

**[Issue No.]** T08-0013

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**[Title]** Introduction of quick solution for CC-Link system error  
(Dividing the CC-Link system that includes AJ65SBT-RPT  
CC-Link system repeater (T-branch) module)

**[Date of Issue]** Nov., '02

**[Relevant Models]** CC-Link system (AJ65SBT-RPT)

Thank you for your continued support of Mitsubishi programmable logic controller.

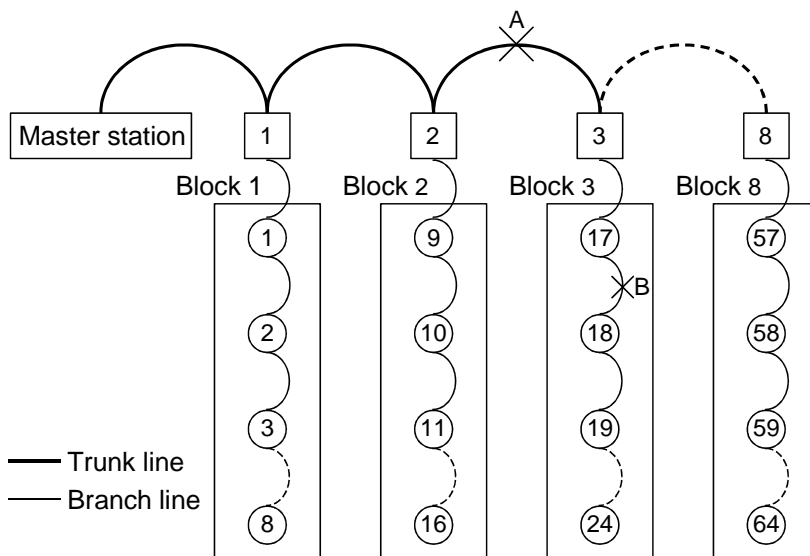
This bulletin explains how to divide the CC-Link system including AJ65SBT-RPT CC-Link system repeater (T-branch) module (referred to as repeater).

## 1. System division using repeater

Repeater is a module designed to expand the transmission distance of CC-Link system and install the wiring in T-shape (T branch connection). It is possible to divide the system and specify the faulty parts quickly by installing repeaters in CC-Link system. This prevents the whole system from being seriously effected by an error.

Use of repeater provides two types of system division, i.e., dividing the system in parallel or series. They are different in how they effect the system when an error occurs. (System division without repeater will result in all station error.)

**[When connecting repeaters and dividing the system in parallel]**



□: Repeater      ○: Remote I/O station (the number indicates the station number)

\* Be sure to draw the module layouts with station number in advance, to make clear where each module is laid. It is recommended to assign the station number according to the wiring order. This makes it easier to specify the faulty part (faulty block) when executing CC-Link diagnosis such as loop test or other station monitor.

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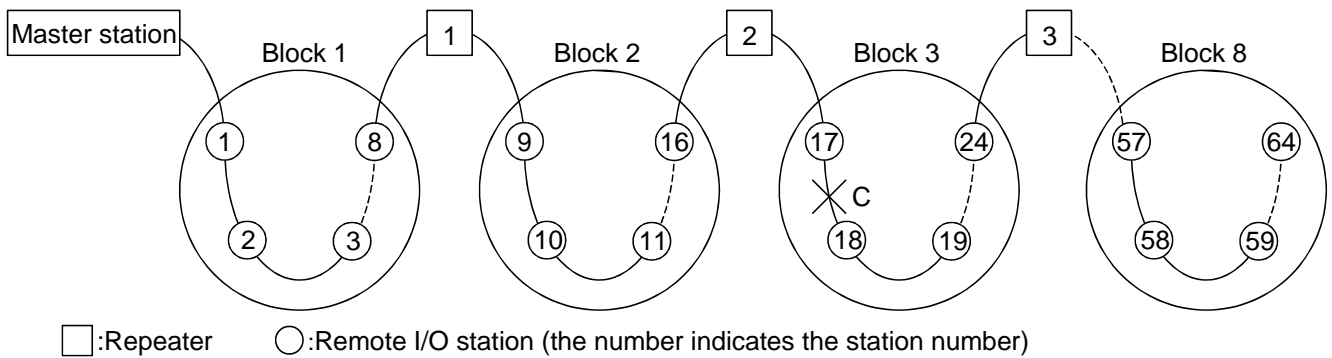
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**[When connecting repeaters and dividing the system in series]**



\* Be sure to draw the module layouts with station number in advance, to make clear where each module is laid. It is recommended to assign the station number according to the wiring order. This makes it easier to specify the faulty part (faulty block) when executing CC-Link diagnosis such as loop test or other station monitor.

System division	Faulty part	Remote I/O station communication status				Error effects on system
		Station No. 1 to 8 (Block 1)	Station No. 9 to 16 (Block 2)	Station No. 17 to 24 (Block 3)	Station No. 25 to 64 (Block 4 to 8)	
Parallel	A (trunk line)	Faulty (unstable*)		Faulty		Effects on all blocks
	B (branch line)	Normal		Station No 17: Faulty (Unstable*) Station No 18 to 24: Faulty	Normal	Effects on faulty block only
Series	C	Normal		Station No 17: Faulty (Unstable*) Station No 18 to 24: Faulty	Normal	Effects on all blocks following the faulty one

\* The station status (normal/faulty) varies with the communication status.

## 1.1 When connecting repeaters and dividing the system in parallel

The following table compares the troubleshooting of the system including no repeater and the system in which remote I/O stations are connected via the T-branch type connection using repeaters.

**Table 1.1**

Number of connected repeaters	Number of connected remote I/O stations	Loop test of CC-Link diagnosis	Number of times for bisection method <sup>1</sup> execution
Not used	64	N/A	6
Used	8 <sup>*2</sup>	Applicable (faulty block specification)	3
	11	Applicable (faulty block specification)	3
	11	Applicable (faulty block specification)	2

\*1: For bisection method, see section 1.1.1 (3) (b).

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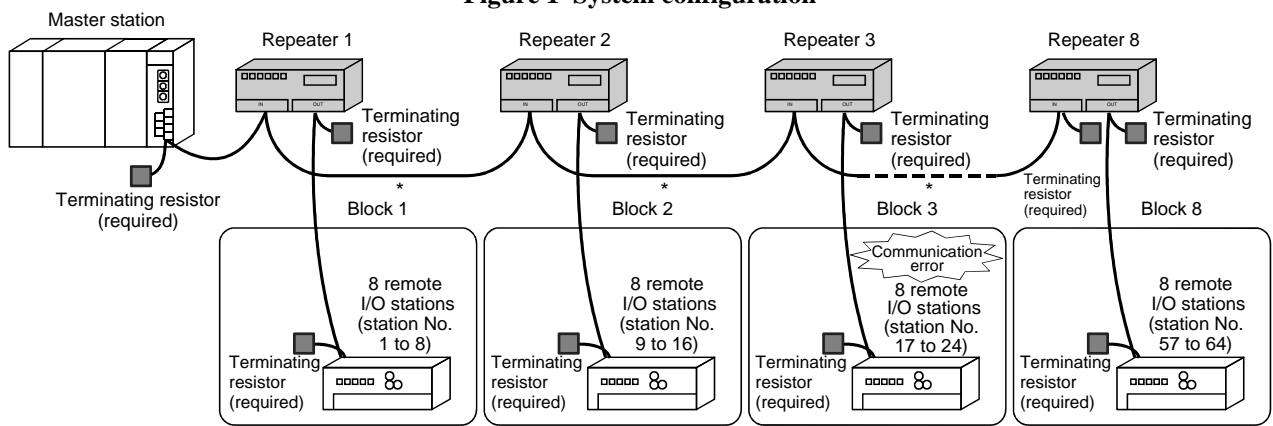
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## 1.1.1 When 8 repeaters are used

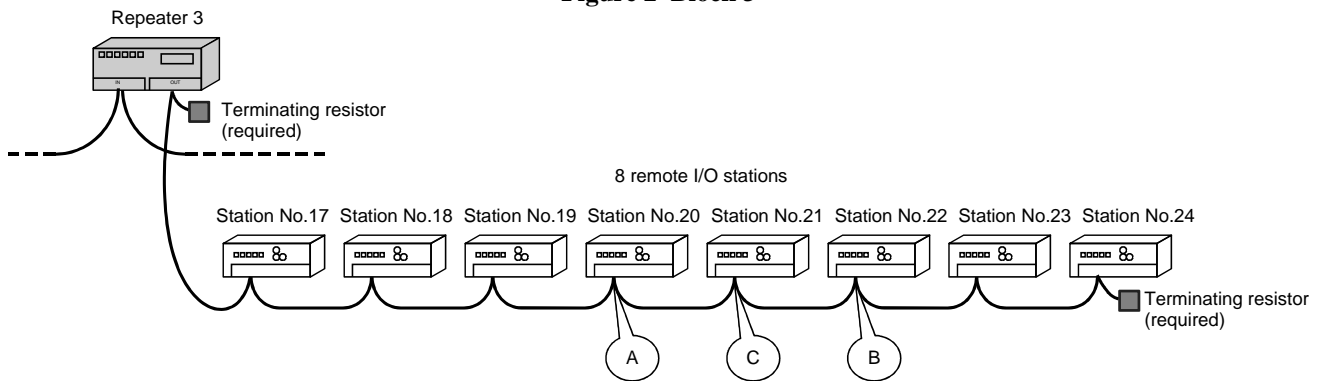
This section explains how to specify the faulty parts with the example \*2 in table 1.1.

**Figure 1 System configuration**



\* Check if the trunk cable is disconnected when communication error occurs in multiple blocks.

**Figure 2 Block 3**



(1) System configuration

- Remote I/O stations are connected via the T-branch type connection with repeaters.
- 8 repeaters are used.
- 8 remote I/O stations are connected per block.

(2) Faulty parts

Supposing that block 3 module or cable is faulty.

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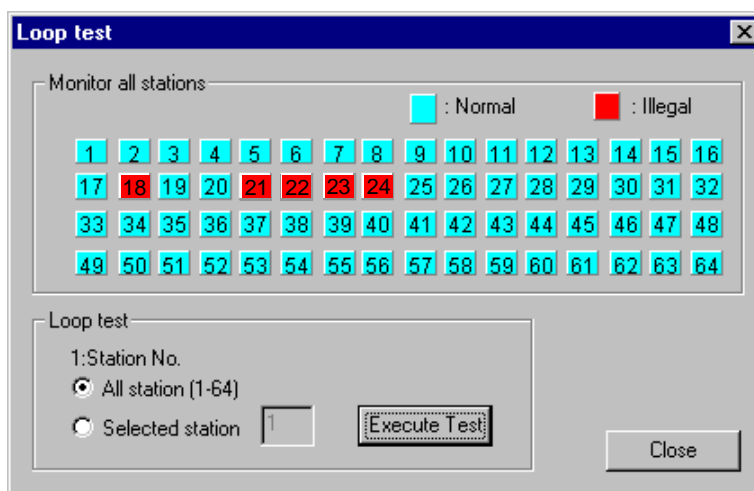
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### (3) Specifying procedures

(a) Execute CC-Link diagnosis such as loop test and other station monitor to specify the faulty block. (See figure 1.)



The screen displays that the remote I/O station in block 3 has developed a communication error. This specifies that block 3 is faulty.

(b) Determine the faulty block by bisection method. And then specify the faulty parts based on the results. (See figure 2.)

Bisection method procedures

- 1) Remove the cable from section A (remote I/O station corresponding to station no. 20) and connect a terminating resistor.
- 2) When no error is detected in up to section A, restore the cable to section A and remove the cable from section B (remote I/O station corresponding to station no. 22) and connect a terminating resistor.
- 3) When error is detected in up to B section, restore the cable to section B and remove the cable from section C (remote I/O station corresponding to station no. 21) and connect a terminating resistor.
- 4) If no error is detected, this means an error has occurred in section B module or the cable between section C and B.
- 5) If an error is detected, this means the error has occurred in section C module or the cable between section A and C.

Point

Be sure to attach a terminating resistor to the end of the branch line.

 **MITSUBISHI ELECTRIC CORPORATION**

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## 1.2 When connecting repeaters and dividing the system in series.

The following table compares the troubleshooting of the system including no repeater and the system in which repeaters are connected between remote I/O stations.

**Table 1.2**

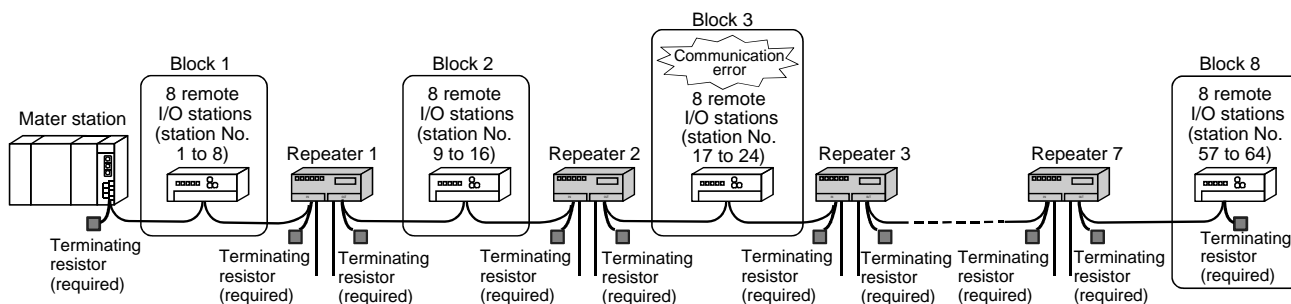
Number of connected repeaters	Number of connected remote I/O stations	Loop test of CC-Link diagnosis	Number of times for bisection method <sup>*1</sup> execution
Not used	64	N/A	6
Used	7 <sup>*2</sup>	64 (8/block)	Applicable (faulty block specification)
	10	64 (6/block)	Applicable (faulty block specification)
	10	44 (4/block)	Applicable (faulty block specification)

\*1: For bisection method, see section 1.2.1 (3) (b).

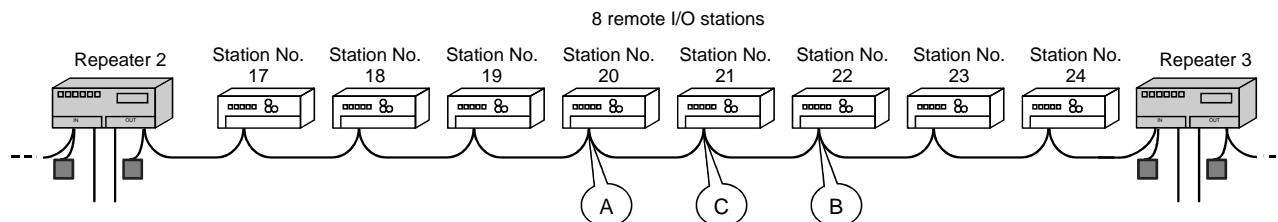
### 1.2.1 When 7 repeaters are used.

This section explains how to specify the faulty parts with the example \*2 in table 1.2.

**Figure 3 System configuration**



**Figure 4 Block 3**



(1) System configuration

- Repeaters are connected between remote I/O stations.
- 7 repeaters are used.
- 8 remote I/O stations are connected per block.

(2) Faulty parts

Supposing that block 3 module or cable is faulty.

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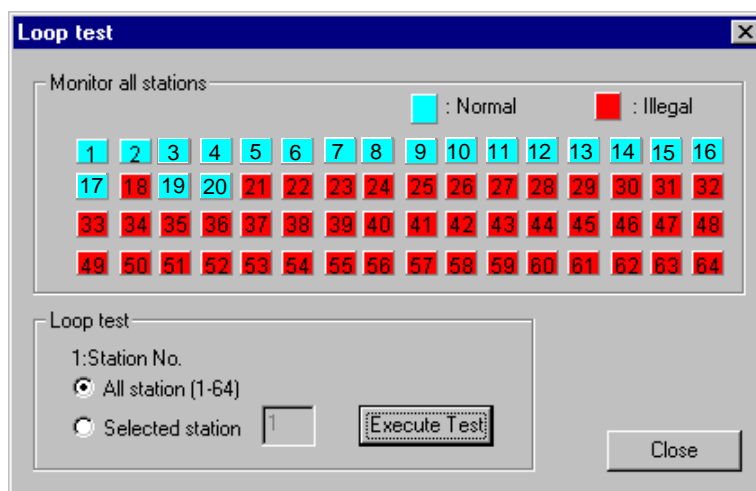
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### (3) Specifying procedures

(a) Execute CC-Link diagnosis such as loop test and other station monitor to specify the faulty block. (See figure 3.)



The screen displays that repeater 2 and later stations are all faulty or some of them are faulty. This specifies that block 3 is faulty because block 3 and block 4 are separated by repeater 3.

(b) Determine the faulty block by bisection method. And then specify the faulty parts based on the results. (See figure 4.)

Bisection method procedures

- 1) Remove the cable from section A (remote I/O station corresponding to station no. 20) and connect a terminating resistor.
- 2) When no error is detected in up to section A, restore the cable to section A and remove the cable from section B (remote I/O station corresponding to station no. 22) and connect a terminating resistor.
- 3) When error is detected in up to B section, restore the cable to section B and remove the cable from section C (remote I/O station corresponding to station no. 21) and connect a terminating resistor.
- 4) If no error is detected, this means an error has occurred in section B module or the cable between section C and B.
- 5) If an error is detected, this means the error has occurred in section C module or the cable between section A and C.

#### Point

Be sure to attach a terminating resistor to the end of the trunk line.