SECTION 1
Serial Communications Control

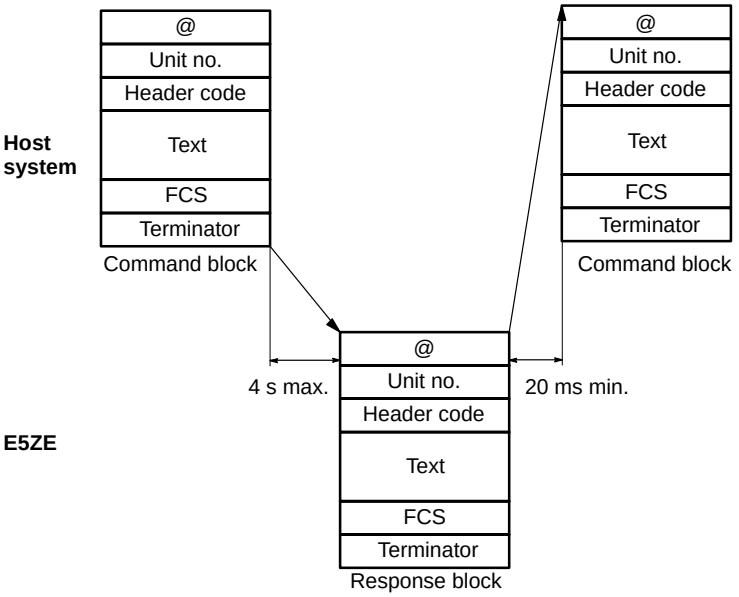
This section provides general information on serial communications and communications checks.

1-1 Communications Control Procedure

The communications procedure of the E5ZE is a special conversation type.

In each E5ZE system, all communications are initiated by the host computer of the system by sending a character string called command block to an E5ZE of the system. The E5ZE then sends a character string called response block back to the host computer, i.e., each time a block is transmitted, the transmission right is also transferred. Each block begins with a start character, @, and the unit number of the E5ZE and ends with an FCS and a terminator.

The E5ZE sends a response block back to the host computer whenever the host computer sends a command block to the E5ZE. The response block is processed by the host computer.



Note Command Block: A block sent from the host system. (Character string)
Response Block: A block sent from the E5ZE. (Character string)

The host computer must be set up to read the responses sent by the E5ZE. If the host computer does not read any response, the reception buffer of the host computer may overflow.

- Communications after E5ZE Turned OFF and ON

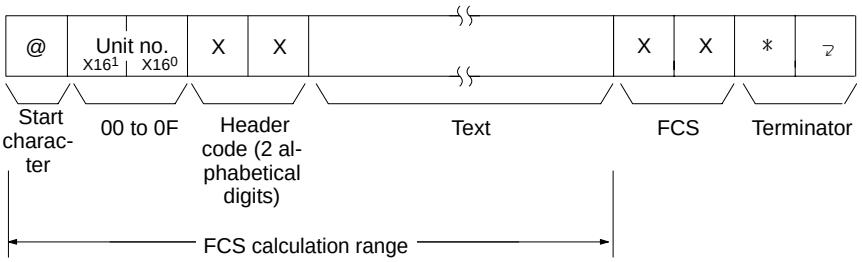
  The host computer can send a command block to the E5ZE at least 4 s after the E5ZE is turned ON.

  When the E5ZE is turned OFF and ON, do not fail to initialize the reception buffer of the host computer before sending a command from the host computer.

- The E5ZE requires a maximum of 4 s to process a command block, which must be taken into consideration when writing programs for the E5ZE.
- An interval of 20 ms minimum is required for the host computer to send a command block after receiving a response block. If an interval less than 20 ms is set on the host computer, communications may not be possible.

1-2 Block Format

The following format is used for the command and response blocks used in E5ZE systems.



Start Character: Each block begins with a start character, @ (40H).

Unit Number: The unit number of the E5ZE is required so that the host computer can identify the E5ZE.

Header Code: The header code consists of two letters identifying the type of command being sent.

Text: The text consists of command or response data in detail.

FCS: The FCS is calculated as the exclusive OR of all characters from the start character through the final data character. The resulting 8-bit data is converted to two ASCII characters for transmission as an FCS.

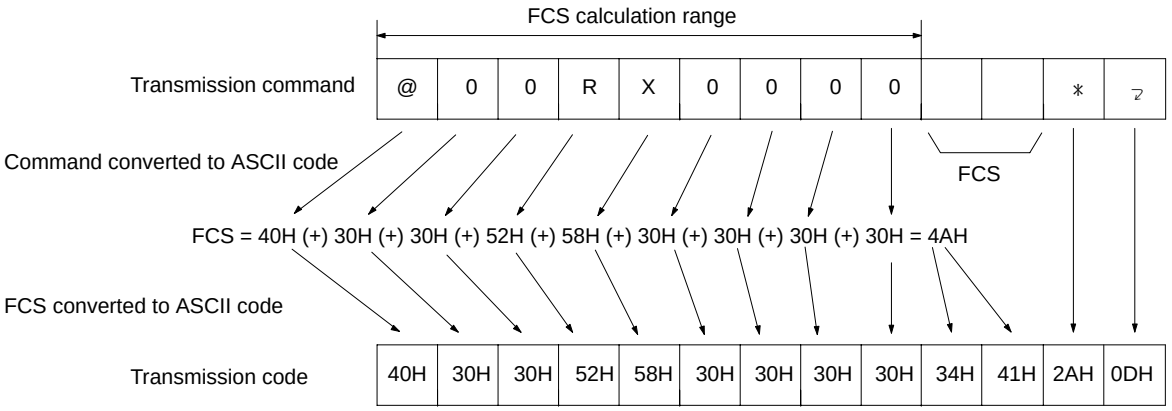
Terminator: Each block ends with a terminator consisting of * (2AH) and a carriage return ↵ (0DH).

If the host computer is connected to more than one E5ZE for RS-422 or RS-485 communications, each of the E5ZE must have a unique unit number, otherwise communications will not be possible.

1-3 FCS Calculations

Write a program for the host computer so that the host computer can calculate the FCS in each command block and each response block to ensure problem-free communications.

Calculation Example



The result “4A” is transmitted as the FCS of the transmission command.

* Symbols
H: Hexadecimal code
(+): Exclusive OR

1-4 Checks

All communications errors and recovery from these communication errors must be processed at the host computer. The E5ZE has the following communications error detection functions.

Character Check

Vertical Parity Check
The E5ZE in vertical parity check operation checks the exclusive OR of each character.

Framing Check
The E5ZE determines that there is an error while the E5ZE is communicating with the host computer if the E5ZE detects a stop bit of 0.

Overrun Check
The E5ZE determines that there is an error while the E5ZE is communicating with the host computer if the E5ZE processing a character receives the next character.

Block Check

Format Check
The E5ZE in format check operation checks each command format that the E5ZE receives.

Numeric Data Check
The E5ZE in numeric data check operation checks the control point numbers and set values of the E5ZE.

FCS (Frame Check Sequence)
The E5ZE in FCS operation checks the start character @ to the exclusive OR of the last character in each block.

If there is a communications error which appears to be caused by noise, execute communications approximately 10 times and check if the communications error disappears. If communications errors occur frequently, change the communication speed between the E5ZE and the host computer or use an optical interface for the transmission path between the E5ZE and host computer.

1-5 Error Processing

If an error occurs in a command block or response block, refer to the following table to take necessary countermeasures.

Error	Remedy
The end code is not 00.	Check the contents of the end code.
An error code is read.	Check the contents of the error code.
The contents of the response block are abnormal.	Execute communications again.
No response block returns.	Make sure that the communications conditions of the host computer and E5ZE, connections between the host computer the E5ZE, the program used by the host computer connected to the E5ZE, and the settings of the E5ZE and host computer are correct.