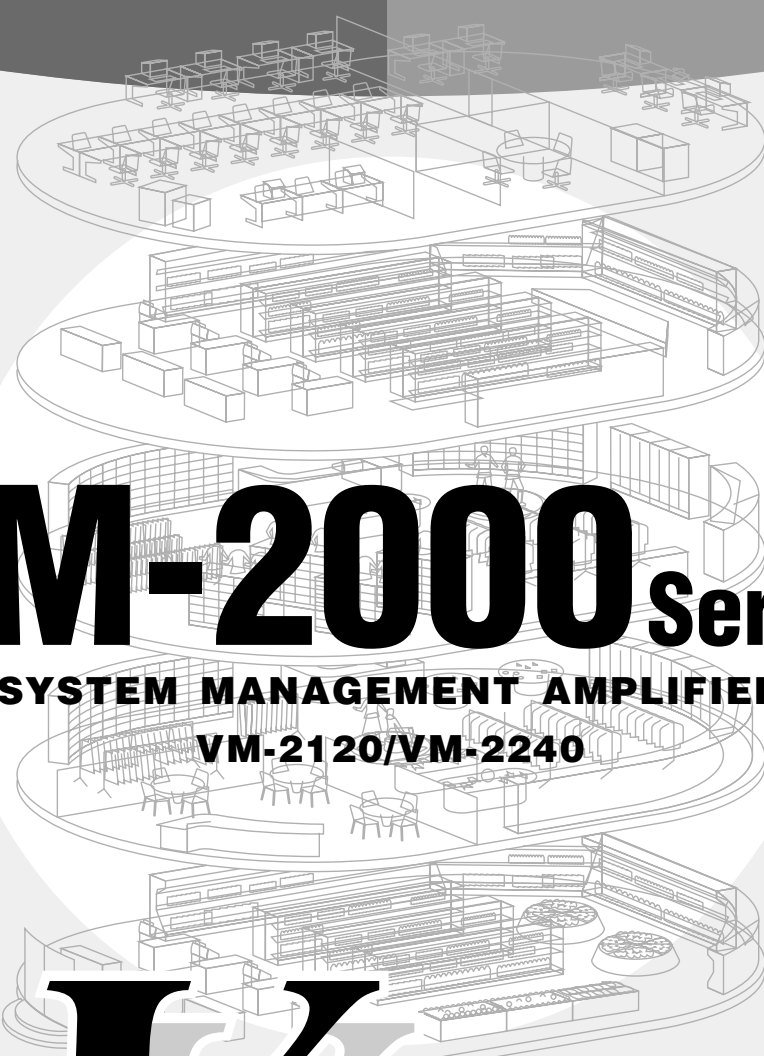# TOA

# Cook Book

# VM-2000 Series

## SYSTEM MANAGEMENT AMPLIFIER
### VM-2120/VM-2240

# VenaS

*Integrated Voice Evacuation System*

# INDEX

# General Description

The TOA System Management Amplifiers VM-2120 and VM-2240 are expressly designed to fulfill increasing requirements for reliable and efficient communications in mid-size facilities such as office buildings, factories, hospitals, transportation terminals and many other sites. Both amplifiers are multifunctional designs, with the VM-2120 rated at 120W and the VM-2240 at 240W. Each amplifier may be cascade-configured to meet increased power demands. Conforming to EIA standards both amplifiers may be rack-mounted, taking up just a 3-unit space.

A VM-2000 Series amplifier accepts six audio inputs which include two BGM inputs and a telephone paging input. Speaker output selector for five zones is provided as well as an internal speaker attenuator. In addition to general-purpose broadcasts, EN60849* standard-based emergency broadcasts which may be pre-recorded[1] or transmitted via the optional RM-200M Remote Microphone are possible. These operations can also be remotely controlled using external auxiliary equipment.

A VM-2000 Series amplifier is also equipped with surveillance capability[2] that conducts automatic system checks for malfunctions.

\* EN denotes European Standard
[1] requires optional EV-200 Announcement Board.
[2] requires optional SV-200M Surveillance Board.

### Remote Microphone RM-200M
May be connected to either amplifier to provide general purpose and emergency broadcasts.

### Remote Microphone Extension RM-210
Facilitating communications as an extension unit for controlling key system operations.
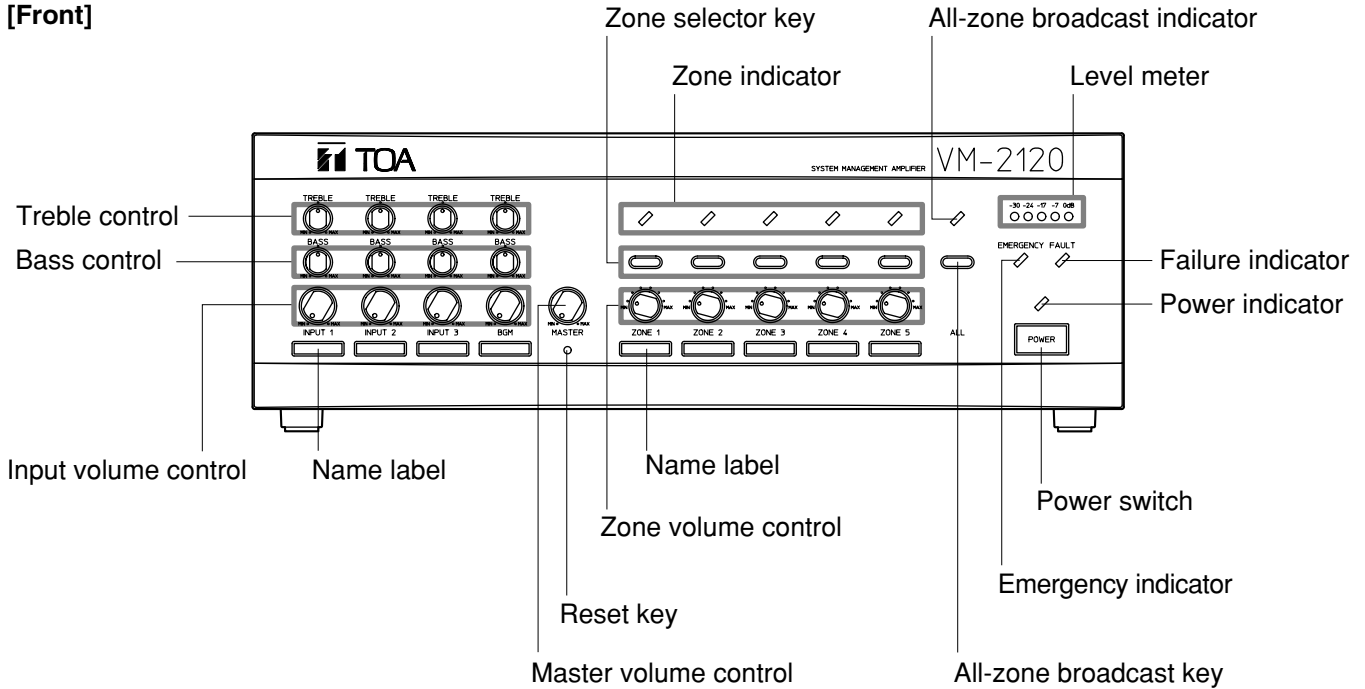
# Features

● A VM-2000 Series amplifier can be combined to increase its system coverage number of speaker zones.

● Use of the optional SV-200M Surveillance Board allows system-wide integrity to be conveniently monitored such as CPU-initiated automatic checking at pre-set times for open or shorted speaker lines, any speaker circuit ground leaks as well as power amp section malfunctions. Signals can be sent to a status display which simplifies maintenance and instantly calls attention to faults.

● If the EV-200 Voice Announcement Board is used, five general-purpose messages and two emergency messages as well as a chime tone can be output. To record customized announcements and messages, the optional EV-350R Digital Announcer can be used. In addition, this allows adding a customized chime tone to the six built-in chime tones.

● When a VM-2000 Series amplifier is used in combination with an emergency power supply unit*, a backup battery ensures uninterrupted operation during power outages.

  * TOA DS-1000B or similar emergency power supply unit.

● During emergency situations a VM-2000 Series amplifier can provide phased emergency broadcasts as per EN60849* standard.

● Emergency broadcasts preempt system volume settings as well any external attenuators to ensure the broadcast is easily heard in any speaker zone.

● Four priority levels can be set for general broadcasts. All priority levels of general broadcasts are overridden in an emergency situation while emergency broadcasts are supplied to all zones.

● Standard speaker line distribution is rated for 100V applications. 50V or 70V speaker line distribution can also be selected by an easily performed internal wiring change.

● The system will accept up to four remote microphones (RM-200M) that can be extended totally up to a maximum of 800 meters.

● The independent speaker zones may be programmed into a maximum of five groups to receive group broadcasts. If a remote microphone is used, it can broadcast to Group 1 and Group 2.

● The RM-200M remote microphone provides announcements with extraordinary clarity and freedom from distortion thanks to a high-performance built-in compression circuit.

# Nomenclature (VM Amplifier)

## System Management Amplifier VM-2120/-2240

**[Front]**

Zone selector key

Zone indicator

All-zone broadcast indicator

Level meter

Treble control

Bass control

TOA                    SYSTEM MANAGEMENT AMPLIFIER    VM-2120

EMERGENCY FAULT

Failure indicator

Power indicator

Input volume control        Name label          Name label

Power switch

Zone volume control

Emergency indicator

Reset key

All-zone broadcast key

Master volume control

**[Rear]**

Preamplifier output jack        Line output jack

24 V DC power input        BGM input jack

SV-200M        EV-200

AC inlet

Audio input terminal

Fuse holder

Signal earth terminal

Link connector

Attenuator control, external speaker input, speaker output connector

Remote microphone input volume control

Chime volume control

Power amplifier input jack

Telephone paging volume control

Recording output jack

External connection terminal

Control input and output connector        Function switch

BGM input volume control

# Nomenclature
# (EV-200, SV-200M, RM-200M, RM-210)

## Voice Announcement Board EV-200

CPU status indicator

Eject button

CPU RUN

COMPACTFLASH CARD

ACCESS

Card access indicator

CF card slot

Voice Announcement board volume control

## Surveillance Board SV-200M

Speaker line impedance setting key

13 SURVEILLANCE I/O 1    SP LINE IMPEDANCE

25    14    SET  CHECK

Surveillance input and output connector

Line check key

## Remote Microphone RM-200M

**[Top]**

Groups 1&2 broadcast key

Name label

Gooseneck microphone

Name label

Zone indicator

Power indicator

Zone selector key

Failure indicator

Emergency indicator

Zone/Message selector key

Emergency broadcast switch

Groups 1&2 indicator

TOA RM-200M REMOTE MICROPHONE

Talk key

Zone/Message indicator

All-zone indicator

In-use indicator

All-zone broadcast key

Busy indicator

**[Right Side]**

Gooseneck microphone

Function setting switch

Extension connector

**[Rear]**

DC POWER IN 24V    LINK    SP MIC    EXTERNAL MIC IN

DC power input jack

Link connector

Microphone volume control

External microphone input jack

## Remote Microphone Extension RM-210

**[Top]**

Zone/Message indicator

Name label

Zone/Message selector key

TOA RM-210

**[Left Side]**

Extension connector

# Input 1-3 (MIC/LINE)

Inputs 1 – 3 can be set for a microphone signal input level ( –60 dB, 600 Ω) or a line signal input level ( –10 dB, 600 Ω) by moving the SETTINGS switch in Fig. 1 to the ON or OFF position. The three inputs also feature Neutrik connectors that permit connection to XLR connectors and phone plugs. Furthermore, Input 1 can also be used for DIN plugs as well.

**Equipment that can be connected to these input includes:**
• Dynamic microphones
• Paging microphones
• Wireless tuners
• Background music players

**Fig. 1**



**Usable connectors and plugs**

• XLR type male connector

Pin 1: Ground    Pin 2: Hot
Pin 3: Cold

• Phone plug

Sleeve: Ground

Ring: Cold    Tip: Hot

DIN connector

XLR type connector    Phone plug

All switches No. 1 – 8 are factory-preset to the OFF position.

SETTINGS
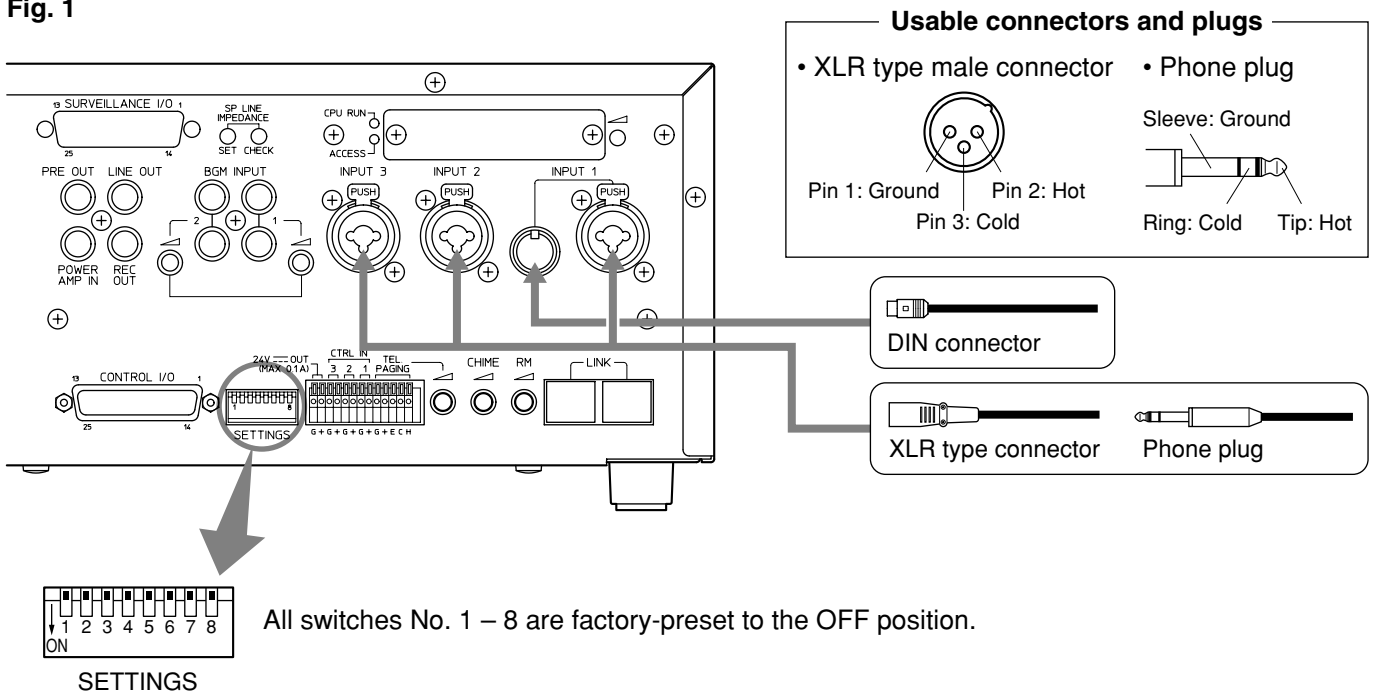
| Switch No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function | Phantom Power*1 | Telephone Paging | Chime Selection | | | Input 3 | Input 2 | Input 1 |
| OFF (Up position) | OFF | Chime ON | See the Chime | | | Mic | Mic | Mic |
| ON (Down position) | ON | Chime OFF | Selection table | | | Line | Line | Line |

*1 Simultaneously turns on or off the phantom power of Inputs 1 – 3. For the method to switch off the phantom power for the individual Inputs 1 to 3, consult the shop from whom the unit was purchased.

# BGM Inputs

Two background music inputs (BGM INPUTS: RCA pin jack, - 20 dB, 10 kΩ) are provided.
An attenuator is also provided for each BGM input to adjust the sound volume when different sound sources are connected.

**Equipment that can be connected to these input includes:**
• Cassette players
• CD players



Cassette Player

CD Player

BGM Input Volume Control
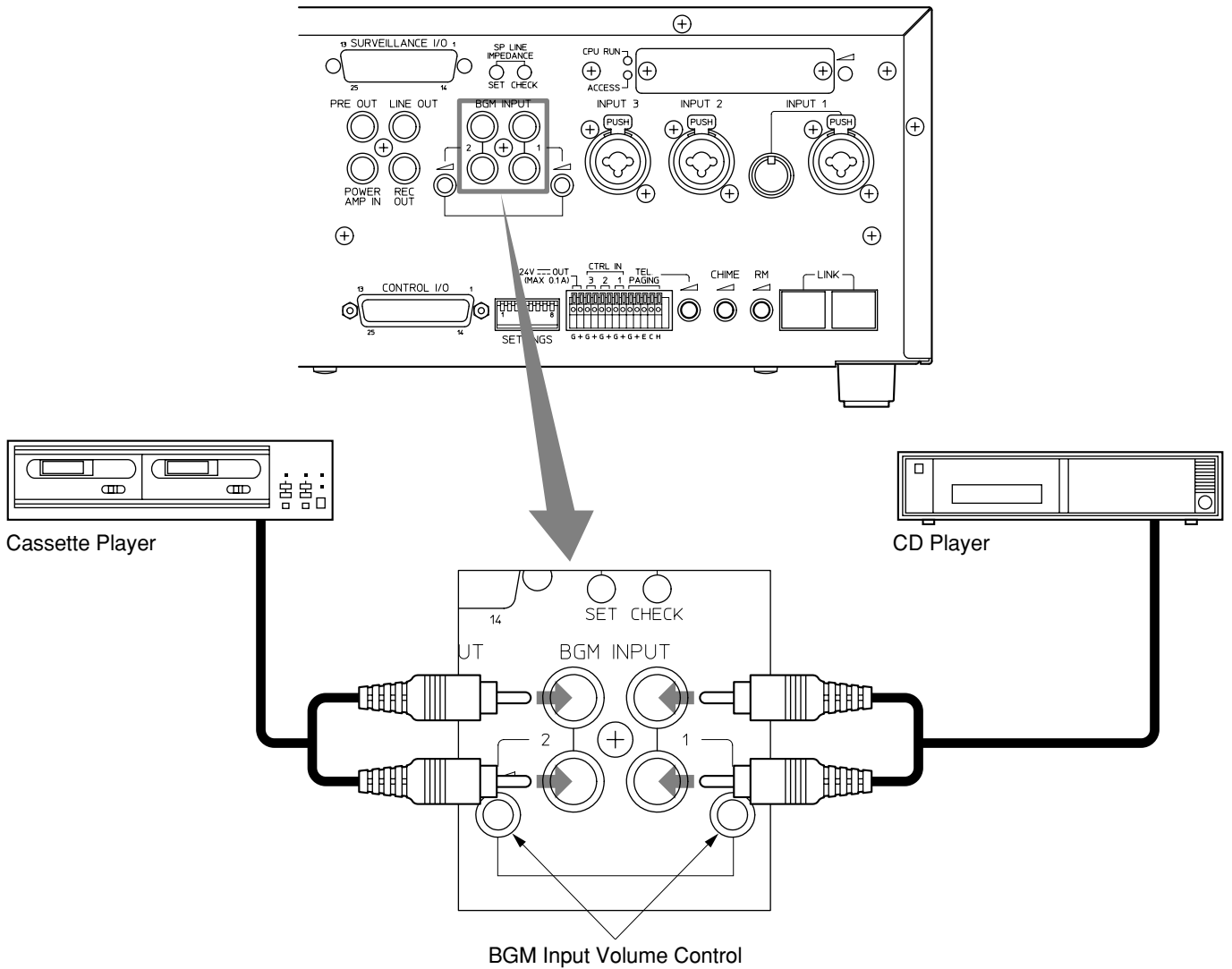
# External Connection Terminal
# (Telephone Device Input)

A specified telephone paging number must be preprogrammed into the telephone exchange.
The VM amplifier's power can then be switched on remotely by dialing this number from a telephone set, permitting telephone paging to be made from that telephone. Telephone paging zones can be set when programming the VM amplifier's zone groups. The telephone exchange's audio signal volume can also be adjusted.

NOTE: Please refer to **Section 24 of the Instruction Manual for the zone group setting.**

**VM Amplifier Connection to a Telephone Exchange**



Telephone Paging Volume Control

G + G + G + G + G + E C H

E C H

When using a single-core shielded cable, connect the shielded mesh to both E and C terminals.

PBX, main telephone device, etc.

Control signal

Audio signal

Telephone line
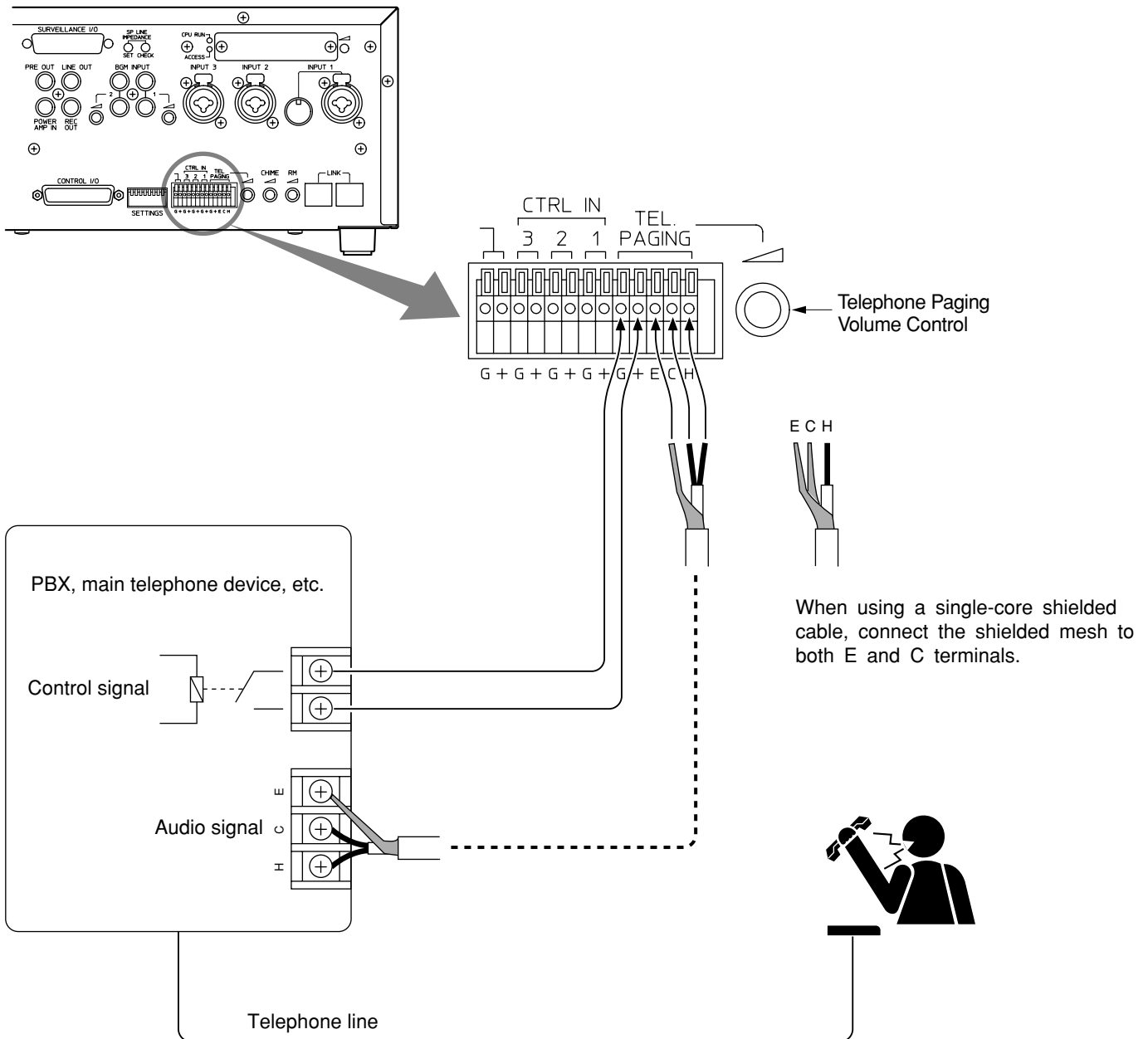
# External Connection Terminal (VS-900)

Use of the VS-900 in conjunction with the VM amplifier permits broadcasts to be made from each station connected to the VS-900. Configure the connections so that two control signals are transmitted from the VS-900 to the VM amplifier's CTRL IN 1 and CTRL IN 2 terminals, then assign different zone groups to the two terminals. This enables each station to make broadcasts to the set zone group.

**Example**

In the VM amplifier group settings, assign Zones 1, 2, and 3 to Group 1, and Zones 4 and 5 to Group 2. Set the VS-900 to output an activation signal from CONTROL 1 when broadcasts are made from the RS-150, and to output an activation signal from CONTROL 2 when broadcasts are made from the RS-160. By setting the VM amplifier and VS-900 in this way, broadcasts can be made to Zones 1, 2, and 3 from the RS-150, and to Zones 4 and 5 from the RS-160.
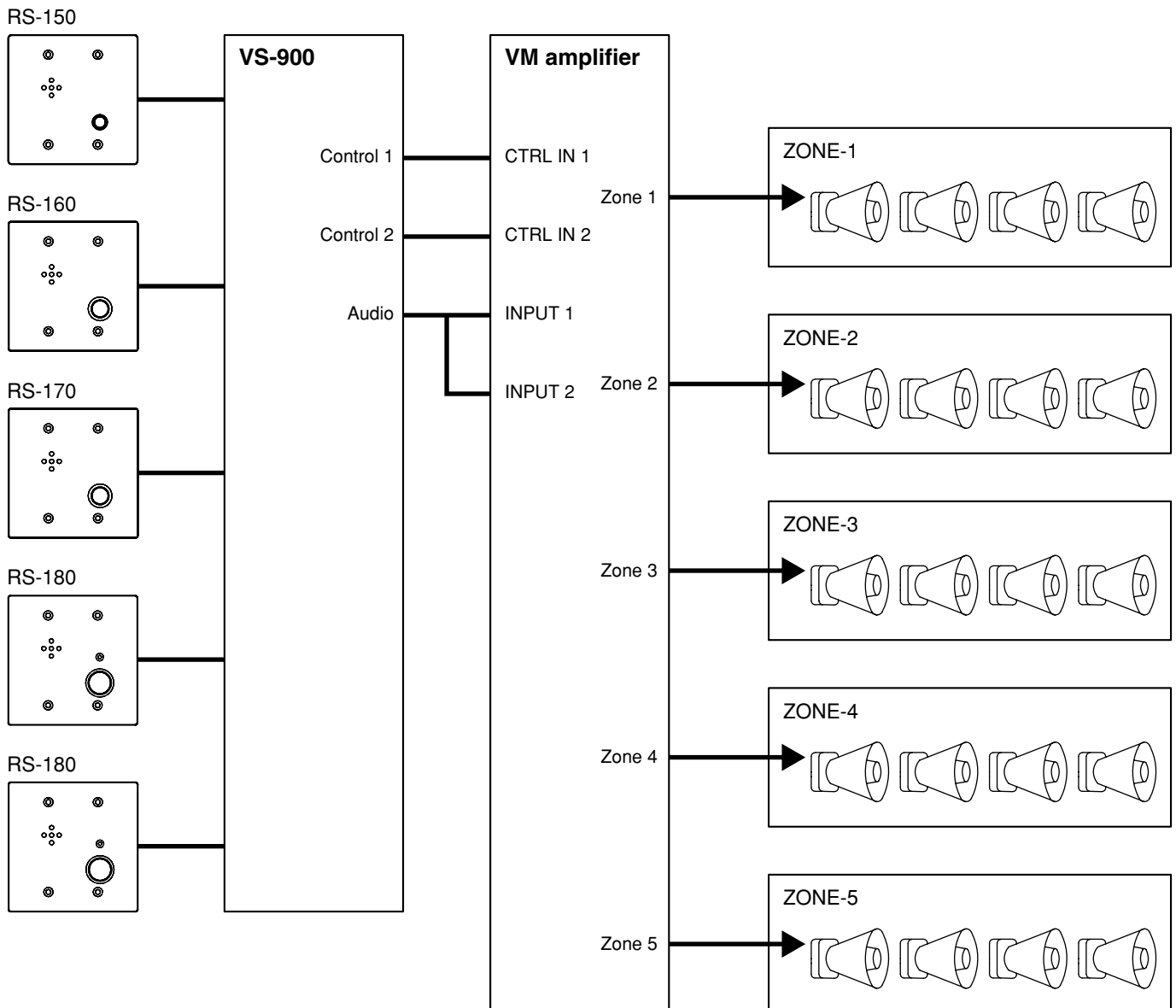
# Control I/O (Timer)

By combining the VM amplifier with a timer, a chime tone can be broadcast at preset times.
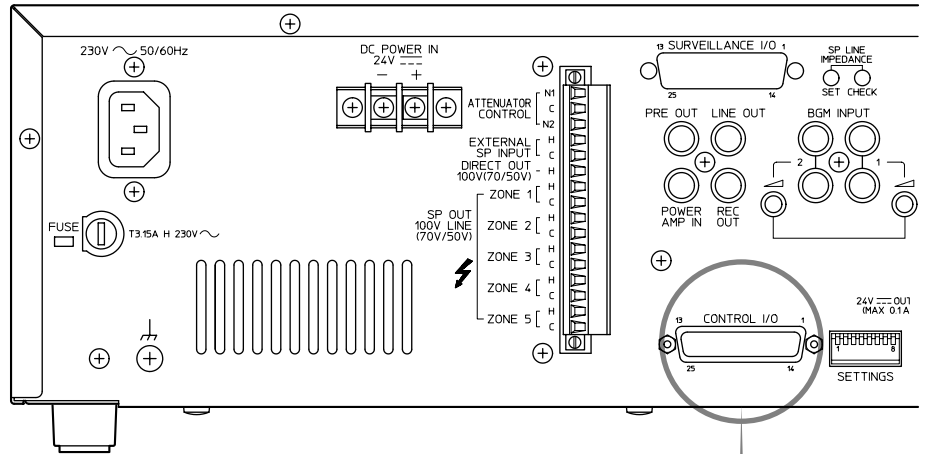


**Pattern 1**
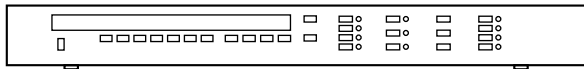


Program Timer TT-104B

Connect the timer (designed to deliver a no-voltage "make" contact output) to Pins 11 and 16 of the VM amplifier's control I/O terminal. The timer will then activate the VM amplifier at preset times to broadcast its built-in Westminster chime.

No.11

No.16

**Pattern 2**
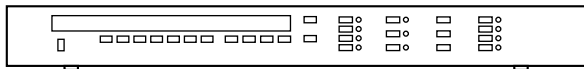


Program Timer TT-104B

Install a pre-recorded memory card in the EV-200, then connect the timer (designed to deliver a no-voltage make contact output) to pins 3 – 7 and 16 of the VM amplifier's control I/O terminal. The timer will then activate the VM amplifier at preset times, and each of the recorded memory card messages will be played back whenever the VM amplifier is activated.

No.3 – 7

No.16

13    CONTROL  I/O    1

25                    14

# Control I/O Connector Functions

The rear panel-mounted Control I/O connector enables the VM amplifier to be controlled or monitored by connected external equipment.

VM amplifier's D-sub female connector

13    CONTROL  I/O    1

Locking nut: 4-40 UNC

25                              14

**CONTROL I/O connector pin function table**

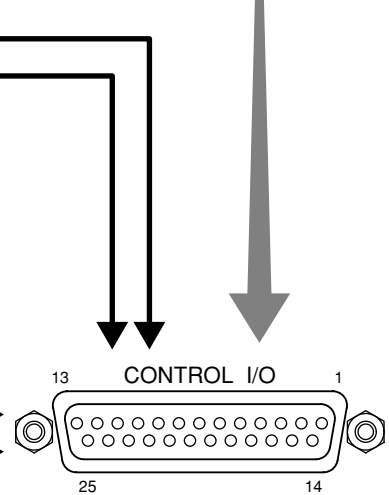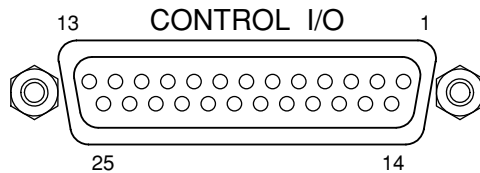| Pin No. | Signal name | IN/OUT | Signal/logic | Function/status |
|---|---|---|---|---|
| 1 | AC power ON | OUT | Active Low | When AC power is on |
| 2 | DC power ON | OUT | Active Low | When DC power is on |
| 3 I 7 | Message 1 – 5 activation | IN | One-shot make | Activates EV-200 Board's Message 1 –5[1] |
| 8 | VM amplifier's broadcast cutoff control | IN | At make | Cuts off the VM amplifier's power amplifier output.[1] [2] (External signals applied to EXTERNAL SP INPUT go through to the speakers.) |
| | | | At break | The VM amplifier's power amplifier output is resumed. |
| 9 | Chime activation (6 built-in chimes and EV-200's selected chime) | IN | Break -to-Make edge | Activates a start chime tone. |
| | | | Make-to-Break edge | Activates an end chime tone (4-tone Down). |
| 10 | Power ON/OFF control | IN | Break-to-Make edge | Turns power on. |
| | | | Make-to-Break edge | Turns power off. |
| 11 | Westminster chime activation | IN | One-shot make | Activates the internal Westminster chime unit. |
| 12 | Emergency alert activation | IN | One-shot make | Places the unit in "Emergency broadcast" mode, during which time an "Alert" announcement and an "Evacuation" announcement are broadcast.[1] |
| 13 | Emergency stop activation | IN | One-shot make | Resets the unit from "Emergency broadcast" mode. |
| 14 | Emergency evacuation activation | IN | One-shot make | Places the unit in "Emergency broadcast" mode, during which time an "Evacuation" announcement is repeated.[1] |
| 15 | Failure indicator control | IN | At make | The FAULT indicator lights to indicate external equipment failure. |
| 16 I 20 | GND | | | |
| 21 | Power switch on | OUT | Active Low | When the power switch is on by means of manual or external control |
| 22 | Communications error | OUT | Active Low | When communications cannot be achieved between the RM-200M and the VM amplifier or between VM amplifiers (High state when communications are restored.) |
| 23 | Failure indication | OUT | Active Low | When the FAULT indicator lamp is on. |
| 24 | Emergency Broadcast on | OUT | Active Low | When an Emergency broadcast is performed by the VM amplifier or the external equipment. (See the description of Pin 8 VM amplifier's broadcast cutoff.) |
| 25 | EV-200's failure | OUT | Active Low | When the EV-200 Voice Announcement Board fails.[1] |

[1] Requires installation of the optional EV-200 Voice Announcement Board.

[2] Use this pin to cut off the VM amplifier's power amplifier output to allow the "Emergency broadcast" initiated by connected external equipment to go through.

# Operations and Broadcasting from Remote Microphone

Broadcasts from the VM amplifier can be remotely enabled by pressing the keys on the RM-200M or RM-210 Remote Microphone. Remote control is also possible even when two or more Remote Microphones or VM amplifiers are connected.

**VM amplifier functions enabled by the Remote Microphone:**

(Control and audio)
• Individual zone broadcasts
• Zone group broadcasts (should be preprogrammed at the VM amplifier)
• Simultaneous All-zone calls
• Emergency broadcasts

(Control)
• Message playback (Recorded memory card and EV-200 must be installed.)
• Emergency activation

**Status indications that can be confirmed at the Remote Microphone:**

• Power
• Failure
• Emergency activation
• Broadcast zone selection
• Other unit in operation
• Current unit in operation



RM-200M

VM amplifier

SV-200M          EV-200
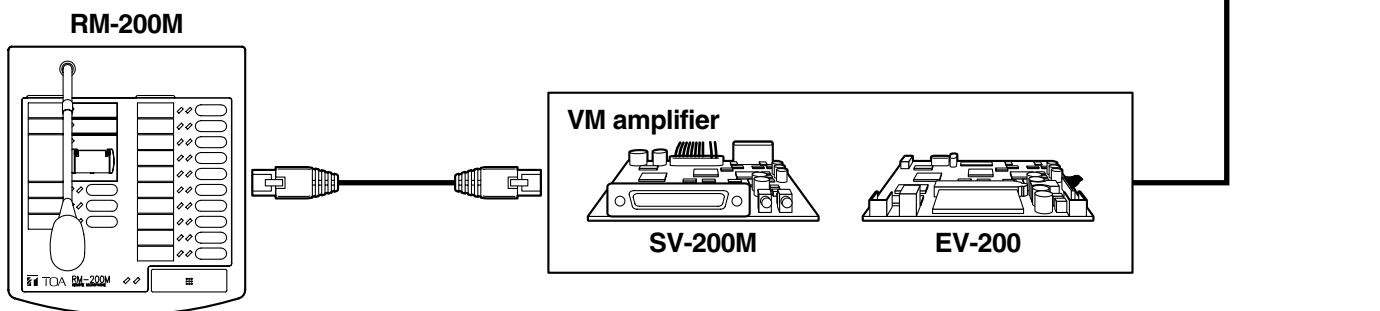
# Remote Microphone
# General Purpose Broadcast

**(1) Simultaneous All-Zone Broadcast Operation**

**Step 1.** Press the ALL-ZONE key.

The All-zone indicator and all zone indicators (1 – 5) will light. (Press the ALL-ZONE key again to cancel.)

ALL-ZONE
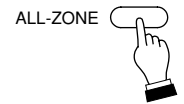
**(2) Individual Zone Broadcast Operation**

**Step 1.** Select the desired broadcast zone by pressing the ZONE key.

The corresponding zone indicator will light. It is also possible to simultaneously select 2 or more zones. (To cancel the selection, press the ZONE key again.)

ZONE 2

**(3) Group Broadcast Operation**

**Step 1.** Select the desired zone group by pressing the GROUP key.

Both the selected group's indicator and the indicators of the zones assigned to that group will light. It is also possible to simultaneously select 2 groups.

GROUP 1

Group 1 (Selected) → Zone 1, Zone 2, Zone 3 — Broadcast Zones / Zone 4

Group 1 (Selected) → Zone 1, Zone 2, Zone 3 ; Group 2 (Selected) → Zone 3, Zone 4 — Broadcast Zones / Zone 5

**Operation Common to Simultaneous All-Zone/Individual Zone/Group Broadcast.**

**Step 2.** Check the Busy indicator.

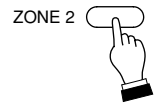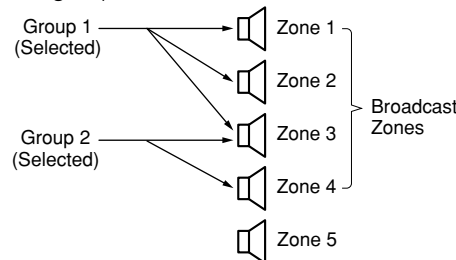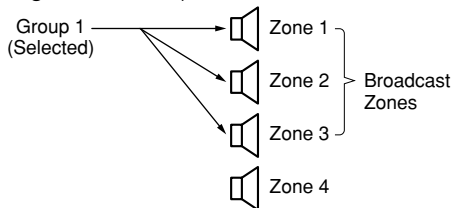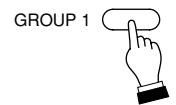(1) When the indicator remains off, other connected equipment are not in use for broadcast.
(2) When the indicator flashes, other connected equipment are in use for broadcast.

**Notes**

• When the indicator flashes orange, you cannot make any broadcast.
• When the indicator flashes green, your broadcast is allowed to go through by interrupting other broadcast.

The Remote Microphone's TALK key is set for either "press-to-talk" or "lock" operation.

[Press-to-talk operation]

**Step 3.** Start of broadcast

**3-1.** Hold down the TALK key.

A start chime tone will be sounded over the broadcast zone.*
(If the chime function is disabled, the microphone announcement can be made upon depression of the TALK key.)
The In-use indicator will light green.

*The unit is preset for one of 7 different types of chime tones.  It is also possible to disable the chime function.

TALK key

Live microphone announcements
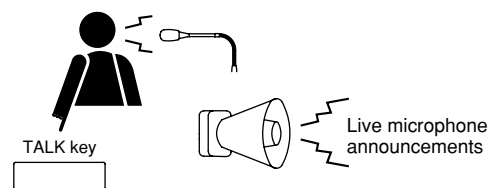
**3-2.** After chime play completion, make an announcement using the microphone.

**Step 4.** End of broadcast

Releasing the Talk key will sound an end chime tone (only when the Up/Down 4-tone chime function is employed by the unit), terminating the broadcast.

The In-use indicator goes out.

[Lock operation]

**Step 3.** Start of broadcast

**3-1.** One-touch press the TALK key.

A start chime tone will be sounded over the broadcast zone.* (If the chime function is disabled, the microphone announcement can be made upon depression of the TALK key.)
The In-use indicator will light green.

*The unit is preset for one of 7 different types of chime tones. It is also possible to disable the chime function.

**3-2.** After the chime play is finished, make an announcement at the microphone.

**Step 4.** End of broadcast

One-touch pressing the TALK key again will sound an end chime tone (only when the Up/Down 4-tone chime function is employed by the unit) and terminate the broadcast.

The In-use indicator goes out.

# Remote Microphone
# General Purpose Broadcast

**(4) Message Broadcast Operation**

Messages (1 – 5) assigned to broadcast groups require to be programmed into the VM amplifier.
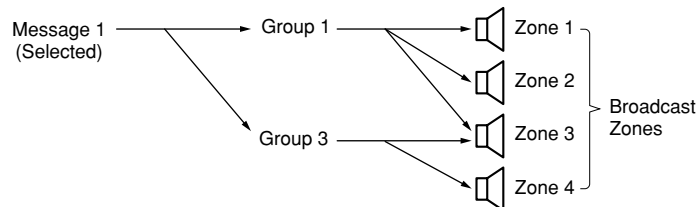


**Step 1.** Start of broadcast

Select the desired message with the MESSAGE key (MESSAGE 1 – 5).
The Message indicator will light only when broadcast is possible.

**Tip:** The message broadcast can also be made by applying a control signal to the **VM amplifier's rear-mounted CONTROL I/O connector.**

The Recorded voice message is broadcast to its designated broadcast group.

**Step 2.** End of broadcast

(1) When the message broadcast is finished, the Message indicator goes out.
(2) Pressing the Message key again during broadcast will terminate the broadcast.

# VM Amplifier Connection to the Remote Microphone

**VM amplifier Connection to the Remote Microphone (Pattern 1)**
**[Operation]**
All 4 Remote Microphones connected to the VM amplifier can enable the same operation. Two different priority levels can also be assigned to the connected Remote Microphones, depending on application.
**[Connection]**
Connect each Remote Microphone in series using the Category 5 STP cable and RJ-45 connectors.

**VM-2000 Connection to the Remote Microphone (Pattern 2)**
Install a terminal panel between the VM amplifier and the Remote Microphone to sort wiring from each remote control unit. The terminal panel also contributes to more adequate and economical cable routing, depending on construction conditions.

**Pattern 1**

**RM-200M**

AC Adapter

Unit No. 1

Unit No. 2

Unit No. 3

Unit No. 4

**Pattern 2**

**RM-200M**

AC Adapter

Unit No. 1

Unit No. 2

Unit No. 3

Unit No. 4
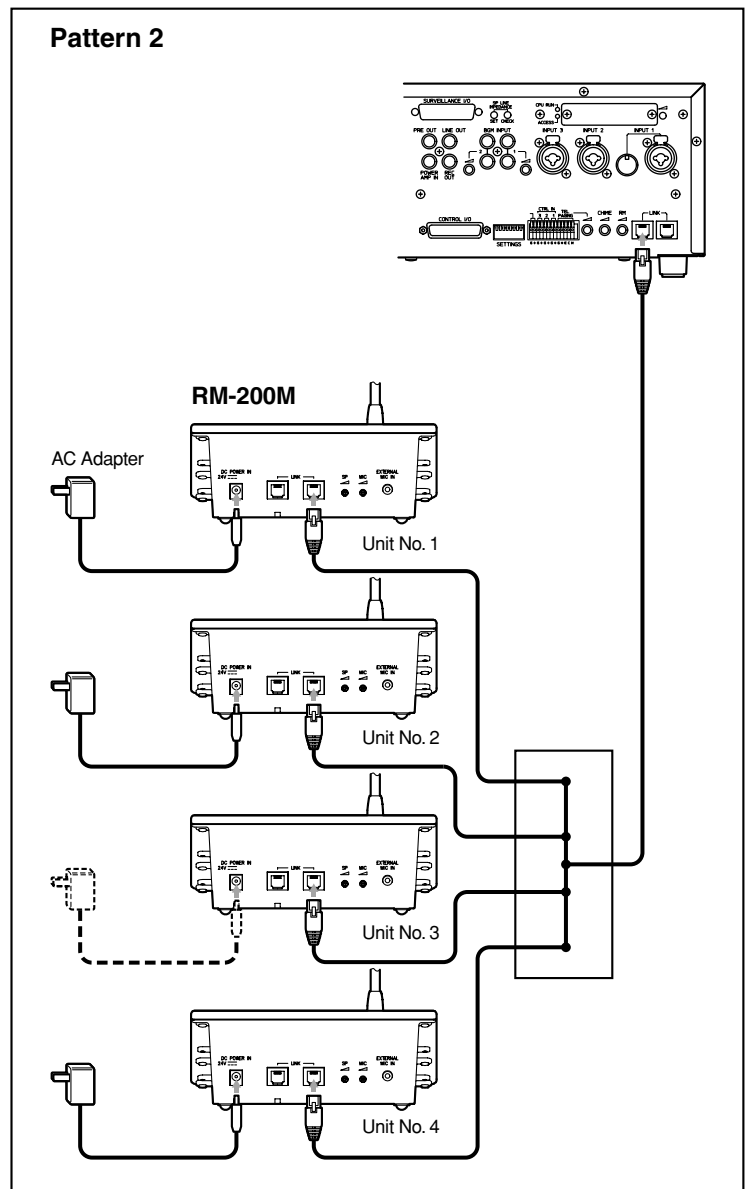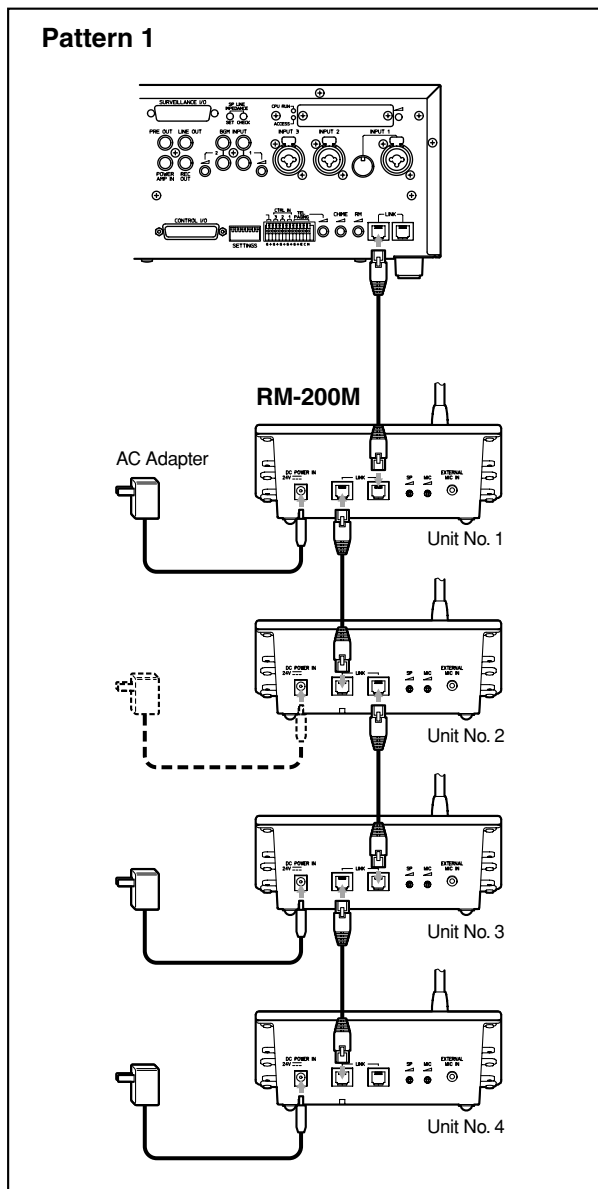
# Distance between Remote Microphone and VM Amplifier

Using the specified cable, connect between the VM amplifier(s) and Remote Microphone(s) via their LINK connectors. They can be connected in any order. (Two connection examples are shown.)

**Connection example 1**

Link cable    LINK connector (RJ45)

a        b        c        d        e

| Remote microphone | Remote microphone | Remote microphone | Remote microphone | Master VM amplifier | Sub-VM amplifier |

PRE OUT jack          POWER AMP IN jack

Audio cable

**Connection example 2**

Link cable    LINK connector (RJ45)

a        b        c        d        e

| Remote microphone | Remote microphone | Master VM amplifier | Sub-VM amplifier | Remote microphone | Remote microphone |

PRE OUT jack        POWER AMP IN jack

Audio cable
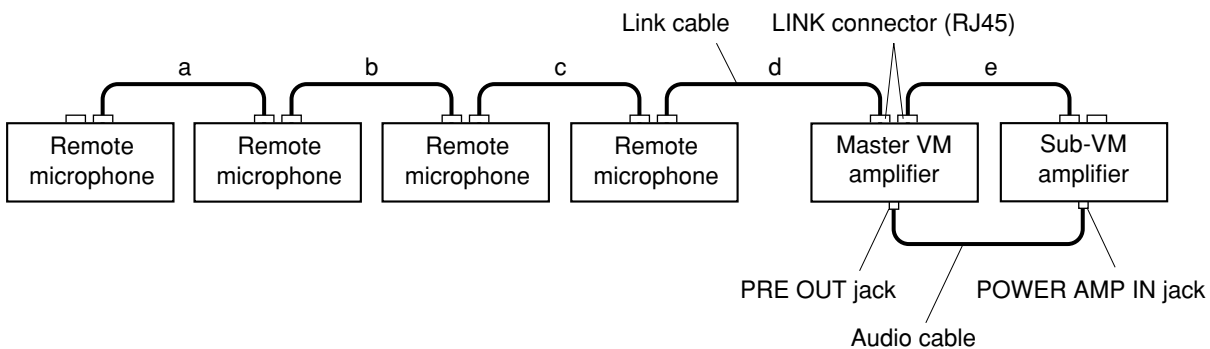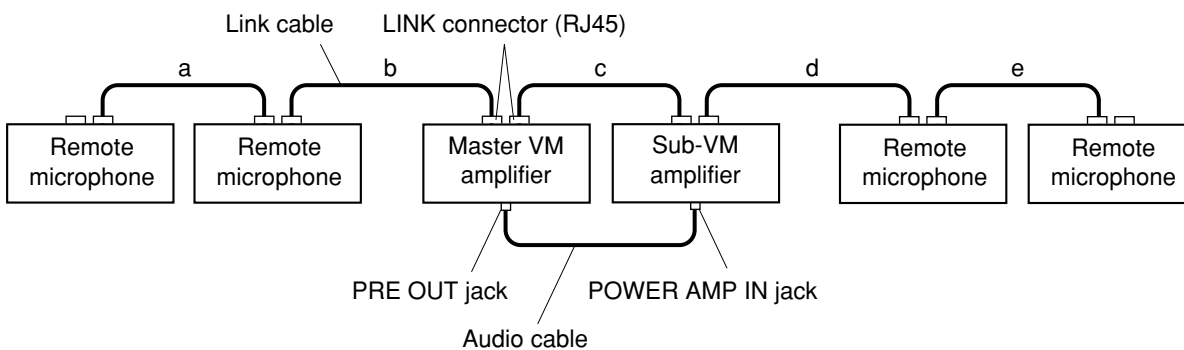
- TIA/EIA-568A standard Category 5 Shielded Twisted-Pair cable (straight type) Abbreviated to "Cat. 5 STP cable."
- The total length of LINK-to-LINK connection cables (Link cables) must be under 800 m (when connected using Category 5 STP cable).

$$a + b + c + d + e \leqq 800 \text{ m}$$

# Supplying Power from the VM Amplifier to the Remote Microphone

The VM amplifier can only supply power to one Remote Microphone. Therefore, each of the remaining Remote Microphone(s) needs to have a 24 V DC power supply (AC adaptor) of its own.

NOTE: When the RM-210 is used to expand the functions of the RM-200M, the power connections remain the same, however cable distances change. **(Please refer to the section describing the connection between the VM amplifier and the RM-200M.)**

**Connection example 1**

| | | | | Link cable | LINK connector (RJ45) |
|---|---|---|---|---|---|
| | a | b | c | d | e |

| Remote microphone | Remote microphone | Remote microphone | Remote microphone | Master VM amplifier | Sub-VM amplifier |
|---|---|---|---|---|---|

| 24 V DC Power supply | 24 V DC Power supply | 24 V DC Power supply |
|---|---|---|

PRE OUT jack     POWER AMP IN jack

Audio cable

**Connection example 2**

Link cable     LINK connector (RJ45)

| a | b | c | d | e |
|---|---|---|---|---|

| Remote microphone | Remote microphone | Master VM amplifier | Sub-VM amplifier | Remote microphone | Remote microphone |
|---|---|---|---|---|---|

| 24 V DC Power supply | | | | 24 V DC Power supply | 24 V DC Power supply |
|---|---|---|---|---|---|

PRE OUT jack     POWER AMP IN jack

Audio cable

**Optional AC Adaptors**

| Part name | Part code | Remarks |
|---|---|---|
| AD-4800 (US) | 100-07-290-70 | 120 V AC version |
| AD-4800 (ER) | 100-07-291-80 | 230 V AC version |
| AD-4800 (BS) | 100-07-292-10 | |
| AD-4800 (AS) | 100-07-293-60 | |

# Special Power Supply from the VM Amplifier to the Remote Microphone

When building a system in which 2 or more Remote Microphones are to be connected to each of two VM amplifiers, a system that eliminates the necessity of an AC adapter for the first RM-200M connected to each VM amplifier can be created by modifying the link cable between the two VM amplifiers.
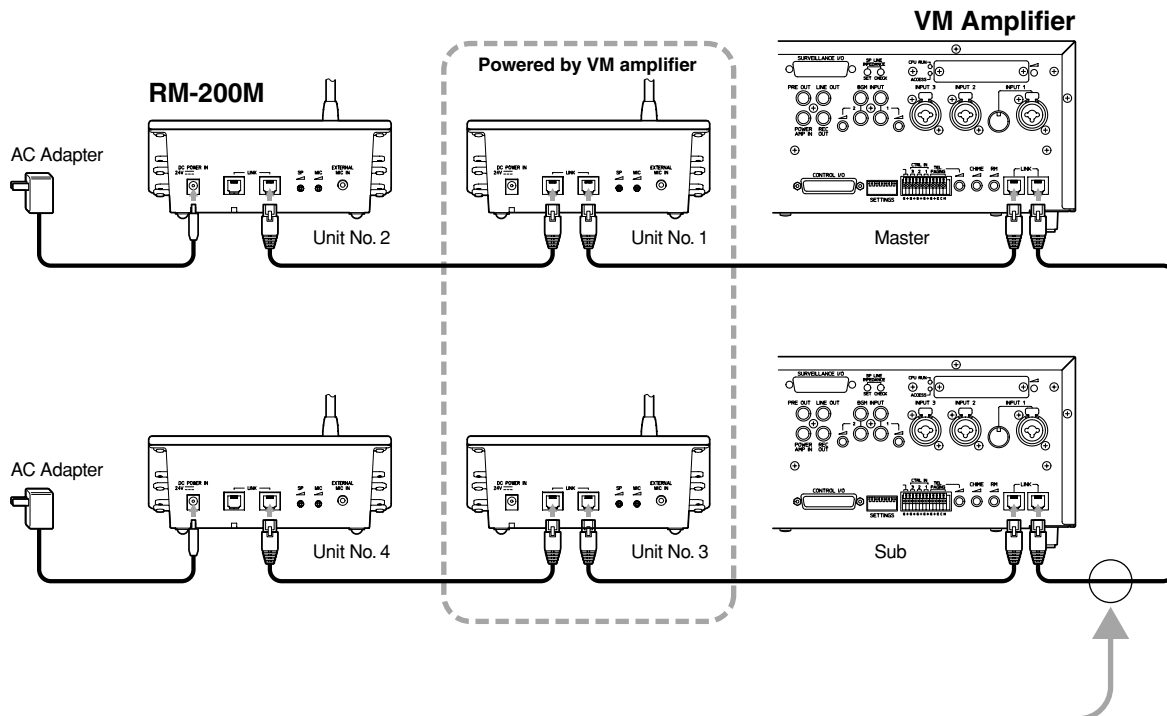


[Connection]

Disconnect power supply pins 1, 2, 7 and 8 from the link cable, and connect the two VM amplifier units.
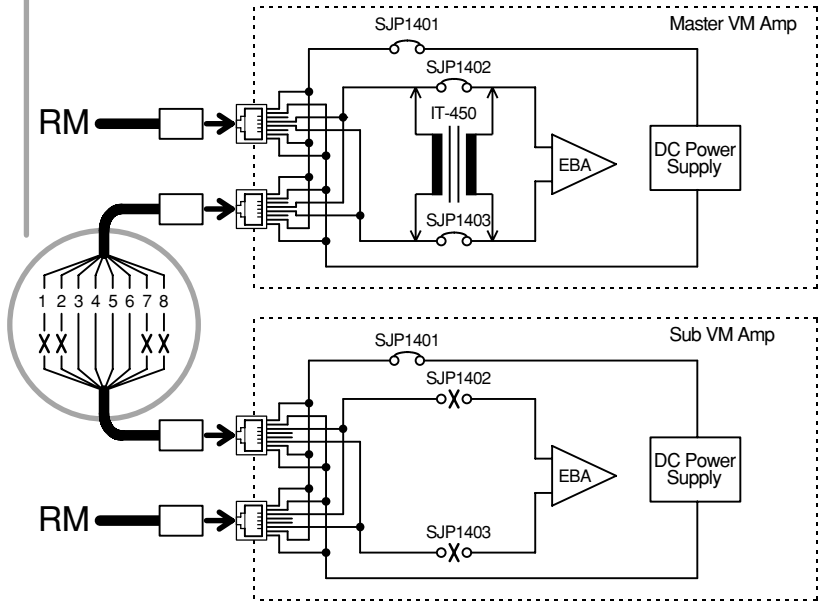
| Pin No. | Colour | Pair | Assignment |
|---------|--------|------|------------|
| 1 | orange/white | | Power　+24V |
| 2 | orange | | Power　GND |
| 3 | green/white | | RS-485 (H) |
| 4 | blue | | Audio signal (H) |
| 5 | blue/white | | Audio signal (C) |
| 6 | green | | RS-485 (C) |
| 7 | brown/white | | Power　+24V |
| 8 | brown | | Power　GND |
| Chassis | — | | GND (shield) |

# About the EV-200

The EV-200 digital sound source playback card for automatic broadcast is featured in the VM-2000 Series lineup. Using the optional card, emergency messages can be automatically broadcast or a chime tone sounded at preset times when using an external timer.

**The following equipment are required to make automatic emergency broadcasts:**

- VM-2000 Series System Management Amplifier (VM-2120/2240)
- EV-200 Voice Announcement Board
- CompactFlash (CF) memory card (made by SanDisk)

**Messages need to be prerecorded on the CompactFlash memory card, which requires the following equipment:**

- EV-350R Digital Announcer
- CompactFlash memory card adapter

Messages recorded in Program 1 - 8 sectors can be played back. (In the VM amplifier, the attributes of the message are determined according to the program number. **Please refer to the section on how to make recording.**)

**<About the Surveillance function>**

The EV-200 is provided with a Surveillance function. When a CF card-equipped EV-200 is installed, the VM amplifier outputs a pilot tone (1 kHz signal) from the EV-200 during periods when messages are not being broadcast. (This signal is not output to external equipment.) The VM amplifier constantly monitors this signal and checks to ensure that the EV-200 is operating correctly. If there is no card inserted, or any irregularities occur in the EV-200 to cause the VM amplifier not to detect the pilot tone, the EV Failure Output terminal will switch to "make" status, causing the VM amplifier's Failure indicator to light.

# Message Activation

Messages recorded on the CompactFlash memory card can be played back by activating (no-voltage "make" contact) the control I/O terminal located on the VM amplifier's rear panel, as in the case of the Remote Microphone.

Record five different general-purpose messages on the CF card. If the pin corresponding to each message is activated, the messages can be individually played back.

MESSAGE 1 ACTIVATION: Pin No. 3
MESSAGE 2 ACTIVATION: Pin No. 4
MESSAGE 3 ACTIVATION: Pin No. 5
MESSAGE 4 ACTIVATION: Pin No. 6
MESSAGE 5 ACTIVATION: Pin No. 7
Ground: Pin Nos. 16 -20

NOTE: Custom-made switches that are appropriate for installation conditions are required to activate the messages.
(Please refer to **P. 4-2-1, Operation and Broadcasting from the Remote Microphone.)**

NOTE: A message activated by switches cannot be stopped till its end, while the message activated by a Zone/Message selector key on remote microphone can be stopped during the broadcast by pressing the key again.
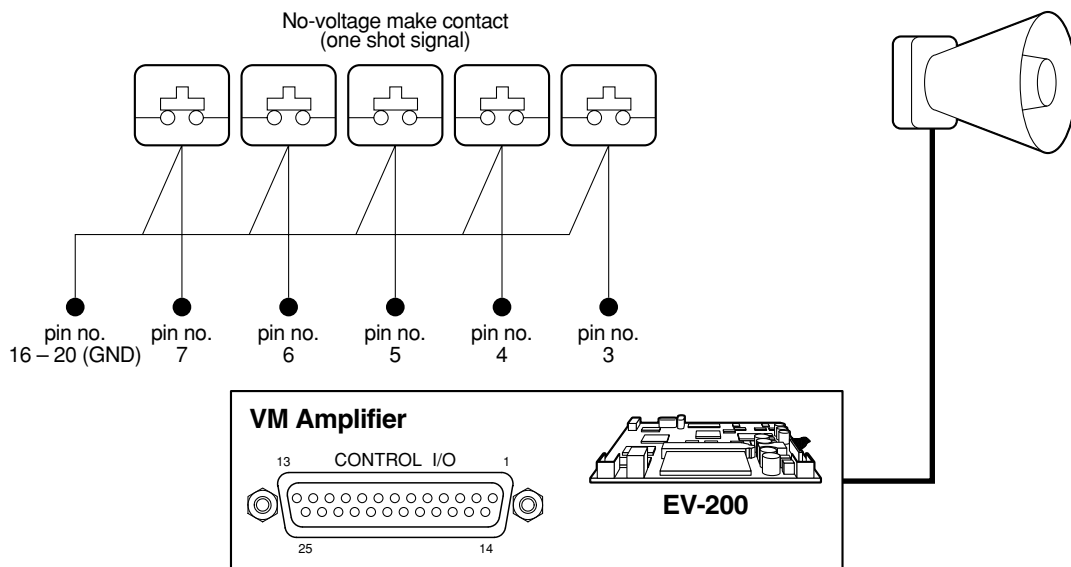
# Recorded CF Card Messages

Messages can be recorded on the CF card using the EV-350R. In the EV-350R, a series of messages is called a "program," which is called a "message" when played back using the EV-200 and VM amplifier. Up to 8 Messages (programs) are available, with Nos. 1 - 5 intended for general-purpose broadcasts, Nos. 6 - 7 for emergency broadcasts, and No. 8 for pre-announcement chime tone broadcasts.

Message (program) Nos. 1 - 5
Messages for general-purpose broadcasts are recorded. Recorded messages or chime tones are played back at preset times using an external timer. These messages can also be broadcast to groups programmed into the VM amplifier by pressing the Remote Microphone's Activation button.

Message (program) Nos. 6 - 7
Emergency messages for alert and evacuation are recorded.
For Message 6, the recorded alert message is broadcast 5 times (in the example below) in repetition to permit investigation of the source of the emergency situation during the broadcast.
   **[Message example]**
   "Attention please. The fire alarm system is indicating a fire. We're now investigating the cause.
   Please await further instructions."
For Message 7, the recorded evacuation message is played back without end even if the Number of repeats setting wouldn't be set as ENDLESS.
   **[Message example]**
   "There is a fire. Please evacuate as quickly as possible."

Message (program) No. 8
Standard equipment on the VM amplifier includes 6 different types of chime tones, however other types of chimes can be recorded on the CF card.

   NOTE: The EV-350R permits more than 8 messages to be recorded, however no more than 8 messages can be played back
         on the EV-200.

**Message Program/Sentence Composition Example**

| VM unit's Message No. | Program No. | Playback method | Number of repeats | Repeat interval | Sentence No. (or Silent Section) | Remarks |
|---|---|---|---|---|---|---|
| Message 1 | P001 | Continuous Program Playback | — | — | A001, A002, M003, A003 | Activation from Remote Microphone or Message activation input (CONTROL I/O) |
| Message 2 | P002 | | — | — | A011, A012, M002, A013 | |
| Message 3 | P003 | | — | — | A021, A022, M002, A023 | |
| Message 4 | P004 | | — | — | A031 | |
| Message 5 | P005 | | — | — | A041 | |
| Message 6 | P006 | Repeat Playback | 5 times | 0 second | A051, M001, A052, M002 | Alert message |
| Message 7 | P007 | | Endless | 0 second | A061, M001, A062, M002 | Evacuation message |
| Message 8 | P008 | Continuous Program Playback | — | — | A071 | Pre-recorded chime |

# Recording

To install the EV-200 Voice Announcement Board in the VM amplifier and play back the message, prerecord the message on the CompactFash memory card using EV-350R.

When the CF card is first inserted into the EV-200, a pilot tone is written in the card.
When using the EV-350R unit for recording, leave the recording space of more than10 seconds.
Since the EV-350R unit is equipped with both the AUX and microphone inputs, a music player and a dynamic microphone can be connected to the EV-350R.

Place the CF card in the CF card adapter and insert the adapter into the EV-350R's memory card slot.

NOTE: Details of recording are described in **the EV-350R's Instruction Manual**.



Dynamic Microphone     **EV-350R**

Music Player
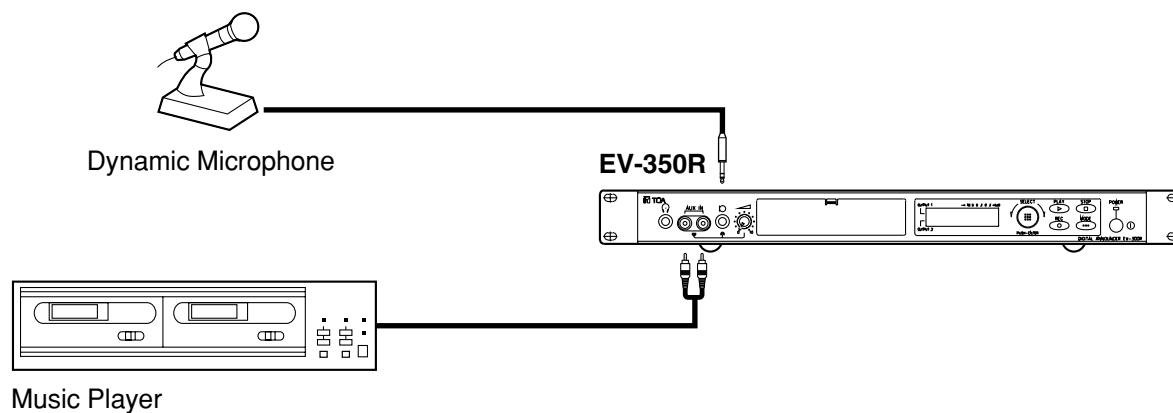
**CF card**



**Card Adapter**
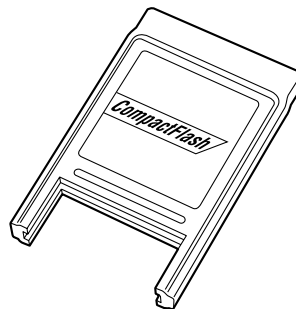
# Broadcast Priorities

The VM-2000 Series features both emergency broadcast and general-purpose broadcast modes. Emergency broadcasts have priority over general-purpose broadcasts, and current general-purpose broadcasts are immediately switched over to emergency broadcast mode if an emergency broadcast is made.

Three (Mic. > Evacuation > Alert) different priority levels (emergency microphone broadcast and EV broadcast) can be designated for emergency broadcasts, while 4 different levels of priority (Priorities 1, 2, and 3 and BGM) can be designated for general-purpose broadcasts. Broadcasts assigned higher priority can interrupt lower priority broadcasts.

### Broadcast priorities

[Emergency Broadcast]
1. Emergency microphone broadcast. Announcements from the RM-200M microphone in emergency broadcast mode.
2. Emergency EV broadcast (evacuation). Evacuation message recorded for EV Program No. 7.
3. Emergency EV broadcast (alert). Alert message recorded for EV Program No. 6.

[General-Purpose Broadcast]
1. Priority 1 broadcast.
    EV 1 - 5, Inputs 1 - 3, TEL or RM 1 - 4 designated as priority 1.
2. Priority 2 broadcast.
    Inputs 1 - 3, TEL or RM 1 - 4 designated as priority 2.
3. Priority 3 broadcast.
    EV 3 - 5 or Inputs 1 - 3 (voice control)
4. Priority 4 broadcast.

### Broadcast Source-to-Priority Relationship

| Broadcast source | Priority level | | | | Functional explanation | DIP switch setting | |
|---|---|---|---|---|---|---|---|
| | | | | | | Switch location | Switch No. |
| Input 1 (MIC/LINE)* ¹ | 1 | <u>2</u> | 3 | — | Priority 1 or 2 selectable. | Inside the VM | SW2-No. 1 |
| Input 2 (MIC/LINE) *¹ | 1 | <u>2</u> | 3 | — | Priority 3 is set when broadcast is | amplifier | SW2-No. 2 |
| Input 3 (MIC/LINE) *¹ | 1 | <u>2</u> | 3 | — | not externally activated.* ² | | SW2-No. 3 |
| Telephone paging | 1 | <u>2</u> | — | — | | | SW2-No. 4 |
| Westminster chime | 1 | — | — | — | Set for Priority 1. | — | — |
| Remote Microphone No.1 | 1 | <u>2</u> | — | — | | RM-200M's right side panel | No. 3 |
| Remote Microphone No.2 | 1 | <u>2</u> | — | — | Priority 1 or 2 selectable. | | |
| Remote Microphone No.3 | 1 | <u>2</u> | — | — | | | |
| Remote Microphone No.4 | 1 | <u>2</u> | — | — | | | |
| Message 1 | 1 | — | — | — | Set for Priority 1. | — | — |
| Message 2 | 1 | — | — | — | | | |
| Message 3 | <u>1</u> | — | 3 | — | Priority 1 or 3 selectable. | Inside the VM | SW2-No. 5 |
| Message 4 | <u>1</u> | — | 3 | — | | amplifier | SW2-No. 6 |
| Message 5 | <u>1</u> | — | 3 | — | | | SW2-No. 7 |
| Message 6 | Highest priority (Emergency broadcast) | | | | For Alert message | — | — |
| Message 7 | | | | | For Evacuation message | | |
| 7 different chimes | — | — | 3 | — | Priority 3 is set when chime is externally activated.* ³ | — | — |
| BGM 1 | — | — | — | 4 | Set for Priority 4. | — | — |
| BGM 2 | — | — | — | 4 | | | |

Underlined priority levels represent factory-preset levels.

*¹ Factory-preset to MIC. For the setting, see p. 39 "VM Amplifier's Rear Panel-Mounted Function Switches."

*² Priority 1 or 2 set for the Inputs 1 – 3 applies to the broadcast activated by their respective Control inputs (CTRL IN 1 – 3), while Priority 3 applies to the broadcast activated not by the control inputs (by the VM amplifier's front-mounted zone selector key).

*³ Chime priority
  • When the chime is used in Inputs 1 – 3 broadcast, Remote Microphone broadcast or telephone paging, its priority level is the same (1 or 2) as those assigned to such broadcasts.
  • Chime priority level is "3" when activated by the Chime activation input (CONTROL I/O connector pin No. 9). Note that Inputs 1 – 3 need to be selected with the front panel selector keys before using the chime.

# Priority Setting
# (General-Purpose Broadcasts)

**Internal DIP switches**

SW3            SW2

SW4
SW3  SW2
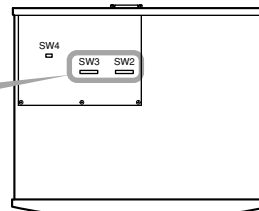
VM amplifier's front panel

**For the following inputs, priorities can be set with the DIP switch.**

SW2

| | | | | |
|---|---|---|---|---|
| INPUT 1 | SW2-1 | 1 | ON (Priority 1) | OFF (Priority 2) |
| INPUT 2 | SW2-2 | 2 | ON (Priority 1) | OFF (Priority 2) |
| INPUT 3 | SW2-3 | 3 | ON (Priority 1) | OFF (Priority 2) |
| TEL | SW2-4 | 4 | ON (Priority 1) | OFF (Priority 2) |
| EV3 | SW2-5 | 5 | ON (Priority 3) | OFF (Priority 1) |
| EV4 | SW2-6 | 6 | ON (Priority 3) | OFF (Priority 1) |
| EV5 | SW2-7 | 7 | ON (Priority 3) | OFF (Priority 1) |
| RM200 | RM's SW3 | 8 | OFF (Priority 1) | ON (Priority 2) |

Factory-preset position

**Remote Microphone's Function Switches**

Function setting switch

* The switch is actually installed upside down.

1 2 3 4 5 6
ON

RM-200 Side View

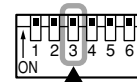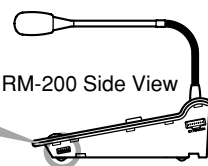**SW2 switch setting (All switches are factory-preset to OFF position.)**

| Switch No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function | Inputs 1 – 3 Broadcast Priority Level | | | TEL Paging Priority Level | Voice Announcement Board's Message Priority Level | | | Priority Mode for Same Priority Unit |
| | Input 1 | Input 2 | Input 3 | | Message 3 | Message 4 | Message 5 | |
| ON | 1 | 1 | 1 | 1 | 3 | 3 | 3 | Unit No. Priority (Numerical order) |
| OFF | 2 | 2 | 2 | 2 | 1 | 1 | 1 | First/Last Priority |

**Priorities between the same levels**

The following priority settings can be made if 2 or more broadcasts assigned the same priority level are simultaneously made:

First-in-first-out or Last-in-first-out priority settings      SW3-1 switch
ON: First-in-first-out priority
OFF: Last-in-first-out priority

Priorities can also be set for the EV message number and RM unit number.
Priority setting by unit number      SW2-8 switch
ON: Lower unit numbers are given priority.
OFF: Priorities are as set with the SW3-1 switch.

**SW3 switch setting (All switches are factory-preset to OFF position.)**

| Switch No. | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| Function | First/Last Priority* | Priority 2 Mixing | Mode after Emergency Talk | Input 3/LINE (Input 3/MIC) Chime On/Off | Unit Type | No. of Connected Units | | |
| ON | First-come first-served | Mixed | Silent | On (off) | Sub-unit | See the Connected unit No. table on the 4-5-1. | | |
| OFF | Last-come first-served | Not mixed | Evacuation message | OFF (on) | Master unit | | | |

\* This function is set in relation to the SW2-8 switch. **(For details, see p. 26 "GENERAL-PURPOSE BROADCAST PRIORITY" of the instruction manual supplied with the VM-2120 or VM-2240.)**

NOTE 1: This setting is used to set priorities between the Remote Microphones (RM) with the same priority level and between the Digital Announcers (EV) assigned the same priority level. If the same priority level is assigned to both the RM and EV, they operate on a first-in-first-out or last-in-first-out basis, as determined with the SW3-1 switch.

NOTE 2: If multiple connected RM units are put in emergency mode, all of the RM units function as emergency microphones. Priorities in this case are also assigned according to the above settings.

# A Maximum System Employing a Single Master Amplifier

In the VM amplifier system, the VM-2120 or the VM-2240 can be expanded as a sub-amplifier to increase the number of broadcast zones. Even in this case, the number of input channels and the EV-200's functions remain unchanged.

**A maximum system employing a single master amplifier.**

    Sub-amplifier: 8 units

    Number of zones: 45 zones

    Remote control unit (RM-200M): 4 units

If the number of zones is increased, the number of zone selection switches will become insufficient. To permit individual broadcasts to such added zones, connect an Expansion unit to each remote control unit to increase the number of zone selection switches. Up to 4 Expansion units (RM-210) can be added to each remote control unit.



Zone: 1 -10
Zone: 11- 20
Zone: 21 - 30
Zone: 31 - 40
Zone: 41 - 45
Massage: 1 - 5
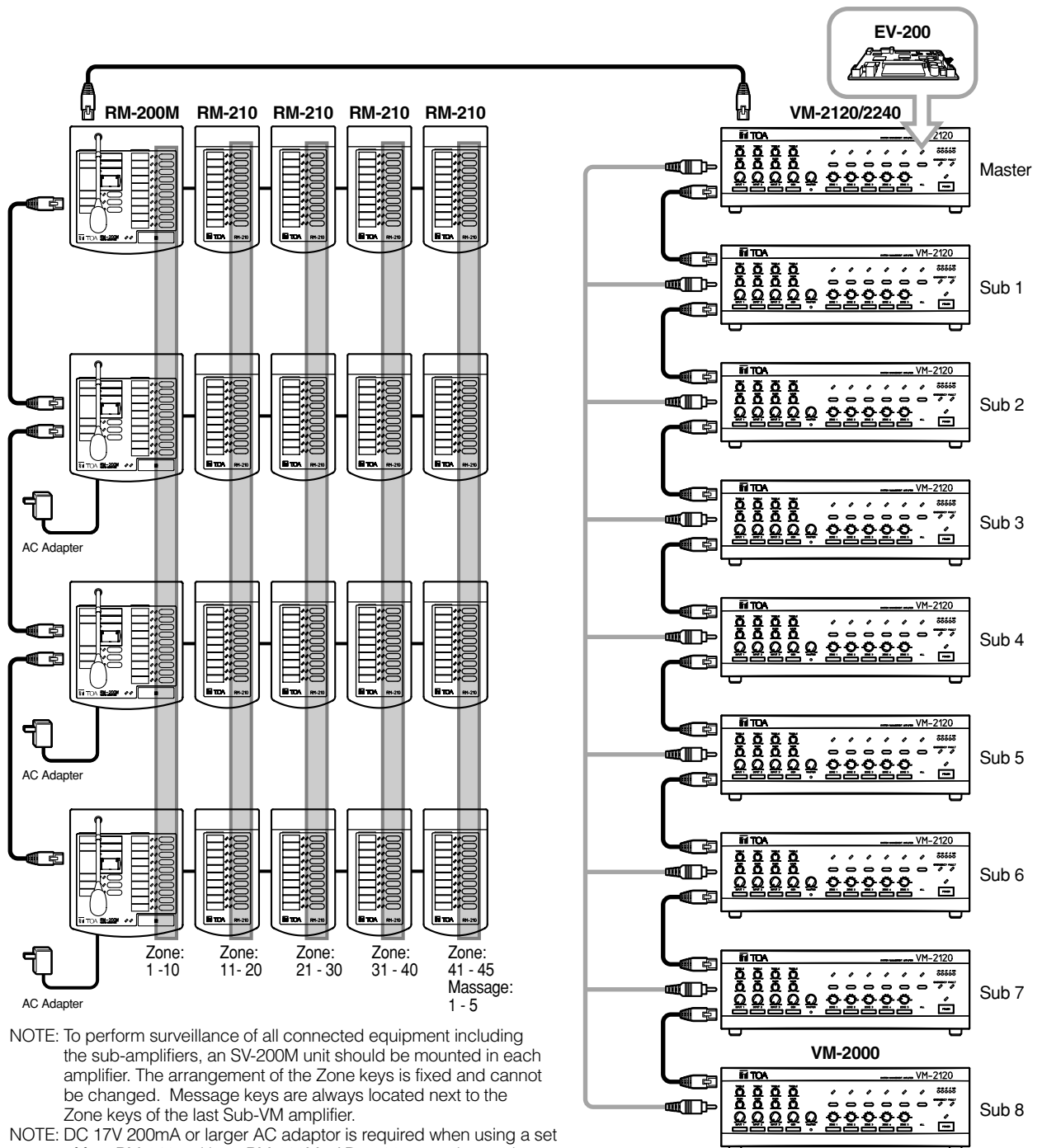
NOTE: To perform surveillance of all connected equipment including the sub-amplifiers, an SV-200M unit should be mounted in each amplifier. The arrangement of the Zone keys is fixed and cannot be changed.  Message keys are always located next to the Zone keys of the last Sub-VM amplifier.

NOTE: DC 17V 200mA or larger AC adaptor is required when using a set of four RM-210s with an RM-200M.  AD-4800 can only supply power enough with a set of three RM-210s.

# How to Connect 3 or More VM amplifiers

**When connecting 3 or more VM amplifiers, the following settings are required:**

　　(1) Master-sub relationship.

　　(2) The number of units to be connected to the system
　　　　(the total number of sub-VM amplifiers and RM units. The master unit is not included).

　　(3) Unit number for each sub-amplifier.

**Setting the number of units to be connected to the system**
(Switch SW3 on the CPU circuit board)

| Switch No. | | | Number of |
|---|---|---|---|
| 6 | 7 | 8 | Connected Units |
| OFF | OFF | OFF | 0 |
| ON | OFF | OFF | 1 |
| OFF | ON | OFF | 2 |
| ON | ON | OFF | 3 |
| OFF | OFF | ON | 4 |
| ON | OFF | ON | 5 |
| OFF | ON | ON | 6 |
| ON | ON | ON | 7 |

NOTE:
The system's total number of connected units should be set at the master
VM amplifier. Set the number to zero when this number exceeds 7.
In this case, communication error signals are not output, even when
connected equipment experience communication failure.

Perform sub-amplifier unit number settings using a jumper header for sub-address settings on the CPU circuit board.



Jumper Headers for
Sub-amplifier's unit No.



Sub-VM 1　　　1 2 3 SUB-ADDR

Sub-VM 2　　　1 2 3 SUB-ADDR

Sub-VM 3　　　1 2 3 SUB-ADDR

Sub-VM 4　　　1 2 3 SUB-ADDR

Sub-VM 5　　　1 2 3 SUB-ADDR

Sub-VM 6　　　1 2 3 SUB-ADDR

Sub-VM 7　　　1 2 3 SUB-ADDR

Sub-VM 8　　　1 2 3 SUB-ADDR
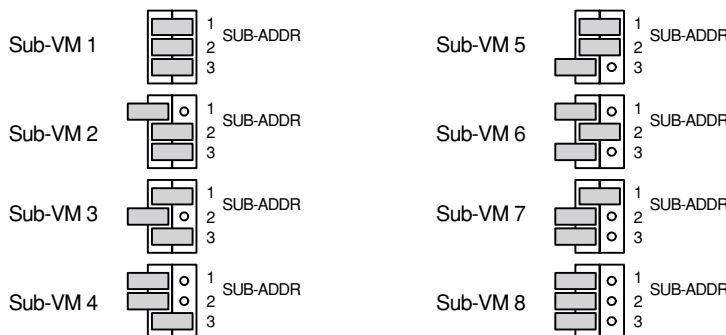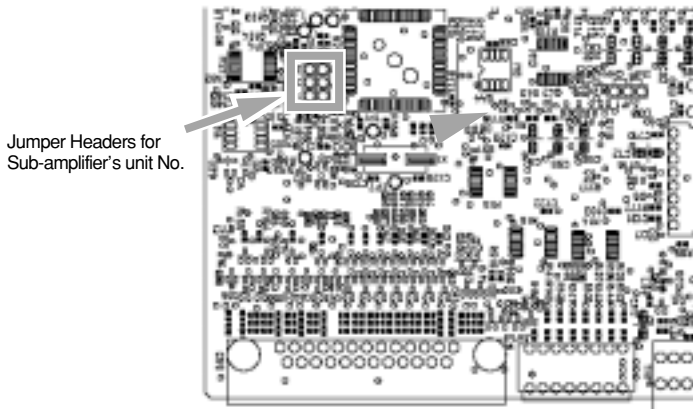
NOTE:
Make sure that the sub-amplifier unit number setting
is performed for each amplifier. The number should
be consecutive from 1, taking care not to duplicate
unit numbers.

A separate line needs to be installed for audio signal transmission from the master VM amplifier to the sub-VM amplifier. Connect the master VM amplifier's PREOUT terminal to the sub-VM amplifier's POWER AMP IN terminal and make the cable distance as short as possible because the line is unbalanced.

# The Number of Connectable Speakers

Up to 5 broadcast zones can be selected with the VM-2120 and VM-2240. The VM-2120's maximum power output is 120 W, while that of the VM-2240 is 240 W.

The following two patterns show the system where speakers of a total of 120 W are connected to the VM-2120 or speakers of a total of 240 W are connected to the VM-2420:

**Pattern 1:** All speakers connected to 5 zones.
**Pattern 2:** All speakers connected to a single zone.

The only difference between the two patterns is whether or not the zones can be selected. Therefore, the speakers can be connected to any zone provided the speaker inputs do not exceed the maximum output of each amplifier.

**Pattern 1**

| VM-2120/2240 | |
|---|---|
| Zone 1 | ZONE-1 |
| Zone 2 | ZONE-2 |
| Zone 3 | ZONE-3 |
| Zone 4 | ZONE-4 |
| Zone 5 | ZONE-5 |

Speaker out

120W or 240W

**Pattern 2**

| VM-2120/2240 | |
|---|---|
| Zone 1 | ZONE-1 |
| Zone 2 | |
| Zone 3 | Open |
| Zone 4 | |
| Zone 5 | |

Speaker out

120W or 240W
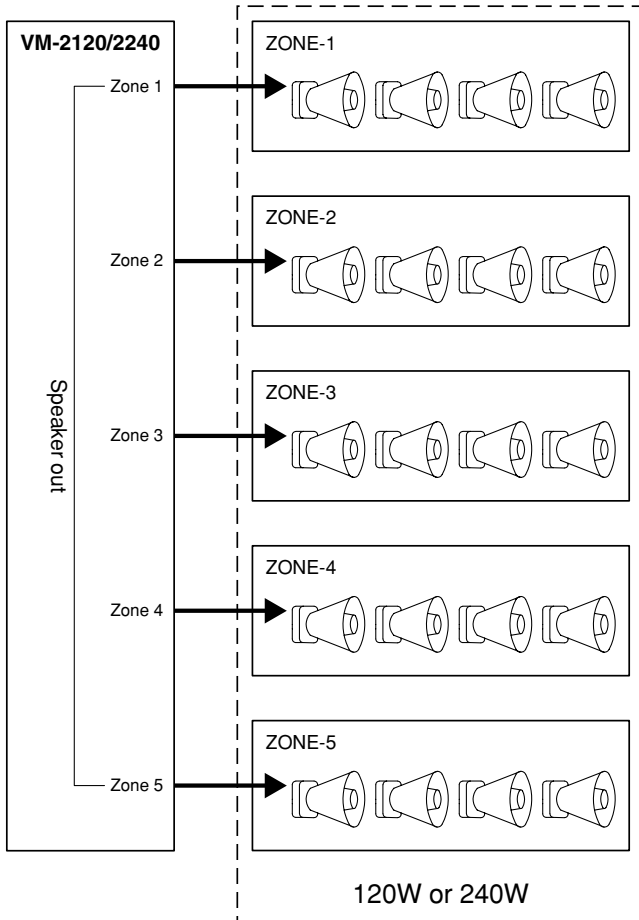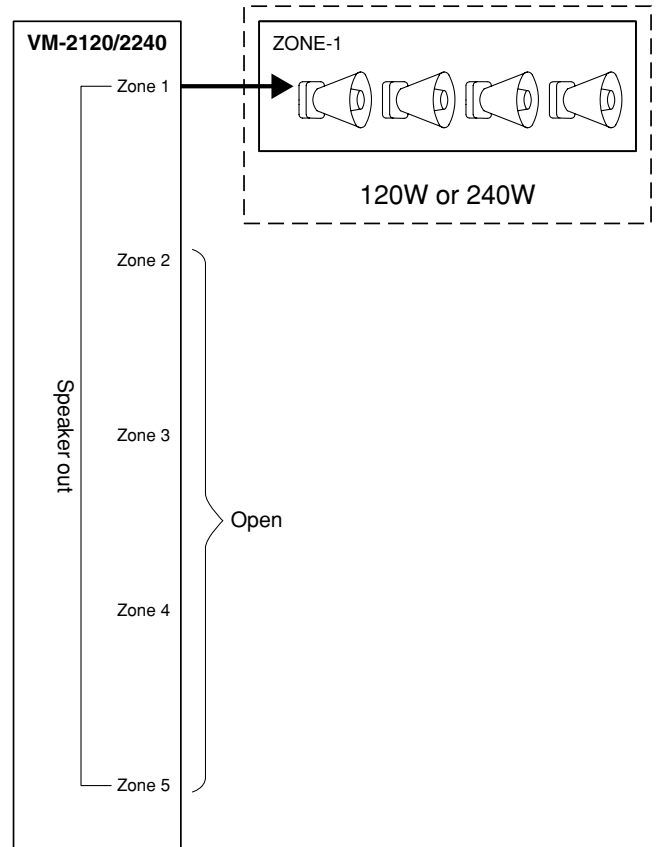
# Amplifier Expansion

The output of the VM amplifier[(120 W in the case of the VM-2120) (240 W in the case of the VM-2240)] can be expanded.

### [Operation setting]

The system can be configured for large system applications by connecting other PA amplifier to the VM amplifier's speaker outputs. The following system examples provide an output of 1,680 W.

Because the expansion amplifiers are connected to the speaker outputs directly ahead of the VM-2240's zone selector, the VM-2240's zone selector function can be used without being affected.

### [Connection]

Connect the VM-2240's speaker output to an external PA amplifier input by way of a circuit that reduces the gain to 1/100.
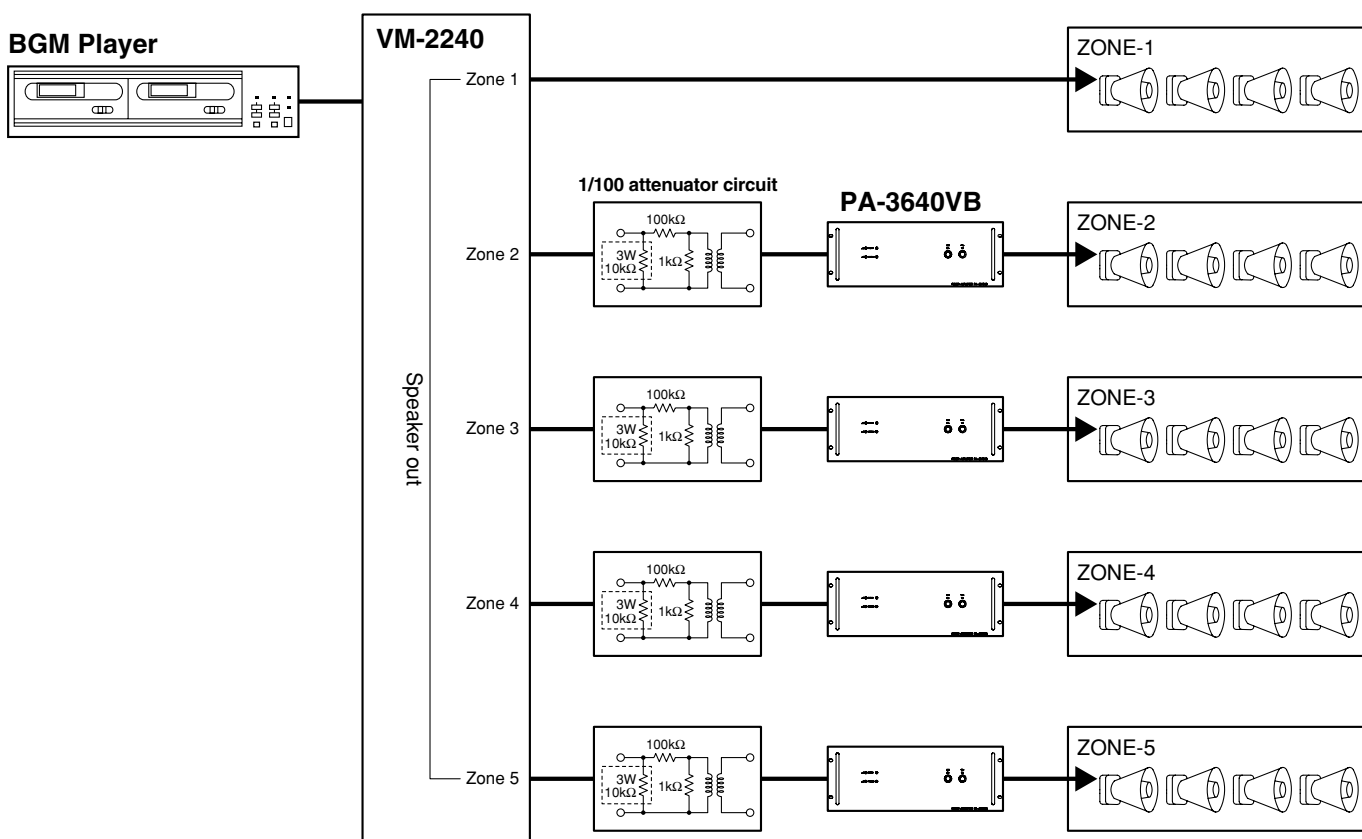


### [1/100 attenuator circuit]

NOTE: When installing the SV-200M in the VM-2240 to monitor the status between the VM-2240's speaker output and the PA-3640VB's input, be sure to install a 3W 10k resistor, while the attenuator is made up of 1/2W 100k resistor and 1/2W 1k resistor. The YA-1000A will be required when monitoring the status between the PA-3640VB's speaker output and the speaker.

# Operation of the Quasi-Dual-Origination Broadcast System

The quasi-dual-origination broadcast is available when the VM amplifier is connected to a BGM amplifier.
Background music (BGM) input to the A-1000 BGM amplifier is broadcast over Zones 1 - 5 in Fig. 1.
In Fig. 2, Individual Zone Selection keys 2 and 3 on the Remote Microphone are selected and the Talk switch
is pressed to page Zones 2 and 3. In this event, since a call from the Remote Microphone takes precedence
over the BGM, the BGM output to Zones 2 and 3 is interrupted. However, the BGM continues to play in
Zones 1, 4 and 5 which were not selected by the Remote Microphone.

**Fig.1**
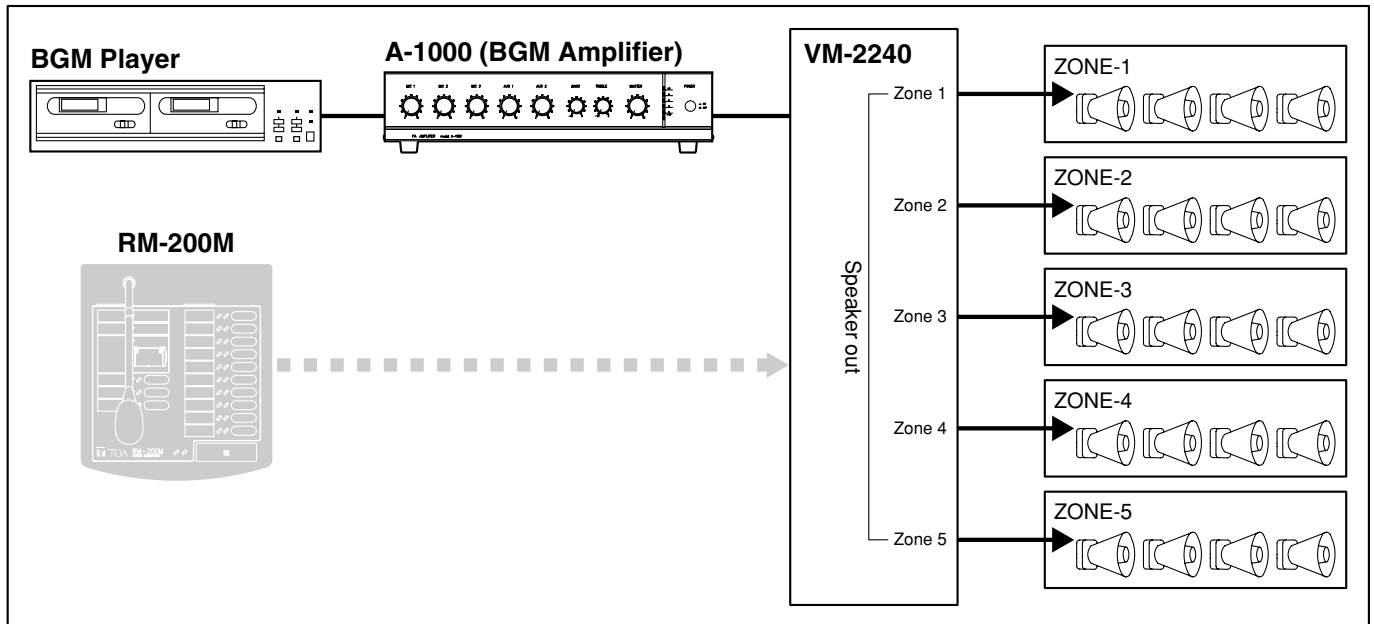


**Fig.2**
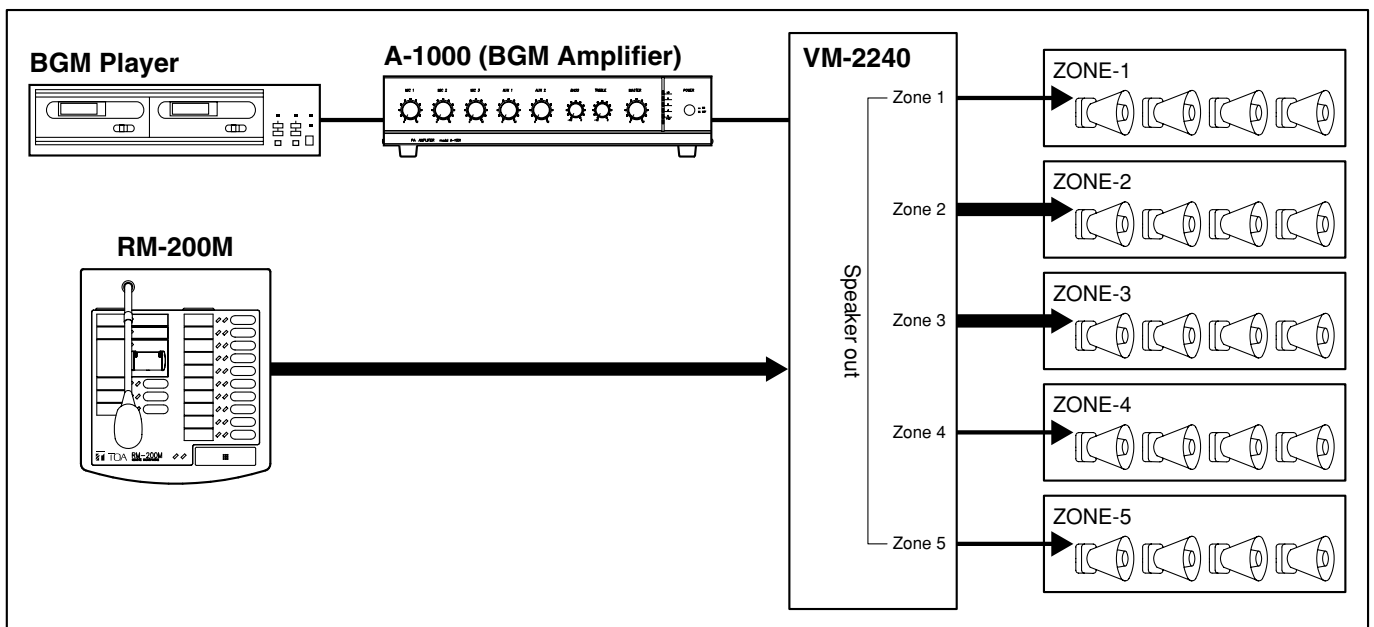
# Quasi-Dual-Origination Broadcast Connection

Quasi-dual-origination broadcasts can be performed by the following system.

**[Connection]**
Change the connection of the CN-1003 connector on the VM amplifier's RY circuit board from [2P-3P Short] position to the [1P-2P Short] position. Connect the BGM amplifier speaker output to the VM amplifier's External Speaker input.

**[VM Amplifier's Internal Operation]**
When the VM amplifier's zone selector switch is set to the OFF position, the zone selector switch relay switches to the External SP input side. If the zones (Zones 2 and 3 in the figure) are selected from the Remote Microphone and a broadcast is started, the VM amplifier's zone selector switch relay contact switches to the amplifier side.

NOTE:
Zone attenuators cannot be used and signals cannot be muted for external BGM signals. Whether or not to distribute external BGM cannot be selected. If the zones not receiving the BGM are fixed, modify the RY circuit board. (If modified, BGM broadcast status cannot be checked from the indication.)
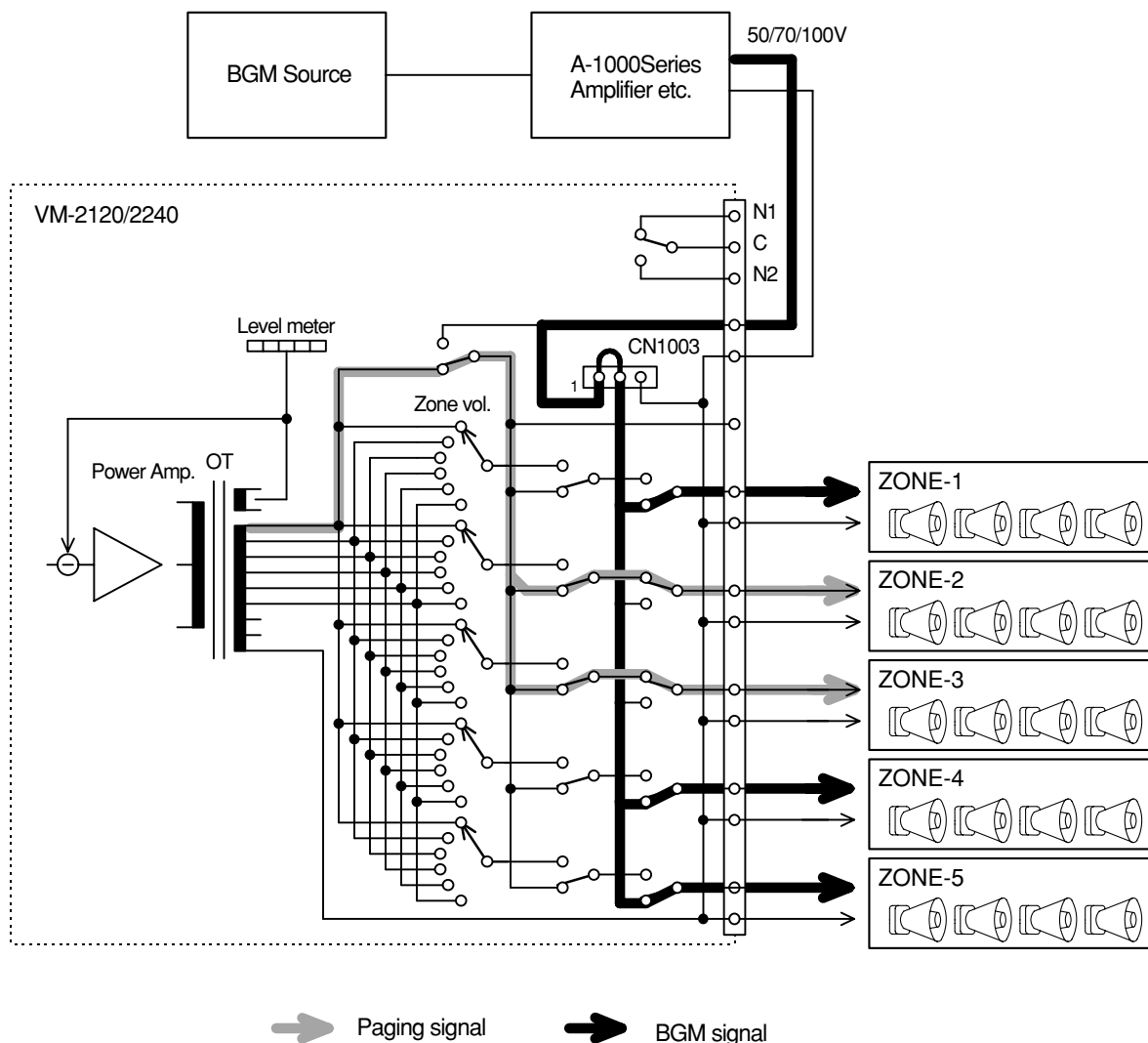
# External Standby Amplifier Operation

A backup system for VM amplifier failure can be created by configuring the following system.

**[Operation]**
During a normal broadcast using two VM amplifiers (Fig.1), one of these amplifiers fails (Fig.2).
The SV-200M in the failed amplifier sends failure information to the CPU inside the VM. And the CPU activates the relay to have the signal from the backup amplifier.

**Fig.1**

**BGM Player**

**Standby amp**

**VM amp**

**VM amp**

ZONE-1
ZONE-2
ZONE-3
ZONE-4
ZONE-5

**Zones**

ZONE-1
ZONE-2
ZONE-3
ZONE-4
ZONE-5

**Zones**

**Fig.2**

**BGM Player**

**Standby amp**

**VM amp**

**VM amp**

ZONE-1
ZONE-2
ZONE-3
ZONE-4
ZONE-5

**Zones**

ZONE-1
ZONE-2
ZONE-3
ZONE-4
ZONE-5

**Zones**
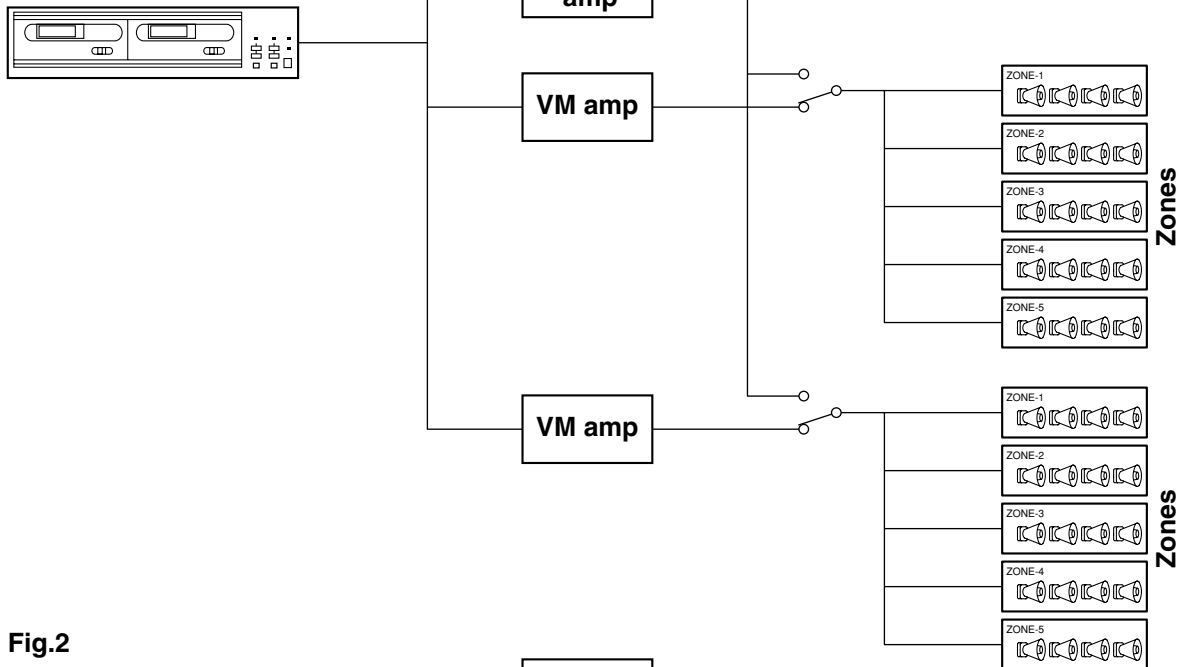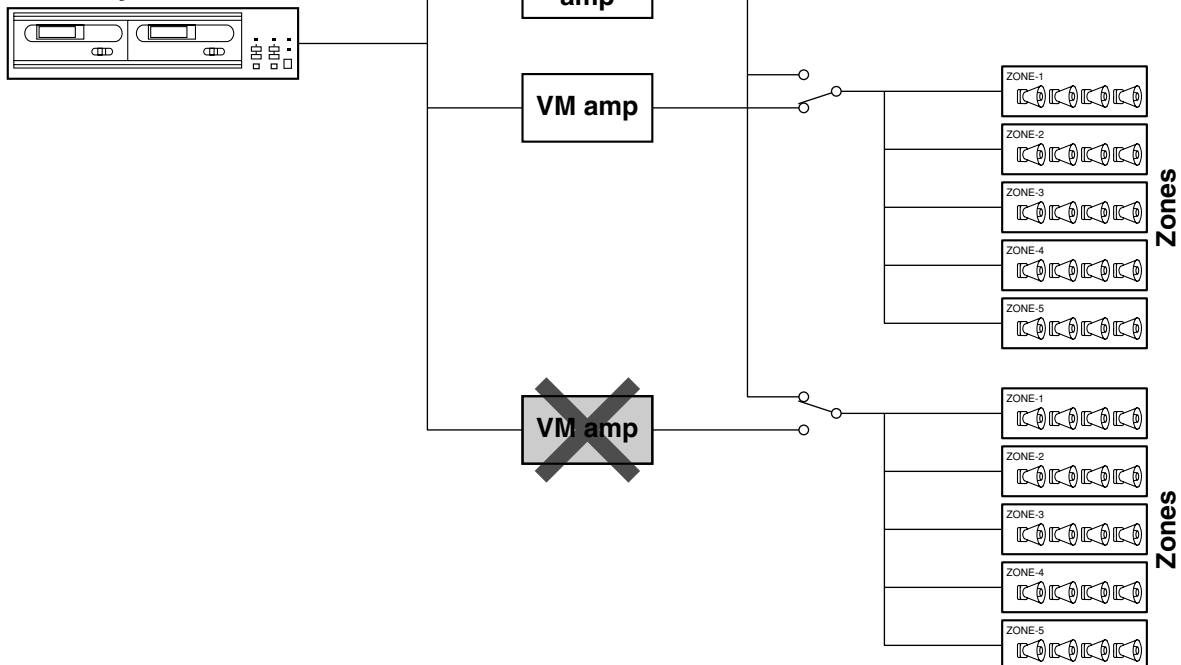
# Standby Amplifier Connection

In case of amplifier failure, they can be backed up by creating the following system.

**[Connection]**
Prepare a standby amplifier with the same output rating as that of the VM amplifier. Install the SV-200M in the VM amplifier and connect the PREOUT to the standby amplifier, and the standby amplifier's output to the VM amplifier's EXTERNAL SP input.

To display the standby amplifier's failure data on both the VM amplifier and the Remote Microphone, connect the standby amplifier's failure detection output to Pin 15 (failure indicator control) of the VM amplifier's Control I/O connector. In the figure, when the YA-1000A detects an amplifier failure, the Failure indicator LED on both the VM amplifier and Remote Microphone lights.

NOTE: When a single standby amplifier is connected to the system employing 2 or more VM amplifiers, if 2 or more VM amplifiers should simultaneously fail, all of their zones will be connected to the standby amplifier. Attenuators cannot be used for the zones covered by the backup amplifier.

**Audio signal flow during sub-amplifier failure.**
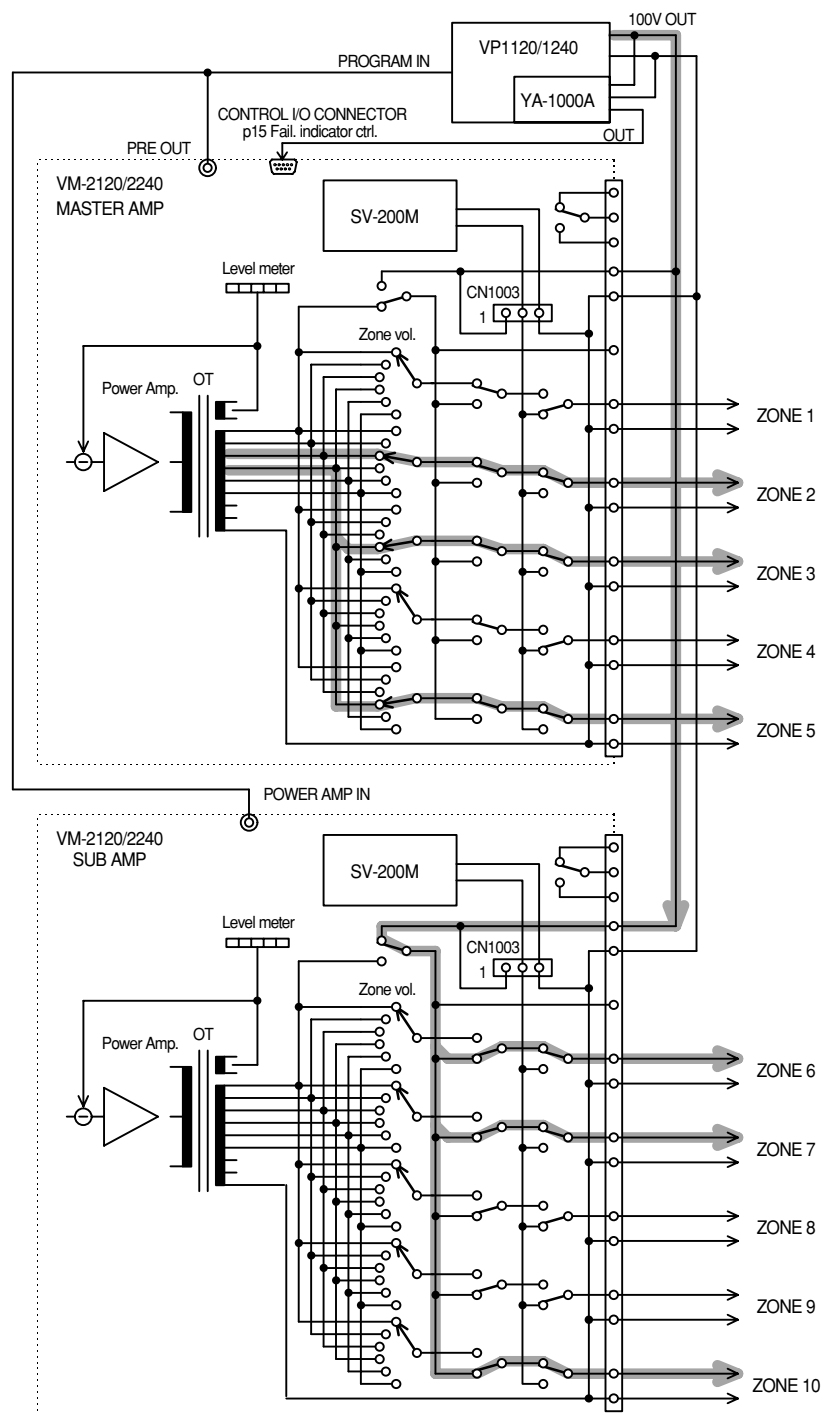
# Operation Using Both Standby and Quasi-Dual-Origination Amplifiers

The following system enables the same amplifier to provide both standby and quasi-dual-origination broadcast functions.

Quasi-dual-origination broadcasts are normally made using both the VP-1120 or VP-1240 amplifier and the VM Series amplifier. If the VM amplifier fails, the VP amplifier functions as the VM amplifier's backup amplifier. Details concerning the operation of the quasi-dual-origination broadcast system are explained in **the Quasi-Dual-Origination Broadcast Operation section. (4-5-5)**

**BGM Player**

YA-1000A

VP-1120/1240

**Customized Relay Circuit**

VM-2240

SV-200M

Speaker out

Zone 1 — ZONE-1
Zone 2 — ZONE-2
Zone 3 — ZONE-3
Zone 4 — ZONE-4
Zone 5 — ZONE-5
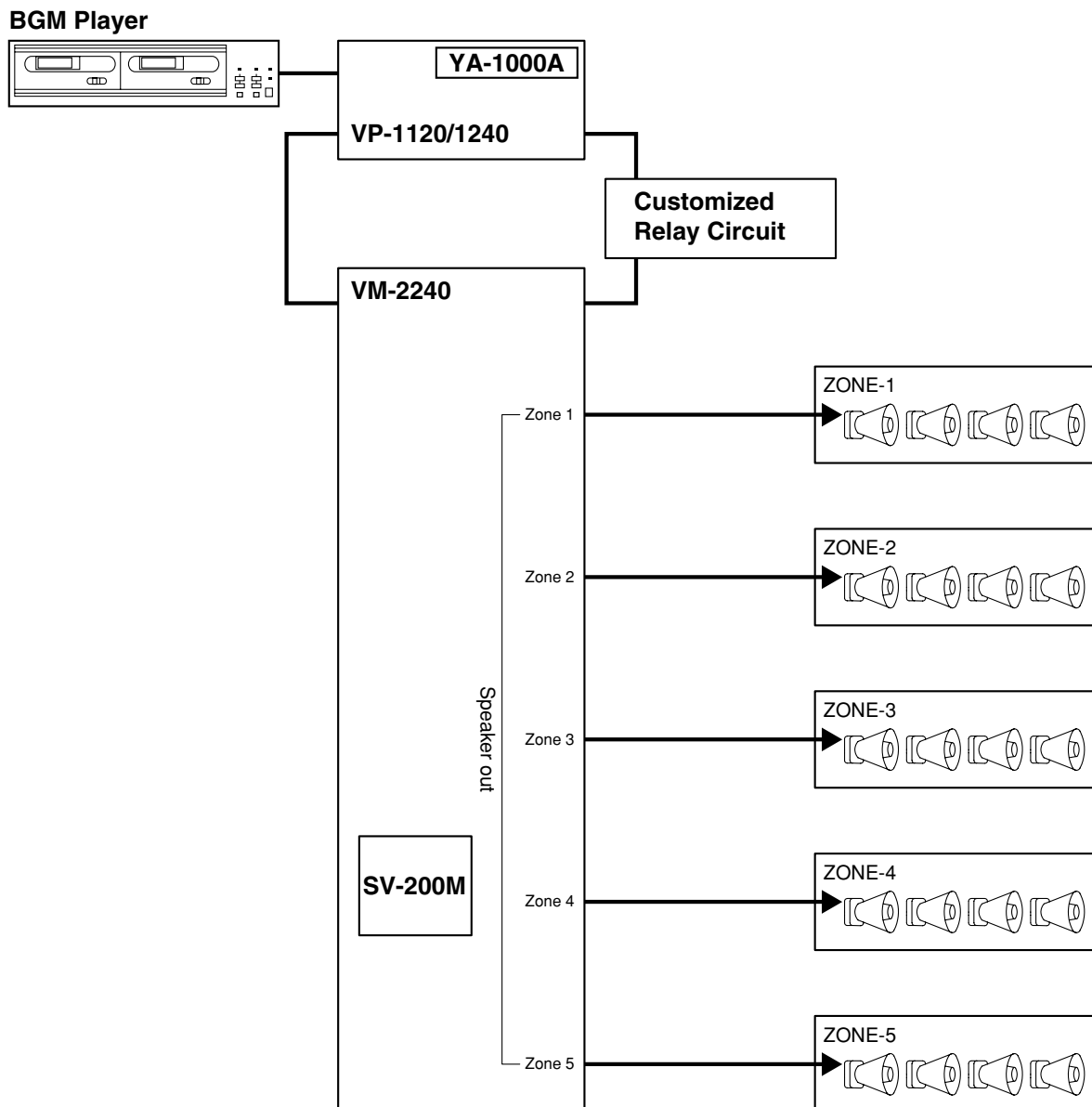
# Connection When Using Both Standby and Quasi-Dual-Origination Amplifiers

The following system permits use of both the BGM amplifier for quasi-dual-origination broadcasts and the standby amplifier.

Prepare a standby amplifier (here, a VP-1120 or VP-1240) with the same output power rating (wattage) as that of the VM amplifier. Place a relay between the SV-200M's CN3 connector and the VM amplifier's RY PCB 1003 circuit board, and control the relay by means of the Surveillance I/O connector's Pin 12 (Power Amplifier Failure) and Pin 13 (Setting/Checking Busy). Details are explained in **4-5-9** Operation When Using Both the Standby and the Quasi-Dual-Origination Amplifiers section.

NOTE: The amplifiers cannot be modified not to distribute external BGM to the specified zones.
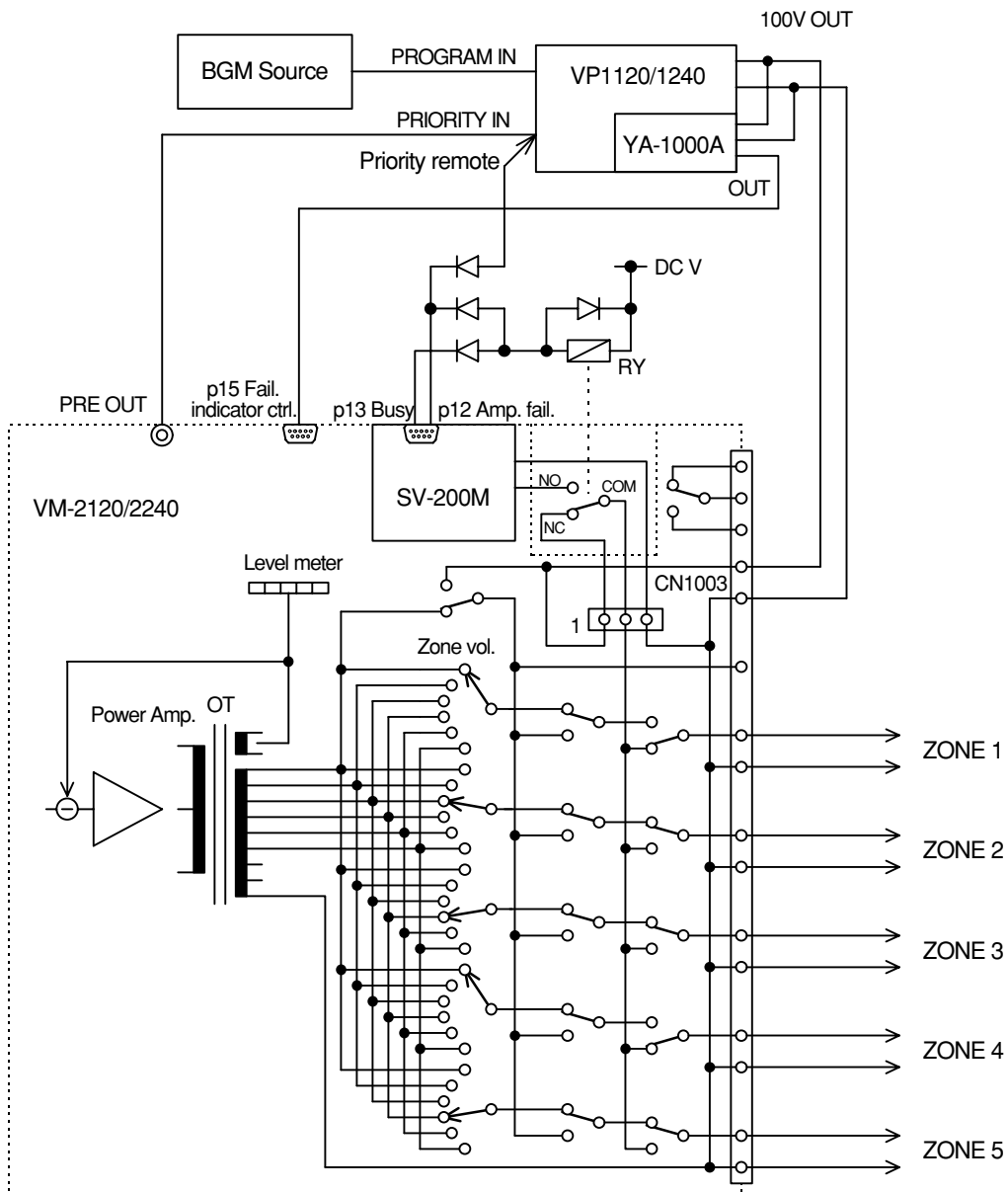
# Rack Mounting

The VM amplifier can be mounted in a standard EIA rack (3-unit space) with the use of optional MB-36 hardware.

EIA 3UNIT

VM amplifier

Plain washer

M4 x 16 screw

**Note:** The screws and washers as illustrated are all supplied with the MB-36.

Rack Mounting Bracket MB-36 (optional)

Rack mounting screw     Fiber washer
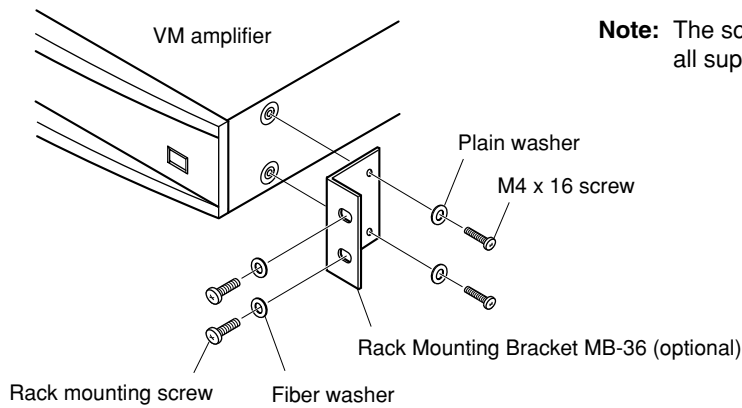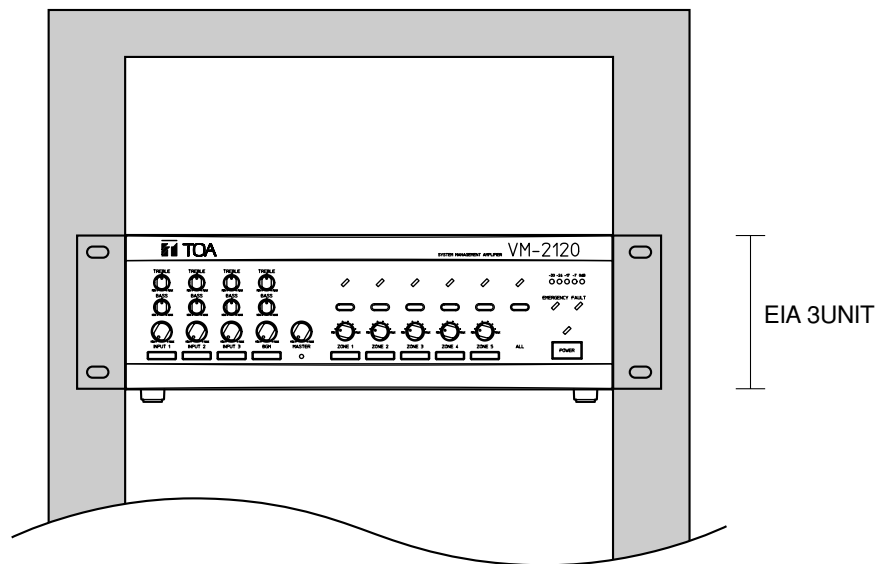
# Headset Microphone

The external microphone input jack located on the rear panel of the RM-200M Remote Microphone can be used to connect a condenser microphone with a 3.5 mm mini-jack.

**[Example]**
Connection of the WH-4000A headset microphone to the RM-200M Remote Microphone enables operators to work and talk with both hands free.

Headset Microphone

# About Emergency Broadcasts

<TOA's Efforts to Make the VM-2000 Series Amplifiers Conform to European Safety Standards>

European Standard EN60849 Paragraph 4.1 (General System Requirements) describes emergency broadcast systems as follows:

a) When any alarm is detected, the system shall immediately disable any function not connected with its emergency role (such as paging, music or general prerecorded announcements being broadcast to the loudspeaker zones requiring emergency broadcasts.
   When emergency broadcasts are initiated from the Remote Microphone or from external equipment in the VM-Series system, all functions other than automatic broadcast of 2 types of recorded messages (warning and evacuation announcements) and manually initiated announcements from the Remote Microphone are disabled until emergency broadcast status is reset.

b) Unless damaged as a result of the emergency, the system shall be available for operation at all times.
   VM-Series amplifiers are not equipped with switches to turn off the power supply of the entire system, making it possible to instantly initiate emergency broadcasts at all times.

c) The system shall be capable of broadcasting within 10s after primary or secondary power is applied.
   VM-Series amplifiers can commence emergency broadcasts in approximately 6 seconds.

d) Except during the condition described in 4.1c), the system shall be capable of broadcasting a first attention-drawing signal within 3s of being placed in an emergency mode by the operator or automatically on receipt of a signal from a fire or other detection system.
   VM-Series amplifiers are not equipped with switches to turn off the power supply of the entire system, making it possible to instantly initiate emergency broadcasts at all times.

e) The system shall be capable to broadcast attention-drawing signals and speech messages to one or more areas simultaneously. There shall be at least one appropriate attention-drawing signal alternating with one or more speech messages for this purpose.
   VM-Series amplifiers are designed to provide emergency broadcasts of both an alert signal or an evacuation message prerecorded on the EV-200 digital voice recording unit over the entire area.

f) At any time the system operator shall be able to receive, by means of a monitoring system, indications of the correct functioning or otherwise of the relevant part of the emergency system.
   VM-Series amplifiers feature built-in failure detection circuitry as standard equipment. This circuitry monitors system conditions in conjunction with other failure detection circuitry supplied by the SV-200M. The outputs from these components enable the system operator to confirm that the system is operating correctly at all times.

g) Failure of a single amplifier or loudspeaker circuit shall not result in total loss of coverage in the loudspeaker zone served.
   If a VM amplifier should fail, it can be switched over to an external standby amplifier. VM-Series amplifiers are also equipped with failure detection functions for individual output zones. If a short circuit failure hampering broadcasts to other zones is detected, that shorted zone can be disconnected from the system, enabling broadcasts to other zones to continue.

h) An attention-drawing signal shall precede the first message for 4s to 10s. Successive signals and messages shall then continued until either changed in accordance with the evacuation procedure, or manually silenced. The interval between successive messages shall not exceed 30s and attention-drawing signals shall be broadcast whenever periods of silence might otherwise exceed 10s.
   VM-Series amplifiers can record 2 different types of emergency message using the EV-200 recording unit. It is possible to separately record an alert tone and an emergency message and edit them. Since the emergency broadcast sequence can be programmed, broadcasts that meet the requirements of the projects can be easily realized.

i) All messages shall be clear, short, unambiguous and as far as practicable, preplanned. Where prerecorded messages are used they shall be held in a non-volatile form, preferably in a solid-state store, and be continuously monitored for availability. The system design shall make it inherently impossible for an external source to corrupt or damage the store or its contents. NOTE - On grounds of reliability, it is preferable not to use storage media depending on mechanical devices.
   Since the VM system's emergency broadcast messages are recorded on compact flash memory cards in the VM amplifier, there is no possibility of the contents becoming lost due to volatility. The availability of the recorded memory contents is constantly monitored, and if a failure should occur, it can be indicated on either the amplifier or Remote Microphone, or a failure signal can be output to connected external equipment. Since recordings are only made using external equipment (EV-350R), it is impossible for the recorded contents to become damaged during operation.

j) The language(s) used shall be specified by the purchaser.
   VM-Series amplifiers permit the user to record emergency broadcast messages in their own language. What is more, the Remote Microphone's indication labels can be easily prepared in user-preferred local languages.

# Operation and Connection Examples as an Emergency Broadcast Amplifier

The following system uses the VM amplifier as an emergency/general-purpose broadcast amplifier. General-purpose announcements are made using the microphone and BGM is normally broadcast. In the case of emergencies such as a fire:

Emergency messages recorded on the CF card are played back to provide an emergency situation alert and evacuation instructions. Any of the following 3 playback methods can be initiated.

(1) Press the Emergency Button on the Remote Microphone.

(2) Transmit a signal — either detected by the fire alarm system or produced when the Fire button is pressed — to the VM amplifier.

(3) Press the manual activation button to activate the VM amplifier's emergency function.

The emergency function is initiated, and the BGM broadcast stops while the emergency message is being output.

If it is confirmed that there is no danger of fire and the emergency broadcast is terminated, the interrupted BGM is restored. (Note that some broadcasts are not restored depending on the type of equipment connected. Please refer to **Section Emergency Broadcast Sequence**.)

# Emergency Broadcast Sequence

```
                           General-purpose broadcast
```

| Depression of the Remote Microphone's Emergency broadcast switch | Activation of Alert input*1 by external equipment. | Activation of Evacuation input*1 by external equipment |

| Alternate repetition of Alert tone signal and Alert announcement | End of set repetition → | Alternate repetition of Evacuation tone signal and Evacuation announcement |

| Live microphone announcement by the Remote Microphone's Talk key | | Live microphone announcement by the Remote Microphone's Talk key |

| Activation of Emergency Stop input*1 by external equipment | End of Emergency broadcast |

(The unit returns to the general-purpose broadcast mode it was in immediately before the Emergency broadcast was started.*2)

*1 Control I/O connector terminal located on the VM amplifier's rear panel.
Emergency broadcast can also be stopped by pressing the front panel-mounted Reset key. Note, however, that the zones the unit was broadcasting to just before the emergency broadcast activation may change.
*2 General-purpose broadcast is not restored depending on its type.

**[Emergency mode]**
- The emergency mode refers to the state where the VM amplifier is making emergency broadcast or where the "VM amplifier's broadcast cutoff control" signal is being transmitted from external emergency broadcast equipment to the VM amplifier **(refer to p-36 "CONTROL I/O CONNECTOR FUNCTIONS")**.
- When the VM amplifier is placed in the emergency mode that takes precedence over general-purpose broadcast mode, the Emergency indicators of both the amplifier and the Remote microphone will light.

**[Restoration to general-purpose broadcast]**
For the general-purpose broadcasts cut off when its mode enters the emergency mode, some are restored after emergency mode completion, and some are not.

| Broadcast to be restored | Broadcast not restored |
|---|---|
| Broadcast that is not activated by manual operation of or control from external equipment. | Broadcast that is activated by manual operation of or control from external equipment. |
| • Broadcast from Inputs 1 – 3 not activated by control input (CTRL 1 – 3). <br>• Broadcast from BGM Inputs 1 and 2. | • Broadcast from Inputs 1 – 3 activated by control input (CTRL 1 – 3). <br>• Broadcast from Remote Microphone <br>• Telephone paging <br>• Message broadcast <br>• Westminster chime |

# Operation and Connection Examples
# for a Local Amplifier

The following system uses the VM amplifier as a general-purpose local amplifier.

In this system, the VM amplifier normally functions as a local amplifier to provide broadcasts of BGM and announcements. If the emergency broadcast amplifier (installed separately from the VM amplifier to cover broadcasts for the entire building area) is activated and an emergency broadcast is initiated, the VM amplifier's speaker junction automatically switches to the emergency broadcast amplifier side, allowing output from the emergency broadcast amplifier to go through.

Entire Building Area

**Emergency Broadcast Amplifier**

Busy

Audio

**RM-200M**

**BGM Player**

**VM-2120/2240**

Control I/O

External SP input

Speaker out

Link Connector

BGM input

Zone 1

Zone 2

Zone 3

Zone 4

Zone 5

ZONE-1

ZONE-2

ZONE-3

ZONE-4

ZONE-5
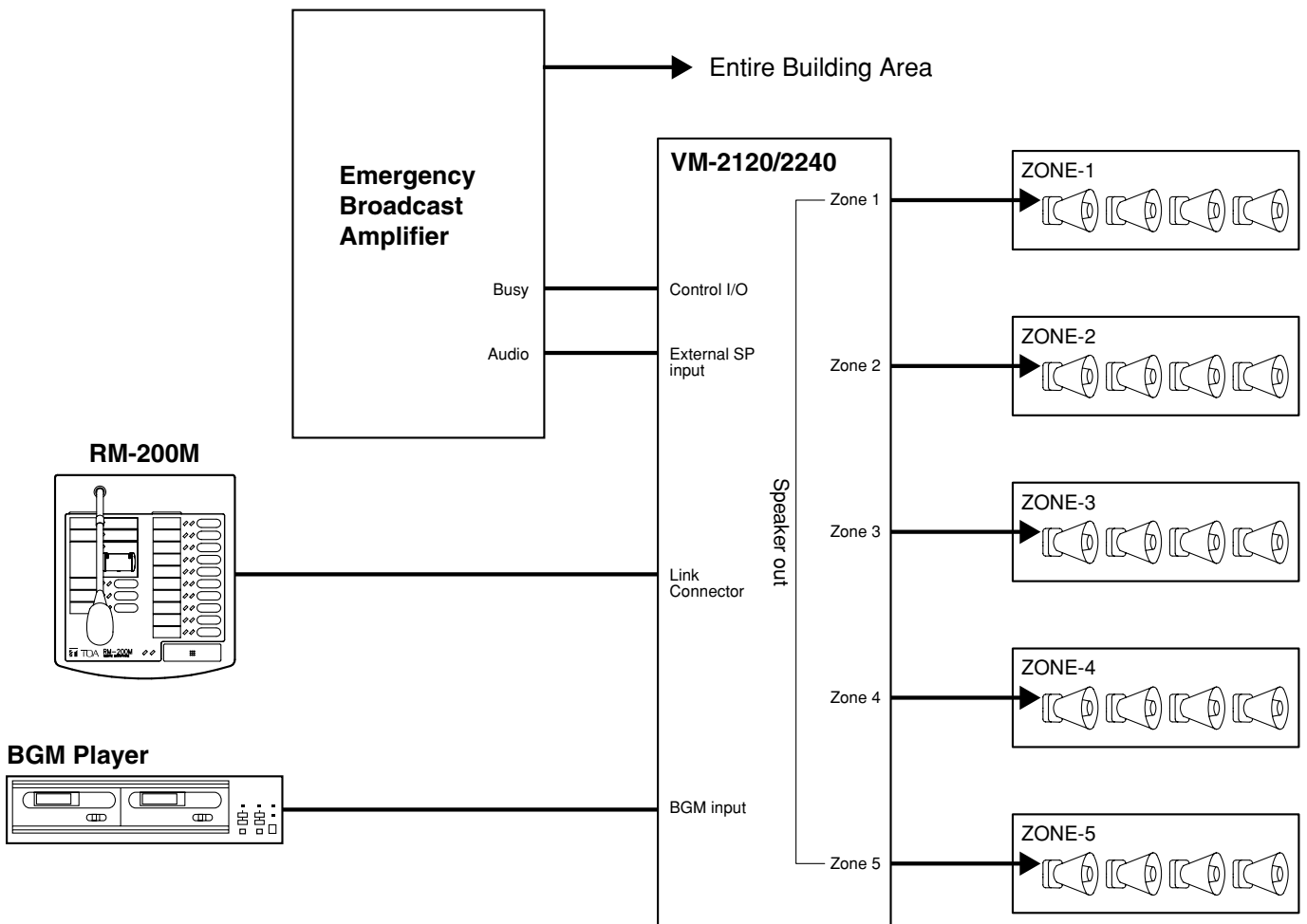
# SV-200M Functions

The failure detection circuitry included as standard-equipment in the VM-2120 and VM-2240 amplifiers permits

- Communication error output (the number of connected units needs to be set)
- Failure detection by way of the optional EV-200 unit.

By installing an optional SV-200M unit, the following failure detection functions can be added.

- Failure detection of output zones 1 - 5
  Detection of shorted or opened circuits for individual lines + simultaneous detection of ground faults of 5 zones.
- Power amplifier failure detection.

When any of these failures is detected, a common failure output is generated in addition to an individual failure output. The failure indicator LEDs on the VM amplifier front panel and the Remote Microphone are also illuminated.

**Failure detection circuit operation**



**SV-200M Block Diagram**
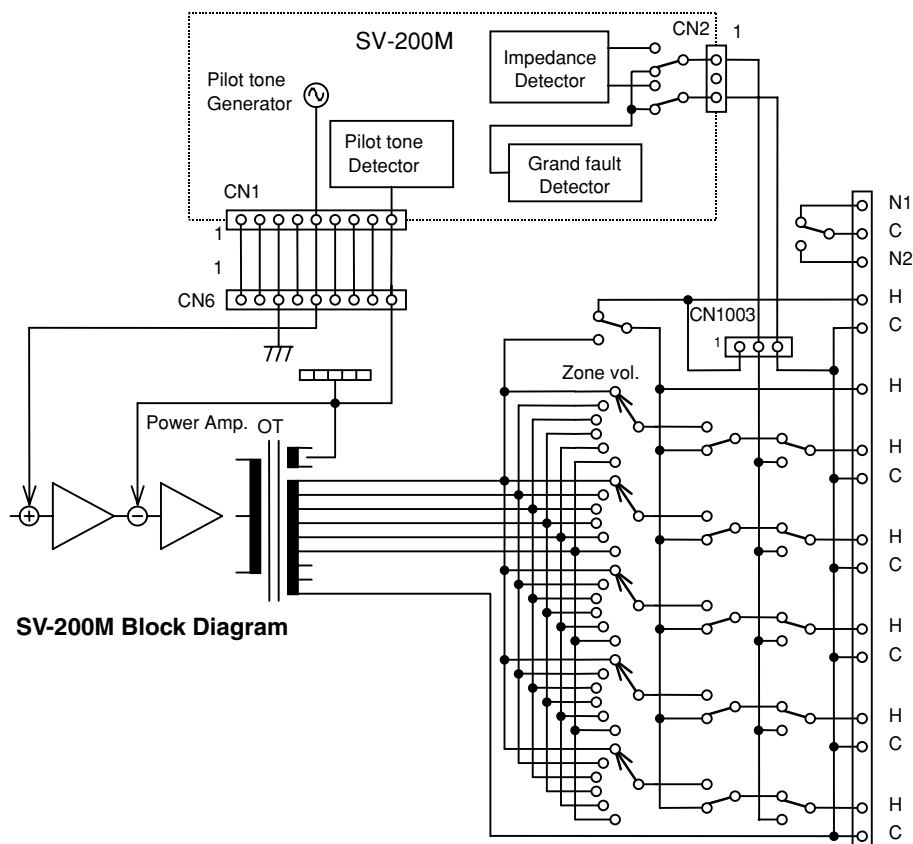
The power amplifier failure is determined by superimposing a 20 kHz pilot signal over the audio signal at the power amplifier input and monitoring the power amplifier output for the pilot signal. This failure detection is constantly enabled.

Speaker line ground failure is detected by monitoring all speaker lines after the power amplifier's output transformer secondary side in a group. Failures are assumed if the impedance at ground falls to under 50 k$\Omega$. This detection is constantly enabled.

An impedance measuring method employing a 40 Hz pilot signal is used to detect the short- or open- circuit failures. Initially, each speaker line impedance is measured and its reading stored (initial setting). When the speaker line check is activated, the speaker line impedance is compared with the initial reading and failure is determined by impedance deviation.

# SV-200M Functions

The initial impedance setting is performed by pressing the SET switch on the SV-200M's panel or by external activation. The speaker lines the SV-200M can cover are those of approximately 1 W to 240 W (100 V line). If initial setting is not possible (speaker line impedance exceeds the measurable range), an initial setting error is output to provide short- or open- circuit information depending on the state. However, since whether all 5 output zones are used differs depending on the project requirements, when an open circuit is detected during initial setting, a common failure signal is not output, and thus the failure indicator LEDs do not light. When a short circuit is detected during initial setting, an initial setting error and the same output as was detected in the speaker line check are provided.

The speaker line check is performed by pressing the CHECK switch on the SV-200M's panel or by activating from the built-in timer or external equipment. If activated, the speaker line is disconnected from the power amplifier and is connected to the SV-200M for impedance measurement. If the impedance is approximately 50% lower than that of the initial setting, a short output is provided, and an open output if approximately 200% higher. If the measurement is completed, the speaker line is reconnected to the power amplifier to restart the broadcast.

If a shorted speaker line is detected, its zone is disconnected and maintained, while restarting broadcasts to other zones. The zone is disconnected because broadcasts cannot be made to other zones when even a single zone fails due to a short circuit. The shorted speaker line is kept disconnected until its status returns to normal.

The time required to check speaker lines of all 5 zones is approximately 20 seconds. During this duration, background music output and broadcast of Level 3 priority are interrupted. If broadcasts of priority higher than Level 2 or emergency activation or emergency cutoff states are enabled during the impedance check, the check will be interrupted and the broadcast initiated.

The built-in timer can be set for 10 - 60 minutes in 10-minute units. To set for shorter or longer intervals than this, use an external timer.

During broadcasts of a priority higher than Level 2 or during emergency broadcast or emergency cutoff states, initial setting or impedance checks cannot be activated. However, since the system remembers the activation, the impedance check will be activated after the broadcast or emergency cutoff state is completed. If Speaker line ground failure is detected, Initial setting and Impedance check cannot be activated. The initial setting and impedance check can be activated regardless of the power switch setting.

Since the SV-200M detects speaker line failure by measuring the impedance, it cannot be used in combination with 3-wire system attenuators. Be sure to use a 4-wire system attenuator when using an external attenuator.

Since speaker line impedance changes due to temperature and time, it is highly recommended that the initial settings for the speaker lines be re-initialized periodically after checking speaker line operation.

# Surveillance Functions for Multiple VM Amplifier Systems

To perform system-wide surveillance, an SV-200M unit must be installed in each amplifier.

To display surveillance results on the external indication board, connect each amplifier's SV-200M unit to a corresponding indication board.

Note that "communication by link cable" errors cannot be displayed if the total number of sub-amplifiers and Remote Microphones within the same system exceeds 7.
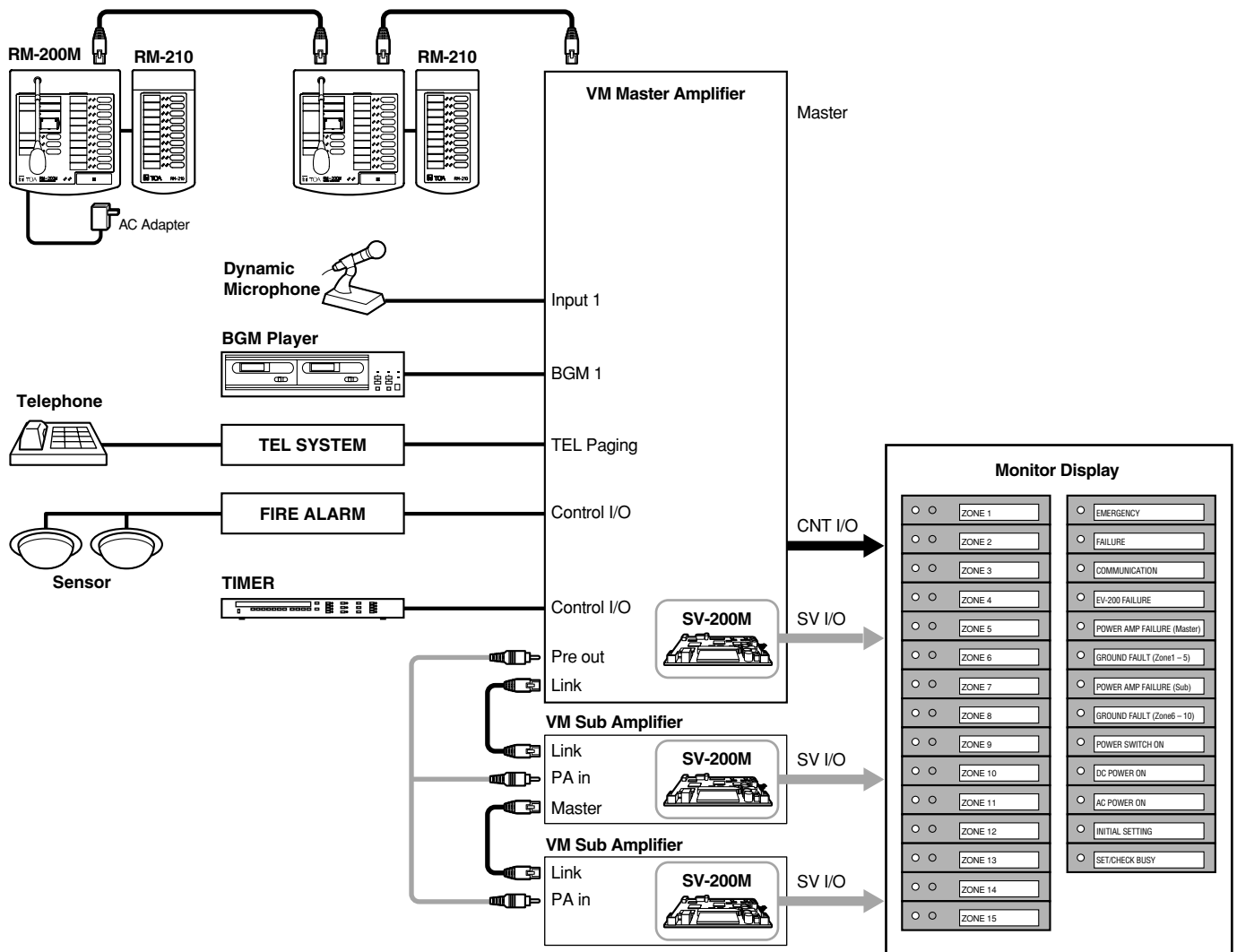
# Surveillance I/O Connector Functions

The rear panel Surveillance I/O connector* permits "Speaker Line Reference Impedance Measurement (Initial Setting)" and "Speaker Line Check" to be enabled and monitored by connected external equipment. Referring to the pin arrangement and functions, prepare the matching D-sub male connector (screw-lock type) for connection to the external equipment.

* Requires installation of the optional SV-200M Surveillance Board.

SV-200M's D-sub female connector

13    SURVEILLANCE  I/O    1

Locking nut: 4-40 UNC

25                      14

**SURVEILLANCE I/O connector pin function table**

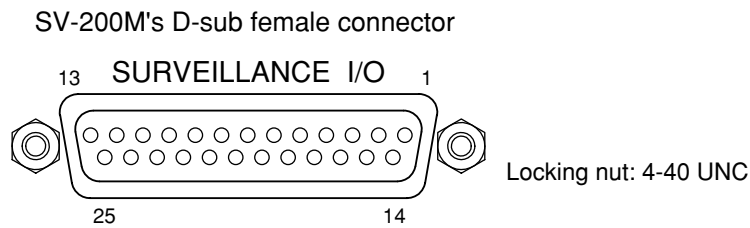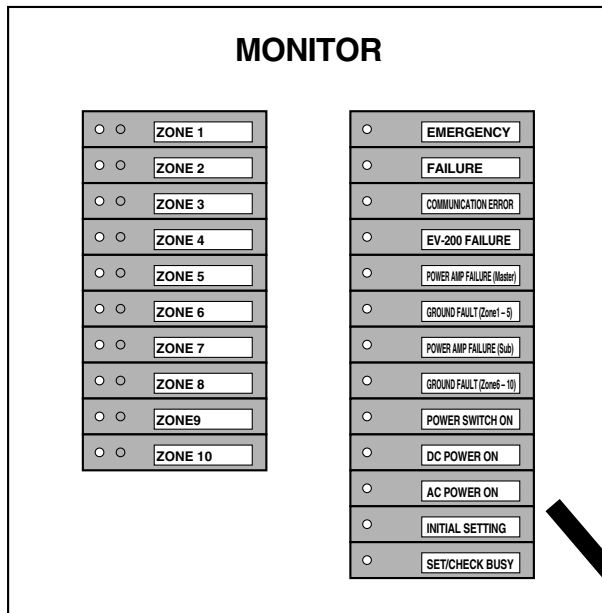| Pin No. | Signal name | IN/OUT | Signal/logic | Function/status |
|---|---|---|---|---|
| 1 | Zone 1 short | OUT | Active Low | Zone 1 speaker line is shorted. |
| 2 | Zone 1 Disconnection | OUT | Active Low | Zone 1 speaker line is disconnected. |
| 3 | Zone 2 short | OUT | Active Low | Zone 1 speaker line is shorted. |
| 4 | Zone 2 Disconnection | OUT | Active Low | Zone 1 speaker line is disconnected. |
| 5 | Zone 3 short | OUT | Active Low | Zone 1 speaker line is shorted. |
| 6 | Zone 3 Disconnection | OUT | Active Low | Zone 1 speaker line is disconnected. |
| 7 | Zone 4 short | OUT | Active Low | Zone 1 speaker line is shorted. |
| 8 | Zone 4 Disconnection | OUT | Active Low | Zone 1 speaker line is disconnected. |
| 9 | Zone 5 short | OUT | Active Low | Zone 1 speaker line is shorted. |
| 10 | Zone 5 Disconnection | OUT | Active Low | Zone 1 speaker line is disconnected. |
| 11 | Ground fault | OUT | Active Low | Some of speaker lines are grounded. |
| 12 | Power amplifier failure | OUT | Active Low | Power amplifier is faulty. |
| 13 | Setting/checking busy | OUT | Active Low | During measurement of the speaker line reference impedance (Initial setting) or during check of the speaker lines. |
| 14 | Initial setting error | OUT | Active Low | The speaker line reference impedance couldn't be measured successfully. (The measured impedance exceeds the expected range or is unstable.) |
| 15 I 22 | | | | Not used. |
| 23 | Speaker line check activation | IN | One-shot make | Check of the speaker line impedance starts. |
| 24 | Speaker line initial setting activation | IN | One-shot make | Measurement of the speaker line reference impedance (Initial setting) starts. |
| 25 | GND | | | |

# Example of a Custom-Made Panel to Display VM Amplifier Status

An active low signal is transmitted to the custom-made indication panel from the VM amplifier's control I/O terminal and the SV-200M installed in the VM amplifier, causing the indication panel LED to light.

**MONITOR**

| | |
|---|---|
| ○ ○ ZONE 1 | ○ EMERGENCY |
| ○ ○ ZONE 2 | ○ FAILURE |
| ○ ○ ZONE 3 | ○ COMMUNICATION ERROR |
| ○ ○ ZONE 4 | ○ EV-200 FAILURE |
| ○ ○ ZONE 5 | ○ POWER AMP FAILURE (Master) |
| ○ ○ ZONE 6 | ○ GROUND FAULT (Zone1 – 5) |
| ○ ○ ZONE 7 | ○ POWER AMP FAILURE (Sub) |
| ○ ○ ZONE 8 | ○ GROUND FAULT (Zone6 – 10) |
| ○ ○ ZONE9 | ○ POWER SWITCH ON |
| ○ ○ ZONE 10 | ○ DC POWER ON |
| | ○ AC POWER ON |
| | ○ INITIAL SETTING |
| | ○ SET/CHECK BUSY |

(The example assumes the system consisting of 2 linked VM amplifiers with EV-200 and SV-200M units installed, and an RM-200M unit expanded with an RM-210 unit.)
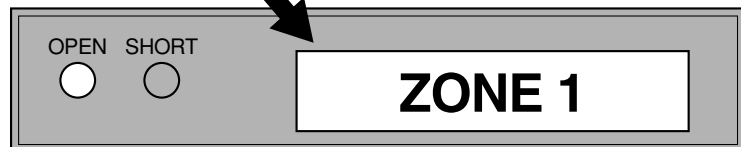
OPEN   SHORT     **ZONE 1**

| | |
|---|---|
| ZONE 1 | EMERGENCY |
| ZONE 2 | FAILURE |
| ZONE 3 | COMMUNICATION ERROR |
| ZONE 4 | EV-200 FAILURE |
| ZONE 5 | POWER AMP FAILURE (Master) |
| ZONE 6 | GROUND FAULT (Zone1 – 5) |
| ZONE 7 | POWER AMP FAILURE (Sub) |
| ZONE 8 | GROUND FAULT (Zone6 – 10) |
| ZONE 9 | POWER SWITCH ON |
| ZONE 10 | DC POWER ON |
| | AC POWER ON |
| | INITIAL SETTING |
| | SET/CHECK BUSY |
| | |

# Schematic Diagrams of Control and Display VM Amplifier Status
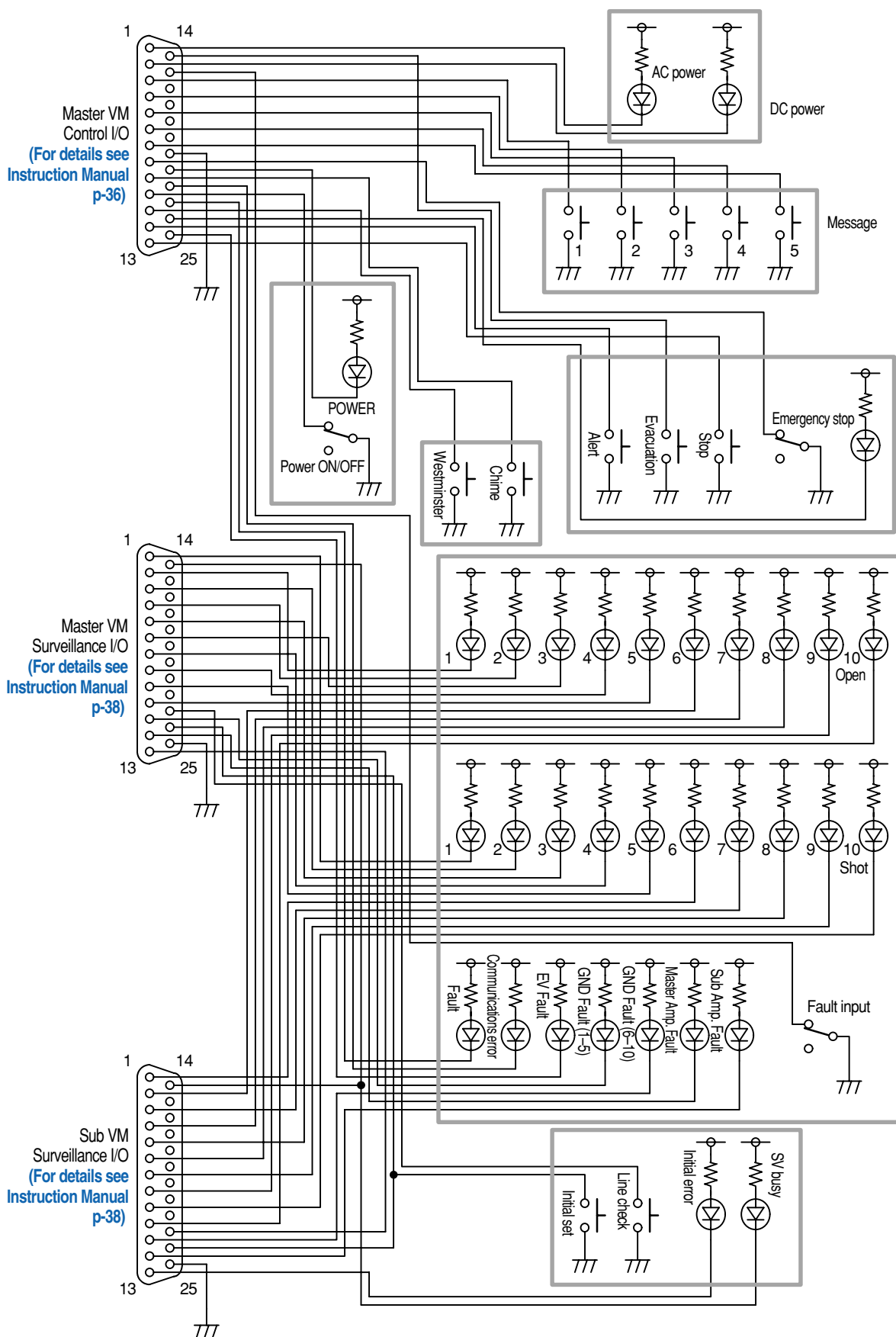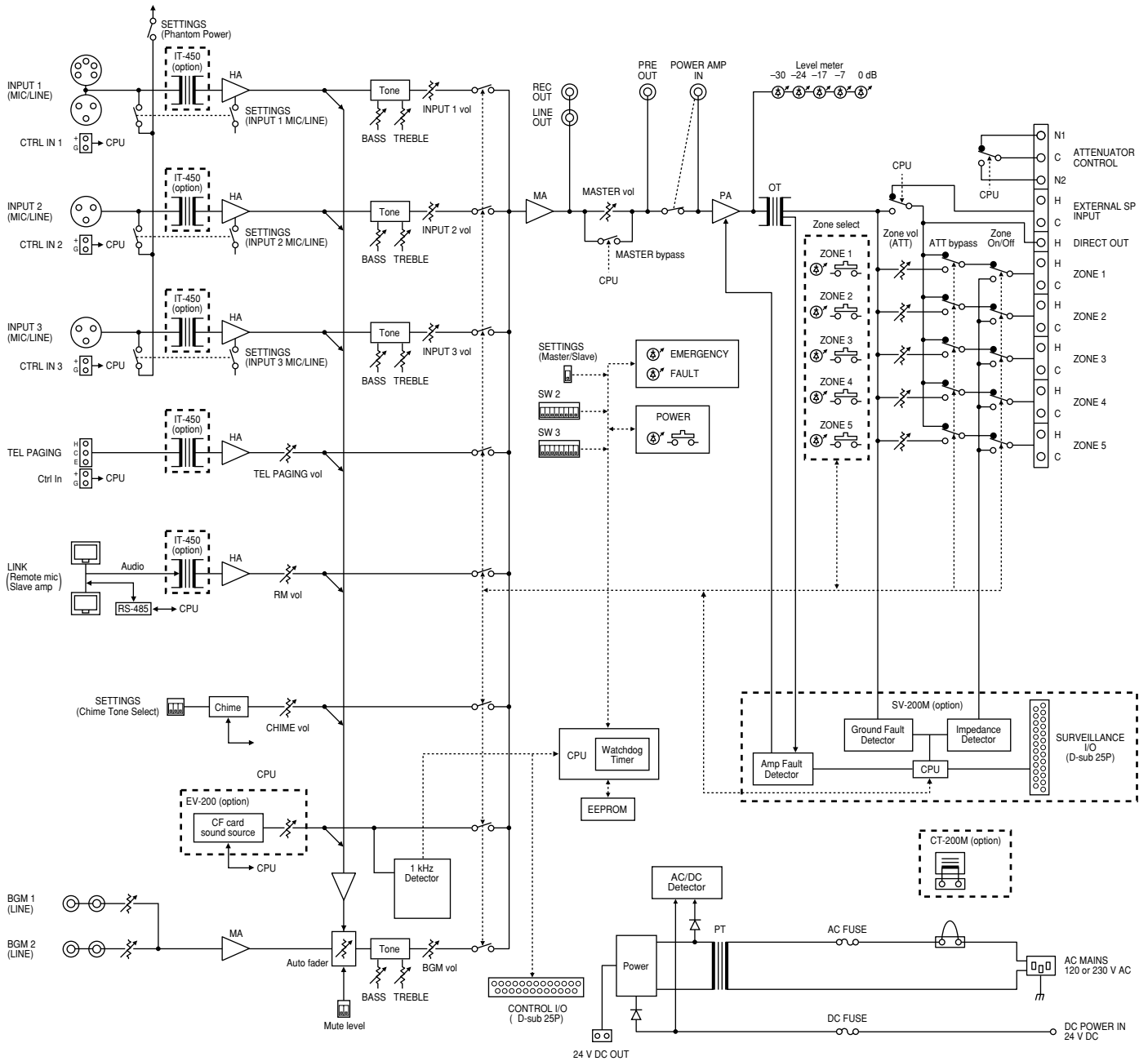
# Block Diagrams

| Model No. | VM-2120<br>System Management Amplifier | VM-2240<br>System Management Amplifier |
|---|---|---|
| Power Requirement | AC: mains, 50/60 Hz<br>DC: 24 V DC/7.5 A, M3.5 screw terminal,<br>Barrier distance: 8 mm, Applicable<br>cable diameter: AWG22 – AWG14 | AC: mains, 50/60 Hz<br>DC: 24 V DC/15 A, M3.5 screw terminal,<br>Barrier distance: 8 mm, Applicable<br>cable diameter: AWG22 – AWG14 |
| Power Consumption<br>on AC Mains | With no signal present: 37 W<br>Under normal operating conditions<br>according to<br>EN60065: 1998 sec. 4.2: 107W<br>With rated output signal: 201 W | With no signal present: 54 W<br>Under normal operating conditions<br>according to<br>EN60065: 1998 sec. 4.2: 255 W<br>With rated output signal: 549 W |
| Current Consumption<br>on 24V DC Power Input | With no signal present: 0.7 A<br>Under normal operating conditions<br>according to<br>EN60065: 1998 sec. 4.2: 2.1 A<br>With rated output signal: 5.2 A | With no signal present: 1 A<br>Under normal operating conditions<br>according to<br>EN60065: 1998 sec. 4.2: 5 A<br>With rated output signal: 14 A |
| Rated Output | 120 W | 240 W |
| Output Voltage/Impedance | 100 V/83Ω,70 V/42Ω, 50 V/21Ω<br>(selectable by the internal wiring change) | 100 V/42Ω, 70 V/21Ω, 50 V/10Ω<br>(selectable by the internal wiring change) |
| Frequency Response | 50 – 16,000 Hz | |
| Distortion | Under 1% | |
| Signal-to-Noise Ratio | Over 60 dB | |
| Tone Control | Bass:100 Hz ±10 dB, Treble: 10 kHz ±10 dB<br>(Inputs 1 – 3 and BGM individually adjustable.) | |
| Remote Microphone/<br>Expansion Amplifier Connection | 2 RJ45 female connectors for connecting the RM-200M Remote Microphone and the VM-2120 or VM-2240 unit used as an expansion amplifier. Maximum distance: 800m in total,<br>Link cable: Category 5 shielded Number of connectable RM-200M's: Up to 4<br>Twisted-Pair straight cable (TIA/EIA-568A standard) | |

| Input | Inputs 1 – 3: | –60 dB*1 (MIC)/–10 dB*1 (LINE) (changeable), 600Ω, electronically balanced*2, combined XLR connector (female)/phone jack<br>(Only Input 1 is additionally equipped with DIN connector*3.) |
|---|---|---|
| | Telephone paging input: | Push-in terminal block*4 Voice sound:–10 dB*1,10kΩ,electronically-balanced input with shield terminal*2<br>Control: No-voltage make contact input, open voltage: 30 V DC,<br>        short-circuit current: under 0.1 A |
| | BGM 1 - 2 | –20 dB*1, 10 kΩ, RCA pin jack, monaural (internally mixed) |
| | Power amplifier input: | 0 dB*1, 10 kΩ, RCA pin jack |
| | External speaker line input: | 100 V line, for All-Zone Broadcast<br>(This input is selected when the "Unit's broadcast cutoff" control is activated.) |
| Output | Speaker output: | Plug-in screw connector*5<br>5-zone selector with attenuator (all zones simultaneously selectable) |
| | Direct speaker line output: | Direct output from the power amplifier output transformer (attenuator bypassed),<br>Plug-in screw connector*5 |
| | Line output | 0 dB*1, 10 kΩ, RCA pin jack |
| | Recording output | 0 dB*1, 10 kΩ, RCA pin jack |
| | Preamplifier output | 0 dB*1, 10 kΩ, RCA pin jack |
| Control Input | | For controlling Inputs 1 – 3, Push-in terminal block<br>No-voltage make contact input, open voltage: 3.3 V DC, short-circuit current: under 1 mA |
| Control Input and Output | | D-sub connector (25-pin, female)<br>Input: No-voltage make contact input, open voltage: 3.3 V DC,<br>        short-circuit current: under 1 mA<br>Output: Open collector output, withstand voltage: 30V DC, control current: under 10 mA<br>(1)External control input<br>•Activation of messages*6<br>•Activation of power<br>•Activation and stop of Emergency Broadcast<br>•Unit's broadcast cutoff (when activated by an external emergency equipment)<br>(2)Status output<br>•Irregularity of communications with the Remote Microphone and an expansion amplifier<br>•AC power condition<br>•DC power condition<br>•Irregularity of the sound source of the Voice Announcement Board<br>•Failure (FAULT) indication on<br>•Power switch on |
| External Attenuator<br>Control Output | | Plug-in screw connector*5, relay, no-voltage make contact output, transfer type,<br>withstand voltage: 30 V DC, 125 V AC, contact current: under 7 A (DC), under 7 A (AC) |
| Surveillance Input<br>and Output*7 | | D-sub connector (25-pin, female)<br>Input: No-voltage make contact input, open voltage: 3.3 V DC,<br>        short-circuit current: under 1 mA<br>Output: Open collector output, withstand voltage: 30 V DC,<br>        control current: under 10 mA |
| Power Supply | | 24 V DC/0.1 A, for supplying power to an optional Amplifier<br>Control Unit RU-2001/2002, push-in terminal block*4 |
| Chime Tone | | Built-in chime: 2-tone chime/2-tone chime(fast repeat)/4-tone chime (Up)/<br>        Single-tone chime/4-tone chime (Up & Down)/Gong/off<br>Voice Announcement Board sound source: Pre-recorded chime*6 |
| Function | | Two units stacking (VM-2120 or VM-2240)<br>Emergency broadcast (sequential control)<br>Broadcast priority control<br>Surveillance (failure detection) function*7<br>Power supply to only one Remote Microphone (RM-200M)<br>Line resistance: Under 24 Ω (one way) |
| Operating Temperature | | 0°C to +40°C |
| Finish | | Panel: ABS resin, dark gray, paint<br>Case: Steel plate, dark gray, paint |
| Dimensions | | 419 (W) ×143.3 (H) × 355.7 (D) mm |
| Weight | 12.5 kg | 14.5 kg |
| Accessory | Power cable (2m) …1,<br>Miniature type time-lag fuse…1,<br>Name label…1, Volume cover…4 | Power cable (2 m) …1,<br>Miniature type time-lag fuse…1,<br>Name label…1, Volume cover…4 |
| Option | Rack mounting bracket: MB-36, Input transformer: IT-450,<br>Voice announcement board: EV-200, Surveillance board: SV-200M | |

*1 0 dB = 1 V
*2 Can be transformer-balanced with the addition of an optional IT-450 input transformer.
*3 For connection of the Paging Microphone PM-660D with a remote control switch.
*4 Usable cable diameter: AWG26–AWG20, 0.5 mm².
*5 Usable cable diameter: AWG24-AWG12, 2.5 mm².
*6 An optional EV-200 Voice Announcement Board is required.
   The chime sound source must be pre-recorded into a CF (CompactFlash) card to be inserted into the EV-200 Board.
*7 An optional SV-200M Surveillance Board is required.

| Model No. | RM-200M<br>Remote Microphone |
|---|---|
| Power Requirement | 24 V DC (Operating range: 14 – 28 V DC)<br>Power input jack: Non-polarity type<br>Usable power input plug*2: Outer diameter ø5.5 mm,<br>inner diameter ø2.1 mm, length 9.5 mm |
| Current Consumption | 100 mA maximum |
| Distortion | Under 1% |
| Frequency Response | 100 – 20,000 Hz |
| Signal-to-Noise Ratio | Over 60 dB |
| Audio Output | 0 dB*1, 600 Ω, balanced |
| Microphone | Unidirectional electret condenser microphone |
| Speaker Control | Zones 1 – 5 or Zones 1 – 10 (2 stacked amplifiers connection),<br>Groups 1 – 2, and All-Zone Broadcast |
| Emergency Broadcast | Activation of Emergency Broadcast (pre-recorded announcement*3<br>or live microphone announcement) by Emergency Broadcast Switch |
| Voice Message Control | Activation of 5 messages*3 |
| Volume Control | Microphone volume control |
| Connection Cable and Connector | Category 5 STP cable, RJ45 connector |
| Finish | ABS resin, bluish gray |
| Dimensions | 190 (W) × 76.5 (H) × 215 (D) mm<br>(Gooseneck microphone excluded) |
| Weight | 750 g |
| Accessory | Link cable (3m) …1 |

*1 0 dB = 1 V
*2 Use the AC adapter AD-4800 optionally available as our service component.
*3 An optional EV-200 Board must be mounted in the VM-2120 or VM-2240 Amplifier.
   The voice messages must be pre-recorded into a CF (CompactFlash) card to be inserted into the EV-200 Board.

| Model No. | RM-210<br>Remote Microphone Extension Unit |
|---|---|
| Current Consumption | 20 mA maximum (in terms of RM-200M's DC power input) |
| Connection | Connection to RM-200M by dedicated cable |
| Function | Activation of Voice Announcement Board's voice messages<br>when controlling speakers in 10 zones at RM-200M |
| Finish | ABS resin, bluish gray |
| Dimensions | 110 (W) × 76.5 (H) × 215 (D) mm |
| Weight | 350 g |
| Accessory | Extension cable …1, Linkage bracket A…2,<br>Linkage bracket B…1, Screw for linkage bracket…12 |

| Model No. | EV-200<br>Voice Announcement Board |
|---|---|
| Power Requirement | 24 V DC, 0.1 A |
| Power Consumption | 3 W |
| Output | 0 dB*1 |
| Frequency Response | 20 – 20,000 Hz (44.1 kHz sampling)<br>20 – 14,000 Hz (32 kHz sampling) |
| Distortion | Under 0.3% (44.1 kHz, recording method: Extremely High) |
| Memory Card | SanDisk*2 CompactFlash*2 card is optionally required.<br>Number of mountable card: 1 |
| Playback Mode | Single source playback |
| No. of Playback Program | 8 programs |
| Operating Temperature | 0°C to +50°C |
| Operating Humidity | Less than 90% (must be free from dew condensation) |
| Dimensions | 120 (W) × 18.6 (H) × 121 (D) mm |
| Weight | 110 g |
| Accessory | Mounting screw…2 |

*1 0 dB = 1 V
*2 Trademark of SanDisk Corporation.
   Note: Use the CompactFlash card adapter on the market for recording by the EV-350R.

| Model No. | SV-200M<br>Surveillance Board |
|---|---|
| Power Requirement | 24V DC |
| Current Consumption | 0.1 A |
| Control Input and Output | Input:  No-voltage make contact input, open<br>        voltage: 3.3 V DC, short circuit current: under 1 mA<br>        (1) Speaker line initial setting activation signal<br>        (2) Speaker line surveillance activation signal<br>Output:  Open collector output, withstand<br>        voltage: 30 V DC, control current: under 10 mA<br>        (1) Monitoring short or open of individual<br>            speaker line  (zone 1 – 5)<br>        (2) Ground fault (insulation resistance: under 50 kΩ)<br>        (3) Power amplifier failures<br>Connector: D-sub connector (25-pin, female) |
| Failure Detection | Power amplifier failure: 20 kHz pilot tone detection<br>Speaker line failure: 40 Hz impedance detection |
| Speaker Line Surveillance | Speaker lines are automatically monitored at set time intervals |
| Set Time | (10 – 60 min, at 10 min intervals) |
| Operating Temperature | 0°C to +50°C |
| Operating Humidity | Less than 90% (must be free from dew condition) |
| Weight | 70 g |