TOSHIBA

6F3B0354

INSTRUCTIONS MANUAL

TOSLINE-S20

T2/T3 STATIONS

Main Menu
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TOSHIBA CORPORATION

FCF50003

CODE

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Publication number: 6F3B0354
1st edition Apr. 1994, 2nd edition Jun. 1994

Preface

The TOSLINE–S20 is a Local Area Network (LAN) for Factory Automation (FA) system. Several kinds of TOSLINE–S20 stations are available for interfacing various equipments, such as PLCs, computers, etc.

This manual describes How To Use the TOSLINE–S20 stations for Programmable Controller T2 and T3. The TOSLINE–S20 enables high speed data linkage between multiple T2/T3s.

Refer to the separate manual for the TOSLINE–S20 Loader software (S–LS) operations.

In this manual, the following abbreviations are used.

S20:	TOSLINE–S20 system
S–LS:	TOSLINE–S20 Loader Software
S20–station:	TOSLINE–S20 station for T2 and/or T3
STN #n:	Station number n

For details of the programmable controllers T2, T3 and their programming software T–PDS, refer to the related manuals for these controllers.

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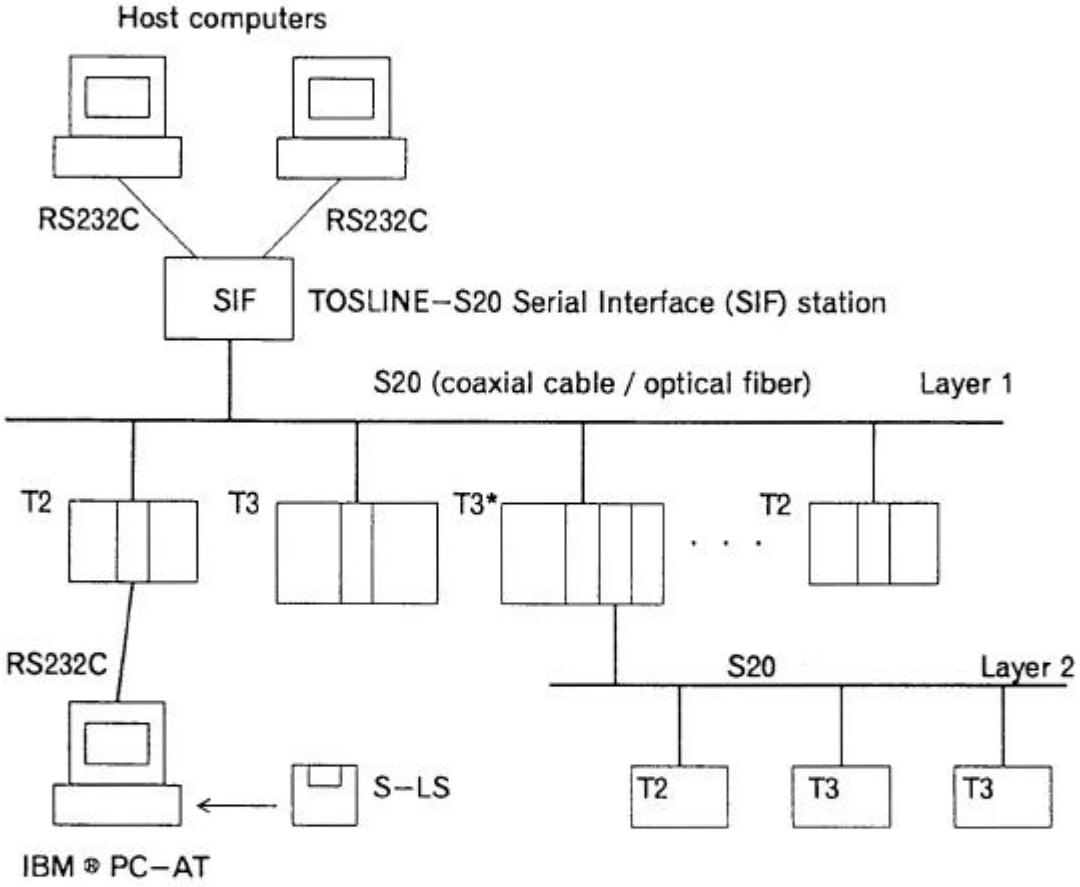
1. Introduction to S20

1.1 System configuration

The following figure shows the typical system configuration of the S20.

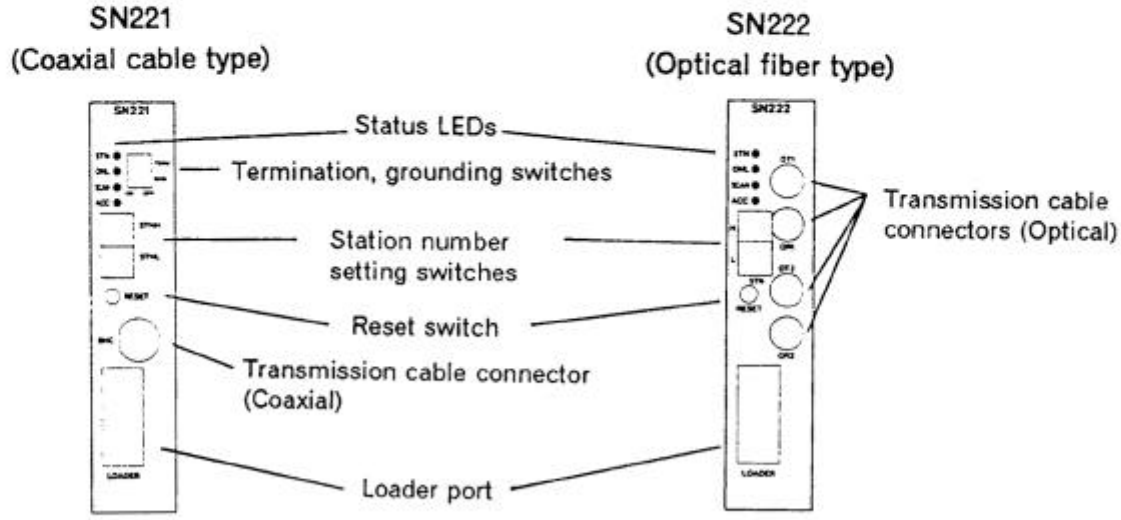


*) T3 only for bridge station

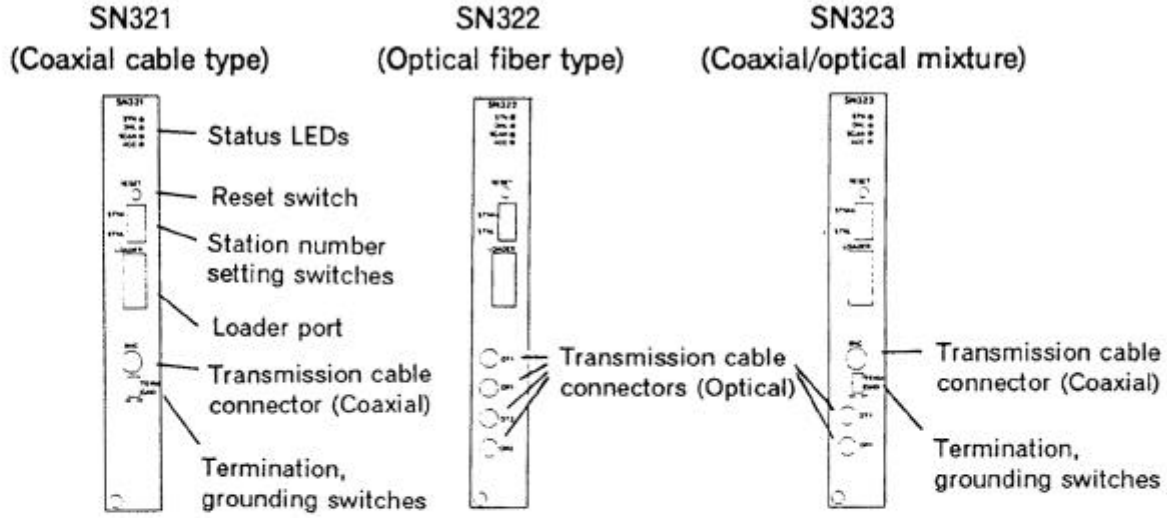
Total number of stations	Max. 64 stations
Transmission distance	Coaxial cable ···· 1 km (total) Optical fiber ···· 1 km (between stations) ··· 10 km (system total)
Scan transmission capacity	Max. 1024 words
Parameter setting tool	S–LS (runs on IBM ® PC–AT or compatibles)

1.2 Station hardware

S20–station for T2



S20–station for T3



- **Status LEDs:**
  Indicate the status of the S20−station. (see Section 5.3)

STN	Lit	Station is normal
	Not lit	Down mode
ONL	Lit	Online mode
	Blink	Standby mode
	Not lit	Offline mode
SCAN	Lit	Scan transmission is executing
	Not lit	Scan transmission is not executing
ACC	Lit	T2/T3 is accessing the station
	Not lit	T2/T3 is not accessing the station

- **Station number setting switches:**
  Used to set the station number. (allowable setting is 1 to 64)
  The setting status is read at power−up.

  STNH ····· 10's digit
  STNL ····· 1's digit

- **Loader port:**
  Used to connect the S−LS (or T−PDS for remote programming/monitoring).

- **Reset switch:**
  Used to reset the S20−station.

- **Transmission cable connector(s):**
  Used to connect coaxial cable or optical fiber cables. (see Section 4)

- **Transmission cable termination / grounding switches (coaxial type only):**

  TERM ····· When this switch is ON, internal termination resistor will be connected. Set this switch to ON at the both terminal stations.

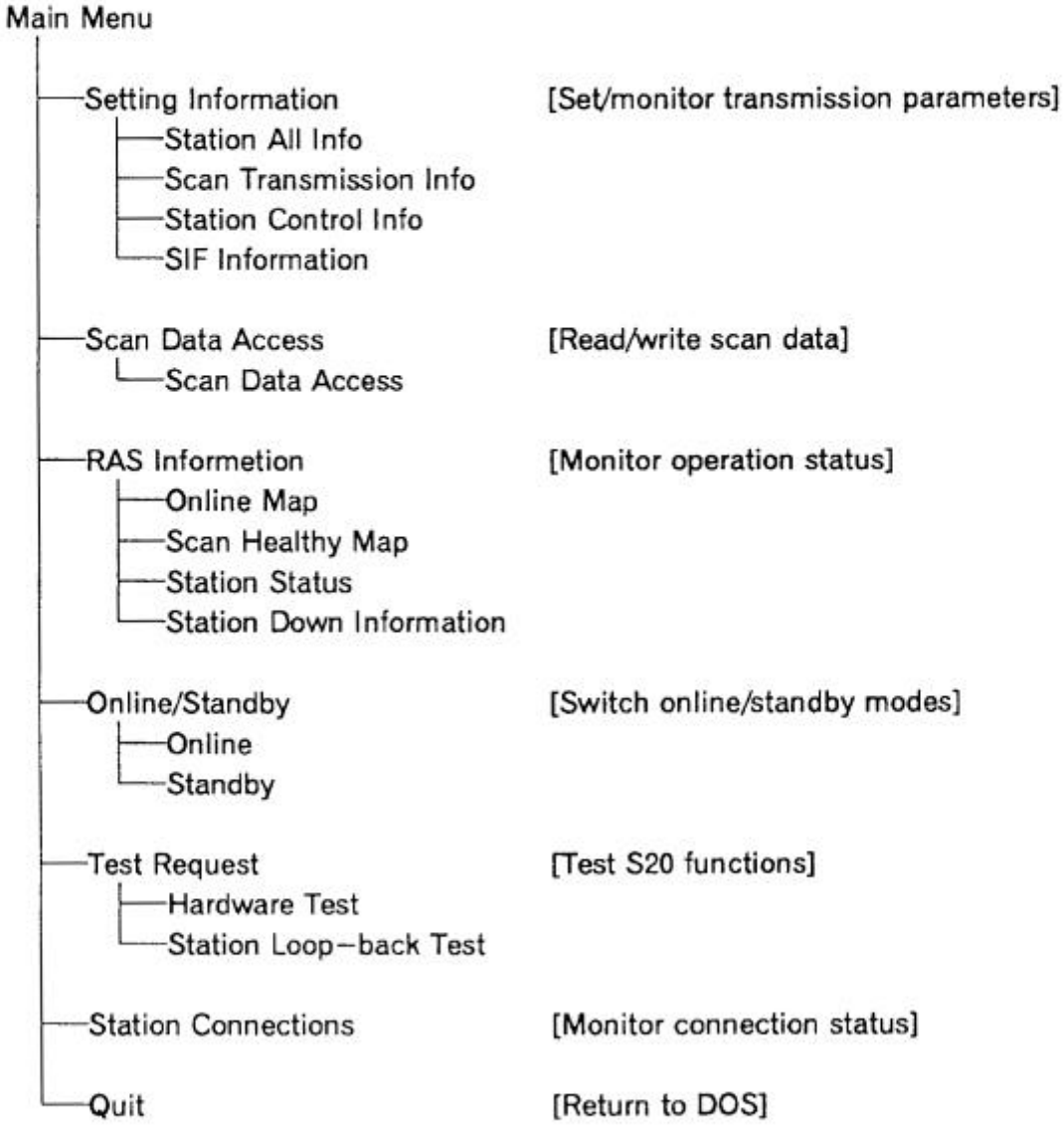
  GND ····· When this switch is ON, outside conductor of the coaxial cable will be connected to the T2/T3's frame ground (FG).
  Set this switch to ON at one station which is in most stable electro−magnetic environment.

1.3 S-LS overview

The S-LS is a software for S20, that runs on IBM ® or compatible personal computer. The S-LS is used to set the transmission parameters and to monitor S20's operation status. The transmission parameters set by S-LS is stored in the S20-station's built-in EEPROM.

Connection between S-LS (personal computer) and S20-station is made by an optional cable, that is the same cable as for T-PDS.

The menu tree of the S-LS is as follows.



1.4 Specifications

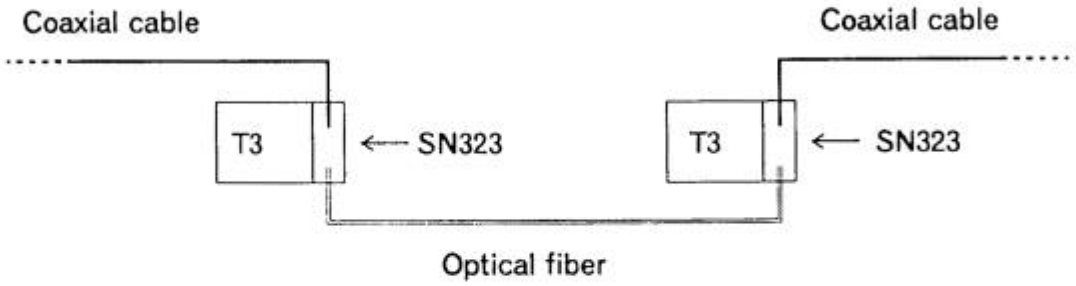
S20 system specifications

Type	Coaxial cable type	Optical fiber type
Transmission cable	5C−2V (JIS C3501)	Silica glass GI 50/125 μ m (JIS C6820)
Cable connection (cable side connector)	BNC−P−5 BNC−TA (JPJ)	FC connector (JIS C5970)
Transmission distance	Max. 1 km (total)	Max. 1 km (between stations)
	Max. 10 km (system total)	
Topology	Bus	
Number of stations	Max. 64 stations	
Transmission speed	2 Mbps	
Transmission code	Manchester	Differential Manchester
Modulation method	Base Band	
Communication service	(1) Scan transmission (cyclic broadcast) (2) Message transmission (on request)	

S20-station specifications

	S20-station for T2	S20-station for T3
Station type	SN221 ··· Coaxial cable SN222 ··· Optical fiber	SN321 ··· Coaxial cable SN322 ··· Optical fiber SN323 ··· Coaxial/optical (note 1)
Max. number on T2/T3	1 station	2 stations (note 2)
Scan transmission capacity	1024 words (Link register W in T2/T3 is assigned)	
Message transmission support	S-LS (primary/secondary) T-PDS (primary/secondary) T-series Computer Link protocol (secondary)	
RAS information	Station status, Online/standby map, Scan healthy map (monitored in T2/T3)	
Consumed current (internal 5Vdc)	SN221 ··· 600mA or less SN222 ··· 700mA or less	SN321 ··· 800mA or less SN322 ··· 800mA or less SN323 ··· 800mA or less

Note 1) By using the coaxial/optical mixture type station (SN323), partial optical system can be configured.

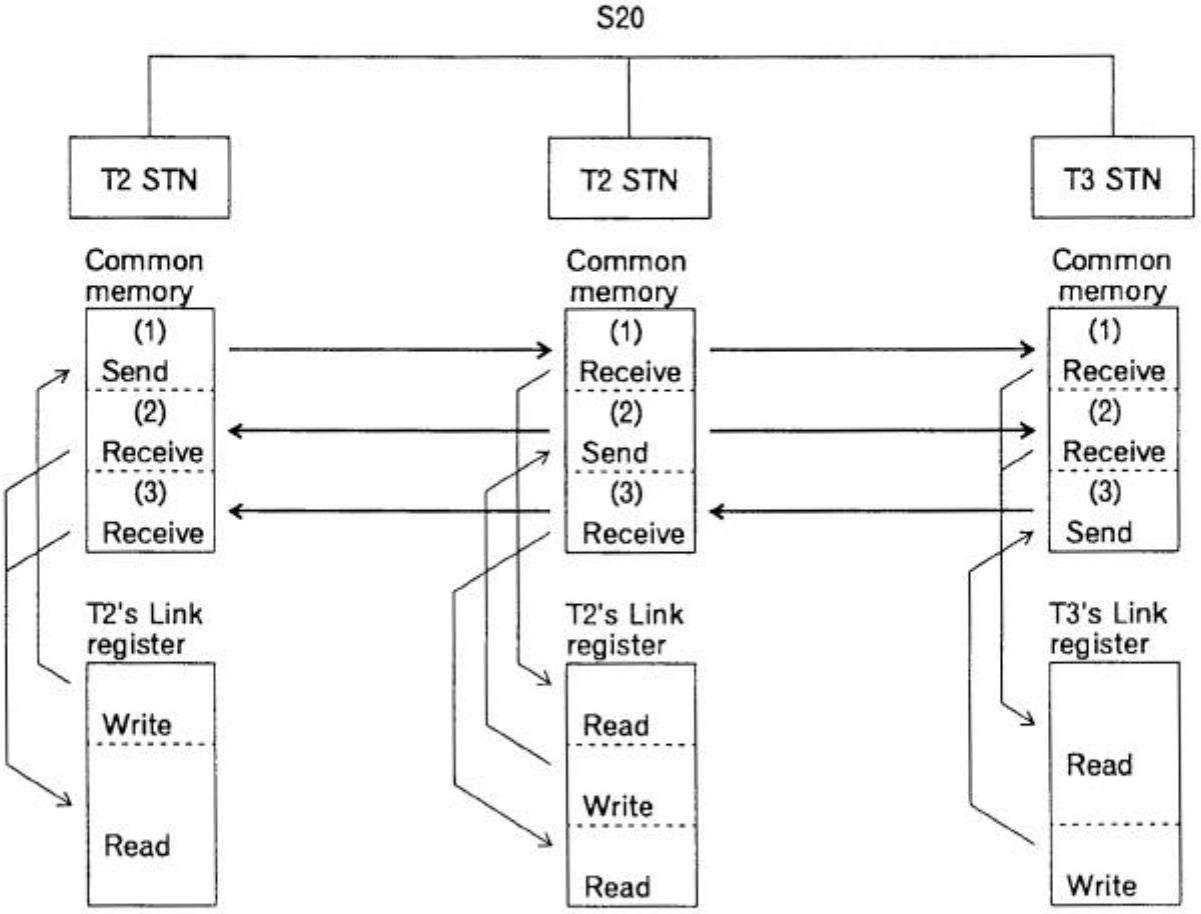


Note 2) The T3 which has two S20-stations can work as a bridge station for two S20 layers.

2. Scan transmission overview

The Scan transmission method is suitable for real time control data linkage.

In the S20, data sending station is rotated cyclically. Each station has common memory for Scan transmission. The size of the common memory is 1024 words. When a station becomes the data sender station, it sends data of prespecified area of the common memory. All other stations receive the data, and store them into their common memory. Therefore, the common memory in each station is totally updated in a transmission cycle.
The common memory is allocated to the Link register (W) in the T2/T3. By simply reading/writing data from/to the Link registers, high speed data linkage is achieved.



Note 1) The data send block(s) of each station is prespecified by using the S–LS.
Note 2) Data transfer between common memory and Link registers is executed by T2/T3's OS. The transfer direction (read or write) is automatically decided.

- **Master station and slave stations**

When power is applied to each S20−station, one station which has lowest station number becomes the master station. And all other stations become the slave stations. The master station controls total timing of the S20 network.
The master station is not fixed. In the connected stations, lowest station number's station becomes the master. (Except station number 64. Station 64 has highest priority for master)

- **Setting the "data send block" (by S−LS)**

On each station, the "data send block" is prespecified by using the S−LS. This setting is made by entering the starting addess and the size (number of send words).
On a station, up to two "data send blocks" can be specified. (see Section 3.3)

- **I/O allocation and network assignment (by T−PDS)**

On each T2/T3, the I/O allocation for S20−station and the network assignment are necessary.
By using the T−PDS's I/O allocation function, allocate the S20−station as "TL−S". And by using the T−PDS's Network assignment function, assign (set "LINK" or "GLOBAL") the Link registers (W) to the S20−station's common memory, Block by Block. (see Section 3.2)

Block 1: W0000 to W0063	Block 9: W0512 to W0575
Block 2: W0064 to W0127	Block 10: W0576 to W0639
Block 3: W0128 to W0191	Block 11: W0640 to W0703
Block 4: W0192 to W0255	Block 12: W0704 to W0767
Block 5: W0256 to W0319	Block 13: W0768 to W0831
Block 6: W0320 to W0383	Block 14: W0832 to W0895
Block 7: W0384 to W0447	Block 15: W0896 to W0959
Block 8: W0448 to W0511	Block 16: W0960 to W1023

T2/T3 accesses the common memory only for the assigned Blocks. (This "Block" and S20's "Data send block" are different.)

"LINK" is normal assignment setting. "GLOBAL" is the setting for multi layers Scan transmission. (effective only in T3)

3. Settings for data linkage

3.1 Station number setting

Each station should have unique station number. If a station number is duplicated, the S20 network cannot be established. Allowable station number is 1 to 64.
To set the station number, two rotary switches (STNH and STNL) are provided on each station. STNH is for 10's digit setting, and STNL is for 1's digit setting.

(For example)

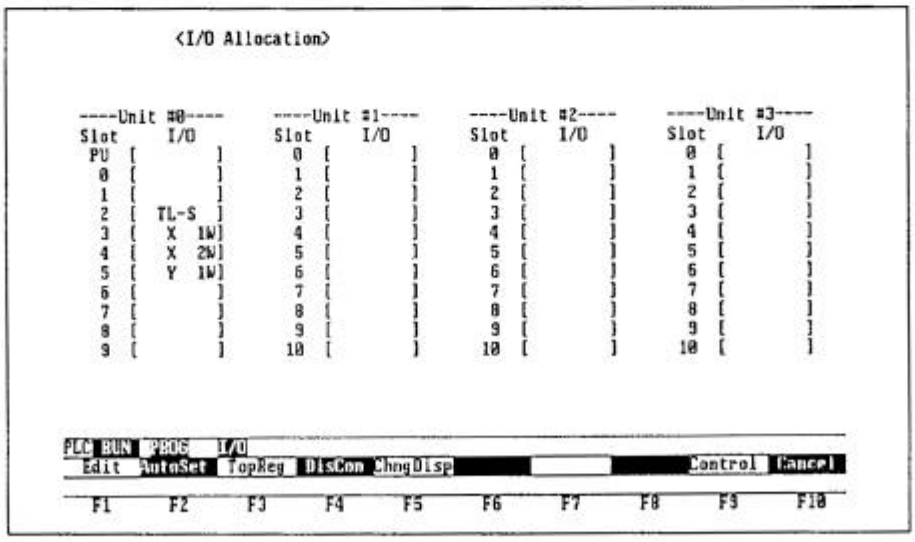
STNH = 1
STNL = 5] ←—— Station number is 15

3.2 Settings on T–PDS

The following settings are necessary for the T2/T3 on which the S20–station is mounted.

(1) I/O allocation
Allocate the S20–station as "TL–S".

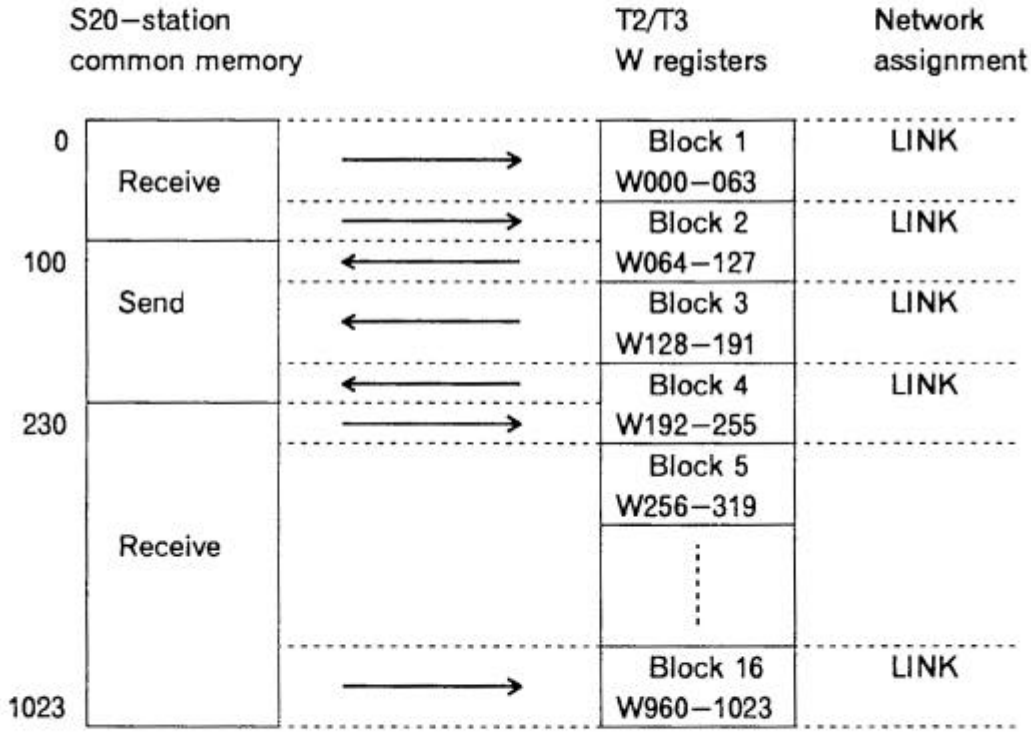
<T–PDS screen example>
S: System Information
└ A: I/O Allocation
└ A: I/O Allocation



(2) Network assignment

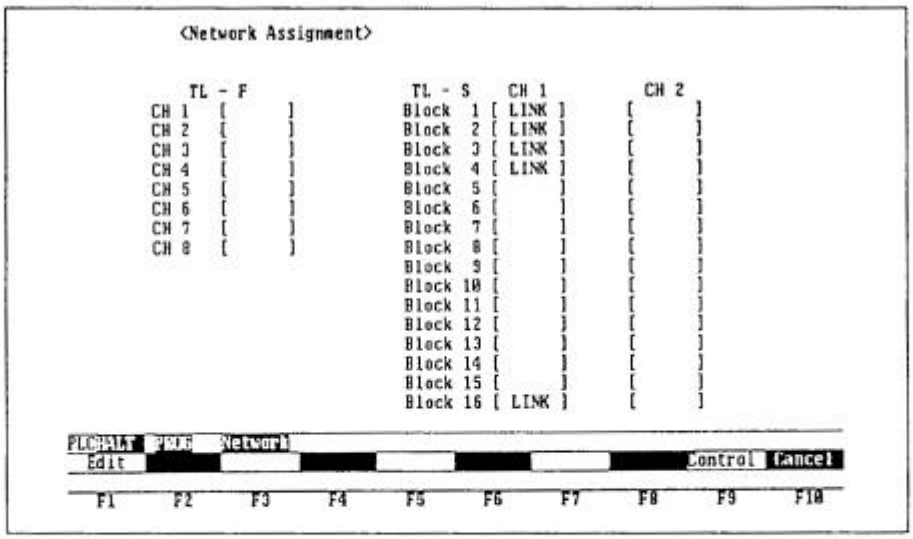
a) Set "LINK" for the Blocks to be assigned.

<Setting example 1>



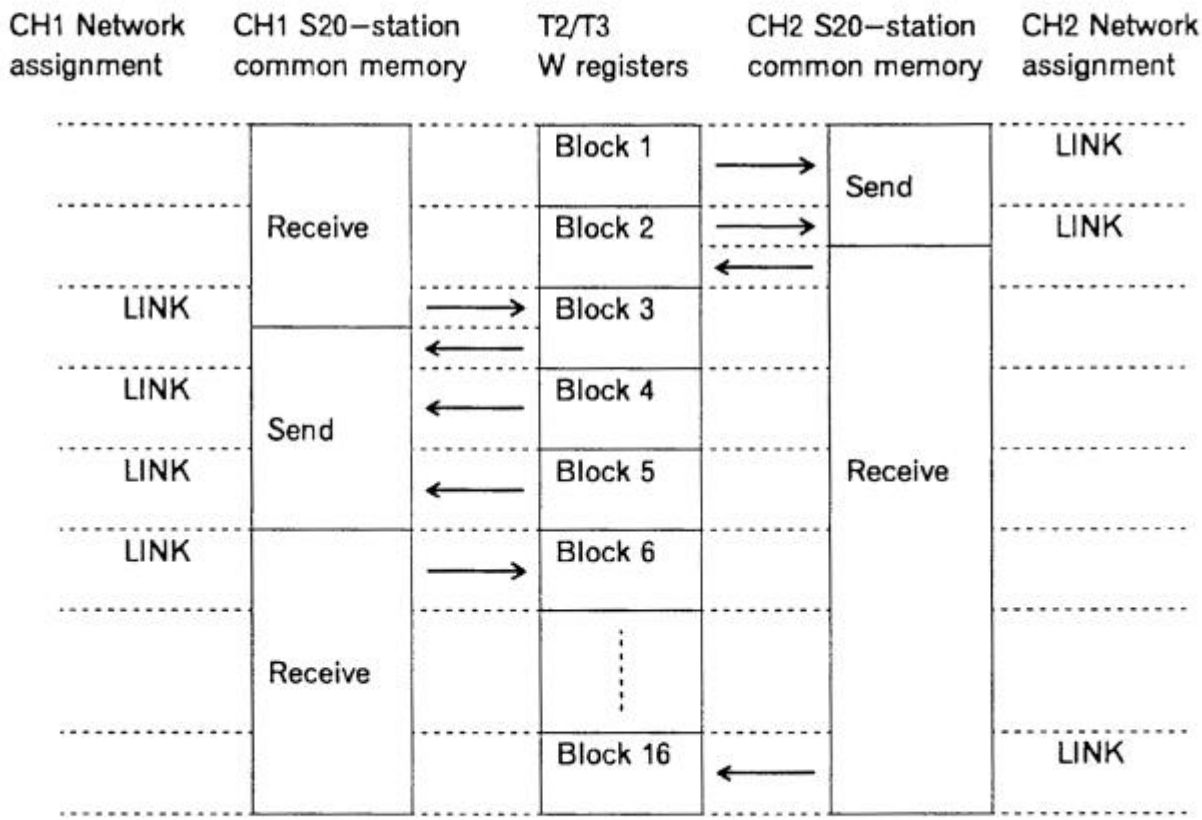
<T–PDS screen example 1>

S: System Information
└ A: I/O Allocation
└ N: Network Assignment

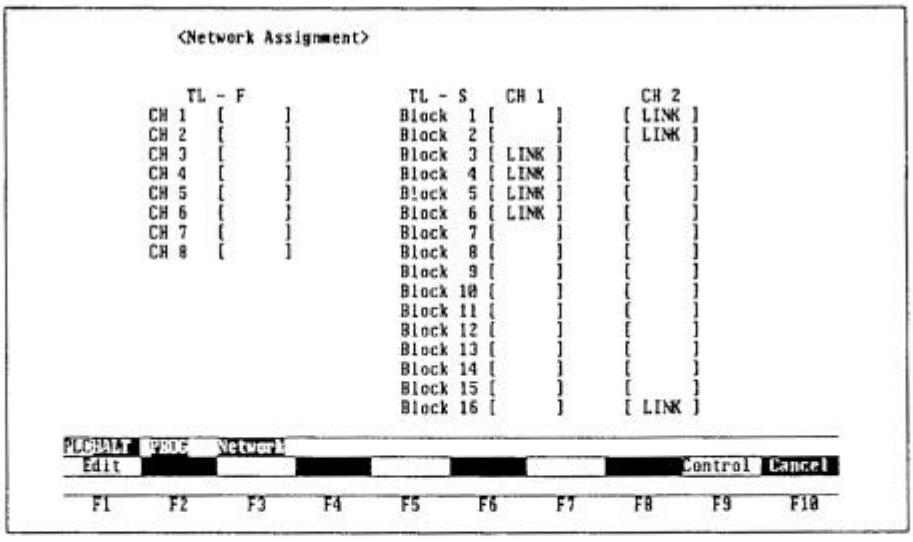


b) If two S20−stations are mounted on the T3, the station which is allocated closer to the CPU in the I/O allocation (see (1)) is assigned as CH1. And the other is assigned as CH2. (CH2 is invalid for T2)

<Setting example 2>

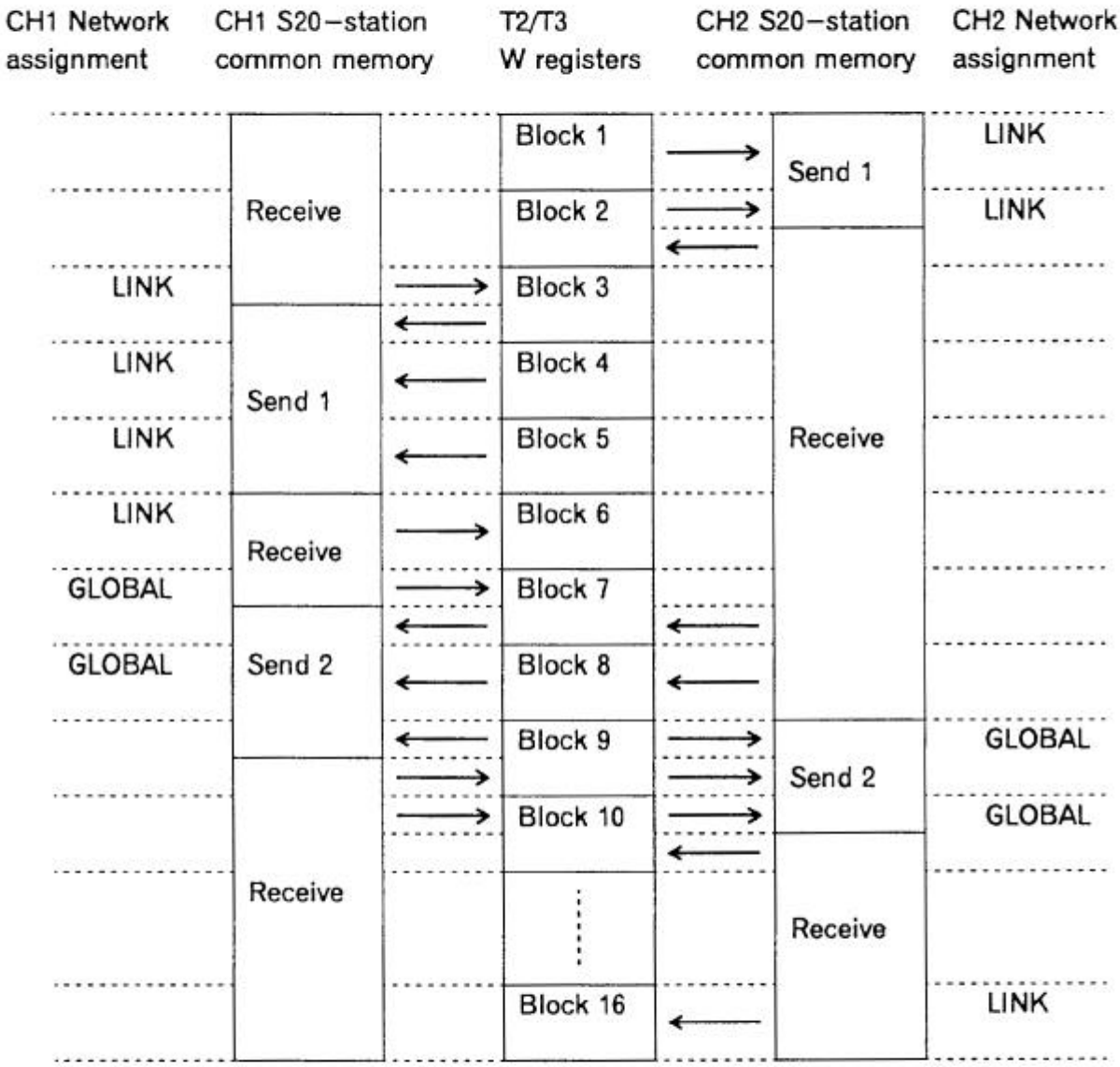


<T−PDS screen example 2>

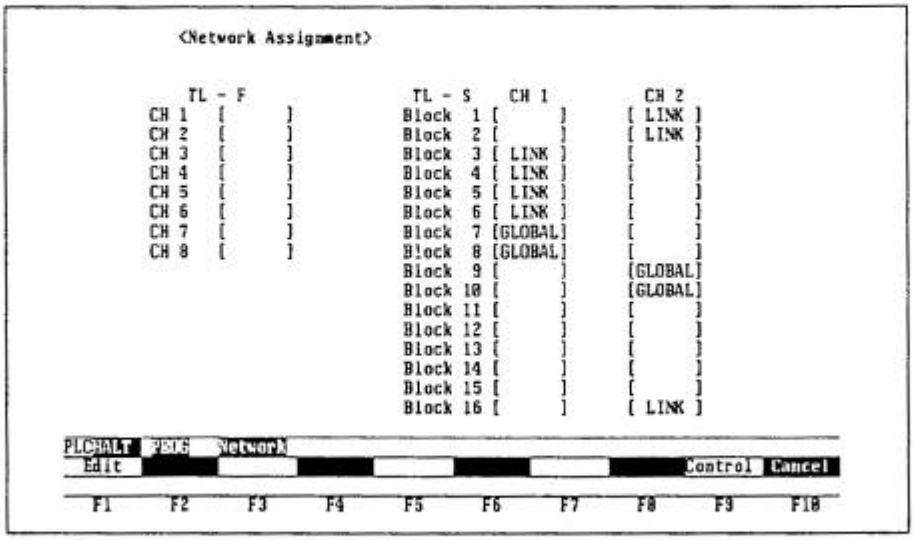


c) If two S20−stations are mounted on the T3 and multi layers Scan transmission function is used, use the "GLOBAL" setting. (GLOBAL is invalid for T2)

<Setting example 3>



<T–PDS screen example 3>



Note) The following rules are applied to the Network assignment.

- Do not set LINK both for CH1 and CH2 for the same Block. If duplicated, CH1 has priority.
- In the GLOBAL setting Block, the "receive" side CH data is transferred to the W register and the "send" side CH. In this case, GLOBAL can be set on either CH.
- In the GLOBAL setting Block, if both CHs are specified as "send", the W register data is transferred to both CHs.
- In the GLOBAL setting Block, if both CHs are specified as "receive", the GLOBAL setting CH data is transferred to the W register. If both CHs have been set as GLOBAL, CH1 has priority.
- If TOSLINE–30 is used together, the TOSLINE–30 is allocated to the W registers from the lowest address. In this case, the W registers which are assigned to the TOSLINE–30 should not be assigned to the S20. (TOSLINE–30 is available only for T2)

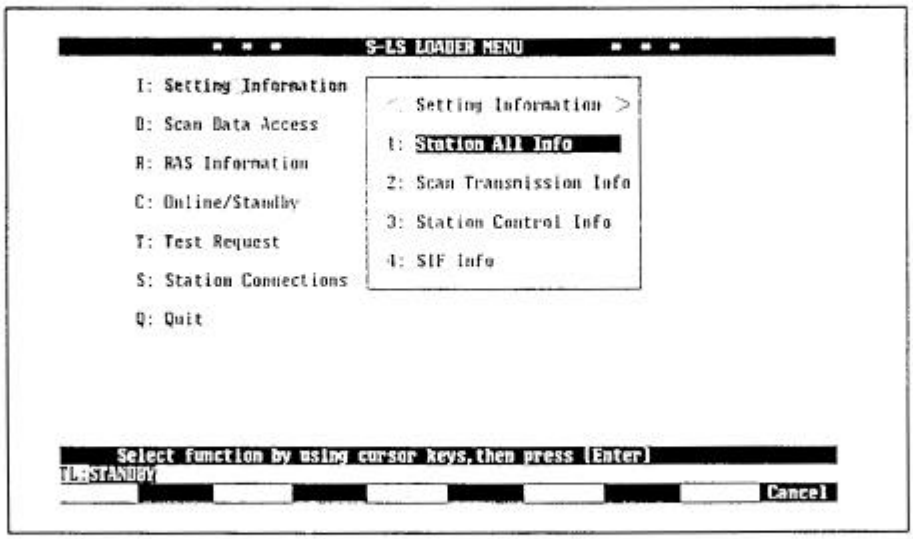
3.3 Settings on S–LS

(1) Start–up the S–LS
Connect the S–LS (personal computr) and the S20–station by the optional cable.
Start–up the S–LS by typing **SLS[Enter]** on DOS.

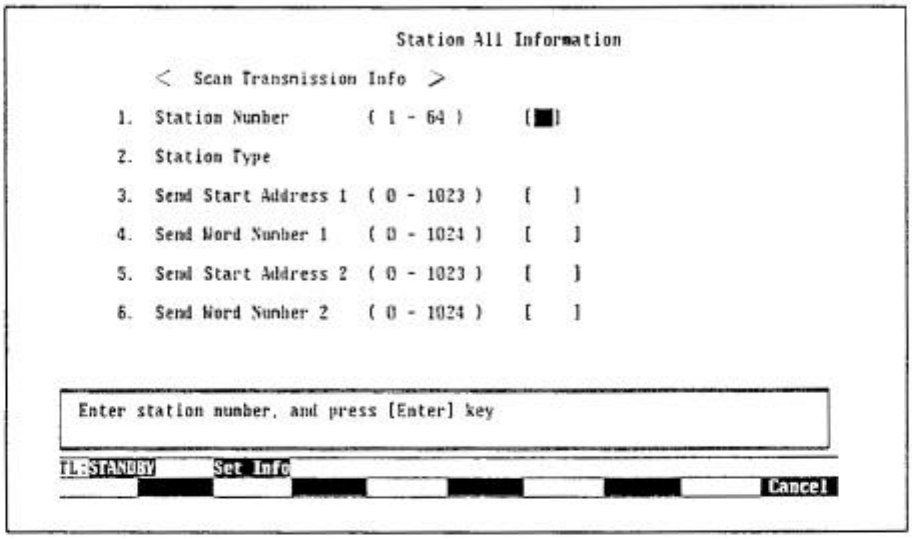
(2) Turn the T2/T3 to HALT

(3) Confirm the S20–station status
Confirm the status of the connected S20–station is "STANDBY". It is displayed on the S–LS screen as below.

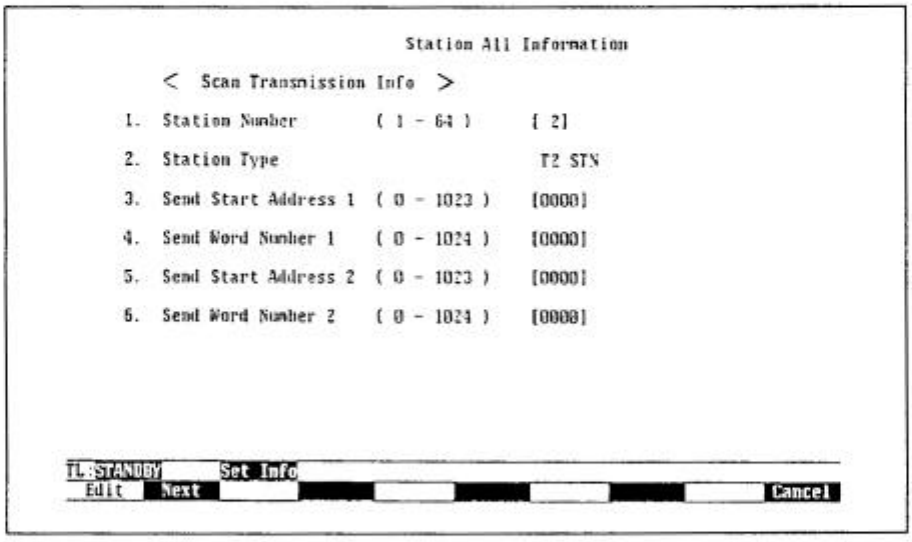
(4) Settings of data send block. Operate the S–LS as follows.
Select **Setting Information**



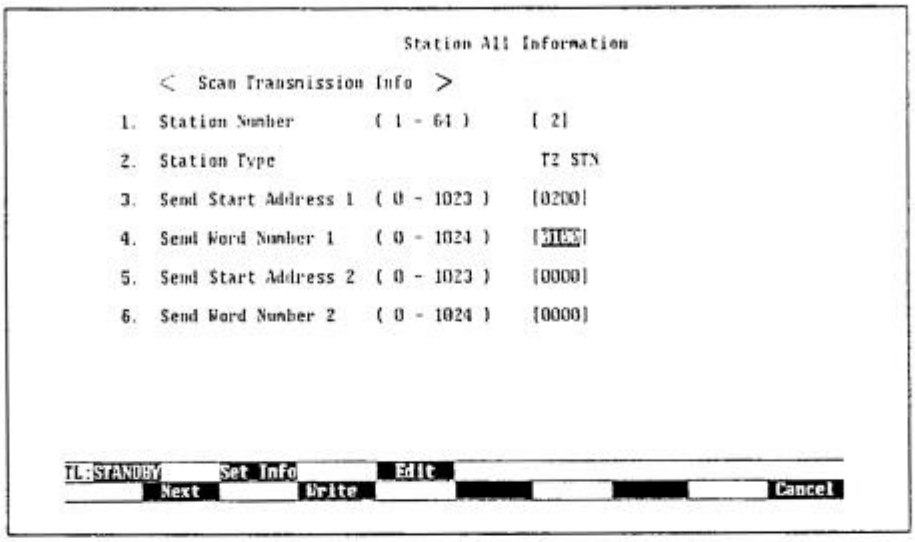
Select **Station All Info**



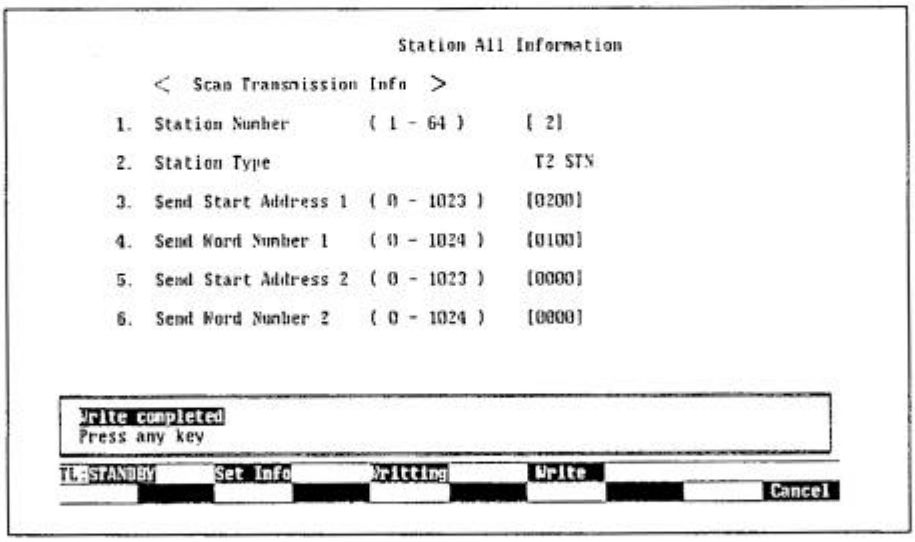
Enter the station number of the connected S20−station



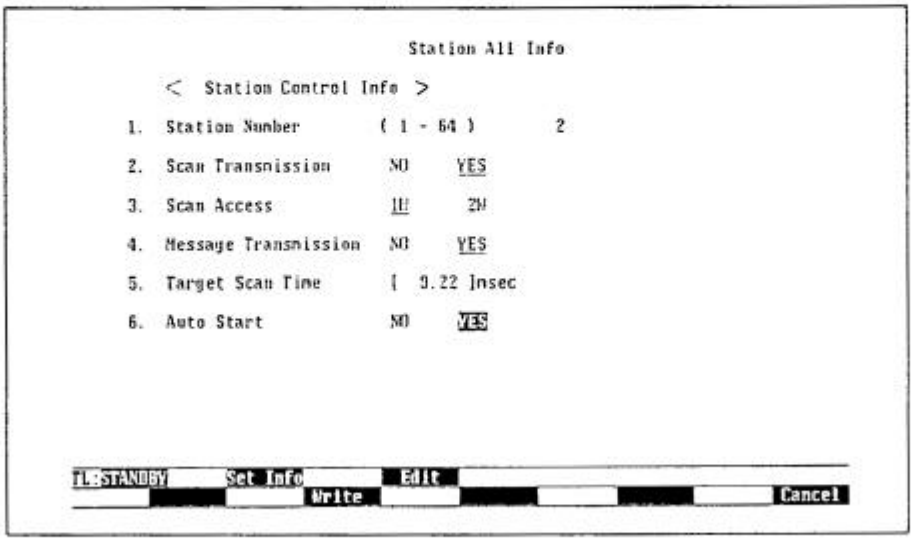
Select **Edit(F1)** and specify the "data send block(s)".
The "data send block" is specified by entering the starting address (Send Start Address 1/2) and the size (Send Word Number 1/2).
Up to two "data send blocks" can be specified. If "data send block 2" is not used, enter 0 both for Send Start Addess 2 and Send Word Number 2.



Write the settings into the S20–station. Press **Write(F4)**, and **[Enter]**.
When the settings are correctly writen into the S20–station's EEPROM, "Write completed" will be displayed.



(5) Settings of station control information
Press **Next(F2)** to display the station control information. Then press **Edit(F1)**. Select by cursor and press **[Enter]**.



· **Scan Transmission**
Enable/disable the Scan transmission. Select **YES** to use the Scan transmission function.

· **Scan Access**
Scan data synchronization 1 word or 2 words. If **2W** (2 words) is selected, data synchronization of double-word data (lower even and higher odd addresses) is achieved. In this case, **2W** setting is needed both on the sender and receiver stations. Also, if **2W** is selected, Send Start Address and Send Word Number must be even number.

· **Message Transmission**
Enable/disable the Message transmission. The Message transmission is used for S-LS remote setting/monitoring, T-PDS remote programming and T-series computer link protocol. Normally select **YES**.

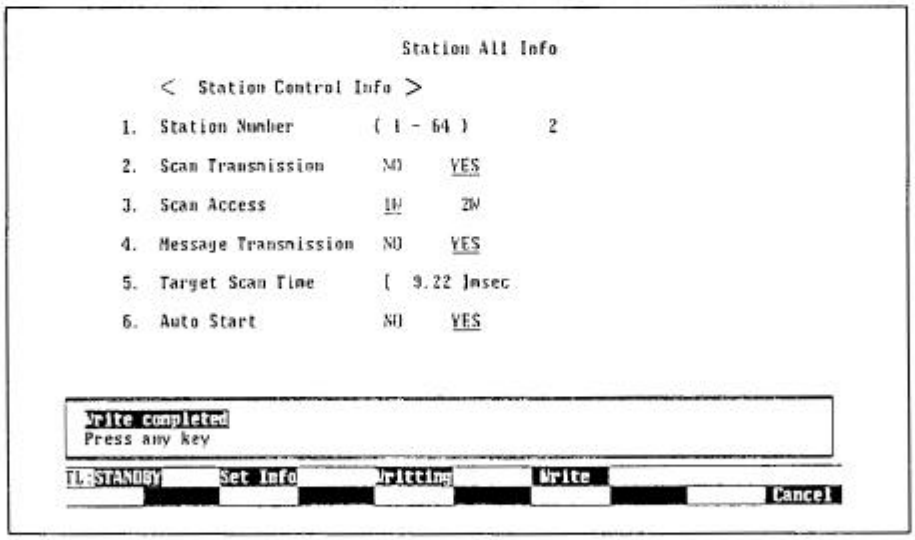
· **Auto Start**
When **YES** is selected, Scan transmission is automatically started at power-up. When **NO** is selected, Scan transmission is not started until Online request is issued by S-LS. Normally select **YES**.

· **Target Scan Time**
A time factor for limiting the time assigned for the Message transmission. The actual Scan time (time of Token passes all stations) is either longer one the Target Scan time or time for Scan transmission. (see Apendix A.1)
The Target Scan time should be the same value in all stations connected to the S20 network (layer).
The Target Scan time can be selected from the following value by [←] or [→] keys.

3.07	8.19	13.3	24.6	45.1
4.10	9.22	14.3	28.7	49.2
5.12	10.2	15.4	32.8	53.2
6.14	11.3	16.3	36.9	57.3
7.17	12.3	20.5	41.0	61.4

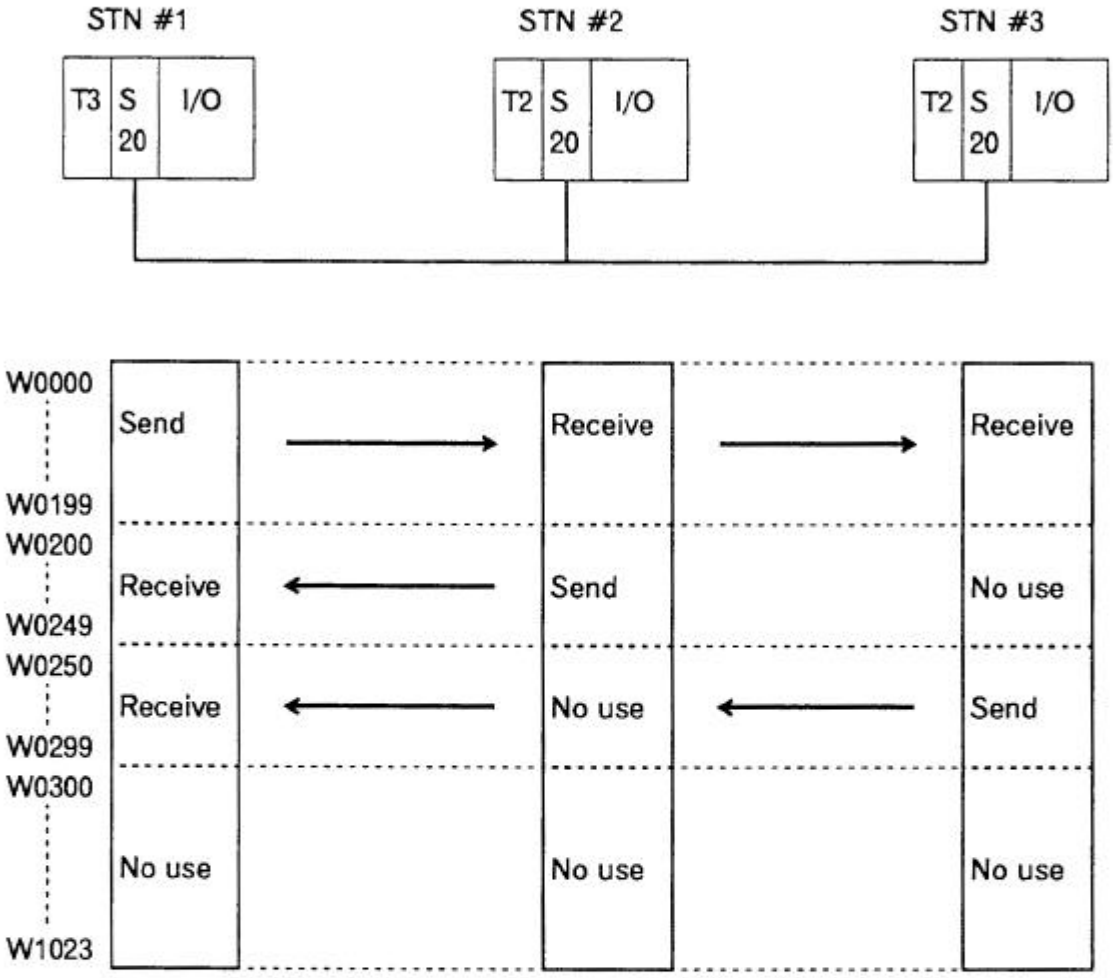
Note) If Message transmission cannot work normally or a S20−station becomes Error down by Receive buffer overflow, the time for Message transmission is not enough. In such case, increase the Target Scan time value.

Write the settings into the S20−station. Press **Write(F4)**, and **[Enter]**.
When the settings are correctly writen into the S20−station's EEPROM, "Write completed" will be displayed.



(6) Change connection to other stations, and repeat (2) to (5).
S−LS remote setting (without changing connection) is also available by selecting the station number. In this case, change the station mode to "STANDBY" by S−LS before setting.

3.4 Data linkage example



STN #1 T3 sends 200 words data (W0000 to W0199) to STN #2 and #3 T2s.
STN #2 T2 sends 50 words data (W0200 to W0249) to STN #1 T3.
STN #3 T2 sends 50 words data (W0250 to W0299) to STN #1 T3.

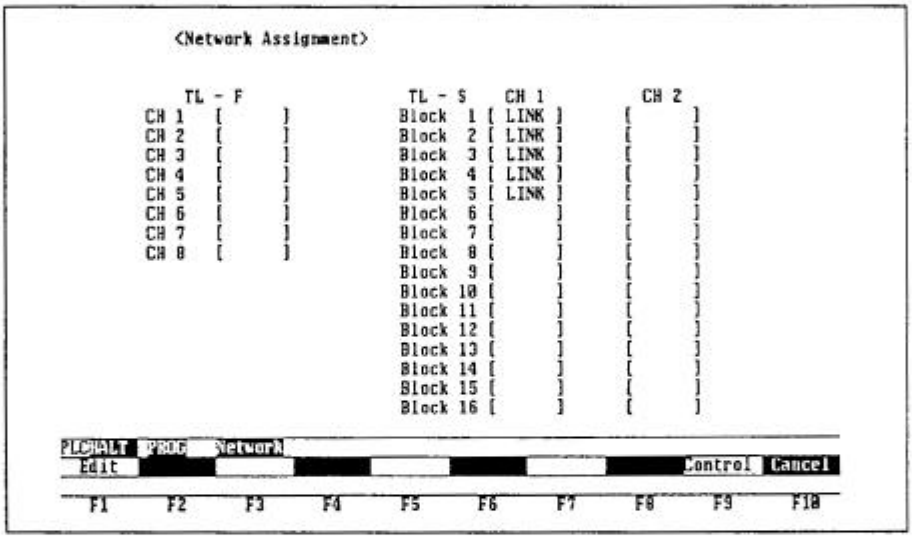
Necessary settings for this data linkage configuration are as follows.

- Settings on T–PDS

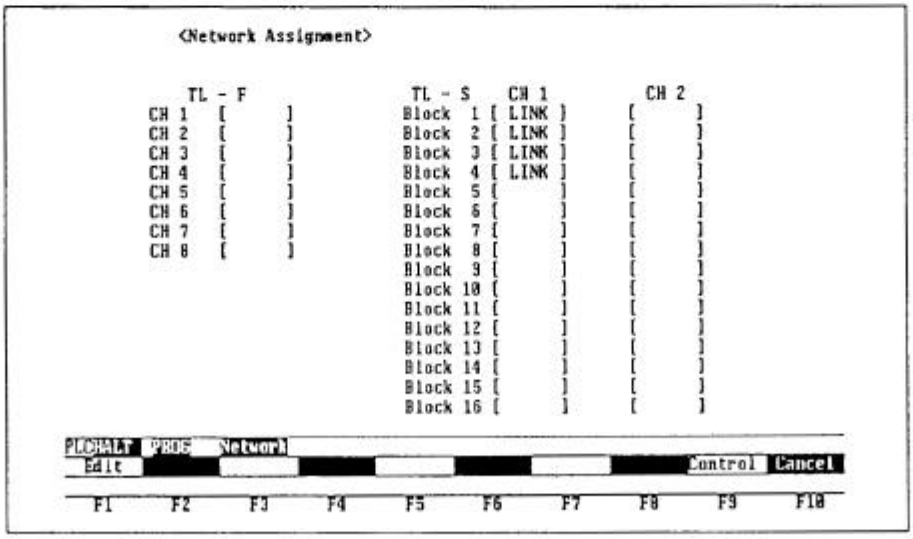
  Allocate the S20–station as "TL–S" by using the automatic I/O allocation command or the manual I/O allocation function of the T–PDS in all T3/T2s.

  By using the Network assignment function of the T–PDS, sssign the Blocks to cover the using W registers.

For STN #1 T3 and STN #3 T2: set LINK for Blocks 1 to 5 (W0000 to W0319)



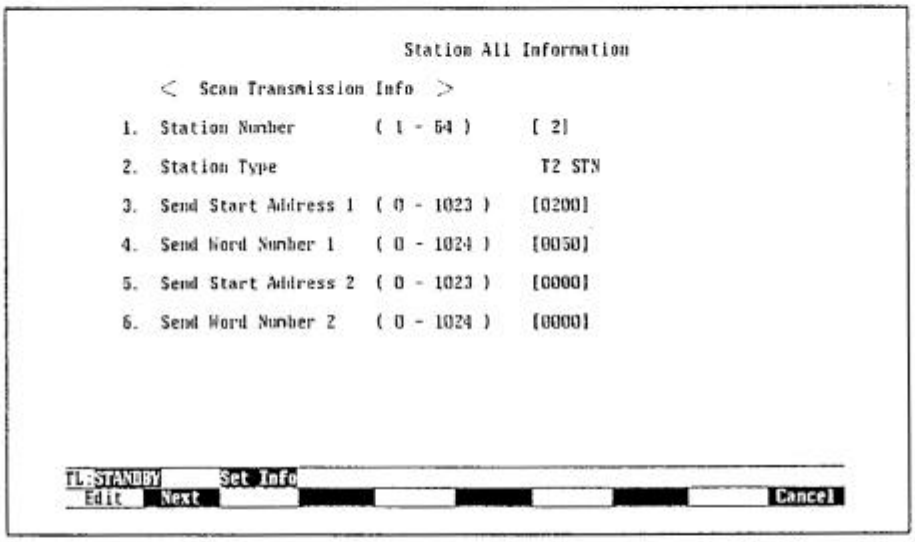
For STN #2 T2: set LINK for Blocks 1 to 4 (W0000 to W0255)



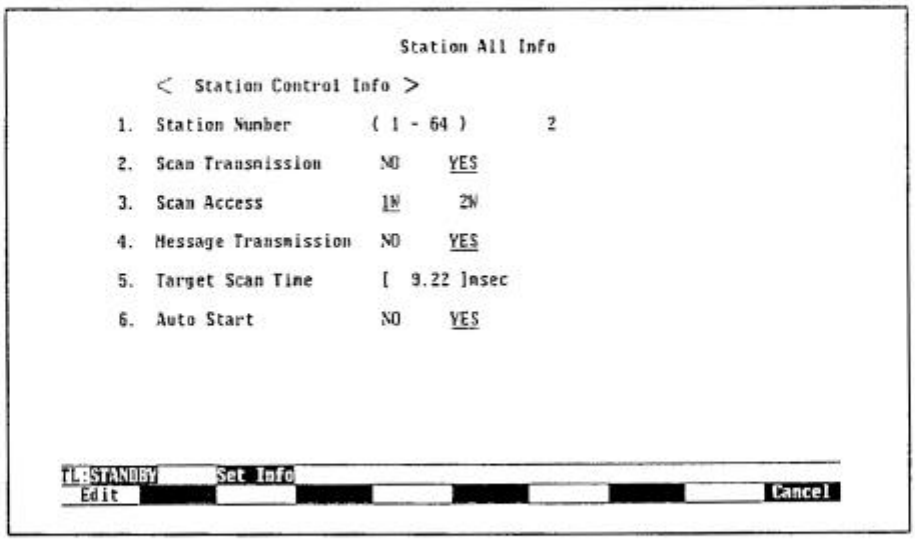
· Settings on S–LS

Station Number	1	2	3
Send Start Address 1	0000	0200	0250
Send Word Number 1	0200	0050	0050
Send Start Address 2	0000	0000	0000
Send Word Number 2	0000	0000	0000
Scan Transmission	YES		
Scan Access	1W		
Message Transmission	YES		
Target Scan Time	9.22 msec		
Auto Start	YES		

<S–LS setting screen 1 for STN #2>

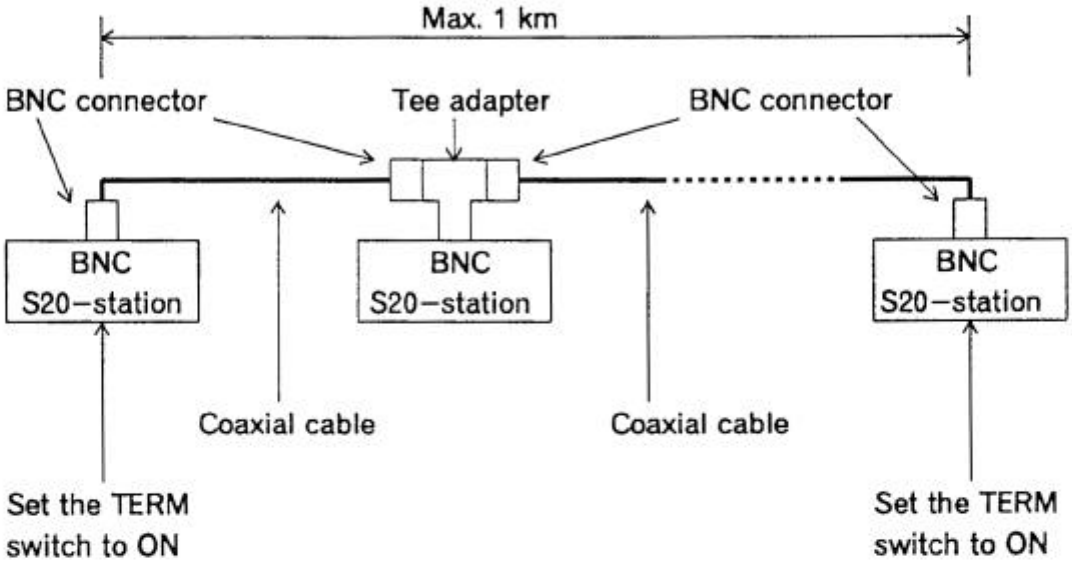


<S-LS setting screen 2 for STN #2>



4. Cable connection

4.1 Coaxial cable system



Item	Type	Remarks
Coaxial cable	5C−2V (JIS C3501)	Characteristic impedance = 75 Ω
BNC connector	BNC−P−5	Cable side
Tee adapter	BNC−TA (JPJ)	For cable branch

Note 1) Separate the transmission cable (coaxial cable) from high power lines and equipments as far as possible. The table below shows a guideline for the distance between coaxial cable and high power line when they run in parallel.

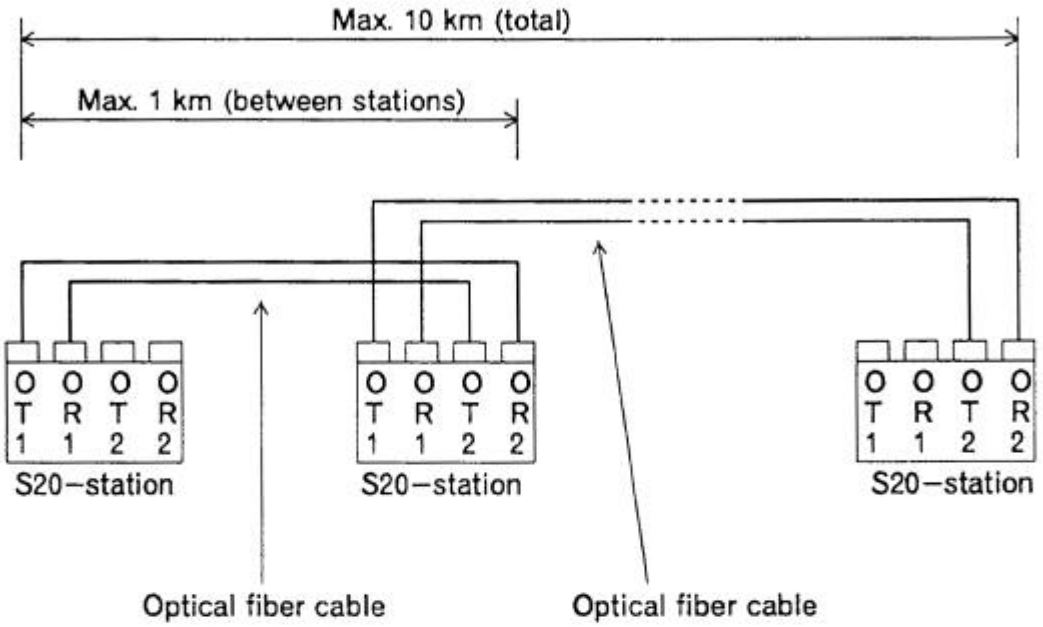
Power line	Minimum distance (mm)			
Voltage Current	> 100A	100 – 50A	50 – 10A	10A >=
more than 440V	2000	2000	2000	2000
440V or less	2000	600	600	600
220V or less	2000	600	600	500
110V or less	2000	600	500	300
60V or less	2000	500	300	150

Note 2) When installing the coaxial cable, take care that the bending radius is not lesser than the cable's allowable limit.

Note 3) Set the TERM switch to ON at both terminal stations.

Note 4) Set the GND switch to ON at one station (most stable electro–magnetic environment).

4.2 Optical fiber cable system



OT1, OT2: Transmitter
OR1, OR2: Receiver

Item	Type
Optical fiber cable	Silica glass, GI (Graded index) type (JIS C6820) 50/125 μm (core/cladding dia.)
Optical connector	FC connector (JIS C5970)

	Optical fiber characteristics
Material	Silica glass, Graded index
Core diameter	50 $\pm$ 3 μm
Cladding diameter	125 $\pm$ 3 μm
Coating	Nylon (diameter: 0.9 $\pm$ 0.1 mm)
Numerical Aperture	0.21 $\pm$ 0.02
Attenuation	3.0 dB/km or less
Bandwidth	400 MHz·km or more
Wavelength	0.85 μm

Note 1) Securely connect the optical connectors. Otherwise, connection loss will increase.

Note 2) Do not bend the optical fiber cable/cord more than the allowable limit.

Note 3) Clamp the optical fiber cable/cord to prevent the optical connector weighted.

Note 4) At both terminal stations, one set of optical connectors are not used. Securely attach the caps to the unused connectors.

4.3 Coaxial/optical mixture system

By using the coaxial/optical mixture type station (SN323), coaxial/optical mixture system can be configured. (see Note 1 of page 10)
This system is effective to prevent the interference by partial severe electro−magnetic environment.

Follow the wiring instructions described in 4.1 and 4.2 for each segment.

5. RAS function

5.1 Behavior in trouble

(1) Coaxial cable system

- Station down
  If a station (either master or slave) becomes down or power off, the abnormal station will be disconnected from the S20 system (re−configuration), then communications of remaining stations will be re−started.

- Transmission cable breakage
  If the transmission cable (coaxial cable) breakage occur, the S20 system will not continue normal communications because of abnormal termination impedance.

(2) Optical fiber system

- Station down
  If a station (either master or slave) becomes down, the abnormal station will be disconnected from the S20 system (re−configuration), then communications of remaining stations will be re−started.
  If a station (either master or slave) becomes power off, the S20 system will split into two independent S20 systems at the power off station.

- Transmission cable breakage
  If both transmmiter and receiver lines are broken, the S20 system will split into two independent S20 sysems. However, if one of the two lines is broken, the S20 system will split into two systems but one system cannot continue normal communications because of interference of the other system.

5.2 Self-diagnostic function

The S20-station has the following self-diagnostic function.

- At initialization (at power-up)

Diagnostic item	Station operation in abnormal
ROM BCC check	Station moves into Down mode. Communications with other stations are not possible. This state will be reset by power off/on or pressing Reset switch.
RAM read/write check	
CPU and peripheral LSI check	
Station number check	
Transmission parameter (EEPROM) check	Station moves into Standby mode. In this state, scan transmission is not possible but message transmission is available. Station waits for transmission parameter setting.

- During operation

Diagnostic item	Station operation in abnormal
Watch dog timer check	Station moves into Down mode. Communications with other stations are not possible. This state will be reset by power off/on or pressing Reset switch.
Abnormal transmission (jabber timer) check	
Receive frame check (CRC check)	Station ignores the abnormal frame.
Response check	In message transmission, if response from the target station cannot be received, station re-sends the frame.
No signal state check	If no signal state continues more than specified time (master station down), station starts re-configuration operation.

5.3 LED indication

The S20–station is equipped with STN, ONL and SCAN LEDs, which indicate the station modes.

STN	ONL	SCAN	Station mode	Remarks
Lit	Lit	Lit	Online	Scan transmission is enabled
		Not lit	Online	Scan transmission is disabled
Lit	Not lit	Not lit	Offline	
Lit	Blink	Not lit	Standby	• Transmission parameter is not written in EEPROM • Auto start is not selected • T2/T3 is not RUN mode
Not lit	Blink (simultaneously)	Blink	Down	Station number is illegal
	Blink	Not lit	Down	Jabber timeout
	Not lit	Blink	Down	Serial interface error (SIF only)
	Blink (alternately)	Blink	Down	Watch dog timer error

5.4 RAS information monitored in T2/T3

RAS information of the S20 system is reflected in the special registers (SW) of T2/T3. This information can be referred in the T2/T3's user program.

SW110	CH1 station status	(1 word)
SW111	CH2 station status (only in T3)	(1 word)
SW112	CH1 online map	(4 words)
SW116	CH2 online map (only in T3)	(4 words)
SW120	CH1 standby map	(4 words)
SW124	CH2 standby map (only in T3)	(4 words)
SW128	Scan healthy map	(64 words)
SW191		

(1) Station status
Indicates the status of the S20−station mounted on the T2/T3.

	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0
SW110 (SW111)	a	b	c	d							e	f				g

a = 1: Down mode
b = 1: Offline mode
c = 1: Stanby mode
d = 1: Online mode
e = 1: Scan transmission disabled
f = 1: Master station
g = 1: Test executing

(2) Online map
Indicates the online stations in the S20 network.

	F	E	D	C	----------	3	2	1	0
SW112 (SW116)	#16	#15	#14	#13		#4	#3	#2	#1
SW113 (SW117)	#32	#31	#30	#29		#20	#19	#18	#17
SW114 (SW118)	#48	#47	#46	#45		#36	#35	#34	#33
SW115 (SW119)	#64	#63	#62	#61		#52	#51	#50	#49

#n = 1: Station number n is online
= 0: Station number n is other than online

(3) Standby map
Indicates the standby stations in the S20 network.

	F	E	D	C	----------	3	2	1	0
SW120 (SW124)	#16	#15	#14	#13		#4	#3	#2	#1
SW121 (SW125)	#32	#31	#30	#29		#20	#19	#18	#17
SW122 (SW126)	#48	#47	#46	#45		#36	#35	#34	#33
SW123 (SW127)	#64	#63	#62	#61		#52	#51	#50	#49

#n = 1: Station number n is standby
= 0: Station number n is other than standby

(4) Scan healthy map
Indicates the S20–station's scan data (commom memory) updating status (data validity) for each address. If two S20–stations are mounted on T3, assigned station's data is reflected.

	F	E	D	----------	2	1	0
SW128	W0015	W0014	W0013		W0002	W0001	W0000
SW129	W0031	W0030	W0029		W0018	W0017	W0016
SW130	W0047	W0046	W0045		W0034	W0033	W0032
⋮							
SW191	W1023	W1022	W1021		W1010	W1009	W1008

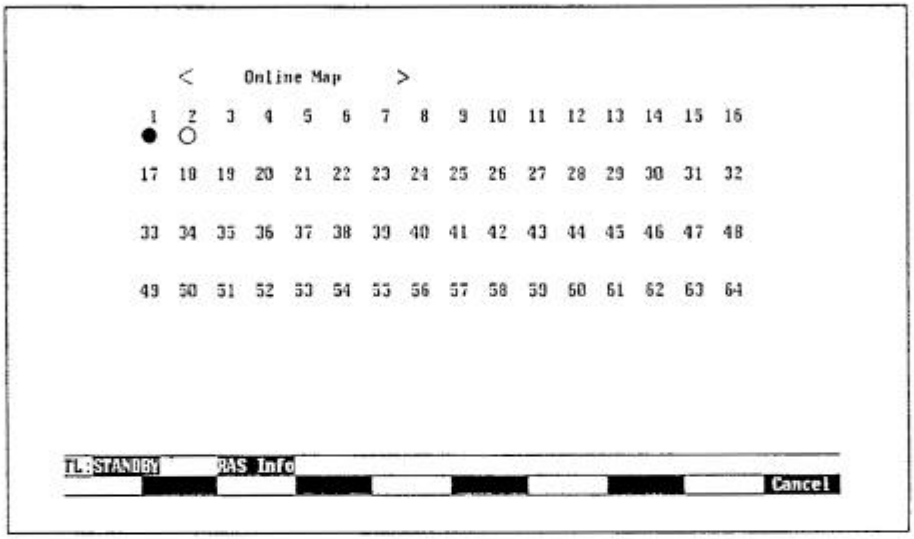
Wn = 1: The scan data assigned to Link register Wn is being updated normally
= 0: The scan data assigned to Link register Wn is not being updated or Wn is not assigned to scan data

5.5 RAS information monitored on S–LS

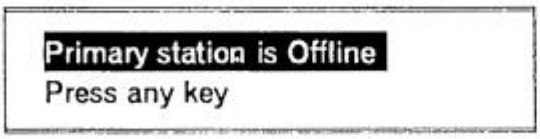
By connecting the S–LS, the following RAS information can be monitored.

(1) Online map

R: RAS Information
└ 1: Online Map

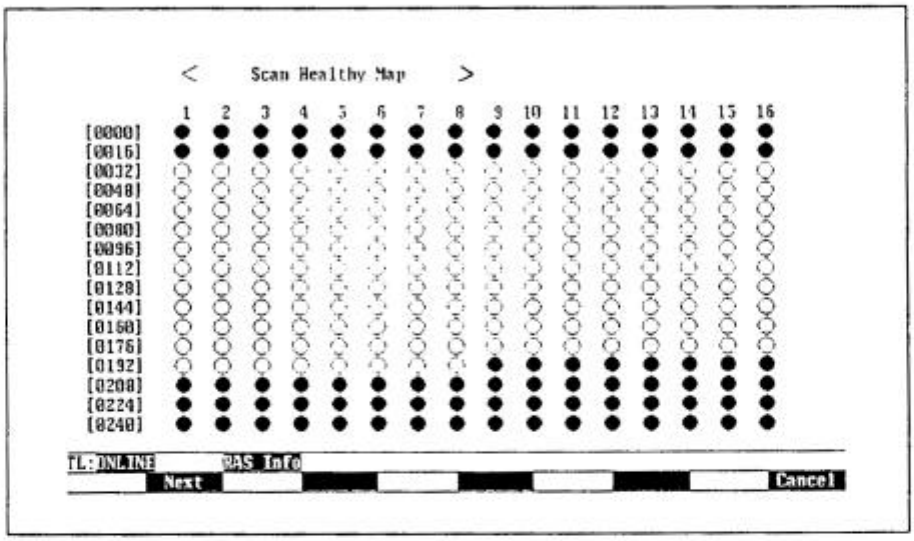


- The number (1–64) on the screen shows the Station number.
- The operaton mode displyed under the Station number means as follows.
  - ○ ------- Standby mode
  - ● ------- Online mode
  - Blank ---- Offline mode or not existing
- This information is read out from the S–LS connecting station every three seconds.
- If the S–LS connecting station is Offline or Down mode, the following message will be displayed on the screen.

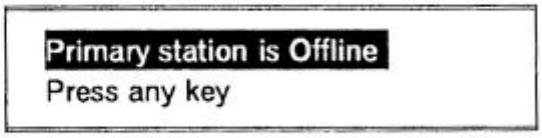


(2) Scan healthy map

R: RAS Information
└─2: Scan Healthy Map



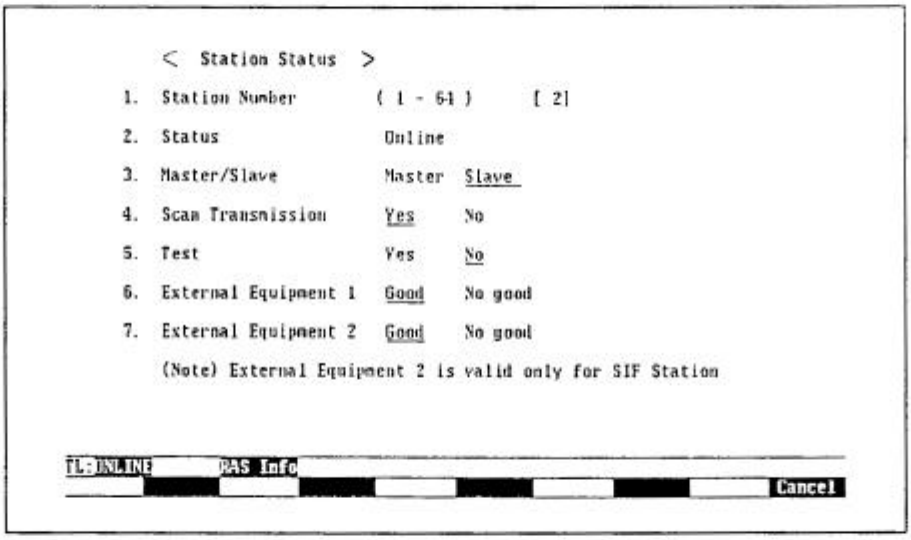
- Scan data updating status for each address is displayed.
  The number in [ ] shows the starting address of the line. The status means as follows.
  - ● ------- Normal
  - ○ ------- Not normal or not used for Scan transmission
- This information is read out from the S–LS connecting station every three seconds.
- If the S–LS connecting station is Offline or Down mode, the following message will be displayed on the screen.



(3) Station status

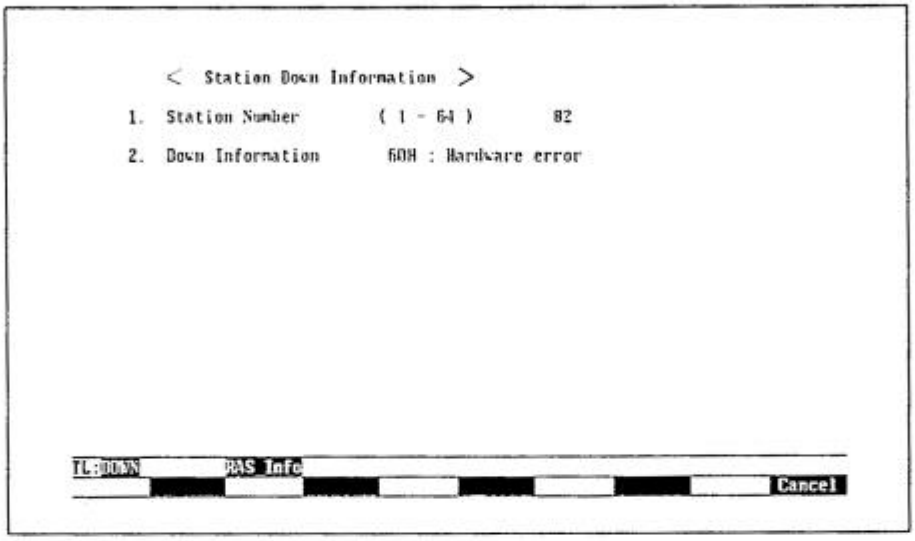
The operation status of the specified station can be monitored as follows.

R: RAS Information
└─ 3: Station Status



(4) Station down information
If the S–LS connecting station is in Down mode, the error message can be monitored as follows.

R: RAS Information
└ 4: Station Down Information



- Possible error messages are as follows.

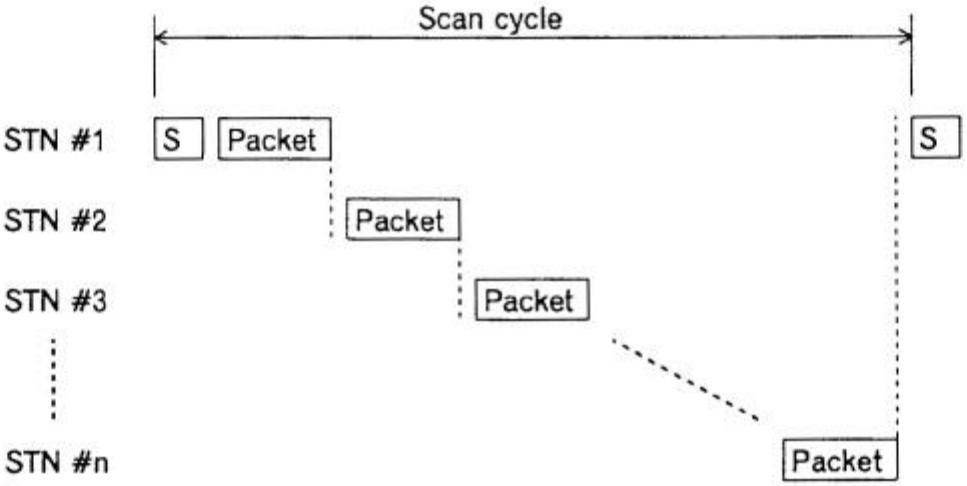
Error code	Error message	Meanings
10H	Watch dog timer error	Watch dog timer error occurred
20H	Memory bus error	Fetched code was illegal
30H	SIF malfunction	SIF (serial interface) error was detected (SIF station only)
40H	Jabber timeout	Abnormal long frame (500ms or more) was transmitted
60H	Hardware error	·Station number illegal ·CPU, RAM, ROM or LSI error
67H	SIF initializing error	SIF (serial interface) initialization error occurred (SIF station only)
77H	Receive buffer overflow	Receive buffer overflow occurred (in Message transmission)

- If these errors connot be reset by power off/on again (except Station number illegal), replace the station.

A.1 Scan cycle

In the S20 network, each station sends out the data onto the transmission line as Packet.

The Packet is sent out onto the transmission line in the following sequence.



In the above figure, [S] means the Synchronization frame which shows the start of transmission cycle (Scan cycle).
At first, the master station sends out the Synchronization frame. Then each station sends out the Packet sequencially in the order of Station number. When the final station finishes sending out the Packet, the master station re-sends out the Synchronization frame, and the next transmission cycle is started.

The Packet consists of a Scan frame and a Message frame(s).
The Scan frame is for Scan transmission and it is sent out every time when the station becomes sender. On the other hand, the Message frame is for Message transmission and it is added only when the necessity of Message transmission is generated.

The Target Scan Time is a time factor for limiting the time assigned for the Message transmission. If the Scan cycle – the time from the station got Token last time to the station get Token this time – is longer than the Target Scan Time, the station sends the Scan frame but does not send the Message frame.
Therefore, the Target Scan Time should be selected as longer than the time for total Scan transmission to enable the Message transmission.

The total Scan transmission time can be calculated from the number of connected stations and the total size (number of words) of send data as follows.

$$T_{SCN} = (64 + 104 \cdot N_{STN} + 8 \cdot W_{SCN}) / 1000 \quad [ms]$$

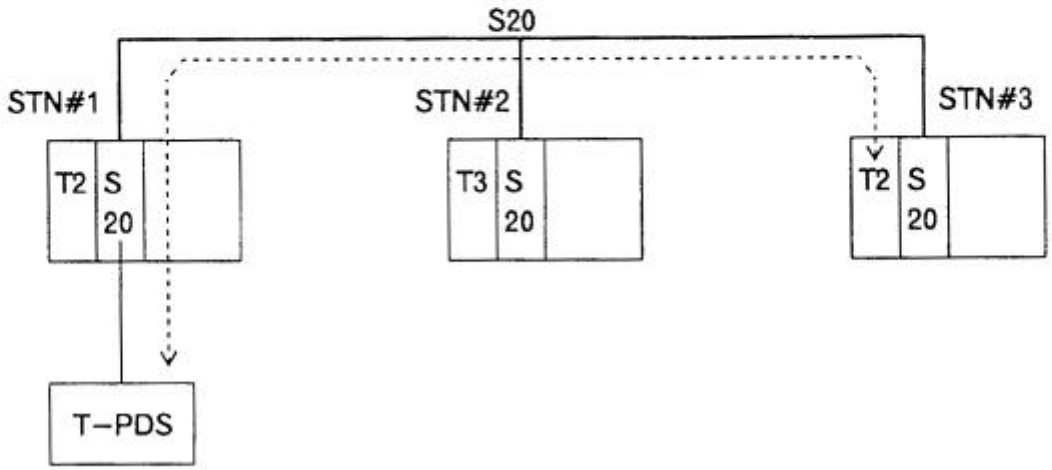
Here;

T_{SCN}: Time for total Scan transmission
N_{STN}: Number of connected stations
W_{SCN}: Total size of send data (words)

Note) The minimum T_{SCN} is about 3 ms. Even if the above calculation result is less than 3 ms, actual T_{SCN} is limited by this value.

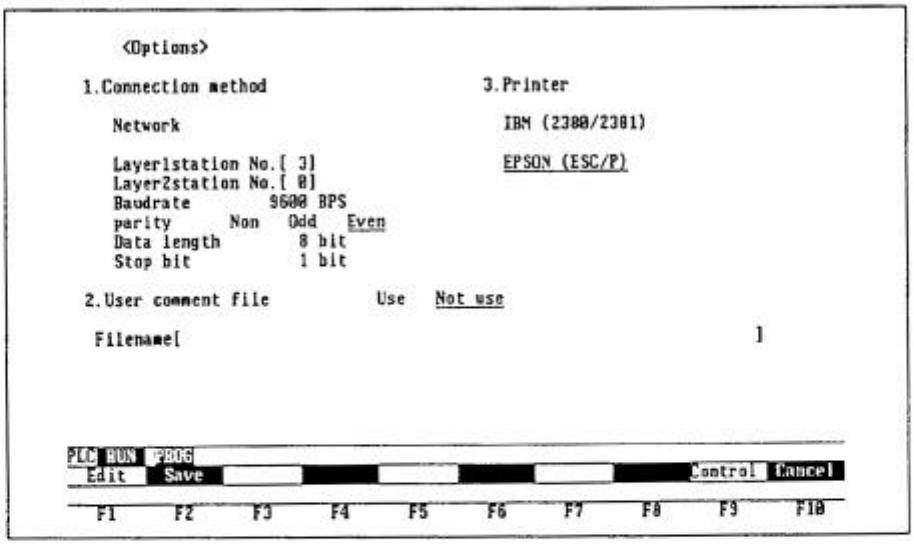
A.2 T–PDS remote programming

The T–PDS can be connected through the Loader port on the S20–station, as well as the Programmer port on the T2/T3 CPU module. By using this function, remote programming/monitoring through S20 network is available.



To use this function, T–PDS's connection method should be set as "Network". The screen below is the setting example of T–PDS's Setup options screen for the above configuration.

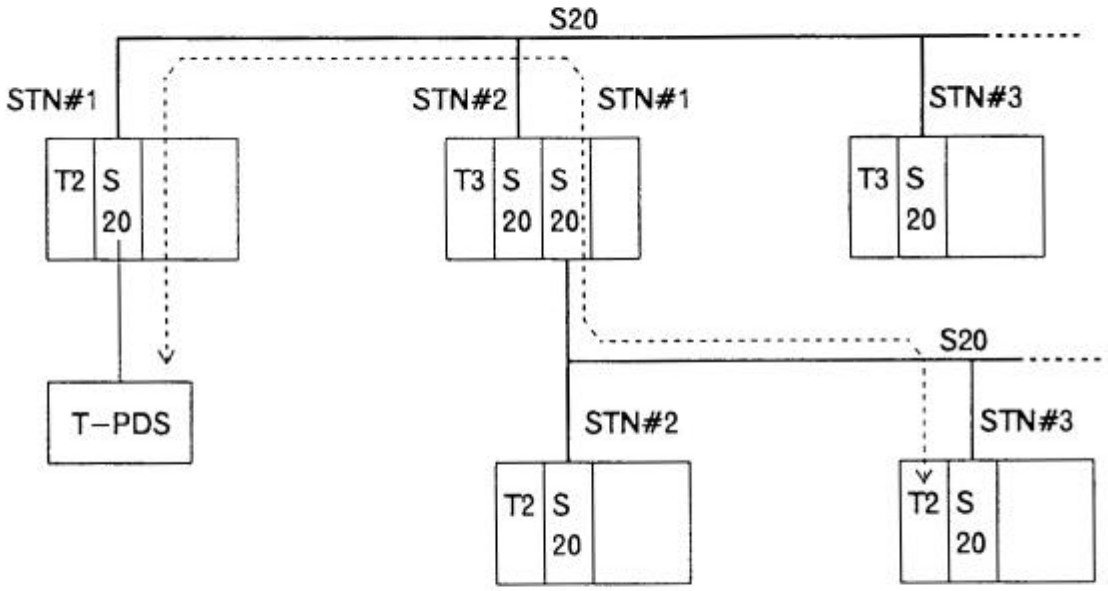
<T–PDS Setup options screen>



Note 1) When connecting on single layer, the Layer 2 Station No. should be set as 0.

Note 2) The Parity is fixed as even.

If the T−PDS is connected to the T2/T3 on the second layer through the bridge station (T3 only), set the T−PDS's connection method as follows.



<T−PDS Setup options screen>

```
      <Options>

1.Connection method                    3.Printer

   Network                               IBM (2380/2381)

   Layer1station No.[ 2]                 EPSON (ESC/P)
   Layer2station No.[ 3]
   Baudrate          9600 BPS
   parity       Non   Odd   Even
   Data length        8 bit
   Stop bit           1 bit

2.User comment file          Use   Not use

 Filename[                                              ]

PLC RUN PROG Edit
 Set  Direct CmpLink NetWork                    Control Cancel
 F1   F2   F3   F4   F5   F6   F7   F8   F9   F10
```

Note 1) The Layer 1 Station No. specifies the bridge station and the Layer 2 Station No. specifies the target station on the second layer.

Note 2) Only T3 is available for the bridge station.

Note 3) The Parity is fixed as even.

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