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**SOFTWARE DEVELOPMENT CENTER
ENGINEERING DEPT.**

HOME AV NETWORK BUSINESS UNIT

JVC

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1. Physical layer

1.1. Electrical connections

1.1.1. Control output format

Open-collector driver output, and pulled up with the power supply of the controlled machine.

Maximum applied voltage : + 15.0 V
Pull-up resistance : 4.7kohm \pm 10 %

1.1.2. Logic levels

High: 1
Low : 0 Maximum Low level output voltage: + 0.4 V (at 3 mA load current)

1.1.3. Data format

8 bit serial, LSB first, 1 start bit, 1 stop bit, odd parity, start bit is Low, stop bit is High, and High when not transmitting

1.1.4. Transmission format

Master-slave type by start-stop asynchronous transmission using three lines of transmit (Tx), receive (Rx) and ground (GND)

1.1.5. Transmission rate

Initialized : 9600 bps
Depended on application : 19200 bps

1.1.6. Branch connection

For the branch connection of multi-control, a Junction Box type1 (J-box type1), a Junction Box type2 (J-box type2) or an equipment is required having an internal branching circuit and the connector specified in Fig.1-1 and Fig.1-2 (or equivalent circuit). Each equipment is able to include the branching circuits.

An example of the connection is specified in Fig.1-3.

1.1.7. Identification (ID) number

A means of both changing and storing a specific ID number for each slave machine must be provided. The ID number must be kept even if the power supply is not distributed.

1.1.8. Length of network

The total length of cables of connecting between equipment must be less than 50 meters.

1.2. Connector of equipment

1.2.1 A jack for 4-pole miniature concentric plug

A jack compatible with a 3.5 mm dia. 4-pole miniature concentric plug is used for the external control connection of each equipment.

The pole assignment is specified in Fig.1-4-1.

1.2.2 A jack for 3-pole miniature concentric plug

A jack compatible with a standard 3.5 mm dia. 3-pole miniature concentric plug is used for the external control connection of each equipment basically.

The pole assignment is specified in Fig.1-4-2.

1.2.3 A jack for 6-pole miniature circular plug

A jack compatible with 6-pole miniature circular plug is used for the connection between J-boxes or J-box and equipment.

The pole assignment is specified in Fig.1-6.

1.3. Cables

1.3.1. A cross-cable with 4-pole miniature concentric plugs (compatible with EIAJ RC-5325)

The cable for connecting equipment is designed specified in Fig.1-5-1. The cable length is less than 2.0 meters. The ground lead is 2 conductor shielded wire. Electrostatic capacity between conductor and shield per unit length must be less than 150 pF/m (20°C, 1 kHz).

1.3.2. A cross-cable with a standard 3-pole miniature concentric plugs

The cable for connecting equipment is designed specified in Fig.1-5-2. The cable length is less than 2.0 meters. The ground lead is 2 conductor shielded wire. Electrostatic capacity between conductor and shield per unit length must be less than 150 pF/m (20°C, 1 kHz).

1.3.3. A cross-cable with 6-pole miniature circular plugs at each end

The cable for connecting mainly between junction boxes is designed specified in Fig.1-6. The cable length is less than 5.0 meters. The cable (J-box's) has 4-conductor shielded wire having thickness more than AWG 28, and it's case shield is connected to the shield wire. Electrostatic capacity between conductor and shield per unit length must be less than 150 pF/m (20°C, 1 kHz).

1.3.4. A cross-cable for connecting between PC and J-box type1

A cable provided at the one end with a plug for connecting to the serial communication terminal (e.g., RS-232C) of some personal computer, and at the other end with a plug for connecting to the jack for PC of J-box type1.

A cross cable for connecting a common type of personal computer or other device with J-box type1. Use the adaptive cable with the serial communication terminal specifications of the computer or other device. The typical cables are designed as specified in Fig.1-7.

1.4. Junction box (J-box)

For using as the connection between machines. There are two types of Junction box(J-box). The type1 is provided a connector for a serial communication terminal such as RS-232C, a DC power supply circuit and the branching circuit, and type2 is provided the branching circuit only.

These two type of J-box circuit can be included in JLIP equipment.

1.4.1. Junction box type1 (J-box type1)

J-box type1 must be designed as specified in Fig.1-1.

- 1) DC output

Maximum output voltage	12.0 V
	10 mA load, including maximum ripple voltage
Minimum output voltage	7.2 V
	300 mA load, including minimum ripple voltage
Current capacity	Capable of supplying at least 300 mA
- 2) Level converter

The operation must be proved when connected to a communication terminal such as RS-232C.
- 3) Number of connected devices

50 devices can be connected for the power supply of Junction box type1. The power supply for a network can be distributed only from Junction box type1.

1.4.2. Junction box type2 (J-box type 2)

J-box type2 must be designed as specified in Fig. 1-2.

1.5. Facility

The facility must have the circuit specified in Fig. 1-8.

1.5.1. Master machine

A master machine means the equipment of producing commands. It must be only one device in all connection. It is not always fixed.

1.5.2. Slave machine

A slave machine means the equipment internally controlled according to commands from the master machine or returned the response data.

2. Data link layer

The data link layer serves the message flow between master and slave machines in the network and gives data blocks to the application layer.

2.1. Frame format

The command and return data sequence is called a frame. The frame consists of 11 bytes specified below.

1st	2nd	3rd	4th	10th	11th
Header		ID	Data to upper layer		FCC

1) Header

It consists of 2 bytes for frame synchronization. The frame header sent from the master machine is called a command header, and the frame header sent from the slave machine is called a return header.

The command header bytes are fixed as follows.

- 1st: FFh
- 2nd: FFh

The return header bytes are fixed as follows.

- 1st: FCh
- 2nd: FFh

2) ID number

ID number is composed of 7 bits.

In command frame

- 1 to 99 : ID number of the slave machine
- 100 to 107: Group command ID
- 127: Broadcast command

In return frame

- 1 to 99 : ID number of the frame machine

A group command for multiple control of slave machines.

A broadcast command for controlling all slave machines.

3) Data to upper layer

The data block of 7bytes are given to application layer. Refer to Section 3.

4) FCC

8-bit frame error check code used for detecting transmission error. It's made of 2's complement of the sum of the 10 bytes through the 1st byte to the 10th byte, and its bit7 is always 0.

The bit7 of each byte through the 3rd to the 11th is always 0.

2.2. Communication processing

The communication format consists of returning data from the designated slave machine in response to the command from the master machine. The slave machine must not transmit any data except responding the command frame of the master machine. Moreover, any return data must not be transmitted to the group or broadcast command.

2.2.1. Master machine

The master machine must finish transmitting the command frame within 20 ms. The master machine must not transmit a command frame for 80 ms have elapsed from the starting timing of the previous broadcast or group command frame output. If the return frame of all 11 bytes are not received for the limited time or the error is detected, a command frame must not be transmitted until 80 ms have elapsed from the starting timing of the previous command frame output. When the

return frame has been properly received, a new command frame is enabled to transmit at 1 ms has elapsed after the end timing of receiving.

2.2.2. Slave machine

The slave machine must start transmitting the return frame at 0.5 ms after the end of receiving timing of the command frame from the master machine. The transmission must be completed within 55 ms from the end of receiving timing of the command frame from the master machine. The return frame must not be transmitted when a broadcast or group command has been received. The data receive standby state must not be inhibited until 55 ms has elapsed after the start of receiving a broadcast or group command. And, the data receive enable state must also be maintained for 60 ms after the start of receiving timing of a broadcast or group command frame. If an error is detected, the data receive standby state must not be inhibited until 55 ms has elapsed after the error detection. After 60 ms has elapsed, the data receive standby state must be maintained. Before turning to the data receive standby state, the data must be flushed in the receive buffer.

2.3. ID number setting

The ID number of each machine must not be set a same one within the system.

3. Application layer

The data through the 4th byte to the 10th of the frame is used in the application layer.

3.1. Command data format

The command data format is specified below.

data	4th	5th	6th	7th	8th	9th	10th
contents	cmd table	command	Parameter #1	Parameter #2	parameter #3	parameter #4	parameter #5

Commands consist of the following three parts.

- 1) Command table selector (cmd table) : The data composed of 1 byte for selecting the command table for each function command.
- 2) Command : The data composed of 1 byte for the kind of the control.
- 3) Parameter : The data composed of 1 byte or up to 5 additional bytes for the control in detail.

3.2. Return data format

The return data format is specified below.

data	4th	5th	6th	7th	8th	9th	10th
contents	cmd status	parameter #1	parameter #2	parameter #3	parameter #4	parameter #5	parameter #6

The return data consist of the following two parts.

- 1) Command (cmd) status:
Common to replies to all commands. Composed of 1 byte for whether the command has been recognized or not.
- 2) Parameter:
Composed of 6 bytes data of the requested contents of each command.

3.3. Command status

When a command has been correctly received from the master machine, the slave machine must transmit the command processing status to the master machine. The contents are as follows.

3.3.1. Command status format

The 4th byte of the return data is specified as follows.

- D7 : 0
- D6 : Command being processed (in processing: 1, not in processing: 0)
- D5-D3 : Command managing number
 - No.0 : Not managed
 - No.1 - No.6 : Managing number 1 – 6
 - No.7 : (Reserved)
- D2-D0 : Command status code (5 types: 001, 010, 011, 100 and 101)

3.3.2. Command managing number

The number is provided for identifying a command in progress or completed in case that the command processing is temporally overlapped at one slave machine. When a slave machine accepts a command and determines that is not instantly finished to process required to process the

command, D6 is set to 1 and returned with the command managing number properly. When the processes being managed reach 6, a new command requiring management is recognized, 'Not managed' is returned. Once assigned, a managing number is released only when status complete is returned in response to the status request command from the master machine. The slave machine without capability of command managing number control returns 'Not managed' to all commands.

3.3.3. Command status code

There are 5 codes of 3 bits of Command status are defined as follow.

If an equipment received some command, it should return one of these code in the return data frame.

(1) 001 : Command is not supported.

Unsupported command, parameter, etc.

(2) 010 : Command that is recognized at the machine has no information of the return data or cannot notify the completion of the command.

At that the machine is unable to return data in response to a control command calling for return data.

At that the machine is unable to inform execution status or completion of a control command. (Example: at return frame of command of Infrared remote controlled equipment.)

(3) 011 : Command execution has completed or now be already in the executed state

Command has been recognized, and processing is completed.

Current state is as same as the result one that the command executed.

Execution completed until next command is received perfectly.

Command processing finished forcedly for some reason.

A return data is transmittable to the normal data request command.

A response as when an already completed command is received again. This status is also returned when the processing will be completed within 100 ms.

(4) 100 : Command recognized, the process still continued or not yet completed.

(5) 101 : Command is not in condition that is able to be processed and also not in the state that command executed.

Command that is unable to execute.

A command process presently in execution, so the new command cannot be accepted.

Not in conditions to enable execution.

Process is busy, so it cannot be executed.

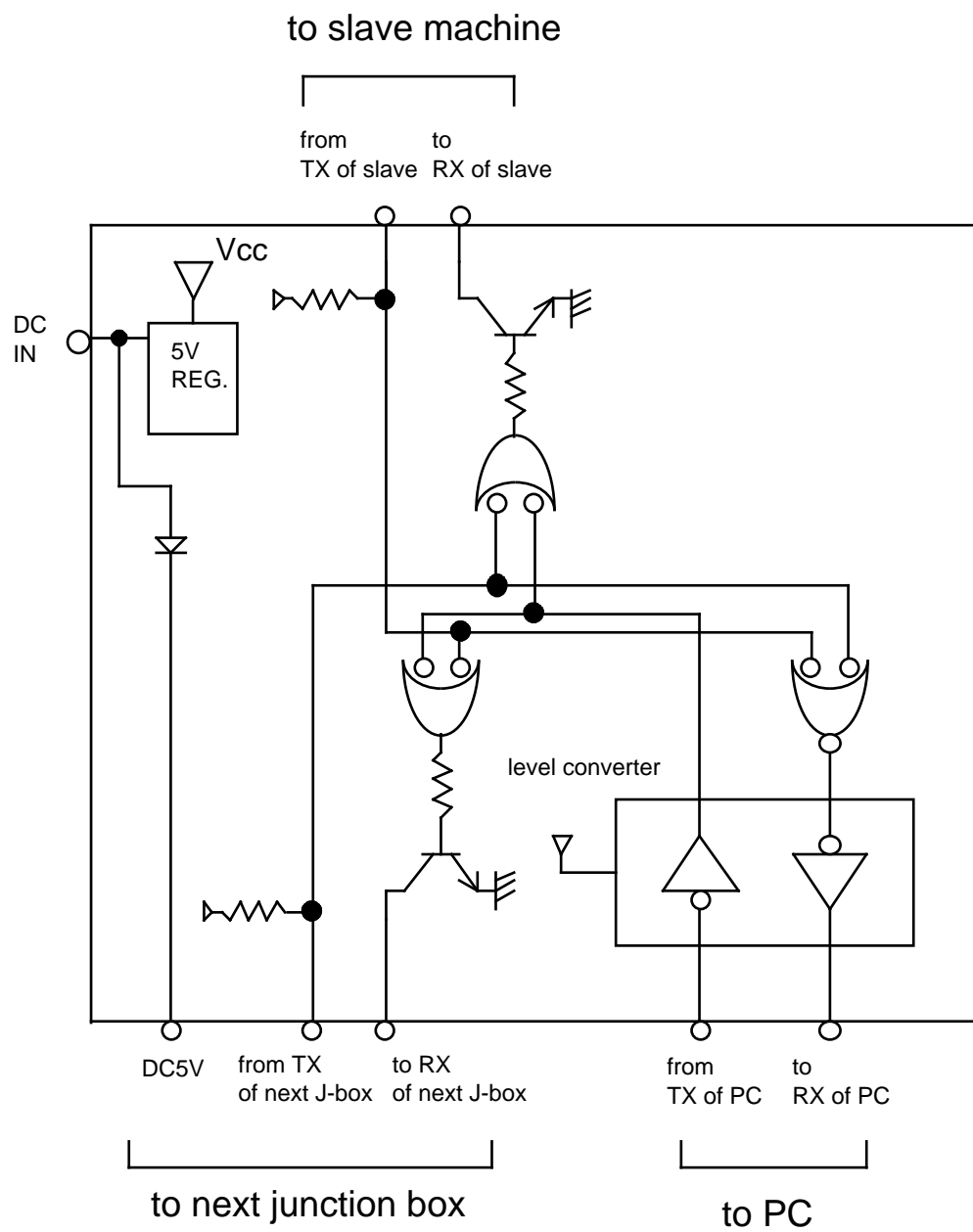


Fig. 1-1. Junction Box(J-box) type 1

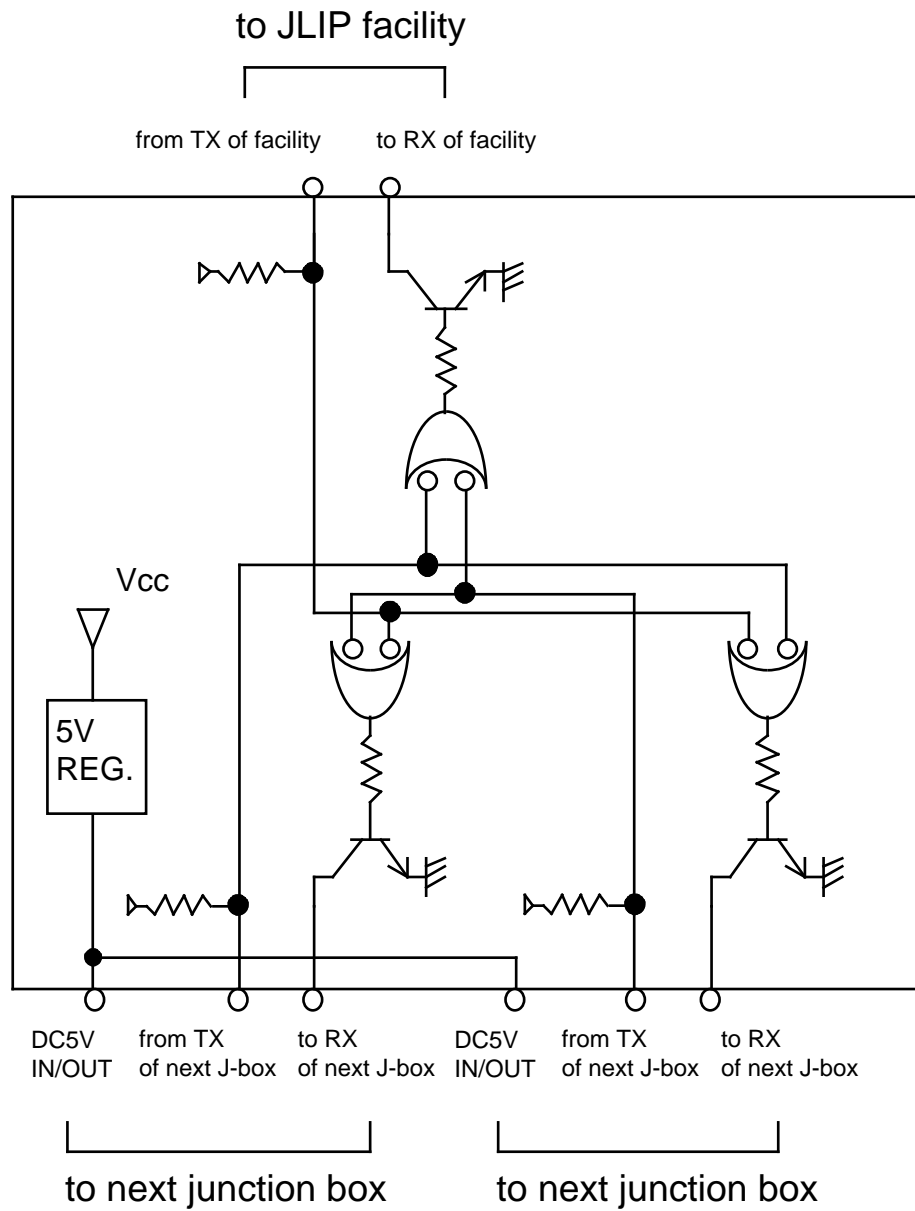


Fig. 1-2. Junction Box(J-box) type 2

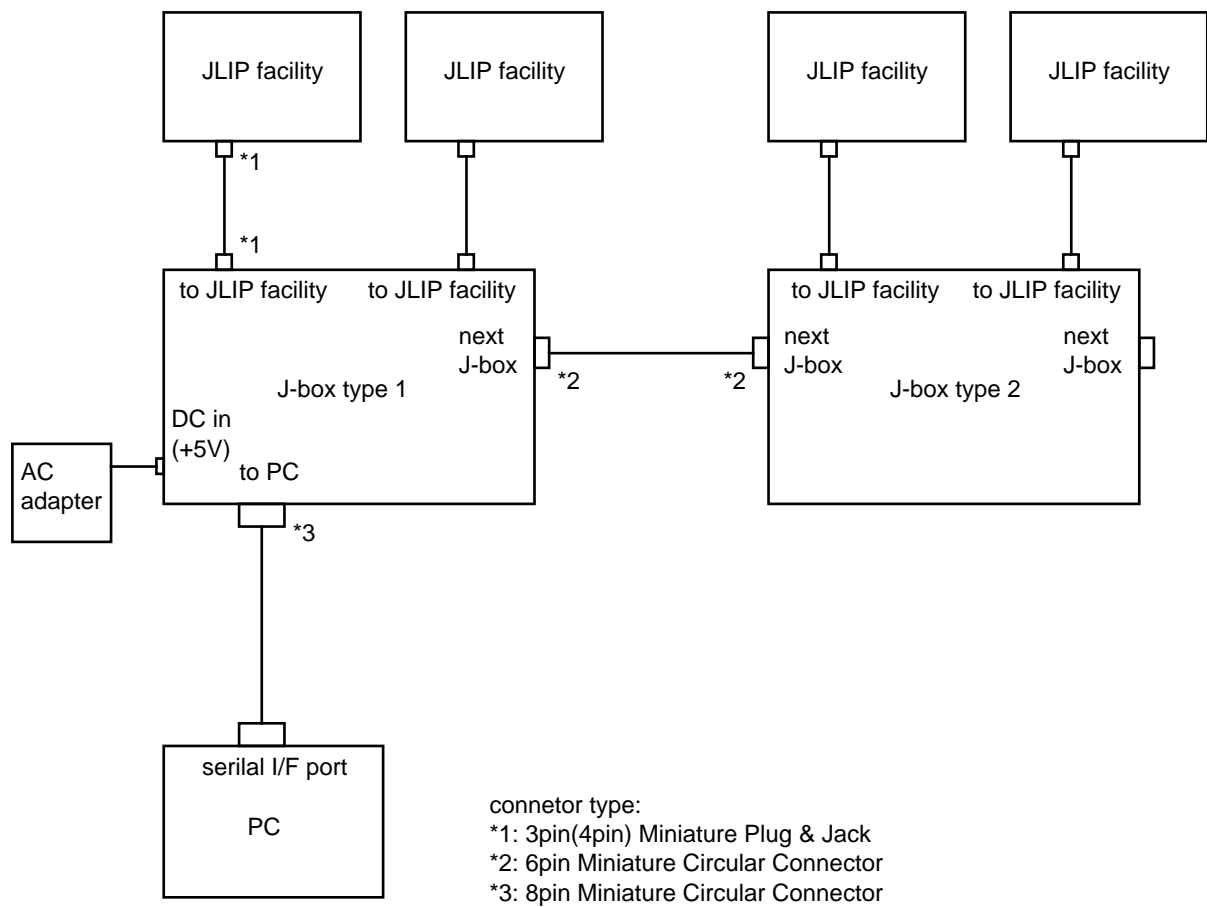


Fig.1-3. JLIP connection of PC and extension with J-box

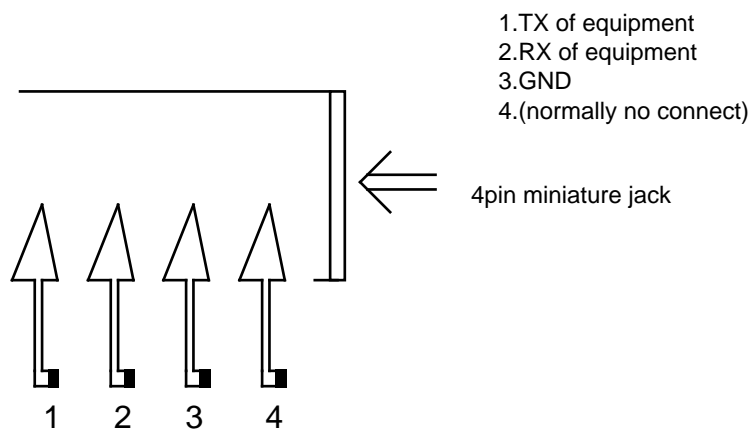


Fig. 1-4-1. 4 pin miniature connector of equipment(jack)

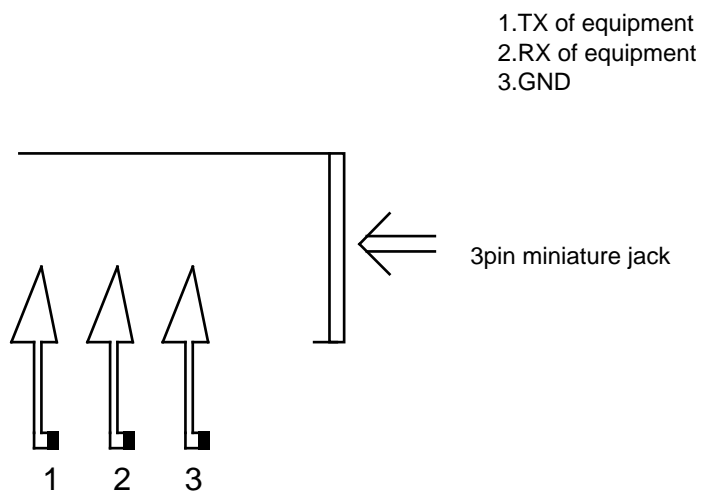


Fig. 1-4-2. 3 pin miniature connector of equipment(jack)

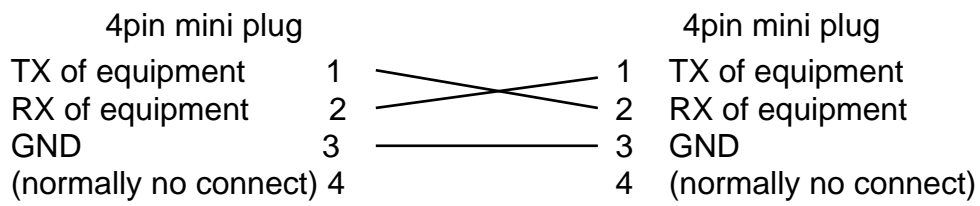


Fig.1-5-1. 4pin miniature plug cable connection

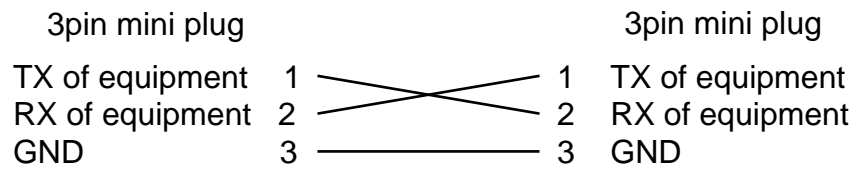
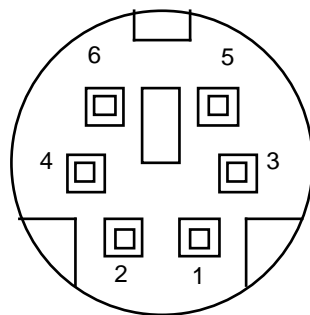


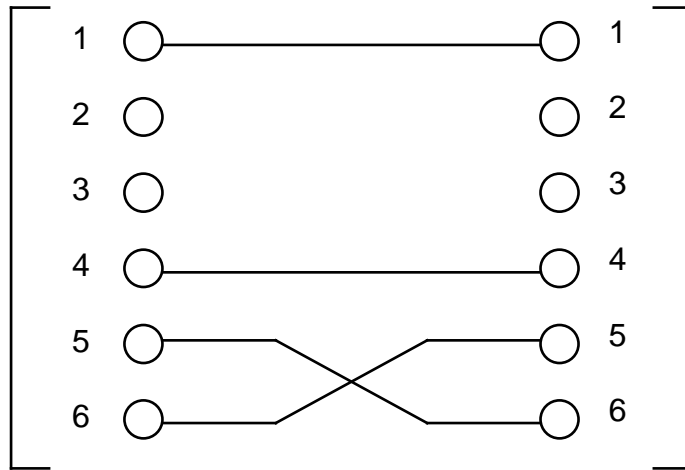
Fig.1-5-2. 3pin miniature plug cable connection



6pin miniature circular connector(jack)

- 1.DC5V
- 2.NC(reserved)
- 3.NC(reserved)
- 4.GND
- 5.TX of J-box
- 6.RX of J-box
- case shield : GND

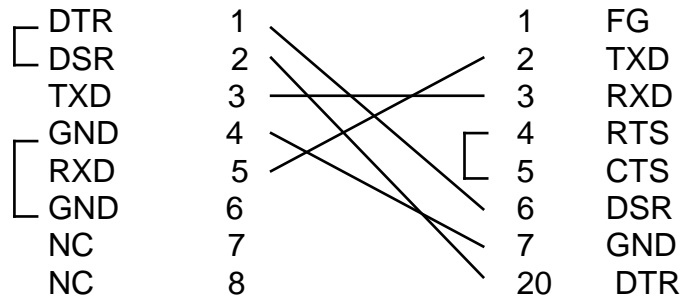
J-box connector(jack)



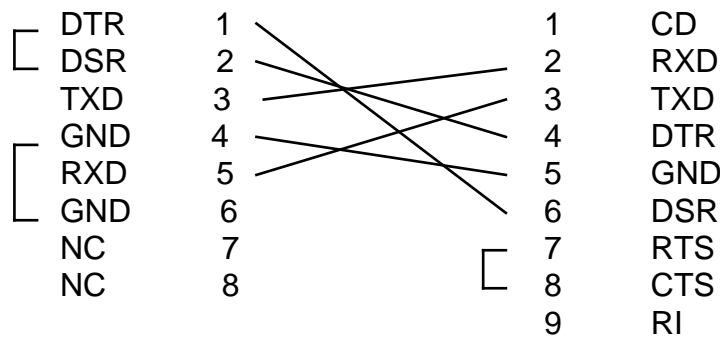
J-box extension cable connection

Fig. 1-6. J-box extension connector & cable

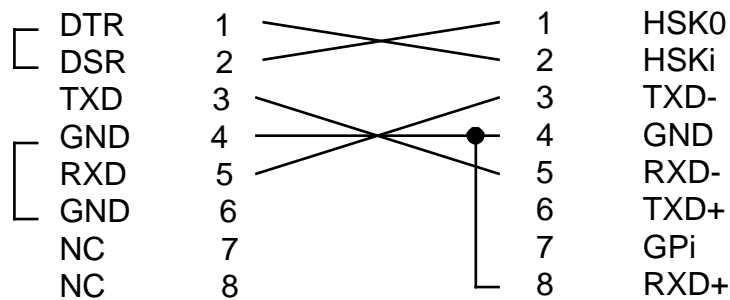
8 pin miniature circular connector ----- D-sub 25 (standard RS232)



8 pin miniature circular connector ----- D-sub 9 (PC compatible)



8 pin miniature circular connector ----- 8 pin miniture circular connector(Macintosh)



J-box cable connection PC

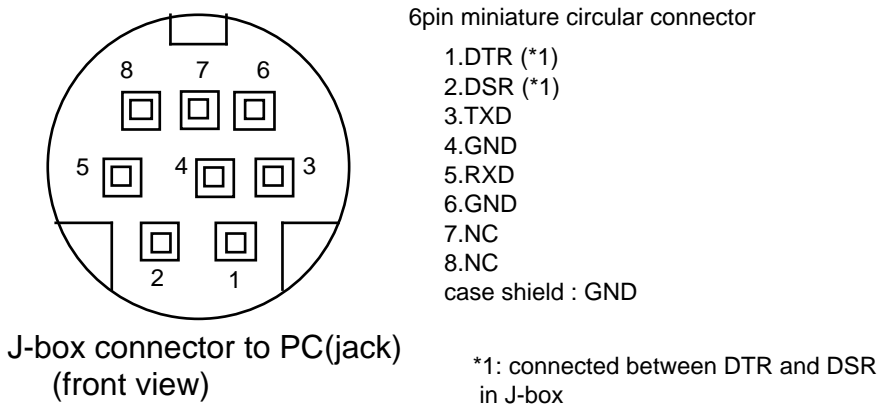


Fig. 1-7. Connections of J-box to PC

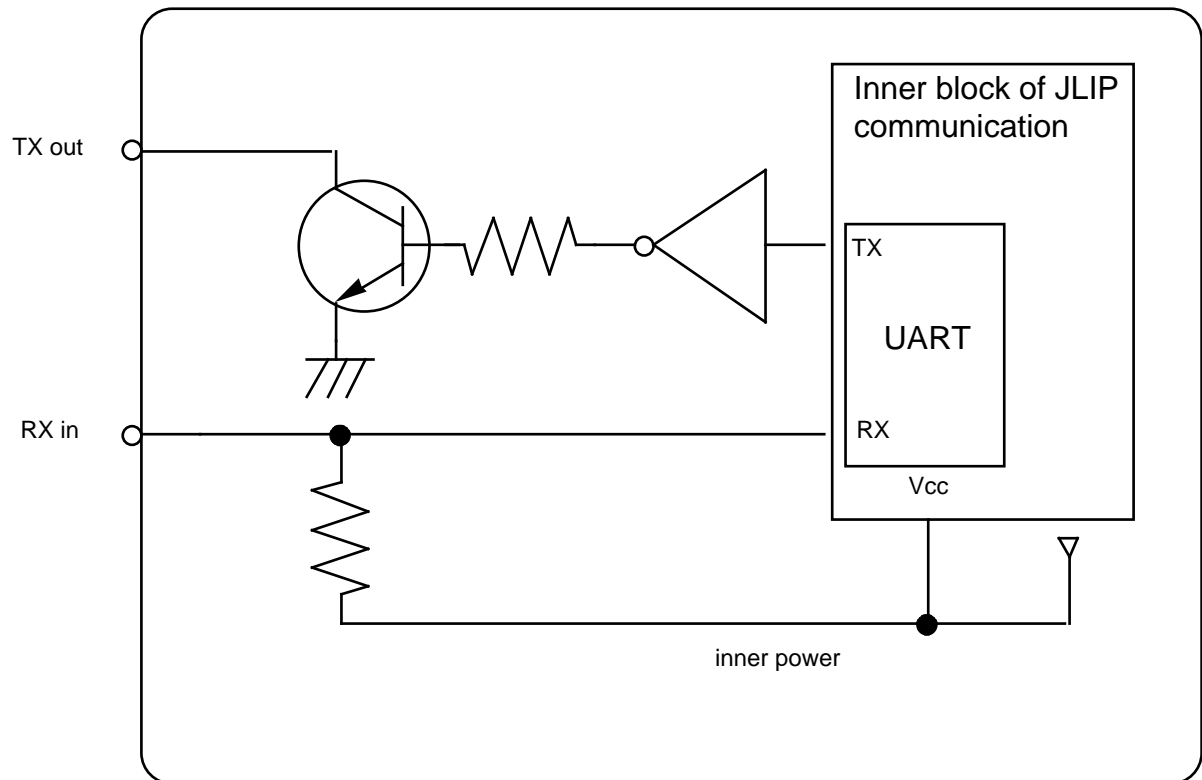


Fig. 1-8. A communication circuit of JLIP facility