



EXES-6000 EX-610/620/630

For \_\_\_\_\_

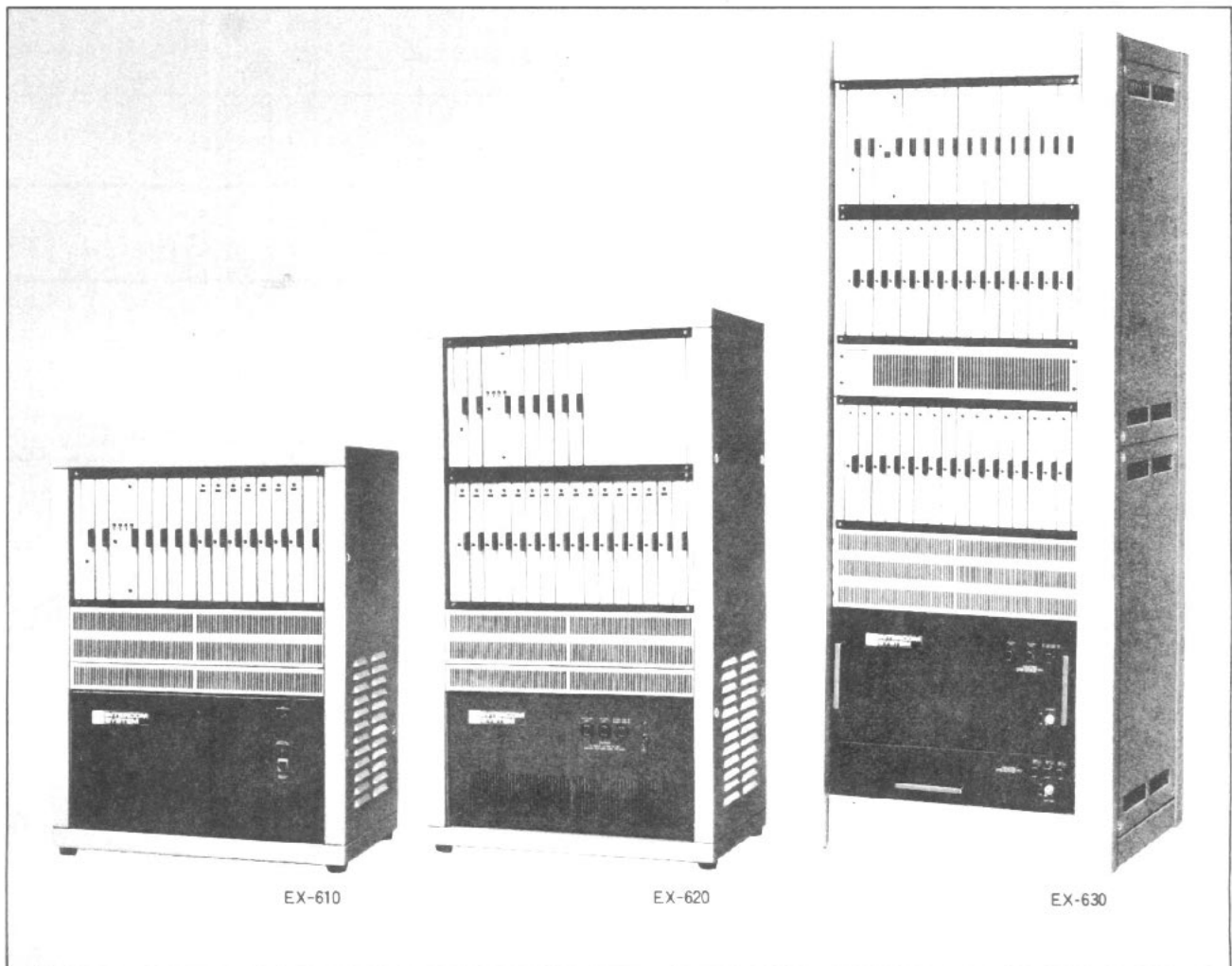
INTERCOM SYSTEM

# EXES-6000 INTERCOM SYSTEM

Fully Electronic Exchange

**EX-610/620/630**

## INSTALLATION HAND BOOK



**WARNING:** (For U.S.A. only)

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection such interference when operated in a commercial environment.

Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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## INTRODUCTION TO THE INSTALLATION MANUAL FOR EXES-6000

This manual forms part of the Installation Manual for INTERCOM SYSTEM EXES-6000.

The EXES-6000 permits various functions besides normal speech by programming or connecting optional equipment according to your specific needs. Correct operation of these additional functions is **not performed by simply connecting the additional equipments/devices**. Provision of such additional function requires the following:

- (1) Connection of the additional equipment, as required.
- (2) Selection of functions which satisfy your needs and setting up these functions in the respective equipment.

This "Installation Handbook of Exchanges EX-610/620/630 for EXES-6000 System" contains technical instructions as to connection of exchange, etc, mentioned in the above Paragraph (1). In addition to this, the proper installation of the system necessitates the other installation manuals dealing with the selection of the function and its programming referred to in the above Paragraph (2).

# PART1. OUTLINES OF EXES-6000 SYSTEM AND RELATED EQUIPMENT

## 1. Description and Features

### 1-1 System

Since the EXES-6000 System is a fully electronic intercom system, it has the following features that surpass conventional mechanical systems.

1. All components of the exchange are designed according to the modular concept. This results in a sizable reduction in the number of procedures required to install the system.
2. The exchange and terminal boards (BX-610/620) are designed as separate units, allowing independent inspection of the wiring and the exchange.
3. The wiring for each station is a non-polar 2-wire system which uses a minimum number of connecting to ease wiring.

### 1-2 Exchanges EX-610 (64 stations)/EX-620 (128 stations)/EX-630 (256 stations)

The features of the exchange of the Toa EXES-6000 Intercom System are as follows:

1. All exchange are of modular constructions. This results in a great increase in ease and speed of system installation.
2. Extensive incorporation of ICs makes each exchange efficient and space-saving as well as allows quieter operation than conventional intercom system.

### 1-3 Stations

The stations of the Toa Intercom EXES-6000 have the following features:

1. Each station is provided with a 2-Pin plug (YC-602) for easy connection to cables.
2. Wiring from the exchange to each station is the non-polar 2-wire system. The fact that only 2 wires are necessary makes installation easier, and with a 2-Pin jack (YC-601 or YC-603) at the end of each cable, connection can be quickly made with a screw-driver.
3. There are eleven types of stations available for selection: desk-top type, flush-mount type and desk/surface-mount type, etc.

### 1-4 Terminal Boards (BX-610/620)

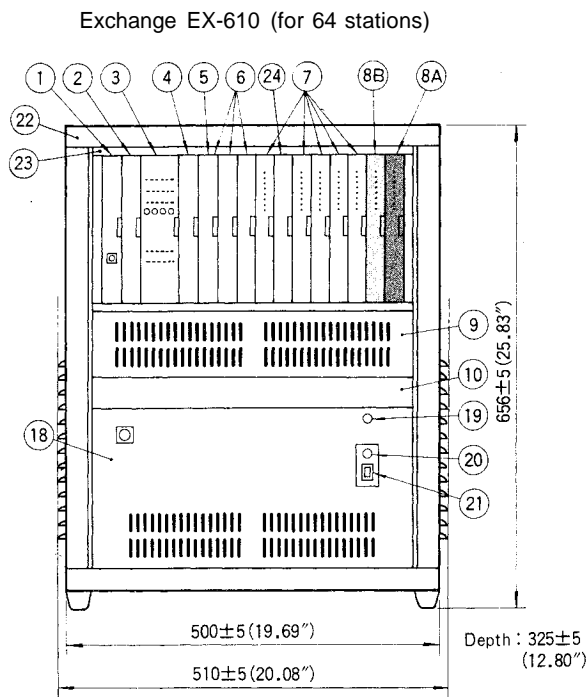
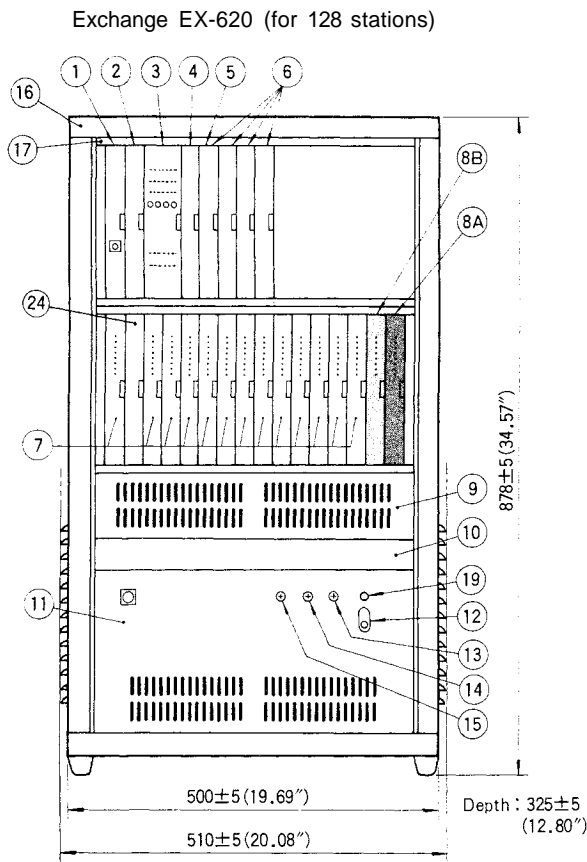
The terminal boards BX-610/620 connect the line between the exchange and the station. Compact and easy to connect, this terminal board saves space and ensures simple disconnection of any station line from the exchange when inspection is necessary. One terminal board BX-610 or BX-620 can connect a maximum of 64 stations (EX-610) or 128 stations (EX-620) to the exchange all-call plus 15 paging zones and 8 tie-line links. The exchange and the terminal board are connected by junction cable YR-810 (2-wire) for stations and YR-801 (4-wire) for paging and tie-line links. To connect the station line to the terminal board, clip terminals are provided which allow ensure simple connection without soldering. For future system expansion or modification, the collective terminal board to be described later on. (See page 12) This terminal is part of the exchange.

### 1-5 Junction Cables (YR-810/801)

The YR-810 or YR-801 junction cable connects the exchange to the terminal board BX-610 or BX-620. A single line of this junction cable is capable of connecting the exchange to 8 stations (YR-810) or to 8 paging zones (YR-801) or to 8 tie-line links (YR-801) through the terminal board BX-610 or BX-620. Both cable ends are equipped with multi-pole connectors which can easily plugged into the exchange or the terminal board BX-610 or 620. Refer to the drawing which appears in the Cable Installation and Connection section of this manual for the right direction and order of cable connections.

## 2. Example of Exchange Mounted on Intercom Cabinet Rack

(Including All-Call Paging and 15 Individual Zone Paging units and one Data Transmitting unit)

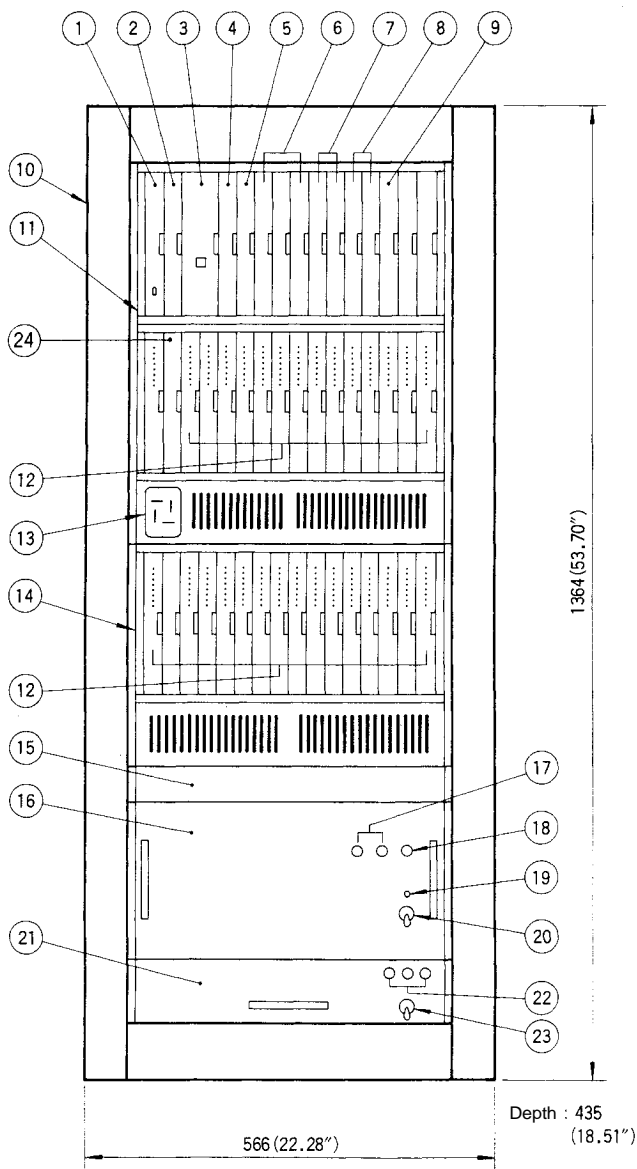


- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>① Central Processing Unit CP-66.</li> <li>② Output Control Unit OC-62</li> <li>③ Highway Control Unit HC-62</li> <li>④ Signal Generating and Distributing Unit SG-62</li> <li>⑤ Conference Link Unit CL-62A (In this location, DL-62A is also mountable.)</li> <li>⑥ Duplex Link Unit DL-62A (CL-62A may be inserted into these positions instead of DL-62A.)</li> <li>⑦ Line Modem Unit LM-62B (LM-65, Line Modem Unit with BGM function, may be inserted into these positions instead of LM-62B).</li> <li>⑧B Paging Interface Unit PI-62 (Type 2) (In this location, LM-62B or Tie-line unit TI-62 is also mountable.) (Zone 8~15 without All-Call Paging)</li> <li>⑧A Paging Interface Unit PI-62 (Type 1) (In this location, LM-62B is also mountable.) (Zone 1~7 with All-Call Paging)</li> <li>⑨ Perforated Panel PF-023A*</li> <li>⑩ Data Transmitting Unit DT-E60 (In the standard system, Perforated Panel PF-013A should come in this position.)* Junction Cable YR-806 (Cable length: 1000mm) (YR-802 Cable length: 400mm) is not available.)</li> </ul> | <ul style="list-style-type: none"> <li>⑪ Power Supply Unit DS-620</li> <li>⑫ Power Switch</li> <li>⑬ AC Fuse 3A(110V/120V), 1.5A(220V/240V)</li> <li>⑭ DC Fuse 20A(for use of 65 ~ 128 stations)</li> <li>⑮ Battery Fuse 5A</li> <li>⑯ Exchange Cabinet Rack CR-620</li> <li>⑰ Exchange Frame FR-620A</li> <li>⑱ Power Supply Unit DS-610</li> <li>⑲ Power Indication Lamp</li> <li>⑳ Battery Power Indication Lamp</li> <li>㉑ Buzzer Stop Switch</li> <li>㉒ Exchange Cabinet Rack CR-610</li> <li>㉓ Exchange Frame FR-610A</li> <li>㉔ Speech Interface Unit SI-62 (LM-62B may be inserted into this position instead.)</li> </ul> |
|---|--|

Note.\*

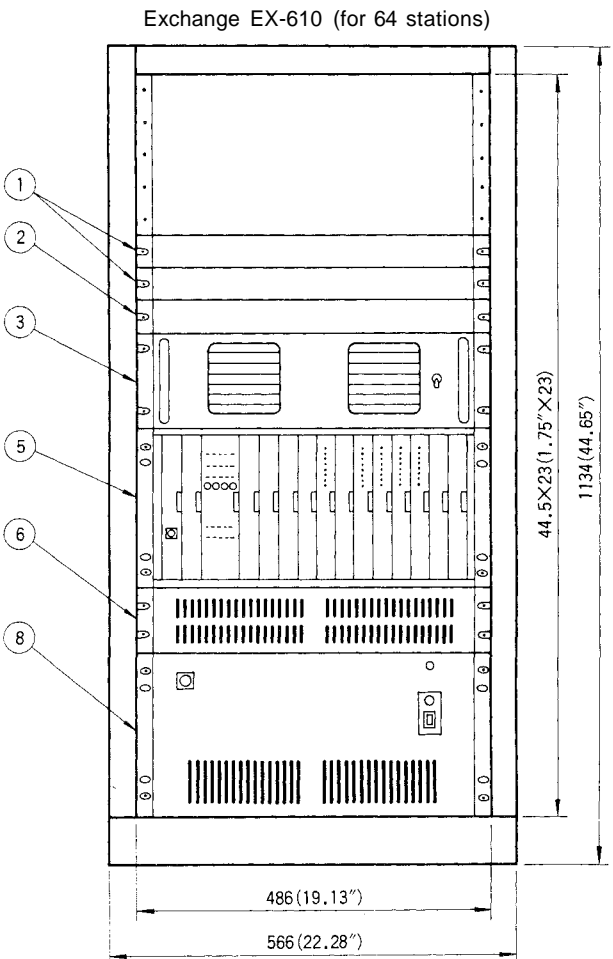
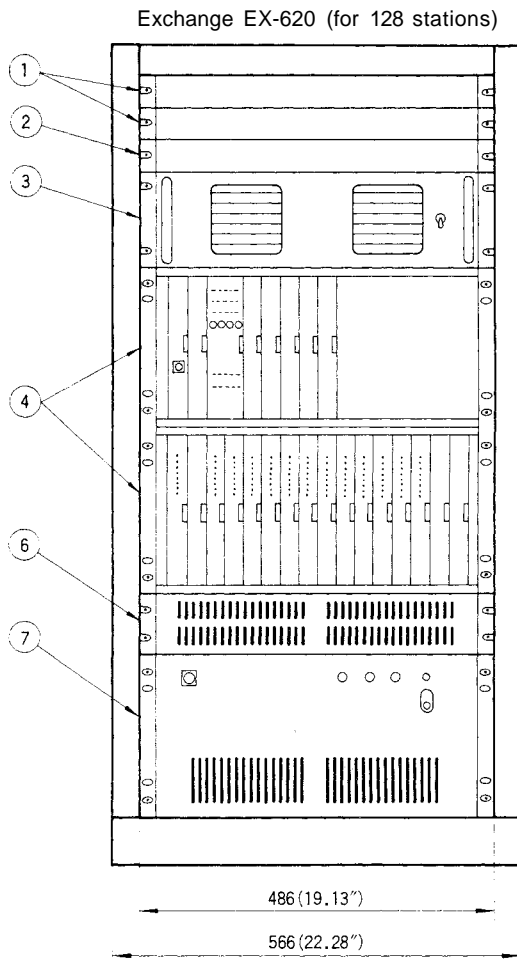
The Exchange Cabinet Rack CR-610 or CR-620 includes Perforated Panels PF-013A and PF-023A.

Exchange EX-630 (for 256 stations)



- |   |   |
|---|---|
| ① Central Processing Unit CP-66.  | ⑬ Jack for Programming Station  |
| ② Output Control Unit OC-62   | ⑭ Extention Frame FR-631A   |
| ③ Highway Control Unit HC-64  | ⑮ Data Transmitting Unit DT-E60 (When this unit is not used, mount Perforated Panel PF-013A in this place.) |
| ④ Signal Generating and Distributing Unit SG-62   | ⑯ Power Supply Unit DS-630  |
| ⑤ Conference Link Unit CL-62A (In this location, DL-62A is also mountable.)   | ⑰ DC Fuse 20A (for use of 129 ~ 256 stations)   |
| ⑥ Duplex Link Unit DL-62A (CL-62A may be inserted into these positions instead of DL-62A.)  | ⑱ AC Fuse 10A (110V/120V), 5A (220V/240V)   |
| ⑦ Paging Interface Unit PI-62 (Type 1 in the left position, type 2 in the right position).  | ⑲ Power Indication LED lamp (green for AC operation, red for battery operation)                             |
| ⑧ Tie-line Interface Unit TI-62 (In this location, PI-62's are also mountable. Type 3 in the left position, type 4 in the right position) | ⑳ Power Switch  |
| ⑨ Station Paging Assignment Unit SA-64  | ㉑ Battery Case BC-630 (When this unit is not used, mount the Perforated Panel PF-023A in this place.)       |
| ⑩ Cabinet Rack CR-271   | ㉒ Battery Fuse 10A  |
| ⑪ Exchange Frame FR-630A  | ㉓ Battery Power Switch  |
| ⑫ Line Modern Unit LM-62B (LM-65, Line Modem Unit with BGM function, may be inserted into these positions instead of LM-62B.)             | ㉔ Speech Interface Unit SI-62 (LM-62B may be inserted into this position instead.)                          |

### 3. Recommendable Example of Exchange Mounted on Amplifier Cabinet Rack



- ① Data Transmitting Unit DT-E60  
Junction Cable YR-803 (for additional DT-E60)
- ② Data Transmitting Unit DT-E60  
Junction Cable YR-802 (Cable length: 400mm) or YR-806  
(Cable length: 1000mm)
- ③ Blower Panel BP-031A (Do not substitute perforated panel for this)

- ④ Exchange EX-620 (Frame FR-620A and necessary Units)
- ⑤ Exchange EX-610 (Frame FR-610A and necessary Units)
- ⑥ Perforated Panel PF-023A
- ⑦ Power Supply Unit DS-620
- ⑧ Power Supply Unit DS-610

### 4. Specifications Related to Installation

#### 4-1 Exchange

- 1) Wiring
  - Non-polar one twisted pair
  - Loop Resistance: 300 ohms, or less
  - Impedance: 600 ohms, balanced
  - Cable length: max. 1.0km (0.4mm dia.)  
max. 2.5km (0.65mm dia.)  
max. 3.5km (0.9mm dia.)
- 2) Power Sources (DS-610/620/630)  
AC Mains (110, 120, 220, 240V) ± 10% 50/60Hz 24V DC
- 3) Rated Power Consumption
  - EX-610 130W (No link occupied) 300W (Max.)
  - EX-620 210W (No link occupied) 500W (Max.)
  - EX-630 410W (No link occupied) 1kw (Max.)
- 4) Battery for System Back-up on AC Power Failure (Option)
  - \* Type Sealed type Ni-Cd battery NDC-2435
  - \* Voltage 24V
  - \* Capacity 3500mAh
  - \* Charge System  
Trickle Charging, approx. 1/40CA (20°C)
  - \* Service Hours
    - EX-610: Approx. 2 hrs.  
(2 x NDC-2435 necessary per system)
    - EX-620: Approx. 1.5 hrs.  
(3 x NDC-2435 necessary per system)
    - EX-630: Approx. 1.5 hrs.  
(3 x NDC-2460 necessary per system)

- 5) Ambient Temperature  
0~40°C (+32° ~+104°F)
- 6) Dimensions
  - EX-610: 510(W) x 656(H) x 325(D)mm  
(20.08" x 25.83" x 12.80")
  - EX-620: 510(W) x 878(H) x 325(D)mm  
(20.08" x 34.57" x 12.80")
  - EX-630: 566(W) x 1364(H) x 435(D)mm  
(22.28" x 53.70" x 17.13")
- 7) Weight
  - EX-610: 45kg (99.1 IDS.) without battery
  - EX-620: 57kg (125.63 lbs.) without battery
  - EX-630: 109kg (240.30 lbs.) without battery

**Caution.** Both top and side panels are perforated for ventilation (EX-610/620). Do not place things on the top panel or close to the side panels. (Intercom cabinet rack)  
For maintenance works, allow much space between the wall and the cabinet rack.

#### 4-2 Station

- Ambient Temperature
  - : 0° ~ +60° C (+32° ~ +140°F) (Except HF-640S)
  - : -10° ~ +60° C (+14° ~ +140°F) (Door Station HF-640S)
- Permissible Loop Resistance: 300 ohms
- Input/Output Impedance : 600 ohms (balanced)
- Note. For details such as functions, dimensions and specifications, refer to Spec. Sheet for each equipment.



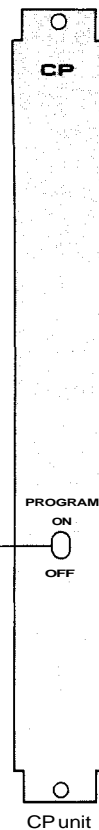
## 5. Functions of Units Mounted on Exchanges EX-610/EX-620/EX-630

### 5-1 CP (Central Processing Unit)

Function: Reads out the exchange procedures written into the memory (ROM) and collates the data from stations for traffic processing.

#### PROGRAM SWITCH for #200 Programming

Set this to "ON" position only at time of initial programming of the exchange and registration of functions. In this case, station No.200 is "programming station" but becomes a normal station when switch is placed in "OFF" position.



### 5-2 OC (Output Control Unit)

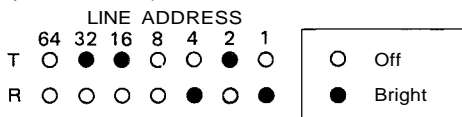
Function: Stores temporarily the output data from the CP unit and distributes them to each unit.

### 5-3 HC (Highway Control Unit HC-62

..... EX-610/620; HC-64..... EX-630)

Function: Turns on and off the time sharing switches at the LM, DLand SG units according to instructions received from the CP unit. The link busy indicator lamps on the front panel display the number of the links in use.

(Example for HC-62)



Calling Station (T): No. 250  
(200+32+16+2 = 250)

Called Station (R): No. 205  
(200+4+1 = 205)

SIGNAL CODE				TONE AND SPEECH MODE	
F	4	2	1		
○	○	○	○	During Conversation	
○	○	○	●	Press-to-talk (R → T)	
○	○	●	○	Press-to-talk (T → R)	
○	○	●	●	OFF duration on T & R	
●	○	○	○	Calling	
●	○	○	●	Privacy/Disconnected	
●	○	●	○	Busy	
●	○	●	●	Dialing	
●	●	○	○	Zone paging	
●	●	○	●	All call	
●	●	●	○	Priority/Executive priority	
●	●	●	○	Registration/Call holding/Mic-off	

#### LINE ADDRESS Lamp

These lamps display the station numbers (Binary number) using the selected link (T: Calling station, R: Called station)

#### SIGNAL CODE Lamp

These lamps display the code of signal tone being used in the selected link.

#### LINK SELECT Switch

The switch position is to be selected in accordance with the number of links in use. The line address and the signal code of the link in use are then displayed by the lamps.

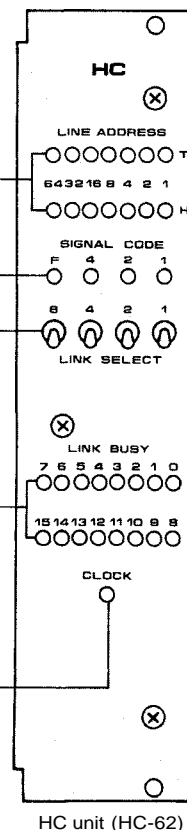
**Note:** Operate these switches using the binary notation.

#### LINK BUSY Lamp

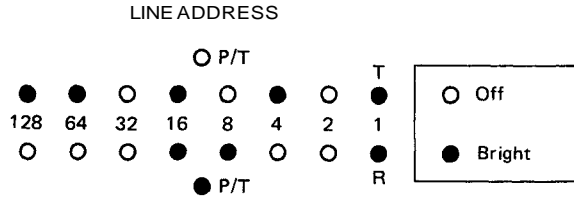
These lamps display the number of the links in use.

#### CLOCK Lamp

This lamp, when on, indicates that the control signal for the time sharing switch is being transmitted normally.



(Example for HC-64)



Calling Station (T): No. 413  
 $(200 + 128 + 64 + 16 + 4 + 1 = 413)$

Called Station (R): paging No. 25  
 $(16 + 8 + 1 = 25)$

**LINE ADDRESS Lamp**  
 These lamps display the station numbers (Binary number) using the selected link (T: Calling station, R: Called station). The P/T lamps when a paging or tie-line call is made.

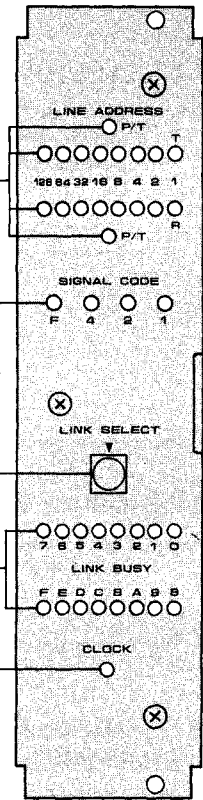
**SIGNAL CODE Lamp**  
 These lamps display the code of signal tone being used in the selected link.

**LINK SELECT Switch**  
 The switch position is to be selected in accordance with the number of links in use. The line address and the signal code of the link in use are then displayed by the lamps.

**Note:** Operate this switch using the hexadecimal notation.

**LINK BUSY Lamp**  
 These lamps display the number of the links in use.

**CLOCK Lamp**  
 Indicates that the control signal for the time sharing switch is being transmitted normally.



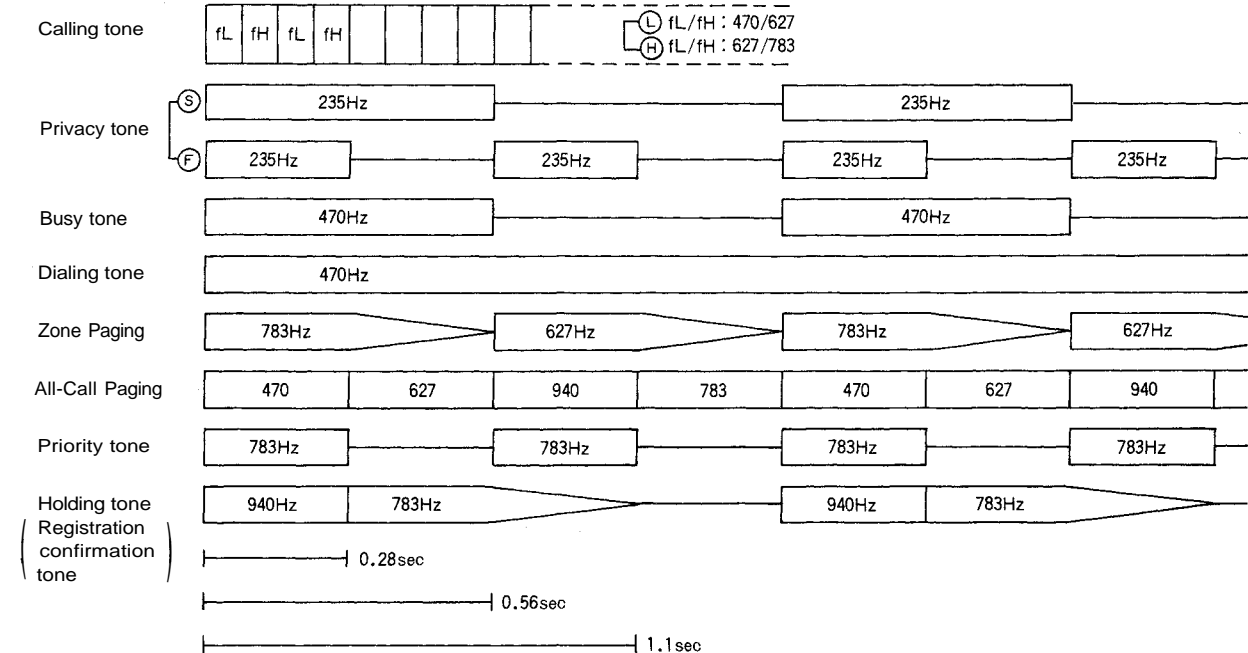
HC unit (HC-64)

### 5-4 SG (Signal Generating and Distributing Unit)

Function: Composed of 8 kinds of signal generators (calling, privacy/disconnected, busy, dialing, zone paging, all call, priority/executive priority, registration confirmation/call holding/mic-off) and distributors.

This unit distributes under HC control the required signal tones to each individual link.

#### • Tone of SG Unit



### 5-5 DL (Duplex Link Unit)

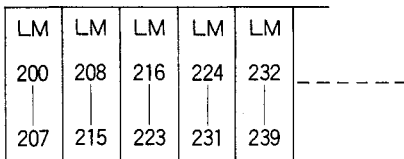
Function: Operates under the control of the HC unit to connect or disconnect the individual links for conversation between two stations, changing over from the hands-free conversation to the full duplex conversation mode, or vice versa. One DL unit is provided with 4 links. Up to 3 DL units can be mounted in the EX-610 and up to 4 in the EX-620/630.

### 5-6 CL (Conference Link Unit)

Function: Operates under the control of the HC unit to connect or disconnect the links for conversation among up to 4 parties and conversation between 2 parties. One CL unit is provided with 1 conference link and 2 speech links.

### 5-7 LM (Line MODEM Unit)

Function: Is composed of a modulator to transmit signals from the station to the speech link, a demodulator to send out signals from the speech link to the station, a dial receiver and a scanning circuit that scans the station "Privacy ON/OFF" conditions and "Handset ON/OFF" conditions. Up to 8 stations can be connected per LM Unit.



Arrangement of the LMs with individual ranges for the station numbers covered (from left to right) is shown here.

### 5-8 SI (Speech Interface Unit)

Function: Connects to the SM-600 Speech Message Device to send or receive a voice signal.

### 5-9 PI (Paging Interface Unit)

Function: Provides PA paging and station paging. It sends out both paging voice signals and relay make signals for power remote control of the PA amplifier. It also delivers the serial output for radio pagers. The PA paging signal goes out through the assigned YR-801 cable to terminal P1 or P2 of the BX-610/620 terminal boards.

### 5-10 SA (Station Paging Assignment Unit)

Function: Distributes each of paging outputs to each LM unit. This unit cannot be used for EX-610/620.

### 5-11 TI (Tie-line Interface Unit)

Function: When 2 or 3 exchanges are tie-line connected, this unit transmits and receives the audio signals and dial data between the exchanges.

### 5-12 DS (Power Supply Unit)

**1. DS-610 (for 64 stations)**

An exclusive power supply unit for the EX-610 exchange. This unit cannot be used in the system for more than 64 stations.

**2. DS-620 (for 128 stations)**

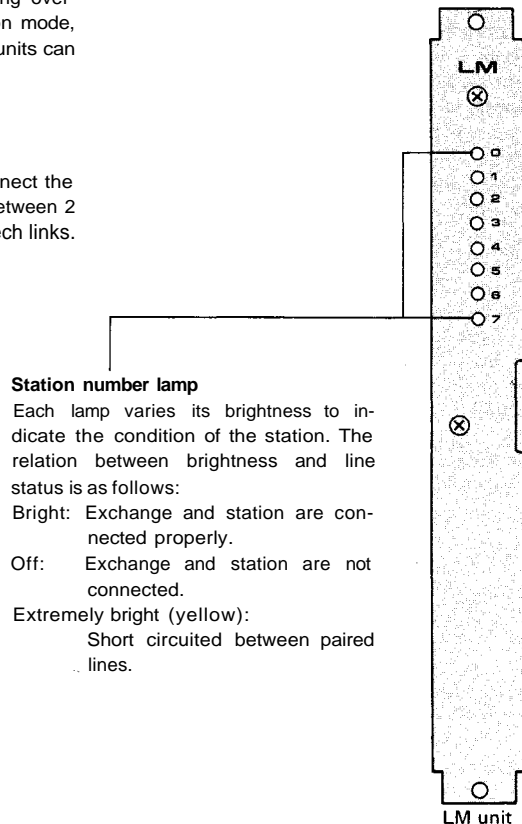
An exclusive power supply unit for the EX-620 exchange and can also be used for the EX-610 exchange.

**3. DS-630 (for 256 stations)**

An exclusive power supply unit for EX-630 exchange.

### 5-13 BC (Battery Case)

An exclusive battery case for EX-630. Accommodates three of Ni-Cd batteries (Sealed type, NDC-2460). The charger circuit is incorporated in DS-630.



## PART2. INSTALLATION OF EXES-6000 SYSTEM

### 6. Installation of the EXES-6000 System

#### 6-1 Exchanges

Pay particular attention to the following points during installation of the exchange:

- \* The layout should allow easy servicing and inspection.
- \* The exchange is compact and lightweight; however it is important to ascertain the strength of the floor or wall on which it will be placed.
- \* The exchange should be grounded. When it is used in combination with other systems, for example, a PA system, the exchange should be connected to the other components for common grounding.
- \* Choose a low "source noise" AC power supply for the exchange. Line noise can downgrade speech quality.
- \* Be sure to provide a power outlet for the exchange and have its capacity checked. A capacity of 500 watts is sufficient.
- \* Plan the layout so that the terminal board BX-610 or BX-620 can be installed near the exchange.
- \* **System should include a surge protector.**

This high performance exchange is compact as well as quiet, and can be easily installed almost anywhere. Areas described below, however, should be strictly avoided.

- \* An area where it will obstruct traffic, for example, an indoor hallway or near the entrance or exit of a room.
- \* An area where it will be exposed to fire, heat or direct sunlight (suitable ambient temperature is 0° ~ +40°C (+32° ~ +104°F)).
- \* A dusty area (where there is metal dust or dirt).
- \* Near a storage place for chemicals, oil, etc.
- \* An area susceptible to vibration.
- \* Near high-voltage equipment.
- \* In a strong electric field.
- \* Near equipment vulnerable to the influence of an electric field.

#### 6-2 Stations

Particular attention should be given to the following points during installation.

- \* Choose a desk-top type, flush-mount type or desk/surface mount type station according to the user's need.
- \* If the PA paging function is adopted, precautions should be taken to ensure against feed-back due to interference between the station (microphone) and the paging speaker; that is, they should be installed facing different directions or separated from each other as far as possible.
- \* The "para-branching" operation or the connection of more than one station to one circuit is not possible.

Stations are compact for each installation almost anywhere. However, areas described below should be strictly avoided.

- \* An area where it can be exposed to fire, heat or direct sunlight (suitable ambient temperature is 0° ~ +60° C (+32° ~ +140°F) (except HF-640S) or -10° ~ +60°C (+14° ~ +140°F) (Door Station HF-640S)).
- \* A dusty area (where there is metal dust or dirt).
- \* Near a storage place for chemicals, oil, etc.
- \* An area subject to vibration.
- \* Near high-voltage equipment.
- \* In a strong electric field.
- \* SCR type light dimmers.

#### 6-3 Accessories

The terminal board BX-610 or BX-620, which is to be connected to the exchange by junction cable YR-810 or YR-801, can be mounted on a wall near the exchange if the cable length 2.5m (8.2 feet) and cable routing is adequate. The exchange should also be installed so that it can easily be connected to the station line.

Junction cable YR-810 or YR-801, which connects the exchange and the terminal board, should not be bent at a sharp angle. The terminal board should be installed so that the cable can be connected with a reasonable amount of slack in it.

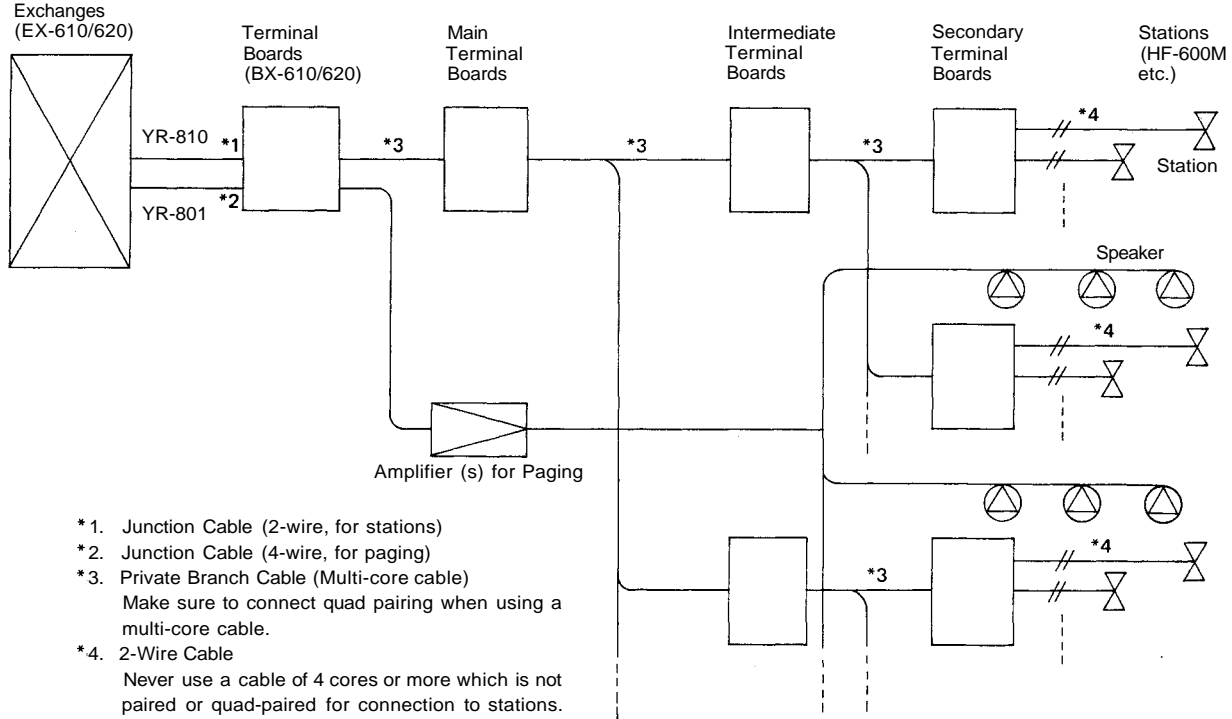
# 7. Cable Installation

## 7-1 The Type of Cables

Wire type, number of wire pairs and number of individual wires are to be determined for individual sections of the wiring system according to the guidelines set out below.

- \* Twisted paired cables (such as those used for key telephones) are to be used for wiring between the station and the intermediate or indoor terminal board.
- \* As a rule, private branch cables are to be used for wiring between indoor terminal boards, intermediate terminal boards, main terminal boards, etc.

- \* Indoors, the number of cables that can be run through a conduit is, as a rule, less than 200 pairs.
  - \* Outdoor wires should be used where wiring passes through inaccessible areas such as in ceilings or under floors. Indoor wires may also be used, however, in cases where there is no risk of deterioration due to exposure to heat, etc.
  - \* The number of cable pairs laid should be determined considering the possibility of future expansion of the system.
- The following chart is provided to give an actual example of the wiring plan within an installed system.



- \*1. Junction Cable (2-wire, for stations)
- \*2. Junction Cable (4-wire, for paging)
- \*3. Private Branch Cable (Multi-core cable)  
Make sure to connect quad pairing when using a multi-core cable.
- \*4. 2-Wire Cable  
Never use a cable of 4 cores or more which is not paired or quad-paired for connection to stations.

**Note:** Since hardware to connect the cable to the terminal board BX-610 or BX-620 is provided, there is a limit to the diameter of cables that can be used to connect the terminal board BX-610 or BX-620 and the main terminal board, and this limit must be taken into consideration when planning wiring of the system. The diameter must be between 0.41mm (0.016") and 0.79mm (0.031").

## 7-2 Core Diameter versus Transmission Distance

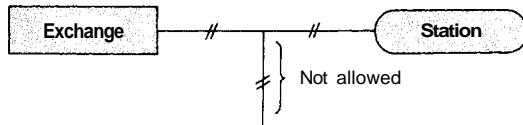
Use appropriate cables according to the following table that shows the relationships between core diameter and transmission distance.

AWG No. (Solid)	Item	Core Diameter mm (mils.)	Service Distance km (ft)
18		1.02 (40.30)	4.6 (15,000)
20		0.81 (31.96)	3.5 (10,000)
22		0.64 (25.35)	2.5 (8,200)
24		0.51 (20.10)	1.5 (4,900)

## 7-3 Wiring

### 1. General Information

- \* Wiring should be done independently of public telephone lines. Otherwise the EXES-6000's line (+30 dBm) can cause cross-talk in the telephone line.
- \* Wiring conduit is often installed underground or embedded in building structures such as walls and floors, so care must be taken to draw up a wiring plan that has ample reserve for future extension of the system and that can be adapted to future remodelling or expansion of the building it is housed in. Wiring systems must be planned with ample wires and conduit and with provision for additions to the system.
- \* Do not connect an unused cable to a connection cable between the exchange and the station.



- \* When a multi-pair cable is used for connection, it must not be used as a power cable or data transmitting cable for facsimile, etc.

### 2. Spacing

Since the working voltage of this system is low and the current passing through it is small, there is no major safety problem involved in the wiring.

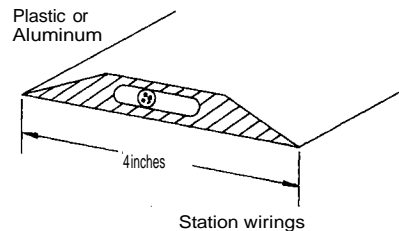
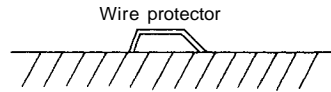
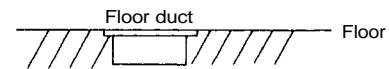
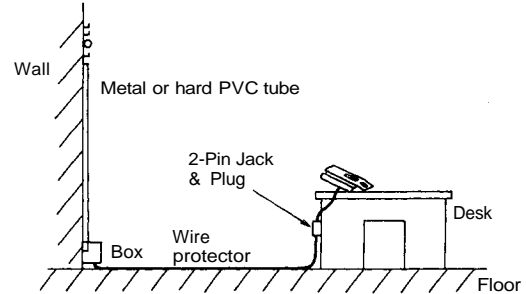
However, since interference due to contact with other indoor wiring can cause wire damage, leakage, and other problems, spacing should be given close consideration when the small-current wiring of this system is laid close to other indoor wiring, particularly AC wiring. The following chart lists spacing standards to be followed in respect to typical causes of interference.

Cause of Interference	Minimum spacing acceptable without extra protection	Remarks
Heating Pipe	15cm (6")	This minimum spacing requirement should be observed, since intercom cable is vulnerable to heat.
Water Pipe	10cm (4")	
Radio transmitting coaxial cables (CB and other). Telephone wire.	30cm (12")	More spacing is required where there is a risk of induction.
Radio/TV Antenna coaxial cables & twin lead. Ground cable.		
Protected Heating and Cooling Pipes.	10cm (4")	

### 3. Piping

- \* Where wiring is to be passed through a wall or the like, it should be protected by a hard PVC or metal tube.
- \* If the number of connecting wires between an indoor terminal board and a station is small and the station's site is fixed so that it will not be moved frequently, install a box at that site and pull wiring through a metal or hard PVC tube as required by job or ordinance.
- \* Use a floor duct if the number of connecting wires is large and the stations are likely to be moved frequently.
- \* Station wiring which must be laid across open areas of floor should be protected by plastic or metal shields. (See drawing below)

#### EXAMPLE:



# 8. Connection of Equipments

## 8-1 Connection of Power Supply

### 1. DS-610 (for EX-610)

The connection on the terminals of the power section is illustrated below.

When batteries are to be connected, connect the connector after plugging into the AC power source. Connect to the AC power source, as illustrated below, after setting the system.

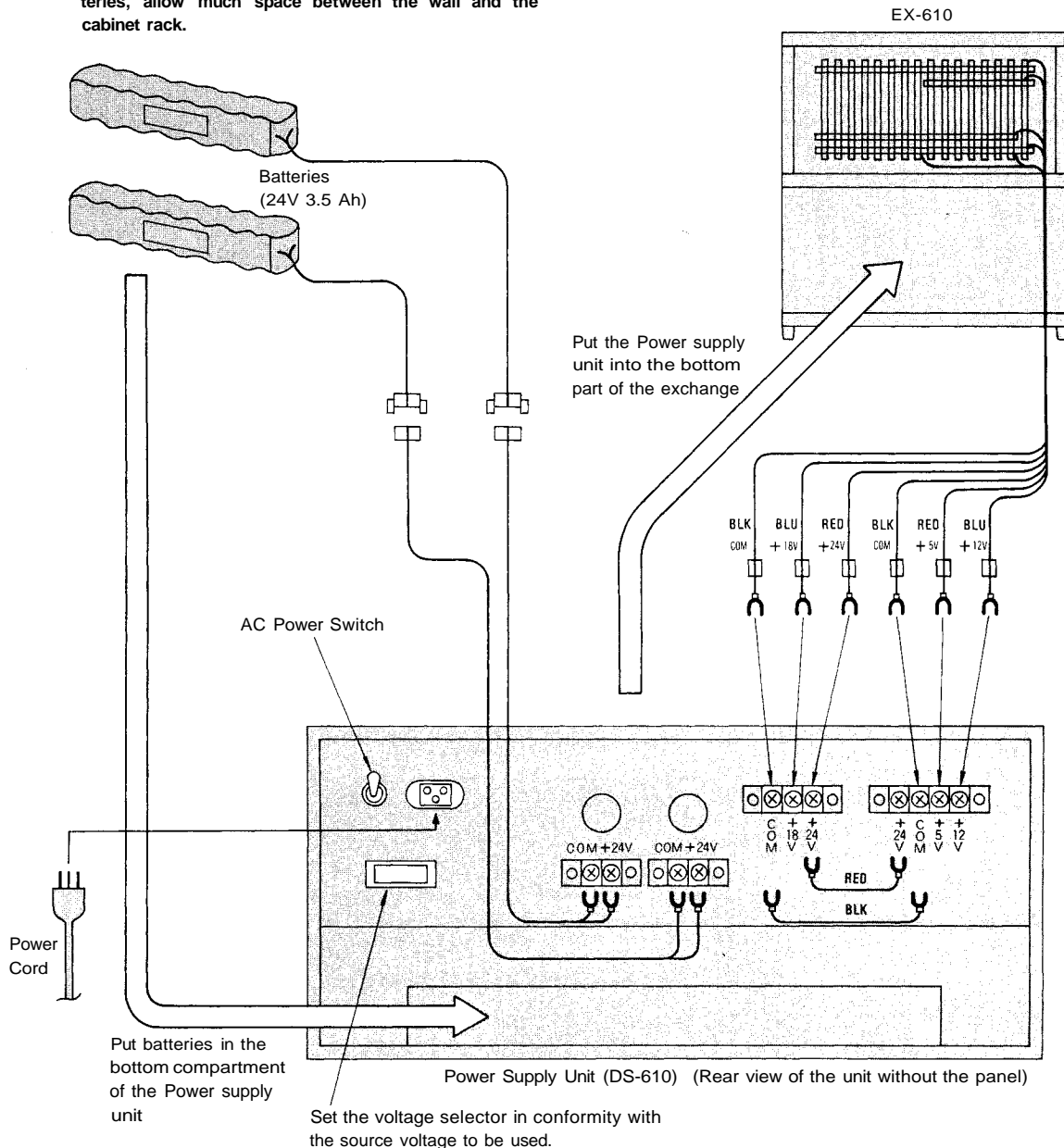
Check if the unit operates on battery without any problem in about 40 hours after power is switched on.

• Fuse

Use a proper type of fuse according to the number of the stations to be connected. See the table below.

Number of Stations	Fuse Capacity
0 ~ 30	DC 5A
31 ~ 64	DC 8A

**Important!** To facilitate maintenance works of the fuses and batteries, allow much space between the wall and the cabinet rack.



## 2. DS-620 (for EX-620)

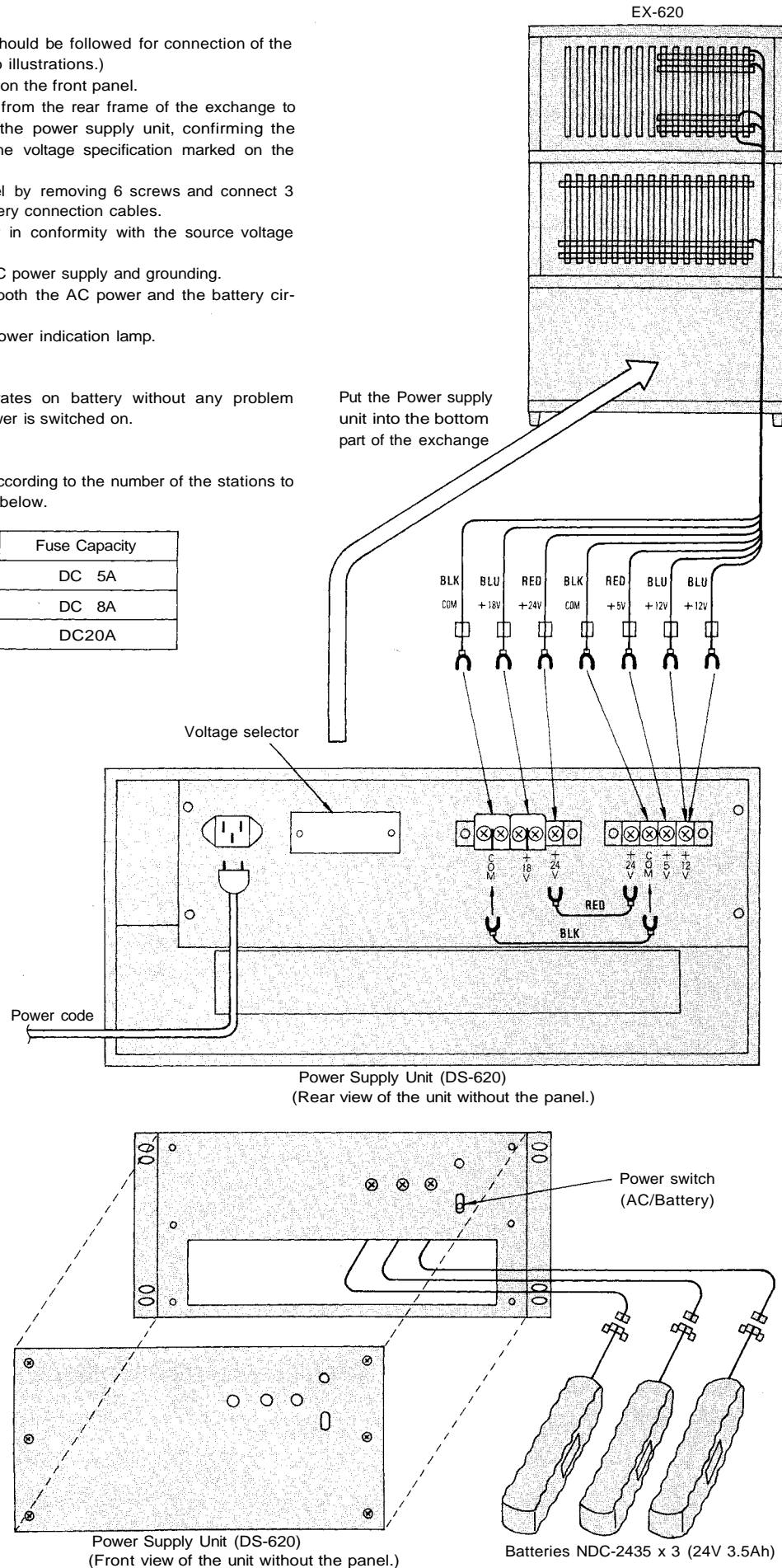
The following procedures should be followed for connection of the power supply unit. (Refer to illustrations.)

1. Turn off a power switch on the front panel.
2. Connect cables coming from the rear frame of the exchange to the terminal board of the power supply unit, confirming the colour of cables and the voltage specification marked on the cables.
3. Take out the front panel by removing 6 screws and connect 3 Ni-Cd batteries to 3 battery connection cables.
4. Set the voltage selector in conformity with the source voltage to be used.
5. Make connections for AC power supply and grounding.
6. Switch power on, and both the AC power and the battery circuits are activated.
7. Confirm the colour of Power indication lamp.  
AC operation: Green  
Battery operation: Red
8. Check if the unit operates on battery without any problem about 40 hours after power is switched on.

### • Fuse

Use a proper type of fuse according to the number of the stations to be connected. See the table below.

Number of Stations	Fuse Capacity
0-30	DC 5A
31 ~ 64	DC 8A
65 ~ 128	DC20A

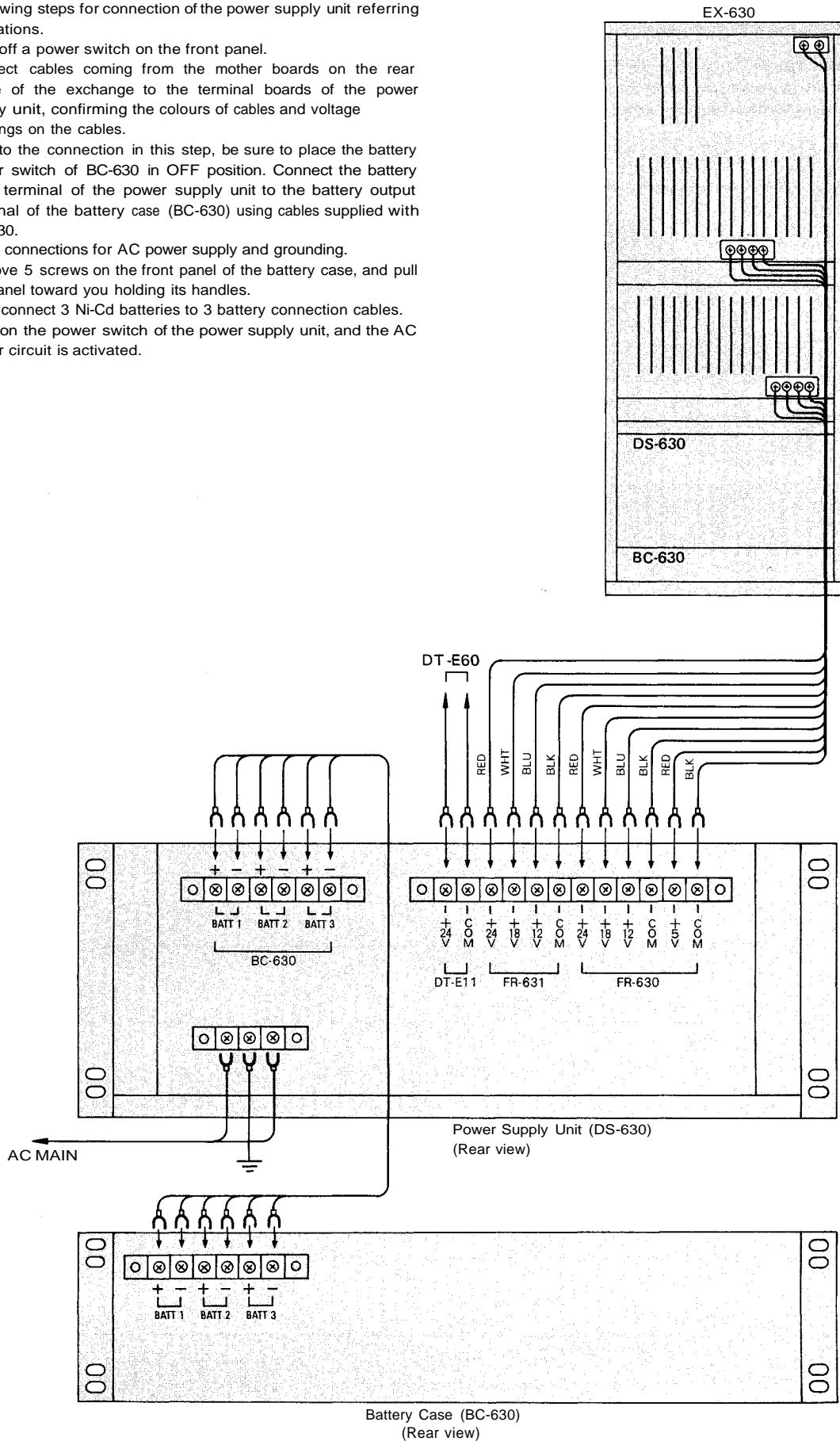




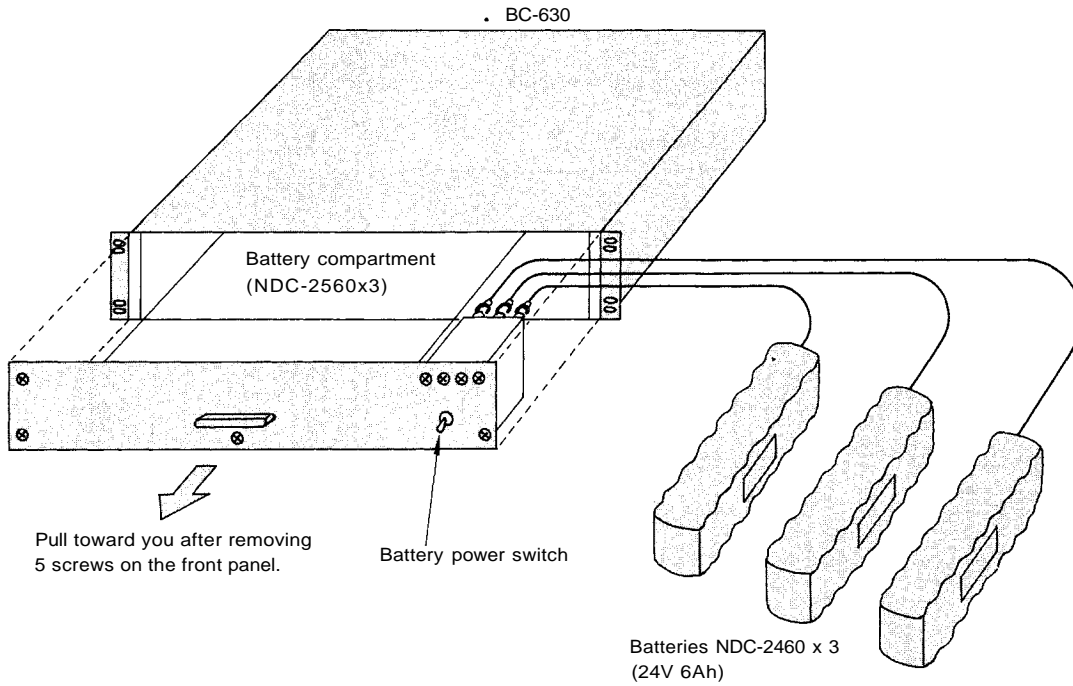
### 3. DS-630 (for EX-630)

Use following steps for connection of the power supply unit referring to illustrations.

1. Turn off a power switch on the front panel.
2. Connect cables coming from the mother boards on the rear frame of the exchange to the terminal boards of the power supply unit, confirming the colours of cables and voltage markings on the cables.
3. Prior to the connection in this step, be sure to place the battery power switch of BC-630 in OFF position. Connect the battery input terminal of the power supply unit to the battery output terminal of the battery case (BC-630) using cables supplied with BC-630.
4. Make connections for AC power supply and grounding.
5. Remove 5 screws on the front panel of the battery case, and pull the panel toward you holding its handles. Then connect 3 Ni-Cd batteries to 3 battery connection cables.
6. Turn on the power switch of the power supply unit, and the AC power circuit is activated.



7. Turn on the battery power switch of the battery case, and the battery circuit is activated.
8. Confirm the colour of power indication lamp.  
AC operation: Green  
Battery operation: Red
9. Conduct a battery operation test about 60 hours after power is switched on since sufficient time is necessary for the batteries to charge fully.



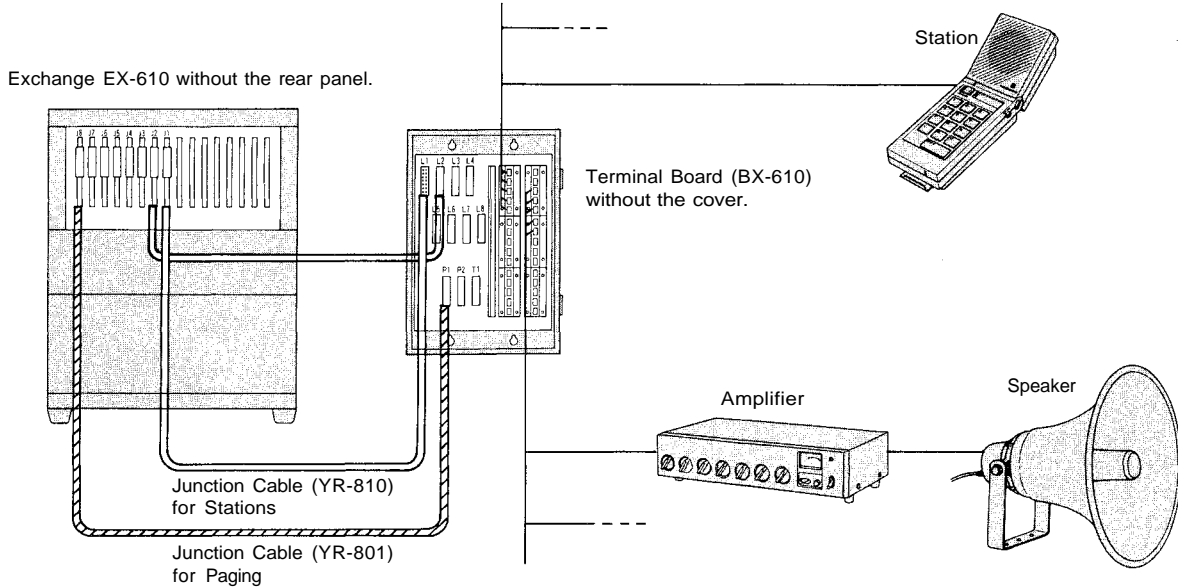
## 8-2 Connection between the Exchange and the Terminal Board (BX-610 or BX-620)

The terminal boards BX-610 for a maximum of 64 stations and BX-620 for a maximum of 128 stations are available in the EXES-6000 system. Use the YR-810 cable (2-wire and for 8 stations) or the YR-801 cable (4-wire and for 8 paging zones and 8 links of

tie-line system) for connection between the exchange and the terminal board. It is also possible to utilize the BOX-08 terminal board with cable (4-wire and for 8 stations, 8 zones and 8 links).

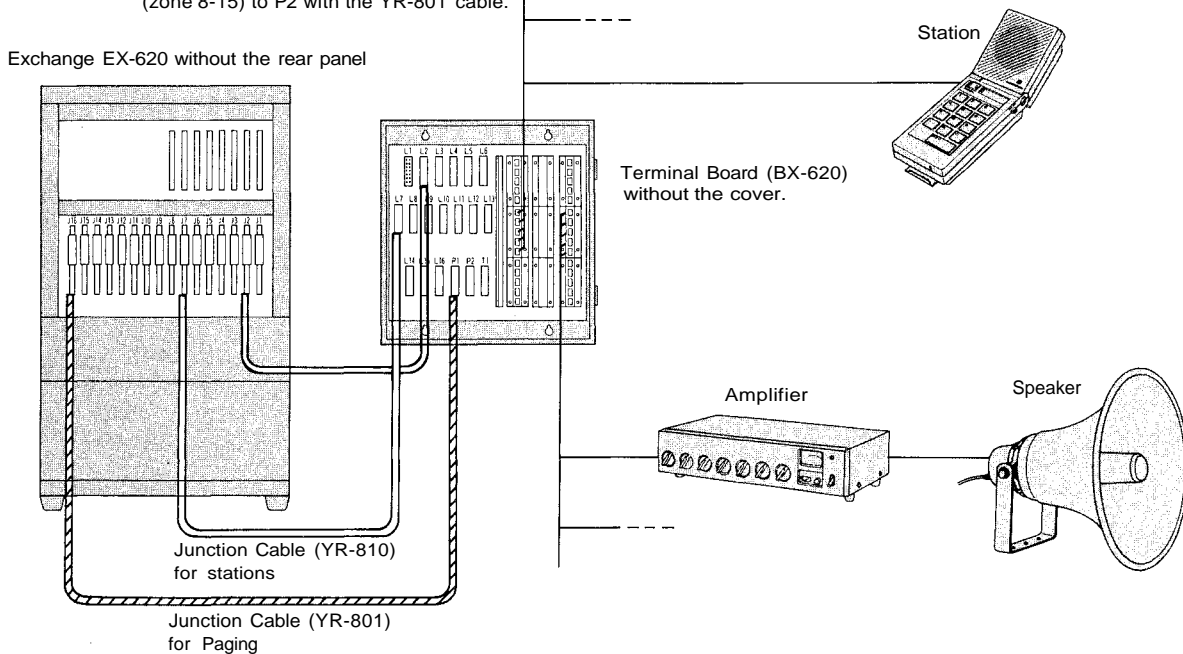
### 1. Wiring Example when Exchange EX-610 is used

- For LM units: Connect J1 through J8 of the exchange to L1 through L8 of the terminal board with the YR-810 cable.
- For PI units: Connect J8 (zones 1 ~ 7 plus All-call) of the exchange to P1 of the terminal board, and J7 (zones 8 ~ 15) to P2 with the YR-801 cable.
- For TI unit: Connect J7 of the exchange to T1 of the terminal board with the YR-801 cable.
- For SI unit: Connect the SI unit to L2 of J2 terminal board of an exchange by means of the YR-810 cable.



### 2. Wiring Example when Exchange EX-620 is used

- For LM units: Connect J1 through J16 of the exchange to L1 through L16 of the terminal board with the YR-810 cable.
- For PI units: Connect J16 (zone 1-7 plus All-call) of the exchange to P1 of the terminal board, and J15 (zone 8-15) to P2 with the YR-801 cable.
- For TI unit: Connect J15 of the exchange to T1 of the terminal board with the YR-801 cable.
- For SI unit: Connect the SI unit to L2 of J2 terminal board of an exchange by means of the YR-810 cable.



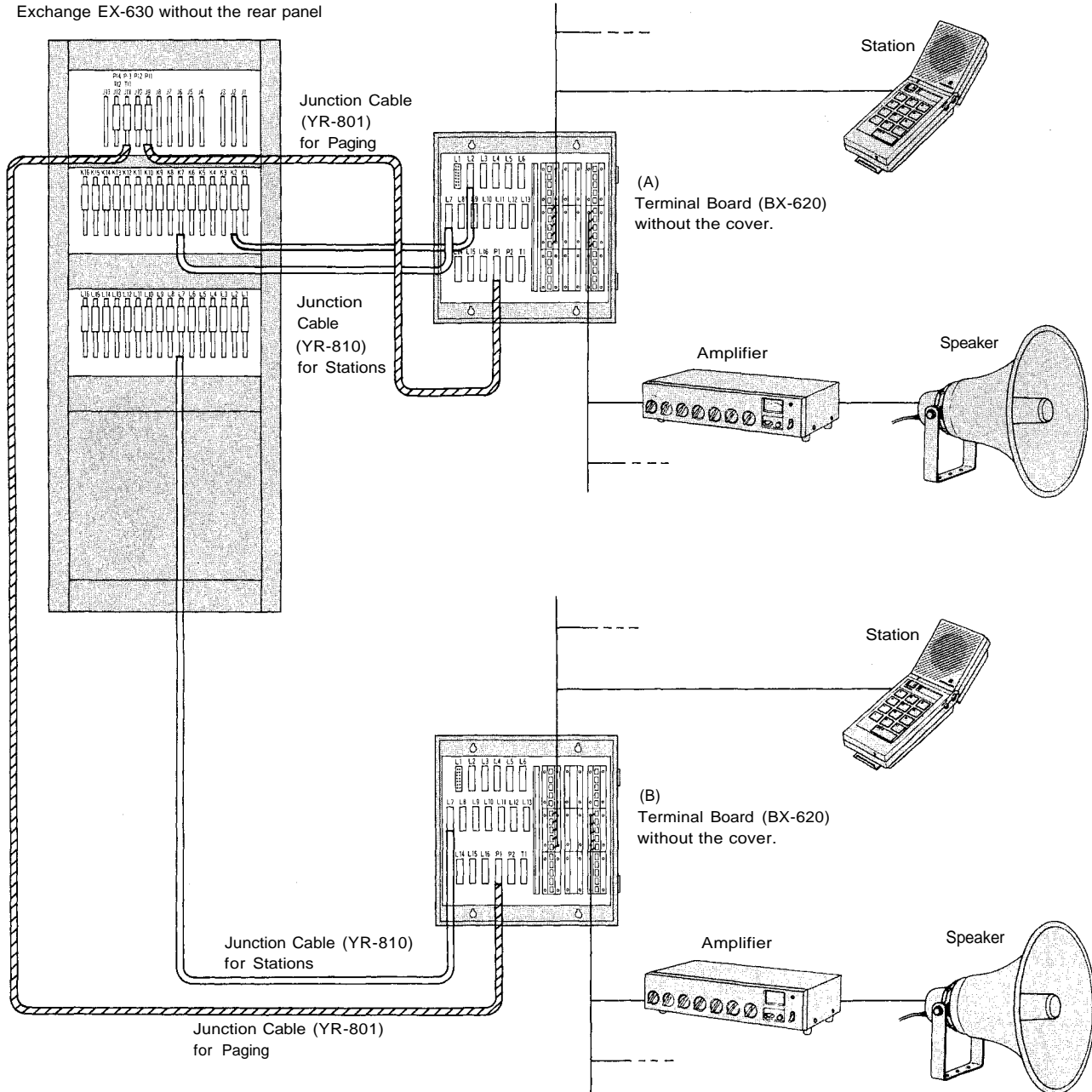
**3. Wiring Example when EX-630 is used**

1. For LM units: Connect K1 through K16 of the exchange to L1 through L16 of the terminal board (A), and L1 through L16 of the exchange to L1 through L16 of the terminal board (B).  
Use YR-810 cable for this connection.
2. For PI units: Connect P11 (J9, zone 1-7 plus All-call) and P12 (J10, zone 8-15) of the exchange to P1 and P2 of the terminal board (A), respectively.  
Similarly, connect P15 (J11, zone 16-23) and P14 (J12, zone 24-31) to P1 and P2 of the terminal

board (B), respectively.  
Use YR-801 cable for this connection.

3. For TI units: Connect T11 (J11, in the place of P13) and T12 (J12, in the place of P14) of the exchange to each T1 of the terminal boards (A) and (B), respectively, with YR-801 cable.
4. For SI unit: Connect K2 or an exchange to L2 of a terminal board (A).

Exchange EX-630 without the rear panel



### 8-3 Connection of the Terminal Board (BX-610 or BX-620) to the Main Terminal Board

Route cables from the main terminal board to the terminal board (BX-610 or BX-620) and connect them to the individual clip terminals using clipping tool YC-105 (Optional accessory).

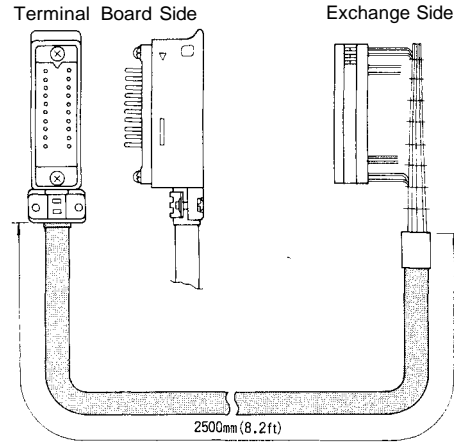
See Fig. 1 and 2 for the diagram of the interior of the terminal boards (BX-610/620).

Internal connections have been made for the corresponding numbers between the connector and clip terminal (for example, L1 ~ L1 and L2 ~ L2 . . . )

Connecting diagram of clip terminals is shown on the back surface of the front door panel of the case.

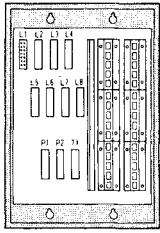
Connect cables to the clip terminals according to the following procedure:

- \* Strip a cable insulative jacket (1.5 times the length of the clip terminal) to expose inner cables.
- \* Fix the cable at the cable clamping part.
- \* Fit the exposed inner cable in a slot of the clip terminal, without stripping an insulative jacket of the inner cable. Push down on the cable with the YC-105 clipping tool (optional), and the cable is cut off. At this point, the connection is finished.



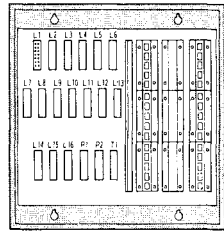
Junction Cable YR-810  
(YR-801 is also the same dimension)

Fig. 1 BX-610  
(for 64 stations)

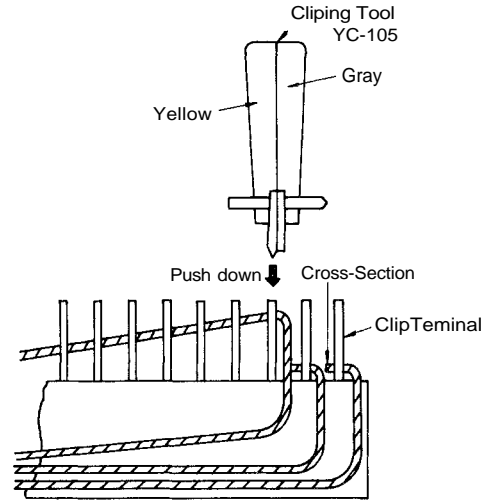


Connector    Clip Terminal  
L1 ~ L8    L1 ~ L8  
P1, P2, T1    P1, P2, T1

Fig. 2 BX-620  
(for 128 stations)



Connector    Clip Terminal  
L1 ~ L16    L1 ~ L16  
P1, P2, T1    P1, P2, T1



**Note**

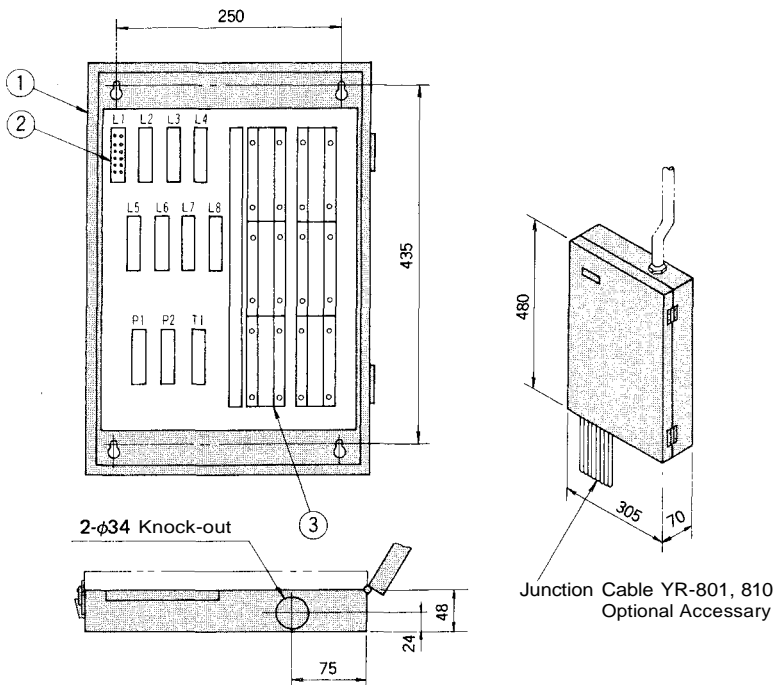
Connect the cables in order, starting with the top terminal. When using the clipping tool, take care about the cutting edge.

**Specifications of the Clip Terminals**

1. Connectable wire (Solid wire) size range:
  - 1) Insulated wire  
Core diameter 0.4-0.8mm (1/64"-1/32")
  - 2) Bared wire  
Core diameter 1.0mm (max.) (0.04")
2. Insertion force  
Approximately 3 kg (6.6 Lbs.) on a copper wire with a core diameter of 0.5mm (0.02")

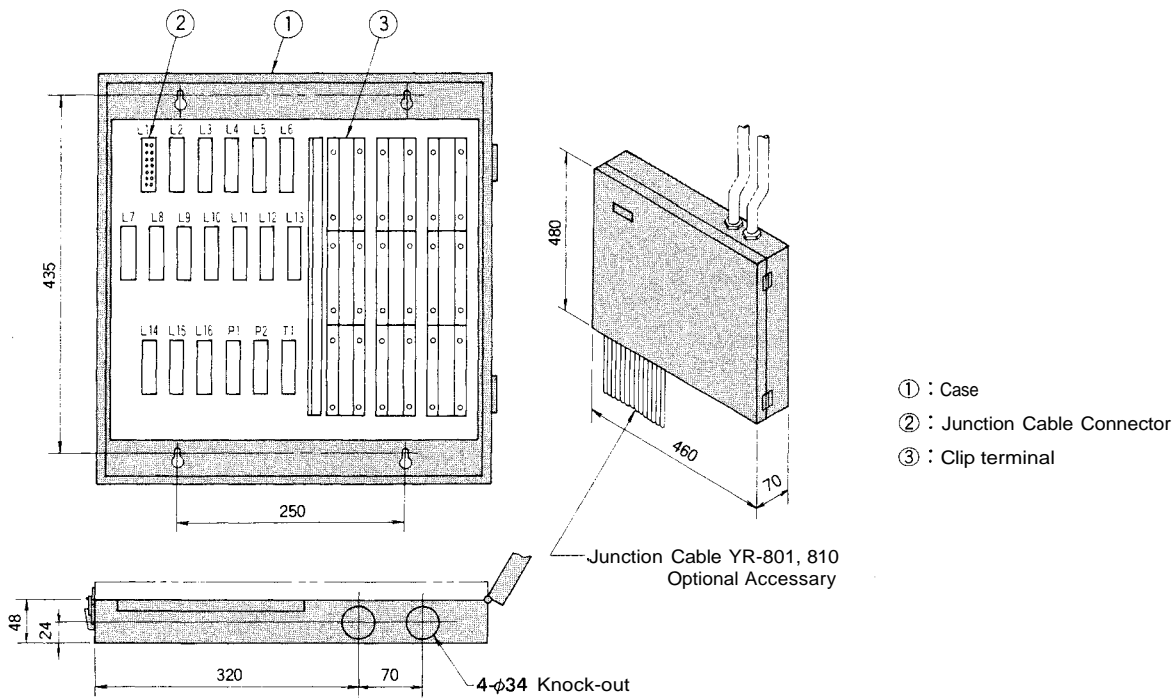
- ① : Case
- ② : Junction Cable Connector
- ③ : Clip terminal

Fig. 3 Terminal Board BX-610 Appearances

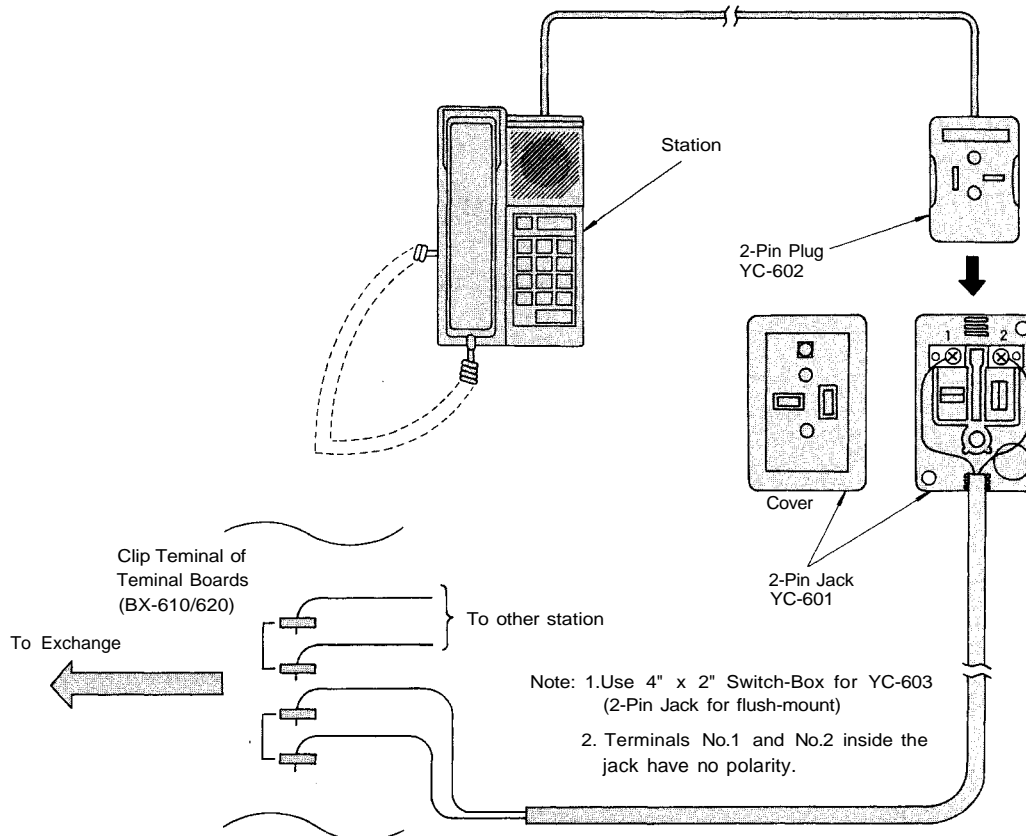


Junction Cable YR-801, 810  
Optional Accessory

Fig. 4 Terminal Board BX-620 Appearances



#### 8-4 Connection of the Station Plug to the Exchange Jack

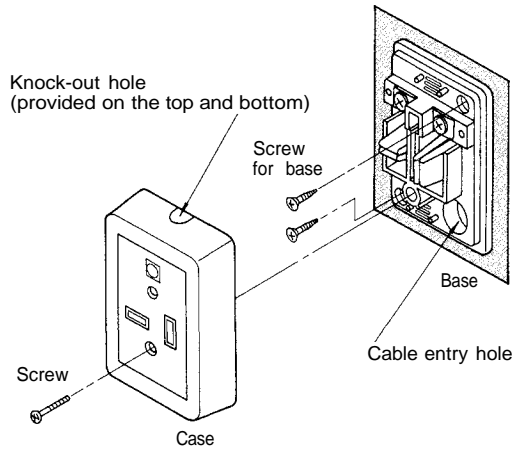


## 8-5 Connection of the station

For station installation, refer to the instruction manual of the station. When installing the desk-top/wall-mounted station, use the YC-601 or YC-603 station jack for connection. The maximum distance between the station and the station jack is 3 meters since the station cable is 3 meters in length.

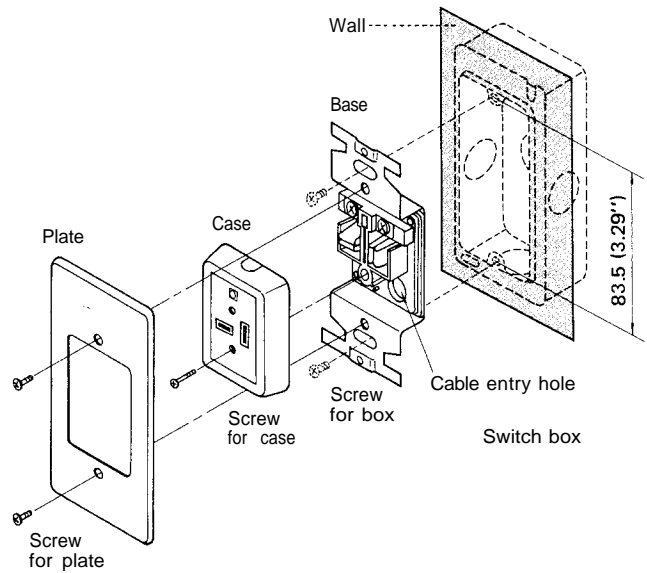
- Station jack YC-601 (Wall-mounted type)

Mount it on a wall or pillar or desk. Utilize either top/bottom knock-out holes of the case or a cable entry hole provided in the base for connecting the cables to the exchange.



- Station jack YC-603 (Flush-mounted type)

First mount the switch box in the wall and then make piping and wiring arrangements before the station jack is installed.



# 9. Connection and Adjustment of Equipment

## 9-1 Connection of the Speaker Station (Simplified Paging)

In the EXES-6000, instead of using a station, a speaker for one-way conversation can be installed using a jumper in the LM-62B. This is possible at each station position on the LM-62B.

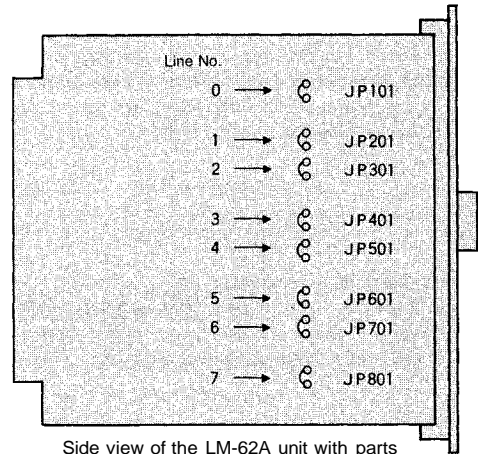
### 1. Cutting off the jumper wires of the LM units.

#### <For the LM-62A unit>

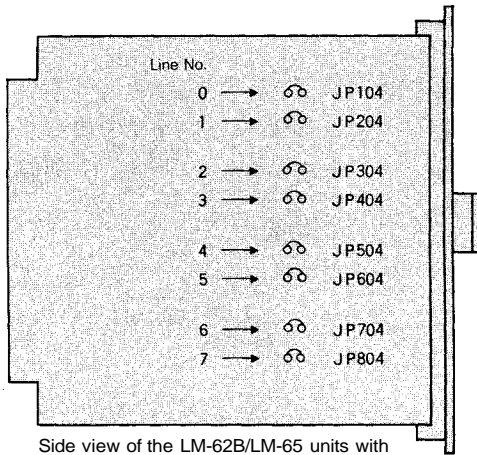
Cut off the jumper wires (JP101-JP801) corresponding to the line connected for "Speaker station" function.

#### <For the LM-62B/LM-62C/LM-65/LM-65C units>

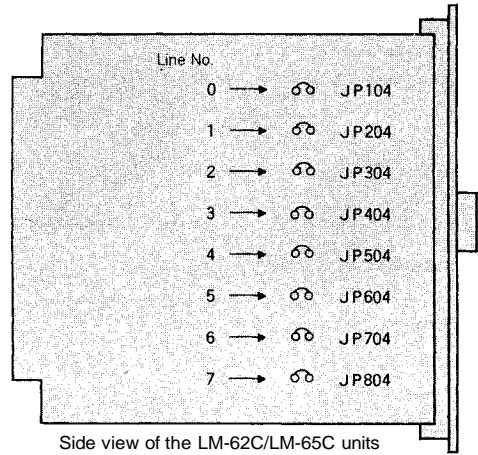
Cut off the jumper wires (JP104-JP804) corresponding to the line connected for "Speaker station" function.



Side view of the LM-62A unit with parts mounted



Side view of the LM-62B/LM-65 units with parts mounted



Side view of the LM-62C/LM-65C units with parts mounted

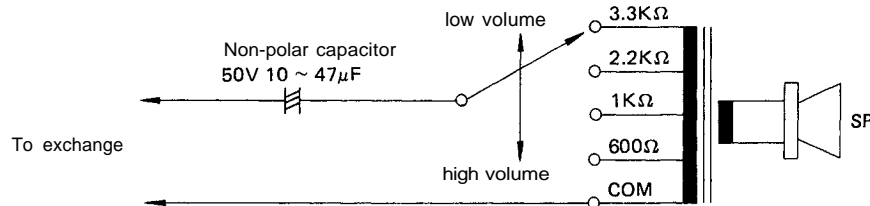
### 2. Speaker Volume Adjustment

1. Speakers with an impedance of 600 ohms or more may be used without a transformer.

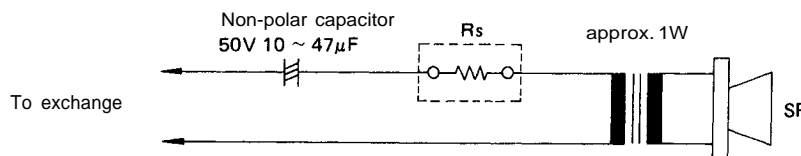
If it is desired to use lower impedance speakers, a transformer should be used to assure proper impedance matching.

2. Volume may be controlled only when:

(a) a matching transformer is used.



(b) a resistor is connected.



The  $R_s$  value should be decided in accordance with the speaker impedance so that the volume is on a suitable level.



## 9-2 Paging Connection

### 1. PA Paging

The audio signal line and control line from the PI unit are connected to clip terminal P1 or P2 inside the terminal board. Fig. 1 shows how to make connections between the terminal board (BX-610 or BX-620) and external PA amplifier.

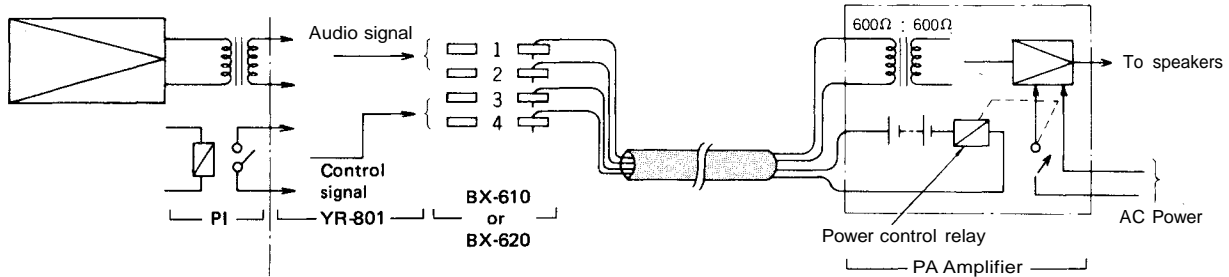


Fig. 1

### Specifications of each output line

1. Audio signal line
  - Impedance: 600 ohms, balanced
  - Output level: -10dBm
2. Control line
  - Relay contact capacity: 30V DC, 0.5A

If the distance between the terminal board (BX-610 or BX-620) and external PA amplifier is over 33 feet (10m), use the balanced type to avoid external noise such as hum. Care should be taken in selecting a relay for power control of the external PA amplifier due to the small line contact capacity (30V, DC 0.5A). Refer to Fig.1.

- Two different types of PI Unit, Type 1 (Standard) and Type 2 (modified version of Type 1), are necessary to employ the "All-call plus 15 or more individual paging zones" function.
  1. PI-62 Type 1 (PI1) is different from PI-62 Type 2 (PI2-PI4) in the following parts being used in each unit.

Table 1

Type	PI-62 Type 1 (PI1) All-call + 7 Paging Zones (No. 1-7)	PI-62 Type 2 (PI2- PI4) 8 Zones (No. 8-15,16-23,24-31) without All-call
Jumper Wire (JW)	Connected	Disconnected
R100(200kΩ)	Not mounted	Mounted

Refer to Fig.3 for the modification.

2. For Ex-610 and Ex-620, "Station paging assignment plug" needs to be modified. Refer to the following instructions for the modifications.

Solder the electrolytic capacitor (33  $\mu$ F) to the terminals, and "PO" and "No. 319" (paired with No. 312) for EX-620, "PO" and "No. 255" (paired with No. 248) for EX-610 of "Station Paging Assignment" on the rear of exchange frame. Do not connect No. 319 (255) to GND.

Polarity of capacitor ... PO: -, No. 319 (255): +

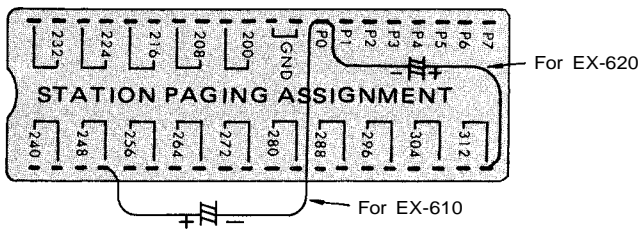
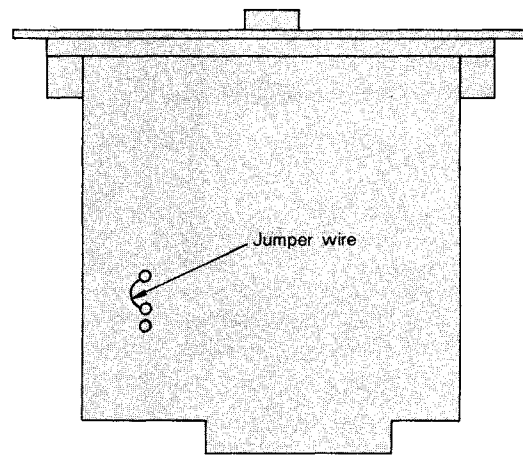


Fig. 2

a.PI-62 Type 1 (PI1)



b. PI-62 Type 2 (PI2-PI4)

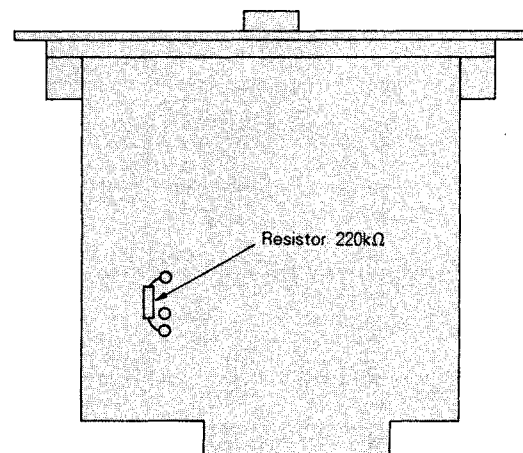


Fig. 3

**2-1 Station Paging (for EX-610/620)**

(1) The paging outputs of the PI unit must be connected to the assigned lines of the LM unit via the station paging assignment plug provided at the back of the exchange. Follow the procedures below to make the required connections.

**<For the LM-62A unit>**

1. After determining the zone allocation, record it in the Station Paging Table, part of Initial Checking Sheet for the system (CP-62/63/64). Refer to tables 1 and 2.
2. Perform the wiring of the station paging assignment plug by soldering according to the zone allocation determined. Refer to Fig. 1 and Table 1.

3. Cut off unnecessary jumper wires (JP3 ~ JP8) and resistor (R126 ~ R826) of the LM unit according to the zone allocation.
4. If the exchange is the EX-610, both No. 256 and No. 263 pins of the assignment plug must not be connected to the GND pin.

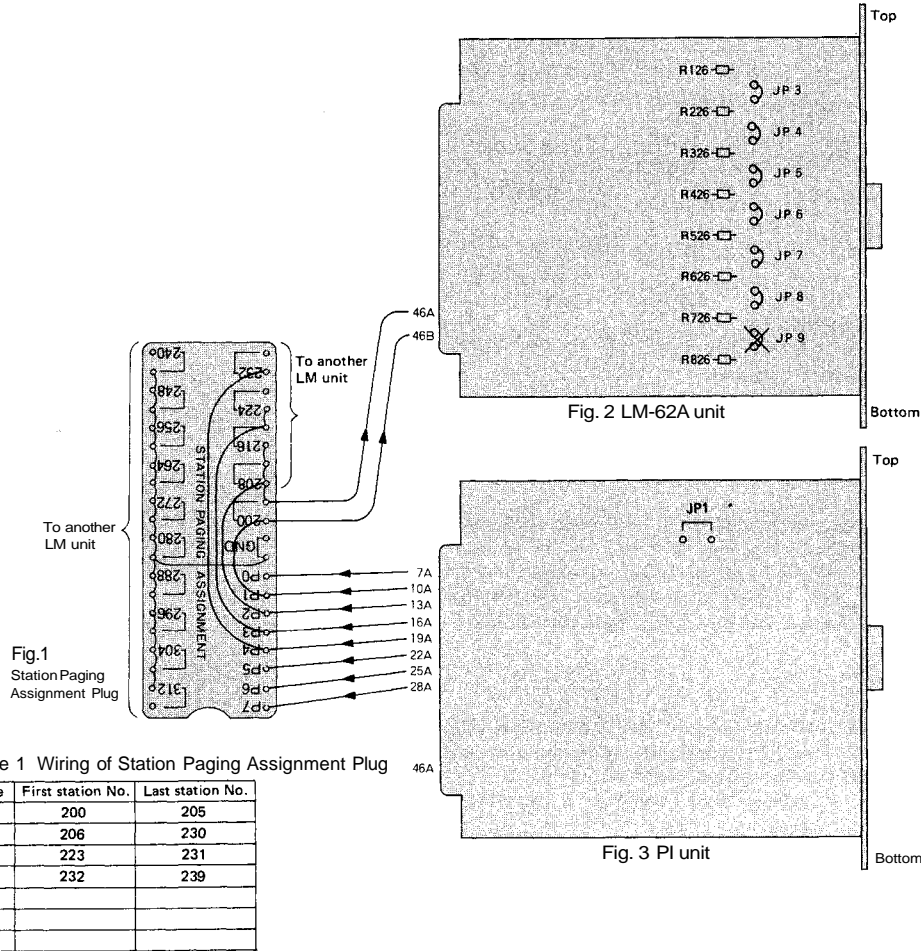


Table 1 Wiring of Station Paging Assignment Plug

Zone	First station No.	Last station No.
1	200	205
2	206	230
3	223	231
4	232	239
5		
6		
7		

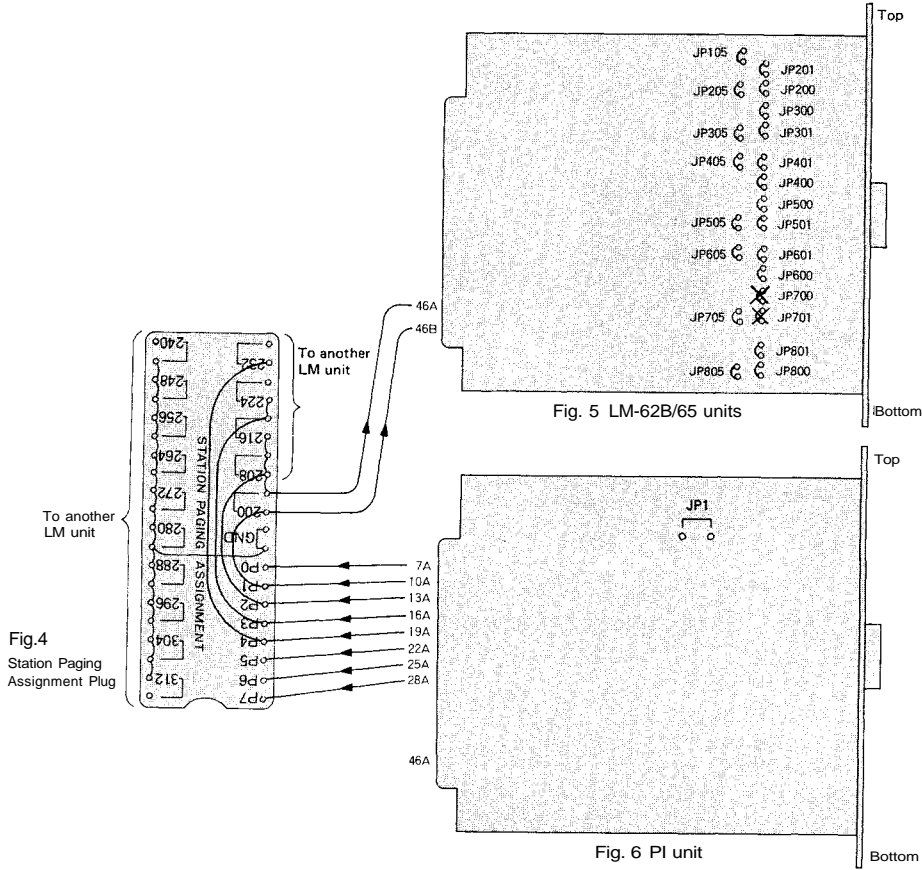
Table 2 Station Paging Connection (LM Unit)

LM No.	LM Station No.	Paging distribution line							Unrequired paging line							Paging Zone			
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	LM	PI
		JP3	JP4	JP5	JP6	JP7	JP8	JP9	R 126	R 226	R 326	R 426	R 526	R 626	R 726	R 826	46A	46B	
1	200(20) - 207(27)							X										200	→ P1
2	208(28) - 215(35)																	208	→ P2
3	216(36) - 223(43)																	216	→ P3
4	224(44) - 231(51)																	224	→ P4
5	232(52) - 239(59)																	232	
6	240(60) - 247(67)																	240	
7	248(68) - 255(75)																	248	
8	256(76) - 263(83)																	256	
9	264(84) - 271(91)																	264	
10	272(92) - 279(99)																	272	
11	280 - 287																	280	
12	288 - 295																	288	
13	296 - 303																	296	
14	304 - 311																	304	
15	312 - 319(P1)																	312	
16	PI																	319	X

**Note:** Mark the disconnected jumper wire or resistor with "X".

<For the LM-62B/62C/65/65C units>

1. After determining the zone allocation, record it in the Station Paging Table, part of Initial Checking Sheet for the system (CP-66). Refer to tables 3 and 4.
2. Perform the wiring of the station paging assignment plug by soldering according to the zone allocation determined. Refer to Fig. 1 and Table 1.
3. Cut off unnecessary jumper wires (JP200 ~ JP800, JP201 ~ JP801, JP105 ~ JP805) of the LM unit according to the zone allocation.
4. If the exchange is the EX-610, both No. 256 and No. 263 pins of the assignment plug must not be connected to the GND pin.



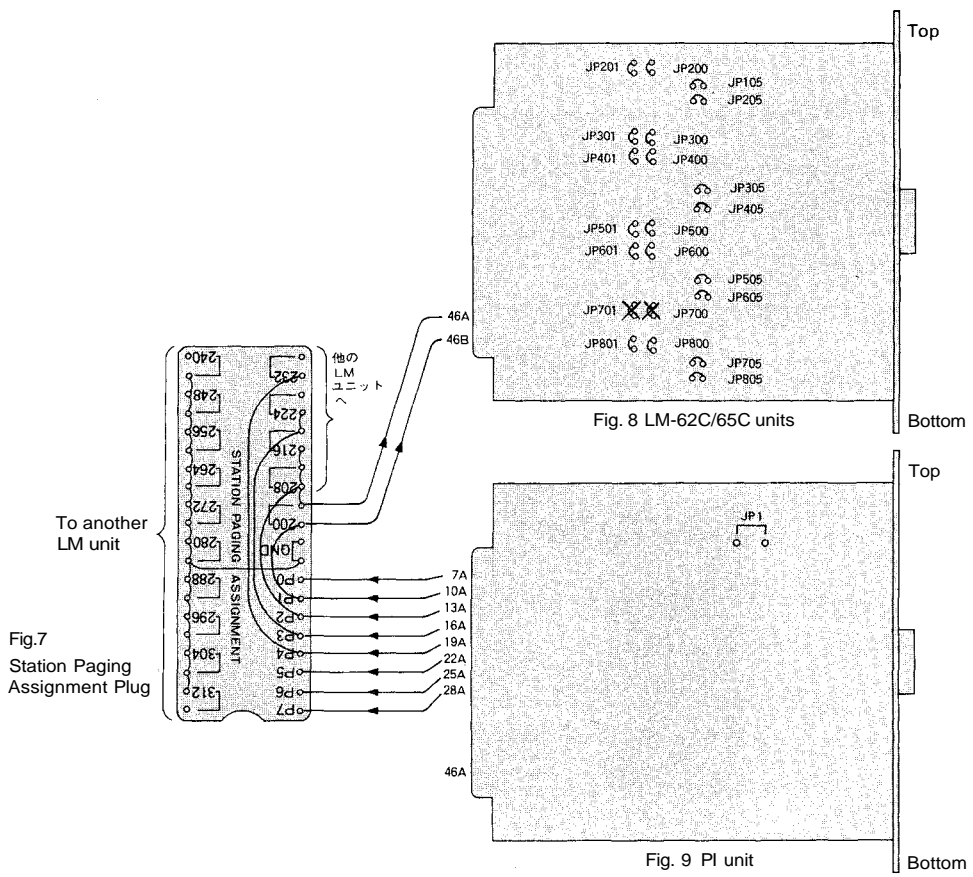


Table 3 Wiring of Station Paging Assignment Plug

Zone	First station No.	Last station No.
1	200	205
2	206	230
3	223	231
4	232	239
5		
6		
7		

Table 4 Station Paging Connection (LM Unit)

LM No.	LM Station No.	Paging distribution line							Unrequired paging line							Paging Zone			
		0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	LM	PI
		JP201 JP201	JP201 JP201	JP401 JP401	JP501 JP501	JP601 JP601	JP701 JP701	JP801 JP801		JP105 JP105	JP205 JP205	JP305 JP305	JP405 JP405	JP505 JP505	JP605 JP605	JP705 JP705	JP805 JP805	46A	P1~P7
1	200(20)~207(27)						X											200	P1
2	208(28)~215(35)																	208	P2
3	216(36)~223(43)					X		X										216	P3
4	224(44)~231(51)																	223	P4
5	232(52)~239(59)																	232	
6	240(60)~247(67)																	240	
7	248(68)~255(75)																	247	
8	256(76)~263(83)																	256	
9	264(84)~271(91)																	264	
10	272(92)~279(99)																	271	
11	280																	279	
12	288																	280	GND
13	296																	288	
14	304																	296	
15	312																	304	
16	PI																	312	

Note: Mark the disconnected jumper wire or resistor with "X".

(2) Connection example

1. If the station paging zones are to be assigned as shown in Table 1, each individual LM unit is divided as shown in Fig. 4.
2. Cut off the following the jumper wires of the LM unit to allocate stations of each group.
  - ◎ <For the LM-62A unit> Refer to Table 2.
  - LM1 (No. 200 ~ 207): JP8
  - LM3 (No. 216 ~ 223): JP7 and JP9
  - (2) <For the LM-62B/62C/65/65C units> Refer to Table 4.
  - LM1 (No. 200 ~ 207): JP700 - JP701
  - LM3 (No. 216 ~ 223): JP600/JP601 and JP800/JP801
3. Stations of each group must have the consecutive station numbers. The station included in the group but not requiring the station paging function can be disconnected by cutting off the corresponding resistor wires or the jumper wires of stations.
  - ◎ <For the LM-62A unit>
  - R126 ~ R826 Refer to Table 2 and Fig. 2.
  - (2) <For the LM-62B/62C/65/65C units>
  - JP105 ~ JP805 Refer to Table 4, Fig. 5 and 8.
4. Perform the wiring of the station paging assignment plug for connection between the LM and PI units. (See Fig. 1, 4 and 5.) The plug can be detached by inserting a screwdriver into between the plug and its socket after removing the rear panel of the exchange. (When inserting the screwdriver, take care that pins are not damaged.)
5. Paging output lines of the PI unit have been connected to pins No. PO through P7 of the plug. For station output lines of the plug, the pin corresponding to the first station number of each LM unit has been connected to a connector 46B of each LM unit, with the pin corresponding to the last station number of each LM unit having been connected to a connector 46A of each LM unit.
  - EX-610: LM1 - LM7 (Station No.200 ~ No.255)
  - EX-620: LM1 ~ LM15 (Station No.200 ~ No.319)
6. Use solder to connect each PI output pin (PO through P7) of the plug to the input pin of the first or last station number of the corresponding paging zone. (Refer to Fig. 1)
7. If the paging zone involves 2 or more LM units, connect between two pins (of the plug) corresponding to the last station number of one LM unit and to the first station number of another LM unit. If there is the LM unit not used for paging, be sure to connect its corresponding two input pins of the plug to the GND pin. Failure to do this can cause crosstalk.
8. After finishing these connections, insert the plug into its 40-pin socket.

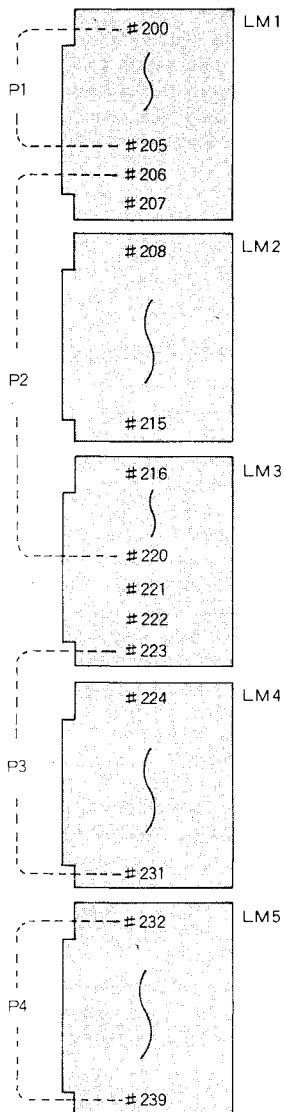


Fig. 4 Assignment of Station Paging

**Important! To give easy access to the station paging assignment plug, provide sufficient space between the wall and the rack.**

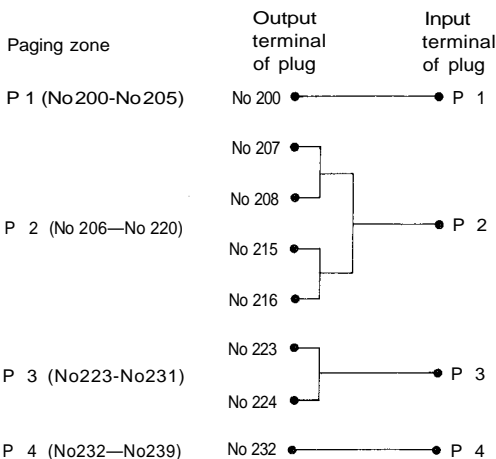


Fig. 5 Connection of Station Paging Assignment Plug

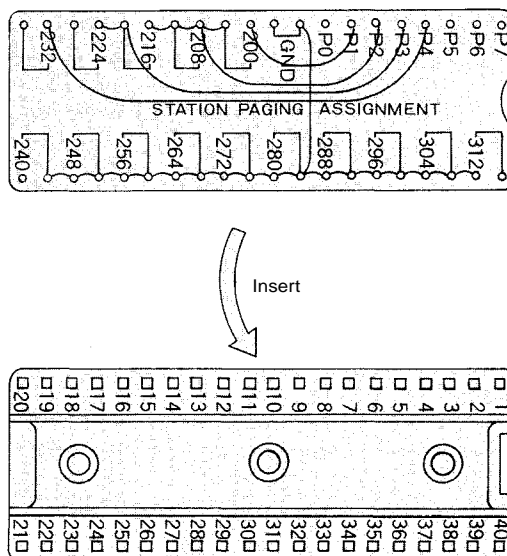


Fig. 6

## 2.2 Station Paging (for EX-630)

(1) The paging outputs of the PI units must be connected to the assigned lines of the LM unit via the SA unit. Follow the procedures below to make the required connections.

1. After determining of the zone allocation, record it in the Station Paging Table of "Initial Checking Sheet for the System (CP-64/66)". Refer to Table 1 and Fig. 2.
2. Perform the wiring of the SA unit using solder according to the zone allocation determined. (Table 1.)
3. Cut off unnecessary jumper wires of the LM unit (JP200 ~ JP800, JP201 ~ JP801, JP105 ~ JP805). Refer to Table 2 and Fig. 2.

(2) Connection example

1. If the station paging zones are to be assigned as shown in Table 1, each individual LM unit is divided as shown in Fig. 1.
2. Cut off the following the jumper wires of the LM unit to allocate stations of each group.
  - ① <For the LM-62A unit> Refer to Table 2.  
LM1 (No. 200 ~ 207): JP8  
LM3 (No. 216 ~ 223): JP7 and JP9
  - ② <For the LM-62B/62C/65/65C units> Refer to Table 3.  
LM1 (No. 200 ~ 207): JP700 ~ JP701  
LM3 (No. 216 ~ 223): JP600/JP601 and JP800/JP801
3. Stations of each group must have the consecutive station numbers. The station included in the group but not requiring the station paging function can be disconnected by cutting off the corresponding resistor wires or the jumper wires of stations.
  - ① <For the LM-62A unit>  
R126 ~ R826 Refer to Table 2.
  - ② <For the LM-62B/62C/65/65C units>  
JP105 ~ JP805 Refer to Table 3.
4. Perform the wiring of the SA unit for connection between the LM and PI units. The paging lines of the PI unit have been factory wires to pins No. P1 through P31 of the SA unit and the paging input lines of the LM unit have been connected to pins No.1 through No.32 for the LM unit. Use solder to connect each paging zone to the first station number or last station number of LM. (Refer to Fig. 2.)
5. If one paging zone involves 2 or more LM units, connect between two pins (of the SA unit) corresponding to the last station number of one LM and to the first station number of another LM unit.
6. In the SA unit, all the paging input lines of the LM are short-circuited to ground via jumper wires. Be sure to cut off the jumper wires corresponding to the LM unit used for paging. Refer to Fig. 2.

Table 1 Wiring of SA Unit

Zone	First station No.	Last station No.
1	200	205
2	206	230
3	223	231
4	232	239
~~~~~		
29		
30	—	—
31	—	—

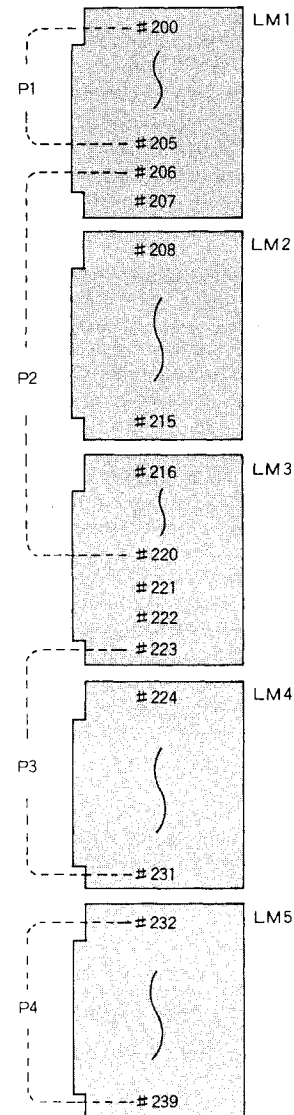


Fig. 1 Assignment of Station Paging



### 9-3 Calling Tone Modifications

- The EXES-6000 system permits you to select any one of the following calling tones ((a) ~ (c)) by connecting or cutting the jumper wires and a resistor on the SG-62 unit.
  - 627Hz/783Hz trill tone (factory-wired to this tone)
  - 470Hz/627Hz trill tone
  - 627Hz single tone
- Modifications necessary for selection of desired calling tone.

	Type of Calling tone	JP-4	JP-5	JP-6	R32 (68kΩ)
(a)	627Hz/783Hz Trill tone (factory-wired to this tone)	Connect	Cut	Connect	Connect
(b)	470Hz/627Hz Trill tone	Cut	Connect	Connect	Connect
(c)	627Hz Single tone	Leave this intact	Leave this intact	Cut	Cut

#### 3. Notes

- Select calling tone (a) or (b) when the station needs to be called by a continuous calling tone.
- Even when (a) or (b) tone is selected, by selecting the DIP switches of the CP-unit, the calling tone of the hands-free station alone can be made a Single note tone 470Hz (0.2 second).

### 9-4 Precautions in using conference unit

The Conference Unit CL-62A is required for holding the intercom conference. Build this unit in all exchanges connected by tie-line. It is not possible to originate the conference from a station connected to the exchange without the CL unit but possible to participate in the conference from that station.

### 9-5 Indication and control

Use the DT-E60 data transmitting unit or the DR-B61 data receiving unit for indication and control.

DT-E60: One (1) DT-E60 unit can be mounted in the rack type exchange. Use the YR-806 cable (1000 mm in length). When using 2 or more DT-E60 units, mount them in an equipment rack. Use the YR-802 cable (400 mm in length) for connection between the exchange and the DT-E60, and the YR-803 extension cable for the DT-E60.

DR-B61: Such devices as indicator, control unit etc. can be made by using this unit and 24V DC power supply.

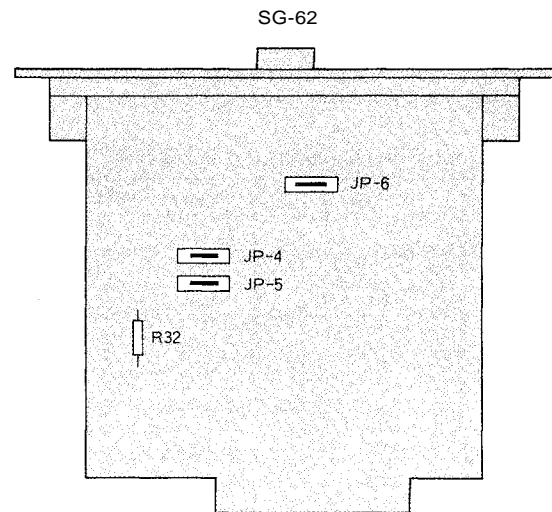
### 9-6 Connecting the station for emergency paging

Connect the station to pin No.247 (147). An emergency paging call can be placed by lifting a handset of the handset type station or by shifting back the Privacy switch of the handsfree station from ON to OFF.

### 9-7 Press-to-talk control

The PI-62 paging interface is required.

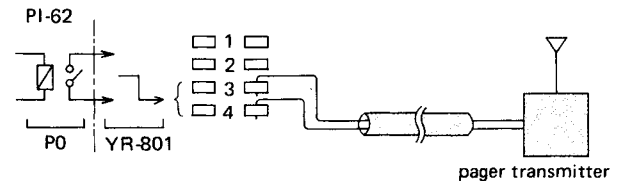
- Be sure to use the PI-62 Type 2, a modified version of Type 1.
- Insert the Type 2 into the PI2 slot (Zone No.8 ~ No.15) when the EX-610 or EX-620 exchange is used, and into the PI4 slot (Zone No.24 ~ No.31) when the EX-630 exchange is used.
- Call the station No.200 (No.100) ~ No.207 (No.107). Pressing the PTT bar causes the relay corresponding to No.0 to No.7 of the PI unit to be connected, and releasing it disconnects the relay.
- The press-to-talk control function can be used for door lock release, switch control of signal transmission/reception to and from radio equipment via an interface, etc.



### 9-8 Connection of PI-62 to call a pager receiver

It is possible to call a pager receiver by connecting the PI-62 to a pager transmitter having an interface of serial input (dial speed: 10 pps).

[Connection diagram]



Note. Cut off a jumper wire (JP1) shown in Fig. 3 page 23, Fig. 6 page 24 and Fig. 9 page 25.

[Specifications]

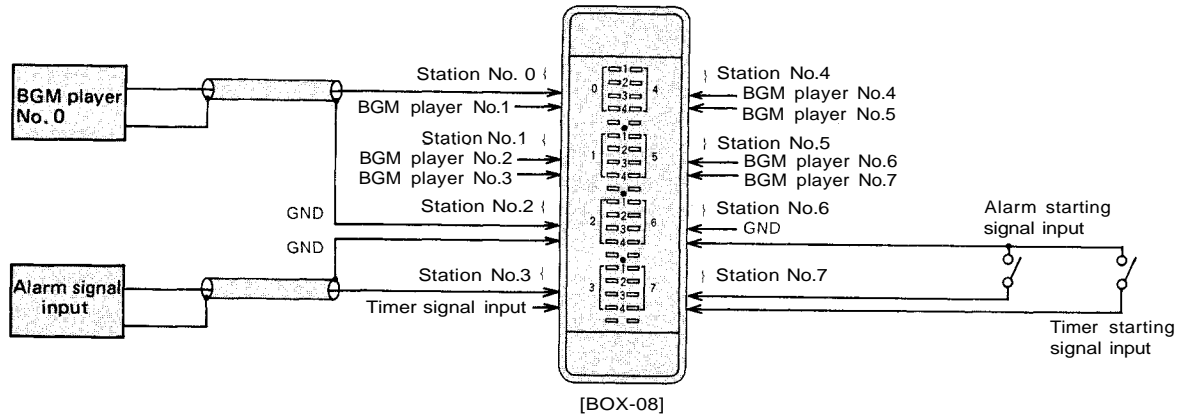
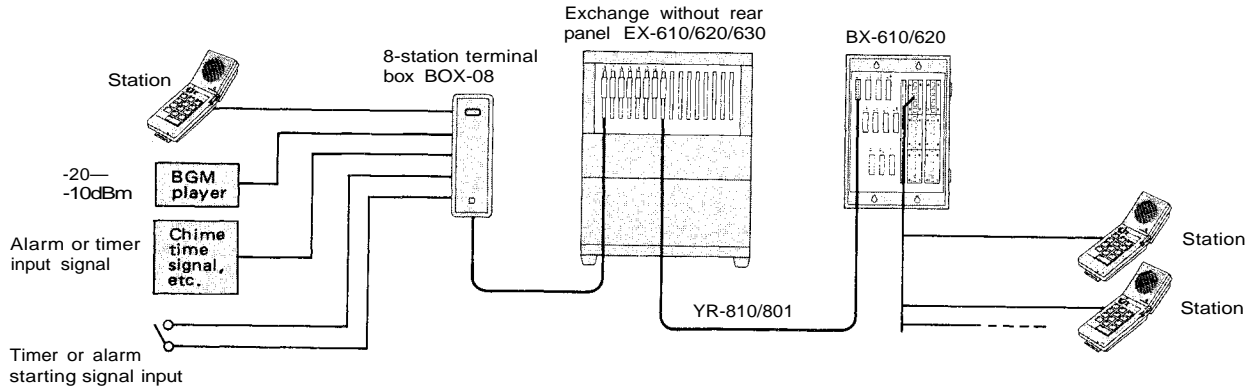
- Contact capacity: 12.5 VA (30VDC 1 A)
- Dial speed: 10 pps



## 9-9 BGM equipment connection

By connecting both the LM-65/65C and BOX-08 to a BGM player, a time signal machine or a chime generator, background music, time signal or chime may be heard from the station.

[Connection diagram]

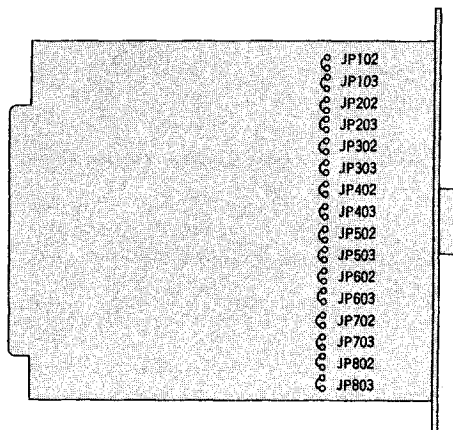


### [Sound volume adjustment]

#### <For the LM-65 unit>

The BGM volume of each individual station may be decreased by cutting off the corresponding jumper wires (JP103-JP803, JP102-JP802). See the figure below.

1. Cutting off the jumper wire having the greatest number of the two (JP103-JP803) decreases the volume by 6 dB.
2. Cutting off the both of the paired jumper wires (JP103-JP803, JP102-JP802) decreases the volume by 12 dB.



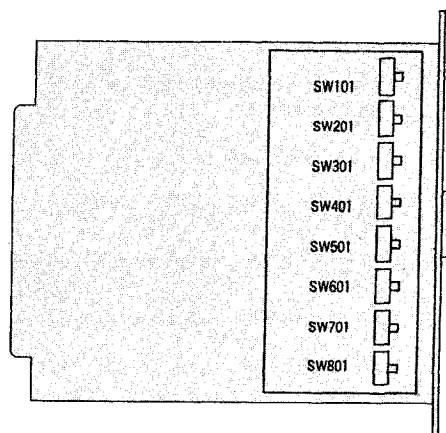
#### <For the LM65C unit>

The BGM volume of each individual station may be adjusted by setting the corresponding switches (SW101-SW801).

See the figure below.

1. Setting the switches having the greatest number of the two (SW101-SW801) to the center position decreases the volume by 6 dB.
2. Setting the switches (SW101-SW801) to the MIN position decreases the volume by 12 dB.

**Note:** Switch is preset to the MAX position when unit is shipped from factory.



## 10. Performance test

### 10-1 Check when Power is Switched On

- \* Before turning on the power switch, check if the power cord is plugged in and the fuse is in place. Also, check for damage to the printed circuit board, connectors and power section. Make sure that the connections of exchange and stations are completed.
- \* Turn on the Power switch of the exchange.
- \* The front-mounted AC indicator of the exchange comes on. If it does not come on, set the power switch to OFF and check both the cord and fuse.
- \* Connect batteries after confirming that the system operates on AC mains. Use 2 batteries for the EX-610 and 3 batteries for the EX-620/630: voltage; 24V, capacity; 3.5 Ah per battery for EX-610/620, 6A per battery for EX-630.
- \* With batteries connected, system unit automatically switches to battery operation when AC power source is cut off. In the event of the DS-610, DC indicator lamp will be on being accompanied by buzzer. To stop the buzzer, push the buzzer reset switch. In the event of the DS-620/630, an operation indicator lamp changes from green to red.

### 10-2 Speech and Function Tests

After completion of wiring, exchange checks and power supplying, perform operation and function tests from each station. Record the test results in "Initial Checking Sheet for CP-66".

#### 1. Speech Test

- \* Under the normal condition, make conversation using the stations connected to the exchange and check the sound volume and sound quality.
- \* According to the operation environment (surrounding noise, echo, installed location, etc.), the microphone sensitivity or speaker volume needs to be adjusted for hands-free conversation.
- \* When the paging function is employed, adjust the gain of the paging amplifier or change the installed location of the speakers and stations to minimize feed-back.

#### <Method of Speech test>

##### (1) Hands-free conversation

1. Call the other station.
2. Start conversation about 50 cm away from each station to check the sound quality and its volume.
3. Confirm that the automatic voice switching allows for smooth conversation.
4. When the other station is in a very noisy area, the voice switches are liable to fail to work properly, causing the voice from the station in a quiet area to be interrupted. In this case, adjust microphone sensitivity and speaker sound volume according to the operating instructions contained in a package of each station.

##### (2) Conversation between a handset station and handsfree station

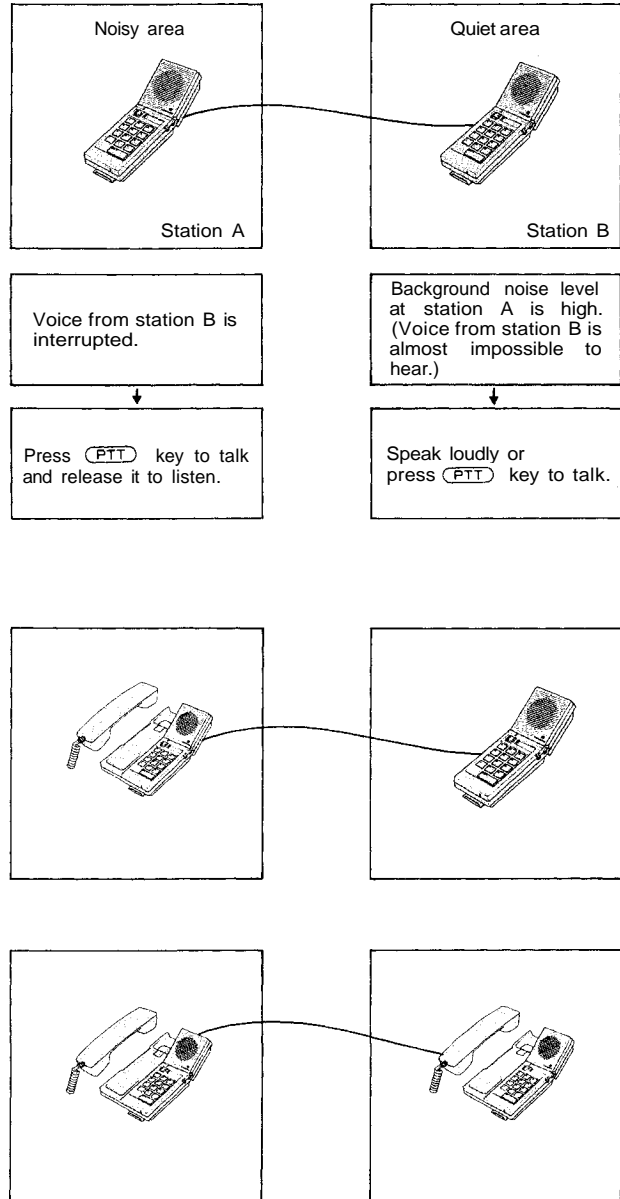
1. Call the other station.
2. Start conversation and check the sound quality and sound volume. Also confirm that simultaneous conversation is possible.
3. When feedback occurs, adjust the microphone sensitivity or speaker volume of the hands-free station.

##### (3) Handset conversation

1. Call the other station.
2. Start conversation and check the sound quality and sound volume. Also confirm that simultaneous conversation is possible.

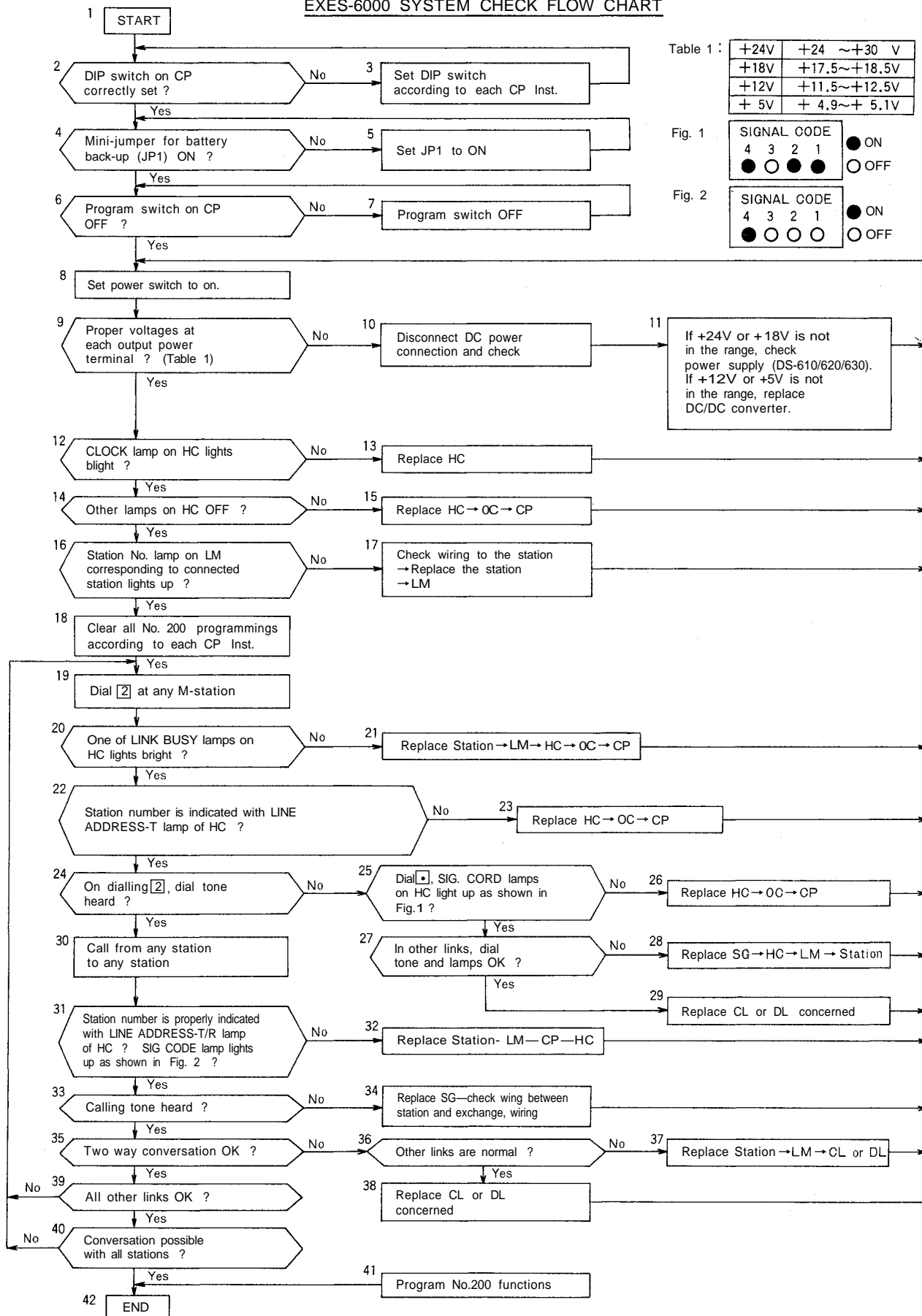
#### 2. Function Test

Confirm that each function works properly by performing tests according to operation manual.



# 10-3 System Check Flow Chart

## EXES-6000 SYSTEM CHECK FLOW CHART



## 10-4 Simple troubleshooting

### ● Delimitative point for system check

A system is checked for the following delimited portions.

Exchange	⊗	Line	⊗	Station
BX-610/620		YC-601/603		

### ● Exchange check

An exchange is checked for the following delimited portions.

- (1) Speech path section SG-62, DL-62A, LM-62B, PI-62, CL-62A, TI-62, and SA-64
- (2) Speech path control section CP-66, OC-62, HC-62, and HC-64
- (3) Power supply section DS-610, DS-620 and DS-630

### ● Line Check

Line faults are checked with the LED lamps of the LM. The LED lamps light orange in an normal condition.

- (1) Symptom — No LED lights up.  
Cause — L1 and L2 have broken in most cases.
- (2) Symptom — When a call is made, two speech links are connected at a time.  
Cause — L1 or L2 is connected to the other station.
- (3) Symptom — The lamps of the LM are lighting yellow.  
Cause — L1 and L2 are short-circuited.
- (4) Disconnect the lines from both the exchange and station and only check the lines for the following.

- Between the BX-610/620 and YC-601/603
- Ground to station insulation (Over 1M $\Omega$ )
- Insulation between lines (Over 1Mft)
- Resistance (Below 100S $\Omega$  for 1km with 0.65mm thick cable)

### ● Station

A station can be divided into the following portions.

- (1) Microphone circuit and amplifier
- (2) Keyboard and dial signal transmitter
- (3) Speaker
- (4) Power supply

To find cause of failures, check for the following symptoms first because the failures, for the most part, show such symptoms. When there is a failure, however, first replace the station with one which works normally. If the symptom remains unchanged, then the trouble lies in the station or in the line. If the station replacement causes the state to return to normal, then the trouble lies in the station.

- (1) Symptom — In-use lamp does not come on when dialled.  
Cause —
  - LED is faulty . . . Dialling is possible.
  - Power supply section is faulty . . . No dialling is possible.
  - M5 (HB 1C) is faulty . . . Dialling is possible
- (2) Symptom — No dial tone is audible when dialled.  
Cause —
  - Speaker wires are broken . . . No tone.
  - Transformer wires are broken.  
. . . Hum noise is provided.
- (3) Symptom — Two stations are connected, but calling party's voice does not reach called party.  
Cause —
  - 1C of M2 is faulty . . . No dialling is possible.
  - Unless replacement of printed circuit board remedies situation, microphone is faulty.
- (4) Symptom — No dialling is possible.  
Cause —
  - If no signal is transmitted when dialled, M5 (HB 1C) is faulty.
  - If only specific keys can be dialled and replacement of printed circuit board does not remedy situation, trouble is in keyboard matrix.

- (5) Symptom — No fully-duplex (simultaneous) conversation is made when handset is lifted. (HF-200M and TL-600).

- Cause —
- Hook switch in printed circuit board is faulty if state remains the same despite replacement of station printed circuit board.
  - Forty Hertz (40Hz) oscillator is faulty . . . Both conversation and dialling are possible.

### ● Whole system check

- (1) Confirmation of numbering schedule  
Points to check for numbering schedule
- Are stations of the same paging group numbered consecutively?
- Is the maximum number of paging groups two for the same LM unit?
- Confirm if stations are grouped correctly for calling party indication.
- Confirm if the station indicated on the in/out annunciation board by the personal number is in the correct place (office).
- Confirm if the station is connected to the corresponding terminal of the terminal box.
- (2) Confirmation of power fuse current capacity (DS-610/620/630)
- (3) Confirm if the CP DIP switches are properly set for each function.
- (4) Confirm if a memory backup jumper of the CP is set to ON.
- (5) Confirm if the exchange is wired properly as planned in the station paging group numbering schedule.
- (6) Confirm wiring of the paging assignment unit.
- (7) Confirm the channel number of the DT-E60.
- (8) Confirm if both the YR-810 and YR-801 cables are used properly.
- (9) Confirm that setting the power switch to ON causes all link busy indicators on the HC to go out.
- (10) Set the front-mounted program switch of the CP to ON.
- (11) Make the exchange initial setting. (Turn off the program switch after setting.)
- (12) Perform link tests.
- (13) Perform speech tests by calling other stations from the station No. 200.
- (14) Turn on the CP program switch.
- (15) Program each function into the exchange from the station No. 200.
- (16) Perform function tests.
- (17) Check battery connection.

