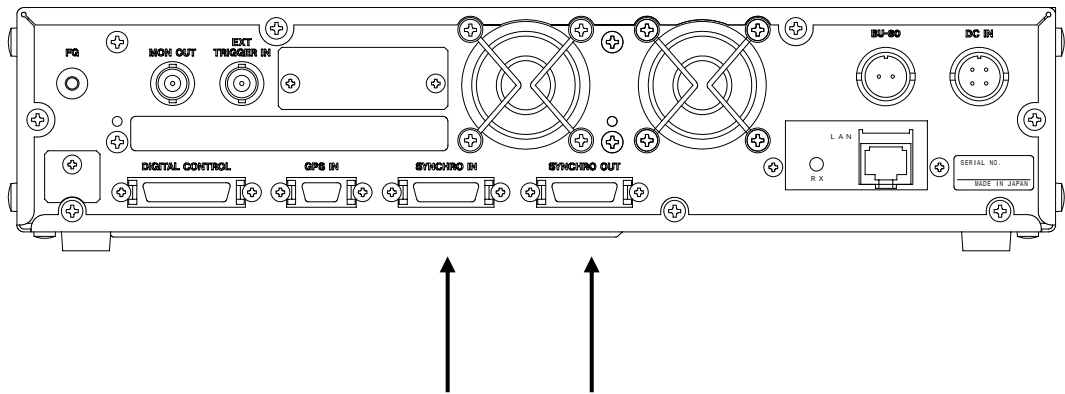
Settings and Recording Operations

Use the LX Navi menu of each master/slave unit for the amp and input range parameter settings, the sampling frequency, and so on. Make sure to use the same sampling frequency and the recording media for the units to be recording synchronized.

Use the LX Navi of the master unit to start and stop recording synchronization, the slave units follows start/stop operation of the master unit.

Connecting Recording Synchronization Cables and Turning on Power

1. Connect among the LX units to be synchronized by using the synchronization cables.



The <SYNCHRO IN> connector and the <SYNCHRO OUT> connector are used for recording synchronization. Connect the <SYNCHRO OUT> connector of the first unit to the <SYNCHRO IN> connector of the second unit. If you have the third unit, connect the <SYNCHRO OUT> connector of the second unit to the <SYNCHRO IN> connector of the third unit. Then connect another unit accordingly.

2. In case of the IEEE1394 interface models, use the IEEE1394 cables to connect among the units in daisy chain. Connect the PC installed the LX Navi to one of the units.

In case of the Ethernet interface models, use a switching hub to connect the units and the PC installed the LX Navi.

3. Turn ON the powers of the LX units and then the PC.

Recording Synchronization

Operations

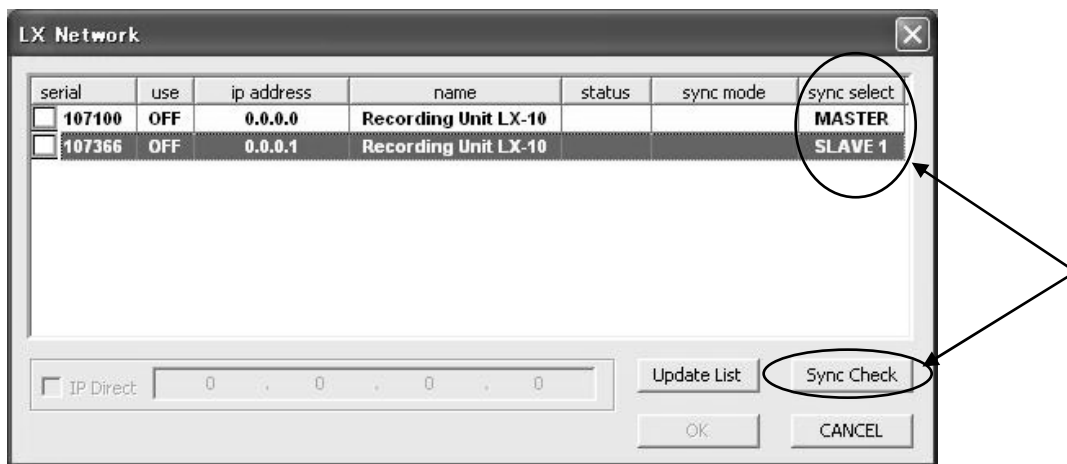
You can set the master unit and the slave unit(s) by using the LX Navi.

1. When starting LxNavi from a PC, the serial number information of the LX series units connected to the same segment is displayed on the LX selection dialog (LX Network).

Click master, slave 1, slave 2...etc in the order of the "sync select" column. Setting information will be displayed for the area clicked upon.(Setting this operation once skips this process next time.)

Click the "Sync Check" button. As a result, verification of specified LX synchronized operation settings and a verification test of the settings and the synchronized connection are done.

In the example diagram below, 2 LX Series units are connected to the same group, and the serial number 107100 for the master and 107366 for slave 1 have been selected (Click master and slave 1 in the order you wish to set them, in the "sync select" column). In this state, clicking the "Sync Check" button performs verification of synchronization mode settings and the synchronized connection.



Explanation of the LX selection dialog (LX Network) columns.

- "Serial" Displays the serial numbers of the LX series recorder connected to the same segment.
- "use" Displays "ON" if in use and "OFF" if not in use.
- "ip address" Displays IP addresses.
- "name" Displays names set in LX.(Model IEEE1394 is an unchanging name)
- "status" Displays the results of verification tests for the connection status and synchronization connection.
- "Sync mode" Displays the synchronization settings of the LX main unit
- "sync select" Displays the set (linked) order of the master unit and slave unit for synchronized operations.

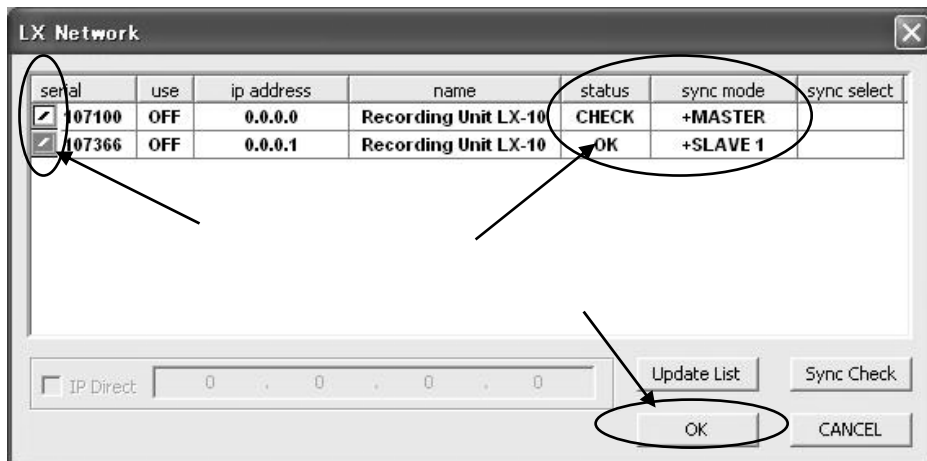
Recording Synchronization

Explanation of names displayed immediately after launching the program or after "Update List" has been performed.

After Initial display & "Update List" are performed	Check BOX display status	"Status" display	"sync mode" display
Executable unit (previously executed unit)	Check mark present		
Non-executable unit	No check mark present		
Unit in use (non-executable)	Red check mark present (Grey background)	USE	
Unit of outside IP address outside (non-executable)	No check mark present (Grey background)	IP ERR	

2. The dialog in the diagram below is displayed when "Sync Check is clicked upon. A check mark is displayed for the unit set to the master unit and a check mark with a grey background is displayed for the unit set to the slave unit. Confirm the verification test results for the synchronized connection and that a check mark is displayed in the check box, and click "OK".

The diagram below shows that the serial number 107100 for master and 107366 for slave 1 have been set, that the synchronized connection verification is indicated properly (under "status", **CHECK** is displayed for the master unit, and **OK** is displayed for the slave unit), and that a check mark is automatically displayed in the check box next to the serial number. (The check box for the slave unit is grey) Clicking the "OK" button in this state will launch LxNavi, which controls the master unit.



Explanation of names after executing "sync check"

After executing "Sync Check"	Check box display status	"Status" display	Sync mode display
The set master unit of synchronization operations	Check mark present	CHECK	MASTER
The set master unit of synchronization operations (connection result OK)	Check mark present (grey background)	OK	SLAVE n (n is the slave number)
The set master unit of synchronization operations (connection result NG)	No check mark present	NG	SLAVE n (n is the slave number)
Set stand-alone unit	No check mark present		NO SYNC
Non-responsive unit model for synchronization operations	No check mark present		NOT SUPPORT
Unit in which a communications error has occurred	Red check mark present (grey background)	ERROR	
Unit in use	Red check mark present (grey background)	(USE)	
Unit outside IP address group	No check mark present (grey background)	(IP ERR)	

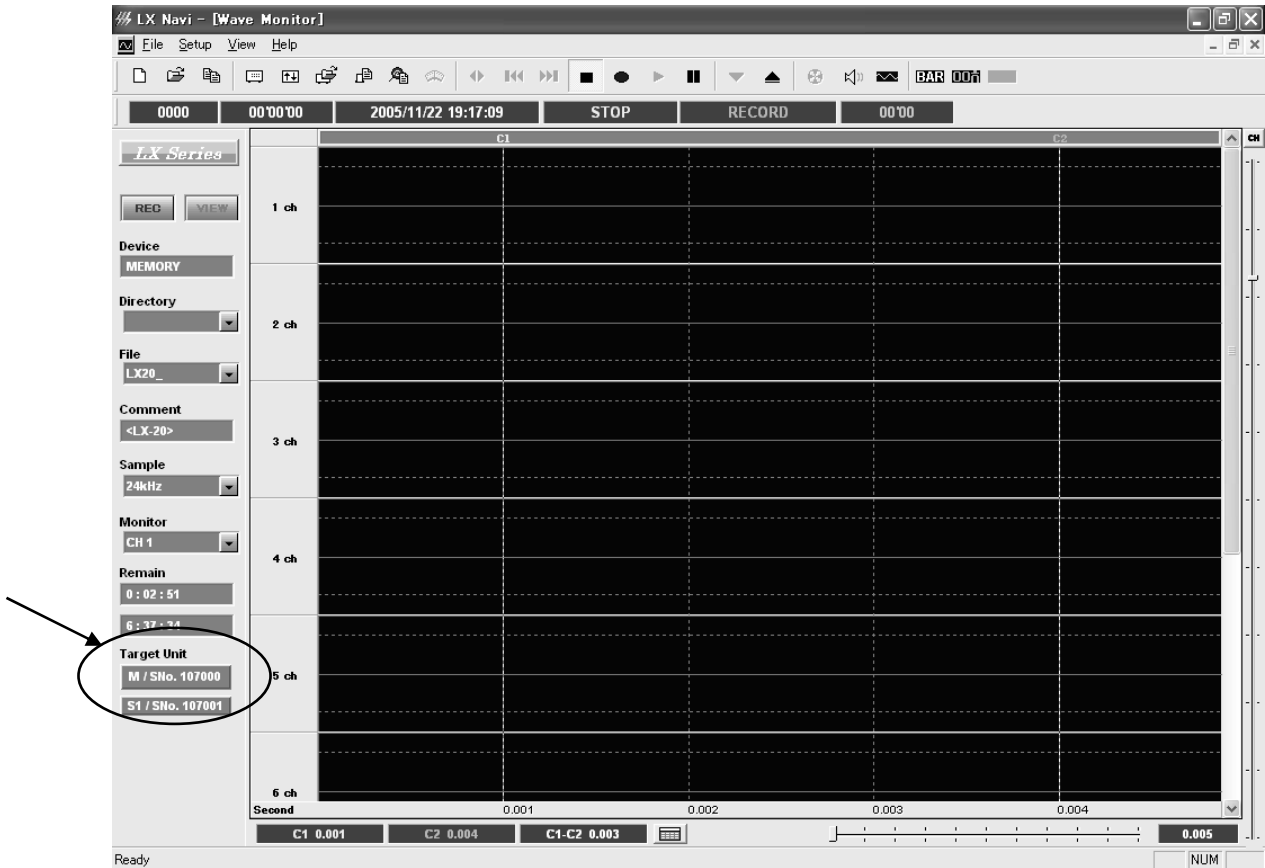
A "+" mark will be displayed in front of modified settings under "sync mode".

"Unit in use" and "units outside IP address group" will not be a target of "sync check".

Recording Synchronization

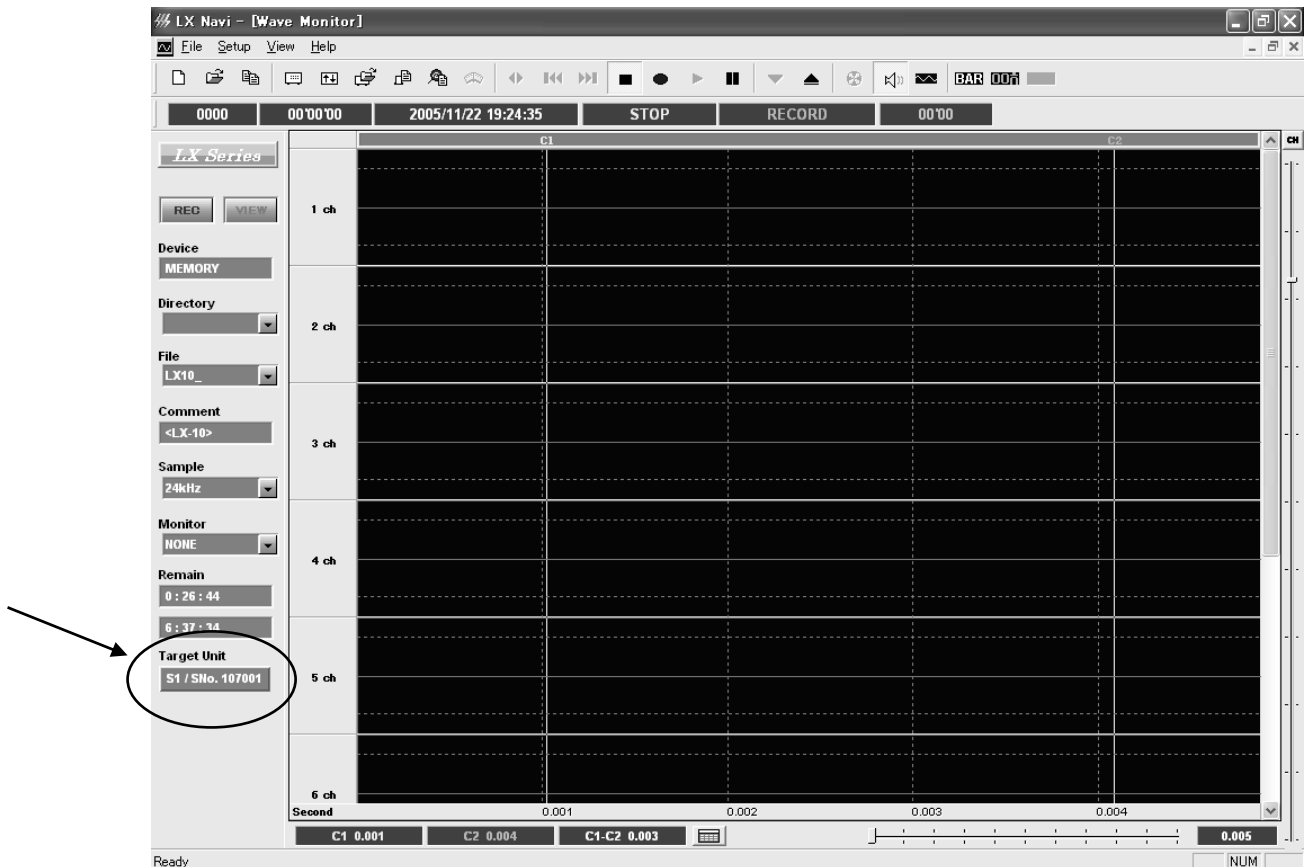
3. The main LX Navi screen of the master unit is displayed. In the bottom left of the screen under **Target Unit** the “M/name or serial number” is displayed. This main screen indicates the master unit. Moreover, the slave unit connected to the master unit is show below in “S*/ name or serial number”.

In order to launch the LX Navi display screen of the next set slave unit, minimize the main display screen of the displayed master unit.



4. When LX Navi is re-launched from a PC, the LX selection dialog (LX Network) indicated in step 1 is displayed. In order to launch the LX Navi display screen set to the slave unit, click the box in the <serial> field of LX main unit set to the slave unit and click [OK]. (If the background of the check box is grey, click on it twice, confirm that a normal check mark is displayed and click [OK]).

The main LX Navi display screen of the selected slave unit will now be shown. In the bottom left of the screen under **Target Unit** the "S*/name or serial number" is displayed. This main screen indicates the slave unit.



Open the main display for other slave units connected in the same manner. While maximizing or minimizing the main display screen of the master unit and each slave unit, set each recording condition of the LX main unit.

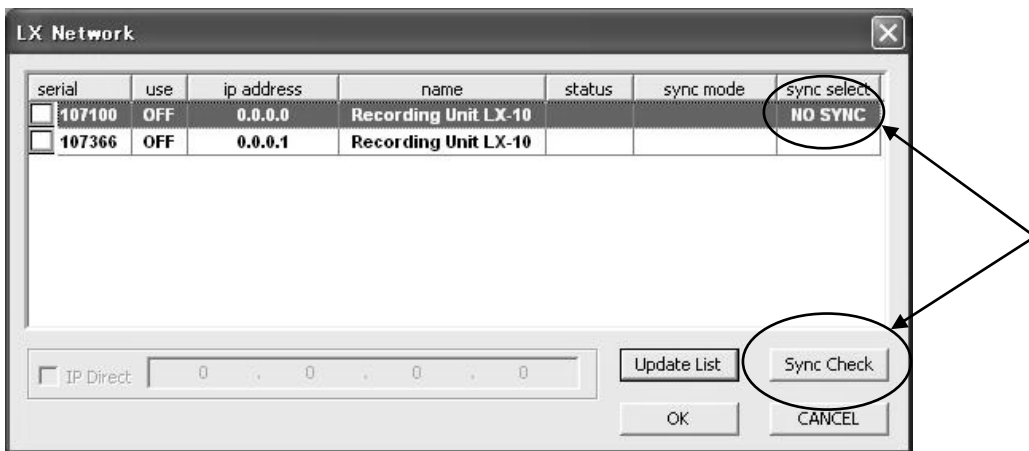
5. If all LX main unit settings of synchronized recording end, close the main screen of all slave units, except for the main screens of the master unit and slave units that require monitoring while recording. Recording can be started and finished by operating the main window of the master unit.

6. Close LxNavi in the opposite order to which it was started (slave n..., slave 1, master).

Recording Synchronization

Miscellaneous

- As LxNavi stores previously executed LX main unit serial numbers, if a previously used LX main unit is connected to an identical segment, a check mark will be present upon start-up, making execution possible with a simple click on [OK].
- Since the synchronization settings of the LX main unit are stored after being set only once, the next time the "Sync Check" button is clicked, synchronized connection verification all that is necessary. (Settings for the master and slave selection only have to be done once.)
- If the LX main unit of the performed synchronization settings is used as an independent unit (mode in which normal synchronization operations are not done), clicking on the LX clock "sync select" cell ("NO SYNC" is displayed) will execute "sync check". If this operation is performed once, the settings will be stored in the main unit, and normal start-up methods are all that is necessary next time.



The diagram above shows the state after right clicking on the "sync select" column; where synchronized operation serial number 107100 has been reverted back to independent unit settings. Click the "Sync Check" button while in this state.

If the LX main unit of the performed synchronization settings is used as an independent unit without changing to stand-alone mode, LX may get unstable.
Change LX to "NO SYNC" before LX is used as stand-alone mode.

- While the LX selection dialog (LX Network) is displayed, clicking on the "sync check" button will display the results of the synchronization connection verification under "Status". "CHECK" will be displayed for the master unit which executed synchronization connection verification, and "OK" will be displayed for a verified slave unit connection. If "NG" is displayed for the slave unit, make sure that the synchronization connection cable is correctly connected, press the "sync check" again, and execute synchronization connection verification.
- If you wish to check the LX connected to the same segment again after the LX selection dialog (LX Network) has been displayed, click the "Update List" button. (If the LX power is turned on after launching LxNavi, etc)

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Main Unit Specifications

Main Unit Specifications

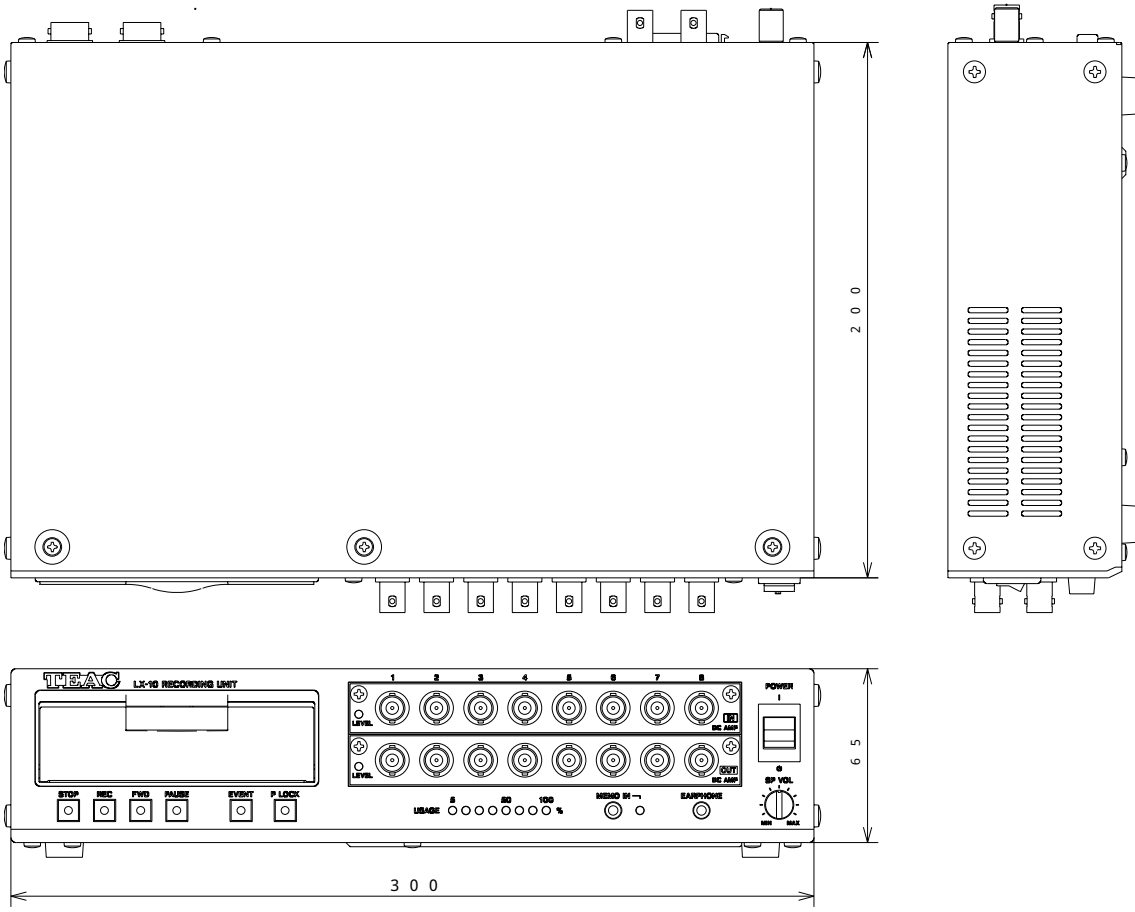
Recording Media	MO disk and memory, PC card and memory, or memory
Capacity of MO Disk	1.3 GB
Capacity of Memory	64 MB, up to 512 MB memory can be added as optional
Amp Slot	2 in the main unit
Interface	IEEE 1394-1995 compatible (LX-10/20) 100BASE-TX (LX-10L/20L)
Sampling frequency	(Value in brackets is the recording bandwidth with tolerances of +/-0.5 dB)

LX-10/10L							
96-1.5 kHz	96 kHz (DC-40 kHz)	48 kHz (DC-20 kHz)	24 kHz (DC-10 kHz)	12 kHz (DC-5 kHz)	6 kHz (DC-2.5 kHz)	3 kHz (DC-1.25 kHz)	1.5 kHz (DC-625 Hz)

LX-20/20L							
96-1.5 kHz	96 kHz (DC-40 kHz)	48 kHz (DC-20 kHz)	24 kHz (DC-10 kHz)	12 kHz (DC-5 kHz)	6 kHz (DC-2.5 kHz)	3 kHz (DC-1.25 kHz)	1.5 kHz (DC-625 Hz)
100-1 kHz	100 kHz	50 kHz	20 kHz	10 kHz	5 kHz	2 kHz	1 kHz
65.536-1.024 kHz	65.536 kHz	32.768 kHz	16.384 kHz	8.192 kHz	4.096 kHz	2.048 kHz	1.024 kHz
102.4-1.28 kHz	102.4 kHz	51.2 kHz	25.6 kHz	12.8 kHz	5.12 kHz	2.56 kHz	1.28 kHz

Voice Memo	Sampling frequency: 8 kHz, WAV file
Internal Clock Precision	+/-1 ppm (at 25 degree C)
Operating Temperatures	5 to 35 degree C (MO model) 0 to 45 degree C (PC card model)
Storage Temperatures	-20 to 60 degree C
Operating Humidity	10 to 85% (no condensation)
Storage Humidity	5 to 90% (no condensation)
Power	+11 to 30 V DC Use AC adaptor for AC source.
Power Consumption	Approx. 35 W (LX-10, AR-LXDC and AR-LXAO)
External Dimensions	300W x 65H x 200D (mm) excluding protrusions
Mass	Approx. 3.8 kg

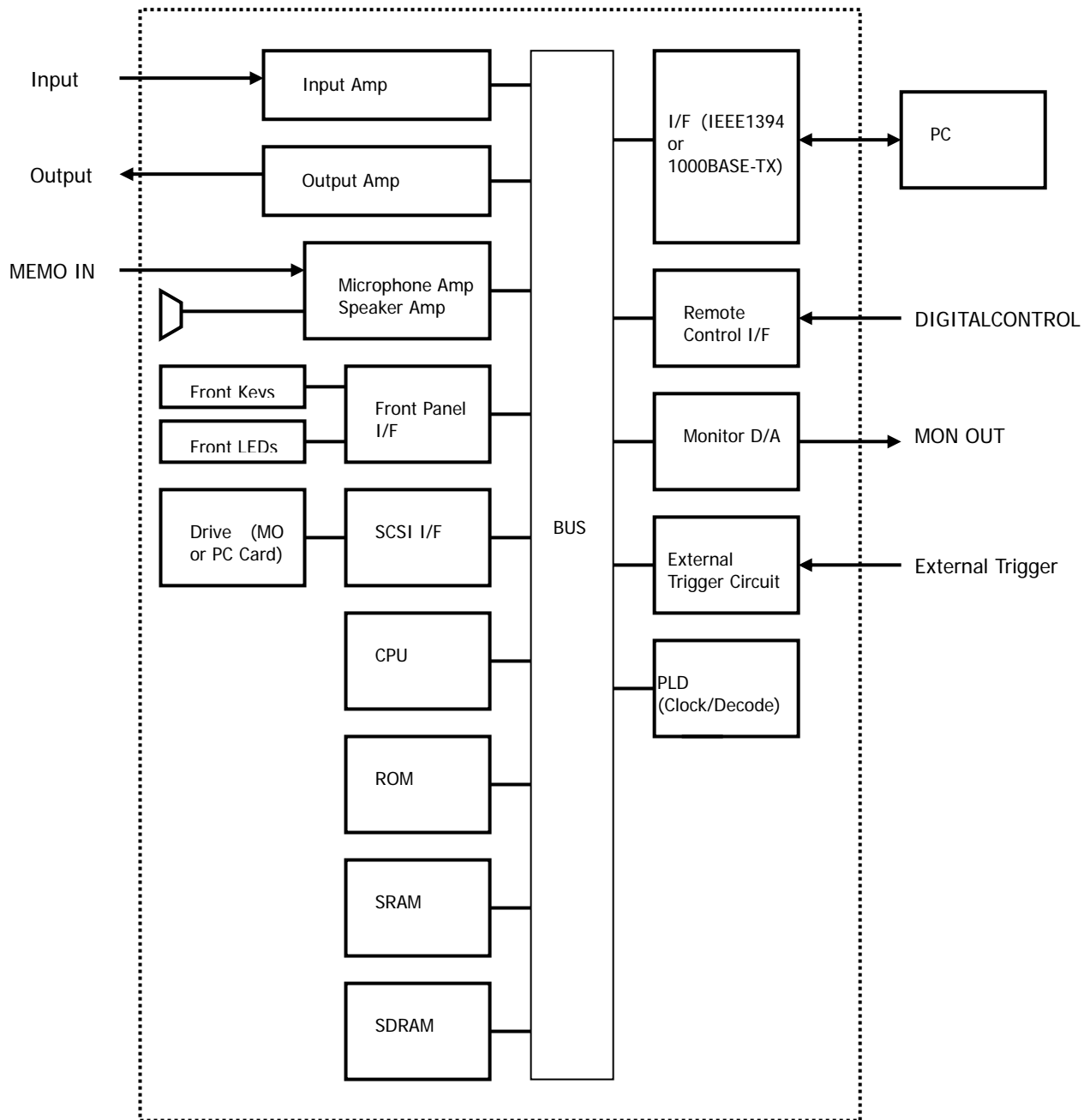
External Dimensions



Main Unit Specifications

Block Diagram

LX-10/10L 8-channel input, 8-channel output



Tachometer Pulse Input Specifications

You can use the tachometer pulse inputs to the PULSE IN A/B connectors of the LX-20/20L.

Number of Inputs	16 bits mode: 2 channels 32 bits mode: 1 channel or 2 channels
Input Method	Threshold Level + 0.5 V, + 1 V, + 2.5 V, + 5 V, + 10 V, + 20 V selectable (Maximum input voltage +/- 50 V) (Applicable input frequency 450 kHz)
Input Impedance	100 kohm
Measurement Mode	(1) pulse (gate): Pulse count mode within the gate time. Range: 1 to 255 times of the sampling frequency. Accuracy: +/- 2 counts (2) pulse (total): Total counts from measurement start to stop Accuracy: +/- ± 5 counts (3) period: Cycle count mode Range: 1 msec, 5 msec, 10 msec, 50 msec, 100 msec, 500 msec, 1 sec Accuracy: +/- 0.3 % (at 16 bits mode) +/- 0.2 % (at 32 bits mode) (4) frequency: Frequency measurement mode Range: 10 Hz, 20 Hz, 50 Hz, 100 Hz, 200 Hz, 500Hz, 1 kHz, 10 kHz, 20 kHz Accuracy: +/- 0.3 % (at 16 bits mode) +/- 0.2 % (at 32 bits mode) (5) rpm: RPM mode Range: 1500 rpm, 3000 rpm, 6000 rpm, 9000 rpm, 12000 rpm, 18000 rpm, 24000 rpm Accuracy: +/- 0.3 % (at 16 bits mode) +/- 0.2 % (at 32 bits mode) Divided Rate: 1 to 255 Moving Average: 1 to 16 Number of Pulse per Revolution: 1 to 255 Tachometer Pulse Timing: Use LSB 1 bit for the tachometer pulse timing Note that this function is available at the sampling frequency 48 kHz or lower.

- 1 x 16 bits tachometer pulse input channel is equivalent to 1 x analog input channel. 1 x 32 bits tachometer pulse input channel is equivalent to 2 x analog input channels. Therefore, if you turn ON tachometer pulse input channel(s), in order keep the same analog input channels, lower the sampling frequency is required by following the setting of tachometer pulse input channel(s).
- Set **Moving Average** to [1] only, when the sampling frequency of 102.4 kHz, 100 kHz, 96 kHz, 65.536 kHz, 51.2 kHz, 50 kHz, 48 kHz, or 32.768 kHz is selected.
- Only 1 x 32 bits tachometer pulse input can be selected when the sampling frequency of 102.4 kHz, 100 kHz, 96 kHz, or 65.536 kHz is selected.
- The LX Navi cannot monitor the tachometer pulse input in wave form display. Use the distal display to monitor.
- The LX cannot playback the recorded tachometer pulse input signals. Process the data as digital data file.
- You cannot use the tachometer pulse inputs and the generator output function at the time.

Generator Output Specifications

Generator Output Specifications

You can use the MON OUT connector of the LX-20/20L for the generator output.

Number of Output Channel	1 channel
Output Level	1 to 5 V at 0.1 V steps (same as the monitor output)
Output Connector	MON OUT (Monitor output) BNC
Types of Outputs	SIN, SWEEP SIN, Pulse, Pink noise, White noise
Noise Level	-70 dB or less (at SIN output)

- You cannot use the tachometer pulse inputs and the generator output function at the time.

Expansion Unit Specifications

<AU-LXEPIO>

Expansion Unit for DC Amp

Amp Slot 2 slots

Dimensions 300W × 30H × 200D (mm) (excluding protrusions)

Mass Approximately 1.2 kg

<AU-LXEPIOP>

Expansion Unit for PA Amp/ST Amp

Amp Slot 2 slots

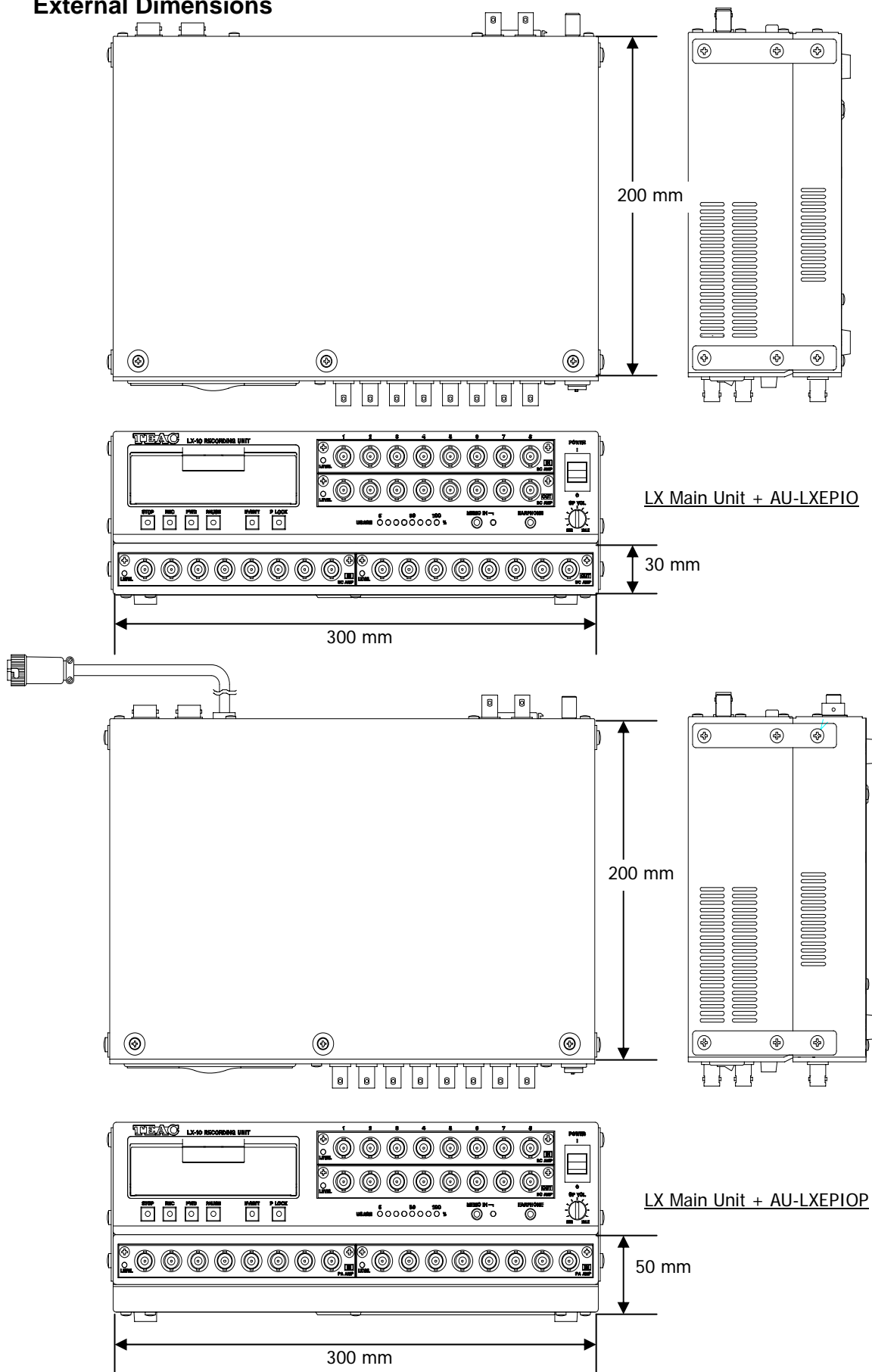
Power Supply +11 to 30 V DC comes with AC adaptor

Dimensions 300W × 50H × 200D (mm) (excluding protrusions)

Mass Approximately 2 kg

Expansion Unit Specifications

External Dimensions



DC Input Amp Specifications

<AR-LXDC>

Quantization Bits	16 bits (simultaneous sampling, use MSB16 bits of 24 bits ADC)
Conversion Method	128 times over-sampling delta-sigma method, 64 times at 96 kHz sampling
Num. of Input Channels	8 channels
Input Range	+/-0.5, 1, 2, 5, 10, 20, 50 Vp (Exceeded range +/-120%)
Absolute Max. Input Voltage	+/-100 V
Input Impedance	100 k ohm unbalanced
Filter	Joint use of digital and analog filters
Linearity	+/-0.1% or less
Distortion	+/-0.05% or less (at bandwidth of 20 kHz)
Drift	+/-0.1% or less
Dynamic Range	80 dB (within bandwidth)
S/N Ratio	78 dB (within bandwidth)
Cross-talk	78 dB (within bandwidth, 48 kHz or lower sampling) 75 dB (within bandwidth, 96 kHz sampling)
Inter-channel Phase Difference	1 degree or less (in same range with bandwidth 20 kHz or less) 3 degrees or less (in same range with bandwidth 40 kHz)

<AR-LXDC2>

Addition to the specifications of the AR-LXDC, Low-speed sampling mode (1 kHz to 1/60 Hz) is available.

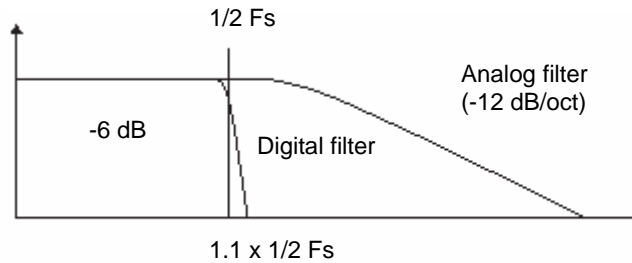
Conversion Method	128 times over-sampling delta-sigma method, 2 kHz sampling
Sampling Frequency	1 kHz, 500 Hz, 200 Hz, 100 Hz, 50 Hz, 20 Hz, 10 Hz, 5 Hz, 2 Hz, 1 Hz, 1/2 Hz, 1/5 Hz, 1/10 Hz, 1/30 Hz, 1/60 Hz (down sampling of 2 kHz sampling data by using DSP)
Recording Times	Example to use 1.3GB MO in 8 channels' recording 100 Hz sampling, Memo off: Approximately 200 hours Memo on: Approximately 33 hours 1 Hz sampling, Memo off: Approximately 20000 hours Memo on: Approximately 40 hours
Digital Filter Characteristics	Caused aliasing at 100 Hz or lower

Sampling Frequency (Fs)	Cut-off Frequency (Fc)	Attenuation
1 kHz	400 Hz	- 80dB (at 500 Hz)
500 Hz	200 Hz	- 80dB (at 250 Hz)
200 Hz	80 Hz	- 80dB (at 100 Hz)
100 Hz	80 Hz	- 80dB (at 100 Hz)
50 Hz, 20 Hz 10 Hz, 5 Hz, 2 Hz, 1 Hz	40 Hz	- 80 dB (at 50 Hz)
1/2 Hz, 1/5 Hz, 1/10 Hz, 1/30 Hz, 1/60 Hz	20 Hz	- 80dB (at 25 Hz)

DC Input Amp Specifications

Filter Characteristics

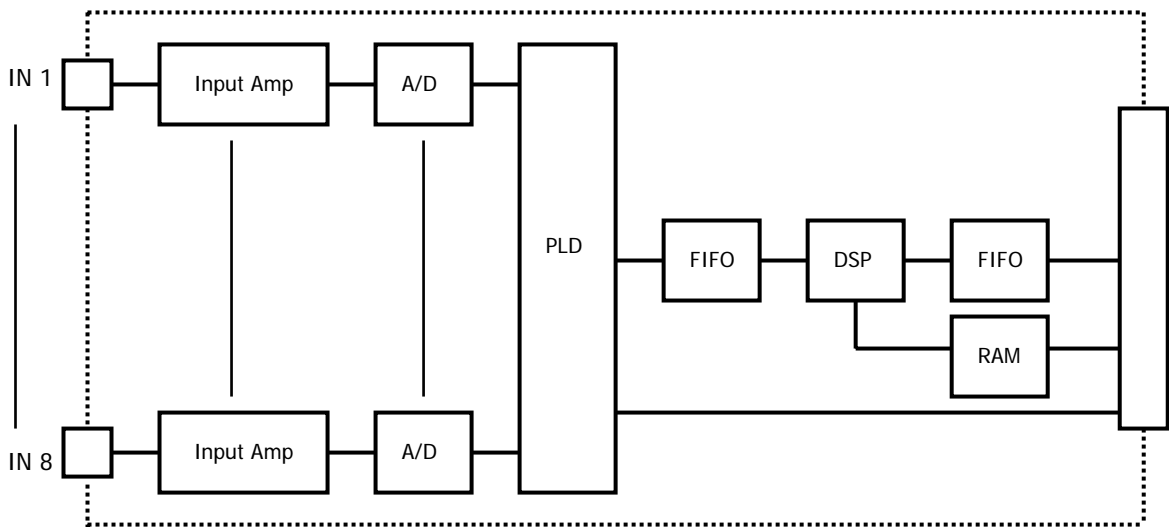
The analog filter is a 2nd-order Butterworth filter, with a cutoff frequency that is about 1.2 times the aliasing frequency ($1/2F_s$). The filter prevents 128-times delta-sigma A/D (analog to digital) high-order aliasing. The digital filter is used when down-sampling 128-times delta-sigma A/D data. The attenuation characteristics are about -6 dB at $1/2F_s$. The aliasing component in -6 dB occurs at a sampling frequency of 1.1 times from 1 of the $1/2F_s$. The attenuation is abrupt so attenuation occurs quickly up to the noise level.



Calibration

When the power is turned on, all channels and all ranges self-calibrate using a DSP. In this operation, when the power is first turned on, the 2 basic signals of zero and + full scale are converted from analog to digital, and the zero point error and gain error are calculated for each range, and then stored. During recording, the data converted from analog to digital is adjusted by the calibration data for each range.

Block Diagram



PA Amp Specifications

<AR-LXPA1>

Num. of Channels	8
Input Format	Balanced and unbalanced
Input Coupling	Balanced AC coupling, balanced DC coupling, unbalanced DC coupling
Input Impedance	150 k ohm
Input Range	+/-0.01 V, 0.0316 V, 0.1 V, 0.316 V, 1 V, 3.16 V, 10 V (over range +/-127%)
Absolute Max. Input Voltage	+/-50 V
Filter	Joint use of digital filter and analog filter
Frequency Response	Flatness: +/-0.5 dB
In AC mode	1 Hz to each bandwidth of the LX main unit.
In DC mode	DC to each bandwidth of the LX main unit.
Quantization Bits	16 bits (simultaneous sampling, use MSB16 bits of 24 bits ADC)
Conversion Method	128-times over-sampling delta sigma modulation. at 96 kHz sampling, 64-times over-sampling is used.
Sampling Frequency	Depends on the sampling frequency of the LX main unit.
Range Precision	+/-2% or less
Linearity	+/-0.1% or less
Distortion Factor	At 48 kHz or 96 kHz sampling: When the input range is 0.316 V or more: +/-0.05% or less. When the input range is 0.1 V or less: +/-0.2% or less. At sampling of 24 kHz or less, +/-0.4% or less.
Drift	+/-0.1% or less (10 or more minutes after power is turned on, at an input range of 1.0 V)

S/N and Crosstalk

Input Range	S/N		Crosstalk	
	Within Bandwidth 20 kHz or less	Within Bandwidth 40 kHz or less	Within Bandwidth 20 kHz or less	Within Bandwidth 40 kHz or less
+/- 0.01 V	64 dB	60 dB	- 64 dB	- 60 dB
+/- 0.0316 V	74 dB	69 dB	- 71 dB	- 69 dB
+/- 0.1 V	83 dB	76 dB	- 77 dB	- 73 dB
+/- 0.316 V	87 dB	77 dB	- 77 dB	- 73 dB
+/- 1.0 V	87 dB	77 dB	- 77 dB	- 73 dB
+/- 3.16 V	87 dB	77 dB	- 77 dB	- 73 dB
+/- 10 V	87 dB	77 dB	- 77 dB	- 73 dB

Inter-channel phase Difference 1 degree or less (with same range and a bandwidth of 20 kHz or less)
3 degrees or less (with same range and a bandwidth of 40 kHz)

Power to Sensor	28 V DC, 4 mA
TEDS	Read TEDS information at the LX Navi or the color LCD remote control unit
Power Consumption	Approx. 7 W

PA Amp Specifications

<AR-LXPA3>

Addition to the specifications of the AR-LXPA, +/- 50 V input range and A/C/FLAT filter are available.

Input Impedance 470 kohm or more (+/-0.01 to 3.16 V) 100 kohm (+/- 10 V, +/- 50 V)

Input Range ± 0.01 V, 0.0316 V, 0.1 V, 0.316 V, 1 V, 3.16 V, 10 V, 50 V (Over range +/-127 %)

Absolute max. Input Voltage +/- 50 V (± 0.01 to 3.16 V) +/- 100 V (+/-10 V, +/- 50 V)

HPF 3rd order butterworth filter 10 Hz (+/- 0.5 dB or less), 20 Hz (+/- 0.5 dB or less)

Weighting A curve, C curve, Flat IEC-TYPE1

Power to Sensor 28 V DC/4 mA, 24 V DC/4 mA (internal switch)

S/N and Crosstalk

Input Range	S/N		Crosstalk	
	Within Bandwidth 20 kHz or less	Within Bandwidth 40 kHz or less	Within Bandwidth 20 kHz or less	Within Bandwidth 40 kHz or less
+/- 0.01 V	64 dB	60 dB	- 64 dB	-60 dB
+/- 0.0316 V	74 dB	69 dB	- 73 dB	-69 dB
+/- 0.1 V	83 dB	77 dB	-78 dB	-74 dB
+/- 0.316 V	87 dB	77 dB	-78 dB	-74 dB
+/- 1.0 V	87 dB	77 dB	-78 dB	-74 dB
+/- 3.16 V	87 dB	77 dB	-78 dB	-74 dB
+/- 10 V	87 dB	77 dB	-78 dB	-74 dB
+/- 50 V	80 dB	77 dB	-78 dB	-74 dB

ST Amp Specifications

<AR-LXST1>

Num. of Channels	8
Input Format	Balanced differential
Input Coupling	Balanced DC coupling, DC bridge method
Input Impedance	1 Mohm
Input Range	ST mode ± 0.25 mV/V, 0.5 mV/V, 1 mV/V, 2.5 mV/V, 5 mV/V, 10 mV/V, 25 mV/V, 50 mV/V (over range +/- 127%) DC mode ± 1 V, 2 V, 5 V, 10 V (over range +/-127%)
Absolute Max. Input Voltage	+/- 25 V
Filter	Joint use of digital filter and analog filter
LPF	10/30/100/300/1 k/3 k/10 k/30 kHz/Pass: - 48 dB OCT butterworth (switched capacitor filter) 8 channels independently
Frequency Response	
In ST mode	DC to 30 kHz (-3 dB)
In DC mode	DC to 40 kHz (-3 dB)
Quantization Bits	16 bits (simultaneous sampling, use MSB16 bits of 24 bits ADC)
Conversion Method	128-times over-sampling delta sigma modulation. at 96 kHz sampling, 64-times over-sampling is used.
Sampling Frequency	Depends on the sampling frequency of the LX main unit.
Range Precision	+/-1% or less
Linearity	$\pm 0.1\%$ or less
Distortion Factor	

Applicable Gage Register	120 to 2000 ohm
Gage Factor	2.0
Bridge Voltage	2 V (± 1 V) / 10 V (± 5 V)
Bridge Connection	Full bridge
Remote Sense	Available
Temperature Drift	$\pm 0.1\%/1$ degree C(10 or more minutes after power is turned on)
Balance Method	Electronic auto balance
Balance Range	± 10000 microST
Zero Balance	Auto and manual calibration by using 16 bits D/A
S/N and Crosstalk	

ST Mode	SCF					
Bridge Voltage=2V	1 KHz		3 KHz		10 KHz	
	SNR(dB)	Cross Talk(dB)	SNR(dB)	Cross Talk(dB)	SNR(dB)	Cross Talk(dB)
+/-0.5mV						
+/-1mV						
+/-2mV						
+/-5mV						
+/-10mV						
+/-20mV						
+/-50mV						
+/-100mV						
DC Mode	SCF bypass					
Input Level	24 KHz or less					
	SNR(dB)	Cross Talk(dB)	SNR(dB)	Cross Talk(dB)	SNR(dB)	Cross Talk(dB)
+/- 1V						
+/- 2V						
+/- 5V						
+/- 10V						

Output Amp Specifications

<AR-LXAO>

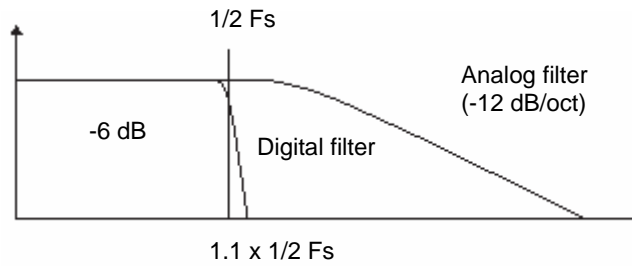
Num. of Output Channels	8
Output Voltage	+/-1 to 5 V (0.1 V steps)
Impedance	75 ohm unbalanced
Output Current	+/-1 mA (at 20 ohm load)
Filter	Joint use of digital and analog filters
Linearity	+/-0.1% or less
Distortion	+/-0.05% or less (at bandwidth of 20 kHz)
Drift	+/-0.1% or less
Dynamic Range	80 dB (within bandwidth)
S/N	78 dB (within bandwidth)
Crosstalk	78 dB (within bandwidth, 48 kHz or lower sampling) 75 dB (within bandwidth, 96 kHz sampling)
Inter-channel Phase Difference	1 degree or less (in same range with bandwidth 20 kHz or less) 3 degrees or less (in same range with bandwidth 40 kHz or less)

Output Amp Specifications

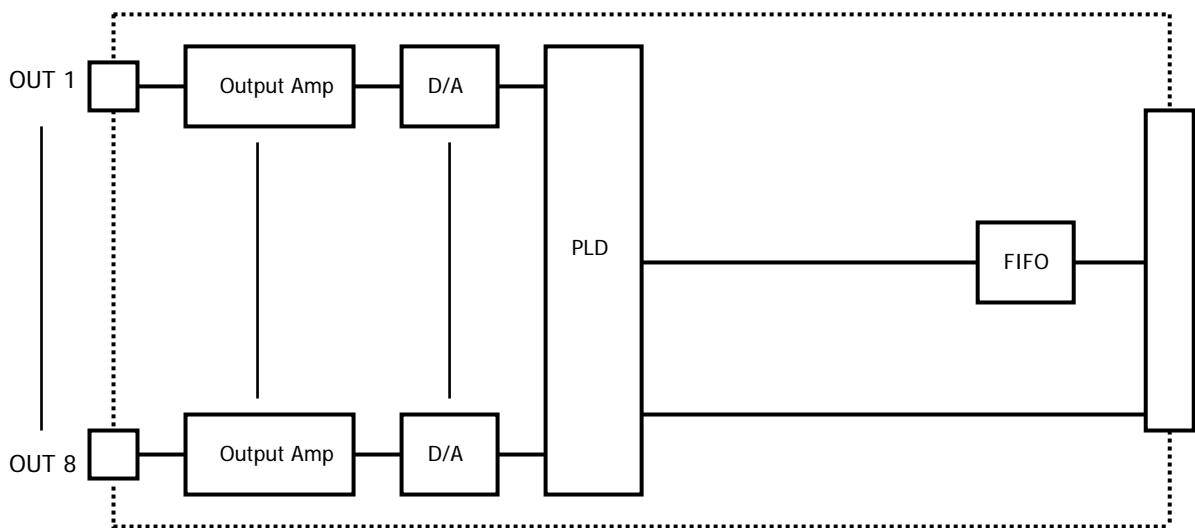
Filter Characteristics

The analog filter is a 2nd-order Butterworth filter, with a cutoff frequency that is about 1.2 times the aliasing frequency ($1/2F_s$).

The digital filter attenuation characteristics are about -6 dB at $1/2F_s$. The input amp and output amp are both added for the input signal, so (as shown in the following diagram) the attenuation is about -12 dB at an aliasing frequency ($1/2 F_s$).



Block Diagram



File Format

Type of Files

The LX makes a binary-format data file and ASCII-format header file each time recording stops or pauses.

Data file: Contains A/D data in binary format. The file extension is dat.

Header file: Contains recording conditions, etc., in text format. The file extension is hdr.

- The files are stored in DOS format on the media.
- When a voice memo is recorded, a WAVE file is made in addition to the above. You can play this WAVE file in the Windows Media Player.

File Name

The file name is common to the data file and header file. An ID number is added to the end of the specified file name. When you specify a new file name, the ID number starts from 1. After recording is stopped or paused, the ID number is automatically incremented each time the recording restarts. If a data file with the same name or same ID number already exists when recording to the media or PC, the next ID number is used.

- When Recording to Memory or to the media

To specify a file name, choose File and New, and then specify the file name in Dataset. For the file name, use up to 5 alphanumeric characters. You cannot use the following characters:

. , ; < > [] * ? = " / ¥ |

The system attaches a 3-digit ID number (starting from 001) to these 5 characters to make a total of 8 characters. If you specify 4 or fewer characters, the system changes the total number of characters to 8 by using a 0 before the 3-digit ID number to pad each of the missing locations.

- When Recording to a PC

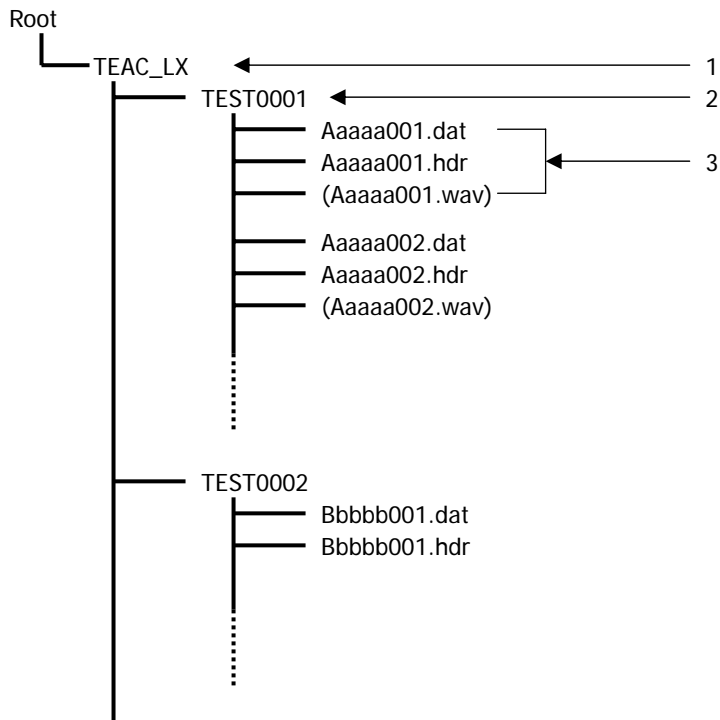
When recording to a PC, or when recording to a PC while recording to memory or the media, there is no restriction on the length of the file name. You cannot use the following characters:

. , ; < > [] * ? = " / ¥ |

An ID number of up to 8 characters can be added to that file name.

Directory Structure on Media

The following diagram shows how directories are organized on the media:



1. TEAC_LX

This directory is made automatically when the media is formatted. When the media is inserted in an LX, this directory is made automatically if it does not already exist.

2. TEST0001

Name of the directory entered in Directory, which is in the dialog box displayed by choosing **File** and then **New**.

3. Aaaaa001.dat, Aaaaa001.hdr, Aaaaa001.wav

The data file, header file, and voice-memo file (if a voice memo was recorded) generated for each ID.

Data File

Data converted from analog to digital is recorded as 2-byte integers from -32768 to +32767. Negative numbers are expressed as complements of 2.

The byte order is from the lower bytes to the higher bytes (Intel format)*1.

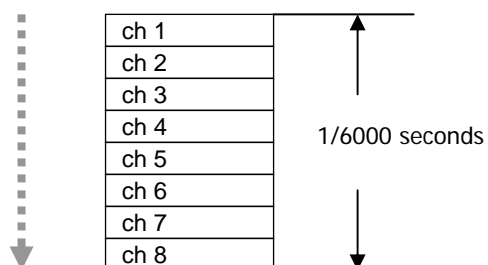
The order of data is as follows: first sampling channel order, second sampling channel order,, last sampling channel order. This order is called the INTERLACED format*2, and the format name is recorded in STORAGE_MODE in the header file.

The organization of a data file is shown in the following diagram. In this document a collection of data as shown in the example is called one scan. A data file consists of scan repetitions.

Example

Data of 1 scan when recorded with a sampling frequency of 6 kHz:

Data Sequence



Notes

*1. The byte order from the higher to the lower bytes is called the Motorola format. It is used in components such as FFT analyzers that used Motorola CPUs and in workstations.

*2. The order of data of the SEQUENTIAL format is as follows: first channel sampling order, second channel sampling order,, last channel sampling order.

Data File When Turning on Tachometer Pulse Inputs

The LX-20/20L can record the tachometer pulse input channel(s) assigned at either one of the following 4 tachometer pulse inputs modes along with analog channels.

2 x 16 bits tachometer input channels (Tachometer pulse input channel A and B)

1 x 32 bits tachometer input channel (Tachometer pulse input channel A)

1 x 32 bits tachometer input channel (Tachometer pulse input channel B)

2 x 32 bits tachometer input channels (Tachometer pulse input channel A and B)

25,000 is 100% range value at 16 bits mode.

1,638,400,000 is 100% range value at 32 bits mode.

The LX-20/20L records the tachometer pulse input data by reflecting the number of pulses per revolution and /or the pre-set divided rate.


The tachometer pulse input data are recorded at the next to the last analog channel of each scans. See the following.

Example

8 analog channels, and 2 x 16 bits tachometer pulse input mode:

(Keyword on the header file for the tachometer pulse input channels are PULSE_CH_A 9 and PULSE_CH_B_10.)

1 scan




Channel 1 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 2 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 3 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 4 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 5 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 6 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 7 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Channel 8 (Analog)	Bit7.....Bit0	Bit15.....Bit8
Tachometer Pulse Input	Channel A	Bit15.....Bit8
Bit7.....Bit0	Bit15.....Bit8	
Tachometer Pulse Input	Channel B	Bit15.....Bit8
Bit7.....Bit0	Bit15.....Bit8	

8 analog channels, and 2 x 32 bits tachometer pulse input mode:

(Keyword on the header file for the tachometer pulse input channels are PULSE_CH_A 9 and PULSE_CH_B_10.)

1 scan



Channel 1 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 2 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 3 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 4 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 5 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 6 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 7 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Channel 8 (Analog)	Bit7.....Bit0	Bit15.....Bit8		
Tachometer Pulse Input	Channel A	Bit15.....Bit8	Bit23.....Bit16	Bit31.....Bit24
Bit7.....Bit0	Bit15.....Bit8	Bit23.....Bit16	Bit31.....Bit24	
Tachometer Pulse Input	Channel B	Bit15.....Bit8	Bit23.....Bit16	Bit31.....Bit24
Bit7.....Bit0	Bit15.....Bit8	Bit23.....Bit16	Bit31.....Bit24	

Converting Data to Physical Quantities

Data converted from analog to digital is 2-byte integers from -32768 to +32767.

When the input is +/-100% of the set input range, the value is +/-25000.

The input value is obtained from the following formula:

Input value = (A/D conversion value of the data file) x SLOPE + Y_OFFSET

- About the tachometer pulse input data

25,000 is 100% range value at 16 bits mode.

1,638,400,000 is 100% range value at 32 bits mode.

The LX-20/20L records the tachometer pulse input data by reflecting the number of pulses per revolution and /or the pre-set divided rate.

Header File

Header files are ASCII-format text files containing information such as recording conditions. Header files are based on the waveform-analysis software DADISP format. Because the files are in text format, they can be read by Windows applications such as WordPad or NotePad.

In a header file, each recording-condition entry is written on 1 line, with parameters separated by a comma (,).

The following shows an example of a header file, with the entries explained after the file.

- Example of Header File (LX-10/10L)

```

DATASET TEST0001
VERSION 1
SERIES CH1_LX10_DC100K,CH2_LX10_DC100K,CH3_LX10_DC100K,CH4_LX10_DC100K,
CH5_LX10_DC100K,CH6_LX10_DC100K,CH7_LX10_DC100K,CH8_LX10_DC100K
DATE 06-23-2001
TIME 16:32:55.00
RATE 1500
VERT_UNITS V,V,V,V,V,V,V,V
HORZ_UNITS Sec
COMMENT <LX-10>
NUM_SERIES 8
STORAGE_MODE INTERLACED
FILE_TYPE INTEGER
SLOPE 0.00008000,0.00008000,0.00008000,0.00008000,0.00008000,0.00008000,0.00008000,0.00008000
X_OFFSET -5
Y_OFFSET 0,0,0,0,0,0,0,0
NUM_SAMPS 59200
DATA
DEVICE LX-10
SLOT1_AMP AD_AMP,8,00000006,
SLOT2_AMP DA_AMP,8,00000006,
CH1_1 LX10_DC100K,RANGE=2V,FILTER=ON
CH2_2 LX10_DC100K,RANGE=2V,FILTER=ON
CH3_3 LX10_DC100K,RANGE=2V,FILTER=ON
CH4_4 LX10_DC100K,RANGE=2V,FILTER=ON
CH5_5 LX10_DC100K,RANGE=2V,FILTER=ON
CH6_6 LX10_DC100K,RANGE=2V,FILTER=ON
CH7_7 LX10_DC100K,RANGE=2V,FILTER=ON
CH8_8 LX10_DC100K,RANGE=2V,FILTER=ON
ID_NO 1
TIME 20010623163255,20010623163335
REC_MODE MO
START_TRIGGER COMMAND,PRE
STOP_CONDITION COMMAND,POST
START_PRE_COUNT 7500
STOP_POST_COUNT 15000
MARK 100,200,300
ID_END
VOICE_MEMO 8BITS,327680
LX10_VERSION PAL1_VER,PAL2_VER,V0.03,02200000

```

File Format

- Explanations of Header File

DATASET	File name
VERSION	1 (This is a fixed value.)
SERIES	Number of the channel used for recording. The channel name is after the underscore.
DATE	Date when recording started (month-day-year)
TIME	Time when recording started (hour: minute: second)
RATE	Sampling frequency (Unit: Hz)
VERT_UNITS	Physical/engineering units of each channel
HORZ_UNITS	Time axis units (Sec: This is a fixed value)
COMMENT	Comment entered using File and New .
NUM_SERIES	Number of recording channels
STORAGE_MODE	Data order. Fixed as INTERLACED because this is the scan order.
FILE_TYPE	Fixed as INTEGER because this is a 2-byte integer for 1 data item.
SLOPE	Coefficient used when converting data to physical/engineering units
X_OFFSET	Location of the beginning data on the time axis. Usually is 0. The set value (in seconds) is written using minus for the pre-trigger time. Even if you set the number of scans for Pre-trigger, this will be in seconds. (Values below the decimal point are discarded.)
Y_OFFSET	Offset used for converting data to physical/engineering units.
NUM_SAMPS	Number of data items recorded per channel
DATA	The information written after this entry is proprietary to this device, and indicates information different from the DADiSP format. The information below is not recorded when recording to a PC. Also, it is not recorded in the header file on the PC when recording to a PC while recording to memory or the media.
DEVICE	LX-10/LX-20 (This is a fixed value.)

(The information below is not recorded when recording to a PC.)

SLOT1_AMP	The ID-name, number of channels, and versions of the amp in slot 1, next to SLOT2_AMP. Depending on the system configuration.
CH1_	The following information is written after the underscore: channel number, amp type, range setting, filter setting. (This is always ON for a DC amp.)
ID_NO	ID number
TIME	Recording start date and time, recording stop date and time (YYYYMMDDhhmmss)
REC_MODE	Recording destination device (MEMORY, MO, PC CARD, PC)
START_TRIGGER	Recording start conditions: COMMAND: Interface command PANEL: FWD button of the front panel LEVEL: Level trigger DATE: When Repeat Count is 1 in the interval action TIMER: When Repeat Count is 2 or more in the interval action EXT: External trigger TIME_OUT: Timeout ,PRE: Added for a pre-trigger
STOP_CONDITION	Recording stop conditions: COMMAND: Interface command PANEL: STOP button of the front panel LEVEL: Level trigger TIMER: Specified recording time EXT: External trigger MEMORY_FULL: Memory is full MEDIA_FULL: Media is full POST: Added for a post-trigger
START_PRE_COUNT	Number of scans recorded by a pre-trigger
STOP_POST_COUNT	Number of scans recorded by a post-trigger
MARK	Number of scans at the instant an event mark was attached.
ID_END	The following information applies to the LX hardware, etc.
VOICE_MEMO	The number of bits per sample for voice-memo data. Data size (bytes)
LX10_VERSION	Firmware and PAL version of the LX-10
(LX20_VERSION)	for LX-20

Connector Specifications

Connector Specifications DIGITAL CONTROL Connector

<Functions>

Contact input: REC FWD, REC, FWD, STOP, PAUSE, event, panel lock, internal clock adjustment

Status output: REC, FWD, STOP, PAUSE, event, panel lock

<Input/Output Circuit>

Input: L level: 0.4 V or less

H level: Open or 2 V or more

Pulse width: 100 ms or more

Output: Open drain, maximum sync current: 8 mA

<Connector>

Angled half pitch 36-pin (DHA-RC36-R1xxx series)

Pin Assignment

Pin No.	Signal	Function	Pin No.	Signal	Function
1	GND	Ground	19	GND	Ground
2	RESERVED	Reserved	20	RESERVED	Reserved
3	RESERVED	Reserved	21	RESERVED	Reserved
4	GND	Ground	22	AGND	Reserved
5	RESERVED	Reserved	23	AGND	Reserved
6	RESERVED	Reserved	24	AGND	Reserved
7	GND	Ground	25	AGND	Reserved
8	RESERVED	Reserved	26	RESERVED	Reserved
9	RESERVED	Reserved	27	RESERVED	Reserved
10	RTCADJIN	Internal clock adjustment input	28	NC	
11	RECFWDIN	REC FWD input	29	NC	
12	RECIN	REC input	30	RECSTS	REC output
13	FWDIN	FWD input	31	FWDSTS	FWD output
14	STOPIN	STOP input	32	STOPSTS	STOP output
15	PAUSEIN	PAUSE input	33	PAUSESTS	PAUSE output
16	EVENTIN	EVENT input	34	EVENTSTS	Event output
17	PLOCKIN	Panel Lock input	35	PLOCKSTS	Panel Lock output
18	GND	Ground	36	GND	Ground

For PANEL LOCK input, the control buttons on the front panel of the LX cannot be used to perform operations. The first signal locks the control buttons; the second signal releases the lock.



Recording Synchronization Specifications

Recording Synchronization Specifications

Number of Units to be Synchronized	4
Inter-channel Phase Differences	Channels with the different units 5 degree or less (with same range and a bandwidth of 20 kHz or less) 7 degree or less (with same range and a bandwidth of 40 kHz)
Total Synchronization Cable Length	Within 10 m

Section 7 Appendixes

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Troubleshooting

Troubleshooting

If you encounter one of the following problems, check whether the recommended actions solve the problem before you request a repair.

Problem	Possible cause and recommended action
No power.	Check whether the DC voltage is low.
The LX Navi software does not recognize the LX.	Make sure that the IEEE 1394 interface card is one of the recommended cards. Make sure that both the LX and the PC have matched IP addresses. Power on the LX again, and then restart LX Navi.
The MO disk is not recognized in the New dialog box.	Make sure the media is formatted. Make sure you are using the specified media.
You cannot record to the media.	Make sure that the media is inserted. Make sure that the media is formatted. Make sure that the MO disk is not write-protected.
The Auto Saving function for automatically saving to the media is not working.	Make sure that the media is formatted. Make sure that the media is not full. Make sure that the Auto Saving option is selected. Note that turning off the power will disable the Auto Saving option. You must enable it each time you turn the power on.
The buttons on the main unit are disabled.	Make sure that panel is not locked (P LOCK button). If the panel is locked, release the lock.
The eject button on the main unit is disabled at the MO model.	Note that while LX Navi is running, the eject button on the LX MO drive is disabled.
You cannot set the sampling frequency.	Make sure that number of the channels you activate is larger than available number of the channels at the sampling frequency in case turning on the tachometer input channels.
A write or read error occurred on the MO disk.	Clean the MO disk and the lens. To clean the MO disk, use the cleaning kit TZ-381. To clean the lens, use the cleaner 0240470.

If you perform the recommended action but the problem remains, contact TEAC's service department.

Supplied Accessories and Options

Supplied Accessories

DC Power Cable	1
Microphone	1
Earphone	1
Ferrite Core	2
CD-ROM (LX Navi)	1
MO Disk	1(Only for the MO model)
Instruction Manual (this manual)	1
AC Adaptor	1

Options

MO Disk	T0005380
MO Cleaning Kit	TZ-381
Lens Cleaner	0240470
Expansion Unit	AU-LXEPIO (for DC input amp) AU-LXEPIOP (for PA amp and ST amp)
Battery Enclosure	BU-80
Battery Pack	

Note

Note

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