LA-1910

GP-IB BUS ANALYZER
OPERATORS MANUAL

TRIO

CONTENTS

FEATURES

■ Bus data may be displayed in binary and hexa-decimal representations.

■ Input and output memories of 512 bytes each are provided separately.

■ Bus data are taken into the memory within 1 μsec after a sampling trigger signal became active.

■ Bus data are sampled at the active edge of a control bus signal or a handshake bus signal. Sampling triggered by signal DAV alone is also possible by software.

■ Provided is a mode in which data may be sampled without affecting the data transfer rate through the bus.

■ Data may be written into memory in hexa-decimal.

■ By connecting the Printer, the memory contents may be printed out.

APPLICATIONS

• Checking GP-IB system hardware

• Debugging GP-IB system software

• Developing GP-IB systems

• Monitoring GP-IB systems

• Simulated controllers

• Training for GP-IB systems

Memory capacity
  Input memory: 512 words
  Output memory: 512 words
Word lengths
  Input memory: 16 bit
  Output memory: 13 bit
POWER SUPPLY
  Supply voltage
    Low: 90 V— 129 V
    High: 198 V— 264 V
                          50/60 Hz
                          Adaptable by changing con-
                          nection to the printed circuit
                          board
  Power consumption: 20 W
OPERATING
TEMPERATURE
AND HUMIDITY: 5°C — 45°C, below 90%
                          (no condensation allowed)
DIMENSIONS: 190(W) × 128(H) × 263(D) mm
                          (exclusive of projections)
WEIGHT: Approx. 3.2 kg
ACCESSORIES
  Operators manual: 1 copy
  AC-power cord: 1
  Replacement fuse: 0.7 A....2
                          1 A....2

OPTIONAL
ACCESSORY
GB-IB connection cable   CB-2420P

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PRECAUTIONS FOR USE

a. Do not expose the LA-1910 to direct sunlight. ICs inside might get damage.
b. Do not use the LA-1910 in an environment where the specified operating temperature and humidity ranges are exceeded.
c. Do not use the LA-1910 in a place where vibrations are heavy. It might operate erroneously.
d. The frequency of the supply power should be 50 or 60 Hz (±10%).
e. Do not plug the power cord into an AC outlet when the power switch is turned on. The LA-1910 might operate erroneously. (If it happens, turn off the power switch then turn on again.)
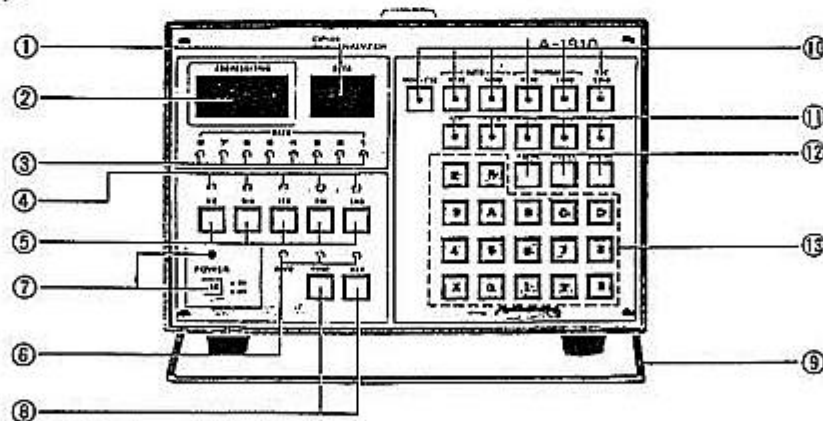
SWITCHES AND INDICATORS

<FRONT PANEL>

Fig. 2

① DATA DISPLAY LEDS
This indicates the data held in a memory location or monitored from the bus in hexa-decimal (00H to FFH).

② ADDRESS DISPLAY LEDS
This indicates a memory address in hexa-decimal (000H — 1FFH).

③ DATA DISPLAY LEDS
This indicates the same data that the data display ① indicates in binary.

④ CONTROL SIGNAL DISPLAY LEDS
This indicates the states of the control signals:

IFC: InterFace Clear
REN: Remote ENable
ATN: ATtentioN
EOI: End Or Identify
SRQ: Service ReQuest

⑤ CONTROL SIGNAL KEY-SWITCHES
These control signals of the bus in Manual send mode.

⑥ HANDSHAKE SIGNAL DISPLAY LEDS
This indicates the states of the handshake signals:
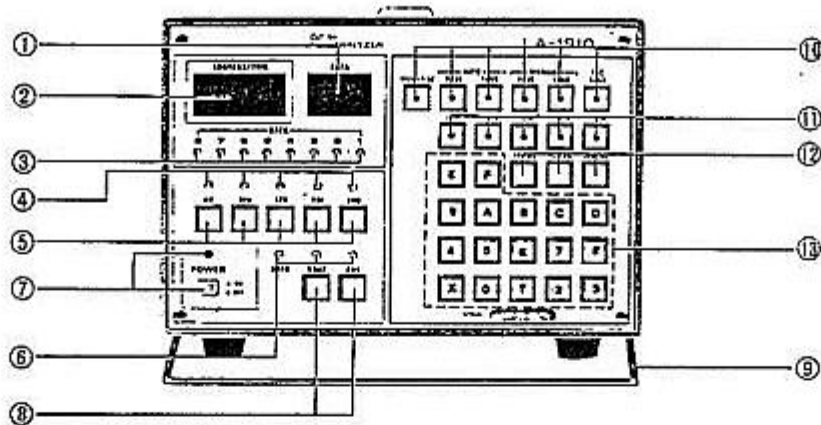NRFD: Not Ready For Data
NDAC: Not Data ACcepted

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Fig. 3

DAV:.   DAta Valid

(7) ·POWER SWITCH & DISPLAY LED

Depress this switch to turn on power. The LED lights, indicating the power-on state.

(8) HANDSHAKE SIGNAL KEY-SWITCHES

These enable to perform handshake in Manual and Trace modes.

NDAC: Use in Receive mode.

DAC: Use in Send mode.

(9) TILT STAND

This permits to tilt the LA-1910 for the ease of operation. Pull it out toward you until it gets fixed.

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(10) MODE KEY-SWITCHES

These select an operating mode.

MEM/ESC: Memory/Escape mode. This mode permits access to the memory and setting trigger conditions. This switch is also used to escape from a current operating mode.

AUTO RCVE: Auto receive mode.

Bus data may be monitored an stored in the input memory with the handshake procedure eliminated.

AUTO SEND:.   Auto send mode.

The contents of the ouptut memory which are prepared in advance may be sent out to the GP-IB bus.

MANU RCVE: Manual receive mode.

Three-line handshake will be performed and data enter the input memory every time when you press the NDAC key.

MANU SEND: Manual send mode.

Signals entered with keys may be directly put on the GP-IB bus to control it.

TRC SEND: Trace send mode.

Three-line handshake will be performed and the contents of the output memory be put on the GP-IB bus every time when you press the DAV key.

(11) MEMORY-MODE FUNCTION KEY-SWITCHES

These select a function in Memory mode.

LIST: List memory.

This function prints out the contents of the memory.

EXCG: Exchange.

This function exchanges the contents of the input and output memories each other.

TRIG: Trigger set.

This function sets trigger conditions in Auto receive mode.

DATA: Data set.

This function writes data into the memory.

ADDR: Address set.

This function sets a memory address.

(12) MEMORY ACCESS KEY-SWITCHES

These keys are used to read data from or write data in the memory in Memory mode.

RD INC: Read increment.

This permits to read data and increment address when setting data or address.

RD DEC: Read decrement.

This permits to read data and decrement address when setting data or address.

WR INC: Write increment.

This permits to set data and increment address when setting data or address. This also terminates operation of a specific funciton.

(13) DATA ENTRY KEY-SWITCHES

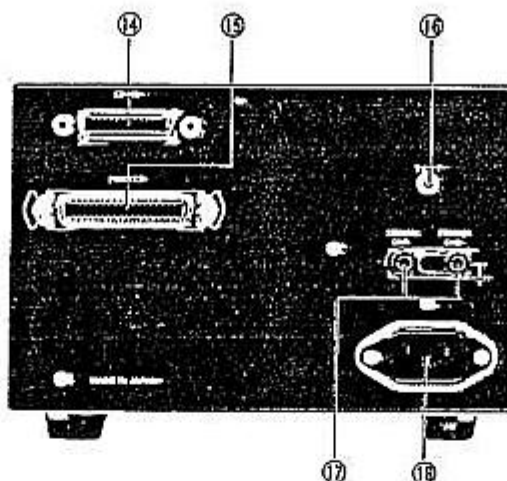These permit to set data in every mode. "X" is the "Don't care" key.

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<REAR PANEL>

Fig. 4

⑭ **GP-IB CONNECTOR**
Twenty-four-pin, IEEE-488 bus compatible connector.

⑮ **PRINTER CONNECTOR**
This permits connection to a printer with the Centronics interface.

⑯ **TEST SWITCH**
This is provided not for the user but for the serviceman. If you press this accidentally, the LA-1910 may not operate properly as a GP-IB bus analyzer: turn off power

then turn on again for recovery.

⑰ **GROUND TERMINALS**
SIGNAL GND: This connects to the ground line of the internal circuits.
FRAME GND: This connects to the chassis.

⑱ **AC POWER CONNECTOR**
This connects to the AC power cord.

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FUNCTION DESCRIPTION

The LA-1910 has following six operating modes.
(a) Memory mode
(b) Auto receive mode
(c) Auto send mode
(d) Manual receive mode
(e) Manual send mode
(f) Trace send mode

MEMORY MODE
This mode is mostly associated with read/write of the memory. In Memory mode, the LA-1910 is at High level with reference to the GP-IB bus and all signals ouptut from the LA-1910 are non-active.

The data put on the GP-IB bus are not displayed in this mode on data display LEDs ① and ③, control signal display LEDs ④ and handshake signal display LEDs ⑥.

Functions:
(a) Setting a memory address
(b) Writing data into the memory and incrementing address
(c) Reading data from the memory and incrementing/decrementing address
(d) Reading and setting trigger data
(e) Exchanging contents of the input and output memories
(f) Printing out contents of the input memory

AUTO RECEIVE MODE
In this mode, data put on the GP-IB bus will be read and put into the input memory when a sampling trigger signal

becomes active. Three-line handshake is not performed.
The LA-1910 displays the data read from the GP-IB bus on data display LEDs ① and ③, control signal display LEDs ④ and handshake signal LEDs ⑥.

Functions:
(a) Starting sampling when a trigger data coincides with a signal put on the GP-IB bus
(b) Stopping sampling when a trigger data coincides with a signal put on the GP-IB bus
(c) It is possible to read data from the GP-IB bus and put them into the memory continuously with no trigger conditions set up, by using the memory cyclically.

AUTO SEND MODE
This is the mode to send the contents of the output memory out to the GP-IB bus, starting from a designated address.

Function:
The data held in that part of the output memory which is bounded by a designated start address and the end address of the memory will be sent out to the GP-IB bus.

MANUAL RECEIVE MODE
In this mode, the LA-1910 sends NDAC "L" to the GP-IB bus and stays ready to receive data.
No operations except with the mode and NDAC key are ineffective.

Function: When the NDAC key of the handshake signal

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key-switches ⑧ has been pressed, three-line handshake is performed once, the current data enters the memory location whose address is displayed at that time, then the memory address is incremented.

The memory locations are used cyclically.

Note that only DAV serves as the sampling trigger signal in this mode.

MANUAL SEND MODE

This is the mode to send interface signals and data out to the GP-IB bus manually. Three-line handshake is performed automatically.

Functions: (a) Setting data with hexa-decimal keys
              (b) Setting a signal with a handshake signal key

TRACE SEND MODE

In this mode, the contents of the output memory will be sent out to the GP-IB bus in a stepping manner.

Functions: (a) Every time when the [DAV] key of the handshake singal key-switches ⑧ has been pressed, the contents of a memory location is sent out to the GP-IB bus, where the start address is designated, then the address is incremented.
              (b) Displaying the signal put on the GP-IB bus on data display LEDs ① and ③, control signal display LEDs ④, and handshake signal LEDs ⑥.

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OPERATION

POWER-ON PROCEDURE

(a) Connect the AC power cord to the AC connector.

┌CAUTION:──────────────────────────
 • The LA-1910 is to be powered by 90 — 129 V or 198 — 264 V. Before turning on power, make sure that the LA-1910 is adapted to the local supply voltage.
   Avoid connecting and disconnecting the AC cable when it is supplying power to the LA-1910.
 • As to the printer, connect it to the LA-1910 before turning on power.
└──────────────────────────────────

(b) Depress the power switch ⑦. Then the LA-1910 is supplied with power, with the power indicator LED fitted right above the switch getting lit.

(c) Now the LA-1910 is in Memory mode (the Memory mode key is lit up).

(d) No function is set up in power-on-time Memory mode. Now the memory mode function key-switches ⑪ and the mode key-switches ⑩ are active.
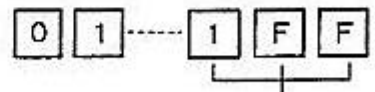
MEMORY MODE

(a) MEMORY MODE SET

Press the [MEM/ESC] key of mode key-switches ⑩, and its key-top LED lights, indicating the selection of Memory mode.

If any function has been selected up to then, it remains selected. The memory address which was set before Memory mode has been entered this time remains un-

changed.

The [MEM/ESC] key may also be pressed to suspend a function of Memory mode or operation in another mode and return to Memory mode. (See Section, Mode transitions.)

(b) ADDRESS SET

Press the [ADDR] key of memory mode function key-switches ⑪, and its key-top LED lights, indicating the selection of the Address set function.

Now a desired address (000-1FF) may be set with data entry keys ⑬. The address display LED ② reads the address thus set.

At this time, the data display LEDs ① and ③, control signal display LEDs ④, and handshake signal display LEDs ⑥ indicate the contents of the designated address which are held in memory.

The readings of the address displays shift to left every time when a data entry key ⑬ gets pressed.

The most significant digit and bit of the address displays are 0 if the number to be shifted is even and 1 if it is even, so that the limits of address are never exceeded.

<Key entry sequence>   <Indication>

ADDRESS/TRIG

| 0 | 1 |------| 1 | F | F | | I F F |

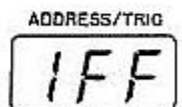The last three digits entered are effective and set.

Fig. 5

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(c) DATA SET

Press the DATA key of memory mode function key-switches ① , and its key-top LED lights, indicating the selection of the Data set function.

Then data may be entered with data entry keys ⑬. The data display LEDs ① and ③ read the data entered.

To set control data, press control signal keys ⑤.

The control signal display LEDs ④ read the control data entered.

★ Key entries and Indications

Data display LED: 0 and 1 alternate at every depression of key.

Control signal keys: IFC, REN, ATN, EOI, SRQ

Press the WR INC key of memory access key-switches ⑰ to terminate Data set. Unless the WR INC key is pressed, the data entered and read by the data display LED will not be set.

After the WR INC key is pressed, address increments and the data set remains displayed in data display LED. After then, only the depression of the WR INC key is enough to set the same data repeatedly.

<Key entry sequence>   <Indication>
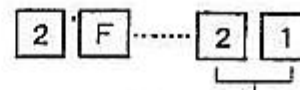
The display reads the last two digits entered. The data is not written into the memory yet.

Fig. 6

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★ Memory All Clear

For the Data set function, the X key of the data entry key-switches ⑬ performs a special function.

Press the X key, then the displays of address, data, control signals, and handshake signals are all cleared to 0's. The subsequent depression of the WR INC key clears all contents of the memory after the address and data display LEDs blink once.

(d) TRIGGER SET

Press the TRIG key of the memory mode function key-switches ① , then its key-top LED lights and the hexadecimal data display LED ① darkens, indicating the selection of the Trigger set function.

At this time, the displays indicate the trigger data and conditions which have been set.

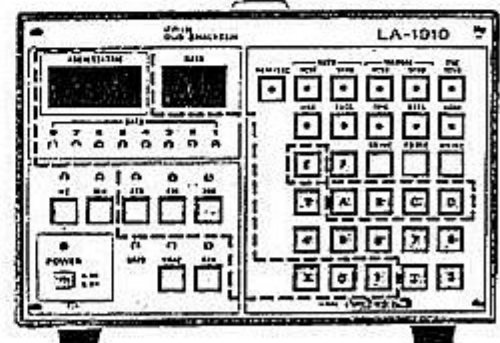These keys and display LEDs as shown in figure are active for the trigger function.

DIO1-DIO8, ATN, EOI, and SRQ indicate the trigger data.

<Key entry sequence>   <Indication>

Fig. 7

Keys and Indication for Trigger Set Function

Fig. 8

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★ Trigger Condition Set
1) The data set is regarded as the trigger start data.

[A]

ADDRESS/TRIG

dOA

Sampling condition ↑ ↑ Trigger condition

2) The data set is regarded as the trigger stop data.

[B]

ADDRESS/TRIG

dOb

↑ Trigger condition

3) Trigger data are cleared, so trigger condition becomes "don't care"

[C]

ADDRESS/TRIG

dOC

↑ Trigger condition

★ Sampling Condition Set
1) Only DAV serves as the sampling trigger signal.

[D]

ADDRESS/TRIG

dOC

↑ Sampling condition

2) DAV, NRFD, NDAC, IFC, REN, ATN, EOI, and SRQ serve as the sampling trigger signals.

[E]

ADDRESS/TRIG

EOC

↑ Sampling condition

Fig. 9

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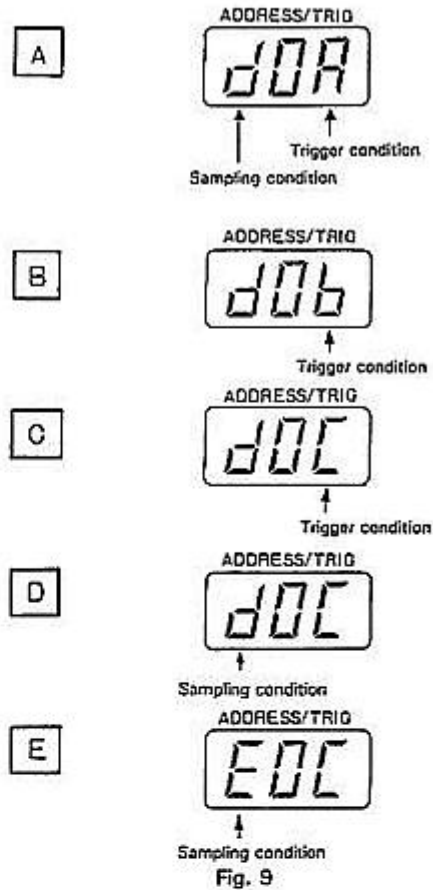
★ Trigger Data Set
Enter the data of DIO with keys [X][0] and [1]. Data display LED ③ D1 appears green, dark, and red respectively when [X][0] and [1] are pressed. The data entered shifts to left on every depression of any of the keys.

| 0 | 0 | ------- | 0 | 1 | 0 | 0 | 0 | 0 | X | X |

The last eight bits entered are effective.

Fig. 10

To set the data of ATN, EOI, and SRQ, the control signal display LED provides a help as it changes from dark to red to green cyclically on depression of any of the keys. After setting data as shown above, press the [WR INC] key. Then the address and data display LEDs blink once and the trigger data is set.
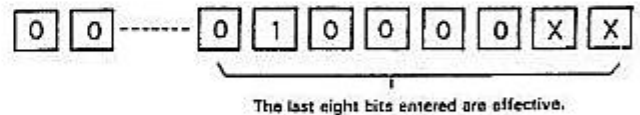
ATN EOI SRQ
 o   o   o

Out (dark) → Red → Green
(0)   (1)   (X)

Control signal key switches for Trigger Data Set.

Fig. 11

(e) MEMORY EXCHANGE
Press the [EXCG] key of the memory mode function keyswitches ⑪ , then its key-top LED lights (or, if is has been lit, goes out), indicating that the contents of the input and output memories are exchanged each other.
There are two ways to write data into the output memory: by exchanging the contents of the input and output memories using the [EXCG] key, or by writing data first into the input memory then exchanging the input and output memories' contents. Address remains unchanged after the exchange.

LED Display — Input Memory — GP-IB Bus Transceiver ⟺ GP-IB
Key enter — Output Memory
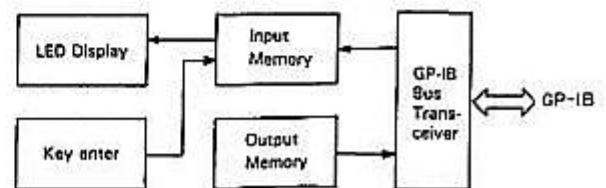
Memory Organization

Fig. 12

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(f) LIST MEMORY

Press the [LIST] key of the memory mode function key-switches ⑪ , then its key-top LED lights, indicating the selection of the List memory function.

If no printer is connected or the printer connected is off-line, error results with the address and data display LEDs blinking to indicate that the List memory function is not selected.

★ Partial List

It is possible to print out the contents of the input memory as much as 64 characters, starting from a desired address.

Set a desired memory address.

The contents of the memory as much as 64 characters will be printed out, starting from the address which has been set with the [WR INC] key. The displays then in-dicate the data which is currently being printed out and the address of the data.

<Key entry sequence>
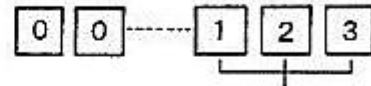
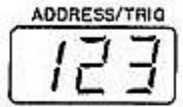The last three digits entered are effective.

<Indication>

Fig. 13

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★ List Memory All

All contents of the input memory (000 through 1FF) may be printed out.

As soon as the [X] key is pressed, the address display LED gets cleared to "000" and printing out the memory contents starts.

★ Print Format

• In listing below, "1" means that the signal is active.

<Key entry sequence>

<Indication>

Fig. 14

DATA MEMORY DUMP LIST

Adress   Data (in Binary)   ASCII code   ASCII character

ADR	DATA				IFC	REN	ATN	EOI	SRQ	N RFD	N DAC	DAV
0001	0101	0101	55	U	0	1	1	0	0	1	0	1
001	0011	1111	3F	?	0	1	1	0	0	1	0	1
002	0010	0011	23	#	0	1	1	0	0	1	0	1
003	0011	0001	31	1	0	1	0	0	0	1	0	1
004	0011	0000	30	0	0	1	0	0	0	1	0	1
005	0011	0000	30	0	0	1	0	0	0	1	0	1
006	0010	0000	20		0	1	0	0	0	1	0	1
007	0010	0000	20		0	1	0	0	0	1	0	1
008	0010	0000	20		0	1	0	0	0	1	0	1
009	0100	0001	41	A	0	1	0	0	0	1	0	1
00A	0100	0010	42	B	0	1	0	0	0	1	0	1
00B	0100	1111	4F	O	0	1	0	0	0	1	0	1
00C	0101	0010	52	R	0	1	0	0	0	1	0	1
00D	0101	0100	54	T	0	1	0	0	0	1	0	1
00E	0010	0000	20		0	1	0	0	0	1	0	1
00F	0011	0111	37	7	0	1	0	0	0	1	0	1
010	0000	1101	0D	.	0	1	0	0	0	1	0	1
011	0000	1010	0A	.	0	1	0	0	0	1	0	1
012	0101	0101	55	U	0	1	1	0	0	1	0	1

Table 1

(g) MEMORY READ

With the aid of the [RD INC] and [RD DEC] keys of the memory access key-switches ⑫ , the Address set or Data set function permits to refer to the contents of memory, starting from the location whose address is currently set.

★ Read Increment

Press the [RD INC] key, then address increments and the data of the address is displayed.

★ Read Decrement

Press the [RD DEC] key, then address decrements and the data of the address is displayed.

★ Repetition effect

If any of the [RD INC] and [RD DEC] keys is kept pressed, the effect of the pressed key will be repeated automatically. At this time, repetition speed rises after executing the effect four times.

AUTO RECEIVE MODE

(a) AUTO RECEIVE MODE SET

Press the [AUTO RCVE] key of the mode keys-switches ⑩ , then its key-top LED lights, indicating the selection of Auto receive mode.

The LA-1910 is now ready to received data from the GP-IB bus with the address display reading the address, which has been set in Memory mode, minus one (this is because, when reading data into the memory triggered by a sampling signal, address is incremented before data is written in the memory).

(b) OPERATION WITH TRIGGER START SET

If Trigger start is set, the LA-1910 does not read in data until the data becomes equal to the trigger data. As soon as such a data has come in, the LA-1910 starts to read in data, triggered by the designated sampling condition, and continues to put data into the input memory until location 1FFH is filled. Then the LA-1910 slips out of Auto receive mode and returns to Memory mode.

(c) OPERATION WITH TRIGGER STOP SET

If Trigger stop is set, the LA-1910 begins to read in data, triggered by a sampling signal as soon as Auto receive mode is entered, and it continues until a data which is identical with the trigger data comes in. The input memory is used cyclically (as if it made up a ring).

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Note that the last data which is read in is that which immediately precedes the data that is the same as the trigger data. After then, the LA-1910 returns to Memory mode.

(d) OPERATION WITH TRIGGERS CLEARED

If trigger conditions are cleared, the LA-1910 begins to read in data, triggered by a sampling signal, as soon as Auto receive mode is entered, and it continues unless escape operation is performed. The input memory is used cyclically.

(e) EXIT FROM AUTO RECEIVE MODE AND TRANSITION TO ANOTHER

Press the [MEM/ESC] key ⑩ to return to Memory mode. Direct transition to Manual receive mode is also possible.

AUTO SEND MODE

Press the [AUTO SEND] key of the mode keys-switch ⑩ , then its key-top LED lights, indicating the selection of Auto send mode.

In this mode, the LA-1910 sends out to the GP-IB bus the data held in that part of the output memory which is bounded by the start address set in Memory mode and the memory end (address 1FFH).

If no GP-IB bus connector is connected or both the NRFD and NDAC lines are at "H" level at this time, the address and data display LEDs blink to warn of error then Memory mode is entered.

Three-line handshake is performed automatically. The data display LEDs ① and ③, control signal display LEDs ④ and handshake signal display LEDs ⑥ indicates the status of the GP-IB bus.

EXIT FROM AUTO SEND MODE AND TRANSITION TO ANOTHER

Press the [MEM/ESC] key ⑩ to return to Memory mode. Direct transition to Trace send mode is also possible.

MANUAL RECEIVE MODE

Press the [MANU RCVE] key of the mode keys-switch ⑩ , then its key-top LED lights, indicating the selection of Manual receive mode.

The LA-1910 then turns NRFD and NDAC to "L" level and becomes ready to receive data.

One presses the [NDAC] key ⑧ next and the LA-1910 performs three-line handshake once and stores the data available at that time into the memory.

The sampling trigger signal in this mode is DAV only. The memory locations are used cyclically and the data display LEDs ① and ③, control signal display LEDs ④ and handshake signal display LEDs ⑥ indicates the status of

the GP-IB bus.

EXIT FROM MANUAL RECEIVE MODE AND TRANSI-
TION TO ANOTHER
Press the [MEM/ESC] key ⑩ to return to Memory mode.
Direct transition to Auto receive mode is also possible.

MANUAL SEND MODE
Press the [MANU SEND] key of the mode keys-switch
⑩ , then its key-top LED lights, indicating the selection
of Manual send mode.
The data display LED indicates the status of the GP-IB
bus. In this mode, data may be sent out to the GP-IB bus
directly through keys but not via the LA-1910's
memory.

(a) DATA SET
When DIO has been entered, the key-top LED of the
[DATA] key ⑪ lights, the data display LED indicates the
data (DIO), and, at the same time, it enters in the
memory of the LA-1910.
When you press the [WR INC] key ⑫ , the [DATA] key's
lamp extinguishes and the data display LED indicates
the status of the GP-IB bus. Now the data (DIO) is held
in the LA-1910 but not sent out to the GP-IB bus yet.
At this time, you may monitor the data (DIO) the
LA-1910 holds, by pressing the [DATA] key (its key-top
LED lights). The status of the GP-IB bus is not displayed.

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The last two digits
enterd are effective
and set.

Fig. 15

(b) CONTROL SIGNAL SET
★ [IFC]
A pulse (≥100 μsec) is sent out when the key has been
pressed.
★ [REN], [ATN], [EOI], [SRQ]
Every time when you press the key, the associated
signal alternates between active and non-active and go
out to the GP-IB bus.

(c) DATA OUT
Press the [DAV] key ⑧, and the LA-1910 performs
three-line handshake once and sends out data DIO
which is set. Note that, if both NRFD and NDAC are "H"
level, the address and data display LEDs blink to warn of
error and the LA-1910 returns to Memory mode.

(d) EXIT FROM MANUAL SEND MODE AND TRANSITION
TO ANOTHER
Press the [MEM/ESC] key ⑩ to return to Memory mode.
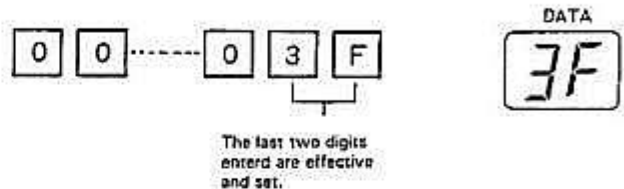No direct transition to another mode is possible from this
mode.

TRACE SEND MODE
Press the [TRC SEND] key of the mode keys-switches
⑩ , then its key-top LED lights, indicating the selection
of Trace send mode. The data display LEDs ① and ③,
control signal display LEDs ④ and handshake signal
LEDs ⑥ now indicate the status of the GP-IB bus.
Next, press the [DAV] key. The LA-1910 performs
three-line handshake once, sends the contents of the
output memory out to GP-IB bus, and increments ad-
dress.
Thus every time you press the [DAV] key, the LA-1910
performs the above procedure, sending out the data
held in the memory location which is currently pointed
to.
Note that, if both NRFD and NDAC are "H" level, the
address and data display LEDs blink to warn of error and
the LA-1910 returns to Memory mode.

EXIT FROM TRACE SEND MODE AND TRANSITION TO
ANOTHER
Press the [MEM/ESC] key to return to Memory mode.
Direct transition to Auto send mode is also possible.

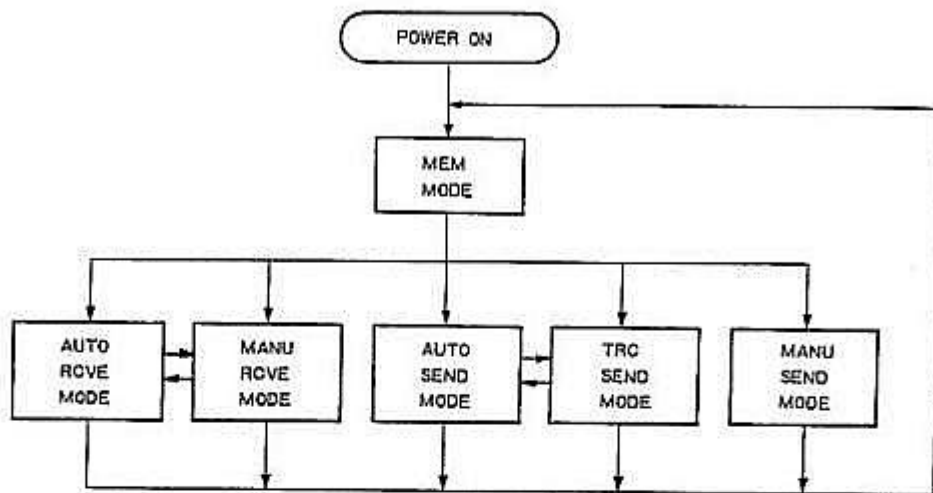## MODE TRANSITIONS

Figure 16 shows possible mode transitions.

Fig. 16 Mode Transition Diagram

SAMPLE OPERATIONS

RECEIVE MODE

Let us take a case that a controller sends characters to a GP-IB printer, and we monitor the signals transmitted using the LA-1910. Figure 17 shows the devices set up for this purpose.
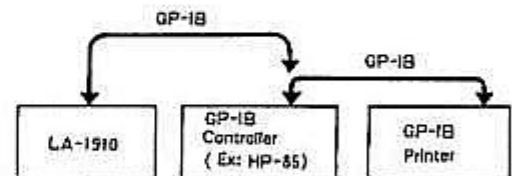

Fig. 17

AUTO RECEIVE OPERATION

(a) TRIGGERED START

1) Put the LA-1910 in Memory mode.

2) Select the Trigger set function.

3) Designate a sampling condition.

4) Select Trigger start for the trigger condition.

5) Enter a trigger data (8-1).

6) Designate the data of ATN EOI and SRQ

<Key entry sequence>

MEM/ESC

☐

TRIG

☐

☐ D or ☐ E

☐ A

☐ X ☐ 0 ☐ 1

ATN EOI SRQ
☐   ☐   ☐
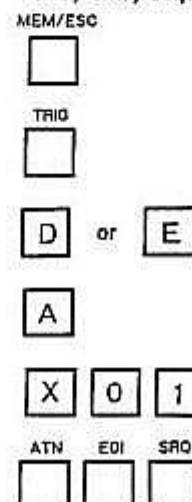
Fig. 18

7) When the entry of sampling and triggering conditions, a trigger data (8-1), [ATN] [EOI] and [SRQ] is completed, press [WR INC] to let the LA-1910 memorize all of the data.

WR INC

□

8) Select the Address set function.

ACOR

□

(Ex. To designate address "000".)

| 0 | | 0 | | 0 |

9) Designate the start address of the memory area where data are to be stored.

10) Now the LA-1910 is completely ready to start Auto receive operation of triggered starts, and you press the [AUTO RCVE] key.
The LA-1910 waits for the first data that is the same as the trigger start data designated. As soon as such a data comes in, it takes the data into its memory. After then, it continues to take in bus data according to the sampling condition until the last location (address 1FFH) of the input memory is filled. Then the LA-1910 returns to Memory mode.

AUTO
RCVE

□

11) In this mode, the LA-1910 accepts no key operations other than unconditional exit from Auto receive mode.

MEM/ESO

□
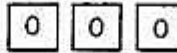
Fig. 19

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(b) TRIGGERED STOP
The only difference from the triggered start operation is that Trigger stop should be selected in step (4) above.

| 8 |

Fig. 20

(c) WITH NO TRIGGER CONDITIONS
The only difference from the triggered start operation is that Trigger clear should be selected in step 4) of (a).

| C |

Fig. 21

MANUAL RECEIVE OPERATION
1) Put the LA-1910 in Memory mode.

MEM/ESC

□

2) Select the Address set function.

ADDR

□

(Ex. To designate address "000".

| 0 | | 0 | | 0 |

3) Designate the start address of the memory area where data are to be stored.

4) Select Manual receive mode.

MANUAL
RCVE

□

5) Every time you press the [NDAC] key, the LA-1910 performs three-line handshake and takes the current data into its memory.
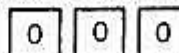
NDAC

□

Fig. 22

SEND MODE

Let us consider an example that the LA-1910 sends characters to a GP-IB printer. Figure 23 shows the devices set up for this purpose.
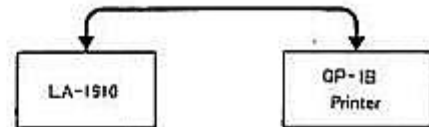

Fig. 23

AUTO SEND OPERATION

1) Put the LA-1910 in Memory mode.

2) Exchange the contents of the input and output memories each other.

3) Select the Address set function.

4) Designate the start address of the memory area into where data are to be written.

5) Select the Data set function.

6) Set data 8-1, IFC, REN, ATN, EOI, and SRQ.

<Key entry sequence>

MEM/ESC

EXCG

ADDR

(Ex. To designate address "000".)

| 0 | 0 | 0 |

DATA

| 0 | ~ | F |

IFC   REN   ATN   EOI   SRQ

Fig. 24

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7) Place the above data into the output memory.

8) Repeat the above two steps to write data, which are to be sent out, into the memory locations.

9) When data have been written in the memory, exchange the contents of the input and output memories again.

10) Select the Address set function.

11) Designate the start address of the memory area from where data are to be taken out.

12) Select Auto send mode.
The LA-1910 then performs three-line handshake and sends out the contents of the output memory one after another, starting from the data held in the location of the designated start address, until the memory end (address 1FFH) is reaches. When the data of the last location has been sent out, the LA-1910 returns to Memory mode. At this time, the LA-1910 accepts no key operations other than unconditional exit from Auto send mode. Use the MEM/ESC key to exit from the mode.

<Key entry sequence>

WR INC

EXCG

ADDR

(Ex. To designate address "000".)

| 0 | 0 | 0 |

AUTO SEND

MEM/ESC

Fig. 25

TRACE SEND OPERATION

Perform steps 1 throught 11 of Section of Auto send operation.

1) Select Trace send mode.

2) Every time you press the [DAV] key, the LA-1910 performs three-line handshake and sends out data, byte by byte.

3) Press the [MEM/ESC] key to exit from Trace send mode.

MANUAL SEND OPERATION

1) Put the LA-1910 in Manual send mode.

2) With the [IFC] key, a pulse is generated as the key gets pressed.

3) With [REN], [ATN], [EOI], and [SRQ] the state of the bus alternates every time as any of the keys gets pressed.

<Key entry sequence>

TRC
SEND
[   ]

DAV
[   ]

MEM/ESC
[   ]

Fig. 26

MANUAL
SEND
[   ]

IFC
[   ]

REN   ATN   EOI   SRQ
[   ]   [   ]   [   ]   [   ]

Fig. 27

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4) Set a data.

5) You may press the [DATA] key to check the data just entered.

6) You may press the [WR INC] key to see the data put on the GP-IB bus.

7) Press the [DAV] key, and the data entered goes out to the GP-IB bus.

Some of the above steps may be performed if necessary.

(Ex. To set "3FH".)

[3] [F]

DATA
[   ]

WR INC
[   ]

DAV
[   ]

Fig. 28

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MAINTENANCE

REMOVAL OF CASE

Remove two screws on the top cover, four screws on the bottom cover, and four screws on the side. Then take the upper and lower covers away upward and downward separately.

POWER SUPPLY CONVERSION

If the LA-1910 is to be adapted to a supply voltage of 90 — 129 V, remove the bottom cover, reconnect the connector connecting to P4 of the CPU board, and replace fuse F1 (0.7 A) with one of 1 A.

CAUTION:
Before adapting the LA-1910 to a certain supply voltage, be sure to unplug the power cord from the AC outlet.

Fig. 29

Fig. 30

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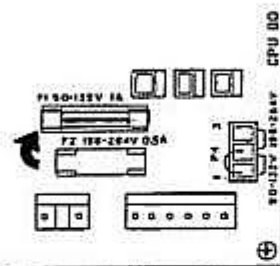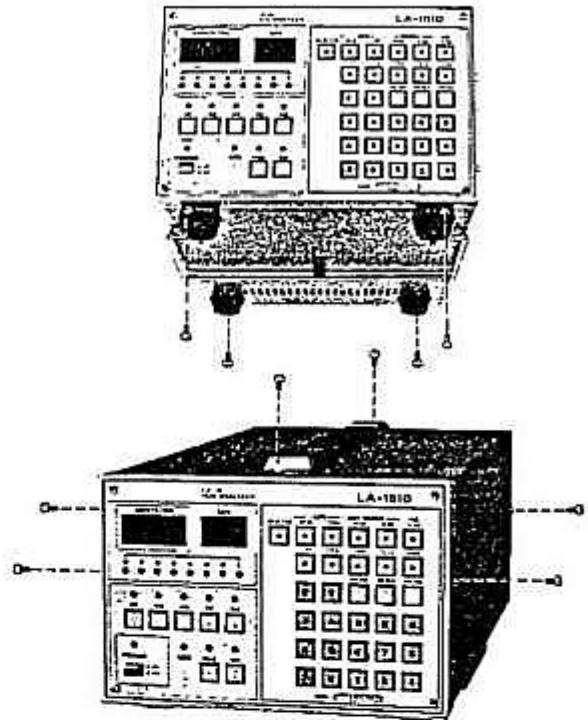
MULTI LINE INTERFACE MESSAGE

Note
① MSG is an interface message.
② b1 = DIO1...b7 = DIO7 DIO8 are not used.
③ Accompanies the secondary command.

GTL........Go to Local
SDC ....Select Device Clear
PPC........Parallel Poll Configure
GET........Group Execute Trigger
TCT........Take Control
LLO ....Local Lockout
DCL........Device Clear
PPU........Parallel Poll Unconfigure
SPE ....Serial Poll Enable
SPD........Serial Poll Disable
UNL........Unlisten
UNT ....Untalk

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