HITACHI

TEST & MAINTENANCE (T/M) MANUAL

S10V

Programmable Controller

SVE-3-003（C）

TEST & MAINTENANCE
(T/M) MANUAL

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SAFETY PRECAUTIONS

Be sure to read this manual and all other attached documents carefully before installing, operating inspecting or conducting maintenance on this unit. Always use this unit properly. Be sure to carefully read the information about the device, the safety information and precautions before using this unit. Be sure that the person(s) responsible for maintenance receives and understands this manual completely.

This manual divides the safety precautions into DANGERs and CAUTIONs.

DANGER : Failure to observe these warnings may result in death or serious injury.

CAUTION : Failure to observe these cautions may result in injury or property damage.

Failure to observe any **CAUTION** may lead to serious consequences.

All of these DANGERs and CAUTIONs provide very important precautions and should always be observed.
Additional safety symbols representing a prohibition or a requirement are as follows:

: Prohibition. For example, “Do not disassemble” is represented by:

: Requirement. For example, if a ground is required, the following will be shown:

1. Installation Precautions

REQUIREMENT

- Fasten the mount base to a vertical surface. Fastening the mount base to a horizontal surface lessens the heat dissipation effects and allows the temperature to rise, thereby rendering the module defective or incurring component parts deterioration.
- Before installing the module, discharge any static buildup from your body because static electricity may render the module defective.
- Properly tighten the screws. If they are inadequately tightened, malfunction, smoke emission, or combustion may occur.

DANGER

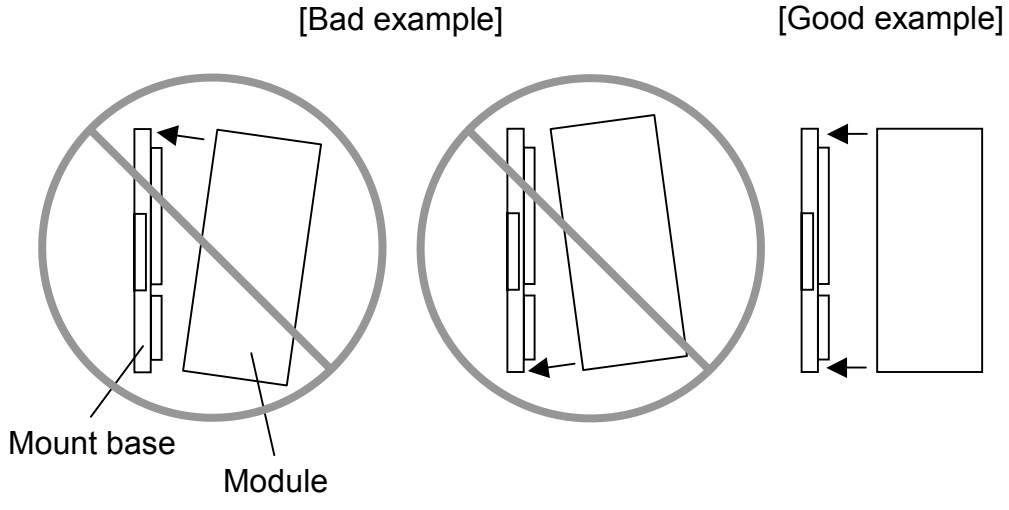
The external power source voltage may create an electric shock hazard. If you disconnect/connect the module or cable with the power supply switched, you may inadvertently touch a power supply terminal and receive an electric shock or the equipment may become damaged due to short circuit or noise. Switch off the power supply before disconnecting/connecting the module or cable.

CAUTION

- Use the module in an environment specified in the catalog and manual.
  If you use the module in an environment where the module is subjected to high temperature, high humidity, dust, corrosive gas, vibration, or impact, a risk of electric shock, fire, or malfunction may result.
- Observe the installation procedure stated in the manual.
  If the module is improperly installed, it may drop, become defective, or malfunction.
- Do not allow wire cuttings or other foreign matter to enter the module.
  The entry of foreign matter in the module may result in a fire or cause the module to become defective or malfunction.
- When the module is to be positioned at a location where it may become wet with water, place it within a drip-proof enclosure to prevent it from becoming defective.

CAUTION

- The module may become defective due to a high temperature, which may result from heat dissipation failure. It may also malfunction due to electromagnetic interference from nearby equipment. For heat dissipation and electromagnetic radiation minimization, provide the specified clearances among the module, its enclosure, and neighboring equipment.
- The degree of temperature rise varies depending on how the module is mounted. The mounting intervals specified in the manual should be used as a guide only. While a test run is conducted after completion of mounting, measure the temperature near the module to check whether it is within the specified range. If the measured temperature is beyond the specified range, increase the mounting intervals or provide forced air cooling with a cooling fan.
- Dust or other foreign matter might accumulate on the connector, resulting in poor contact. Immediately after the module is unpacked, perform the mounting and wiring procedures.
- To prevent the module from being damaged, observe the following precautions when you mount or demount the module:
  - Before mounting the module to the mount base connector, check that the connector pins are properly aligned and not bent, broken, or soiled with dirt or the like.
  - Ensure that the module is parallel to the mount base vertical surface as shown below when mounting. If you connect a module to or disconnect it from its connector while it is tilted, the connector pins may become damaged.



PROHIBITION

Keep the insulating sheet in position (to insulate the mount base from the cabinet).

PROHIBITION

Do not disassemble or modify the module. Failure to observe this precaution may result in a fire or cause the module to become defective or malfunction.

2. Wiring Precautions

REQUIREMENT

- Before supplying power to the equipment, thoroughly check the wiring connections.
- Before making power supply wiring connections, make sure that no voltage is applied to the power cable. Immediately after completion of power supply wiring, be sure to install the terminal cover.

DANGER

Electric shock hazards exist so that you might suffer burns or become electrocuted. Further, the system might malfunction due to noise interference. Therefore, ground the line ground (LG), frame ground (FG), and shielded cable (SHD).

REQUIREMENT

- Insulate the mount base from the enclosure. To keep the mount base insulated, avoid removing the insulation sheets that are supplied with the mount base.
- The LG is a ground terminal for power supply noise. The FG and SHD are ground terminals for the noise in the remote I/O, communication module and other external interface lines. To avoid interference between the ground terminals, separately ground the LG and FG.
- Connect the FG terminal of each module to the FG terminal of the mount base. Ground the FG of each remote I/O or JPCN-1 line at a single point (LPU module). (Be sure to ground the FG of all remote I/O station modules or JPCN-1 station modules that can be grounded at the same point as the LPU module.)

CAUTION

- If the input voltage for the power supply module is within the specified range but close to the upper or lower limit, you should conclude that an input power problem exists, and ask the power supply facility manager to conduct an inspection.
- Be sure that the power source for supplying power to various modules is rated as specified. The use of a differently rated power source may cause a risk of fire.
- Ensure that the same power source is used for S10V output module external power source (for supplying power to the +V terminal) and load power supply. The use of different power sources may cause a risk of malfunction.
- Only qualified personnel should be allowed to make cable connections. Incorrect wiring connections may cause a risk of fire, malfunction, or electric shock.

3. Operating Precautions

REQUIREMENT

- Before shutting down (i.e., switching off or resetting) the equipment, confirm that such shutdown will not adversely affect the performance of peripheral devices.
- Module failure could damage stored data. Therefore, make backup copies of all valuable data.
- Heating could result in a fire or unit failure. If the ambient temperature is likely to exceed 48°C, limit the maximum output current of the power module. For more details, refer to 9.7, "Power Supply Module Output Current," in the "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)." In consideration of the environment in which the unit is installed, install a cooling fan in the cabinet or limit the number of modules installed in the cabinet.

DANGER

- Use the I/O current of an I/O module within its allowable maximum current limit. Overcurrent flowing through an I/O module could damage the module's components, resulting in a possible accident, fire, or failure.
- If the module emits smoke or foreign odor, immediately switch off the power supply and investigate the problem cause.
- While the power is applied, never touch a terminal strip or connector pin. If you touch a terminal strip or connector pin while the power is applied, you may receive an electric shock.

CAUTION

- Before changing the program, generating a forced output, or performing the RUN, STOP, or like procedure during an operation, thoroughly verify the safety because the use of an incorrect procedure may cause equipment damage or other accident.
- When you switch on the power supply, follow the specified sequence. Failure to follow the specified sequence may cause equipment damage or other accident.
- Do not use a transceiver, cellular phone, or similar device near the module because module malfunction or system failure may occur due to noise.

CAUTION

- The parts, which used gallium arsenic (GaAs) for a photo coupler and LED, are included in this product. GaAs is specified as a harmful object by law. Take special care when handling the product, in particular, scrapping it. Before scrapping the product, ask a professional waste disposal dealer in charge of scrapping work.
- To avoid malfunction, ensure that the power supply is switched on and off at intervals of longer than 1 second.

PROHIBITION

Never stick your fingers or any other objects into openings in the connectors or the mount base. Otherwise, you run the risk of physical injury.

PREFACE

This manual provides information about the unit test facility (T/M) used for the individual S10V modules.
The unit test facility (T/M) determines whether these modules are normal or faulty.

- This manual is intended for service engineers. Implementation of the unit test facility (T/M) by the customer could cause a variety of trouble and should be avoided by all means.
- In implementing the unit test facility (T/M) at a customer's site, obtain approval from the customer before setting the modules on which to run the unit test facility (T/M) offline (i.e., separate the modules from the control system).
- Before implementing the unit test facility (T/M), be sure to back up valuable data. Implementing T/M will destroy the content of the data area.
- Run the unit test facility (T/M) on only one module at a time. Running T/M on multiple modules concurrently may result in a state of data area contention and an incorrect test result.
- After running the unit test facility (T/M), restore the original data from the backup copies made.

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FIGURES

TABLES

1 USING T/M

1.1 LPU Module (LQP510)

1.1.1 T/M diagnostic functions

Table 1-1 gives a summary description of the T/M diagnostic functions used for the LPU module.
Launching T/M will run test items 1 to 8.
For instructions on how to run T/M, see 1.1.3, “Launching T/M.”

Table 1-1 T/M Diagnostic Functions Used for the LPU Module

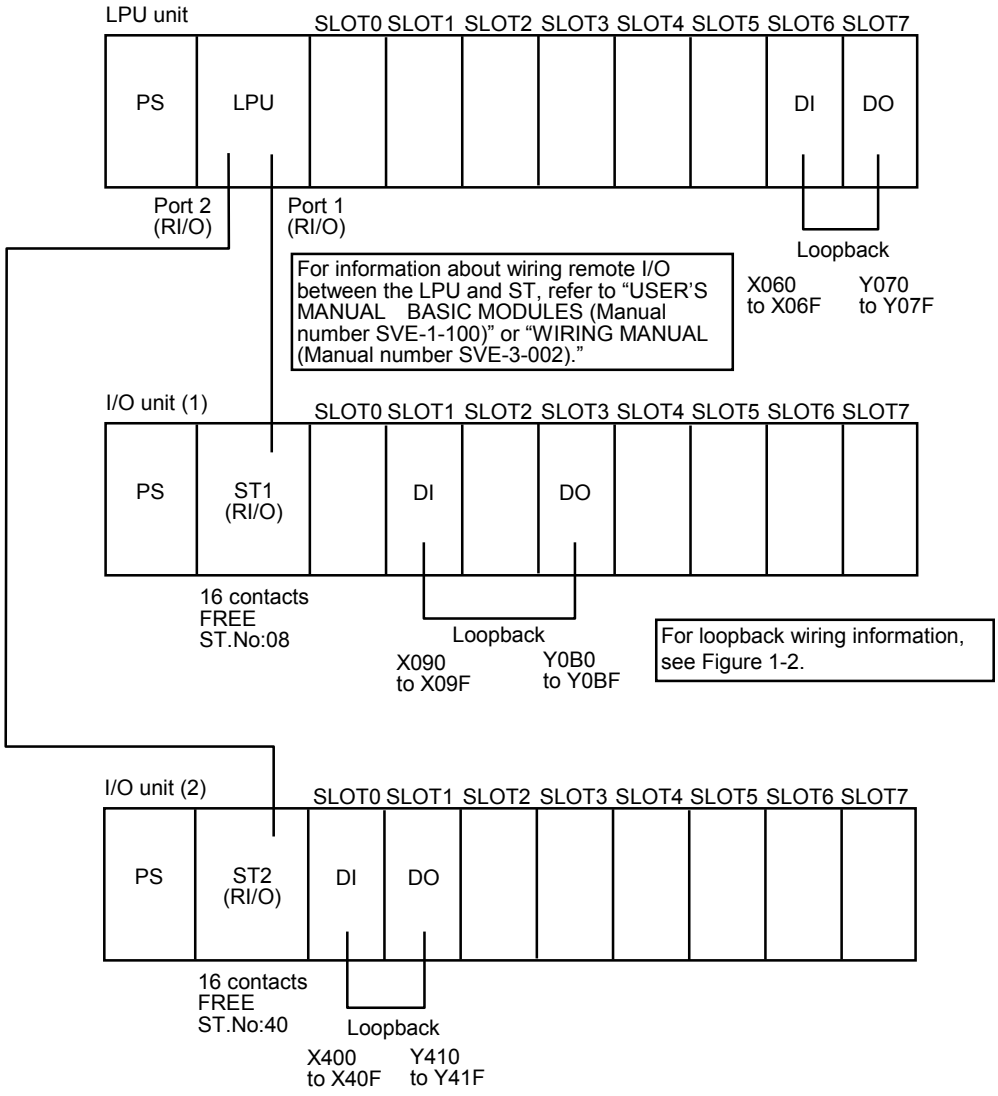
No.	Test item	Diagnostic function	Need for wiring
1	Ladder processor check	Runs the ladder serial/parallel circuits and computing functions to verify the integrity of the ladder processor.	No
2	SEQ-RAM check	Writes a value to SEQ-RAM, then reads it back for comparison to verify agreement.	No
3	PIO-RAM check	Writes a value to PIO-RAM, then reads it back for comparison to verify agreement.	No
4	Remote I/O check	Loops back the data written to the DO modules (mounted in the LPU and I/O units) to the DI module for comparison to verify agreement. This function is run on an I/O unit by using a remote I/O line (ports 1/2). For more details, see 1.1.2, “Wiring instructions.”	Yes
5	RS-232C check	Compares sent data and received data to verify agreement. Data is transmitted at 115.2 kbps.	Yes (loop connector)
6	RS-422 check	Compares sent data and received data to verify agreement. Data is transmitted at 19.2 kbps.	Yes (loop connector)
7	Power-failure PI/O memory backup check (*)	Checks if the contents of the battery-backed PI/O memory have been automatically saved in the backup area in case of a power failure.	No
8	Battery-backed memory check (*)	Checks if the contents of the battery-backed PI/O memory have not been corrupted due to a battery failure.	No

(Note 1) To enable the diagnostic function result of a test item for which the need for wiring is marked “Yes,” wire the relevant units as instructed in 1.1.2, “Wiring instructions,” and then run T/M.
(Note 2) When launched, T/M runs all of the test items numbered 1 through 8 above and record the results of diagnosis separately for each run of each test item. For information on the results of diagnosis for test items 4 through 8, see 1.1.4, “Identifying errors.”
(*) This test item is available only in cases where the LPU module used has the revision number “Q”.

1.1.2 Wiring instructions

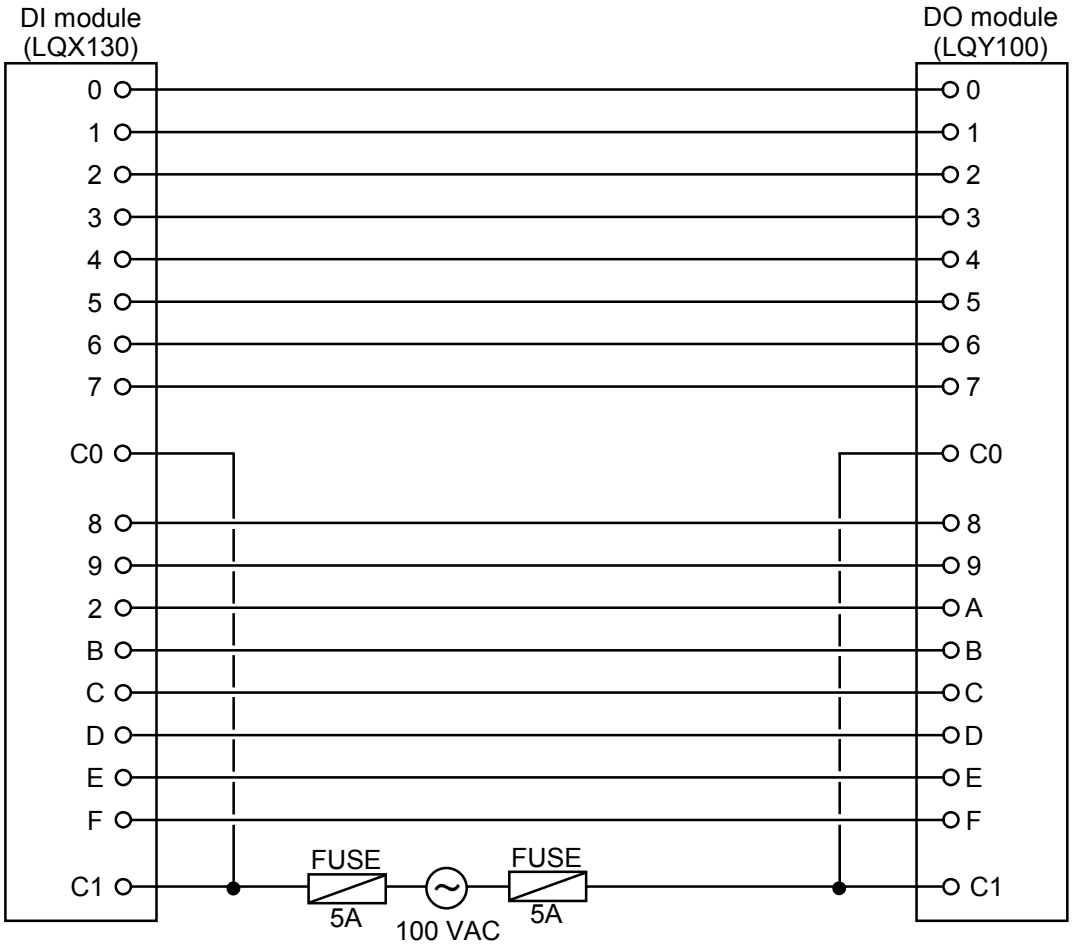
■ Wiring required in order to run the remote I/O check (No. 4)

This test is run by connecting one LPU module and two I/O units together with remote I/O cables, and then looping back data between the DI/DO modules mounted in these units.



(Note) The LQX130 DI module and LQY100 DO module should be used in order to eliminate the need to install a loopback power supply unit. When a 12 V or 24 V power supply unit can be installed, the LQX200 DI module and LQY200 DO module can be used as well.

Figure 1-1 Wiring Required to Run the Remote I/O Check



(Note 1) Install a fuse (5 A) on both sides of the 100 VAC power supply unit.

(Note 2) For information about making cable connections to the DI/DO modules, refer to "HARDWARE MANUAL I/O MODULES (Manual number SME-1-114)" or "WIRING MANUAL (Manual number SVE-3-002)."

Figure 1-2 Loopback Wiring between the DI and DO Modules

■ Wiring required to run the RS-232C/RS-422 checks (Nos. 5 and 6)

The RS-232C check test is run by plugging an RS-232C loop connector into the TOOL port (RS-232C) of the LPU module. The RS-422 check test is run by plugging an RS-422 loop connector into the UP LINK port (RS-422) of the LPU module. For instructions on how to wire the loop connectors, see Figure 1-4.

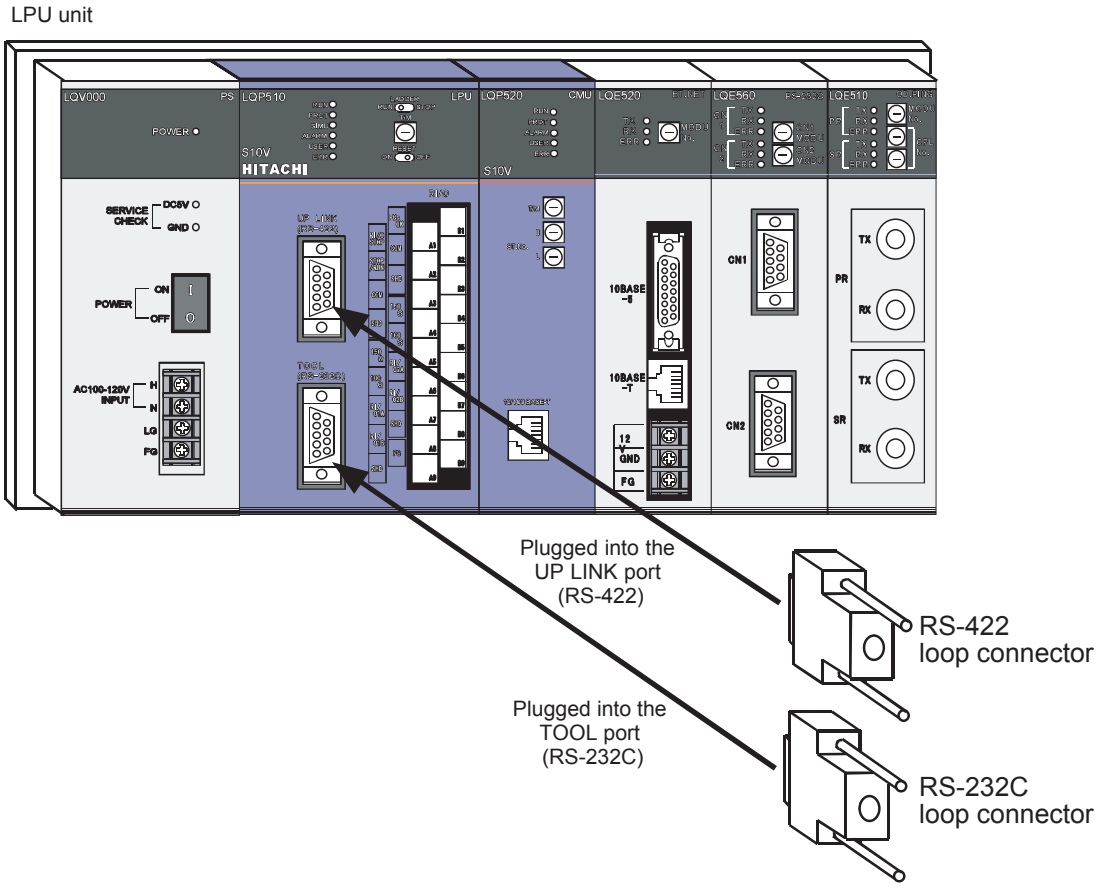


Figure 1-3 Wiring Required to Run the RS-232C/RS-422 Checks

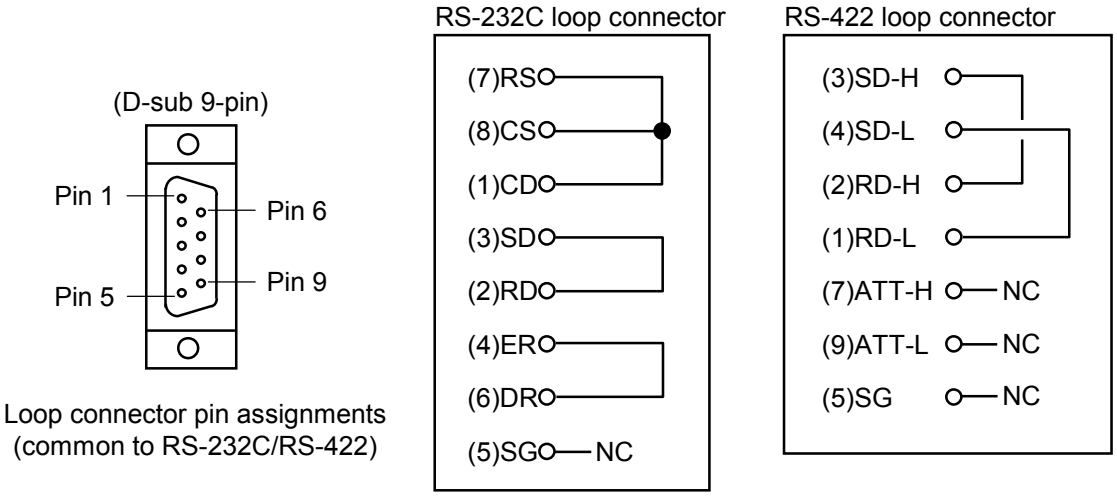


Figure 1-4 Wiring Loop Connectors

1.1.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the LPU module, and then back up (*1) valuable data before proceeding to Steps (1) to (9) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

■ Procedure

You can launch T/M by performing the following procedure:

(1) Make the connections described in 1.1.2, "Wiring instructions," as needed. These connections can be made with the battery connected with the LPU module. However, remember to turn the power "OFF" before making the connections.

(2) Initialize the LPU module's memory by performing the procedure described in 1.1.5, "Initializing the LPU module's memory -- flash memory for storing ladder programs."

(3) With the T/M (rotary) switch of the LPU module (shown in Figure 1-5) set to "8," set the LADDER switch to "RUN." Set the RESET switch to "OFF" at this time.

(4) If you want to make a remote I/O check, set both the remote I/O station module's ST.NO (rotary) switch and the terminal block, according to the information given in Figure 1-6. If not, skip this step.

(5) If you want to make a remote I/O check, turn "ON" the remote I/O station module's power switch. If not, skip this step.

(6) Turn "ON" the power switch on the power module mounted in the LPU module. T/M will then launch. The RUN lamp remains on while T/M is running. Check that the USER and ERR lamps are both "OFF". The USER lamp continues blinking when the power switch is initially "ON". This continuous blinking does not indicate any abnormality.

(7) Test items 7 and 8 are put into operation only when the power switch is turned “OFF” and then back “ON” again. Repeat this “turning the power switch ‘OFF’ and then back ‘ON’ again” action when you want to use these two test items one after the other successively. Check that the operation of T/M neither lights up the USER and ERR lamps nor blinks the USER lamp.

(8) When you want to end the operation of T/M, turn the LPU module’s power switch “OFF” and then restore all the switch settings you have made for the testing to their original conditions.

(9) Initialize the LPU module’s memory by performing the procedure described in 1.1.5, “Initializing the LPU module’s memory -- flash memory for storing ladder programs.” Then, load the backed-up data to the LPU module. (*2)

(*1) This backup operation should be carried out by performing the procedure described in 3.2, “Backup,” of the SOFTWARE MANUAL OPERATION BACKUP RESTORE SYSTEM For Windows® (Manual number SVE-3-127).

(*2) This loading operation should be carried out by performing the procedure described in 3.3, “Restore,” of the SOFTWARE MANUAL OPERATION BACKUP RESTORE SYSTEM For Windows® (Manual number SVE-3-127).

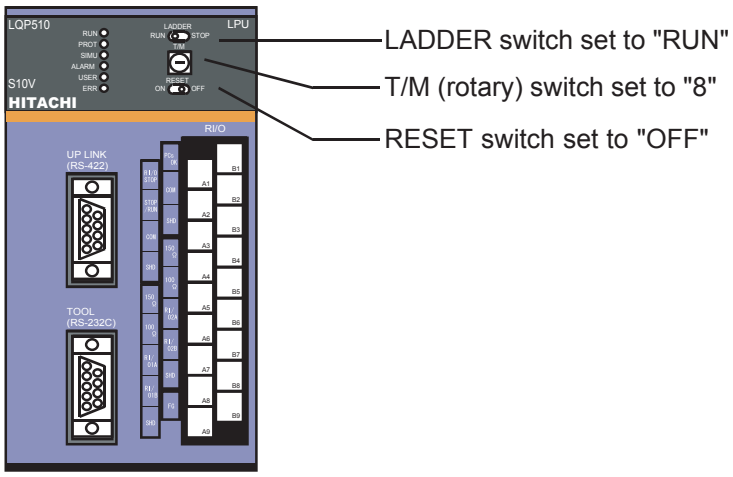
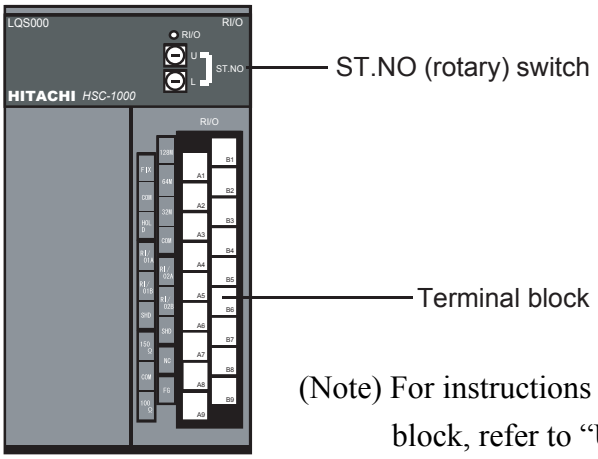


Figure 1-5 Switch Settings for the LPU Module



	ST.NO	
	U	L
I/O unit (1)	0	8
I/O unit (2)	4	0

	Terminal block	
	Number of contacts	Fixed
I/O unit (1)	16	FREE
I/O unit (2)	16	FREE

(Note) For instructions on how to make connections to the terminal block, refer to “USER’S MANUAL BASIC MODULES (Manual number SVE-1-100).”

Figure 1-6 Switch Settings for the Remote I/O Station Module

1.1.4 Identifying errors

If faults are detected as a result of running T/M, the ERR and USER lamps of the LPU module come on, except in the case of test item 4 (“Remote I/O check”). The USER lamp, in particular, come on in the case of test item 7 and blinks in the case of test item 8. To obtain more about the detection result, connect the tool system to the LPU module and launch the basic system before locating the fault on the event register monitor. For instructions on how to connect the tool system and use the basic system, refer to Chapter 6, “TOOLS,” in “USER’S MANUAL BASIC MODULES (Manual number SVE-1-100).”

■ ERR and USER lamps both lit or only USER lamp blinking

Assume that faults have been detected as a result of running test item 1, 2, 3, 5, 6, 7, or 8. Table 1-2 lists the fault locations associated with the indications on the event register monitor of the basic tool.

Note that the ERR and USER lamps always come on after T/M has been run without the RS-232C and RS-422 loop connectors in position. In such case, confirm that test items 1, 2, and 3 ended successfully.

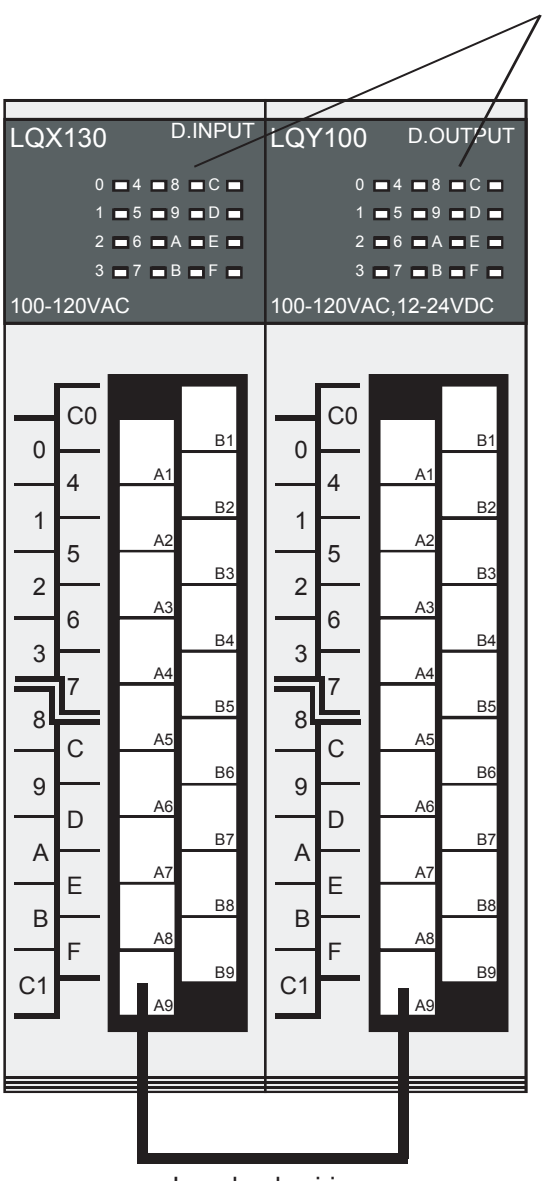
Table 1-2 Correspondence between the Event Registers and Fault Locations

No.	Event register	Error location	Relevant test item
1	E000	Contact fault in ladder serial circuit b	No. 1
2	E001	Contact fault in ladder serial circuit a	No. 1
3	E010	Latch fault in ladder output circuit	No. 1
4	E020	Fault in ladder parallel circuit	No. 1
5	E030	Fault in ladder processor computing function	No. 1
6	E040	Fault in ladder T-coil	No. 1
7	E050	Long-word compare error in SEQ-RAM	No. 2
8	E051	Word compare error in SEQ-RAM	No. 2
9	E052	Long-word compare error in PIO-RAM	No. 3
10	E053	Word compare error in PIO-RAM	No. 3
11	E054	Long-word compare error in backup PIO-RAM	No. 3
12	E055	Word compare error in backup PIO-RAM	No. 3
13	E056	RS-232C receive error (parity, framing, overrun)	No. 5
14	E057	RS-232C compare error	No. 5
15	E058	RS-232C receive timeout error	No. 5
16	E059	RS-422 receive error (parity, framing, overrun)	No. 6
17	E05A	RS-422 compare error	No. 6
18	E05B	RS-422 receive timeout error	No. 6
19	E05C	PI/O backup area compare error	No. 7
20	E05D	PI/O backup area clear error	No. 8

If any of errors 1 to 20 listed above has been detected, the LPU module is faulty.

■ Evaluating the result of the remote I/O check

The ERR and USER lamps of the LPU module do not go on if an error has been detected as a result of running test item 4 (remote I/O check). To determine whether this test ended successfully, check the indicators on the DI/DO modules mounted in each unit. If an indicator does not go on or one remains on, the remote I/O facility is faulty. When this test item ends successfully, the indicators will go on and off alternately in sequence.



Loopback wiring
(For more details, see 1.1.2, "Wiring instructions.")

Observe the indicators on both the DI and DO modules to check the result of the remote I/O check.

Normal: Indicators 0 to F on both the DI and DO modules will go on and off alternately in sequence. Loopback wiring between the DI and DO modules enables indicators at the same positions to go on and off. The indicators continue going on and off until T/M shuts down.

Abnormal: Any indicator on the DI or DO module does not go on at all or one remains on. An indicator on the DI module goes on but the corresponding indicator on the DI module does not.

● Isolating faults

Depending on the status of indicators going on or off, faults can be essentially isolated as follows:

- The indicators on all units do not go on at all.
  ··· LPU module fault
- The indicators on both I/O units (1) and (2) do not go on at all.
  ··· LPU module fault or incorrect remote I/O wiring
- The indicators on either I/O unit do not go on at all.
  ··· LPU module fault, RI/O ST module fault, DO module fault, or incorrect remote I/O wiring
- Some or all indicators on the DO module do not go on at all.
  ··· DO module fault
- Some or all indicators on the DI module do not go on at all.
  ··· DI module fault

Figure 1-7 Determining Whether the Remote I/O Check Ends Normally or Abnormally

1.1.5 Initializing the LPU module's memory -- flash memory for storing ladder programs

The LPU module's memory, which is made up of flash memory and is used to store ladder programs, must be initialized, before and after testing by T/M, by performing the following procedure:

(1) Turn off the power supply module's power switch in the LPU unit.

(2) Set the LPU module's rotary switch in "E" position, and then turn on the power supply module's power switch in the LPU unit. All the six indicators of the LPU module are then lit for one second and go out.

(3) Check that all the six indicators are OFF, and turn off the power supply module's power switch in the LPU unit. Then, set the LPU module's rotary switch in "F" position and turn on the power supply module's power switch in the LPU unit.

(4) All the six indicators of the LPU module will be lit one-by-one, the uppermost indicator being first lit. When the lowermost indicator is lit, the initialization process is completed.

(5) Turn off the power supply module's power switch in the LPU unit, and then set the LPU module's rotary switch back in "0" position.

1.2 CMU Module (LQP520)

1.2.1 T/M diagnostic functions

Table 1-3 gives a summary description of the T/M diagnostic functions used for the CMU module. Launching T/M will run test items 1 to 4.
For instructions on how to run T/M, see 1.2.3, “Launching T/M.”

Table 1-3 T/M Diagnostic Functions Used for the CMU Module

No.	Test item	Diagnostic function	Need for wiring
1	Processor check	Performs arithmetic operations (addition, subtraction, multiplication, and division) and logic operations (AND, OR, NOT, XOR) on the internal processor in the CMU to verify the operation results.	No
2	Dedicated LSI register check	Performs a write operation to a specific register (INITSR), and read and compare operations to verify agreement.	No
3	Flash memory check	Adds up all areas of the program (HKP) stored in flash memory in multiples of 4 bytes, and then compares with the checksum to verify agreement.	No
4	Ethernet LSI check	Verifies successful data transmission and reception using the LSI internal loopback facility.	No

1.2.2 Wiring instructions

No special considerations are needed to run T/M on the CMU module.

1.2.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the CMU module, and then back up valuable data before proceeding to Steps (1) to (3) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Set the T/M (rotary) switch on the CMU module (shown in Figure 1-8) to "F."

(2) Turn "ON" the power switch on the power module mounted in the LPU module. The RUN, PROT, ALARM, USER, and ERR lamps flash while T/M is running.

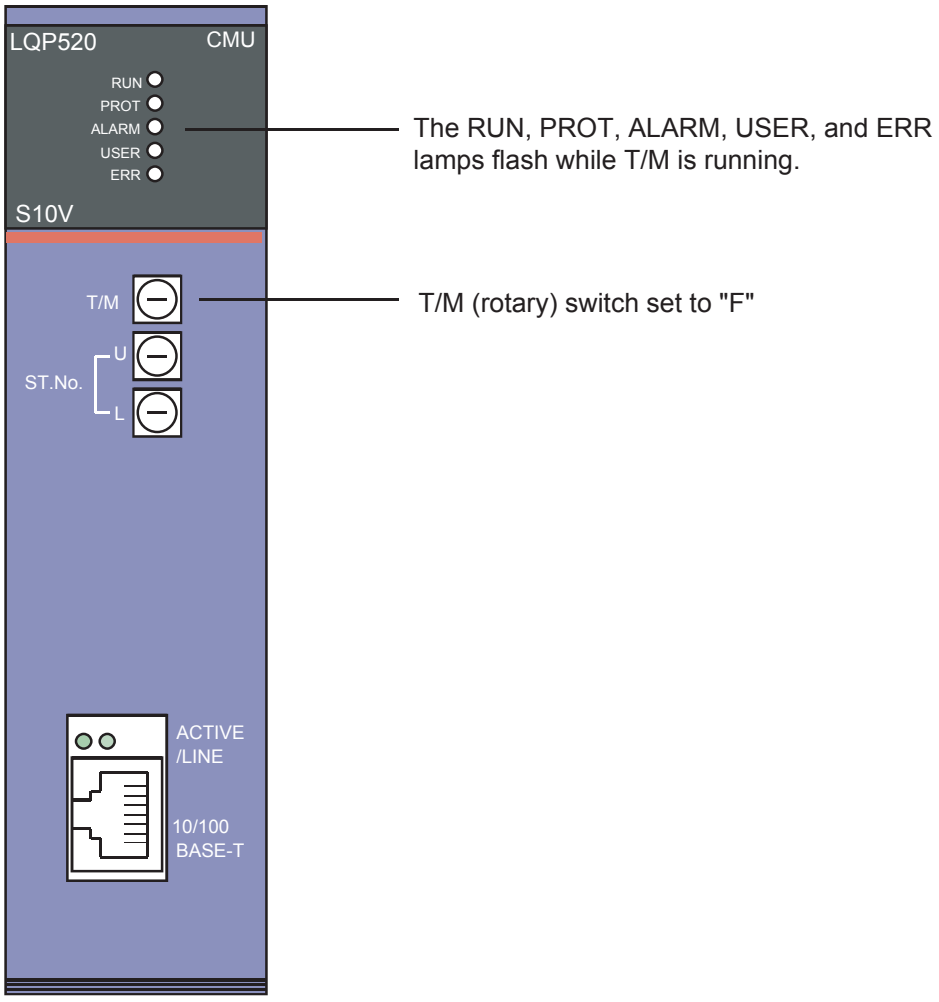


Figure 1-8 Switch Settings for the CMU Module

(3) To shut down T/M, turn "OFF" the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.2.4 Identifying errors

If faults are detected as a result of running T/M, the ERR lamp of the CMU module goes on, but there is no way of knowing the test item for which the CMU module failed.
If the CMU module has failed in any of the T/M test items, a critical failure may have occurred, thus requiring replacement of the CMU module.

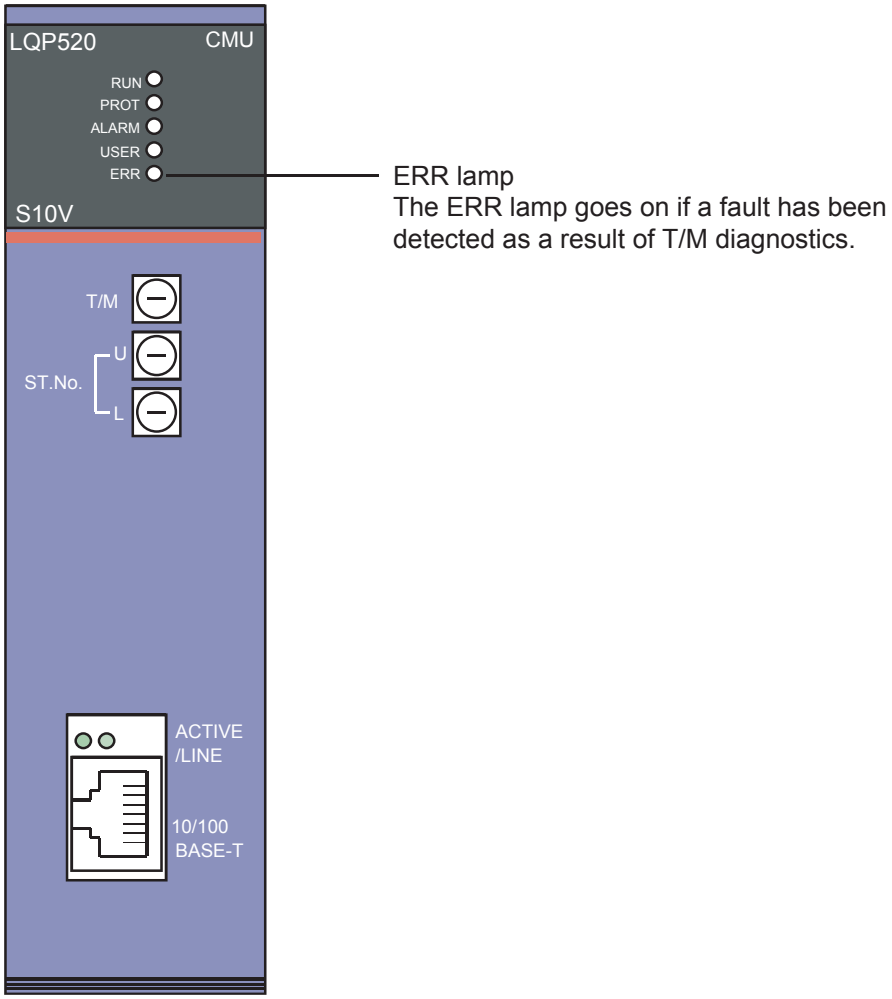


Figure 1-9 ERR Lamp of the CMU Module

1.3 FL.NET Module (LQE500)

T/M cannot be run on the FL.NET module (LQE500).

1.4 OD.RING Module (LQE510, LQE515)

1.4.1 T/M diagnostic functions

Table 1-4 gives a summary description of the T/M diagnostic functions used for the OD.RING module. The three types of T/M available are switch-selectable.
For instructions on how to run T/M, see 1.4.3, “Launching T/M.”

Table 1-4 T/M Diagnostic Functions Used for the OD.RING Module

No.	Test item	Diagnostic function	Need for wiring
1	(T/M1) Internal loopback check	Verifies successful data transmission and reception over both lines of the primary and secondary rings using the LSI internal loopback facility.	No
2	(T/M2) External loopback check	Verifies successful data transmission and reception over both lines of the primary and secondary rings in a module external loopback (looping from optic module transmission to reception).	Yes
3	(T/M3) Inter-module connection check	Verifies successful data transmission and reception over both lines of the primary and secondary rings by running T/M on a regular connection between OD.RING modules.	Yes

(Note) To enable the diagnostic function result of a test item for which the need for wiring is marked “Yes,” wire the relevant units as instructed in 1.4.2, “Wiring instructions,” and then run T/M.

1.4.2 Wiring instructions

■ Wiring required to run the T/M2 external loopback check (No. 2)

Wire the OD.RING module as shown in Figure 1-10. Note that primary ring (PR) transmission and secondary ring (SR) transmission, and primary ring (PR) reception and secondary ring (SR) reception are wired together, each in a loopback connection. Be careful not to wire primary or secondary rings together.

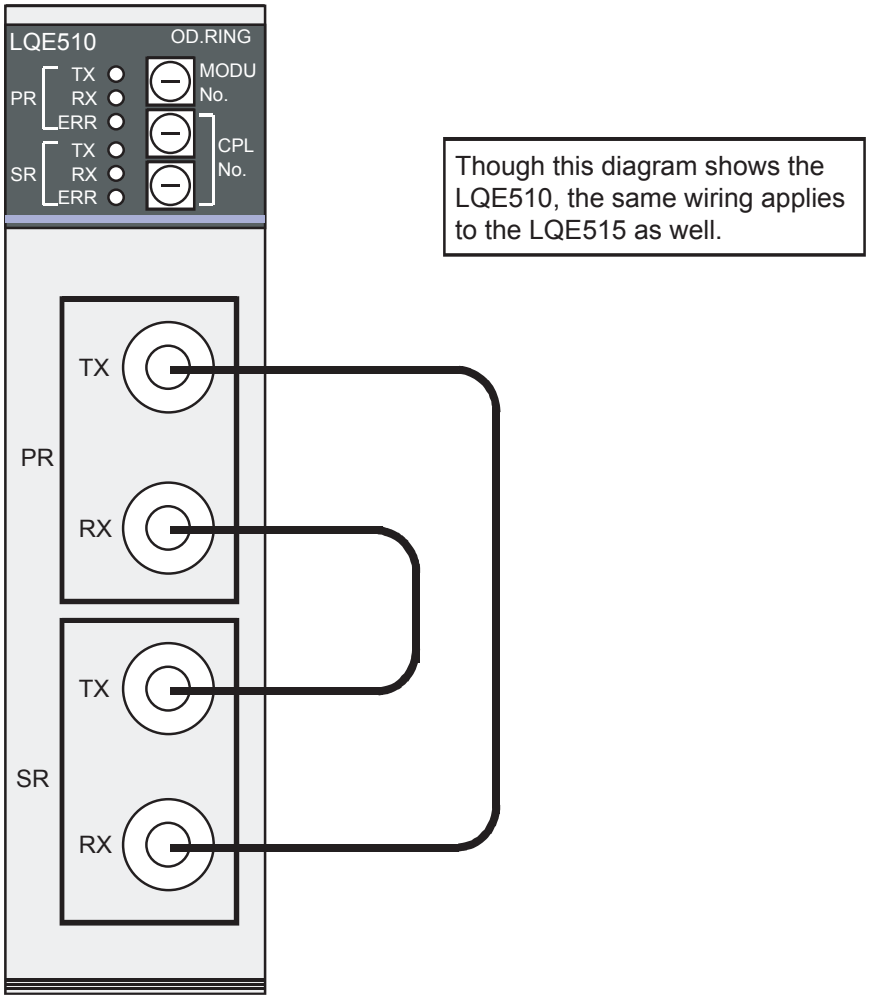


Figure 1-10 Wiring Required to Run the T/M2 External Loopback Check

■ Wiring required to run the T/M3 inter-module connection check (No. 3)

Wire OD.RING modules as shown in Figure 1-11. Complete the wiring within the working specifications. For more details on such limits, refer to Chapter 1, "SPECIFICATIONS," in "USER'S MANUAL OPTION OD.RING (Manual number SVE-1-102)."

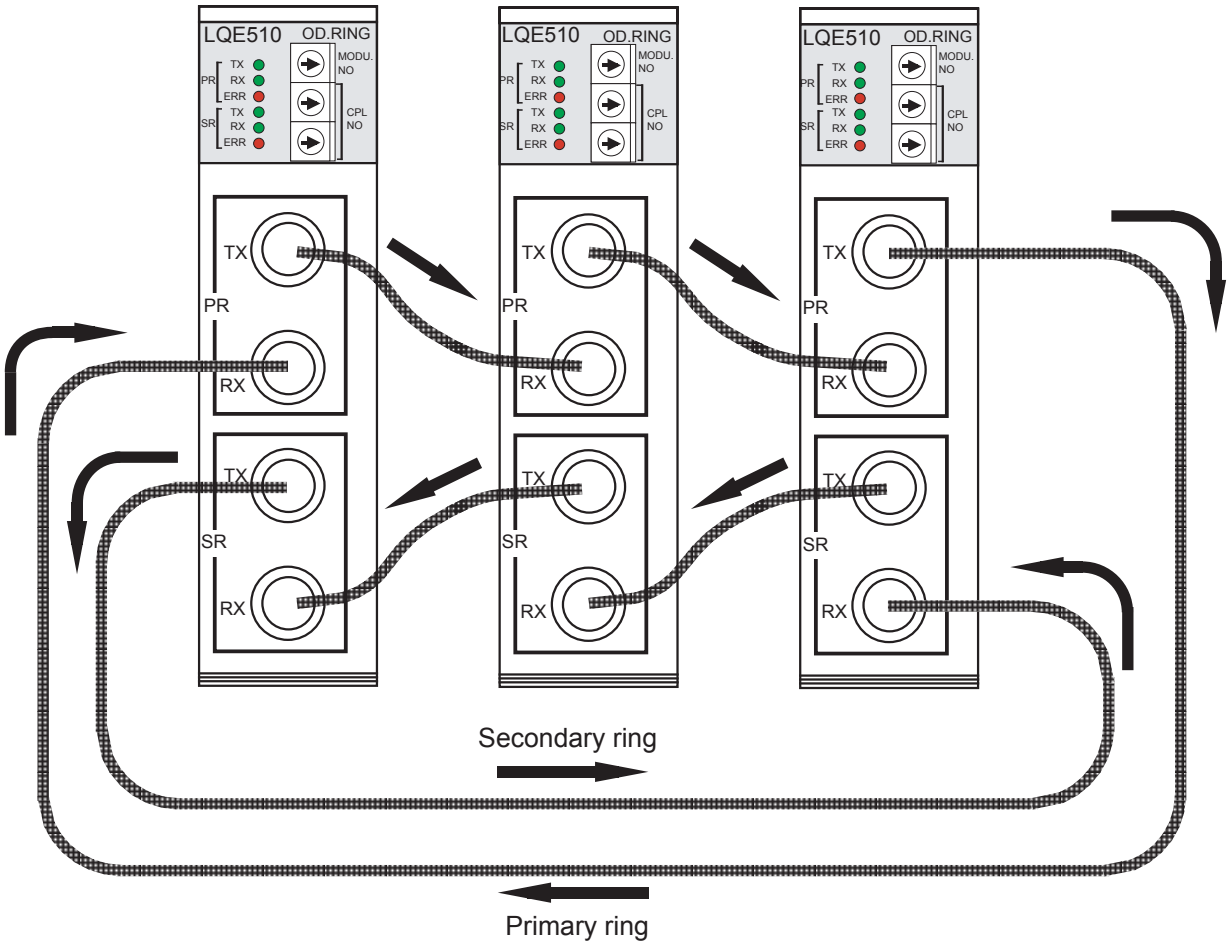


Figure 1-11 Wiring Required to Run the T/M3 Inter-Module Connection Check

1.4.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the OD.RING module, and then back up valuable data before proceeding to Steps (1) to (5) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.4.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Set the MODU No. (rotary) switch on the OD.RING module (shown in Figure 1-12) to select which T/M to run.
Table 1-5 gives the correspondence between the switch positions and T/Ms selected. When running T/M3, set all OD.RING modules that are wired together.

Table 1-5 Correspondence between MODU No. Switch Positions and T/Ms Selected

MODU No.	T/M	Module type
8	T/M1	Main module
9		Submodule
A	T/M2	Main module
B		Submodule
C	T/M3	Main module
D		Submodule

Up to two OD.RING modules can be mounted in the LPU module. Select "8," "A" or "C" for the main module; select "9," "B," or "D" for the submodule.

(3) Set both CPL No. (rotary) switches on the OD.RING module (shown in Figure 1-12) to "0." When selecting T/M3, set these switches to avoid duplicate module connections.

(4) Turn “ON” the power switch on the power module mounted in the LPU module. T/M will then launch.
The TX lamp flashes while T/M1 is running.
The TX and RX lamps flash while T/M2 or T/M3 is running.

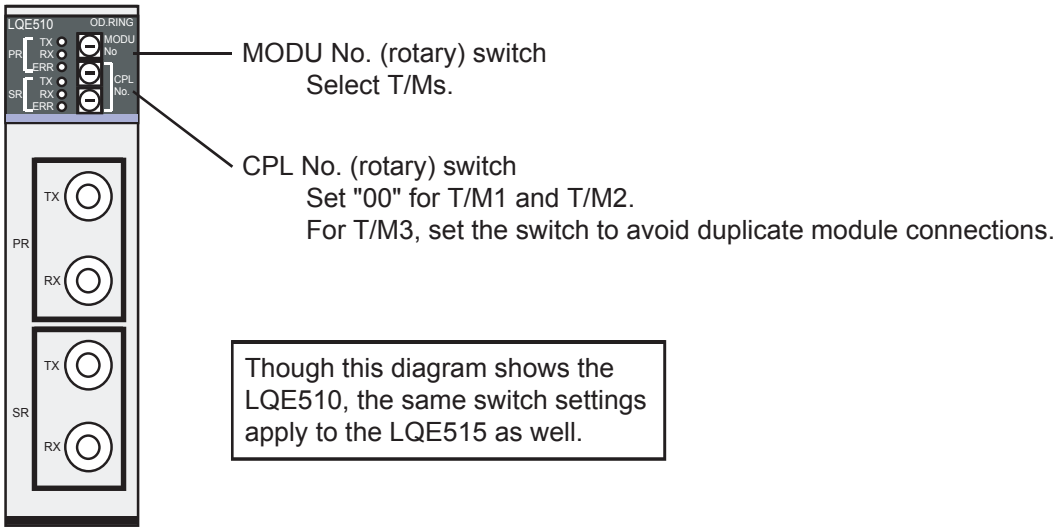


Figure 1-12 Switch Settings for the OD.RING Module

(5) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.4.4 Identifying errors

If faults are detected as a result of running T/M1 to T/M3, the ERR lamp of the OD.RING module goes on.
If the ERR lamp goes on after T/M1 has been run, the module may well have failed, thus requiring replacement.
If the ERR lamp goes on after T/M2 has been run, check whether the optical used for loopback connection is properly connected. When the optical cable is properly connected and T/M1 ends successfully, the optical cable may be faulty or the optic module may have failed. After replacing the optical cable, run T/M2 again. If the ERR lamp goes on again, replace the module.
If the ERR lamp goes on as a result of running T/M3, incorrect wiring, a faulty cable, or a module CPL number defined in duplicate may be the cause. Check the wiring of the module. If no problem is found, connect the tool system to the LPU module whose ERR lamp is on to probe the cause of error.
For instructions on how to connect the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)." For more information about the ERR lamp, refer to Chapter 6, "MAINTENANCE," in "USER'S MANUAL OPTION OD.RING (Manual number SVE-1-102)."

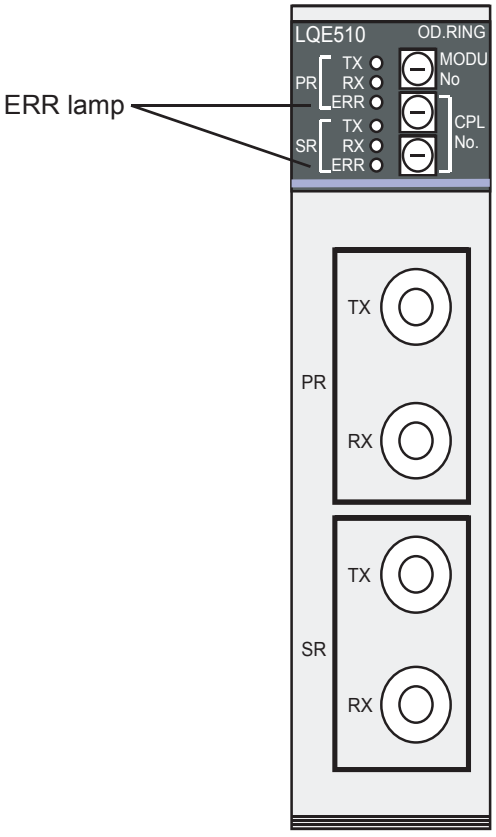


Figure 1-13 ERR Lamp of the OD.RING Module

Table 1-6 Location of Faults Associated with ERR Lamp Lighting, and Corrective Action

T/M	Probable fault location	Corrective action
T/M1	Faulty module	Replace the module.
T/M2	Faulty optical cable Faulty optic module	Replace the cable. Replace the module.
T/M3	Faulty optical cable Improper wiring CPL No. defined in duplicate	Replace the cable. Correct the wiring. Set a unique CPL No.

1.5 ET.NET Module (LQE520)

1.5.1 T/M diagnostic functions

Table 1-7 gives a summary description of the T/M diagnostic functions used for the ET.NET module. Launching T/M will run test items 1 to 3.
For instructions on how to run T/M, see 1.5.3, “Launching T/M.”

Table 1-7 T/M Diagnostic Functions Used for the ET.NET Module

No.	Test item	Diagnostic function	Need for wiring
1	Internal memory compare check	Runs a compare operation in internal memory of the ET.NET module in units of long words, words, and bytes to verify agreement.	No
2	LPU memory compare check	Runs a compare operation in internal memory of the LPU module from the ET.NET module in units of words to verify agreement.	No
3	LPU interrupt check	Issues an interrupt from the ET.NET module to the LPU module to verify successful reception of the interrupt.	No

1.5.2 Wiring instructions

No special considerations are needed to run T/M on the ET.NET module.

1.5.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the ET.NET module, and then back up valuable data before proceeding to Steps (1) to (3) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Use the MODU No. (rotary) switch on the ET.NET module (shown in Figure 1-14) to select the type of module on which to run T/M.
Table 1-8 gives the correspondence between the switch positions and module types selected.

Table 1-8 Correspondence between MODU No. Switch Positions and Module Types Selected

MODU No.	Module type
C or E	Main module
D or F	Submodule

Up to two ET.NET modules can be mounted in the LPU module. Select "C" or "E" for the main module; select "D" or "F" for the submodule.

(2) Turn "ON" the power switch on the power module mounted in the LPU module. T/M will then launch.
The ERR lamp flashes while T/M is running. (The flashing ERR lamp indicates that T/M is running and not that an error occurred.)

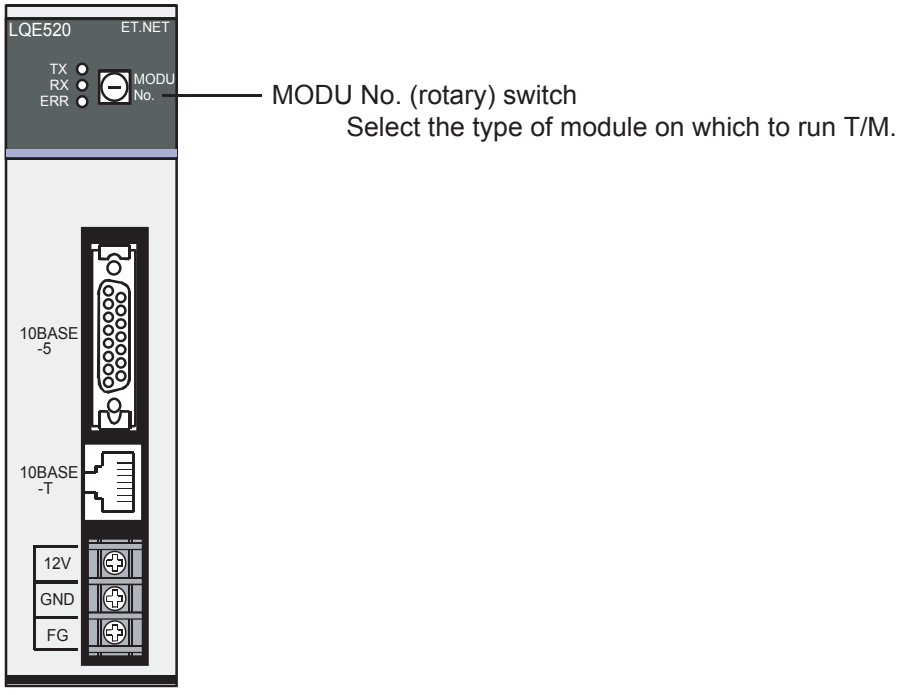


Figure 1-14 Switch Settings for the ET.NET Module

(3) To shut down T/M, turn "OFF" the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.5.4 Identifying errors

If faults are detected as a result of running T/M, the ET.NET module ERR lamp remains on after flashing.
If the ERR lamp goes on as a result of running T/M, replace either the ET.NET module or LPU module because one may be faulty. To isolate the module that failed, connect the tool system to the LPU module to check and evaluate the contents of the addresses listed in Table 1-9.
For more information about the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)."

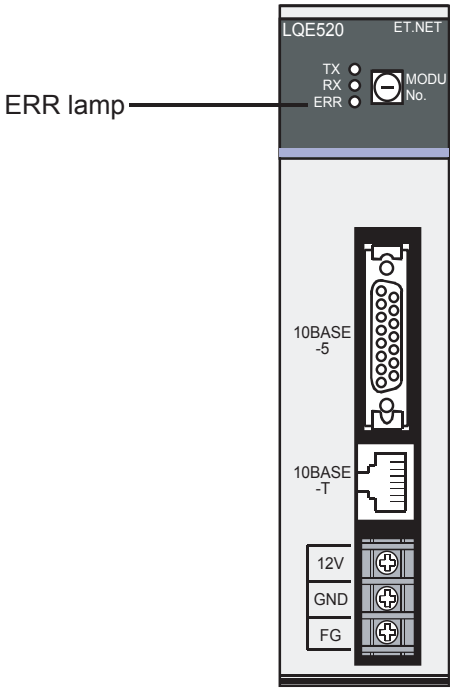


Figure 1-15 ERR Lamp of the ET.NET Module

Table 1-9 Correspondence between the Locations of Faults Isolated by the Tool System, and Corrective Action

Address to reference		Read value and fault location	Corrective action
Main module	Submodule		
/0084080C	/008C080C	/0001 ··· Long-word compare error in internal memory (Test item 1)	Replace the ET.NET module.
		/0002 ··· Word compare error in internal memory (Test item 1)	
		/0003 ··· Byte compare error in internal memory (Test item 1)	
		/0004 ··· Compare error in LPU memory (Test item 2)	Replace either the ET.NET module or the LPU module.
		/0005 ··· Address error at LPU interrupt reception (Test item 3)	

The address value detected a compare error in Test items 1 and 2 can be checked by referencing the four bytes starting from address /00840810 in the main module or from address /008C0810 in the submodule.

1.6 SV.LINK Module (LQE521)

1.6.1 T/M diagnostic functions

Table 1-10 gives a summary description of the T/M diagnostic functions used for the SV.LINK module. Launching T/M will run test items 1 to 3.
For instructions on how to run T/M, see 1.6.3, “Launching T/M.”

Table 1-10 T/M Diagnostic Functions Used for the SV.LINK Module

No.	Test item	Diagnostic function	Need for wiring
1	Internal memory compare check	Runs a compare operation in internal memory of the SV.LINK module in units of long words, words, and bytes to verify agreement.	No
2	LPU memory compare check	Runs a compare operation in internal memory of the LPU module from the SV.LINK module in units of words to verify agreement.	No
3	LPU interrupt check	Issues an interrupt from the SV.LINK module to the LPU module to verify successful reception of the interrupt.	No

1.6.2 Wiring instructions

No special considerations are needed to run T/M on the SV.LINK module.

1.6.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the SV.LINK module, and then back up valuable data before proceeding to Steps (1) to (3) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Use the MODU No. (rotary) switch on the SV.LINK module (shown in Figure 1-16) to select the type of module on which to run T/M.
Table 1-11 gives the correspondence between the switch positions and module types selected.

Table 1-11 Correspondence between MODU No. Switch Positions and Module Types Selected

MODU No.	Module type
C or E	Main module
D or F	Submodule

Up to two SV.LINK modules can be mounted in the LPU module. Select "C" or "E" for the main module; select "D" or "F" for the submodule.

(2) Turn "ON" the power switch on the power module mounted in the LPU module. T/M will then launch.
The ERR lamp flashes while T/M is running. (The flashing ERR lamp indicates that T/M is running and not that an error occurred.)

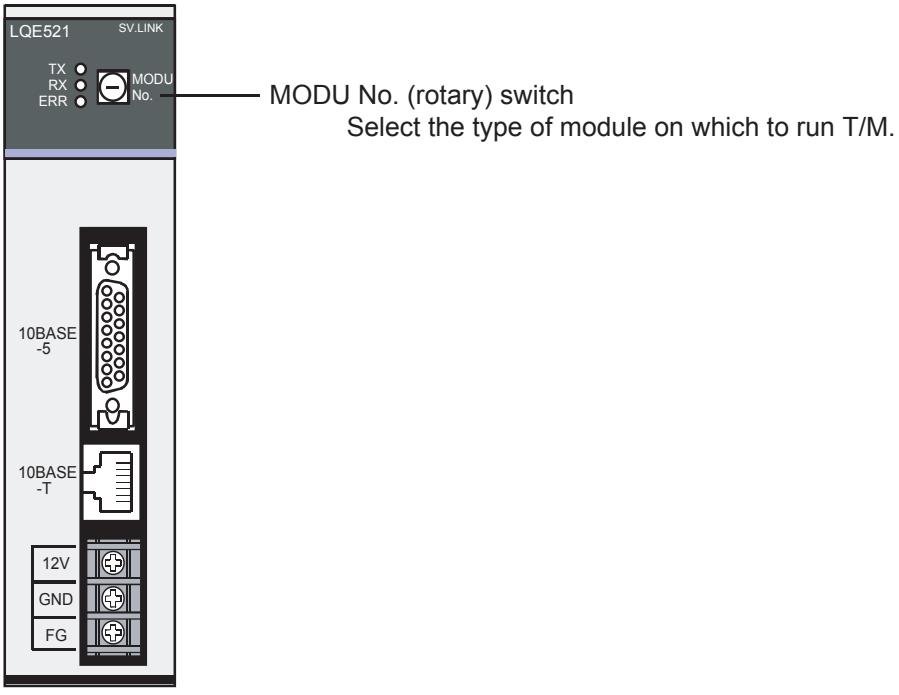


Figure 1-16 Switch Settings for the SV.LINK Module

(3) To shut down T/M, turn "OFF" the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.6.4 Identifying errors

If faults are detected as a result of running T/M, the SV.LINK module ERR lamp remains on after flashing.
If the ERR lamp goes on as a result of running T/M, replace either the SV.LINK module or LPU module because one may be faulty. To isolate the module that failed, connect the tool system to the LPU module to check and evaluate the contents of the addresses listed in Table 1-12.
For more information about the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)."

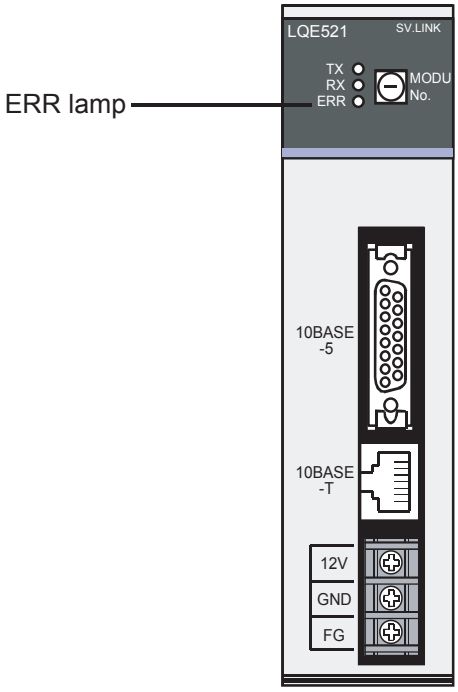


Figure 1-17 ERR Lamp of the SV.LINK Module

Table 1-12 Correspondence between the Locations of Faults Isolated by the Tool System, and Corrective Action

Address to reference		Read value and fault location	Corrective action
Main module	Submodule		
/0084080C	/008C080C	/0001 ··· Long-word compare error in internal memory (Test item 1)	Replace the SV.LINK module.
		/0002 ··· Word compare error in internal memory (Test item 1)	
		/0003 ··· Byte compare error in internal memory (Test item 1)	
		/0004 ··· Compare error in LPU memory (Test item 2)	Replace either the SV.LINK module or the LPU module.
		/0005 ··· Address error at LPU interrupt reception (Test item 3)	

The address value detected a compare error in Test items 1 and 2 can be checked by referencing the four bytes starting from address /00840810 in the main module or from address /008C0810 in the submodule.

1.7 SD.LINK Module (LQE530)

1.7.1 T/M diagnostic functions

Table 1-13 gives a summary description of the T/M diagnostic functions used for the SD.LINK module. The three types of T/M available are switch-selectable.
For instructions on how to run T/M, see 1.7.3, “Launching T/M.”

Table 1-13 T/M Diagnostic Functions Used for the SD.LINK Module

No.	Test item	Diagnostic function	Need for wiring
1	(T/M1) Internal loopback check	Verifies successful data transmission and reception over both lines of the primary and secondary rings using the LSI internal loopback facility.	No
2	(T/M2) External loopback check	Verifies successful data transmission and reception over both lines of the primary and secondary rings in a module external loopback (looping from optic module transmission to reception).	Yes
3	(T/M3) Inter-module connection check	Verifies successful data transmission and reception over both lines of the primary and secondary rings by running T/M on a regular connection between SD.LINK modules.	Yes

(Note) To enable the diagnostic function result of a test item for which the need for wiring is marked “Yes,” wire the relevant units as instructed in 1.7.2, “Wiring instructions,” and then run T/M.

1.7.2 Wiring instructions

■ Wiring required to run the T/M2 external loopback check (No. 2)

Wire the SD.LINK module as shown in Figure 1-18. Note that primary ring (PR) transmission and secondary ring (SR) transmission, and primary ring (PR) reception and secondary ring (SR) reception are wired together, each in a loopback connection. Be careful not to wire primary or secondary rings together.

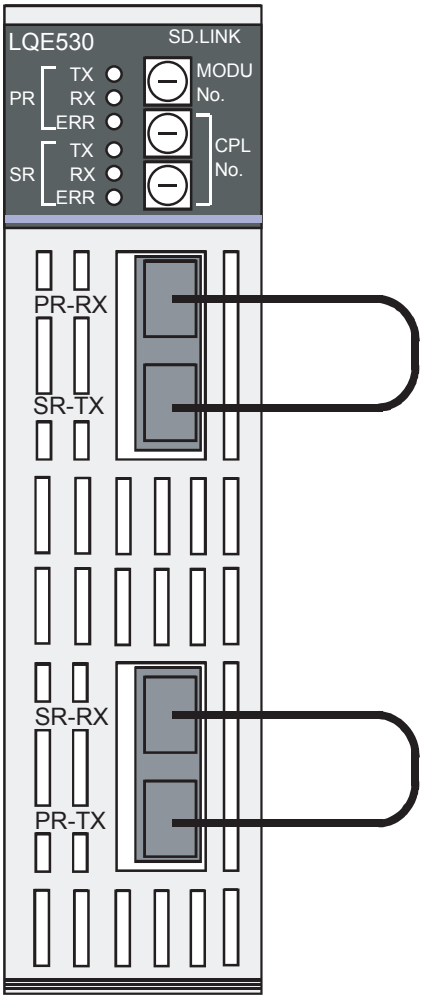


Figure 1-18 Wiring Required to Run the T/M2 External Loopback Check

■ Wiring required to run the T/M3 inter-module connection check (No. 3)

Wire SD.LINK modules as shown in Figure 1-19. Complete the wiring within the working specifications. For more details on such limits, refer to Chapter 1, "SPECIFICATIONS," in "USER'S MANUAL OPTION SD.LINK (Manual number SVE-1-115)."

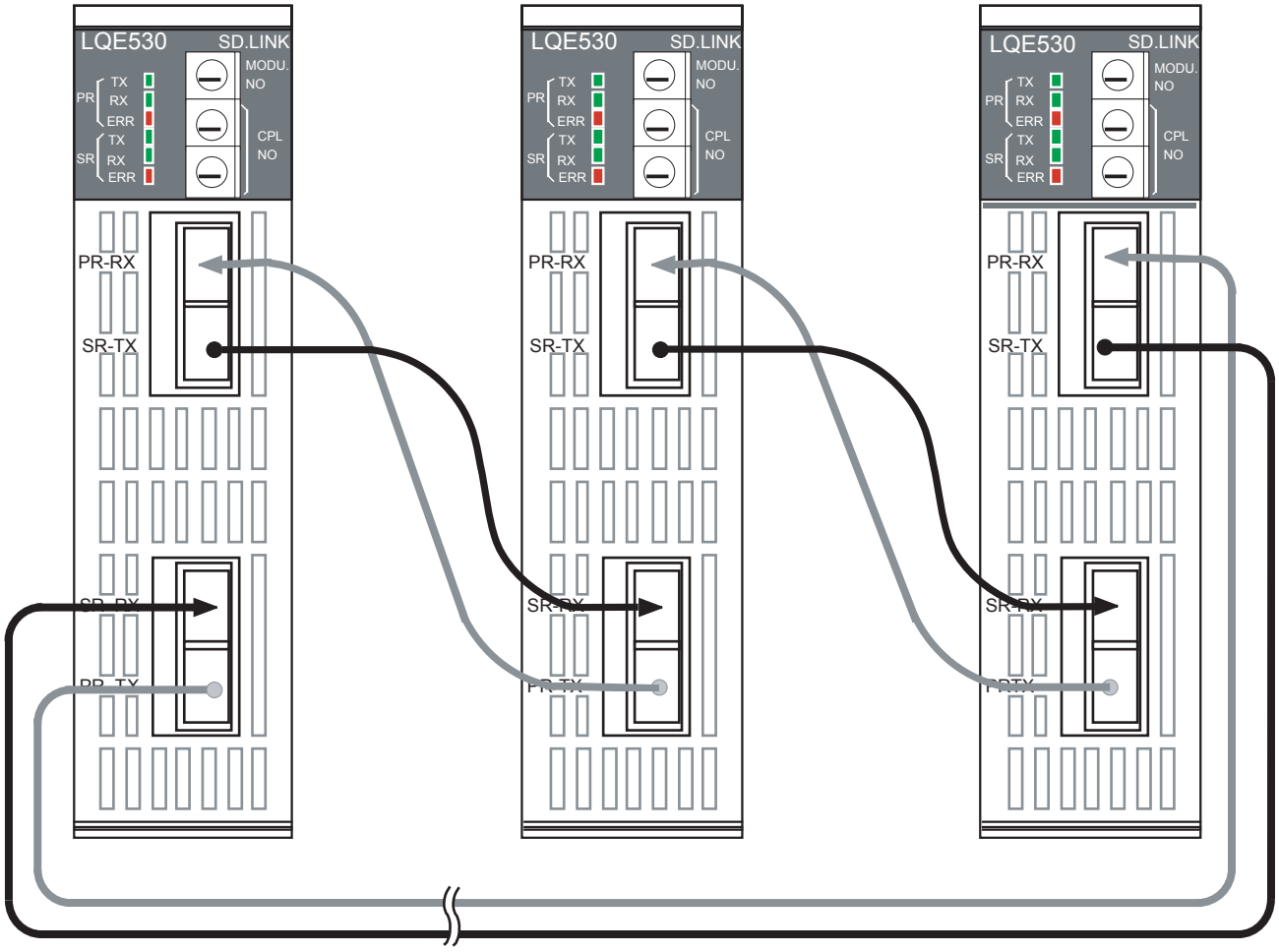


Figure 1-19 Wiring Required to Run the T/M3 Inter-Module Connection Check

1.7.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the SD.LINK module, and then back up valuable data before proceeding to Steps (1) to (5) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.7.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Set the MODU No. (rotary) switch on the SD.LINK module (shown in Figure 1-20) to select which T/M to run.
Table 1-14 gives the correspondence between the switch positions and T/Ms selected. When running T/M3, set all SD.LINK modules that are wired together.

Table 1-14 Correspondence between MODU No. Switch Positions and T/Ms Selected

MODU No.	T/M	Module type
8	T/M1	Main module
9		Submodule
A	T/M2	Main module
B		Submodule
C	T/M3	Main module
D		Submodule

Up to two SD.LINK modules can be mounted in the LPU module. Select "8," "A" or "C" for the main module; select "9," "B," or "D" for the submodule.

(3) Set both CPL No. (rotary) switches on the SD.LINK module (shown in Figure 1-20) to "0." When selecting T/M3, set these switches to avoid duplicate module connections.

(4) Turn ON the power switch on the power module mounted in the LPU module. T/M will then launch.
The TX lamp flashes while T/M1 is running.
The TX and RX lamps flash while T/M2 or T/M3 is running.

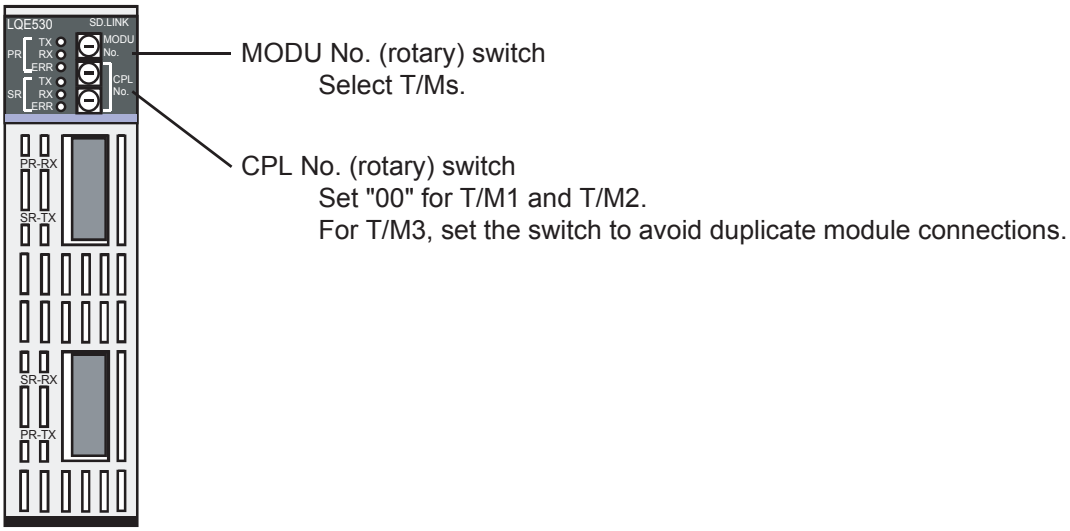


Figure 1-20 Switch Settings for the SD.LINK Module

(5) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.7.4 Identifying errors

If faults are detected as a result of running T/M1 to T/M3, the ERR lamp of the SD.LINK module goes on.
If the ERR lamp goes on after T/M1 has been run, the module may well have failed, thus requiring replacement.
If the ERR lamp goes on after T/M2 has been run, check whether the optical used for loopback connection is properly connected. When the optical cable is properly connected and T/M1 ends successfully, the optical cable may be faulty or the optic module may have failed. After replacing the optical cable, run T/M2 again. If the ERR lamp goes on again, replace the module.
If the ERR lamp goes on as a result of running T/M3, incorrect wiring, a faulty cable, or a module CPL number defined in duplicate may be the cause. Check the wiring of the module. If no problem is found, connect the tool system to the LPU module whose ERR lamp is on to probe the cause of error.
For instructions on how to connect the tool system, refer to Chapter 6, “TOOLS,” in “USER’S MANUAL BASIC MODULES (Manual number SVE-1-100).” For more information about the ERR lamp, refer to Chapter 6, “MAINTENANCE,” in “USER’S MANUAL OPTION SD.LINK (Manual number SVE-1-115).”

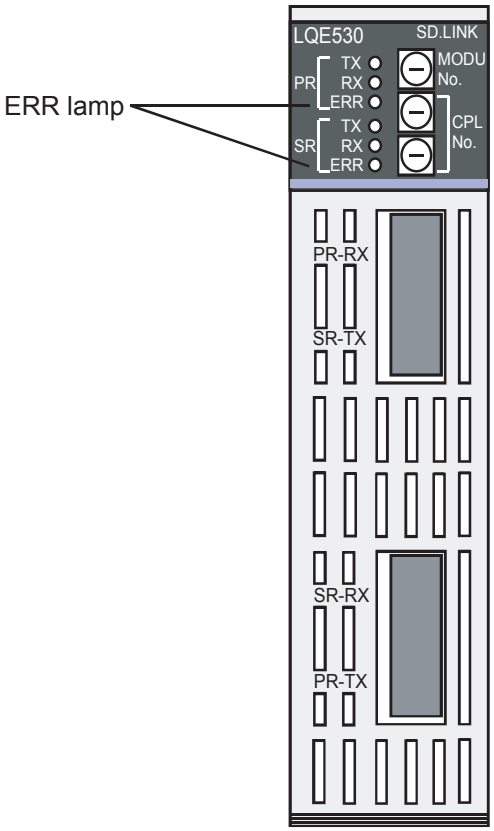


Figure 1-21 ERR Lamp of the SD.LINK Module

Table 1-15 Location of Faults Associated with ERR Lamp Lighting, and Corrective Action

T/M	Probable fault location	Corrective action
T/M1	Faulty module	Replace the module.
T/M2	Faulty optical cable Faulty optic module	Replace the cable. Replace the module.
T/M3	Faulty optical cable Improper wiring CPL No. defined in duplicate	Replace the cable. Correct the wiring. Set a unique CPL No.

1.8 J.NET/J.NET-INT Module (LQE540, LQE545)

1.8.1 T/M diagnostic functions

Table 1-16 gives a summary description of the T/M diagnostic functions used for the J.NET/J.NET-INT module. The eight types of T/M available are switch-selectable.
For instructions on how to run T/M, see 1.8.3, "Launching T/M."

Table 1-16 T/M Diagnostic Functions Used for the J.NET/J.NET-INT Module

No.	Test item	Diagnostic function	Need for wiring
1	Internal loopback check	Verifies successful data transmission and reception using the loopback facility between NET1 and NET2 inside the module.	No
2	Internal memory compare check	Runs a compare operation in internal memory of the J.NET/J.NET-INT module in units of long words, words, and bytes to verify agreement.	No
3	LPU memory compare check	Runs a compare operation in internal memory of the J.NET/J.NET-INT module from the ET.NET module in units of words to verify agreement.	No
4	LPU interrupt check	Issues an interrupt from the J.NET/J.NET-INT module to the LPU module to verify successful reception of the interrupt.	No
5	External loopback check	Verifies successful data transmission and reception using a loopback connection between NET1 and NET2 outside the module (NET1 and NET2 wired to each other).	Yes
6	Combination check	Runs test items No.2 to No.5 in sequence.	Yes
7	Station connection check 1	Connects the J.NET/J.NET-INT module with the J.Station module using NET1 to verify successful data transmission and reception.	Yes
8	Station connection check 2	Connects the J.NET/J.NET-INT module with the J.Station module using NET1 and NET2 to verify successful data transmission and reception.	Yes

(Note) To enable the diagnostic function result of a test item for which the need for wiring is marked "Yes," wire the relevant units as instructed in 1.8.2, "Wiring instructions," and then run T/M.

1.8.2 Wiring instructions

■ Wiring required to run the external loopback checks (Nos. 5 and 6)

Wire the J.NET/J.NET-INT module as shown in Figure 1-22.

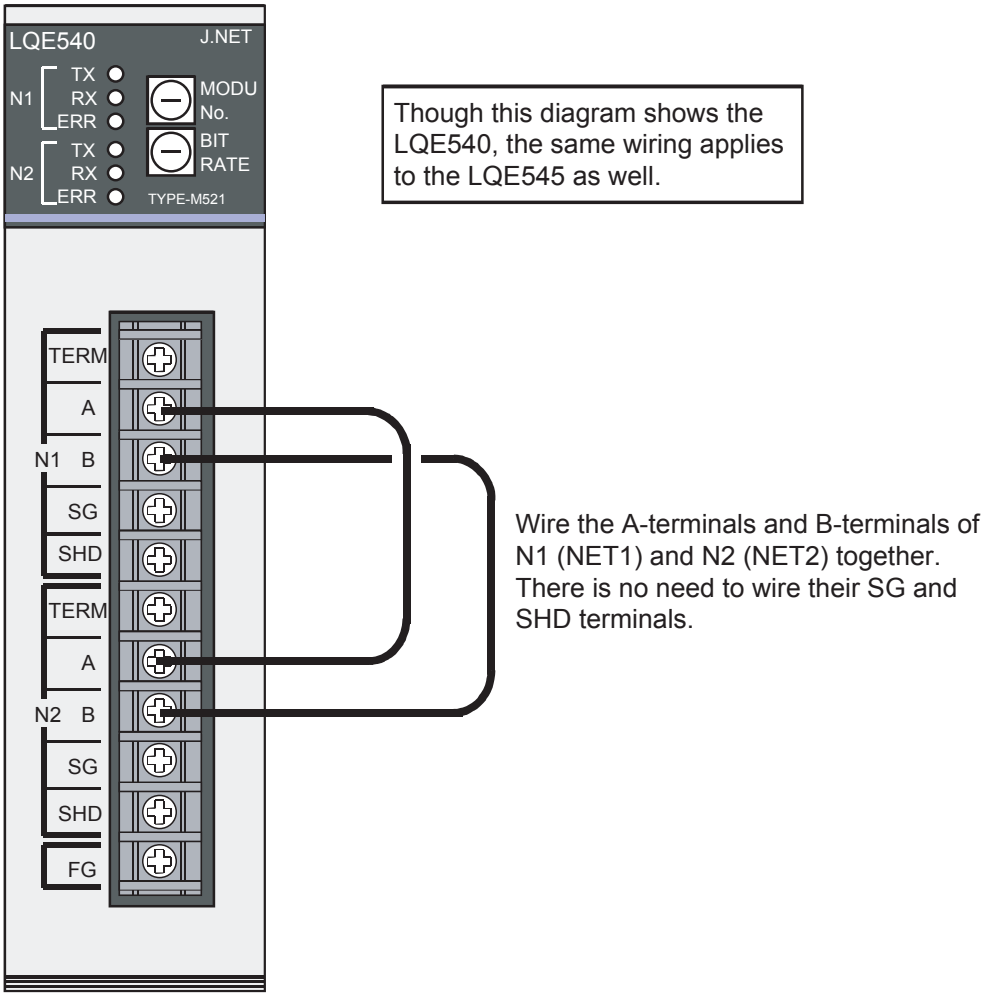
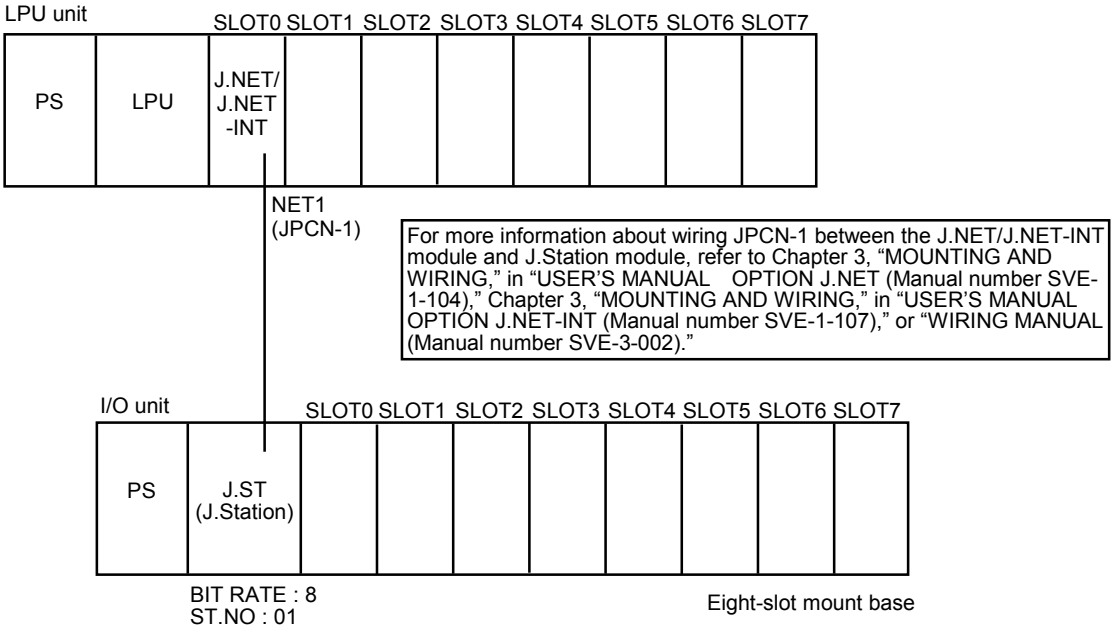


Figure 1-22 Wiring Required to Run the External Loopback Check

■ Wiring required to run station connection check 1 (No. 7)

Wire the J.NET/J.NET-INT module and J.Station module (LQS020) as shown in Figure 1-23. Set the J.Station module to BIT RATE: 8 and ST.NO: 01.



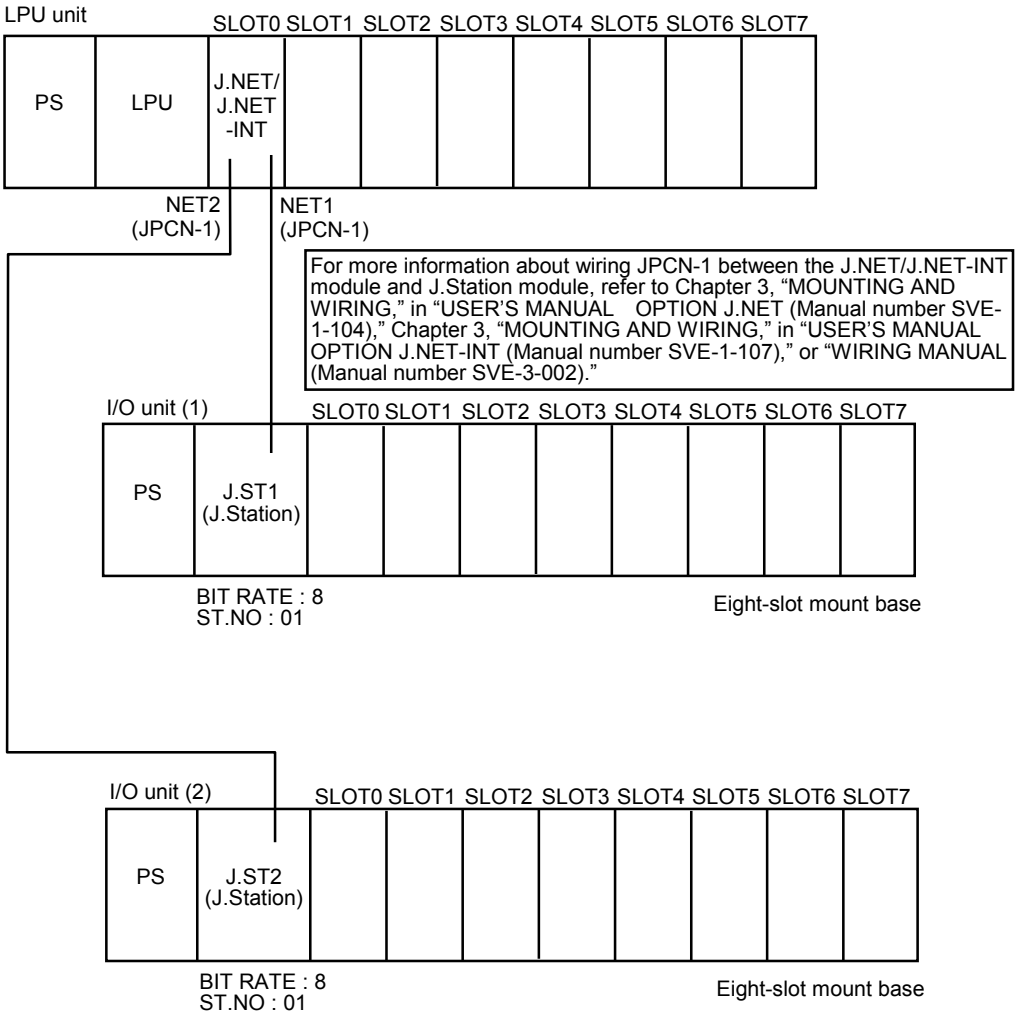
(Note 1) The J.NET/J.NET-INT module is mounted in slot 0 in this diagram, but actually may be safely installed in any slot.

(Note 2) Use an eight-slot mount base for the I/O unit. There is no need to mount an I/O module in the I/O unit. (Test data output will be available when a DO or AO module is mounted.)

Figure 1-23 Wiring Required to Run Station Connection Check 1

■ Wiring required to run station connection check 2 (No. 8)

Wire the J.NET/J.NET-INT module and J.Station module (LQS020) as shown in Figure 1-24. Set the J.Station module to BIT RATE: 8 and ST.NO: 01 for both J.ST1 and J.ST2.



(Note 1) The J.NET/J.NET-INT module is mounted in slot 0 in this diagram, but actually may be safely installed in any slot.

(Note 2) Use an eight-slot mount base for the I/O unit. There is no need to mount an I/O module in the I/O unit. (Test data output will be available when a DO or AO module is mounted.)

Figure 1-24 Wiring Required to Run Station Connection Check 2

1.8.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the J.NET/J.NET-INT module, and then back up valuable data before proceeding to Steps (1) to (4) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.8.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Use the MODU No. (rotary) switch and BIT RATE (rotary) switch on the J.NET/J.NET-INT module (shown in Figure 1-25) to select the type of T/M to run and the type of module on which to run T/M.
Table 1-17 gives the correspondence between the switch positions, and that between the T/M types (test items) selected and module types.

Table 1-17 Correspondence between MODU No. Switch Positions, and between T/M Types (Test Items) Selected and Module Types

MODU No.	BIT RATE	Selected test item	Module type
8	8	No. 1	Main module
9			Submodule
8	9	No. 2	Main module
9			Submodule
8	A	No. 3	Main module
9			Submodule
8	B	No. 4	Main module
9			Submodule
8	C	No. 5	Main module
9			Submodule
8	D	No. 6	Main module
9			Submodule
8	E	No. 7	Main module
9			Submodule
8	F	No. 8	Main module
9			Submodule

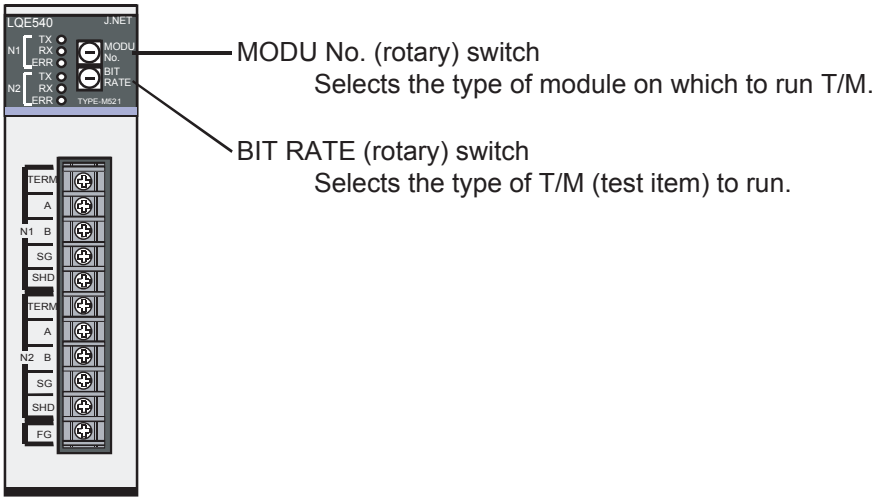


Figure 1-25 Switch Settings for the J.NET/J.NET-INT Module

(3) Turn "ON" the power switch on the power module mounted in the LPU unit. T/M will then launch.
The TX and RX lamps either remain on or flash while T/M is running. Table 1-18 gives the correspondence between the test items and lamp states.

Table 1-18 Correspondence between the T/M Test Items in Progress and Lamp States

Test item	NET1			NET2		
	TX lamp	RX lamp	ERR lamp	TX lamp	RX lamp	ERR lamp
No. 1	On	On	(*1)	On	On	(*1)
No. 2	Off	Flashing	(*1)	Off	Flashing	(*1)
No. 3	Off	On	(*1)	Off	On	(*1)
No. 4	Off	Flashing	(*1)	Off	Flashing	(*1)
No. 5	Flashing (*2)	Flashing (*2)	(*1)	Flashing (*2)	Flashing (*2)	(*1)
No. 6	On	On	(*1)	On	On	(*1)
No. 7	Flashing	Flashing	(*1)	Off	Off	(*1)
No. 8	Flashing	Flashing	(*1)	Flashing	Flashing	(*1)

(*1) The ERR lamps (NET1 and NET2) only go on in case an error occurs.
For more details, see 1.8.4, "Determining errors."
(*2) The NET1/NET2 RX lamps start flashing once T/M launches. The NET1/NET2 RX lamps go on momentarily at 30-second intervals.

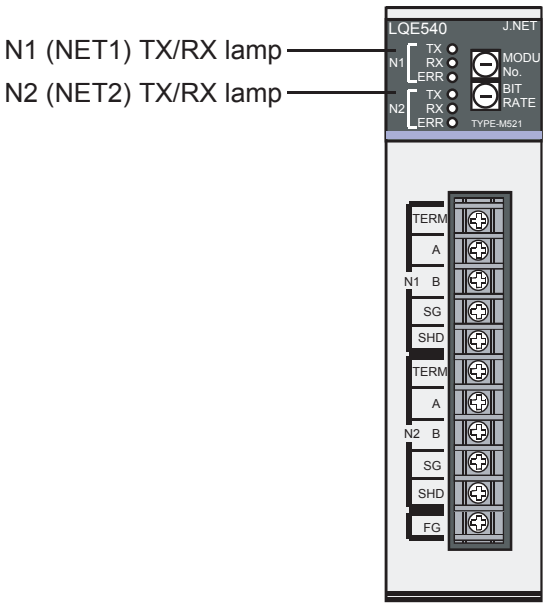


Figure 1-26 TX/RX Lamps of the J.NET/J.NET-INT Module

(4) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU unit.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.8.4 Determining errors

If faults are detected as a result of running T/M, the ERR lamp of the J.NET/J.NET-INT module goes on.
If the ERR lamp goes on after T/M has been run, either the J.NET/J.NET-INT module or the LPU module may be at fault. Replace either module. The method of isolating which module has failed varies with each test item that has been run. See Table 1-19. To find out more, connect the tool system to the LPU unit, and then check and evaluate the contents of the addresses listed in Table 1-20.
For more information about the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)."

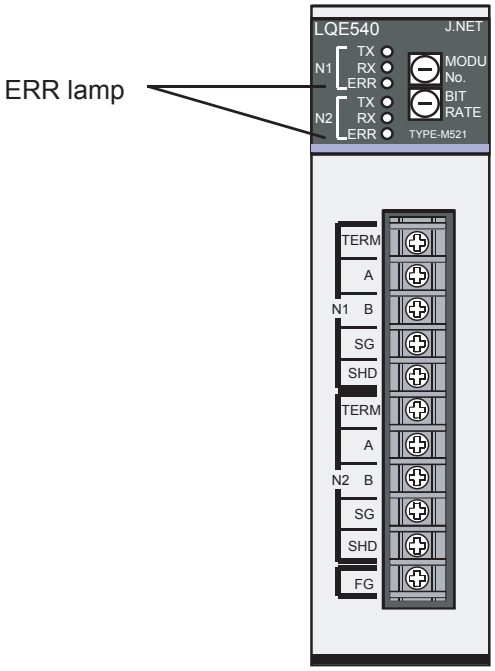


Figure 1-27 ERR Lamp of the J.NET/J.NET-INT Module

Table 1-19 Location of Faults Associated with ERR Lamp Lighting, and Corrective Action

Test item	Probable fault location	Corrective action
No. 1, 2	Faulty module	Replace the module.
No. 3, 4	Faulty module Faulty LPU unit	Replace the module. Replace the LPU unit.
No. 5	Faulty module Improper wiring	Replace the module. Correct the wiring.
No. 6	Faulty module Faulty LPU unit Improper wiring	Replace the module. Replace the LPU unit. Correct the wiring.
No. 7, 8	Faulty module Faulty J.ST module Improper wiring	Replace the module. Replace the J.ST module. Correct the wiring.

Table 1-20 Viewing Detailed Error Information from the Tool System

Address to reference		Detailed error information as read
Main module	Submodule	
/00A40E34	/00AC0E34	NET1 send error count (Test items 1, 5, 6)
/00A40E38	/00AC0E38	NET2 send error count (Test items 1, 5, 6)
/00A40E3C	/00AC0E3C	NET1 receive error count (Test items 1, 5, 6)
/00A40E40	/00AC0E40	NET2 receive error count (Test items 1, 5, 6)
/00A40E44	/00AC0E44	NET1 send error status (Test items 1, 5, 6)
/00A40E46	/00AC0E46	NET2 send error status (Test items 1, 5, 6)
/00A40E48	/00AC0E48	NET1 receive error status (Test items 1, 5, 6)
/00A40E4A	/00AC0E4A	NET2 receive error status (Test items 1, 5, 6)
/00A40E4C	/00AC0E4C	Long-word access check error count in internal RAM (Test items 2, 6)
/00A40E50	/00AC0E50	Word access check error count in internal RAM (Test items 2, 6)
/00A40E54	/00AC0E54	Byte access check error count in internal RAM (Test items 2, 6)
/00A40E58	/00AC0E58	Long-word access write data in internal RAM (Test items 2, 6)
/00A40E5C	/00AC0E5C	Word access write data in internal RAM (Test items 2, 6)
/00A40E5E	/00AC0E5E	Byte access write data in internal RAM (Test items 2, 6)
/00A40E62	/00AC0E62	Word access check error count in LPU memory (Test items 3, 6)
/00A40E64	/00AC0E64	Word access write data in LPU memory (Test items 3, 6)
/00A40E68	/00AC0E68	LPU interrupt check error count (Test items 4, 6)
/00A40E6E	/00AC0E6E	LPU interrupt message data (Test items 4, 6)

1.9 IR.LINK Module (LQE546)

1.9.1 T/M diagnostic functions

Table 1-21 gives a summary description of the T/M diagnostic functions used for the IR.LINK module. The four types of T/M available are switch-selectable.
For instructions on how to run T/M, see 1.9.3, “Launching T/M.”

Table 1-21 T/M Diagnostic Functions Used for the IR.LINK Module

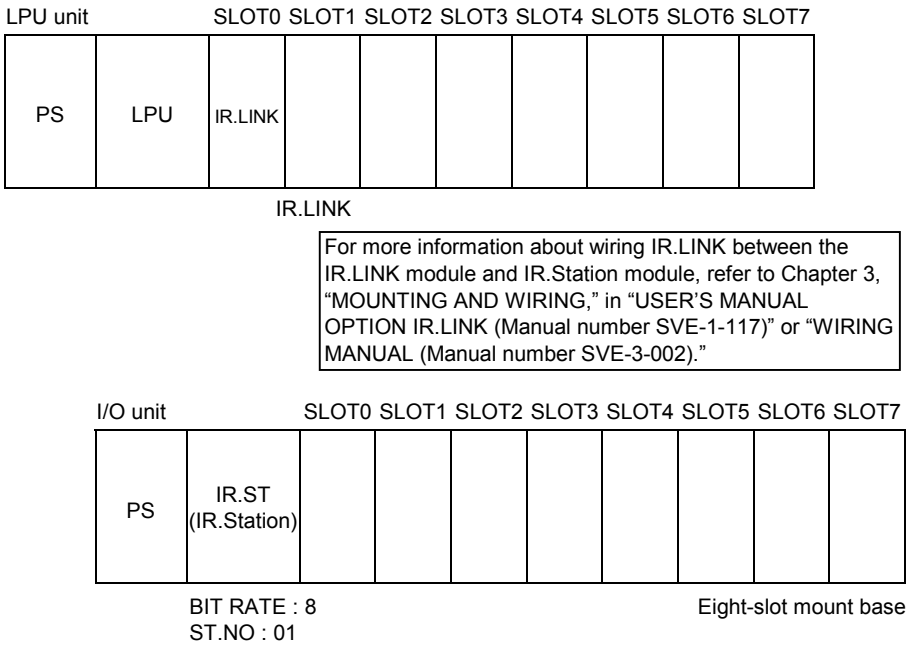
No.	Test item	Diagnostic function	Need for wiring
1	Internal loopback check	Verifies successful data transmission and reception using the loopback facility in the module.	No
2	Internal memory compare check	Runs a compare operation in internal memory of the IR.LINK module in units of long words, words, and bytes to verify agreement.	No
3	LPU memory compare check	Runs a compare operation in internal memory of the LPU unit from the IR.LINK module in units of words to verify agreement.	No
4	Station connection check	Verifies successful data transmission and reception between the IR.LINK module and IR.Station module wired together.	Yes

(Note) To enable the diagnostic function result of a test item for which the need for wiring is marked “Yes,” wire the relevant units as instructed in 1.9.2, “Wiring instructions,” and then run T/M.

1.9.2 Wiring instructions

■ Wiring required to run the station connection check (No. 4)

Wire the IR.LINK module and IR.Station module (LQS021) as shown in Figure 1-28. Set the IR.Station module to BIT RATE: 8 and ST.NO: 01.



(Note 1) The IR.LINK module is mounted in slot 0 in this diagram, but actually may be safely installed in any slot.

(Note 2) Use an eight-slot mount base for the I/O unit. There is no need to mount an I/O module in the I/O unit. (Test data output will be available when a DO or AO module is mounted.)

Figure 1-28 Wiring Required to Run the Station Connection Check

1.9.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the IR.LINK module, and then back up valuable data before proceeding to Steps (1) to (4) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.9.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Use the MODU No. (rotary) switch and BIT RATE (rotary) switch on the IR.LINK module (shown in Figure 1-29) to select the type of T/M to run and the type of module on which to run T/M.
Table 1-22 gives the correspondence between the switch positions, and that between the T/M types (test items) selected and module types.

Table 1-22 Correspondence between MODU No. Switch Positions, and between T/M Types (Test Items) Selected and Module Types

MODU No.	BIT RATE	Selected test item	Module type
8	8	No. 1	Main module
9			Submodule
8	9	No. 2	Main module
9			Submodule
8	A	No. 3	Main module
9			Submodule
8	B	No. 4	Main module
9			Submodule

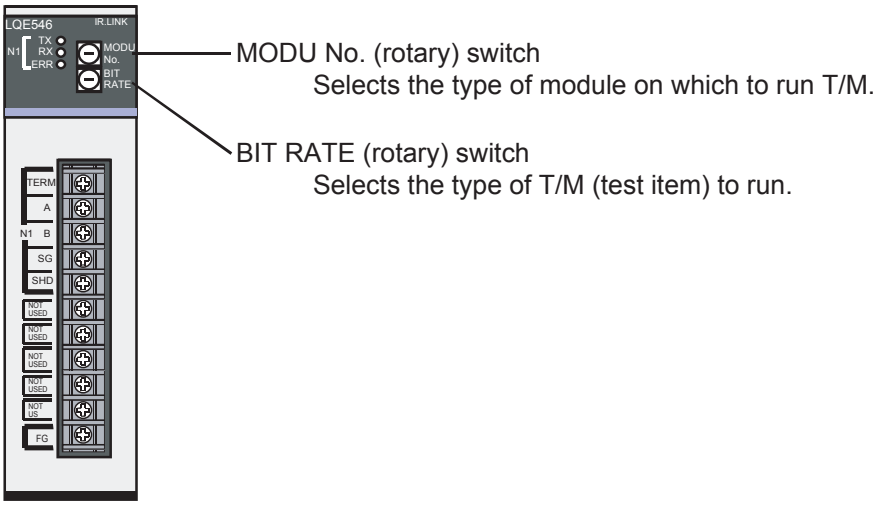


Figure 1-29 Switch Settings for the IR.LINK Module

(3) Turn “ON” the power switch on the power module mounted in the LPU unit. T/M will then launch.
The TX and RX lamps either remain on or flash while T/M is running. Table 1-23 gives the correspondence between the test items and lamp states.

Table 1-23 Correspondence between the T/M Test Items in Progress and Lamp States

Test item	NET1	
	TX lamp	RX lamp
No. 1	On	On
No. 2	Off	Flashing
No. 3	Off	On
No. 4	Flashing	Flashing

(Note) The ERR lamps (NET1) only go on in case an error occurs.
For more details, see 1.9.4, “Determining errors.”

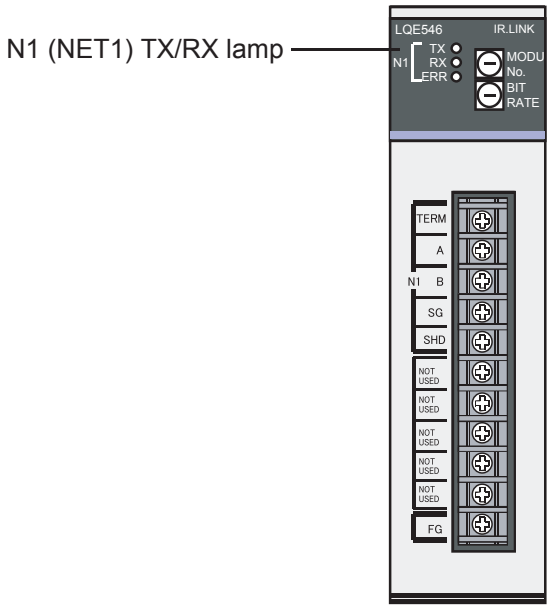


Figure 1-30 TX/RX Lamps of the IR.LINK Module

(4) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU unit.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.9.4 Determining errors

If faults are detected as a result of running T/M, the ERR lamp of the IR.LINK module goes on. If the ERR lamp goes on after T/M has been run, either the IR.LINK module or the LPU module may be at fault. Replace either module. The method of isolating which module has failed varies with each test item that has been run. See Table 1-24. To find out more, connect the tool system to the LPU unit, and then check and evaluate the contents of the addresses listed in Table 1-25. For more information about the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)."

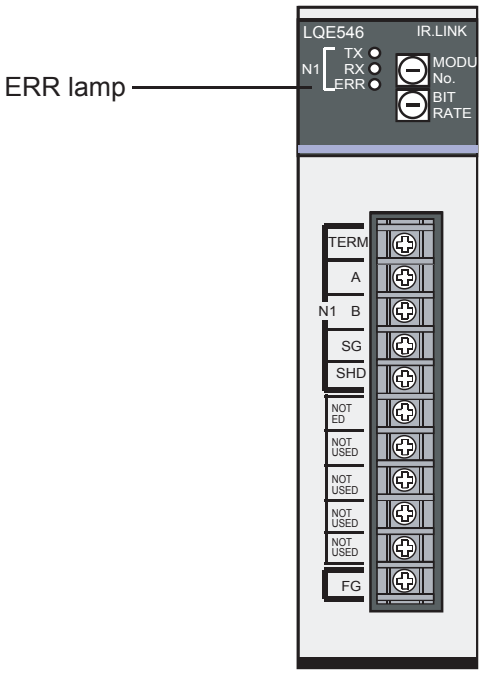


Figure 1-31 ERR Lamp of the IR.LINK Module

Table 1-24 Location of Faults Associated with ERR Lamp Lighting, and Corrective Action

Test item	Probable fault location	Corrective action
No. 1, 2	Faulty module	Replace the module.
No. 3	Faulty module Faulty LPU unit	Replace the module. Replace the LPU unit.
No. 4	Faulty module Faulty IR.Station module Improper wiring	Replace the module. Replace the IR.Station module. Correct the wiring.

Table 1-25 Viewing Detailed Error Information from the Tool System

Address to reference		Detailed error information as read
Main module	Submodule	
/00A40E34	/00AC0E34	NET1 send error count (Test items 1, 4)
/00A40E3C	/00AC0E3C	NET1 receive error count (Test items 1, 4)
/00A40E44	/00AC0E44	NET1 send error status (Test items 1, 4)
/00A40E48	/00AC0E48	NET1 receive error status (Test items 1, 4)
/00A40E4C	/00AC0E4C	Long-word access check error count in internal RAM (Test item 2)
/00A40E50	/00AC0E50	Word access check error count in internal RAM (Test item 2)
/00A40E54	/00AC0E54	Byte access check error count in internal RAM (Test item 2)
/00A40E58	/00AC0E58	Long-word access write data in internal RAM (Test item 2)
/00A40E5C	/00AC0E5C	Word access write data in internal RAM (Test item 2)
/00A40E5E	/00AC0E5E	Byte access write data in internal RAM (Test item 2)
/00A40E62	/00AC0E62	Word access check error count in LPU memory (Test item 3)
/00A40E64	/00AC0E64	Word access write data in LPU memory (Test item 3)

1.10 CPU.LINK Module (LQE550)

1.10.1 T/M diagnostic functions

Table 1-26 gives a summary description of the T/M diagnostic functions used for the CPU.LINK module. Launching T/M will run test items 1 to 3.
For instructions on how to run T/M, see 1.10.3, “Launching T/M.”

Table 1-26 T/M Diagnostic Functions Used for the CPU.LINK Module

No.	Test item	Diagnostic function	Need for wiring
1	Internal memory compare check	Runs a compare operation in internal memory of the CPU.LINK module in units of bytes to verify agreement.	No
2	LPU memory compare check	Runs a compare operation in internal memory of the LPU unit from the CPU.LINK module in units of words to verify agreement.	No
3	Inter-module connection check	Verifies successful data transmission and reception by running T/M on LINK1 via a regular connection wired between the CPU.LINK modules (with LINK2 excluded from the scope of testing).	Yes

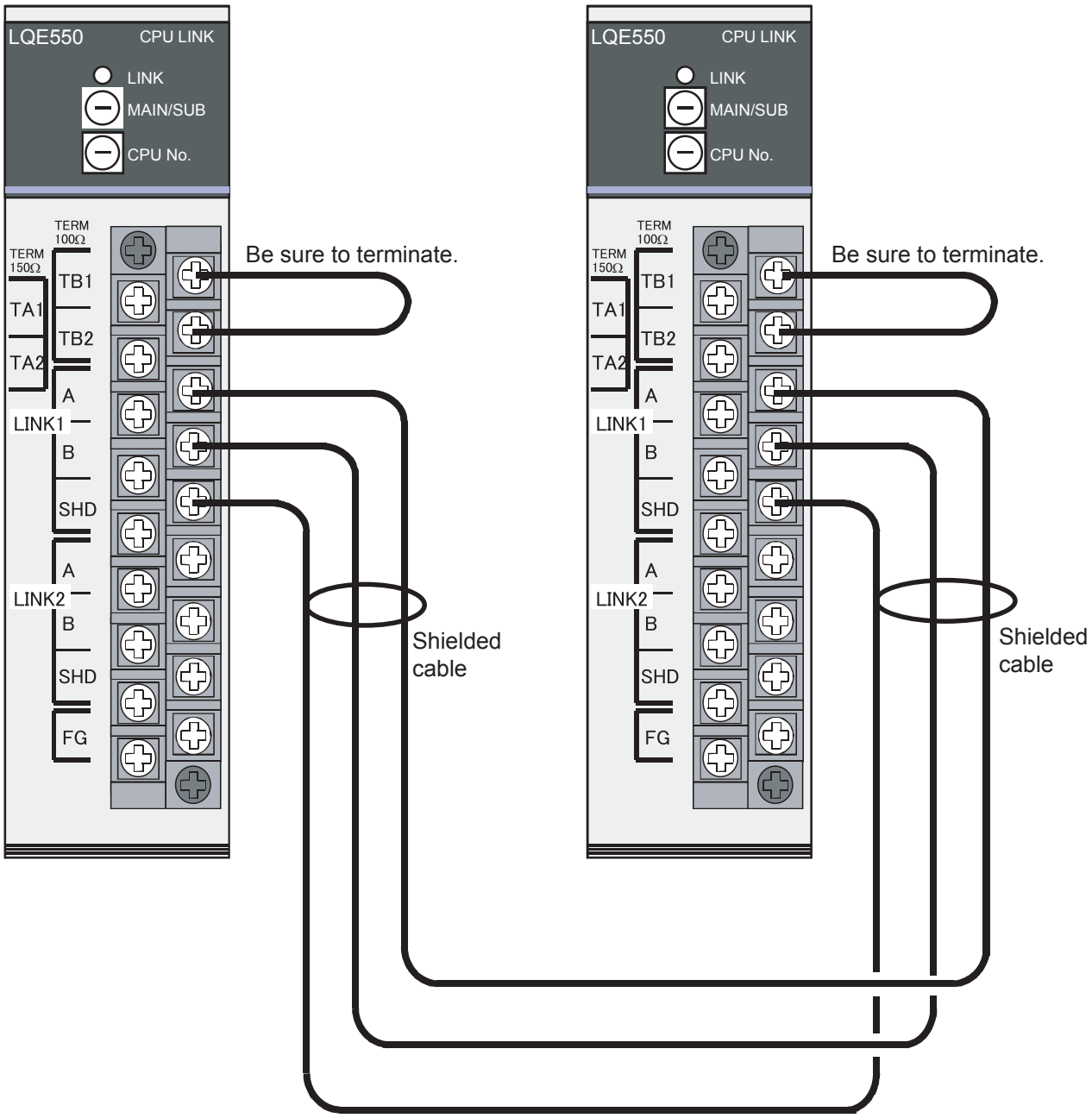
(Note 1) To enable the diagnostic function result of a test item for which the need for wiring is marked “Yes,” wire the relevant units as instructed in 1.10.2, “Wiring instructions,” and then run T/M.

(Note 2) When launched, T/M runs all of test items 1 to 3. Since a diagnostic function result is recorded for each test item run, browse through the results of test item 3 as needed.

1.10.2 Wiring instructions

■ Wiring required to run the inter-module connection check (No. 3)

Wire the CPU.LINK modules as shown in Figure 1-32. Do not connect LINK2 because it is outside the scope of testing.



(Note 1) Termination at 100 Ω is used here, but perform termination suited to the communication cable.

(Note 2) Use a shielded communication cable. Securely connect it to the SHD terminal.

Figure 1-32 Wiring Required to Run the Inter-Modulation Check

1.10.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the CPU.LINK module, and then back up valuable data before proceeding to Steps (1) to (4) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.10.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Select a module type using the MAIN/SUB (rotary) switch on the CPU.LINK module (shown in Figure 1-33). Select a run count using the CPU No. (rotary) switch. Table 1-27 gives the correspondence between the switch positions, and that between the module types selected and run counts.
When test item 3 is enabled, be sure to set both CPU.LINK modules, one of which is the main module and the other the submodule.

Table 1-27 Correspondence between Switch Positions, and between Module Types Selected and Run Counts

MAIN/SUB	CPU No.	Module type	T/M run count
4	0	Main module	Repeat (until errors are detected).
5		Submodule	
4	Other than 0	Main module	Once (for test items 1 to 3).
5		Submodule	

(3) Turn ON the power switch on the power module mounted in the LPU unit. T/M will then launch. The LINK lamp remains on while T/M1 is running.

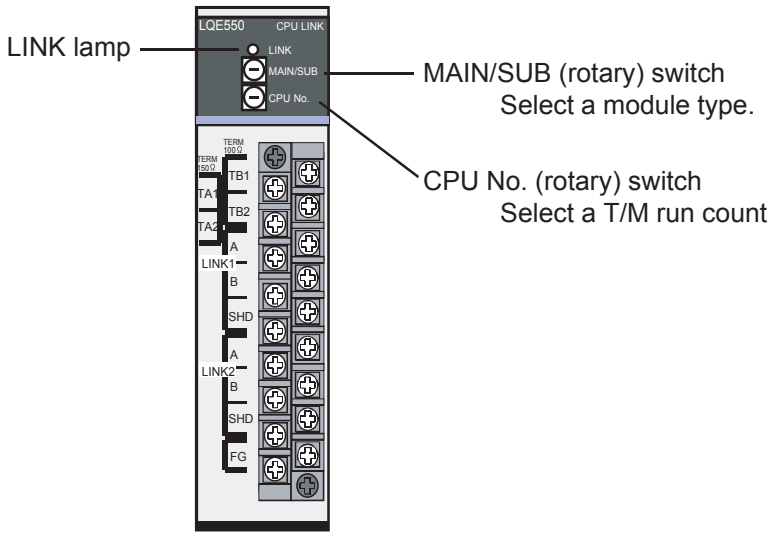


Figure 1-33 Switch Settings for the CPU.LINK Module

(4) To shut down T/M, turn "OFF" the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.10.4 Determining errors

If faults are detected as a result of running T/M with the T/M run count set to “Repeat,” the LINK lamp of the CPU.LINK module goes off. With a T/M run count setting of 1, the LINK lamp goes on while T/M is running, but goes off when running T/M is completed. In this case, there is no way of knowing whether the LINK lamp went off due to the detection of a fault or at the successful ending of T/M. To determine what occurred, connect the tool system to the LPU unit, and then check and evaluate the contents of the addresses listed in Table 1-28.
For more information about the tool system, refer to Chapter 6, “TOOLS,” in “USER’S MANUAL BASIC MODULES (Manual number SVE-1-100).”

Table 1-28 Correspondence between the Locations of Faults Isolated by the Tool System and Corrective Action

Address to reference		Read value and fault location	Corrective action
Main module	Submodule		
/00F0807C	/00F1807C	Byte compare error address in internal memory (Test item 1)	Replace the CPU.LINK module.
/00F08088	/00F18088	Byte compare error data in internal memory (Test item 1)	
/00F08080	/00F18080	Word compare error address in LPU memory (Test item 2)	Replace either the CPU.LINK module or the LPU unit.
/00F0808C	/00F1808C	Word compare error data in LPU memory (Test item 2)	
/00F08084	/00F18084	Send/receive error address (Test item 3)	Replace the CPU.LINK module or correct the wiring.
/00F08090	/00F18090	Send/receive error data (Test item 3)	

1.11 RS-232C/RS-422 Module (LQE560, LQE565)

1.11.1 T/M diagnostic functions

Table 1-29 gives a summary description of the T/M diagnostic functions used for the RS-232C/RS-422 module. Seven types of T/M are available. When launched, T/M proceeds to run test items 1 to 5 and 6, or test items 1 to 5 and 7. Use the rotary switch to select whether to run test item 6 or 7. For instructions on how to launch T/M, see 1.11.3, "Launching T/M."

Table 1-29 T/M Diagnostic Functions Used for the RS-232C/RS-422 Module

No.	Test item	Diagnostic function	Need for wiring
1	Internal memory compare check	Runs a compare operation in internal memory of the RS-232C/RS-422 module in units of long words, words, and bytes to verify agreement.	No
2	LPU memory compare check	Runs a compare operation in internal memory of the LPU unit from the RS-232C/RS-422 module in units of words to verify agreement.	No
3	LPU interrupt check	Issues an interrupt from the RS-232C/RS-422 module to the LPU unit to verify successful reception of the interrupt.	No
4	Timer check	Verifies that the timer in the RS-232C/RS-422 module is counting correctly.	No
5	ATT interrupt check (RS-422 module only)	Generates ATT interrupts periodically from both channels of the RS-422 module. No check is made to determine actual interrupt output.	Yes (external LED)
6	External loopback check 1 (dual-channel opposed loop)	Verifies successful data transmission and reception between the two channels of the RS-232C/RS-422 module connected by cross cables.	Yes
7	External loopback check 2 (channel-specific self loop)	Verifies successful data transmission and reception with a loop connector plugged into each of the two channels of the RS-232C/RS-422 module.	Yes (loop connector)

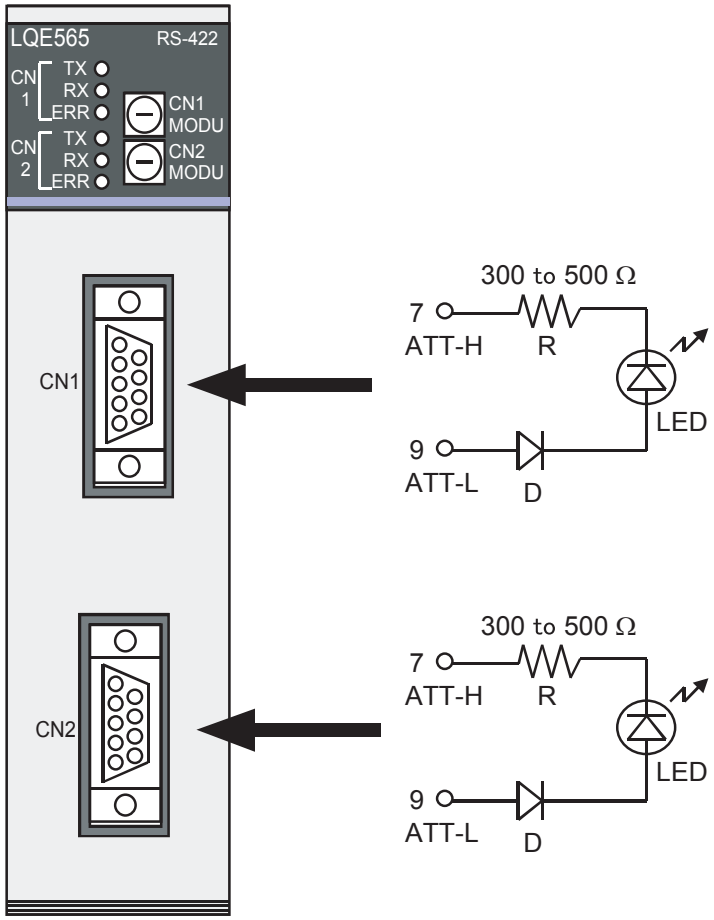
(Note 1) To enable the diagnostic function result of a test item for which the need for wiring is marked "Yes," wire the relevant units as instructed in 1.10.2, "Wiring instructions," and then run T/M.

(Note 2) When launched, T/M runs all of test items 1 to 5 and 6, or 1 to 5 and 7. Since a diagnostic function result is recorded for each test item run, browse through the results of test items 6 or 7 as needed.
The result of test item 5 is not recorded.

1.11.2 Wiring instructions

■ Wiring required to run the ATT interrupt check (No. 5)

Plug an external LED, a diode, and a resistor into each of the two channels of the RS-422 module to monitor ATT interrupt output. The ATT interrupt check is successful when the LED flashes at 0.5-second intervals. Figure 1-34 shows the wiring required to run the ATT interrupt check.



(Note 1) Use an LED with forward voltage of about 1.8 V to 2.2 V, and forward current of 10 mA or less.

(Note 2) When using an LED with withstand reverse voltage of 5 V or less, insert a diode (D) as shown.

(Note 3) When the ATT interrupt is on, ATT-L (9) goes on (3 V to 5 V) with reference to ATT-H (7).

Figure 1-34 Wiring Required to Run the ATT Interrupt Check

■ Wiring required to run external loopback check 1 (No. 6)

Wire the two channels of the RS-232C/RS-422 module together using cross cables (as shown in Figure 1-35). Figure 1-36 shows how to connect cross cables.

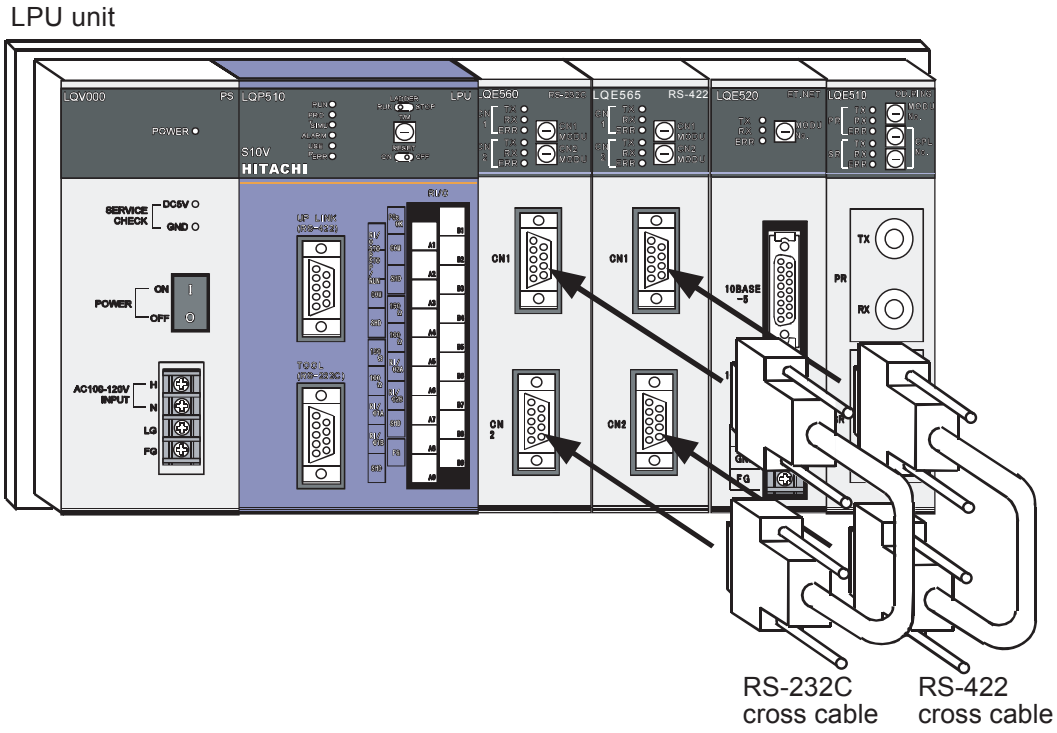


Figure 1-35 Wiring Required to Run External Loopback Check 1

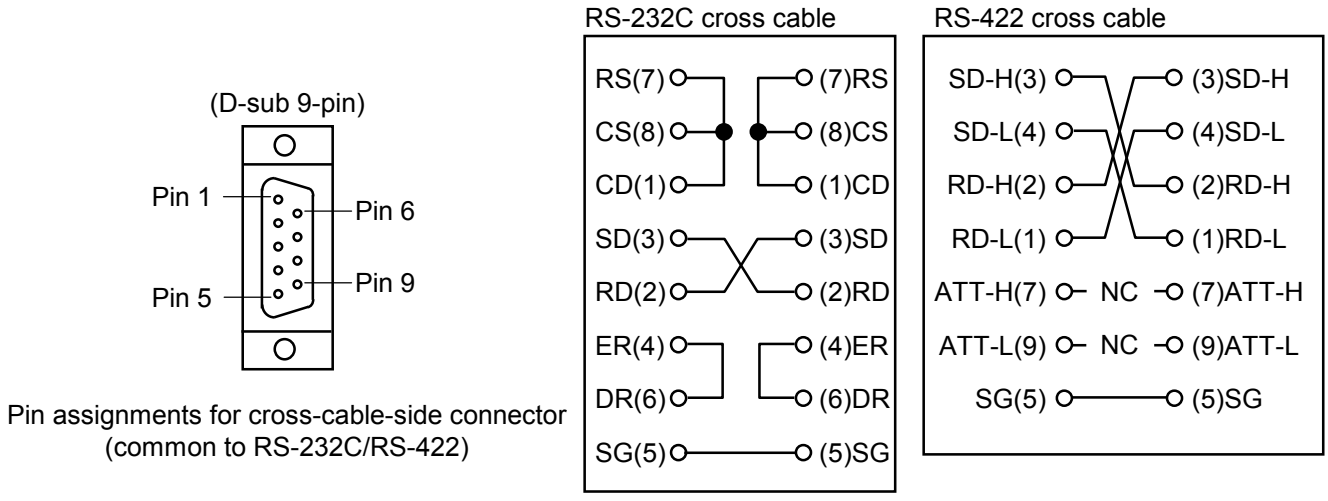


Figure 1-36 Cross-Cable Connections

■ Wiring required to run external loopback check 2 (No. 7)

Plug a loop connector into each of the two channels of the RS-232C/RS-422 module (as shown in Figure 1-37). Figure 1-38 shows how to insert loop connectors.

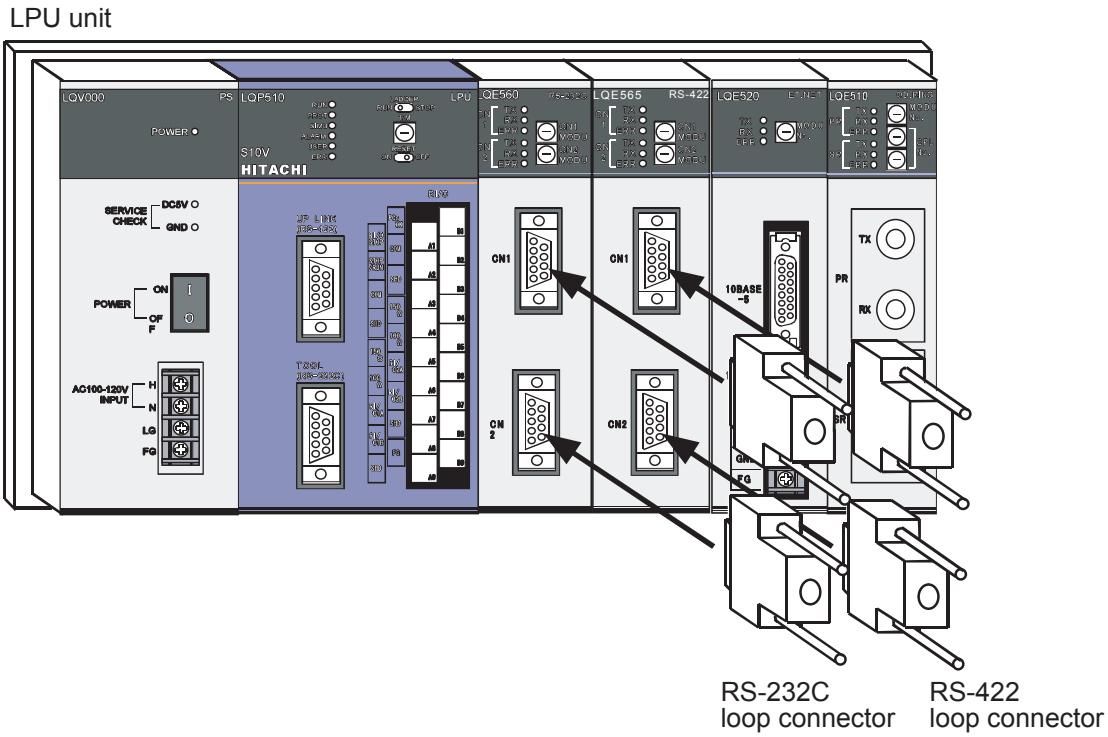


Figure 1-37 Wiring Required to Run External Loopback Check 2

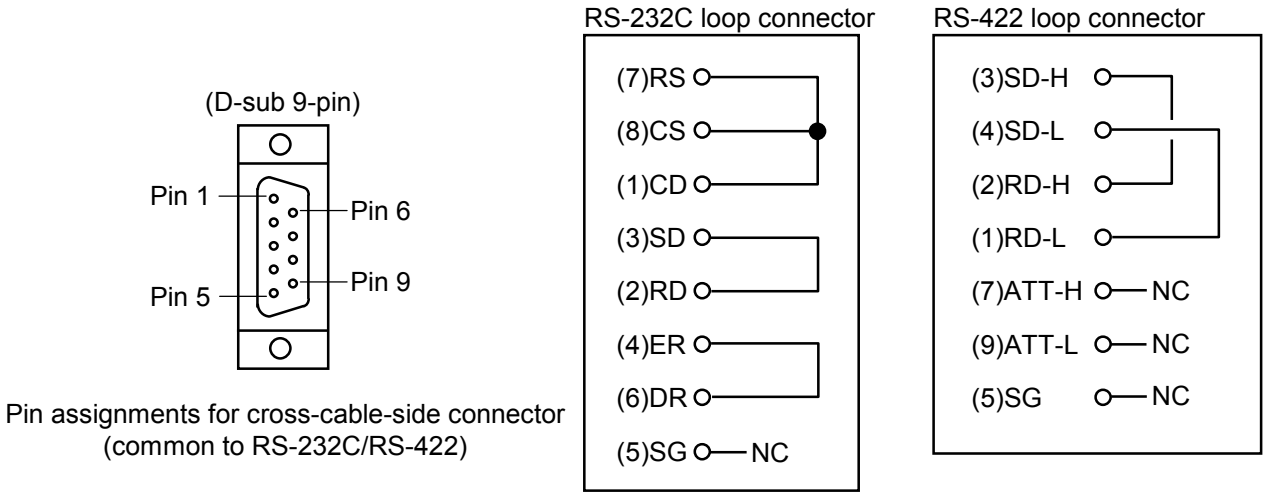


Figure 1-38 Loop Connector Connections

1.11.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the RS-232C/RS-422 module, and then back up valuable data before proceeding to Steps (1) to (4) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.11.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Select a type of module and type of T/M (i.e., type of external loopback check to run) using the CN1 MODU and CN2 MODU (rotary) switches on the RS-232C/RS-422 module (shown in Figure 1-39). Table 1-30 gives the correspondence between the switch positions, and that between the module types selected and T/M types.

Table 1-30 Correspondence between Switch Positions, and between Module Types Selected and T/M Types

CN1 MODU	CN2 MODU	Module type	T/M type (Test items run)
C	D	Main module	Test items 1 to 5 and 6 (dual-channel opposed loop)
E	F	Submodule	
C	F	Main module	Test items 1 to 5 and 7 (channel-specific self loop)
E	D	Submodule	

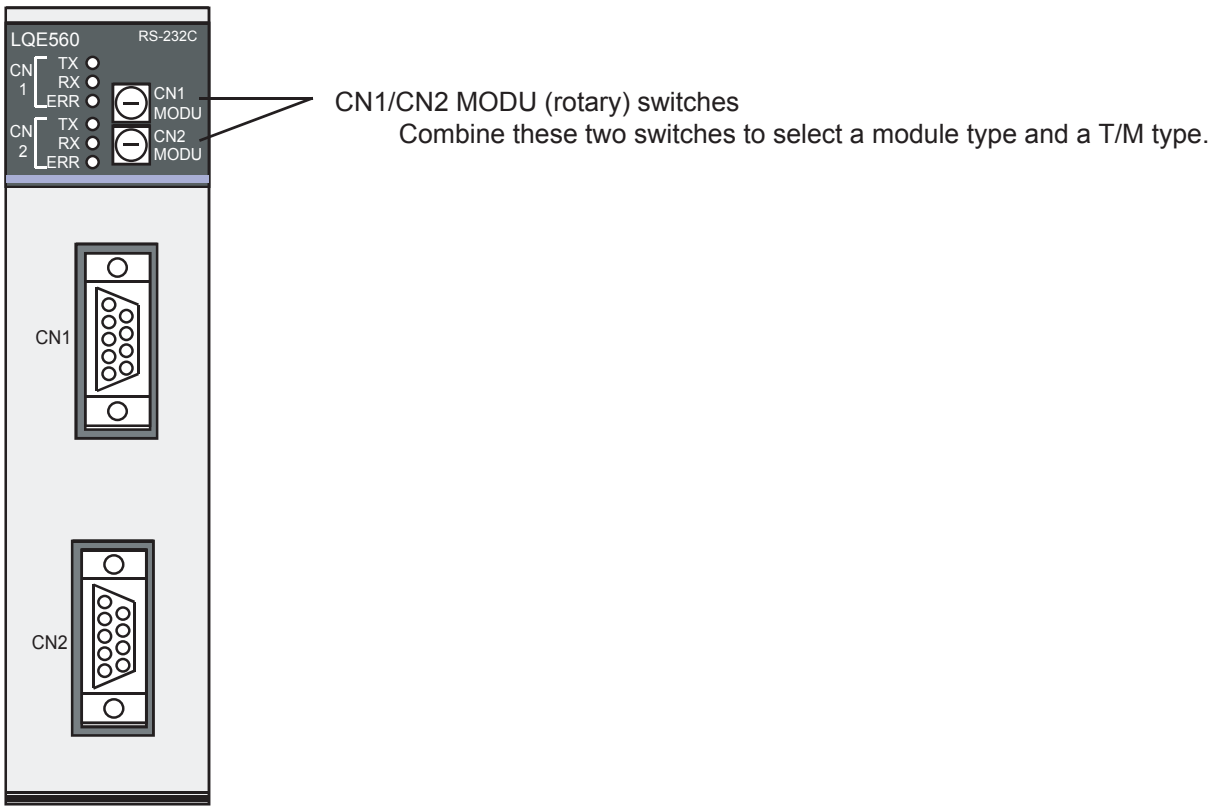


Figure 1-39 RS-232C/RS-422 Module Switch Settings

(3) Turn “ON” the power switch on the power module mounted in the LPU unit. T/M will then launch.
The CN1 and CN2 TX and RX lamps remain on while T/M is running.

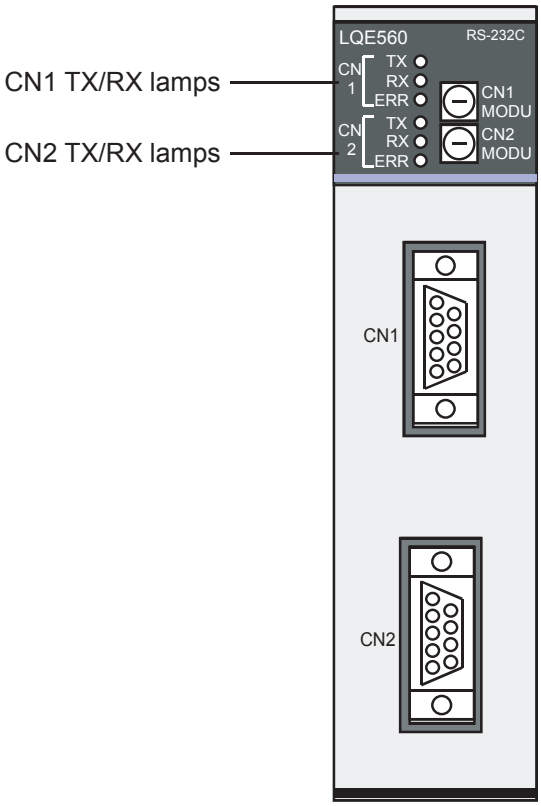


Figure 1-40 RS-232C/RS-422 Module TX/RX Lamps

(4) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.11.4 Determining errors

If faults are detected as a result of running T/M, the RS-232C/RS-422 module ERR lamp goes on. If the ERR lamp goes on as a result of running T/M, replace either the RS-232C/RS-422 module or LPU module because one may be faulty. To isolate the module that failed, connect the tool system to the LPU module, and then check and evaluate the contents of the addresses listed in Table 1-31. For more information about the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)."

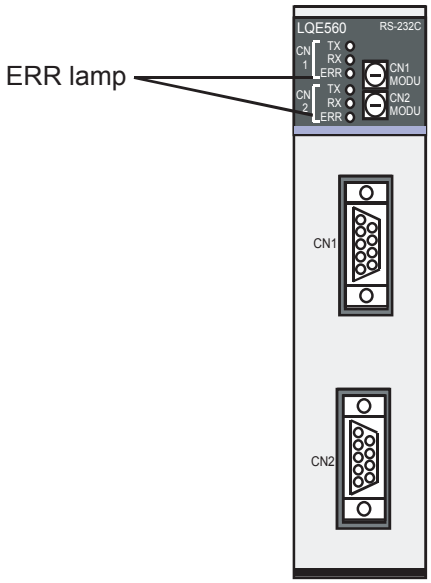


Figure 1-41 ERR Lamp of the RS-232C/RS-422 Module

Table 1-31 Correspondence between the Locations of Faults Isolated by the Tool System and Corrective Action

Address to reference		Probable fault location	Corrective action
Main module	Submodule		
/00F48304	/00F68304	CN1 receive error count (Test item 6 or 7)	Replace the RS-232C/ RS-422 module or replace the cross cable/loop connector.
/00F48308	/00F68308	CN2 receive error count (Test item 6 or 7)	
/00F4830C	/00F6830C	Long-word compare error count in internal memory (Test item 1)	Replace the RS-232C/ RS-422 module.
/00F48310	/00F68310	Word compare error count in internal memory (Test item 1)	
/00F48314	/00F68314	Bye compare error count in internal memory (Test item 1)	
/00F48322	/00F68322	Word compare error count in LPU memory (Test item 2)	Replace the RS-232C/ RS-422 module or replace the LPU module.
/00F48328	/00F68328	LPU interrupt check error count (Test item 3)	

(Note) If all error counts listed in Tabled 1-31 read "0" while the ERR lamp of the RS-232C/RS-422 module is on, an error may have been encountered while running test item 4 (timer check). Check error log information in the LPU module. For more information about the tool system, refer to Chapter 6, "TOOLS," in "USER'S MANUAL BASIC MODULES (Manual number SVE-1-100)."

Table 1-32 Viewing Detailed Error Information from the Tool System

Address to reference		Detailed error information as read
Main module	Submodule	
/00F48318	/00F68318	Long-word compare error data in internal memory (Test item 1)
/00F4831C	/00F6831C	Word compare error data in internal memory (Test item 1)
/00F4831E	/00F6831E	Byte compare error data in internal memory (Test item 1)
/00F48324	/00F68324	Word compare error data in LPU memory (Test item 2)

1.12 D.NET Module (LQE570, LQE575)

1.12.1 T/M diagnostic functions

Table 1-33 gives a summary description of the T/M diagnostic functions used for the D.NET module. T/M simply verifies the communication between D.NET modules. At least two D.NET modules are required to run this T/M. For instructions on how to launch T/M, see 1.12.3, "Launching T/M."

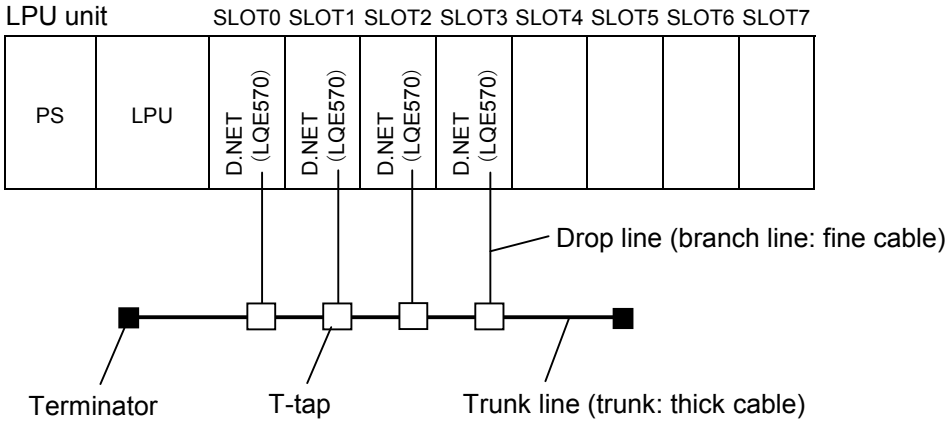
Table 1-33 T/M Diagnostic Functions Used for the D.NET Module

No.	Test item	Diagnostic function	Need for wiring
1	Inter-module connection check	Verifies successful data transmission and reception over a DeviceNet line that interconnects two to four D.NET modules.	Yes

(Note) This T/M requires wiring to interconnect modules. Wire modules as described in 1.12.2, "Wiring instructions," before launching T/M.

1.12.2 Wiring instructions

Wire the D.NET modules as shown in Figures 1-42 and 1-43. At least two D.NET modules are required to run this T/M. Up to four modules can be wired together. No external power supply is required when all four modules under testing are the LQE570 (see Figure 1-42). However, an external power supply unit is required when the LQE575 is included among the modules under testing (see Figure 1-43).



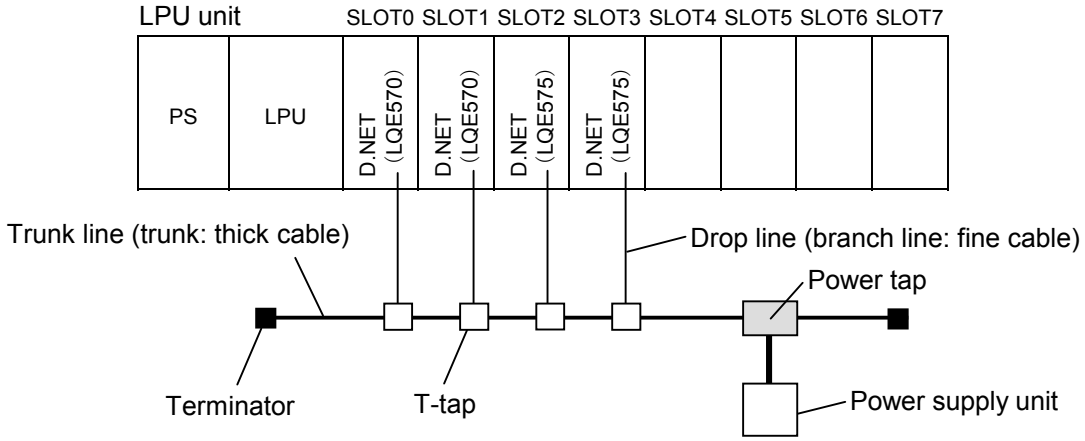
For more information about DeviceNet wiring between the D.NET modules, refer to Chapter 3, "MOUNTING AND WIRING," in "USER'S MANUAL OPTION D.NET (Manual number SVE-1-106)" or "WIRING MANUAL (Manual number SVE-3-002)."

(Note 1) In this diagram, four D.NET (LQE570) module units are mounted, though only two or three can be safely mounted.

(Note 2) The D.NET modules are mounted in slots 0 to 3 in this diagram, but actually may be safely installed in any slot.

(Note 3) No external power supply is required when all D.NET modules under testing are the LQE570.

Figure 1-42 Wiring Required for Testing a Group of Modules that Consist Solely of the LQE570



For more information about DeviceNet wiring between the D.NET modules, refer to Chapter 3, "MOUNTING AND WIRING," in "USER'S MANUAL OPTION D.NET (Manual number SVE-1-106)" or "WIRING MANUAL (Manual number SVE-3-002)."

(Note 1) In this diagram, four D.NET (LQE570 or LQE575) module units are mounted, though only two or three can be safely mounted.

(Note 2) The D.NET modules are mounted in slots 0 to 3 in this diagram, but actually may be safely installed in any slot.

(Note 3) An external power supply unit is required when the LQE575 is included among the D.NET modules under testing.

Figure 1-43 Wiring Required when Including the LQE575 Among Modules Under Testing

1.12.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the D.NET module, and then back up valuable data before proceeding to Steps (1) to (4) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.12.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Select a T/M mode and a T/M module type using the NA, DR, and MODU No. (rotary) switches on the D.NET module (shown in Figure 1-44).
Table 1-34 gives the correspondence between the switch positions and module types selected.

Table 1-34 Correspondence between Switch Positions and Module Types Selected

MODU No.	NA U/L	DR	Module type
8	0/0	0	Module 0 (channel 0)
9	0/1	0	Module 1 (channel 1)
A	0/2	0	Module 2 (channel 2)
B	0/3	0	Module 3 (channel 3)

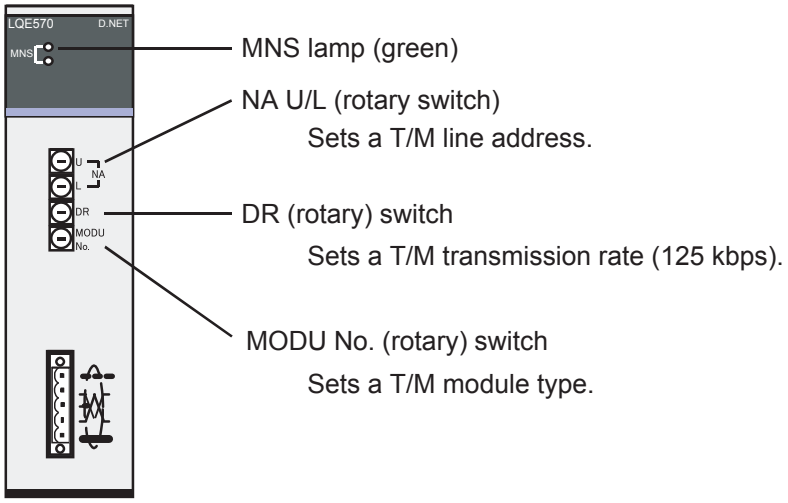


Figure 1-44 D.NET Module Switch Settings

(3) Turn “ON” the power switch on the power module mounted in the LPU unit. T/M will then launch.
The MNS lamp (green) on each D.NET module mounted remains on while T/M is running.

(4) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.12.4 Determining errors

Even if an error is detected by running T/M, the MNS lamp remains unchanged. Be sure to connect the tool system to the LPU unit, and then check and evaluate error log information. Whenever T/M detects an error in a module, the occurrence of said error and the module number are displayed.
For more information about the tool system, refer to Chapter 6, “TOOLS,” in “USER’S MANUAL BASIC MODULES (Manual number SVE-1-100).”

1.13 D.NET Module (LQE770, LQE775)

1.13.1 T/M diagnostic functions

Table 1-35 gives a summary description of the T/M diagnostic functions used for the D.NET module. T/M simply verifies the communication between D.NET modules. At least two D.NET modules are required to run this T/M. For instructions on how to launch T/M, see 1.13.3, "Launching T/M."

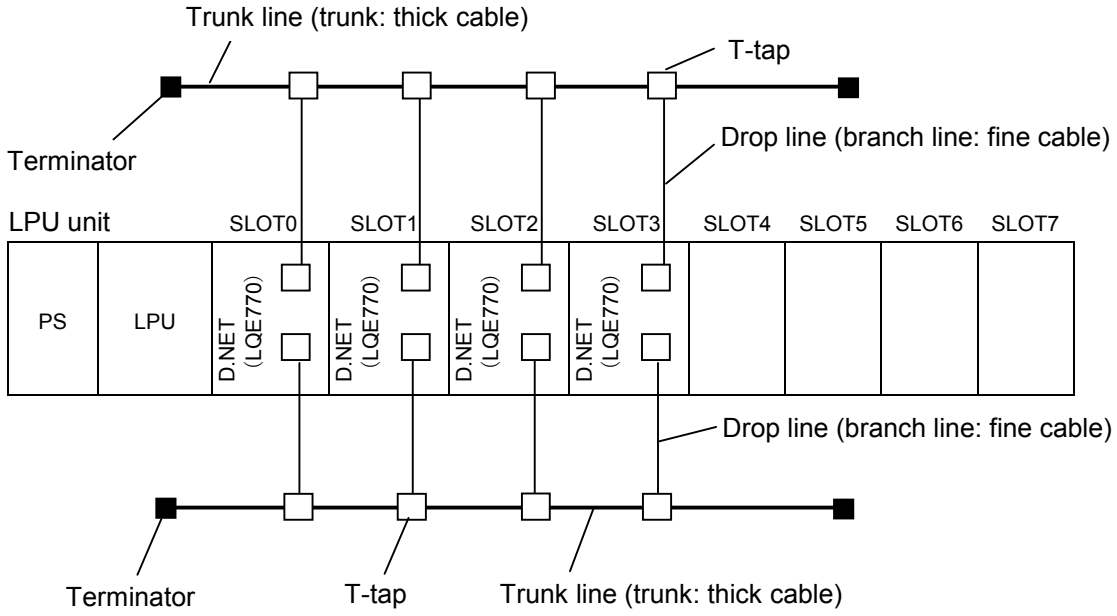
Table 1-35 T/M Diagnostic Functions Used for the D.NET Module

No.	Test item	Diagnostic function	Need for wiring
1	Inter-module connection check	Verifies successful data transmission and reception over a DeviceNet line that interconnects two to four D.NET modules.	Yes

(Note) This T/M requires wiring to interconnect modules. Wire modules as described in 1.13.2, "Wiring instructions," before launching T/M.

1.13.2 Wiring instructions

Wire the D.NET modules as shown in Figures 1-45 and 1-46. At least two D.NET modules are required to run this T/M. Up to four modules can be wired together. No external power supply is required when all four modules under testing are the LQE770 (see Figure 1-45). However, an external power supply unit is required when the LQE775 is included among the modules under testing (see Figure 1-46).



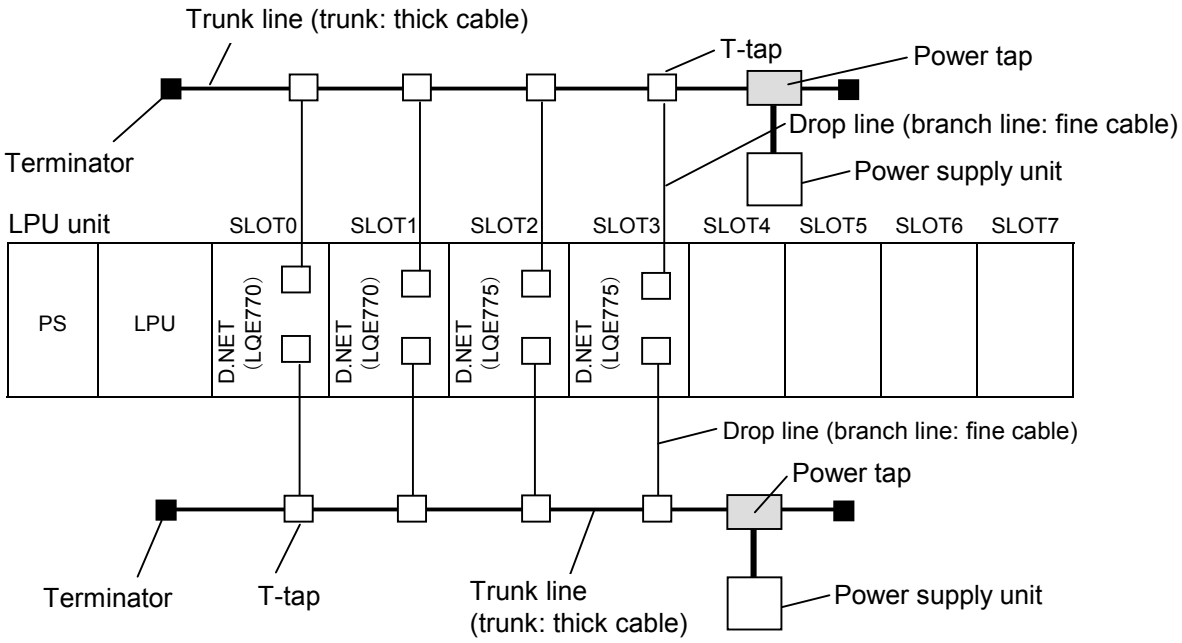
For more information about DeviceNet wiring between the D.NET modules, refer to Chapter 3, "MOUNTING AND WIRING," in "USER'S MANUAL OPTION D.NET (Manual number SVE-1-129)" or "WIRING MANUAL (Manual number SVE-3-002)."

(Note 1) In this diagram, four D.NET (LQE770) module units are mounted, though only two or three can be safely mounted.

(Note 2) The D.NET modules are mounted in slots 0 to 3 in this diagram, but actually may be safely installed in any slot.

(Note 3) No external power supply is required when all D.NET modules under testing are the LQE770.

Figure 1-45 Wiring Required for Testing a Group of Modules that Consist Solely of the LQE770



For more information about DeviceNet wiring between the D.NET modules, refer to Chapter 3, “MOUNTING AND WIRING,” in “USER’S MANUAL OPTION D.NET (Manual number SVE-1-129)” or “WIRING MANUAL (Manual number SVE-3-002).”

(Note 1) In this diagram, four D.NET (LQE770 or LQE775) module units are mounted, though only two or three can be safely mounted.

(Note 2) The D.NET modules are mounted in slots 0 to 3 in this diagram, but actually may be safely installed in any slot.

(Note 3) An external power supply unit is required when the LQE775 is included among the D.NET modules under testing.

Figure 1-46 Wiring Required when Including the LQE775 Among Modules Under Testing

1.13.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the D.NET module, and then back up valuable data before proceeding to Steps (1) to (4) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Make the connections described in 1.13.2, "Wiring instructions," as needed. Remember to turn the power "OFF" before making these connections.

(2) Select a T/M mode and a T/M module type using the MODU No. (rotary) switch on the D.NET module.
Table 1-36 gives the correspondence between the switch positions and module types selected.

Table 1-36 Correspondence between Switch Positions and Module Types Selected

MODU No.	Module type
8	Module 0
9	Module 1
A	Module 2
B	Module 3

Set the MODU No. switch to avoid duplicating module assignments. Be sure to always mount module 0 (MODU No. 8).

(3) Turn "ON" the power switch on the power module mounted in the LPU unit. T/M will then launch.
The MS/NS lamp (green) on each D.NET module mounted remains on while T/M is running.

(4) To shut down T/M, turn "OFF" the power switch on the power module mounted in the LPU module.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.13.4 Determining errors

If an error is detected by running T/M, the NS lamp goes on in red only on module 0 (MODU No. 8). Connect the tool system to the LPU unit, and then check and evaluate more detailed error log information. For more information about the tool system, refer to Chapter 6, “TOOLS,” in “USER’S MANUAL BASIC MODULES (Manual number SVE-1-100).”

1.14 ET.NET Module (LQE720)

1.14.1 T/M diagnostic functions

Table 1-37 gives a summary description of the T/M diagnostic functions used for the ET.NET module. The two types of T/M available are switch-selectable. For instructions on how to launch T/M, see 1.14.3, "Launching T/M."

Table 1-37 T/M Diagnostic Functions Used for the ET.NET Module

No.	Test item	Diagnostic function	Need for wiring
1	(T/M1) Unit check	Makes a read/write check in internal memory of the ET.NET module and checks the Ethernet LSI. Only one ET.NET module unit is needed to make this check.	Yes
2	(T/M2) Inter-module connection check	Checks Ethernet communication between two ET.NET modules, one designated as the main module and the other as the submodule. Two ET.NET modules are always required to make this check.	Yes

(Note) Wire the ET.NET modules as described in 1.14.2, "Wiring instructions," before launching T/M.

1.14.2 Wiring instructions

■ Wiring required to run the T/M1 unit check (No. 1)

Plug a loop connector into the RJ45 connector of the ET.NET module as shown in Figure 1-47. Figure 1-48 shows how to wire the loop connector.

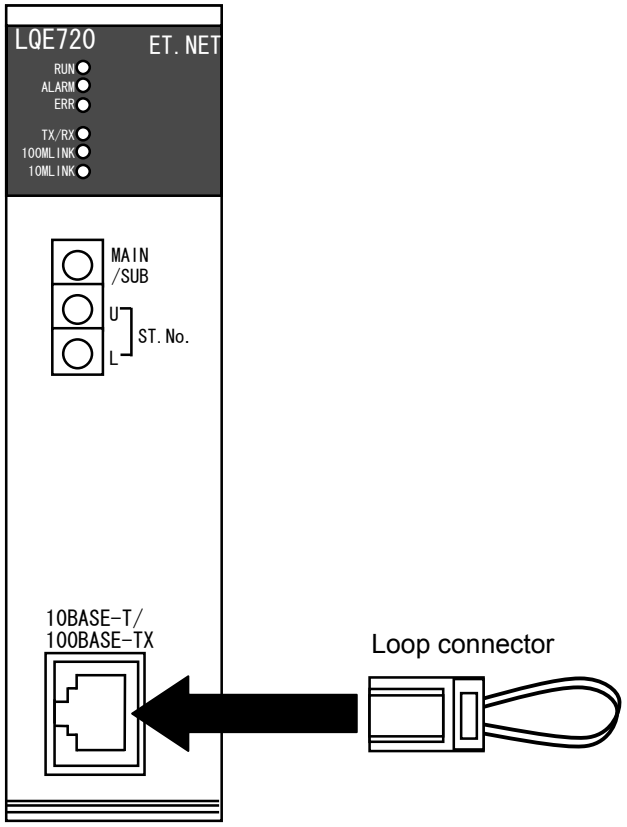
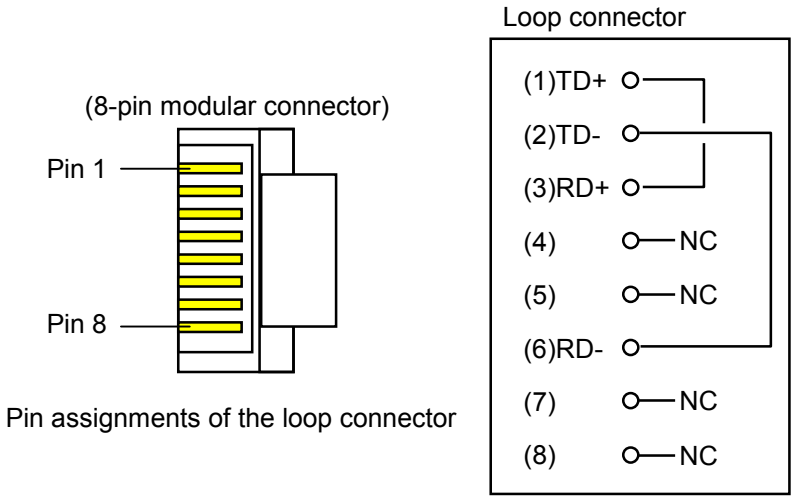


Figure 1-47 Wiring Required to Make the T/M1 Unit Check



Pin assignments of the loop connector

Figure 1-48 Wiring a Loop Connector

■ Wiring required to run the T/M2 inter-module connection check (No. 2)

Wire ET.NET modules as shown in Figure 1-49. Two ET.NET modules are always required to make this check. Use a Category 5 or higher cross cable to wire these modules together.

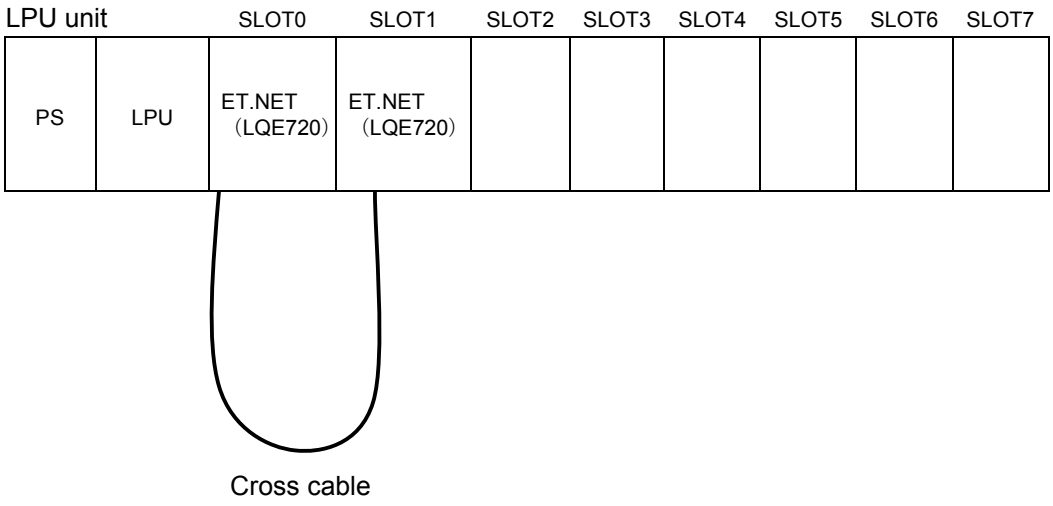


Figure 1-49 Wiring Required to Make the T/M2 Inter-Module Connection Check

1.14.3 Launching T/M

- To run T/M at a customer's site, seek prior approval from the customer and disconnect all the connections from the ET.NET module, and then back up valuable data before proceeding to Steps (1) to (7) below.
- Do not run T/M concurrently with T/M for other modules.
- Make a note of the relevant switch settings so as to restore these settings once T/M execution is completed.

(1) Turn "OFF" the power to the S10V.

(2) If a CMU module is mounted, demount it. Set the LPU ladder program operation switch to "STOP."

(3) Make the connections described in 1.14.2, "Wiring instructions," to suit the T/M to be run. Remember to turn the power "OFF" before making these connections.

(4) Set the T/M to be run using the MAIN/SUB (rotary) switch on the ET.NET module (shown in Figure 1-50). Table 1-38 gives the correspondence between the switch positions and T/M types selected. Be sure to turn "OFF" the power before setting the switch.

Table 1-38 Correspondence between MAIN/SUB Switch Positions and T/M Types Selected

MODU No.	T/M type	Module type
C	T/M2	Main module
D		Submodule
F	T/M1	Main module
		Submodule

Up to two ET.NET modules can be mounted in the LPU module. Select "C" or "F" for the main module; select "D" or "F" for the submodule.

(5) Set the ST. No. (rotary) switches on both ET.NET modules (shown in Figure 1-50) to "00."

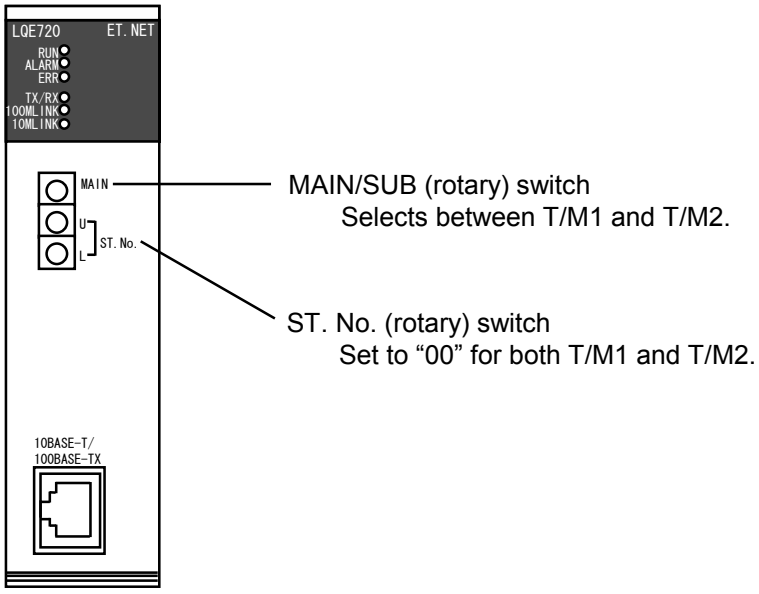


Figure 1-50 Switch Settings for the ET.NET Module

(6) Turn “ON” the power switch on the power module mounted in the LPU unit. T/M will then launch.
The RUN, ALARM, and ERR lamps flash and the 100MLINK lamp remains on while T/M1 is running.
The RUN, TX/RX, and 100MLINK lamps remain on while T/M2 is running.

(7) To shut down T/M, turn “OFF” the power switch on the power module mounted in the LPU unit.
Restore the original switch settings in effect before implementing T/M, and also restore the original data from the backup copies made.

1.14.4 Determining errors

If faults are detected as a result of running T/M1 or T/M2, the ERR lamp of the ET.NET module goes on.
If the ERR lamp goes on as a result of running T/M1 or T/M2, replace the ET.NET module because it may be faulty.
Table 1-39 lists the errors that may occur while running T/M1.
Table 1-40 lists the errors that may occur while running T/M2.

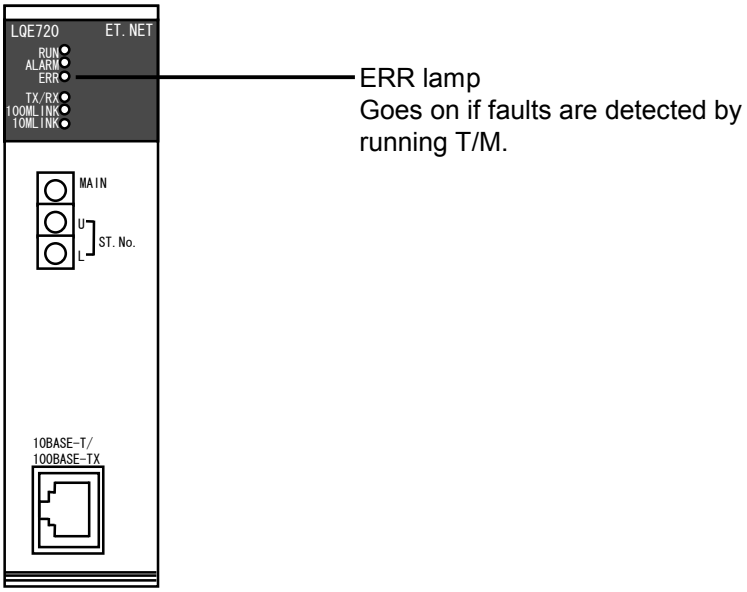


Figure 1-51 ERR Lamp of the ET.NET Module

Table 1-39 Viewing Detailed Error Information Posted by the Tool System at Occurrence of T/M1 Errors

Reference address	Error information as read
/00414XX0	Error code of error that occurred
/00414XX4	Extended information 1
/00414XX8	Extended information 2
/00414XXC	Extended information 3

XX: Dependent on the slot in which the ET.NET module is mounted.
The table to the right lists the content of XX by slot number.

Mounting slot number	Content XX
Slot 0	/80
Slot 1	/84
Slot 2	/88
Slot 3	/8C
Slot 4	/90
Slot 5	/94
Slot 6	/98
Slot 7	/9C

Table 1-39 Viewing Detailed Error Information Posted by the Tool System at Occurrence of T/M1 Errors (continued)

Error code	Error definition	Extended information 1	Extended information 2	Extended information 3
/01220001	ECC double-bit error detected in internal memory (during address data setting)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220002	ECC single-bit error detected in internal memory (during address data setting)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220003	ECC double-bit error detected in internal memory (during inverted address data setting)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220004	ECC single-bit error detected in internal memory (during inverted address data setting)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220011	ECC single-bit error detected in internal memory (during address data compare)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220012	ECC double-bit error detected in internal memory (during address data compare)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220013	ECC single-bit error detected in internal memory (during inverted address data compare)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220014	ECC double-bit error detected in internal memory (during inverted address data compare)	Starting address of affected area	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01220015	Compare error detected in internal memory (address data)	Error address	Write data	Read data
/01220016	Compare error detected in internal memory (inverted address data)	Error address	Write data	Read data
/01230001	Ethernet LSI reset failure	Not used (fixed to /00000000)	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01230002	Ethernet LINK not established	Not used (fixed to /00000000)	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01230003	Ethernet send/receive timeout (10 ms)	Not used (fixed to /00000000)	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01230004	Ethernet send/receive error	Not used (fixed to /00000000)	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01230005	Invalid length of Ethernet receive data	Not used (fixed to /00000000)	Not used (fixed to /00000000)	Not used (fixed to /00000000)
/01230006	Compare error in Ethernet send/receive data	Not used (fixed to /00000000)	Not used (fixed to /00000000)	Not used (fixed to /00000000)

Table 1-40 Viewing Detailed Error Information Posted by the Tool System at Occurrence of T/M2 Errors

Reference address		Information
Main module	Submodule	
/00415000	/00415100	T/M test count
/00415004	/00415104	Not used
/00415008	/00415108	Error count when issuing the Socket macro
/0041500C	/0041510C	Error code when issuing the Socket macro
/00415010	/00415110	Error count when issuing the Bind macro
/00415014	/00415114	Error code when issuing the Bind macro
/00415018	/00415118	Error count when issuing the Connect macro
/0041501C	/0041511C	Error code when issuing the Connect macro
/00415020	/00415120	Error count when issuing the Listen macro
/00415024	/00415124	Error code when issuing the Listen macro
/00415028	/00415128	Error count when issuing the Accept macro
/0041502C	/0041512C	Error code when issuing the Accept macro
/00415030	/00415130	Error count when issuing the Send macro
/00415034	/00415134	Error code when issuing the Send macro
/00415038	/00415138	Error count when issuing the Recv macro
/0041503C	/0041513C	Error code when issuing the Recv macro
/00415040	/00415140	Error count when issuing the Shutdown macro
/00415044	/00415144	Error code when issuing the Shutdown macro
/00415048	/00415148	Send timeout error (10 s) count
/0041504C	/0041514C	Receive timeout error (10 s) count
/00415050	/00415150	Data compare error count

2 APPENDIXES

2.1 T/M Detailed Information

2.1.1 LPU module (LQP510)

Figures 2-1 to 2-7 show detailed information about the T/M running on the LPU module. T/M is run in a ladder configuration.

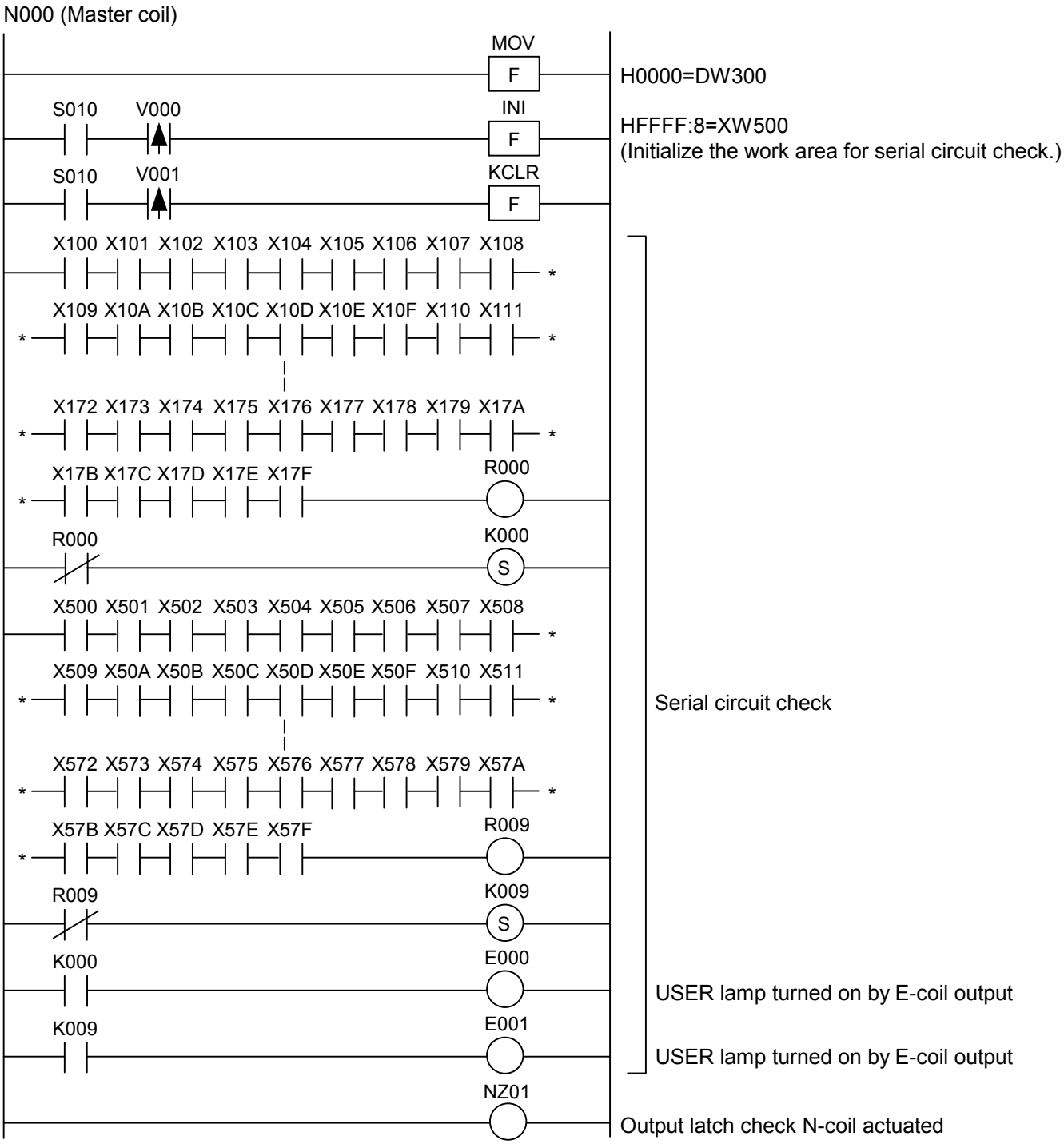


Figure 2-1 N000 Master Coil

N000 (Master coil) (continued)

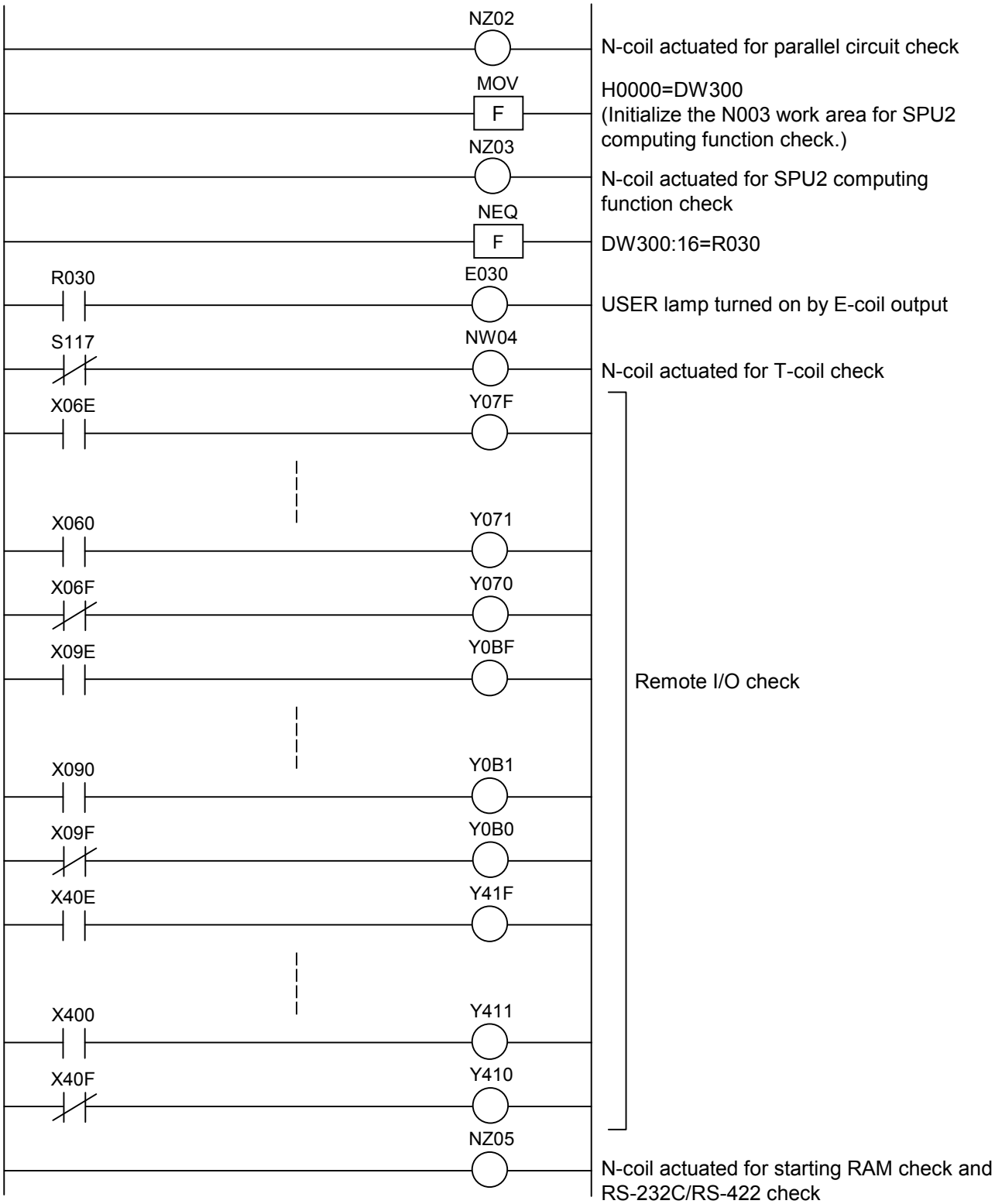


Figure 2-2 N000 Master Coil (continuation)

N001 (Output latch check coil)

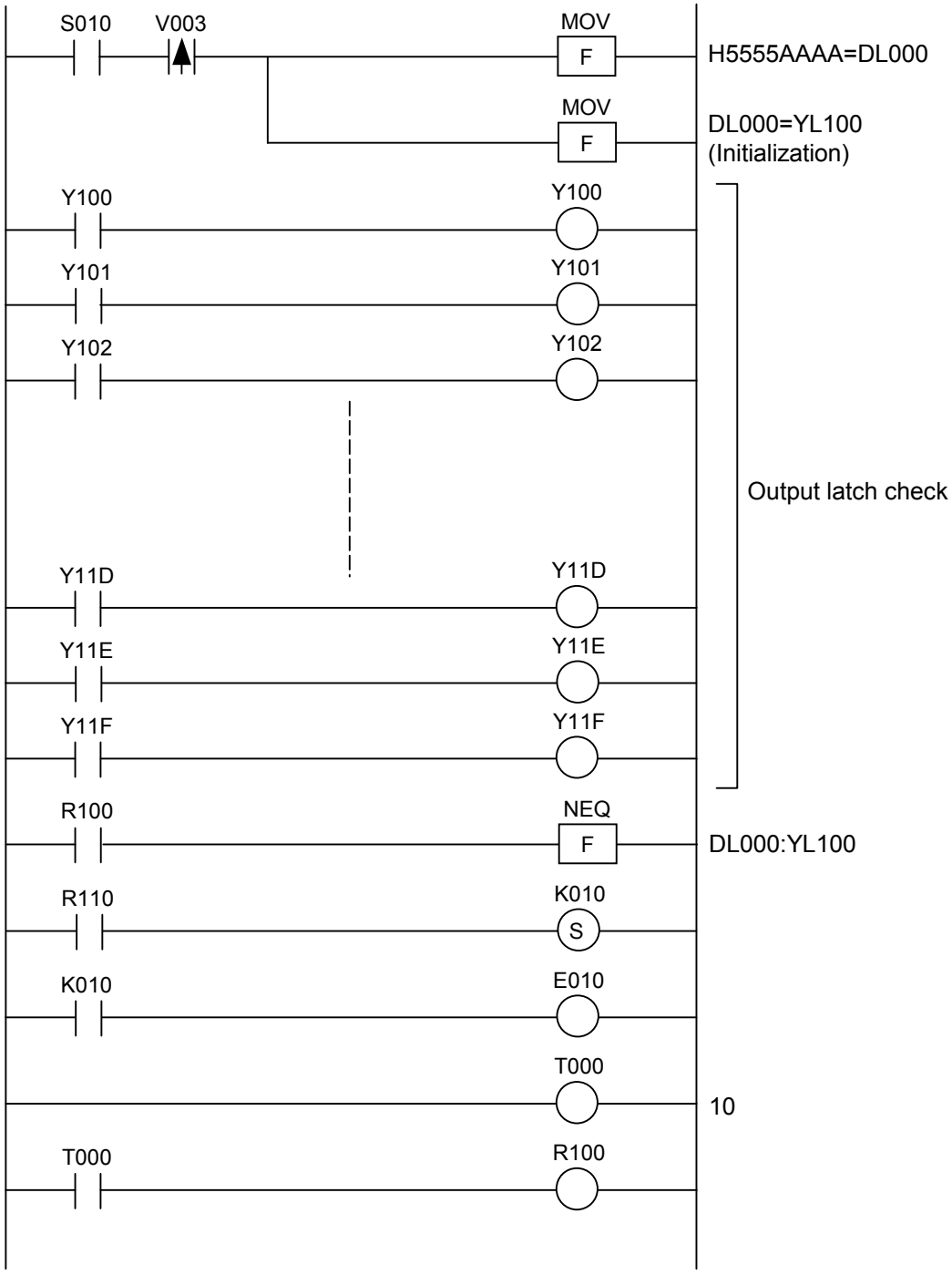


Figure 2-3 N001 Output Latch Check Coil

N002 (Parallel circuit check coil)

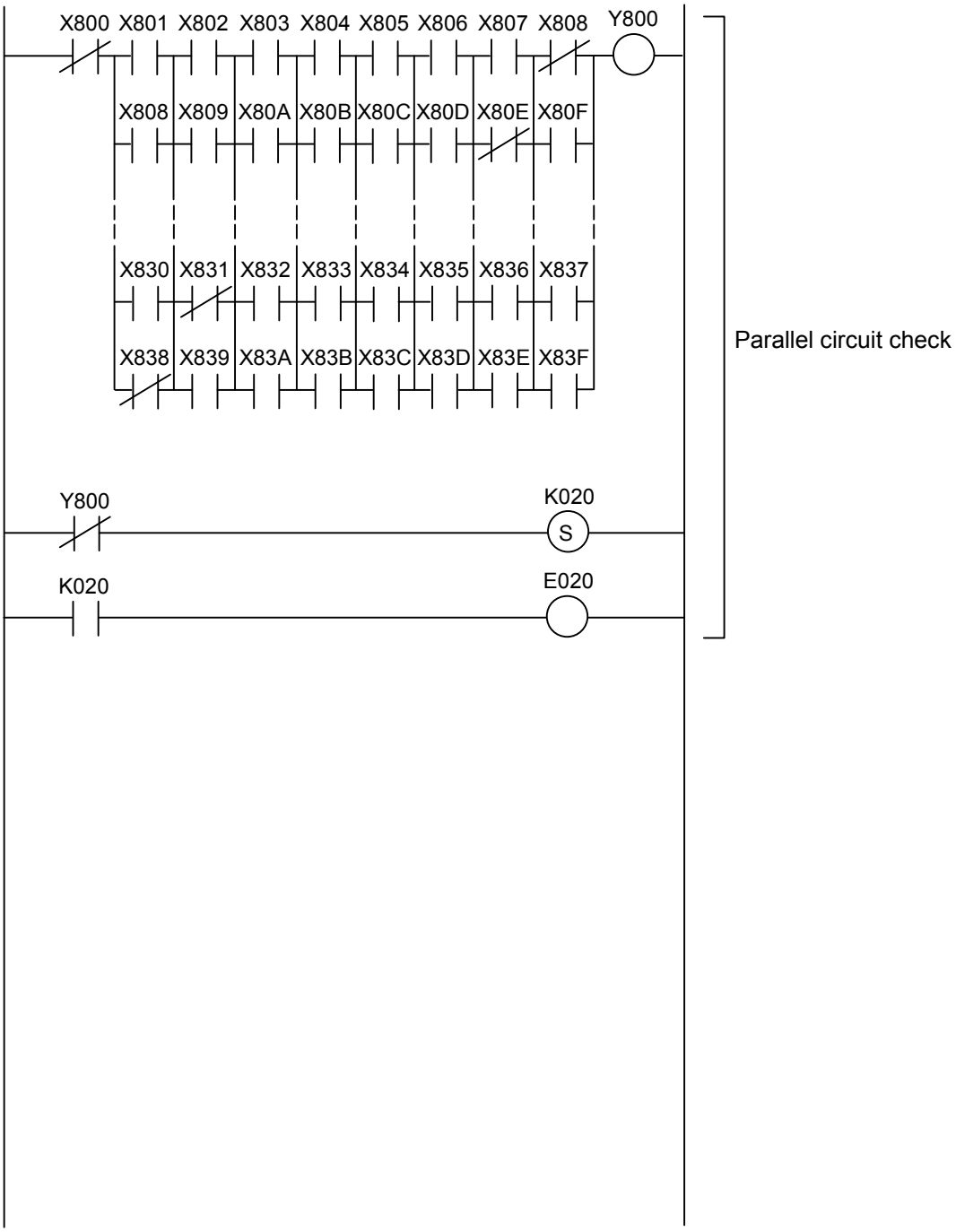


Figure 2-4 N002 Parallel Circuit Check Coil

N003 (SPU2 computing function check coil)

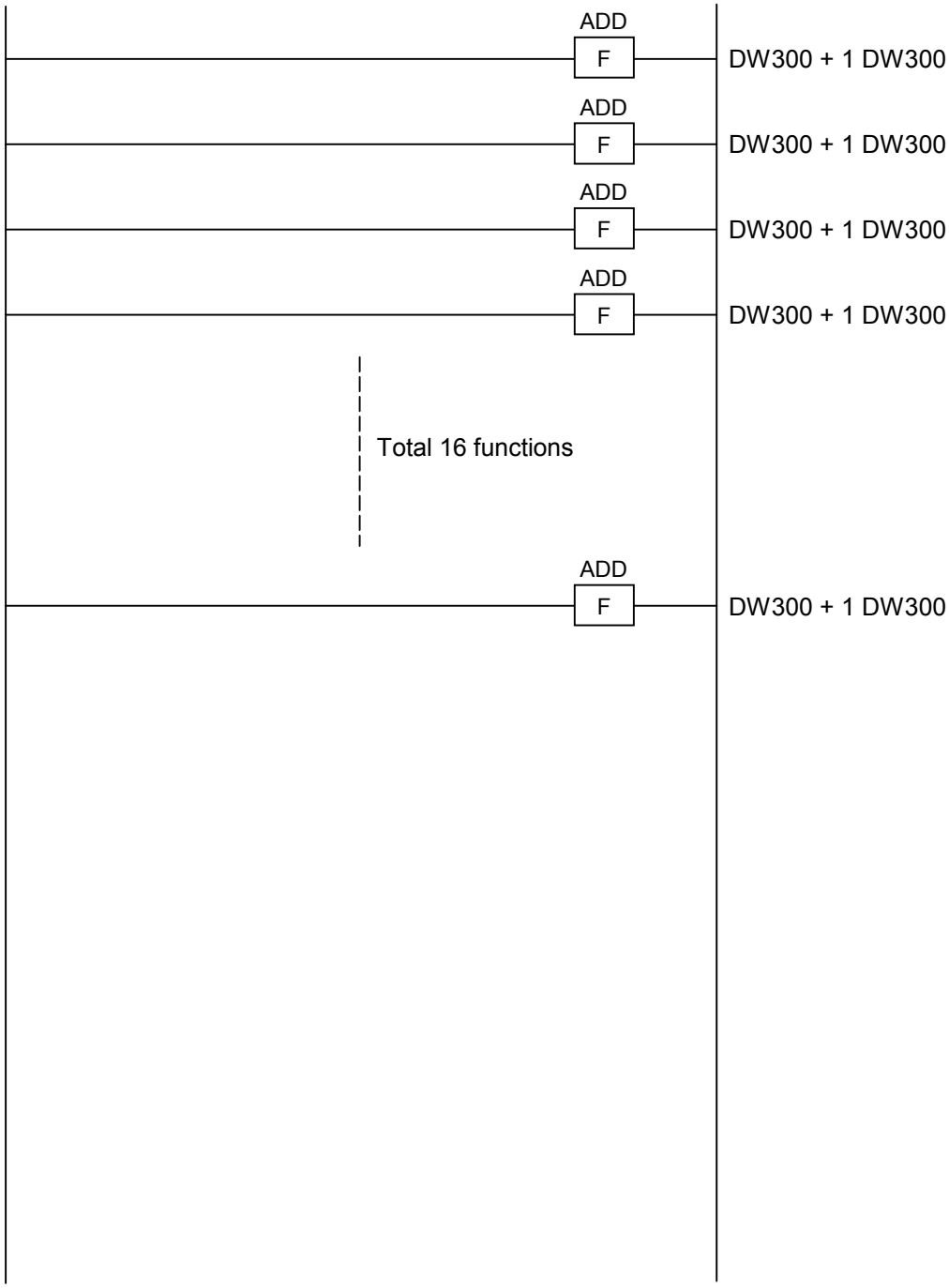


Figure 2-5 N003 SPU2 Computing Function Check Coil

N004 (T-coil check coil)

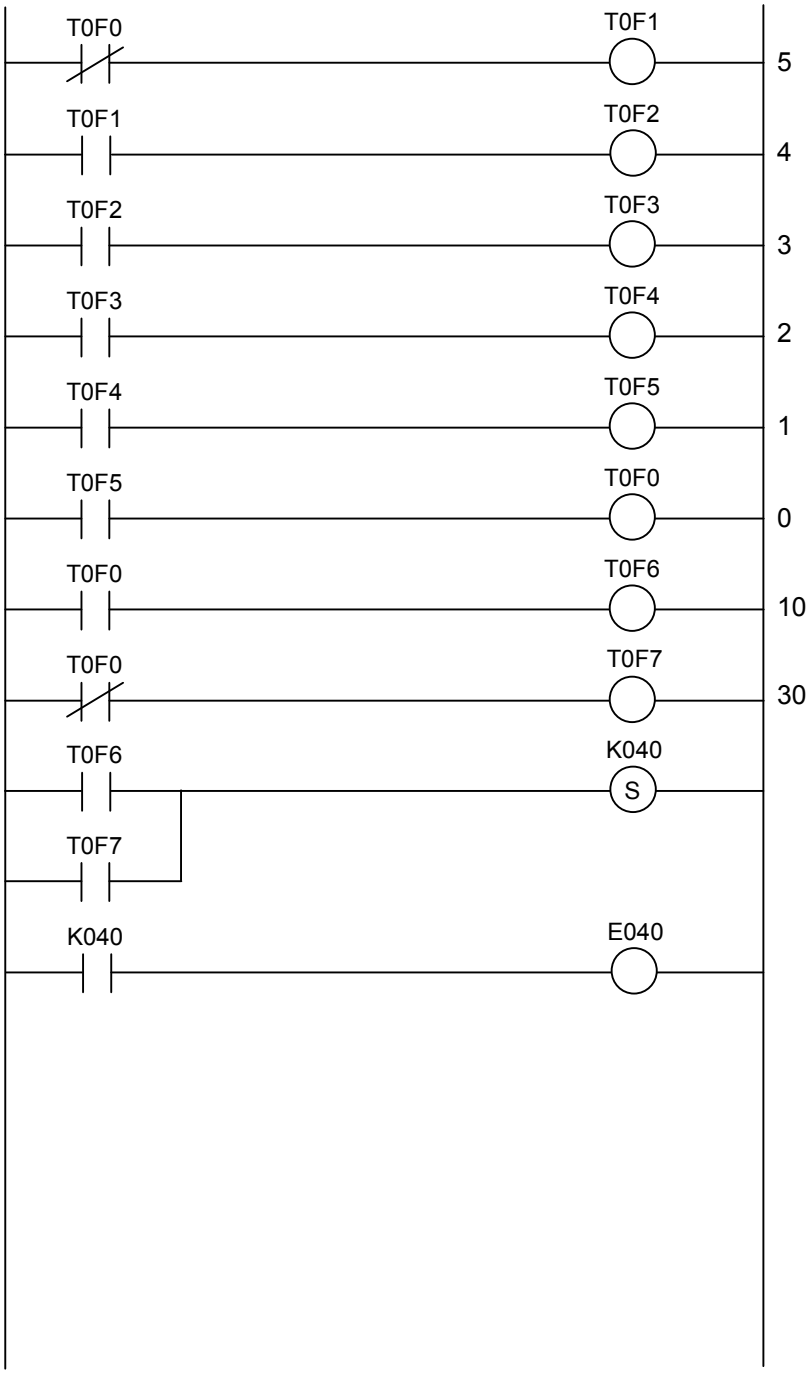


Figure 2-6 N004 T-Coil Check Coil

N005 (RAM compare check and RS-232C/RS-422 check startup coil)

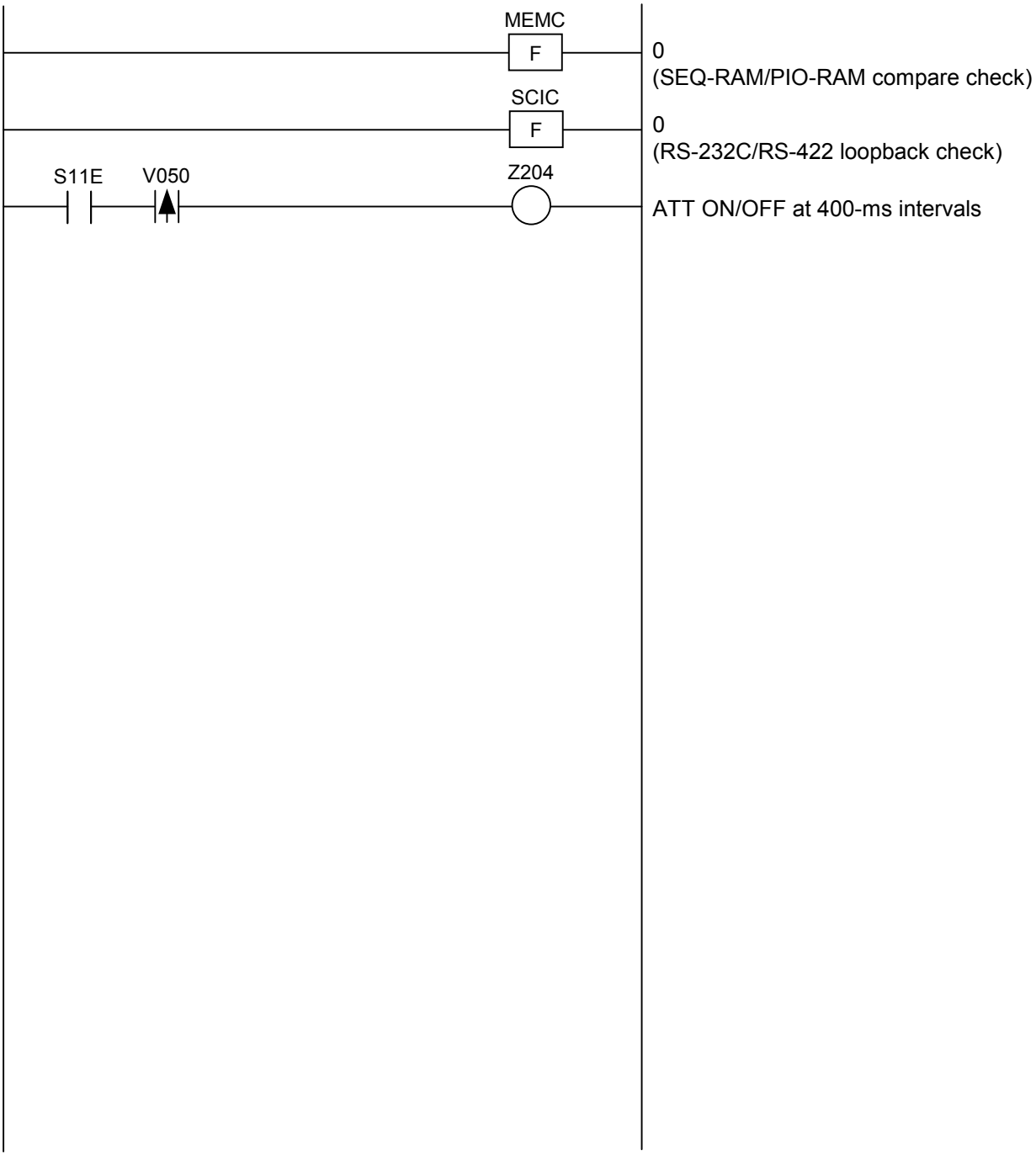


Figure 2-7 N005 RAM Compare Check and RS-232C/RS-422 Check Startup Coil

2.1.2 CMU module (LQP520)

Table 2-1 summarizes detailed information about the T/M running on the CMU module.

Table 2-1 Detailed Information About the T/M Running on the CMU Module

No.	Test item	Target device	Detailed information
1	Processor check	SH-4	Performs arithmetic operations (addition, subtraction, multiplication, and division) and logic operations (AND, OR, NOT, XOR) on SH-4.
2	Dedicated LSI register check	SUWA3 (LSI)	Writes data (1) /FFFFFFFF and (2) /00000000 to and reads it from the INITSR register for comparison.
3	Flash memory check	FROM	Adds up all areas of the program (HKP) stored in flash memory in multiples of 4 bytes and performs a compare operation with the checksum.
4	Ethernet LSI check	LANCE	Verifies successful data transmission and reception using the LSI internal loopback facility.

2.1.3 FL.NET module (LQE500)

No T/M detailed information is available concerning the FL.NET module.

2.1.4 OD.RING module (LQE510, LQE515)

Table 2-2 summarizes detailed information about the T/M running on the OD.RING module.

Table 2-2 Areas Used by Running T/M on the OD.RING Module

Module type	Send buffer area	Receive buffer area
Main module	FW000 to FW3FF	Hardware register in the OD.RING module
Submodule	FW400 to FW7FF	Hardware register in the OD.RING module

2.1.5 ET.NET module (LQE520)

Table 2-3 summarizes detailed information about the T/M running on the ET.NET module.

Table 2-3 Detailed Information About the T/M Running on the ET.NET Module

Test item	Module type	
	Main module	Submodule
Compare check of internal memory	Target area Module internal address /5A01000 to /5A33FFF /5A3C000 to /5A7EFF System bus address /00841000 to /00873FFF /0087C000 to /0087FFFF	Target area Module internal address /5A01000 to /5A33FFF /5A3C000 to /5A7EFF System bus address /008C1000 to /008F3FFF /008FC000 to /008FFFFF
Compare check of LPU memory	Target area System bus address FW800 to FW9FF	Target area System bus address FWA00 to FWBFF

2.1.6 SV.LINK module (LQE521)

Table 2-4 summarizes detailed information about the T/M running on the SV.LINK module.

Table 2-4 Detailed Information About the T/M Running on the SV.LINK Module

Test item	Module type	
	Main module	Submodule
Compare check of internal memory	Target area Module internal address /5A01000 to /5A33FFF /5A3C000 to /5A7EFF System bus address /00841000 to /00873FFF /0087C000 to /0087FFFF	Target area Module internal address /5A01000 to /5A33FFF /5A3C000 to /5A7EFF System bus address /008C1000 to /008F3FFF /008FC000 to /008FFFFF
Compare check of LPU memory	Target area System bus address FW800 to FW9FF	Target area System bus address FWA00 to FWBFF

2.1.7 SD.LINK module (LQE530)

Table 2-5 summarizes detailed information about the T/M running on the SD.LINK module.

Table 2-5 Areas Used by Running T/M on the SD.LINK Module

Module type	Send buffer area	Receive buffer area
Main module	FW000 to FW3FF	Hardware register in the SD.LINK module
Submodule	FW400 to FW7FF	Hardware register in the SD.LINK module

2.1.8 J.NET/J.NET-INT module (LQE540, LQE545)

Table 2-6 summarizes detailed information about the T/M running on the J.NET/J.NET-INT module.

Table 2-6 Detailed Information About the T/M Running on the J.NET/J.NET-INT

Test item	Module type	
	Main module	Submodule
Compare check of internal memory	Target area Module internal address /5A04000 to /5A2FFFF System bus address /00A44000 to /00A6FFFF	Target area Module internal address /5A04000 to /5A2FFFF System bus address /00AC4000 to /00AEFFFF
Compare check of LPU memory	Target area System bus address XW000 to XWFF0	Target area System bus address YW000 to YWFF0
Internal loopback check External loopback check (common)	Send buffer XW000 to XWFF0 Receive buffer (NET1) System bus address /00A43800 to /00A43BFF Receive buffer (NET2) System bus address /00A43C00 to /00A43FFF	Send buffer YW000 to YWFF0 Receive buffer (NET1) System bus address /00AC3800 to /00AC3BFF Receive buffer (NET2) System bus address /00AC3C00 to /00AC3FFF
Station connection check 1 Station connection check 2 (common)	Send buffer (NET1) YW000 to YW070 Send buffer (NET2) YW080 to YW0F0 Receive buffer (NET1) XW000 to XW070 Receive buffer (NET2) XW080 to XW0F0	

2.1.9 IR.LINK module (LQE546)

Table 2-7 summarizes detailed information about the T/M running on the IR.LINK module.

Table 2-7 Detailed Information About the T/M Running on the IR.LINK

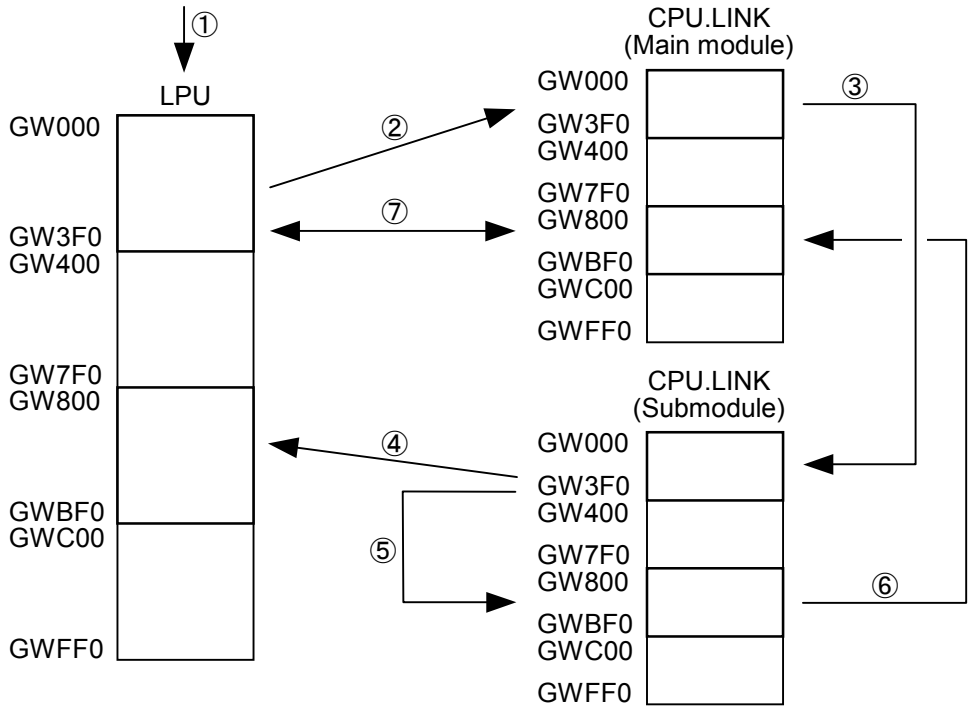
Test item	Module type	
	Main module	Submodule
Compare check of internal memory	Target area Module internal address /5A04000 to /5A2FFFF System bus address /00A44000 to /00A6FFFF	Target area Module internal address /5A04000 to /5A2FFFF System bus address /00AC4000 to /00AEFFFF
Compare check of LPU memory	Target area System bus address XW000 to XWFF0	Target area System bus address YW000 to YWFF0
Internal loopback check	Send buffer XW000 to XWFF0 Receive buffer System bus address /00A43800 to /00A43BFF	Send buffer YW000 to YWFF0 Receive buffer System bus address /00AC3800 to /00AC3BFF
Station connection check	Send buffer YW000 to YW070 Receive buffer XW000 to XW070	

2.1.10 CPU.LINK module (LQE550)

Table 2-8 and Figure 2-8 show detailed information about the T/M running on the CPU.LINK module.

Table 2-8 Detailed Information About the T/M Running on the CPU.LINK Module

No.	Test item	Detailed information
1	Compare check of internal memory	Performs 16 cycles of write/read/compare operations at module internal addresses /2B00 to /2CFF using data that is incremented starting from 0. Data that is incremented from address to address is checked.
2	Compare check of LPU memory	Performs 16 cycles of write/read/compare operations at main module addresses GW000 to GW3F0 and submodule addresses GW800 to GWBF0 using incremental word data starting from 0. Data that is incremented from address to address is checked.
3	Inter-module connection check	Performs 16 cycles of send/receive and compare operations on the main module and submodule mounted in the same LPU unit, using data that is incremented starting from 0. Data that is incremented from address to address is checked.



① Set the data in LPU memory (→ GW000 to GW3F0).

② Transfer the data from LPU memory (GW000 to GW3F0) to the memory (GW000 to GW3F0) of the CPU.LINK main module.

③ Send the data from the memory (GW000 to GW3F0) of the CPU.LINK module to the memory (GW000 to GW3F0) of the submodule.

④ Transfer the data from the memory (GW000 to GW3F0) of the CPU.LINK submodule to LPU memory (GW800 to GWBF0).

⑤ Transfer data in the memory of the CPU.LINK submodule from GW000 to GW3F0 to GW800 to GWBF0.

⑥ Send the data from the memory (GW800 to GWBF0) of the CPU.LINK submodule to the memory (GW800 to GWBF0) of the main module.

⑦ Compare the data in the memory (GW800 to GWBF0) of the CPU.LINK main module with that in LPU memory (GW000 to GW3F0).

⑧ Update data ① when the compare check is successful and repeat from step ①.

Figure 2-8 Flow of Executing Inter-Module Connection Check

2.1.11 RS-232C/RS-422 module (LQE560, LQE565)

Figures 2-9 and 2-10 show detailed information about the T/M running on the RS-232C/RS-422 modules.

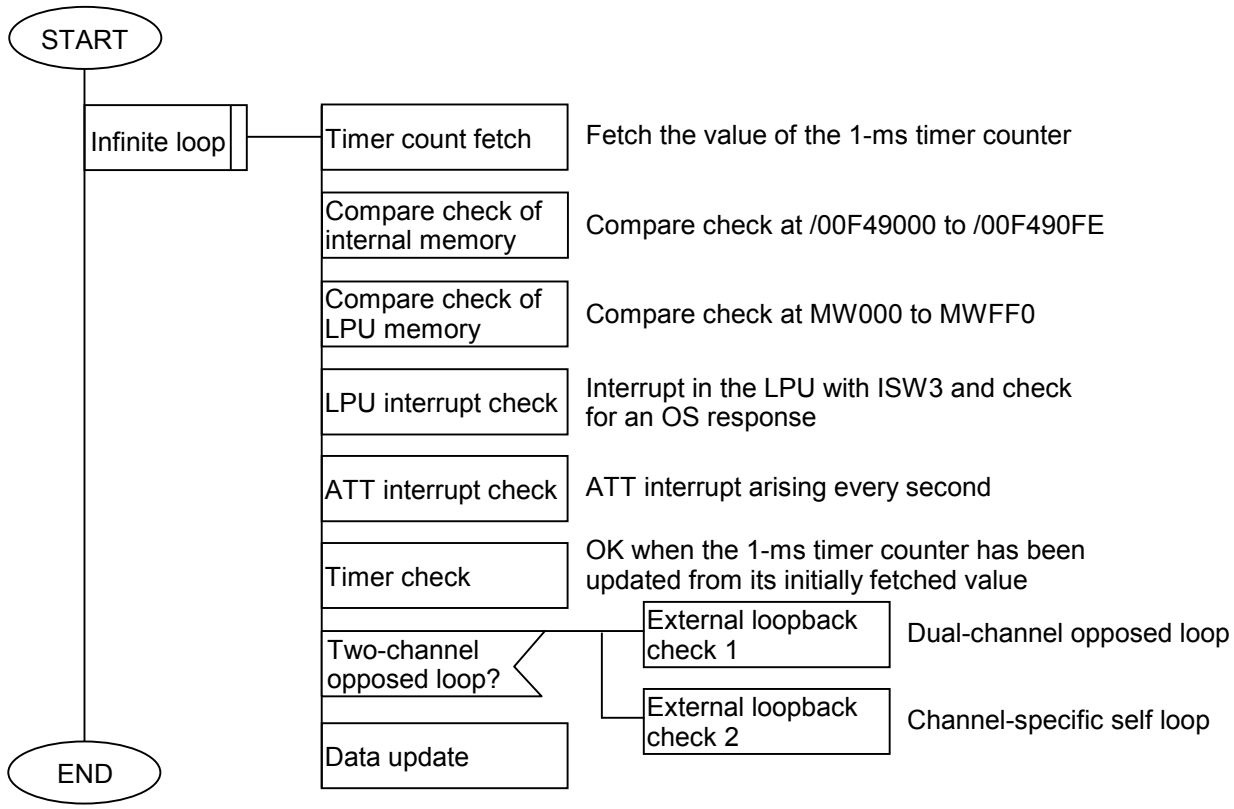
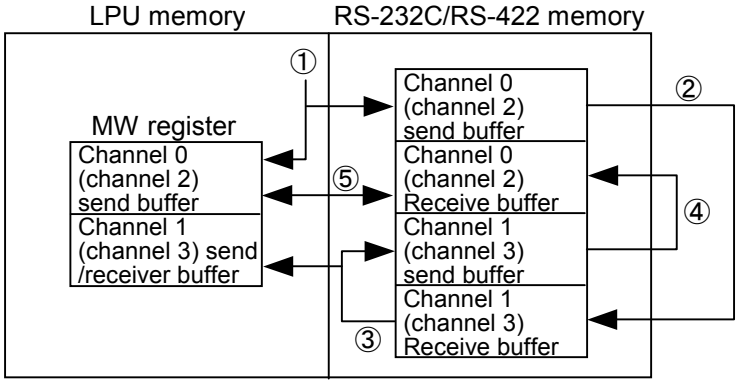


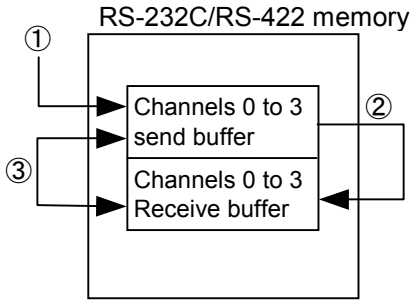
Figure 2-9 Flow of T/M Running on the RS-232C/RS-422 Modules

■ Operation of external loopback check 1



① Set send data.
② Send the data from channel 0 to channel 1
③ Copy the received data to the send buffer and MW register
④ Send channel 0 data from channel 1
⑤ Compare the MW register and receive buffer

■ Operation of external loopback check 2



① Set send data
② Send and receive the data
③ Compare the send buffer and receive buffer

Area used by the send/receive buffers
Channel 0: MW000 to MW3FF
Channel 1: MW400 to MW7FF
Channel 2: MW800 to MWBFF
Channel 3: MWC00 to MWFFF

Figure 2-10 Operations of External Loop Checks 1 and 2

2.1.12 D.NET module (LQE570, LQE575)

Table 2-9 summarizes detailed information about the T/M running on the D.NET module.

Table 2-9 Areas Used by Running T/M on the D.NET Module (LPU memory)

Register	Use	Word length	Remarks
BD000	Channel 0 send area message ID = 1	8 bytes	
BD002	Channel 0 send area message ID = 2	8 bytes	
BD004	Channel 0 send area message ID = 3	8 bytes	
BD006	Channel 0 receive area MAC ID = 1, message ID = 0	8 bytes	
BD008	Channel 0 receive area MAC ID = 2, message ID = 0	8 bytes	
BD00A	Channel 0 receive area MAC ID = 3, message ID = 0	8 bytes	
BD00C	Channel 1 send area message ID = 0	8 bytes	
BD00E	Channel 1 receive area MAC ID = 0, message ID = 1	8 bytes	
BD010	Not used	8 bytes	
BD012	Channel 2 send area message ID = 0	8 bytes	
BD014	Channel 2 receive area MAC ID = 0, message ID = 2	8 bytes	
BD016	Not used	8 bytes	
BD018	Channel 3 send area message ID = 0	8 bytes	
BD01A	Channel 3 receive area MAC ID = 0, message ID = 3	8 bytes	
BD01C to BD01F	Not used		
BD020	Channel 0 channel 1 monitoring timer	4 bytes	
BD021	Channel 0 channel 2 monitoring timer	4 bytes	
BD022	Channel 0 channel 3 monitoring timer	4 bytes	
BD023 to BD031	Not used		
BD032	Channel 1 error flag (Error occurring: 0x00000001)	4 bytes	Not cleared even when the error is eliminated.
BD033	Channel 1 error cumulative counter	4 bytes	
BD034	Channel 1 error flag (Error occurring: 0x00000001)	4 bytes	Not cleared even when the error is eliminated.
BD035	Channel 1 error cumulative counter	4 bytes	
BD036	Channel 1 error flag (Error occurring: 0x00000001)	4 bytes	Not cleared even when the error is eliminated.
BD037	Channel 1 error cumulative counter	4 bytes	

2.1.13 ET.NET module (LQE720)

Tables 2-10 and 2-11 summarize detailed information about the T/M running on the ET.NET module.

Table 2-10 Detailed Information About T/M1 Running on the ET.NET Module

No.	Test item	Target device	Detailed information
1	Processor check	Processor (SH-4)	Performs arithmetic operations (addition, subtraction, multiplication, and division) and logic operations (AND, OR, NOT, XOR) on SH-4 (processor).
2	Compare check of internal memory	Internal memory (SDRAM)	Writes data to and reads it from module internal addresses /A4280000 to /A5FFFFFF for comparison. Memory address data and bitwise-inverted data (one's complement) of said memory address data are used.
3	Compare check of LPU memory	Bus-connected LSI	Writes data to and reads it from LPU module address /414800 + slot number × /40 for comparison. Memory address data and bitwise-inverted data (one's complement) of said memory address data are used.
4	Ethernet LSI check	Ethernet communication LSI	Verifies successful data transmission and reception using loop connectors.

Table 2-11 Detailed Information About T/M2 Running on the ET.NET Module

No.	Test item	Detailed information
1	Inter-module connection check	Performs communication from the main module to the submodule since both are mounted in the same LPU unit. Since the incremented data (starting from 0) is sent from the main module, the submodule loops the data back for comparison by the main module. The data that is incremented from address to address is checked. System addresses /00415200 to /004163FF are used as buffers.

2.2 Trouble Report

Fill out this form and submit it to local source.

Your company name			Person in charge	
Data and time of occurrence	(year / month / day / hour / minute)			
Where to make contact	Address			
	Telephone			
	FAX			
	E-mail			
Model of defective module			LPU model	
OS Ver. Rev.	Program name:		Ver.	Rev.
Support program	Program name:		Ver.	Rev.
Symptom of defect				
Connection load	Type			
	Model			
	Wiring state			
System configuration and switch setting				
Space for correspondence				