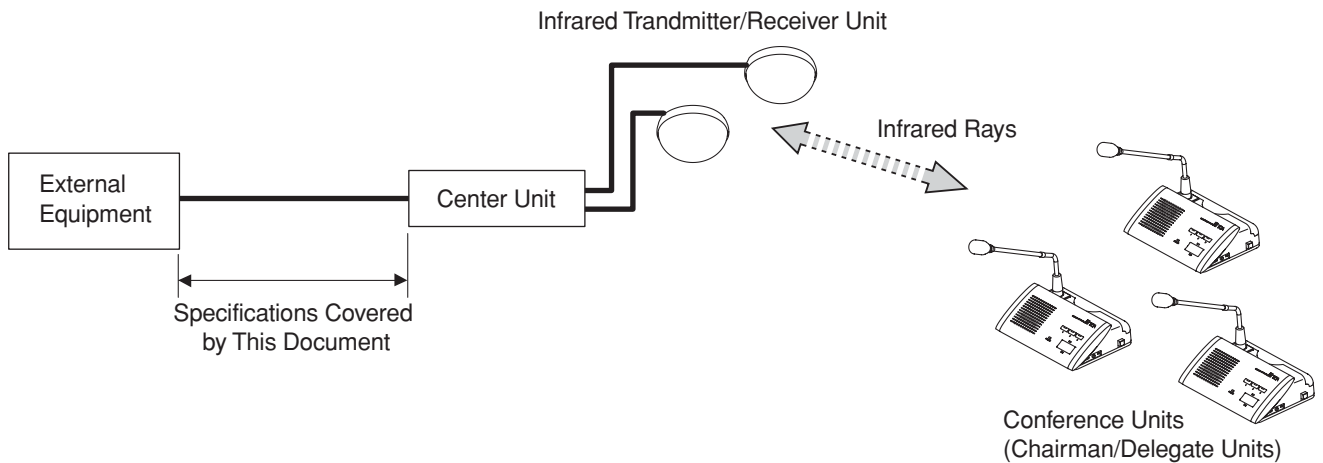


**Infrared Conference System
External Control
Communication Specifications**

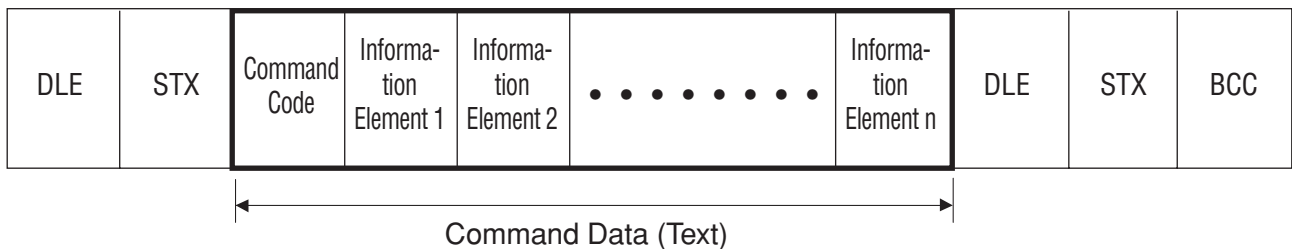
Infrared Conference System External Control Communication Specifications

1. Outline

This document prescribes the transmission of command data required for each type of control when control equipment is connected to the Center Unit's external-control interface within the infrared conference system. Further, interface specifications and transmission control procedures required when transmitting command data are detailed in Infrared Conference System External Control Interface Specifications.



2. Data Format



1) Command Codes (1 byte)

Express the command data function for control and query requests transmitted from the external equipment to the Center Unit, or, for status information and responses sent from the Center Unit to the external equipment.

2) Information Elements (1 byte * n)

Information added to each command code.
The size of the added information is specific to each command code.

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3. Commands

The separate table TS-900/TS-800 External Control Interface Command List shows the relationships between command codes, required information elements, bit lengths, and request and response commands. The system uses five specific types of commands for the following functions 1 through 5. These can be summarized by type and function, as described below.

(1) Control Request Commands (External Equipment → Center Unit)

Used when instructing the Center Unit to perform control such as speech permission/end, etc. Responses to the control instructions are conveyed by either an event notification command or an error response command.

1) Speech Function Setting Change

- Switches settings to the specified speech method, number of speaker limits, and auto Mic-Off settings.

2) Conference Unit Microphone Input Volume Adjustment

- Adjusts the volume to the specified value.

3) Start Speech

- Gives the designated conference unit speech permission (microphone ON), allowing it to begin speech.
- When the speech method is set to "First-in-first-out priority/Centralized control," an error occurs if there is no idle speech channel (No Idle Channel).
- An error (Function Status Mismatch) occurs if the Chairman Unit is speaking, or if a vote or equipment installation check test is already in progress.

4) End Speech

- Terminates the designated conference unit's speech (microphone OFF).
- It is not possible to end chairman priority speech.
- An error (Function Status Mismatch) occurs if the Chairman Unit is speaking, or if a vote or equipment installation check test is already in progress.
- An error (Unit Status Mismatch) occurs if the designated conference unit is already in the process of requesting speech permission (when the speech method is set to "centralized control allowing speech requests").

5) Cancel Speech Request

- Cancels the speech request for the designated conference unit.
- If the speech method is anything other than "centralized control allowing speech requests," an error occurs (Cannot Accept Speech Request).
- An error (Function Status Mismatch) occurs if the Chairman Unit is speaking, or if a vote or equipment installation check test is already in progress.
- An error (Unit Status Mismatch) occurs if the designated conference unit is already speaking (microphone ON).
- If a remote conference unit is designated, an error occurs (Invalid Information Element: Unit Number).

6) End All Speech

- Terminates speech (microphone OFF) from all conference units simultaneously.
- An error (Function Status Mismatch) occurs if the Chairman Unit is speaking, or if a vote or equipment installation check test is already in progress.

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7) Cancel All Speech Requests

- Cancels speech requests from all conference units simultaneously.
- If the speech method is anything other than "centralized control allowing speech requests," an error occurs (Cannot Accept Speech Request).
- An error (Function Status Mismatch) occurs if the Chairman Unit is speaking, or if a vote or equipment installation check test is already in progress.

8) Start Voting

- Starts the voting function.
- If a vote or installation check test is already in progress, an error occurs (Function Status Mismatch).

9) End Voting

- Stops the voting function and initializes the display of vote tallies on the Center Unit.
- If a vote is not in progress, an error occurs (Function Status Mismatch).

10) Start Equipment Testing

- Starts an equipment installation check test.
- If an equipment installation test is already in progress, an error occurs (Function Status Mismatch).

11) Stop Equipment Testing

- Stops an equipment installation check test.
- If an equipment installation test is not in progress, an error occurs (Function Status Mismatch).

(2) Query Request Commands (External Equipment → Center Unit)

Used when directing queries regarding control status, function settings status, etc. to the Center Unit.

Responses to these queries are conveyed by a query response command (event notification commands in some cases) or an error response command.

1) Speech Function Setting Status Query

- Requests the current status of speech function settings (speech method, speaker number limit, auto Mic-Off).

2) Function Operation Status Query

- Requests the current status of function operation (speech in progress, voting in progress, etc.).

3) Conference Unit Microphone Input Volume Adjustment Status Query

- Requests the current volume adjustment value.

4) Speech Status Query

- Requests the current speech status (chairman priority speech on or off, the unit numbers of conference units currently speaking on each channel).

5) Speech Request Acceptance Status Query

- Requests the current status of speech request acceptance (number of requests accepted, unit numbers of conference units currently accepted).
- If the speech method is anything other than "centralized control allowing speech requests," an error occurs (Cannot Accept Speech Request).
- An error (Function Status Mismatch) occurs if a vote or an equipment installation check test is in progress.

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6) Voting Response Query

- Requests vote content for the designated conference unit (vote 1-3, none).
- If no vote is in progress, an error occurs (Function Status Mismatch).
- If a remote conference unit is designated, an error occurs (Invalid Information Element: Unit Number)

7) Vote Results Query

- Requests the tallied results of a vote (number each for votes 1, 2, and 3).

8) Equipment Installation Test Response Query

- Requests the check test content for the designated conference unit (Chairman and Delegate Units).
- If equipment testing is not in progress, an error occurs (Function Status Mismatch).
- If a remote conference unit is designated, an error occurs (Invalid Information Element: Unit Number)

9) Equipment Installation Test Results Query

- Requests tallied results of an equipment installation check test (numbers of Chairman and Delegate Units).

(3) Event Notification Commands (Center Unit → External Equipment)

These commands notify external equipment of control information generated by the system, for example speech start/end, etc. They are also used as response commands to control query commands (query request commands in some cases) from external equipment.

After the power is turned on, the Center Unit notifies external equipment of events whenever they occur as long as no communications failures occur.

Regarding operations when the power is switched on or when a communications failure or recovery from a failure is detected, refer to the separate descriptions in "5. Operations Following Power-On or Communications Failure Recovery

1) Speech Function Settings Change

- When the system has been set to prohibit speech function settings from being changed by a control request from external equipment but a function (speech method, number of speaker limits, and auto Mic-Off) has been changed manually (by switch operation) at the Center Unit, external equipment is notified of the new setting status.
- If the settings are changed by a control request from external equipment, the Center Unit notifies external equipment of the changed function setting status in response to the request.
- When the power to the Center Unit is turned on, or when there has been a recovery from a communications failure occurring between the Center Unit and external equipment, the Center Unit notifies external equipment of the current setting status.

2) Function Operation Status

- When the power to the Center Unit is turned on, or when there has been a recovery from a communications failure occurring between the Center Unit and external equipment, the Center Unit notifies external equipment of the current function operation status (speech request acceptance in progress, vote in progress, etc.)

3) Conference Unit Microphone Input Volume Adjustment

- In response to a control request from external equipment, the Center Unit notifies external equipment of the changed volume adjustment value.
- When the power to the Center Unit is turned on, or when there has been a recovery from a communications failure occurring between the Center Unit and external equipment, the Center Unit notifies external equipment of the current volume adjustment value (default value).

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4) Battery Alarm

- The Center Unit notifies external equipment if the designated conference unit's battery voltage drops below the specified level. This notification will continue at regular intervals while the unit remains in operation until the battery is replaced or recharged.

5) Start of Speech

- The Center Unit notifies external equipment that speech has begun (microphone ON) for the designated conference unit, and also indicates the number of the channel in use.
- Speech is started when: the conference unit starts operation; a start request is received from external equipment; or interrupted speech is resumed after chairman priority speech finishes (when the Chairman Unit is set to "Stop").
- If a "Start Speech" request is received from external equipment when speech is already in progress, the Center Unit still offers the same notification as when speech is not yet started.
- If there has been a recovery from a communications failure between the Center Unit and external equipment, the Center Unit notifies external equipment that speech is in progress on the channel in use, and also gives information on the number of the conference unit that is speaking.

6) End of Speech

- When the designated conference unit's speech has finished (microphone OFF), the Center Unit notifies external equipment of this, along with the free channel number and failure detection yes/no information.
- Speech is terminated when: the conference unit stops operation; an "End" request is received from external equipment; speech is initiated from another higher-priority conference unit (chairman priority or last-in-first-out priority); another function is activated (voting or installation check testing); auto Mic-Off activates to turn the microphone off; or a failure such as "Out of Service Range" is detected.
- If an "End Speech" request is received from external equipment when the busy channel has already been freed, the Center Unit still offers the same notification as when the channel is busy. In this event, the Center Unit also indicates "No corresponding number" for other free channel numbers.
- If an "End All Speeches" request is received from external equipment, notification of speech end is transmitted for individual channels.
- When the power to the Center Unit is turned on, it sends out notification that channels are available to be used on a channel-by-channel basis. In this event, the information element "No corresponding number" is added to the unit number, and the element "Power-on detection" is added to the failure-detection yes/no information.
- When there has been a recovery from a communications failure between the Center Unit and external equipment, the Center Unit notifies external equipment that the unused channels are in open status. In this event, the information element "No corresponding number" is added to the unit number, and the element "No failure detection" is added to the failure-detection yes/no information.

7) Speech Request

- The Center Unit gives notification that the designated conference unit has made a speech request.
- Speech can only be requested when the speech method is set to "centralized control allowing speech requests."
- Speech requests are generated only when the request is made from the conference unit.

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8) Cancellation of Speech Request

- The Center Unit gives notification that the designated conference unit has cancelled its speech request, along with failure-detection yes/no information.
- A speech request can only be cancelled when the speech method is set to "centralized control allowing speech requests."
- Speech requests are cancelled when: a request is cancelled at the conference unit; a cancellation request is received from external equipment; another conference unit starts speech (chairman priority speech); or another overriding function (such as voting or equipment installation testing) is started.
- If an end control request is received from external equipment when the speech request has already been cancelled, the Center Unit still offers the same notification as when a speech request exists.
- If a "Cancel All Speech Requests" request is received from external equipment, the Center Unit transmits a cancellation response command for individual conference units making speech requests. When there is no conference unit making a speech request, the Center Unit notifies "no corresponding unit" for the unit number.

9) Start of Chairman Priority Speech

- The Center Unit gives notification that the designated conference unit has started chairman priority speech (microphone ON), along with the number of the channel used.
- Chairman priority speech is available only to Chairman Units.

10) End of Chairman Priority Speech

- The Center Unit gives notification that the designated conference unit has completed chairman priority speech (microphone OFF), along with information about the number of the re-opened channel and whether or not failures have been detected.
- Chairman priority speech finishes when: the Chairman Unit performs operation for completion; another Chairman Unit begins chairman priority speech; failures like "use outside-operating-range" are detected.

11) Start of Voting

- The Center Unit gives notification that the voting function has been activated to start voting, along with the number (unit number) of the activated equipment.
- Voting is started by operation of the Center Unit, operation of a Chairman Unit, or a control request from external equipment.

12) Voting Response

- The Center Unit notifies external equipment of the voting contents when the designated conference unit enters voting mode (voting or its cancellation).
- The same notification is also made when a voting response query request is received from external equipment.

13) End of Voting

- The Center Unit notifies external equipment of voting completion, as well as the tallied results of the vote (number for each vote type 1-3).

14) Start of Installation Testing

- The Center Unit gives notification that an equipment installation test has been started and test operation started.

15) Installation Testing Response

- When the designated conference unit's operation has been confirmed through the equipment installation test, the Center Unit notifies external equipment of the unit type (Chairman or Delegate Unit).
- The Center Unit makes the same notification when an Installation check test response query request is received from external equipment.

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16) Installation Testing Completion

- The Center Unit gives notification that the equipment installation test has been completed, along with the test results (the number of Chairman and Delegate units).

(4) Query Response Commands (Center Unit → External Equipment)

Used to notify responses to control status query commands transmitted from external equipment. However, event notification commands are used in some cases when responding to queries.

1) Speech Function Setting Status Query Response

- The Center Unit gives notification regarding current function settings status (speech method, number of speaker limits, and auto Mic-Off) in response to a query from external equipment.

2) Function Operation Status Query Response

- The Center Unit gives notification regarding current function operation status (speech is being accepted, voting is in progress, etc.) in response to a query from external equipment.

3) Conference Unit Microphone Input Volume Adjustment Query Response

- The Center Unit gives notification regarding the current volume value in response to a query from external equipment.

4) Speech Status Query Response

- The Center Unit gives notification regarding the current speech status (chairman priority speech in progress/not in progress and ID numbers of conference units speaking on each channel) in response to a query from external equipment.

5) Speech Request Acceptance Status Query Response

- The Center Unit gives notification regarding the current speech request acceptance status (number of speech requests accepted and the unit ID numbers of the conference units currently accepted) in response to a query from external equipment. (Valid only when the speech method is set to "centralized control allowing speech requests.")

6) Voting Result Query Response

- The Center Unit gives notification regarding the latest tallied results of a vote (number for each of votes 1-3) in response to a query from external equipment. (The information element "No voting" is transmitted for votes 1-3 if no voting has been performed after the power to the Center Unit was switched on.)

7) Installation Testing Result Query Response

- The Center Unit gives notification regarding the latest tallied results of an equipment installation check test (the number of Chairman and Delegate units) in response to a query from external equipment. (The number is "0" for both units if no installation test has been made after the power to the Center Unit was switched on.)

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(5) Error Response Command (Center Unit → External Equipment)

The Center Unit gives notification that it cannot accept a request in response to a control request command transmitted from external equipment. The inability to accept such a request may be caused by an invalid command data format, a status mismatch, or other cause.

1) Error Response (Information Element 2)

The Center Unit gives notification that it cannot accept a request command, with the reason for the error added if the command data format is incorrect (undefined command, invalid bit length, or invalid information element), or if a request related to the system (request accompanied by no conference unit ID number) contains a status mismatch, etc.

Examples

- * An error command is transmitted if the unit number contained in a "speech permission" command is invalid (Invalid Information Element)
- * An error command is transmitted if the system is currently not in voting mode when a "stop voting" command is received (Function Status Mismatch).

2) Error Response (Information Element 3)

The Center Unit gives notification regarding its inability to accept a request code, along with the designated unit ID number and the reason for the error if there is a status mismatch in a request for individual conference units (request designating the unit number).

Examples

- * An error command is transmitted if the unit No. OO is in the course of voting when a "Permit speech No. OO" command is received (Function Status Mismatch).
- * An error command is transmitted if the designated conference unit is speaking when a "Cancel speech request No. OO" command is received (Unit Status Mismatch).
- * An error command is transmitted if there is no idle channel when a "Permit speech No. OO" command is received (No Idle Channel).

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4. Information Elements

The information elements to be added to each command are defined as follows:

1) Speech Method (1 byte)

- | | | |
|-----------|---|-----|
| (1) 0x00: | Default (set to the switch status on the Center Unit) | |
| (2) 0x41: | FIFO (First-in-first-out) priority | (A) |
| (3) 0x42: | LIFO (Last-in-first-out) priority | (B) |
| (4) 0x43: | 1 fixed + LIFO | (C) |
| (5) 0x44: | Centralized external control allowing speech requests from conference units | (D) |
| (6) 0x45: | Centralized external control prohibiting speech request from conference units | (E) |

Remarks

- Applied to the "speech function setting change request or setting status query request" for the conference unit from external equipment, or "setting change notification or response to query" from the Center Unit.
- (1) is valid only for control requests from external equipment.

2) Speaker Number Limits (1 byte)

- | | | |
|-----------|---|-----|
| (1) 0x00: | Default (set to the switch status on the Center Unit) | |
| (2) 0x31: | Speaker number limits: 1 | (1) |
| (3) 0x32: | Speaker number limits: 2 | (2) |
| (4) 0x34: | Speaker number limits: 4 | (4) |

Remarks

- Applied to the "speech function setting change request or setting status query request" for the conference unit from external equipment, or to "setting change notification or response to query" from the Center Unit.
- (1) is valid only for control requests from external equipment.
- When the speech method is set to "external centralized control," the speaker number limit is fixed at "4."
(When a control request is received from external equipment, the Center Unit ignores it. When the Center Unit responds to an event notification query, it gives notification that the number is fixed at "4.")

3) Auto Mic-Off ON/OFF(1 byte)

- | | | |
|-----------|---|-----|
| (1) 0x00: | Default (set to the switch status on the Center Unit) | |
| (2) 0x59: | ON | (Y) |
| (3) 0x4E: | OFF | (N) |

Remarks

- Applied to the "speech function setting change request or setting status query request" for the conference unit from external equipment, or to "setting change notification or response to query" from the Center Unit.
- (1) is valid only for control request from the external equipment.
- When the speech method is set to "external centralized control," the function is fixed at "OFF."
(When a control request is received from external equipment, the Center Unit ignores it. When the Center Unit responds to an event notification query, it gives notification that the function is fixed at "OFF.")

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4) Sound Volume Adjustment (1 byte)

- (1) 0x00 : Default (No adjustment specified: initial value = 16)
 (2) 0x01 – 0x20: Adjustment value (1 – 32)

Remarks

- Applied to external equipment's "conference unit microphone input volume adjustment request/query request" or to the Center Unit's "volume adjustment notification/query response."
- (1) is valid only for control requests from external equipment. When (1) is specified, the volume setting should be at "16."
- The sound volume decreases as the designated value becomes smaller and increases as the designated value becomes larger.

5) Unit Number (1 byte)

- (1) 0x00: Not applicable, or monitor-only conference unit number.
 (2) 0x01 – 0x60: Conference unit (Chairman and Delegate units) number (1 – 96)
 in the case of the TS-900 system
 0x01 – 0x40 : Conference unit (Chairman and Delegate units) number (1 – 64)
 in the case of the TS-800 system.
 (3) 0xF0 – 0xF3: Remote control conference unit numbers (0~3)
 (4) 0xFA: External equipment
 (5) 0xFC: Center Unit

Remarks

- Applied to external equipment's control or query requests which designate the conference unit, or to event notification or query responses from the Center Unit.
- (1), (4) and (5) are applicable when the Center Unit gives an event notification or responds to a query. (Addition from external equipment is prohibited.)
- The monitor-only conference unit number of (1) is applied when a "battery alarm" event notification is transmitted from the Central Unit.
- If (3) is added to a "cancel speech request" control request, "voting response query", or "installation check test response query" query requests from external equipment, the Center Unit returns an error command (invalid information element: unit number).

6) Channel No. (1 byte)

- (1) 0x00: No corresponding number
 (2) 0x31: Speech (conference unit → Center Unit) channel 1 (1)
 (3) 0x32: Speech (conference unit → Center Unit) channel 2 (2)
 (4) 0x33: Speech (conference unit → Center Unit) channel 3 (3)
 (5) 0x34: Speech (conference unit → Center Unit) channel 1 (4)

Remarks

- Applied at the time of event notification from the Center Unit.

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7) Failure Detection Yes/No (1 byte)

- | | | |
|------------|-----------------------------------|-----|
| (1) 0x00 : | Failure detection performed | |
| (2) 0x41 : | Outside-operating-range detection | (A) |
| (3) 0x4D : | Auto Mic-Off detection | (M) |
| (4) 0x42 : | Power-on detection | (R) |

Remarks

- Applied when notification is given of an "end of speech," "cancellation of speech request," or "end of chairman priority speech" event command.
- (3) is not added to the event notification "end of chairman priority speech." (Not applicable to auto Mic-Off.)
- (4) is added when the power to the Center Unit is turned on.

8) Function Operation Status (1 byte)

- | | | |
|------------|--------------------------------------|-----|
| (1) 0x41 : | Accepting speech. | (A) |
| (2) 0x42 : | Chairman priority speech in progress | (B) |
| (3) 0x43 : | Voting in progress | (C) |
| (4) 0x44 : | Installation testing In progress | (D) |
| (5) 0x52 : | else | (R) |

Remarks

- Applied when notification of a "function operation status notification" or "query response" is given by the Center Unit.
- Returning (5) indicates that control requests from external equipment cannot be accepted because the Center Unit's function has stopped.

9) Chairman Priority Performed/Not Performed (1 byte)

- | | | |
|------------|---------------|-----|
| (1) 0x59 : | Performed | (Y) |
| (2) 0x4E : | Not performed | (N) |

Remarks

- Applied when notification of a "speech status query response" is given by the Center Unit.

10) Number of Speech Requests Accepted (1 byte)

- | | | |
|------------|--------------------------|-----|
| (1) 0x00 : | No request accepted | |
| (2) 0x31 : | No. accepted one time | (1) |
| (3) 0x32 : | No. accepted twice | (2) |
| (4) 0x33 : | No. accepted three times | (3) |
| (5) 0x34 : | No. accepted four times | (4) |

Remarks

- Applied when notification of a "speech request acceptance status query response" is given by the Center Unit.

11) Voting Content (1 byte)

- | | | |
|------------|---------------------------|-----|
| (1) 0x00 : | No vote or vote cancelled | |
| (2) 0x31 : | Vote 1 | (1) |
| (3) 0x32 : | Vote 2 | (2) |
| (4) 0x33 : | Vote 3 | (3) |

Remarks

- Applied when notification of a "voting response" event command " is given by the Center Unit.
- The "No vote" element of (1) is added only when a "voting response" event command is given in response to a "voting response query" request from external equipment.

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12) Vote Results (1 byte for each of Vote 1, Vote 2 and Vote 3)

- (1) 0x00 – 0x60: Number of votes for each of votes 1 through 3 (0 – 96) when the TS-900 system is used.
 0x00 – 0x40: Number of votes for each of votes 1 through 3 (0 – 64) when the TS-800 system is used.

Remarks

- Applied when notification of a "end of voting" event command or a "voting result query response" command is given by the Center Unit.

13) Unit type

- (1) 0x00: No check
 (2) 0x43: Chairman Unit (C)
 (3) 0x31: Delegate Unit (D)

Remarks

- Applied when a notification of "installation testing response" event command is given by the Center Unit.
- (1) is added only when an "installation testing response" event command is given in response to an "installation testing response query" request from external equipment.

14) Installation Testing Result (1 byte each for the number of Chairman and Delegate Units)

- (1) 0x00 – 0x60: Total number of Chairman or Delegate Units (0 – 96) in the TS-900 system:
 0x00 – 0x40: Total number of Chairman or Delegate Units (0 – 64) in the TS-800 system.

Remarks

- Applied when notification of an "end of installation testing" event command or an "installation testing result query response" is given by the Center Unit..

15) Request Command Code (1 byte)

- (1) ???? : Command codes received from external equipment are given as they are received.

Remarks

- Applied when an "error response" is given by external equipment when there is an error in a control or query request transmitted from external equipment.

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16) Reasons of errors (1 byte)

| | | |
|-----------|--------------------------------|-----|
| (1) 0x43: | Reception of undefined command | (C) |
| (2) 0x4C: | Invalid command data length | (L) |
| (3) 0x49: | Invalid information element | (I) |
| (4) 0x46: | Function status mismatch | (F) |
| (5) 0x55: | Unit status mismatch | (U) |
| (6) 0x42: | No idle channel | (B) |
| (7) 0x51: | Cannot accept speech request | (Q) |

Remarks

- Applied when an "error response" is given by the Center Unit when there is an error in a control or query request transmitted from external equipment.
- (1) is given when an undefined command code is used for request, or when a vote-related request is received in the TS-800 system.
- (2) is given if the command data length prescribed for each command is invalid.
- (3) is given if the information element added to a command is invalid.
- (4) is given when there is a mismatch in the current function operation status (speech acceptance process in progress, chairman priority speech in progress, or voting in progress) and it is impossible to comply with a control or query request transmitted from external equipment.
- (5) is given when there is a mismatch in the current unit operation status (speech in progress or speech acceptance process in progress) and it is impossible to comply with a control request transmitted from external equipment.
- (6) is given if the speech system is set to anything other than "last-in-first-out priority" and "1 fixed + LIFO priority" and also if the number of speeches has already exceeded the speaker number limits when a "speech permission" request is received.
- (7) is given if the speech method is set to anything other than "centralized control allowing speech request" when a "cancel speech request," "cancel all speech requests," or "speech request acceptance status query" request is received

5. Operation Following Power-On or Following Recovery from a Communications Failure

This section details how the Center Unit operates following power on, or when the occurrence of and recovery from a communications failure has been detected.

1) Operation when the power is turned on

After the power is turned on, the Center Unit transmits the following event notification commands in succession to notify external equipment of the current function setting and operation statuses.

1) Transmission of speech function setting change notification command

| | |
|---------------------------|--|
| Speech method: | Current operation status (as set using the Center Unit's switches) |
| Number of speaker limits: | Current operation status (as set using the Center Unit's switches) |
| Auto Mic-OFF ON/OFF: | Current operation status (as set using the Center Unit's switches) |

2) Transmission of function operation status notification command

| | |
|----------------------------|------------------|
| Function operation status: | Accepting speech |
|----------------------------|------------------|

3) Transmission of conference unit microphone input volume adjustment notification command

| | |
|--------------------------------|-------------------------------|
| Sound volume adjustment value: | Initial value (no adjustment) |
|--------------------------------|-------------------------------|

4) Transmission of speech end notification command (channels 1 – 4, total 4 transmissions)

| | |
|---------------------------|-------------------------|
| Unit No.: | No corresponding number |
| Channel No.: | Speech channels 1 – 4 |
| Failure detection yes/no: | Power-on detection |

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2) Operation following detection of a communications failure

If a command is not transmitted correctly to external equipment, the Center Unit assumes a communications failure has occurred and performs the following actions. Such an incorrect command transmission means that no appropriate response (as detailed in the separate "Infrared conference system external control interface specifications") has been received, that is to say that neither a positive nor a negative response has been received from external equipment and a timeout has occurred as a result

- 1) Discards all event notification commands (control information) that have not been transmitted and accumulated.
- 2) Suspends subsequent event notification (even if a new event occurs, it is not transmitted).
- 3) Cancels current speech function settings (speech method, speaker number limits, and auto Mic-Off) and updates them to match those set using the Center Unit's setting switches.
- 4) Cancel all speech requests currently being accepted (when the speech method is set to "centralized control allowing speech request").
- 5) Initializes the conference unit microphone input volume adjustment (no adjustment).

3) Operation following detection of and recovery from a communications failure

When a communications failure occurs between the Center Unit and external equipment, if any data including informal commands is received from external equipment, the Center Unit assumes that the failure has been recovered from and, after making a notification in response to the received data, it notifies external equipment of the current function setting status as well as operation status.

(0) Transmission of response command to the data received.

- 1) Transmission of transmission function setting change notification command .

| | |
|------------------------|--|
| Speech method: | Current operation status (as set using the Center Unit's switches) |
| Speaker number limits: | Current operation status (as set using the Center Unit's switches) |
| Auto Mic-Off ON/OFF: | Current operation status (as set using the Center Unit's switches) |
- 2) Transmission of function operation status notification command

| | |
|----------------------------|--|
| Function operation status: | Current operation status (speech acceptance process in progress, voting in progress, etc.) |
|----------------------------|--|
- 3) Transmission of conference unit microphone input volume adjustment notification command

| | |
|--------------------------|-------------------------------|
| Volume adjustment value: | initial value (no adjustment) |
|--------------------------|-------------------------------|
- 4) Notification of status of each speech channel (channels 1 – 4, total 4 transmissions)
 - Transmits a speech start notification command if the channel is in use.

| | |
|--------------|----------------------------|
| Unit No.: | No. of the unit speaking |
| Channel No.: | Speech channels Nos. 1 – 4 |
 - Transmits a speech end command if the channel is not in use.

| | |
|---------------------------|----------------------------|
| Unit No.: | No. of the unit speaking |
| Channel No.: | Speech channels Nos. 1 – 4 |
| Failure detection yes/no: | No failure detection. |
- 5) Resumes notification of subsequent events.

Infrared Conference System External Control Communication Specifications

(4) Remarks (Memorandum)

- Detection of communication failure occurs when external equipment seems to be disconnected (indicated not by negative response, but by timeout). If a command is transmitted whenever an event occurs but external equipment is not connected, approximately 4 seconds will be consumed in processing the transmission of each command.

An appropriate buffer is required to give notification of all frequently occurring event information, but the capacity of this buffer is limited. The method of transmitting events in sequence takes a long time to process a command resulting from one event, making the buffer liable to overflow. For these reasons, transmission of the command is stopped at the time of a communications failure, with stored information being discarded.

- Even when a communications failure occurs and control from external equipment becomes impossible, by switching over the control to the Center Unit, the status of the currently speaking conference unit is maintained, allowing the conference to continue via the conference unit's speech switch.
- When the power is switched on or recovery has been made from a communications failure, notification is given regarding function settings, operation status, individual channel status (whether it is in use or not), etc. The aim of this notification is to allow the system to recover smoothly.

If the Center Unit notifies external equipment of operation status following a system recovery, the mismatch between pre-failure external equipment status and post-failure Center Unit status can be corrected, enabling recovery control at external equipment.

Infrared Conference System External Control Interface Specifications

1. Outline

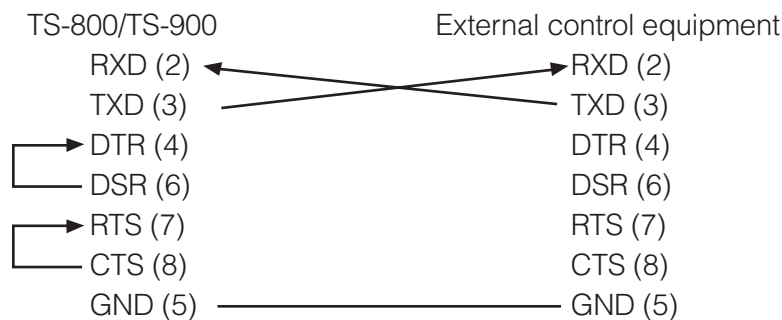
This document defines interface specifications and transmission control procedures used between the Center Unit and external equipment connected to the Center Unit's external equipment control terminals in the TOA infrared conference system.

Applicable components, model numbers, connection capacities, and connectors are as shown below.

| | | | |
|-------------------------------|--------|-----|---------------------|
| (1) TS-900 Series Center Unit | TS-900 | 1CH | D-Sub 9 pins (male) |
| (2) TS-800 Series Center Unit | TS-800 | 1CH | D-Sub 9 pins (male) |

2. Basic Specifications

| | |
|------------------------------------|---|
| (1) Communication method | Full duplex method (alternate watch method=half duplex transmission) |
| (2) Transmission rate | 9600 [bps] |
| (3) Signal format | NRZ |
| (4) Synchronization system | Start/stop system |
| (5) Link control method | Contention (point to point configuration) |
| (6) Transmission control procedure | In compliance with the basic data transmission control procedure (Basic procedure: JIS X5002) |
| (7) Transmission mode | Code independent mode (8-bit transparent transmission) |
| (8) Transmission code | 8-bit binary and transmission control character |
| (9) Code configuration | Start bit 1 bit + data length 8 bits + parity 1 bit (even) + stop bit 1 bit |
| (10) Error detecting system | Horizontal/vertical parity check method (BCC: Block Check Character) (JIS X5001; Character configuration and horizontal parity usage on transmission lines) |
| (11) Connection | Cable connections are as shown below. |

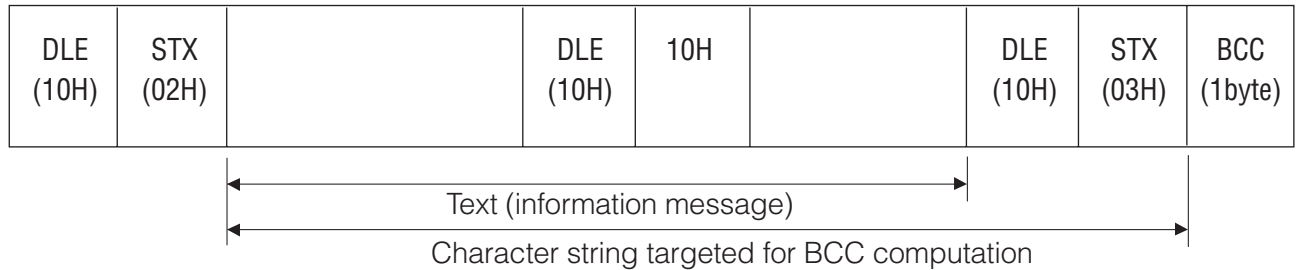


3. Control Characters

| | | |
|-----------------------------|----------------------------|-----|
| (1) Status Inquiry | ENQ (Enquiry) | 05H |
| (2) Acknowledgment | ACK (Acknowledge) | 06H |
| (3) Negative Acknowledgment | NAK (Negative Acknowledge) | 15H |
| (4) Data Link Escape | DLE (Data Link Escape) | 10H |
| (5) Start of Text | STX (Stat of Text) | 02H |
| (6) End of Text | ETX (End of Text) | 03H |
| (7) End of Transmission | EOT (End of Transmission) | 04H |

Infrared Conference System External Control Interface Specifications

4. Transmission Format



- (1) The transmitting side always adds the data link escape (DLE) character immediately before the start of text (STX) character and the end of text (ETX) character.
- (2) The receiving side retrieves all DLE characters in the text as data, except the STX and ETX characters accompanied by the DLE characters.
- (3) If data "10H" exists in the text, the transmitting side adds the DLE character just before the "10H" data and then transmits the text. The receiving side reads two DLE characters as one data "10H" to retrieve the text.

5. Error Detection

- (1) Control characters
Errors in transmitting control characters are detected using vertical parity (even number).
- (2) Text
Errors in transmitting text are detected using both vertical parity (even number) and horizontal parity (even number). (For details, refer to JIS X5001; Character configuration and horizontal parity usage on transmission lines.)
For computation, the information message between the STX and ETX characters is computed using an exclusive OR to find the BCC character, and the computed BCC character is added after the ETX character. However, the DLE character added before the ETX character and another DLE character added in order to transmit the "10H" character code in the text are excluded from the computation.

6. Communication Procedures

The procedure is in compliance with the "Basic data transmission control procedure (Basic procedure: JIS X5002)."

Details are described in the "TS-800/TS-900 External Control SIO Interface Transition Table."

Shown below are the settings values for the watch dog timer (timeout) and retry counter (retry) in the above table.

| | | | |
|--|---|-----|-----------------|
| (1) Non-response watch dog timer after ENQ transmission | (Master unit phase 2) | TA2 | : 500ms |
| (2) Non-response watch dog timer after text transmission | (Master unit phase 3) | TA3 | : 500ms |
| (3) ENQ retransmission interval timer after EOT transmission | (Master unit phase 2: Avoidance of ENQ collision) | TR | : 500ms |
| (4) Text reception watch dog timer after data link establishment | (Slave unit phase 3) | TB3 | : 500ms |
| (5) Text ETX reception watch dog timer after STX reception | (Slave unit phase 3: Watch of ETX loss) | TC3 | : 1 sec. |
| (6) Data link establishment retry counter | (Master unit phase 2) | C1 | : 3 times (=N1) |
| (7) Data transmission retry counter | (Master unit phase 3) | C2 | : 3 times (=N2) |

TS-800/TS-900 External Control Interface Communication Procedure Status Transition

| Status Event | Standby status | Transmission (Master unit side) | | | Reception (Slave unit side) | | |
|---|---|---|--|---|---|---|--|
| | | Phase 2 | Phases 3-4 | Phase 2 | Phases 2-4 | Phase 3 | |
| | | Waiting for ACK after transmitting ENQ | Waiting for ACK after transmitting text | Waiting for retransmission of ENQ after transmitting EOT | Waiting for STX after transmitting ACK | Text received and waiting for ETX | Waiting for BCC reception |
| | N | S1 | S2 | ER | R1 | R2 | R3 |
| Transmission request from high-order component | Transmission of ENQ C1=0 Activation of TA2 (Waiting for response to ENQ) → S1 | | | | | | |
| Reception of ACK | Ignores | Text transmission (DLE/STX-DLE/ETX.BCC) C2=0 Activation of TA3 (Waiting for text response) → S2 | Notifies high-order component of transmission completion. If there is a text to be transmitted, Transmits the next text (DLE/STX-DLE/ETX.BCC) C2=0 Activation of TA3 (Transmits the next text.) ↑ If there is no text to be transmitted, Transmits EOT (Normal completion) → N | Ignores | Ignores | Stores as text. (Waiting for next text reception) ↑ | |
| Reception of NAK | Ignores | If N1>C1, Transmits EOT C1=C1+1 Activation of TR (Waiting for retransmission of ENQ) → ER If C1=N1, Transmits EOT Notifies high-order component of a failure. (Abnormal completion) → N | If N2>C2, Transmits text (DLE/STX-DLE/ETX.BCC) C2=C2+1 Activation of TA3 (Retransmission of text) ↑ If C2=N2, Transmits EOT Notifies high-order component of a failure. (Abnormal completion) → N | Ignores | Ignores | Stores as text. (Waiting for next text reception) ↑ | If BCC = OK and ErrorFlg, Transmits ACK Notifies high-order component of reception. Activation of TB3 (Normal reception) → R1 |
| Reception of ENQ | If impossible to receive, Transmits NAK (Refusal of reception) ↑ If possible to receive, Transmits ACK Activation of TB3 (Approval of reception) → R1 | Ignores | Ignores | If impossible to receive, Transmits NAK (Refusal of reception) ↑ If possible to receive, Transmits ACK Activation of TB3 (Approval of reception) → R1 | Transmission of ACK Activation of TB3 (Response to ENQ retransmission) ↑ | Stores as text. (Waiting for next text reception) ↑ | If BCC = NG or ErrorFlg, Transmits NAK Activation of TB3 (Abnormal reception) → R1 |
| Reception of DLE+STX | Ignores | Ignores | Ignores | Ignores | ErrorFlg=0 Activation of TC3 → R2 | Abandons the received text. ErrorFlg=0 Activation of TC3 (Waiting for new text reception) ↑ | |
| Reception of DLE+ETC | Ignores | Ignores | Ignores | Ignores | ErrorFlg=1 TC3 → TB3 Activation of TC3 (Loss of STX) → R3 | (Waiting for BCC reception) → R3 | |
| Reception of EOT | Ignores | Ignores | Ignores | Transmission of ENQ Activation of TA2 (Retransmission of ENQ) → S1 | (Normal completion) → N | Stores as text. (Waiting for next text reception) ↑ | |
| Reception of other signals | Ignores | Ignores | Ignores | Ignores | Ignores | Stores as text. (Waiting for next text reception) ↑ | |
| SIO error | Ignores | Ignores | Ignores | Ignores | Ignores | ErrorFlg=1 | |
| Timeout | Ignores | <TA2=0> If N1>C1, Transmits EOT C1=C1+1 Activation of TR (Waiting for ENQ retransmission) → ER If C1=N1, Transmits EOT Notifies high-order component of a failure. (Abnormal completion) → N | <TA3=0> If N2>C2, Transmits text (DLE/STX-DLE/ETX.BCC) C2=C2+1 Activation of TA3 (Retransmission of text) ↑ If C2=N2, Transmits EOT Notifies high-order component of a failure. (Abnormal completion) → N | <TR=0> Transmission of ENQ Activation of TA2 (Retransmission of ENQ) → S1 | <TB3=0> (Abnormal completion) → N | <TC3=0> (Abnormal completion) → N | ErrorFlg=1 <TC3=0> (Abnormal completion) → N |

< NOTE >

→ : Changes into the designated status.
↑ : Remains unchanged.

TA2 : Non-response watch dog timer after ENQ transmission (Master unit phase 2)

TA3 : Non-response watch dog timer after text transmission (Master unit phase 3)

TR : ENQ retransmission interval timer after EOT transmission (Master unit phase 2: Avoidance of ENQ collision)

TB3 : Text reception watch dog timer after data link establishment (Slave unit phase 3)

TC3 : Text ETX reception watch dog timer after STX reception (Slave unit phase 3: Watch of ETX loss)

C1 : Data link establishment retry counter (Master unit phase 2)

N1 : Number of repeated data link establishment retries (Master unit phase 2)

C2 : Data transmission retry counter (Master unit phase 3)

N2 : Number of repeated data transmission retries (Master unit phase 3)

TS800/TS-900 External Control Interface Command List (Separate Table 1)

| | Command Name | Command Data | | | | | | | Data Length | Response Command | | |
|--|--|--|--------|--------------------------|------------------------------------|--------------------------|--------------------------|-------------------------|-------------------------|------------------|-------|----------|
| | | Command Code | | Information Element 1 | Information Element 2 | Information Element 3 | Information Element 4 | Information Element 5 | | Normal | Error | |
| | | b7 - 4 | b3 - 0 | | | | | | | | | |
| External equipment → Center Unit | | | | | | | | | | | | |
| Control request | R00 | Speech function setting change | F | 1 | Speech method | Speaker number limit | Auto Mic-Off ON/OFF | | | 4 | E00 | ER2 |
| | R01 | Conference unit's microphone input volume adjustment | | 9 | Volume adjustment value | | | | | 2 | E02 | ER2 |
| | R02 | Start speech | A | 1 | Unit number | | | | | 2 | E04 | ER2, ER3 |
| | R03 | End speech | | 0 | Unit number | | | | | 2 | E05 | ER2, ER3 |
| | R04 | Cancel speech request | | 4 | Unit number | | | | | 2 | E07 | ER2, ER3 |
| | R05 | End all speeches | | 8 | | | | | | 1 | E05 | ER2 |
| | R06 | Cancel all speech requests | C | | | | | | | 1 | E07 | ER2 |
| | R07* | Start voting | C | 1 | | | | | | 1 | E10 | ER2 |
| | R08* | Stop voting | | 0 | | | | | | 1 | E12 | ER2 |
| | R09 | Start installation check test | D | 1 | | | | | | 1 | E13 | ER2 |
| R10 | Stop installation check test | 0 | | | | | | | 1 | E15 | ER2 | |
| Query request | Q00 | Speech function setting status query | F | 3 | | | | | | 1 | A00 | |
| | Q01 | Function operation status query | | 7 | | | | | | 1 | A01 | |
| | Q02 | Conference unit microphone input volume adjustment query | B | | | | | | | 1 | A02 | |
| | Q03 | Speech status query | A | 3 | | | | | | 1 | A03 | |
| | Q04 | Speech request acceptance status query | | 7 | | | | | | 1 | A04 | ER2 |
| | Q05* | Voting response inquiry | C | 2 | Unit number | | | | | 2 | E11 | ER2, ER3 |
| | Q06* | Voting result query | | 3 | | | | | | 1 | A05 | |
| | Q07 | Installation check test response query | D | 2 | Unit number | | | | | 2 | E14 | ER2, ER3 |
| Q08 | Installation check test result query | 3 | | | | | | | 1 | A06 | | |
| Center Unit → External equipment | | | | | | | | | | | | |
| Event notification (Control response) | E00 | Speech function setting change | F | 1 | Speech method | Speaker number limit | Auto Mic-Off ON/OFF | | | 4 | | |
| | E01 | Function operation status | | 5 | Function operation status | | | | | 2 | | |
| | E02 | Conference unit microphone input volume adjustment | | 9 | Volume adjustment value | | | | | 2 | | |
| | E03 | Battery alarm | D | | Unit number | | | | | 2 | | |
| | E04 | Start of speech | A | 1 | Unit number | Channel number | | | | 3 | | |
| | E05 | End of speech | | 0 | Unit number | Channel number | Failure detection ON/OFF | | | 4 | | |
| | E06 | Speech request | | 5 | Unit number | | | | | 2 | | |
| | E07 | Speech request cancellation | | 7 | Unit number | Failure detection ON/OFF | | | | 3 | | |
| | E08 | Start of chairman priority speech | B | 1 | Unit number | Channel number | | | | 3 | | |
| | E09 | End of chairman priority speech | | 0 | Unit number | Channel number | Failure detection ON/OFF | | | 4 | | |
| | E10* | Start of voting | | 1 | Unit number | | | | | 2 | | |
| | E11* | Voting response | C | 2 | Unit number | Voting contents | | | | 3 | | |
| | E12* | End of voting | | 0 | Number of Vote 1 | Number of Vote 2 | Number of Vote 3 | | | 4 | | |
| | E13 | Start of installation check test | | 1 | | | | | | 1 | | |
| | E14 | Installation check test response | | 2 | Unit number | Unit type | | | | 3 | | |
| E15 | End of installation check test | 0 | | | | | | | 3 | | | |
| Query response | A00 | Response to speech function setting status query | F | 3 | Speech method | Speaker number limit | Auto Mic-Off ON/OFF | | | 4 | | |
| | A01 | Response to function operation status query | | 7 | Function operation status | | | | | 2 | | |
| | A02 | Response to conference unit microphone input volume adjustment query | | B | Volume adjustment value | | | | | 2 | | |
| | A03 | Response to speech status query | A | 3 | Chairman priority ON/OFF | Unit number (Channel 1) | Unit number (Channel 2) | Unit number (Channel 3) | Unit number (Channel 4) | 6 | | |
| | A04 | Response to speech request acceptance status query | | 7 | Number of accepted speech requests | Unit number | Unit number | Unit number | Unit number | 6 | | |
| | A05* | Response to voting result query | | 3 | Number of Vote 1 | Number of Vote 2 | Number of Vote 3 | | | 4 | | |
| A06 | Response to installation check test result query | C | 3 | Number of Chairman Units | Number of Delegate Units | | | | 3 | | | |
| Error response | ER2 | (Number of information elements: 2) | E | 2 | Request command code | Reason of error | | | | 3 | | |
| | ER3 | (Number of information elements: 3) | | 3 | Request command code | Unit number | Reason of error | | | 4 | | |

* Cannot be used in the TS-800 Series. (Function not available.)