MODEL 1890A PROM PROGRAMMER

PROGRAMMER UNIT

Version 1.0

OPERATION MANUAL

First Edition, December, 1988

Minato Electronics Co., Ltd.

CONTENTS

1. CAUTIONS

When using the 1890A, the following precautions and instructions must be observed.

1. ALWAYS use power having the specified ratings. Use of power exceeding the ratings will cause failure of the 1890A.
2. DO NOT operate the 1890A in vicinities of equipment that generate significant levels of electrical noise. Such noise will cause malfunctions by coming into the power, etc. and may destruct PROM data being written.
3. Use the GND terminal attached to the power cord of the programmer for grounding connection. This will effectively prevent electrical shock and malfunctions.
4. DO NOT turn on/off the power with a PROM device inserted into the receptacle. Otherwise, when the power is turned on/off, high voltage will apply to the receptacle which can damage the PROM.
5. DO NOT change adapter units during energization. This can cause damage to the units and the programmer itself.
6. DO NOT reset the system during programming. If you have to reset, erase the contents of the ROM.
7. The IC Socket is consumable and should be replaced periodically.

It is recommended to replace the IC Socket every 10,000 operations.

8. DO NOT place PROM chips on the case. The case is plastics and the programmer can be statically charged. In addition, use wet cloth squeezed tightly to clean the case and panels. DO NOT use thinner.

9. DO NOT use the programmer in areas at high temperatures and high humidities. Care should be taken to avoid poor receptacle contact if the programmer is used in a dusty place.

2. GENERAL INFORMATION

The Minato Electronics' Model 1890A PROM Programmer uses a 8-bit micro processor and the latest LSI chips in the control section and take advantage of their functions to permit faster and extensible programming of various PROM devices with various adapter units available.

The programmer has RS232C and parallel interface ports to connect to external equipment. And it can be easily interfaced with a host computer to download data to be written into PROMs from the memory or diskette.

The programmer contains a standard 256-Kbyte write buffer memory and can process up to 2-Mbit data. Also the compact and lightweight design makes it a portable programmer that can serve for a wide range of applications.

3. RATINGS

CPU	Z80A (4.0MHz)
RAM (for data written)	256Kbyte (1Mbyte optional)
Interface	RS232C, Parallel
Baud Rate	110, 300, 600, 1200, 2400, 9600, 19200
Parity Check:	Even, Odd or Non-parity selectable
Data Transfer Formats	Up to 16 types
Control Switches	Hexadecimal key switches and others. Sealed membrane switches.
Display	2-line, 16-character LCD display
Check Functions	Memory Check, Power Check
Operating Temperature	5 to 35^{o}C

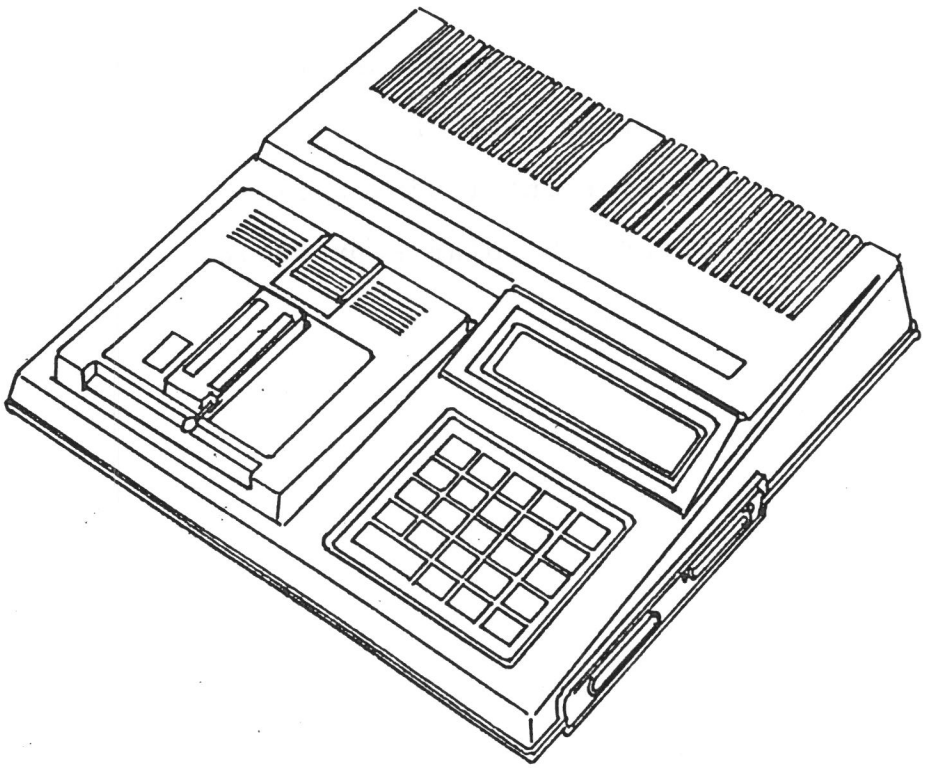
Power	85V to 264V AC 50/60Hz
Power consumption	75VA max
External Dimensions	300mm x 230mm x 65mm
Weight	2 kg
Accessories	One power cord, One copy of Operation Manual
Available Adapter Units	
	OU910 (for EPROM and EEPROM devices)
	OU901 (for PLD chips)
	OU902 (for Intel 87xx series)
	OU903 (for bipolar PROM devices)

4. CONTROLS, DISPLAY AND CONNECTOR

Fig. 4-1 illustrates the external view of the 1890A PROM programmer unit.

Figs. 4-3 and 4-4 shows the 1890A side and rear panels respectively.

4-1 External View



4-2 Front Panel

4-2-1 Display

This is a 2-line, 16-position Character LCD display that shows addresses, data, status, and the results of an operation.

4-2-2 Key Switches

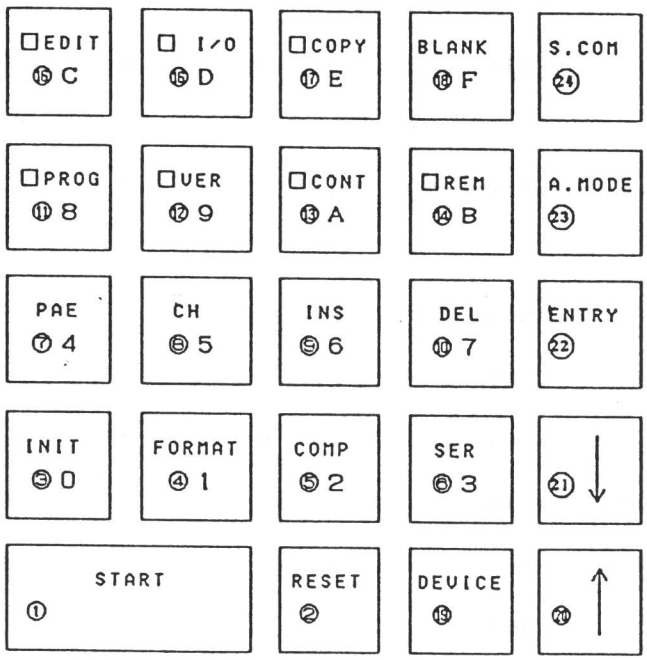


Fig. 4-3 Key Switches

(1) START Switch: Press this to start operations in the COPY, BLANK, PROGRAM, VERIFY and CONTINUANCE modes.

(2) RESET Switch: When pushed, clears current entry and resets setup. When pushed during running, suspends operation.

NOTE: The switches (3) to (10) and (20) to (22) of the following are available only in the EDIT mode.

(3) INIT Switch: Initializes memory (in EDIT mode). Also used to enter the hexadecimal number 0.

(4) FORMAT Switch: Specifies the format of data transfer (in EDIT mode). Also used to enter the hexadecimal number 1.

(5) COMP Switch: Complements or inverts data in buffer memory (in EDIT mode). Also, used to enter the hexadecimal number 2.

(6) SER Switch: Specifies the Data Search mode (during EDIT).
Also, used to enter the hexadecimal number 3.

(7) PAE Switch: Allows program address entry for programming in each mode of operation (during EDIT). Also, used to enter the hexadecimal number 4.

(8) CH Switch: Specifies the Change mode (during EDIT). Also, used to enter the hexadecimal number 5.

(9) INS Switch: Specifies the Insert mode (during EDIT). Also, used to enter the hexadecimal number 6.

(10) DEL Switch: Specifies the Delete mode (during EDIT). Also, used to enter the hexadecimal number 7.

(11) PROG Switch: Specifies the PROGRAM mode. Also, used to enter the hexadecimal number 8.

(12) VER Switch: Specifies the VERIFY mode. Also, used to enter the hexadecimal number 9.

(13) CONT Switch: Specifies the CONTINUANCE mode. Also, used to enter the hexadecimal number A.

(14) REM Switch: Specifies the REMOTE mode. Also, used to enter the hexadecimal number B.

(15) EDIT Switch: Specifies the EDIT mode. Also, used to enter the hexadecimal number C.

(16) I/O switch: Specifies the I/O mode. Also, used to enter the hexadecimal number D.

(17) COPY Switch: Specifies the COPY mode. Also, used to enter the hexadecimal number E.

(18) BLANK Switch: Specifies the BLACK CHECK mode. Also, used to enter the hexadecimal number E.

(19) DEVICE Switch: Selects a PROM type.

(20) 1 Switch: Increments the address. (Active in EDIT mode)

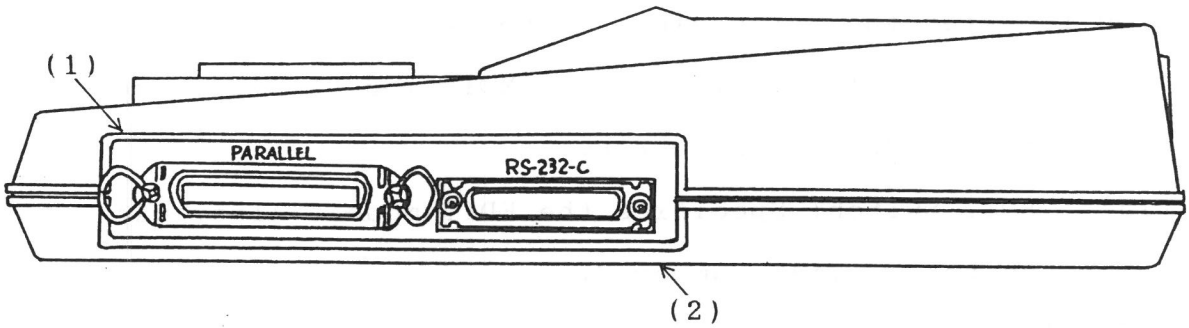
(21) 1 Switch: Decrements the address. (Active in EDIT mode)

(22) ENTRY Switch: Enters a value on the display, or completes entry. (Active in EDIT mode)

(23) A.MODE Switch: Selects the ADDRESS mode.

(24) S.COM Switch: Selects a subcommand.

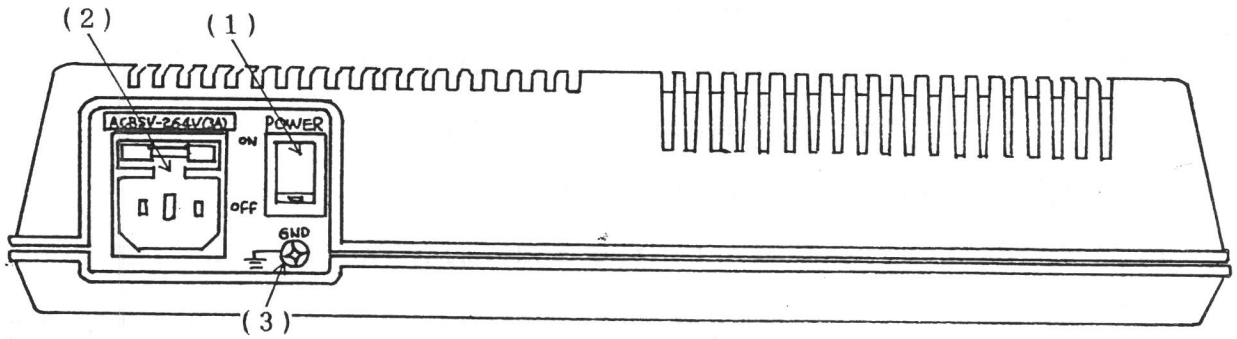
4-3 Side Panel



(1) Connector for Parallel Interface

(2) Connector for RS232C Interface

4-4 Rear Panel



(1) POWER Switch

(2) Power Input Connector integral with a Fuse Holder.

(3) Grounding Terminal

5. POWER ON AND OFF

5-1 Power On

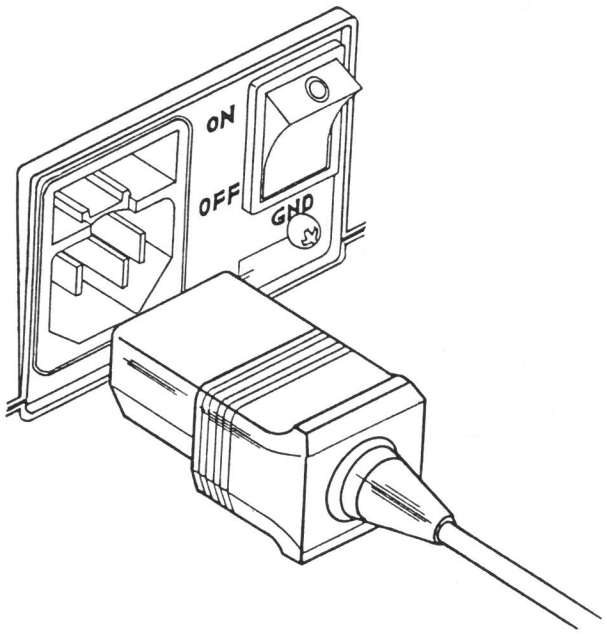
This section describes the Power On Sequence. These instructions must be observed.

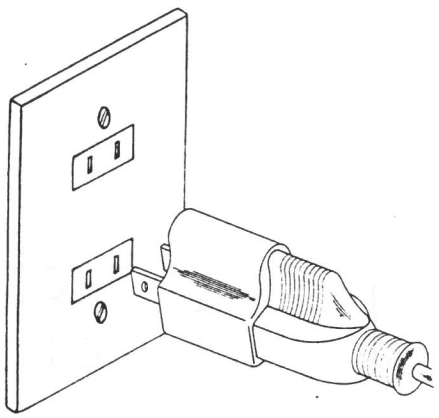
CAUTION: Failure to follow this sequence may cause damage to the programmer, PROM, and backup data.

(1) Ensure that the POWER switch on the programmer is set to the OFF position. If set to ON, turn OFF the switch.

(2) Make sure that the line voltage from an outlet meets the ratings of the 1890A. Then, plug the power cord into the outlet.

The power for the 1890A is rated at 85V to 264V AC. The 1890A can be operated within this voltage range without any change-over.



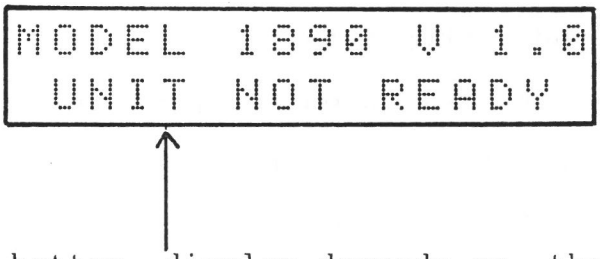


(3) Ensure that the adapter unit is properly mounted.

(4) Ensure that a PROM is not inserted into the receptacle.

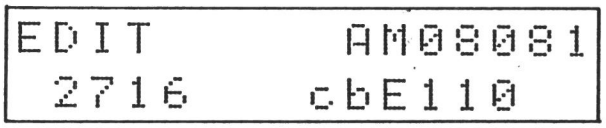
Then, turn on the POWER switch. When the power is turned on, the 1890A will start the self tests.

After these tests are completed, the programmer will display the following message for about one second.



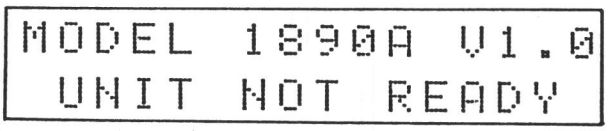
The bottom display depends on the adapter units used.

If no errors are found in the self tests, the programmer will display the following message and then wait for input.



(The device name and device code are previous settings.)

If any unit is mounted, the programmer will display:



5-2 Power Off

When turning off the power, the following instructions must be observed.

Ensure that a PROM is removed from the receptacle. If a PROM remains inserted in the IC Socket, the PROM may be

damaged.

CAUTION: Once the power is turned off, wait three seconds at least before turning on the power again.

5-3 Self Tests

When the power is turned on, the 1890A will perform the self tests of the programmer system:

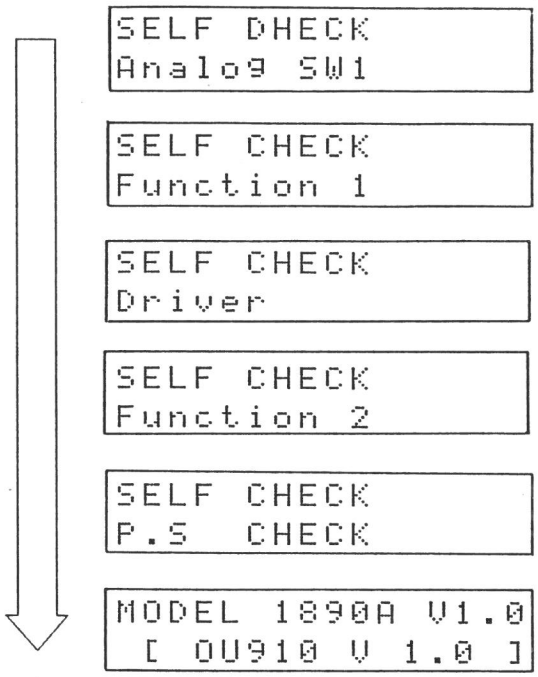
Memory Test and

Power Test

An Example of A Display of Self Check (programmer unit)

```
SELF CHECK
 MEMORY TEST    1
```

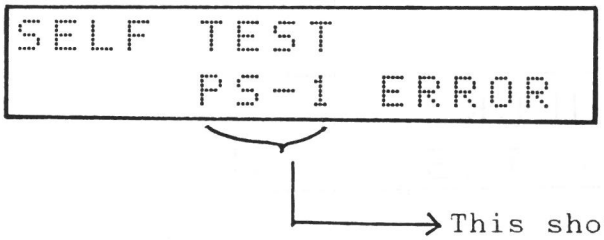
An Example of Displays of Self Check (with OU910 attached)



If any error is detected during this self testing, the following error message will appear.

When memory error(s) is found:

When power supply error(s) is found:



This shows a power supply name where the error is found.

6. EDIT MODE

This mode allows the corresponding switches on the panel to be active and available to change memory data or set various conditions.

The EDIT mode provides the following commands.

* PAE.....Program Address Entry
* CH.....Change Data
* INS.....Insert Data
* DEL.....Delete Data
* INIT.....Initialize Data
* FORMAT....Select Communication Format
* COMP.....Complement or Invert Data
* SER.....Search Data

Address and Data Entry in the EDIT Mode

* An address is entered by hexadecimal numbers and must be below five digits. Data entry is hexadecimal and must be represented by two digits.
* If an entry value exceeds the allowable digits, the last five (or two) digits are effective.
* If an address specification exceeds the available memory capacity, the memory will be masked. Care should be taken when entering the most significant digit of an address.

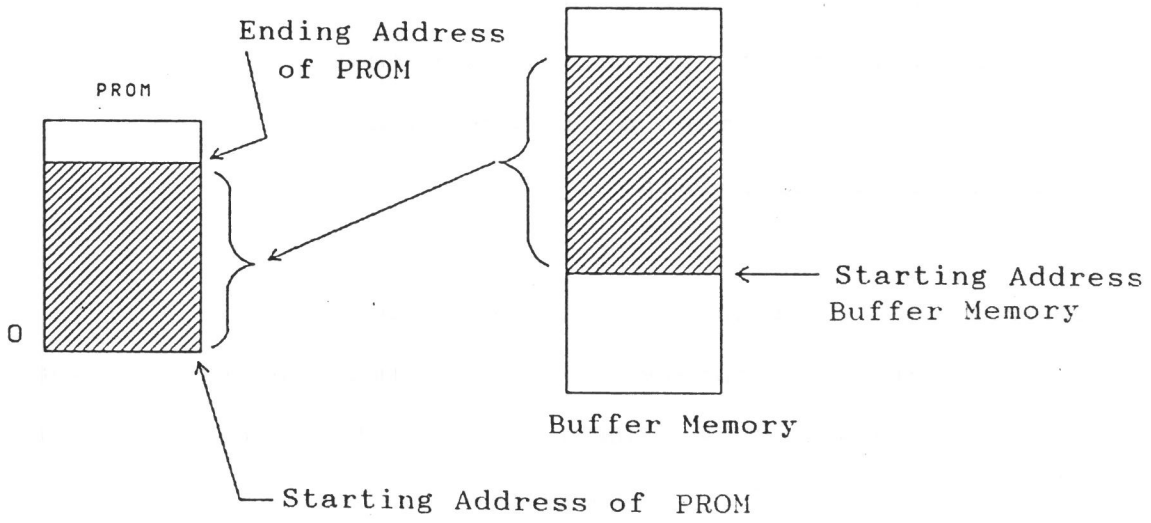
Example: When the available memory is 3FFFF, entering 4000 will cause the programmer to interpret the address as zero address.

6-1 PAE Command (Program Address Entry)

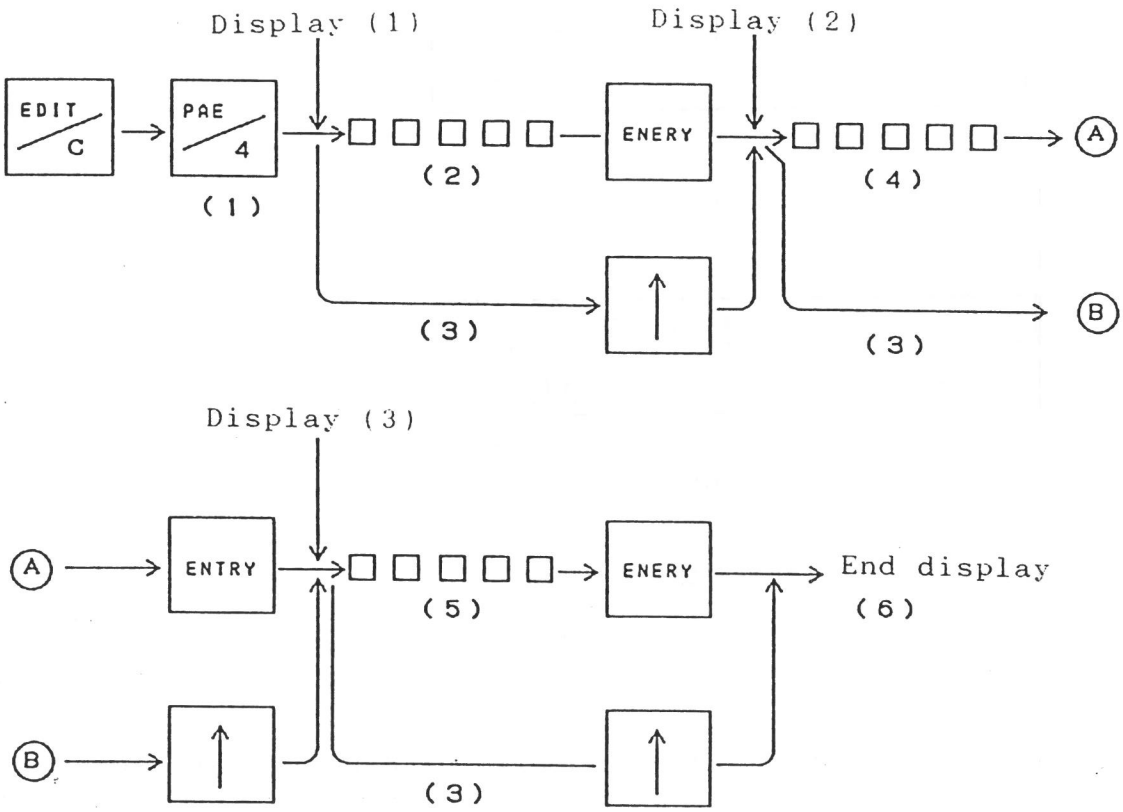
This command is used to specify the starting and ending addresses of a PROM to read data between them and to specify the address for programming.

The settable items are:

* Starting Address of P-ROM
* Ending Address of P-ROM
* Starting Address of the buffer memory



6-1-1 Operation



(1) Select the PAE mode by pressing "PAE" switch.

(2) Enter the starting address of a PROM. Then, press the "ENTRY" switch to enter it.

(3) If no new entry is needed, only pressing the "1" or "ENTRY" switch allows you to proceed to the next step.

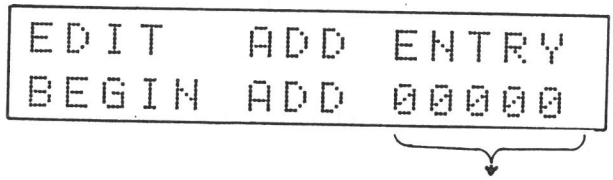
(4) Enter the ending address of the PROM and press "ENTRY".

(5) Enter the starting address of the RAM and press "ENTRY".

(6) Once all the settings are entered, the programmer will display the message "COMPLETE".

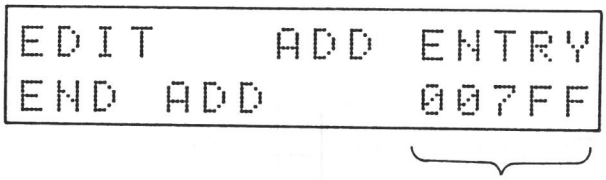
(1) Display (1)

(2) The defaul



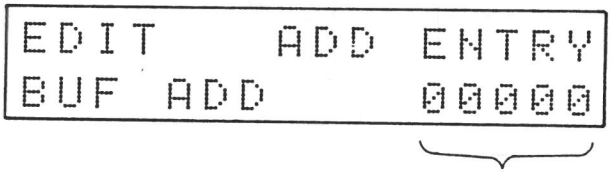
The default is address 0.

Display (2)



The default is the last address of the PROM.

Display (3)



The default is address 0.

6-1-2 Notes On Issuing PAE Command

* When entering addresses, the following instructions must be observed.

(1) The "PROM starting address" must be equal to or greater than the "PROM ending address".

(2) The "PROM ending address" must be equal to or smaller than the "last address" of the selected PROM.

(3) The buffer memory starting address must be smaller than the last address of the buffer memory. In addition, there must be sufficient memory to write data in the PROM.

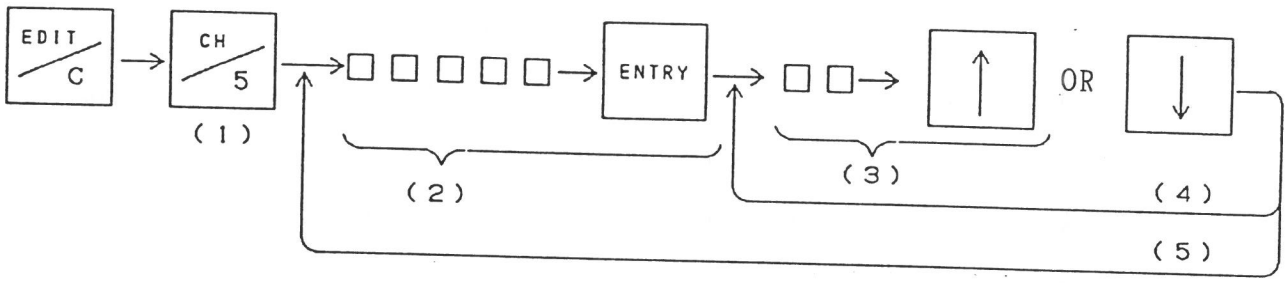
* When the PROG mode is selected, the "PROM starting address" will be automatically set to address "0" while the "PROM ending address" to the "PROM's last address".

* When specifying this PAE command, all entries will not be implemented unless the last message "COMPLETE" is displayed.

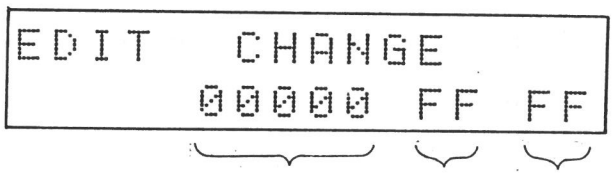
6-2 CH Command (Change Data)

This is used to change data to be written and to create new data.

6-2-1 Operation

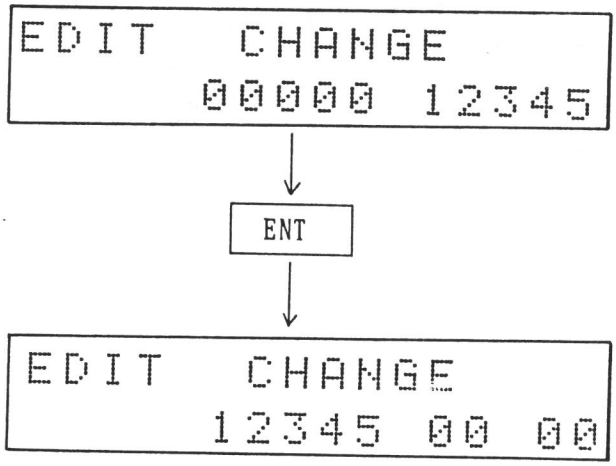


(1) Press the "CH" switch to activate the CHange mode. Pressing the "CH" switch will display address "0" and the contents of the RAM.



(2) Enter the address that you want to specify. Then press "ENTRY" to enter the address.

If no address entry is needed (data is modified at address 0), Step (2) may be omitted.



(3) Enter new data of two digits. Pressing "↑" switch will cause the data entry to be written on the buffer memory and the next address and the data to be appear on the display. "↑" switch may be pressed to store the entry but the previous address and the data will appear.

(4) To continue to enter data, repeat Step (3).

(5) To change the address, perform Steps (2) and (3) again. Press "RESET" switch to terminate the CHange mode.

6-2-2 Notes On Issuing CH Command

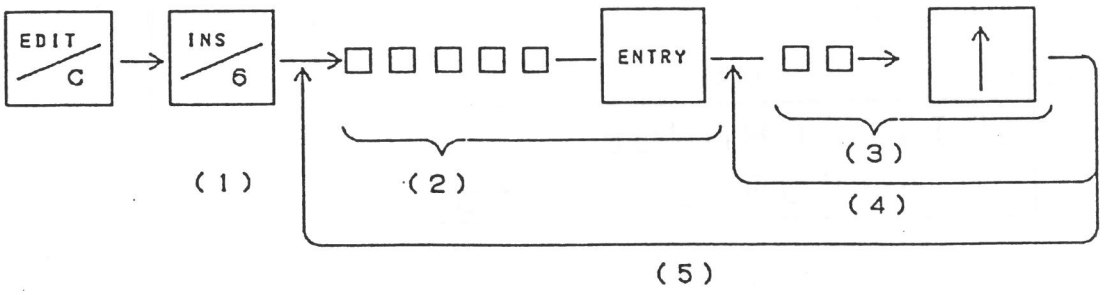
1. If keyed in character digits exceed the predetermined character digits for address and data entry, the last five (address entry) or last two (data entry) will be valid.

2. In the CH command, "ENTRY" is used to enter addresses and "↑" or "↓" is used to enter data.

6-3 INS Command (Insert Data)

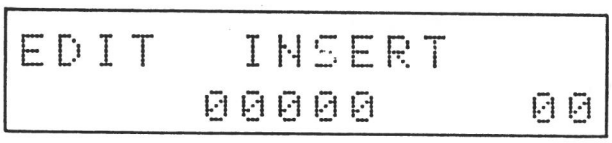
This command inserts data at any address.

6-3-1. Operation



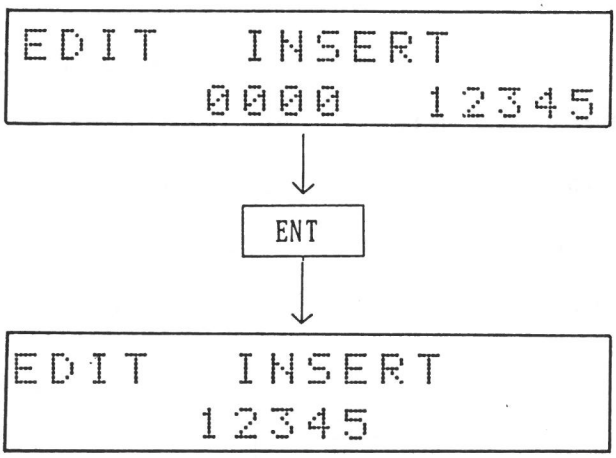
(1) Press "INS" switch to activate the INSert mode.

The programmer will display address 0.

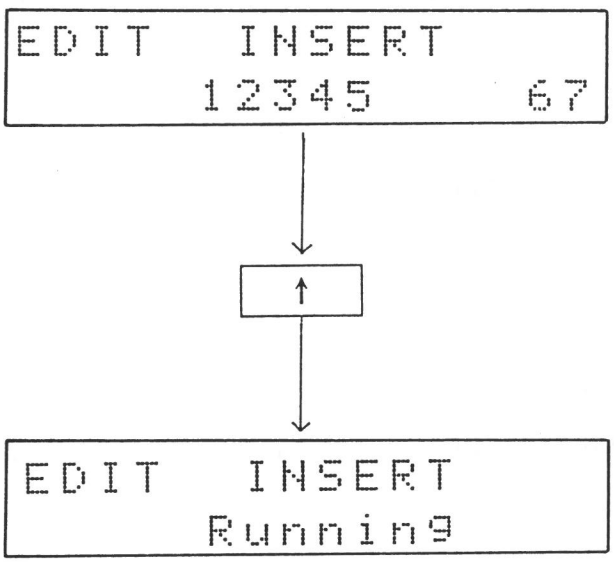


(2) Enter the address. Press "ENTRY" to enter the address.

The programmer will display the address.



(3) Enter data to be inserted. The input sequence is the same as for the CHange command.



While the INsert command is being executed, the programmer will show "Running" on the data display. When the operation is finished, it will show the next address and wait for input.

(4) To continue data entry, repeat Step (3).

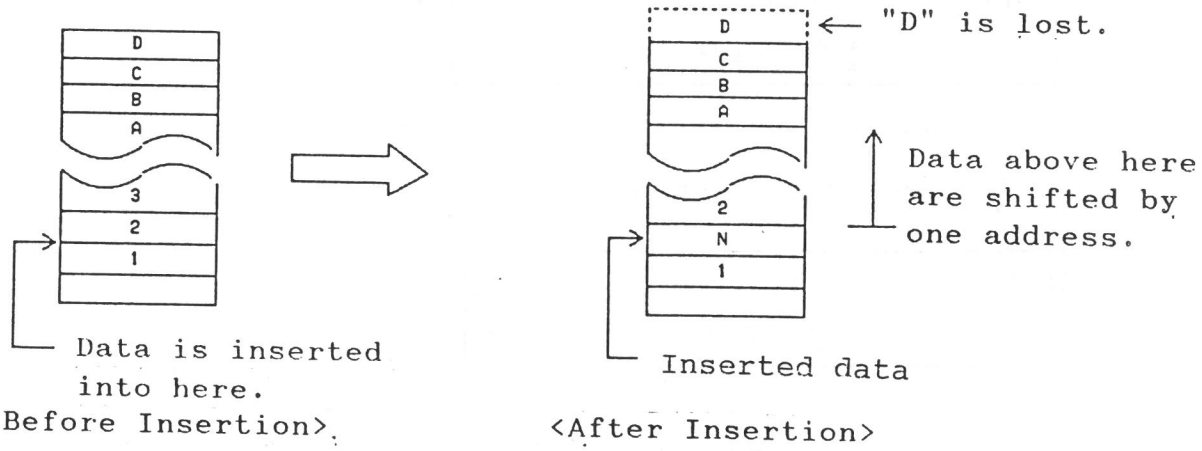
(5) To change the address where you want to insert data, perform Steps (2) and (3) again.

Press "RESET" switch to exit from the INSert mode.

6-3-2 Notes On Issuing the INSert Command

1. If keyed in character digits exceed the predetermined character digits for address and data entry, the last five (address entry) or last two (data entry) will be valid.

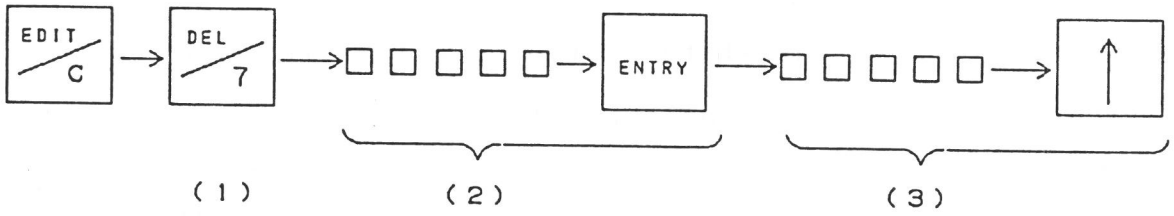
2. When this command is executed, the last area of the buffer memory will lose its data by the inserted bytes.



6-4 DEL Command (Delete Data)

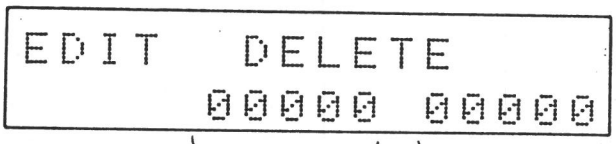
This command deletes the specified data in the buffer memory.

6-4-1 Deleting Procedure



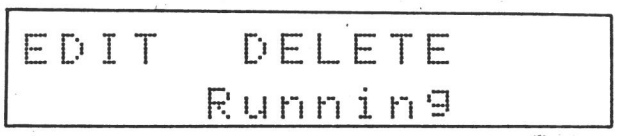
(1) Press "DEL" switch to access the DELete mode.

The following display will appear.

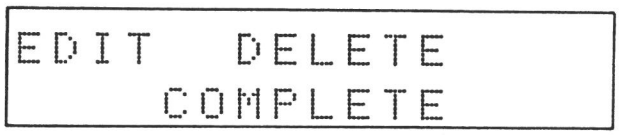


(2) Enter the starting address to delete.

(3) Enter the ending address to delete. Pressing "START" switch will cause the programmer to "delete" the data within the specified range. When this operation is finished, the "COMPLETE" message will appear.

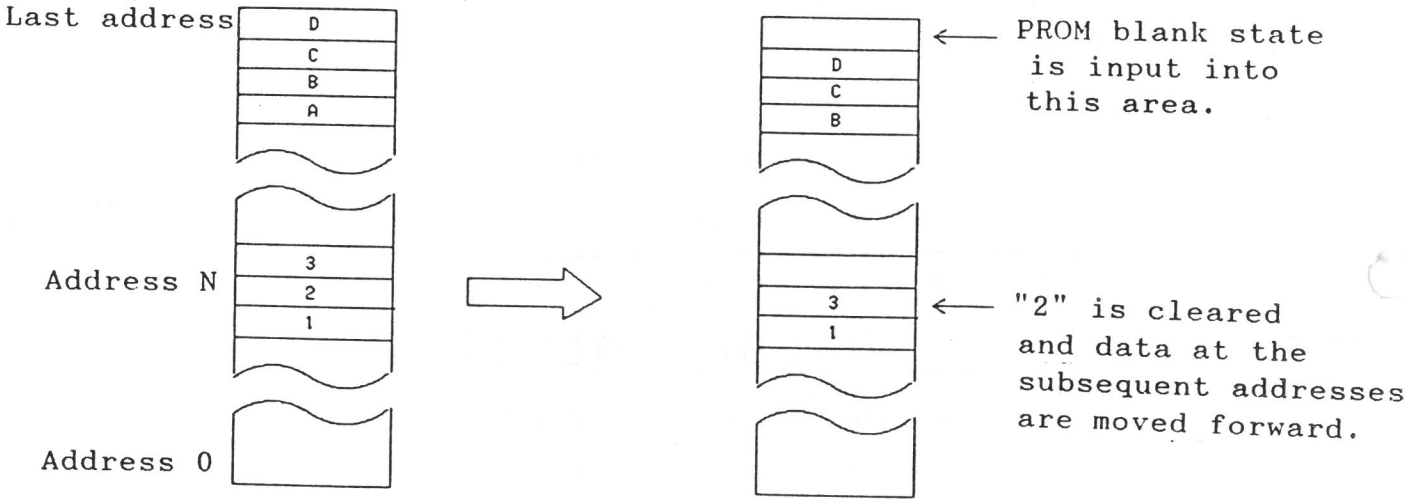


←"Running" displayed during operation.



6-4-2 Notes On Issuing the DEL Command

(1) Since all data are moved forward in this deletion as shown below, the blank state of the selected PROM will be input into the last area of the buffer memory.

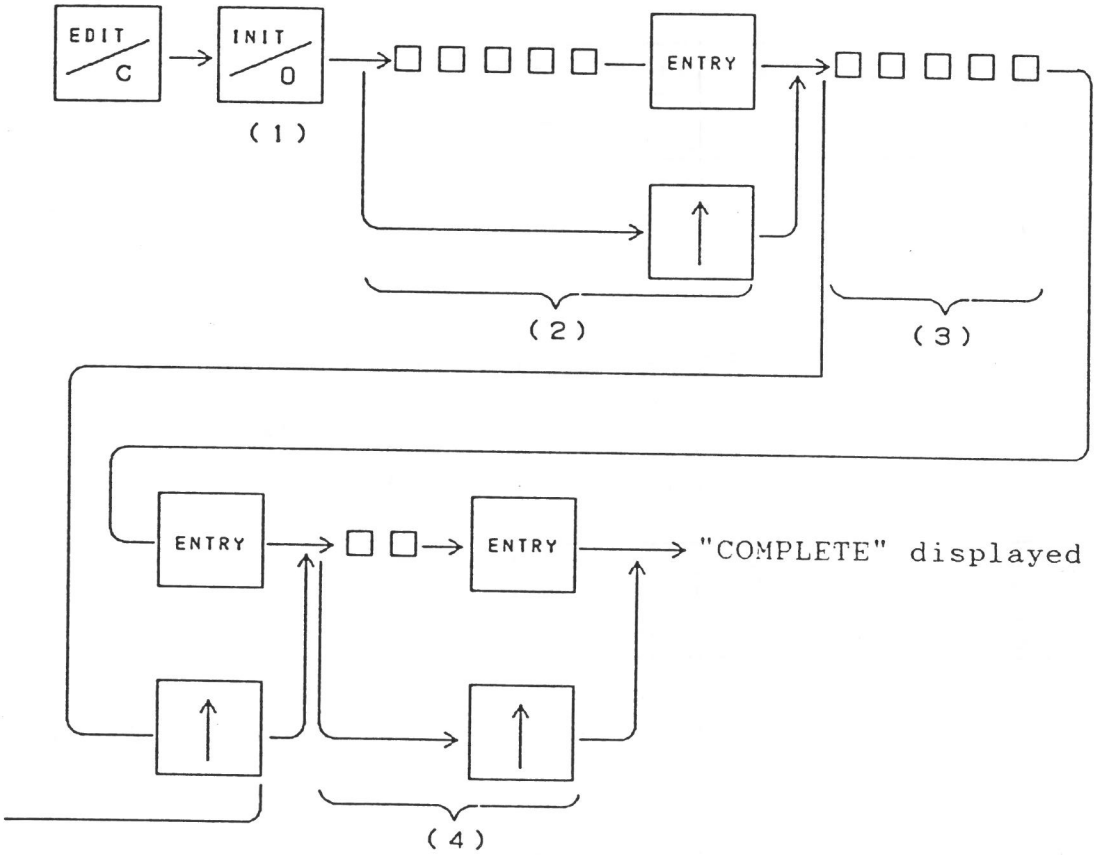


<Data at address N is cleared.>

6-5 INIT Command (Initialize Buffer Memory)

This command initializes the contents of the buffer memory between the specified addresses.

6-5-1 Operation



(1) Press "INIT" switch to active the INITialize mode. The programmer will display the following message with the starting address 0.

```
EDIT   INITIALIZE
BEGIN ADD   00000
```

(2) Enter the starting address. Press "ENTRY" to enter the address.

If you need not change the address, press "↑" .

When the starting address is entered, the programmer will display the following message and go to the next step.

```
EDIT   INITIALIZE
END ADD     3FFFF
```

The default ending address is the last address of the programmer memory.

(3) Enter the ending address. Press "ENTRY" to enter the address. If you need not change the address, press "↑".

Entering the ending address will present the following display.

The default data value is "FF".

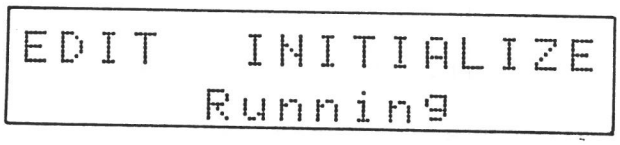
```
EDIT   INITIALIZE
DATA              FF
```

(4) Data Entry

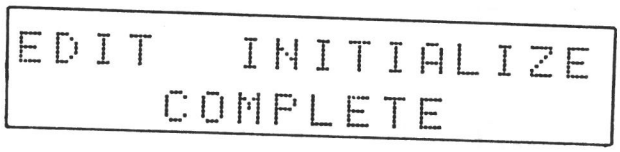
Enter the data in 2 digits.

If you need not change the data, enter "↑".

Entering the data will cause the programmer to display "Running" and start operation.



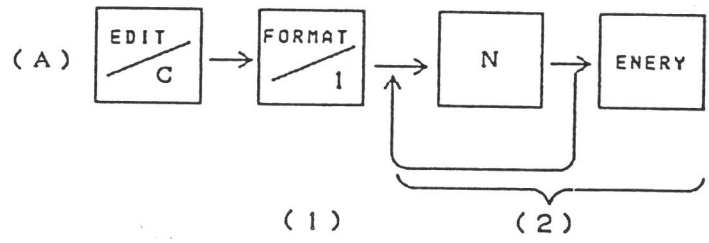
When deleting the data within the specified range is finished, "COMPLETE" message will be displayed.



6-6 FORMAT (Set Communication Format)

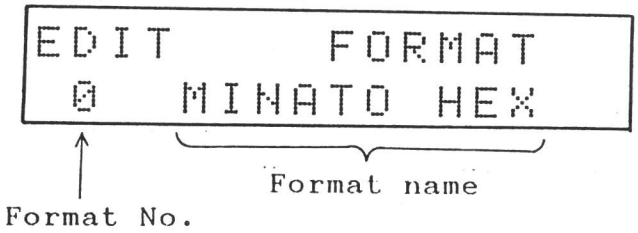
This is used to set the format of data I/O when the I/O or Remote command is issued. This format can be specified by either (A) entering the number or (B) using the "↑" switch.

6-6-1 Operation



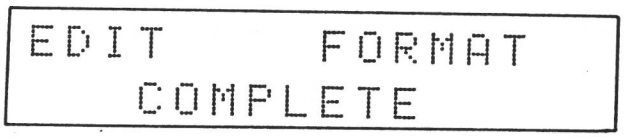
(1) Press the "FORMAT" switch.

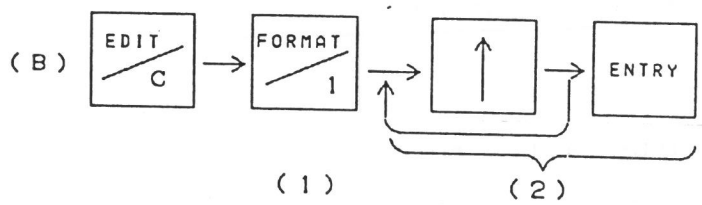
The current format selection will be displayed.



(2) Press the appropriate switch (0 - 9, A - F) to enter the desired format No. Then, press "ENTRY" switch to set the format.

When the format is set, the programmer will display "COMPLETE" and terminate all operations.





(1) Press the "FORMAT" switch.

The current format selection will be displayed.

(2) Pushing "↑" switch will present the next format No. Repeatedly press "↑" switch to change the format No. from one to another until the desired format No. is displayed. With the desired format No. displayed, press "ENTRY" to complete the setting.

6-6-2 Types of Formats

The 1890A offers thirteen (13) types of formats as standard. The system can accommodate up to sixteen (16) types of formats and so three (3) types can be added optionally.

No.	Format	No.	Format
0	MINATO	8	TEKTRONIX
1	INTEL HEX	9	T.I SDS-MAX
2	HP64000 ABS	A	BNPF
3	BINARY	B	BHLF
4	MOTOROLA	C	NC FORMAT
5	ASCII HEX	D	SPARE
6	ASCII OCT	E	〃
7	TEKTRONIX	F	〃

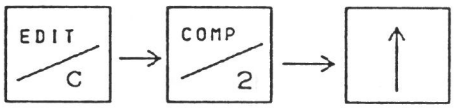
6-6-3 Notes On Issuing the FORMAT Command

1. The direct setting by entering the number can be combined with the setting by pressing the "↑" switch.
2. If any format that is not stored in memory (D, E, or, F number for standard systems) is specified, an error will be indicated. This allows no change of the current setting.

6-7 COMP (Complement (Invert) Data)

This command inverts the contents of the buffer memory. When specifying this, addresses to specify a range cannot be entered. Therefore, issuing the COMP command will cause data in all the areas of the buffer to be inverted.

6-7-1 Operation



Push the "COMP" switch to activate the COMPlement mode. The display will say:

```
EDIT   COMPLEMENT
            PUSH
```

Then, pressing "↑" will cause the programmer to start operation.

```
EDIT   COMPLEMENT
     Running
```

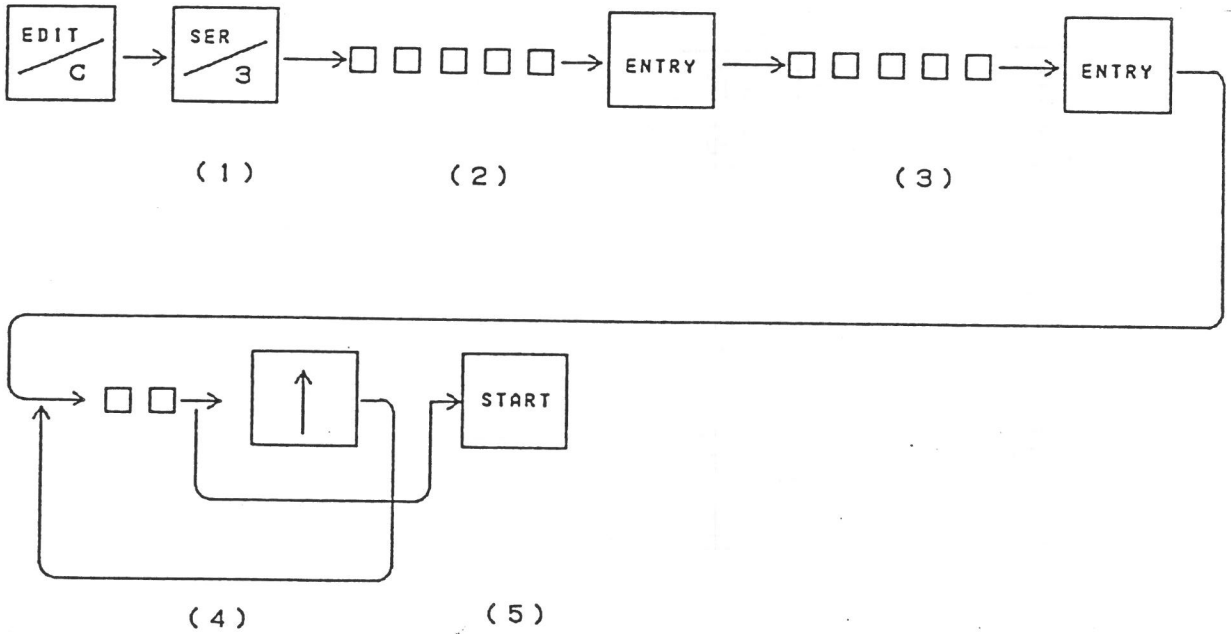
When this operation is completed, the display will look like this:

```
EDIT   COMPLEMENT
     COMPLETE
```

6-8 SER Command (Search Data)

This searches for the specified data row (up to 4 bytes) in the buffer memory.

6-8-1 Operation



(1) Push the "SER" switch to activate the SEaRch mode. The display will look like this:

```
EDIT   SEARCH
BEGIN  ADD   00000
```

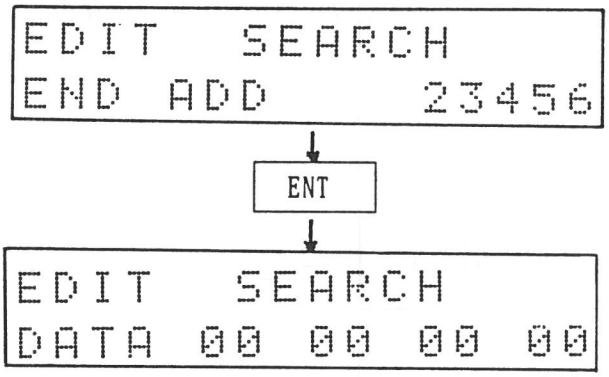
(2) Enter the address at which a search begins.

```
EDIT   SEARCH
BEGIN  ADD   12345
```

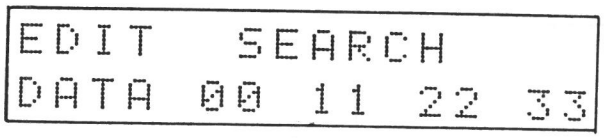
↓ ENTRY ↓

```
EDIT   SEARCH
END    ADD   3FFFF
```

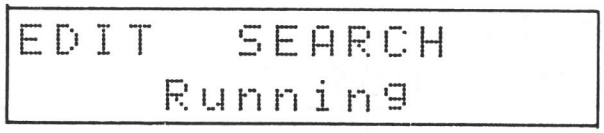
(3) Enter the address at which a search ends.



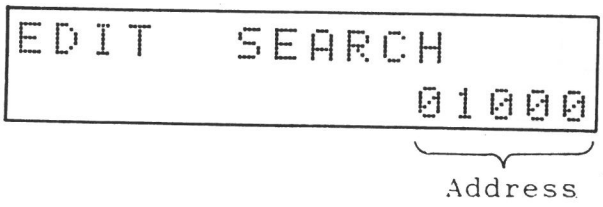
(4) Enter the data. Up to 4 bytes of data can be entered in this command. If your entry exceeds 4 bytes, the last 4 bytes will be valid and used.



(5) Once the data is entered, push the "START" switch. The programmer will start searching.

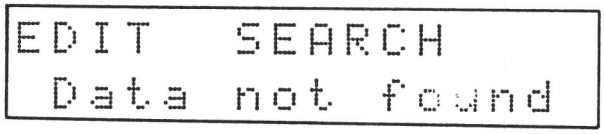


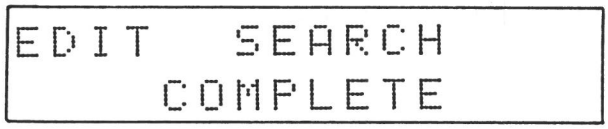
When the specified data row is detected, the programmer will stop displaying the first address.



Pushing "START" switch twice will cause the programmer to resume the searching at the next address.

If the system searches to the last address without detecting the target data, it will show "Data not found" . If the system finds the data, it will show "COMPLETE".





7. I/O COMMAND

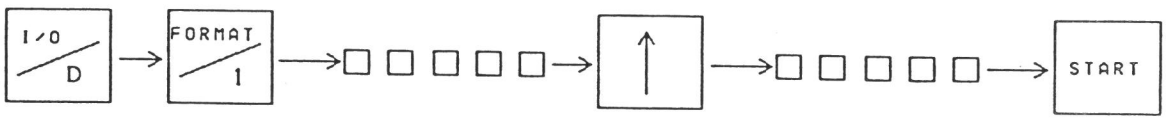
The I/O command is used to establish data transfer between the programmer and external equipment and to set up interface conditions.

This command allows the following operations:

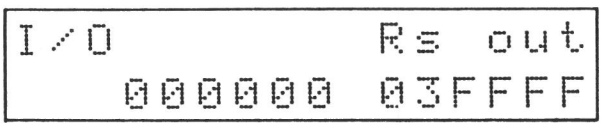
* Input of data via the RS232C interface
* Output of data via the RS232C interface
* Input of data via the parallel interface
* Output of data via the parallel interface
* Output of data from the panel
* Setup of communication conditions

The format preset in "EDIT" mode is effective as the data transfer format of receiving and sending data by this command.

7-1 Output of Data



(1) (2) (3)



(1) Specify the output port of data: RS232C by "1" and Parallel by "3".

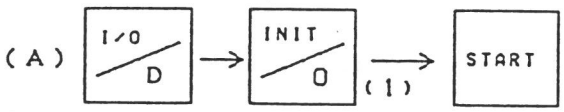
(2) Enter the starting address. If this entry exceeds six digits, the last six digits will be valid. If this entry is below five digits, the value having "0" in the most significant digit will be regarded as the address.

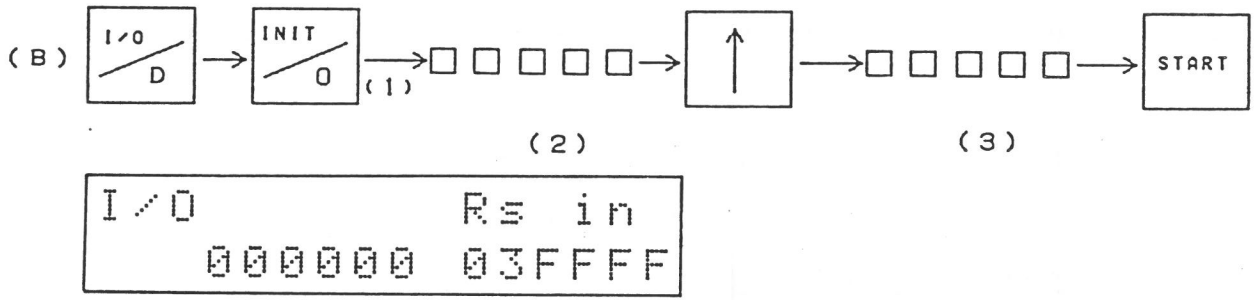
Note that when you specify output of data, a value from 0 to 3FFFF is regarded as effective address. Entry of any value without the range will cause an error.

(3) Enter the ending address. This entry is also interpreted by the system as described in Step (2).

During output of data, "DATA OUT" is shown. Upon completion of this operation, "COMPLETE" message will appear.

7-2 Input of Data





(A) is the usual data input sequence and (B) is the data input sequence used to give an offset to an address.

(1) Specify the input port of data: RS232C by "0" and Parallel by "2".

(2) Enter the offset address. This entry is interpreted by the system in the same manner as Output of Data. However, effective addresses are 6-digit values in this mode.

When the address of data read matches this address, the system begins storing the data.

During input of data, the address and data is shown. Upon completion of this operation, "COMPLETE" message will

appear.

If any error is caused during input of data, "Format error" or "Sum error" will be indicated.

(3) Enter the ending address. When the address of data read matches this address, the system will terminate storing the data.

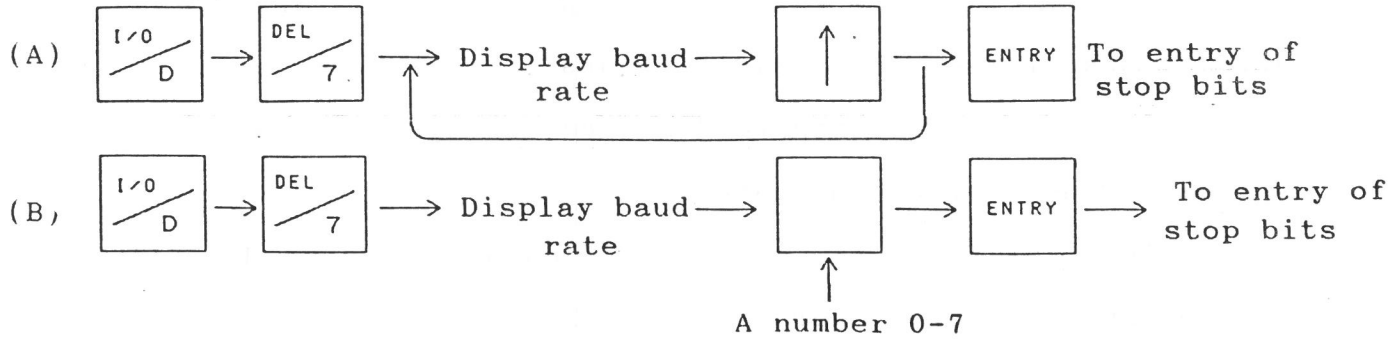
7-3 Set Communication Conditions

Specifying the RS232C and Parallel interfaces is followed by setting up necessary communication conditions.

The six conditions are settable: baud rate, number of stop bits, parity, character length, presence or absence of echo, and communication control. The settings are effective only for RS232C. ???

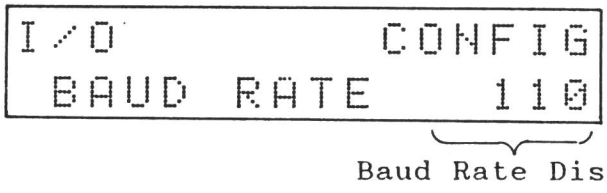
This setup begins with setting the baud rate and the subsequent conditions are set in this order.

Number	Baud Rate
0	110
1	300
2	600
3	1200
4	2400
5	4800
6	9600
7	19200



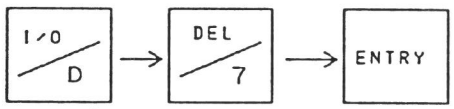
(A) is the way to select the baud rate by "↑" key and (B) is the way to select the baud rate directly by entering the number.

Both ways may be used at the same times.



Pressing "ENTRY" will access the next step (select stop bits).

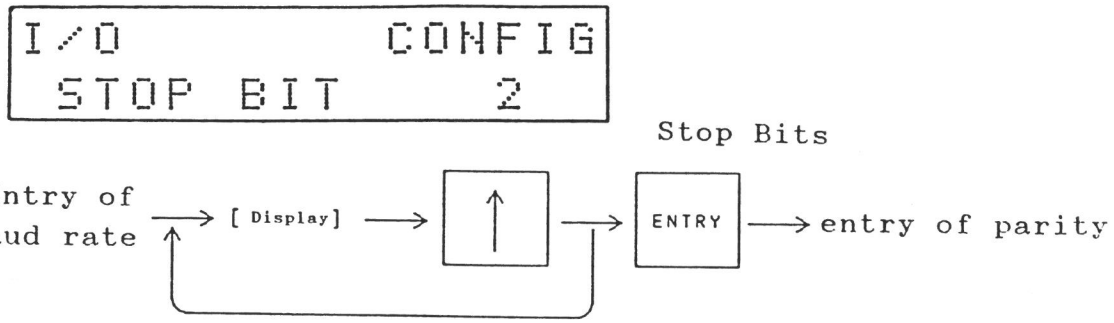
If you do not want to change the baud rate, proceed as follows:



7-3-2 Stop Bits

Three types of stop bits: 1, 1.5, and 2 are selectable.

Once the baud rate is selected, the system will display the current stop bits and wait for input.

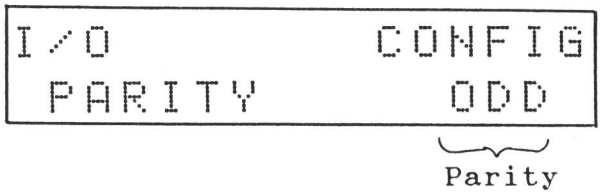


Once entry of stop bits is done, then you will go to entry of parity.

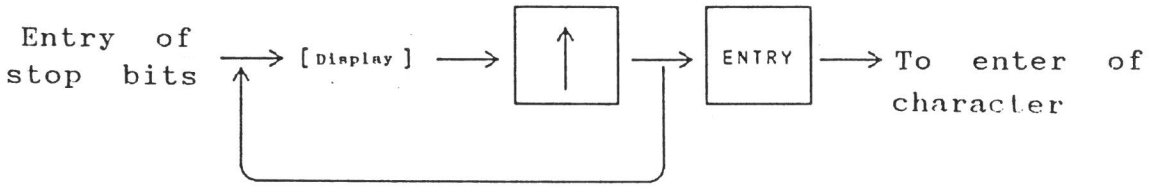
7-3-3 Parity

Three forms of parity: no parity (disabled), odd parity, and even parity are selectable.

The parity is selected in the same manner as for stop bits.

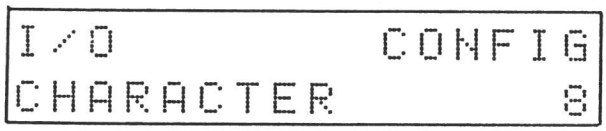


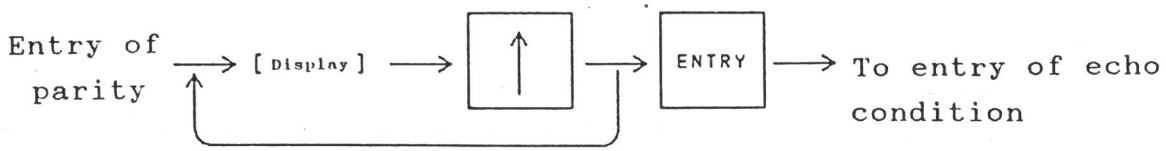
One of three messages: "ODD", "EVEN", and "DIS." (no parity) will be displayed.



7-3-4 Character Length

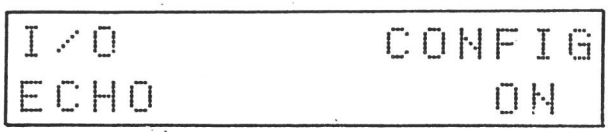
Two character lengths: 7 bits and 8 bits are selectable. The character length is selected in the same manner as for stop bits.

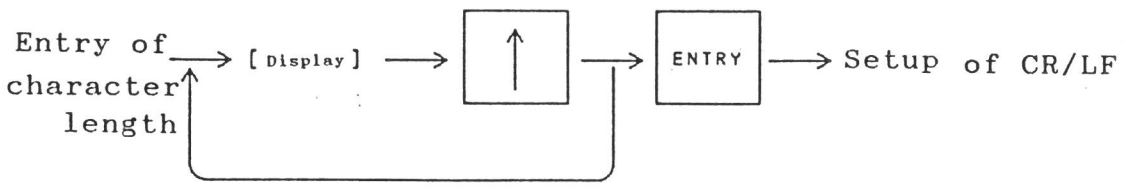




7-3-5 Set Echo Mode

This specifies whether an echo is backed for a command entered in the REMOTE mode. The setting sequence is the same as the setting sequences for other conditions. This is set to "ON" or "OFF".





This setting is effective only in the REMOTE mode.

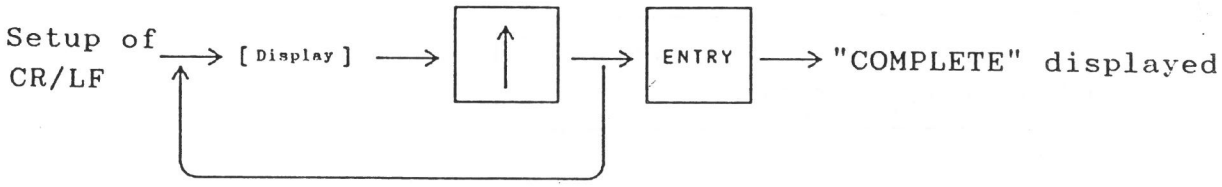
7-3-6 Control Mode

This specifies the handshake mode during data transfer. Three modes: X-ON/OFF control, CTS/RST control, and no control are selectable.

The setting sequence is the same as the other setting sequences.

Once this mode has been set, the system will present "COMPLETE" message terminating setup of all conditions.

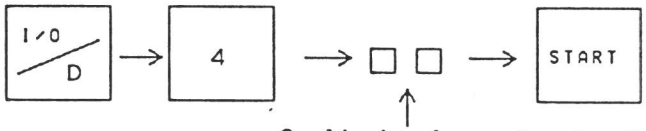
```
I/O          CONFIG
CONTROL  X-ON/OFF
```



7-4 Output of Control Codes

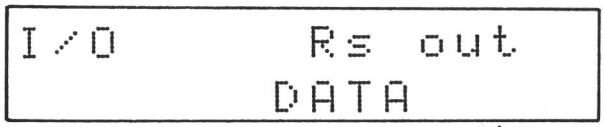
Sometimes it may be required to send the control code before and after data when the data is transferred between the programmer and external equipment.

The 1890A allows the user to output any of the control codes given below by operating the controls on the panel.



2-digit hexadecimal number (output data)

Display



Specified control code number

Once this operation is done, "COMPLETE" will be displayed.

Control Codes Table

	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		D_E	(SP)	0	@	P		p			(SP)	ー	タ	ミ		
1	S_H	D_1	!	1	A	Q	a	q			。	ア	チ	ム		円
2	S_X	D_2	"	2	B	R	b	r			「	イ	ツ	メ		年
3	E_X	D_3	#	3	C	S	c	s			」	ウ	テ	モ		月
4	E_T	D_4	$	4	D	T	d	t			、	エ	ト	ヤ		日
5	E_Q	N_K	%	5	E	U	e	u			・	オ	ナ	ユ		時
6	A_K	S_N	&	6	F	V	f	v			ヲ	カ	ニ	ヨ		分
7	B_L	E_B	'	7	G	W	g	w			ァ	キ	ヌ	ラ		秒
8	B_S	C_N	(	8	H	X	h	x			ィ	ク	ネ	リ	♠	
9	H_T	E_M	)	9	I	Y	i	y			ゥ	ケ	ノ	ル	♥	
A	L_F	S_B	*	:	J	Z	j	z			ェ	コ	ハ	レ	♦	
B	H_M	E_C	+	;	K	[	k	{			ォ	サ	ヒ	ロ	♣	
C	C_L	→	,	<	L	¥	l	¦			ャ	シ	フ	ワ	⊖	
D	C_R	←	−	=	M	]	m	}			ュ	ス	ヘ	ン	○	
E	S_O	↑	.	>	N	^	n	~			ョ	セ	ホ	゛		
F	S_I	↓	/	?	O	_	o	DEL			ッ	ソ	マ	゜		DEL

NOTE: SP represents space code.

NOTE: The control codes are represented by hexadecimal numbers.

8. REMOTE MODE

This allows the user to control the 1890A programmer from a remote terminal or computer connected to it via the RS232C interface.

This mode provides the following commands.

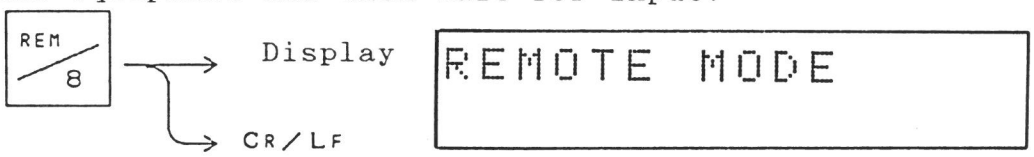
Number	Command	Function
1	A	Selects address mode.
2	B	Performs Blank check.
3	BO	Outputs check sum.
4	C	Changes data.
5	D	Deletes data.
6	E	Exits remote mode.
7	F	Formats (initializes) memory.
8	I	Insert data.
9	L	Lists data.
10	MD	Specifies address range for operation.
11	N	Selects device.
12	OP	Copies data.
13	OT	Performs continuous operation.
14	P or PL	Ports (outputs) data via RS232C port.
15	PH	Ports (outputs) data via Parallel port.
16	RL	Reads (inputs) data via RS232C port.
17	RH	Reads (inputs) data via Parallel port.
18	RLV	Compares memory data via RS232C port.
19	RHV	Compares memory data via Parallel port.
20	S	Selects communication format.
21	T	Transfers data.
22	V	Verification.

23	W	Programming.
24	Z or ER	Erases data.

8-1 Activate Remote Mode

Press the "REM" switch on the control panel to activate the REMOTE mode.

When the REMOTE mode is active, the programmer will display "REMOTE MODE" while it will send "CR/LF # " signal to external equipment and then wait for input.



To activate the REMOTE mode, the communication conditions must be established.

8-2 A Or AM Select Address Mode

This command is issued to select the address mode. Enter the address mode by entering a hexadecimal number 0-9, A-C. The numbers are associated with the address modes as follows: For in-depth information of the address modes, see the Unit Manual.

No.	Address mode	No.	Address mode
0	AM08080	7	AM16160
1	AM08160	8	AM16161
2	AM08161	9	AM16320
3	AM08320	A	AM16321
4	AM08321	B	AM16322
5	AM08322	C	AM16323
6	AM08323		

Input Sequence

#ANCR N....A hexadecimal number 0-9, A-C

8-3 BO Check Sum Output

This command displays the sum and EXOR value of the data within the range for operation between the specified addresses.

This address range for operation is specified in the PAE mode selected from the control panel and is specified by the MD command in the REMOTE mode.

Input Sequence

#△BOCR

××××△YYCR/LF

xxxx.....Sum (hexadecimal 4 digits)

YY .....EXOR (hexadecimal 2 digits)

8-4 C Change Data

This command is used to change memory data.

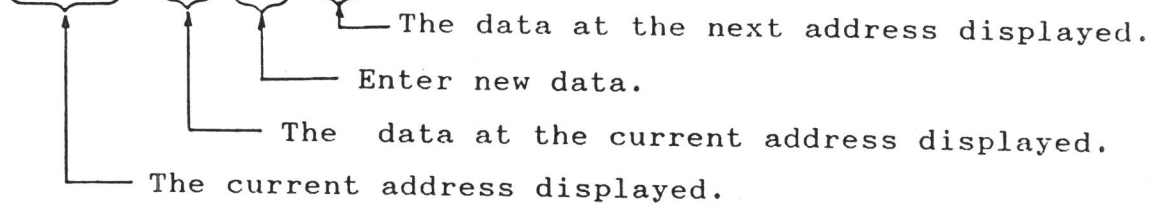
#C. CR or #C. NNNNNCR

Enter the address (hexadecimal number).

When the address is omitted, the programmer will begin changing memory data at address "0".

#C. CR

00000ΔMM-××ΔNN-



This command will cause an automatic carriage return (CR/CF) every 8 addresses.

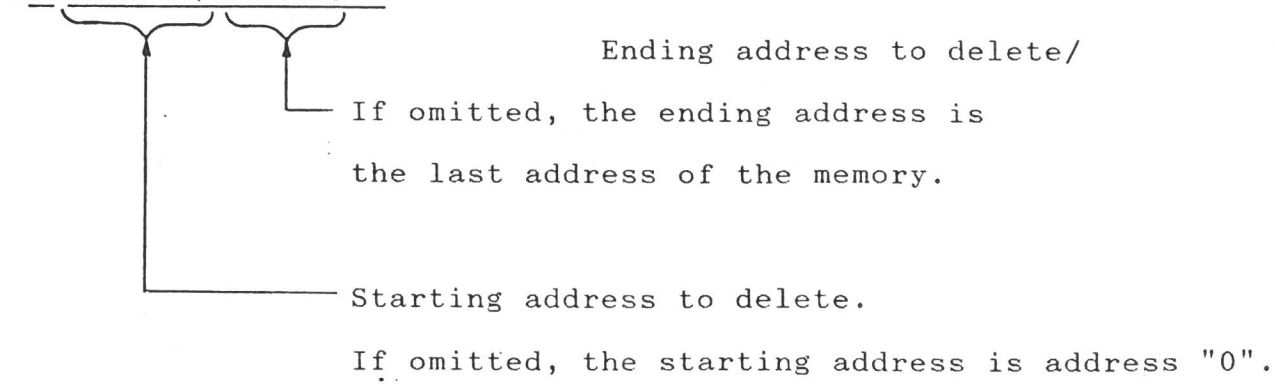
This command is terminated by entering "CR" into the data input area.

If this change causes an excess over the maximum memory address, the address returns to address "0" and then advances to higher order addresses one by one.

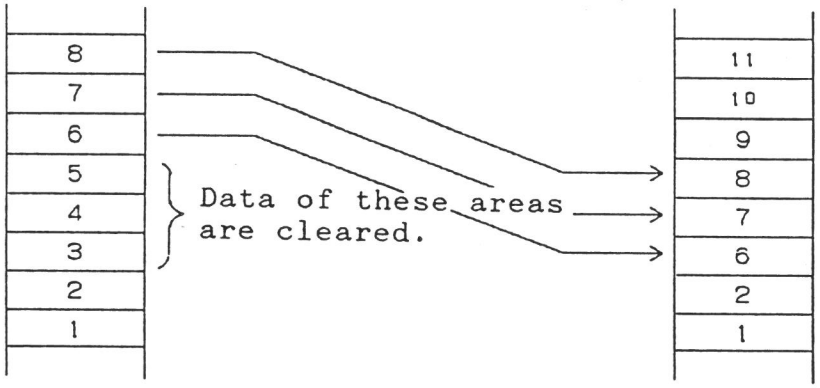
8-5 D Delete Data

This command is used to delete the data within the range between the specified addresses.

#D.OOOOO, OOOOOCR



Example: Executing this command produces the following result.



Also, the blank state of the selected PROM will be input into the areas at the highest order addresses (high order 3 addresses in this example).

For instance, when 27256 is selected, OFFH will be input.

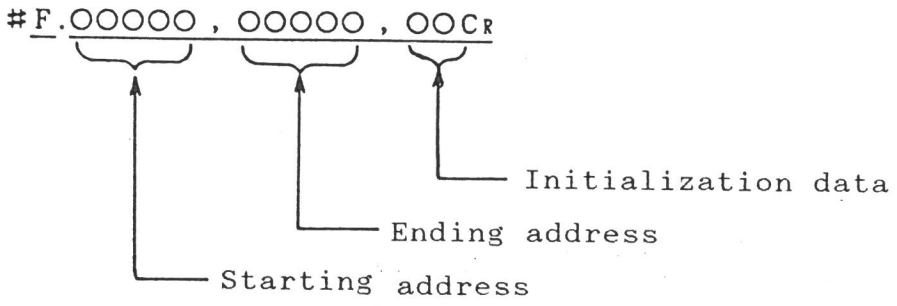
8-6 E Exit Remote Mode

This command is executed to terminate the REMOTE mode.

#EC$_R$

8-7 F Format (Initialize) Memory

This command initializes the memory within the range between the specified addresses by the specified data.



If omitted, the starting address is set to address "0".

If omitted, the ending address is set to the highest order address of the available memory.

If the initialization data is not specified, the blank state of the elected PROM is set.

When all of the starting and ending addresses and initialization data are not specified, the input sequence is as follows:

#F. CR

8-8 I Insert Data

This command inserts data into the area at the specified address.

#I. OOOOOCR

Starting address

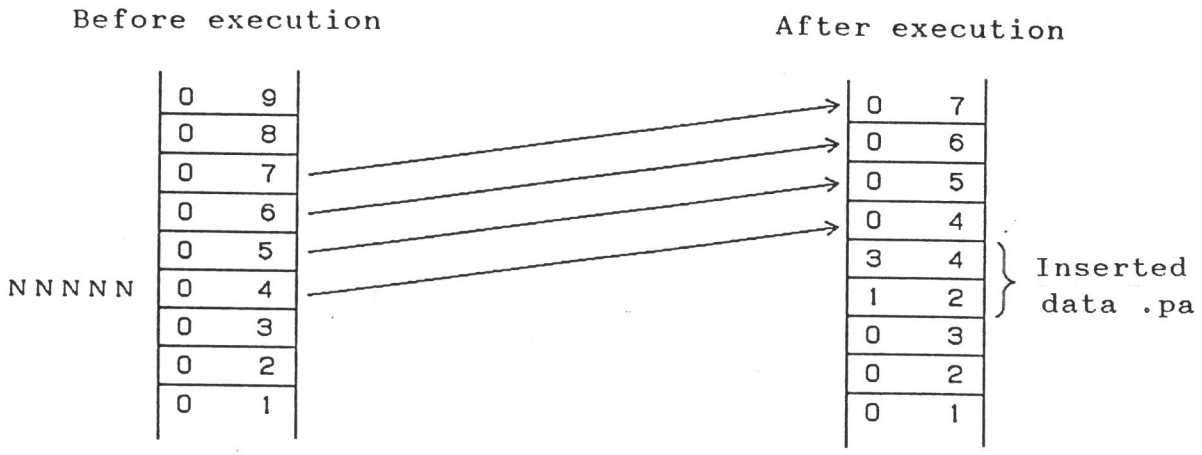
OOOOOΔOOΔOOΔ ····OOCR

Data to be inserted

If omitted, the starting address is set to address 0.
Any number of bytes can be entered for data to be inserted (unless data overflows the highest address of the memory).
The comma (') should be used to separate one data from another data.
Example: Executing of this command inserts data into the memory as follows:

#I.NNNNNC$_R$

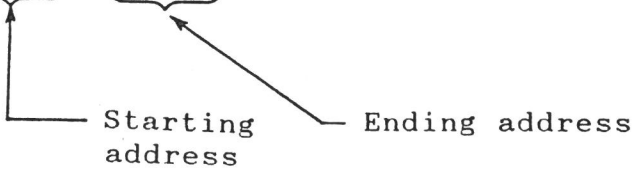
NNNNNΔ12Δ34C$_R$



8-9 L List Output

This command lists the memory data between the specified addresses.

#L. OOOOO, OOOOOC_R



OOOOOΔOOΔOOΔ ···OOC_R

If omitted, the starting and ending addresses are set respectively to address 0 and the last address of the memory just as other commands.

#L. C_R (address 0 to the last address)

#L. NNNNNC_R (address NNNNN to the last address)

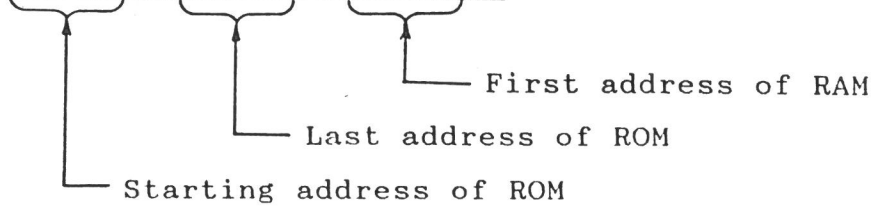
#L. , NNNNNC_R (address 0 to address NNNNN)

8-10 MD Display and Specify Address Range

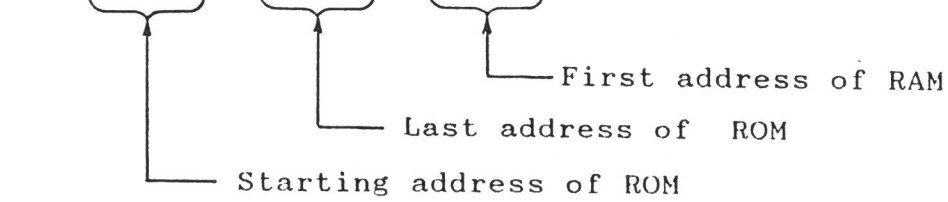
This command is used to display and specify the addresses of the ROM to read/write device data and the first address of the memory.

#MDC_R ··· Input Sequence for Display

OOOOO , OOOOO , OOOOOC_R



#MDOOOOO , OOOOO , OOOOOCR Input Sequence for Setting



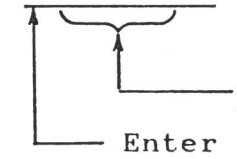
These addresses may be omitted. If omitted, the previous settings are effective.

8-11 N Device Select

This command is used to select the device by entering the device code.

For detailed information on the device codes, see the Unit Manual.

#NOOOOOCR



#N. CR

This sequence allows the user to determine the current device entries.

In this command, if the device code is not specified, an error will occur.

8-12 P (Or PL), PH Port Data

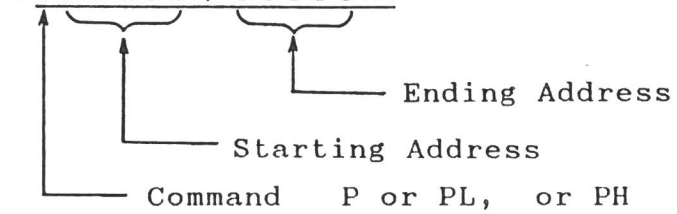
This command is used to port or output RAM data to external equipment.

Specify P (or PL) to output data from the RS232C port.

Specify PH to output data from the Parallel port.

If the address entry is omitted, this command is processed just as the "P" command.

#POOOOO , OOOOOCR



The format of data output by this command is the format specified by the "S" command.

8-13 RL Or RH Read Data

This is used to read or input data via the RS232C and Parallel ports from external equipment. RL means that data is read via RS232C and RH means that data is read via Parallel port.

When the address is entered immediately after this command, the address of the input data address plus the entered address will be the address to store the data.

#ΔRHCR Data input from parallel port

#ΔRLΔOOOOO , OOOOOCR

Ending address

Starting address

Example: #ΔRLΔ100 , 1FFCR

If the address of input data is address 100, the system begins storing data into memory at address 0 and continues until the data address is 1FF.

8-14 RLV Or RHV Compare Data

This command compares data read from RS232C and Parallel ports with the contents of the RAM in the programmer.

The input sequence is the same as for the RL (or RH) command.

Specify RLV for input from RS232C and RHV for input from parallel port.

8-15 S Select Communication Format

This command selects the communication format used by P, PL, PH, RL, RH, RLV and RHV commands.

This format is specified by entring the corresponding hexadecimal number 0-9, A-F.

0	MINATO HEX
1	INTEL HEX
2	HP64000 ABS
3	BINARY
4	MOTOROLA
5	ASC II HEX
6	ASC II OCT
7	TEKTRONIX
8	〃
9	TEXAS SDS-MAX
A	BNPF
B	BHLF
C	NO FORMAT
D	Spare
E	〃
F	〃

This input sequence allows the user to determine the current format entries.

#S. OCR

Format No.

#S. CR

8-16 T Transfer Data

This command transfers data within the memory.

#T. OOOOO , OOOOO , OOOOOCR

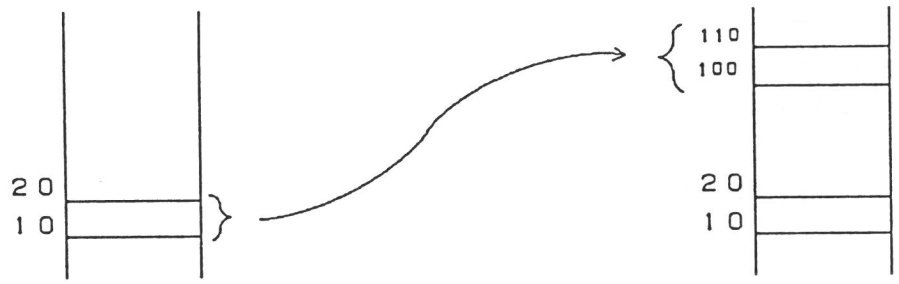
Address to which data is to be moved

Ending address

Starting address

If these addresses are not specified in this command, an error will be caused.

#△T△10 , 20 , 100CR



The contents of memory at addresses 100-110 become equal to those of memory at 10-20.

The contents at addresses 10-20 are not changed.

8-17 B, OP, OT, V, W, Z(ER)

These commands are used to read and write data from and to the P-ROM. They have the same input sequence.

#BCR

Performs a blank check.

#WNCR

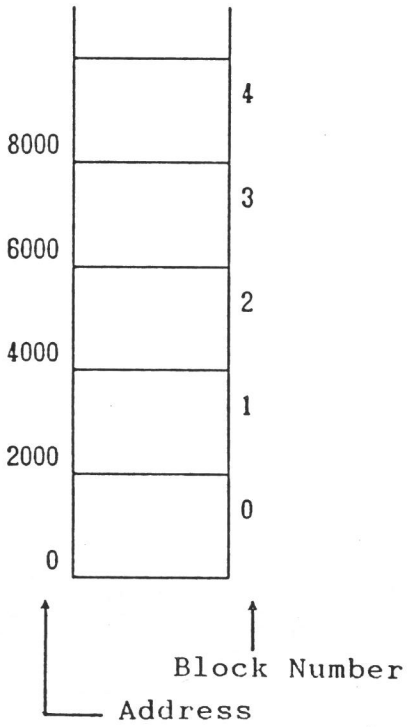
N is any hexadecimal number 0-9, A-F.

This is the same command except a block number is attached. This block number shows the block number when the RAM is separated by the selected ROM capacity from address 0.

The above command will cause the contents of the Nth block to be written into the PROM.

Although this command provides the same operation as issuing the "MD" command to change the RAM start address, the RAM start address setting will not be changed.

In this example, a 64K-bit ROM is selected and therefore the RAM memory is blocked by 8K bytes.



B	Blank check
OP	Copy data from ROM onto memory into PROM
OT	Continuance operation
V	Verify check
W or PG	Write data
Z or ER	Erase data of EEPROM

NOTE: B, Z, and ER commands do not permit you to specify the block number. However, if specified, the block number is only ignored without any error.

9. RS232C INTERFACE SPECIFICATIONS

9-1 Hardware Specifications

Baud Rate

Start Bit 1 bit

Data Bit 7, 8 bit

Parity No, Odd, Even

Stop Bits 1, 1.5, 2 bits

Synchronization System Asynchronous

Communication System Full duplex

9-2 Signal Functions and Connections

The signals and their connections in the 1890A are listed below.

Signal and abbreviation	Code	Pin No	Direction of signal	
			MODEL 1890	External
Protective Grand (FG)	AA	1		
Transmitted Data (TXD)	BA	2	←	
Recived Data (RXD)	BB	3	→	
Request to Send (RTS)	CA	4	←	
Clear to Send (CTS)	CB	5	→	
Date Set Ready (CSR)	CC	6	→	
Signal Ground (SG)	AB	7		
Date Terminal Ready (DTR)	CD	20	←	
Darrier Detector (CD)	CE	8	→	

1. AA; Protective Ground

2. BA; Receive Data....1890A receives data from external equipment.

3. BB; Transmit Data...1890A transmits data to external equipment.

4. CA; Request to Send (RTS)....ON: External equipment informs the 1890A that it is ready to receive.

OFF: External equipment informs the 1890A that it is not ready to receive.

5. CB; Clear to Send (CTS)...ON: The 1890A informs external equipment that it is ready to receive.

OFF: The 1890A informs external equipment that it is not ready to receive.

6. CC; Data Set Ready (DSR)...ON: The 1890A informs external equipment is ready to receive and send.

OFF: The 1890A informs external equipment that it is not ready to receive and send.

7. AB; Signal Ground

20. CD; Data Terminal Ready (DTR)...ON: External equipment informs the 1890A that it is ready to receive and send.

OFF: External equipment informs the 1890A that it is not ready to receive and send.

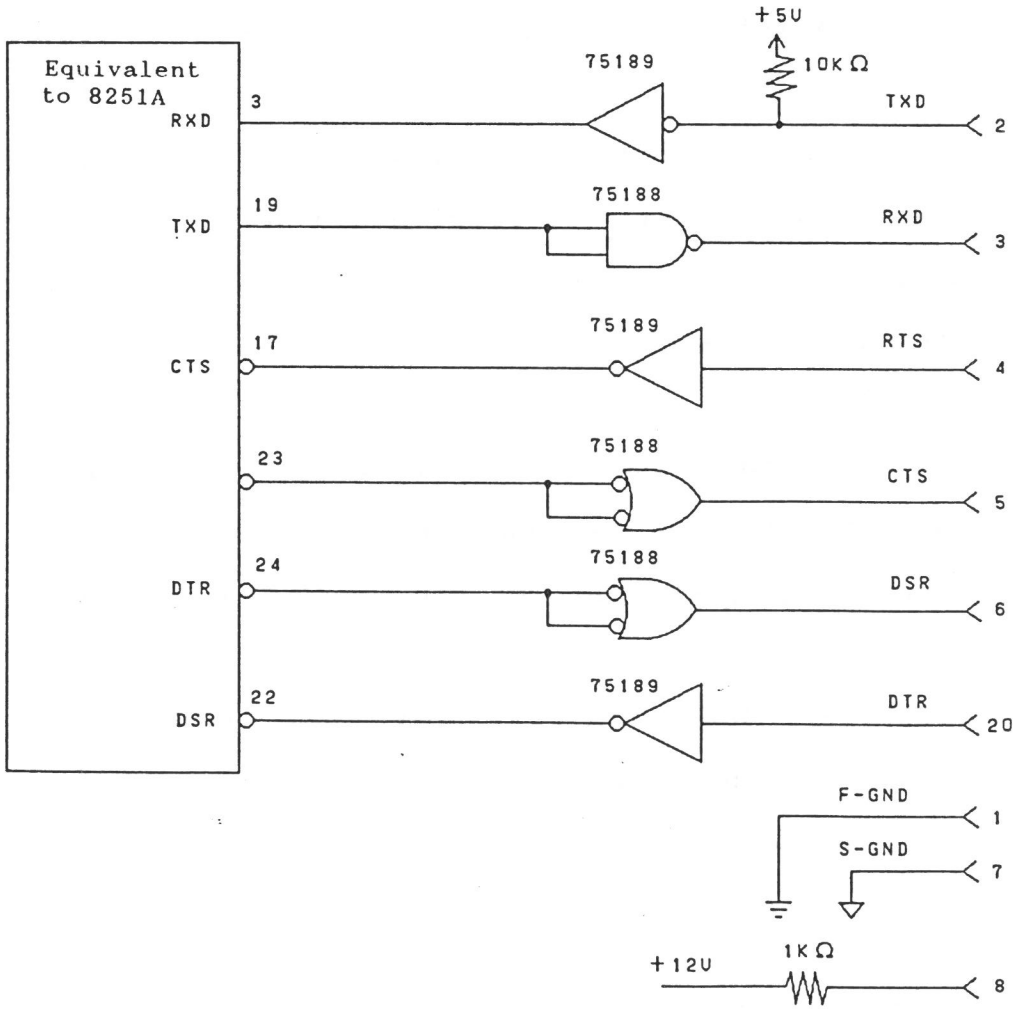
8. CE: Carrier Detection (CD)...ON: The 1890A informs external equipment that the carrier is detected.

NOTE: No OFF state.

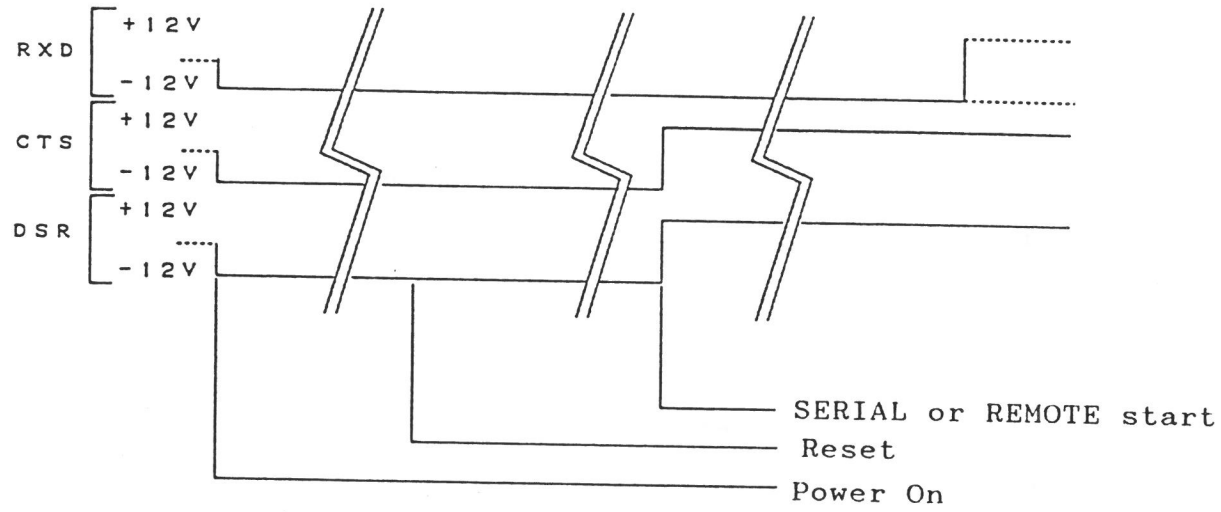
* Polarity of Interface Signals

Voltage	Data signal	Control signal
+3V ~ +12V	0	ON
-3V ~ -12V	1	OFF

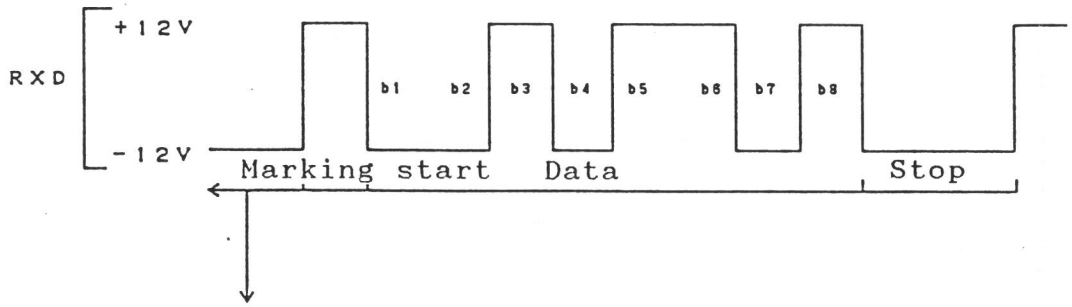
* Interface Signal Outputs



* Output Signal Levels



* Transmit Data



Output is always "LOW" level (1) during no data transfer.

This example: Start 1 bit

Stop 2 bits

Data 8 bits (no parity, 2HB)

* Receive Data

External equipment cannot be interfaced to the 1890A unless the output is "LOW" level (1) when data is not being transferred.

9-3 Connections To External Equipment

This section describes the two ways of connecting different equipment having a RS232C serial interface to the 1890A. Equipment having a RS232C serial interface are usually divided into the two classes:

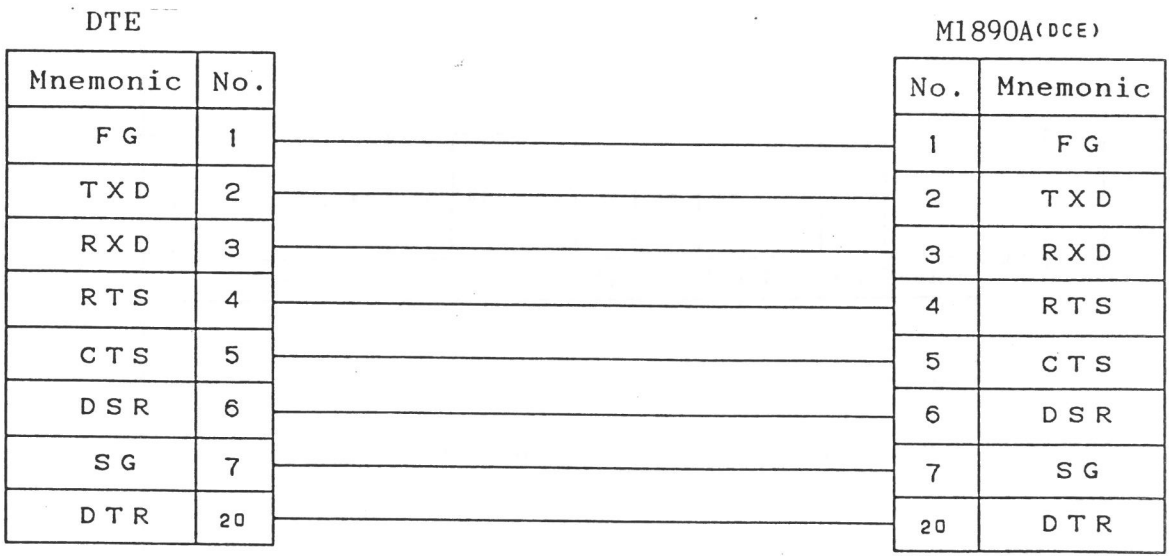
1) Data Terminal Equipment (DTE)

2) Data Communication Equipment (DCE)

The Model 1890A programmer is defined as DCE. In general, terminals, PTRs, and printer are defined as DTE. Modems are defined as DCE.

9-3-1 Connection to Data Terminal Equipment (DTE)

* DTE that use DTR and RTS



Mnemonic	No.
FG	1
TXD	2
RXD	3
RTS	4
CTS	5
DSR	6
SG	7
DTR	20

No.	Mnemonic
1	FG
2	TXD
3	RXD
4	RTS
5	CTS
6	DSR
7	SG
20	DTR

The appropriate equipment include:

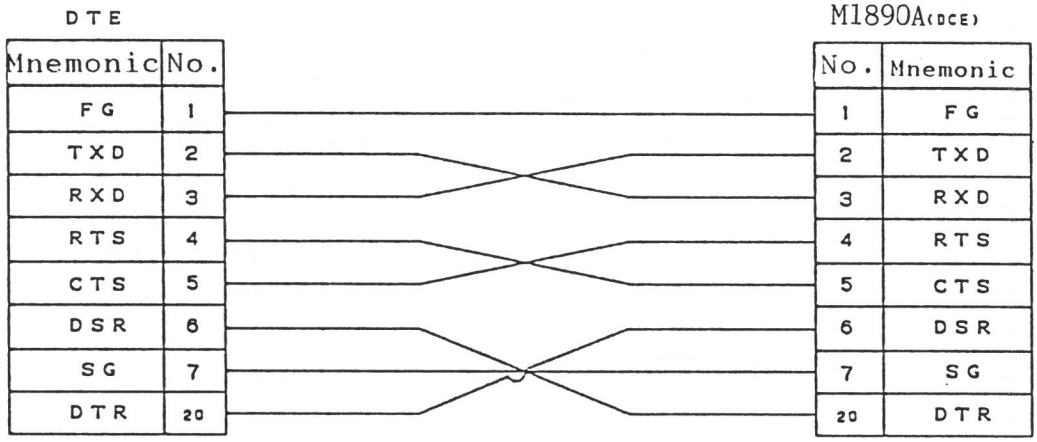
* HP64000 TO MODEM connection * Intel MDS

* ADM-3A (CRT Terminal) * PC-8800

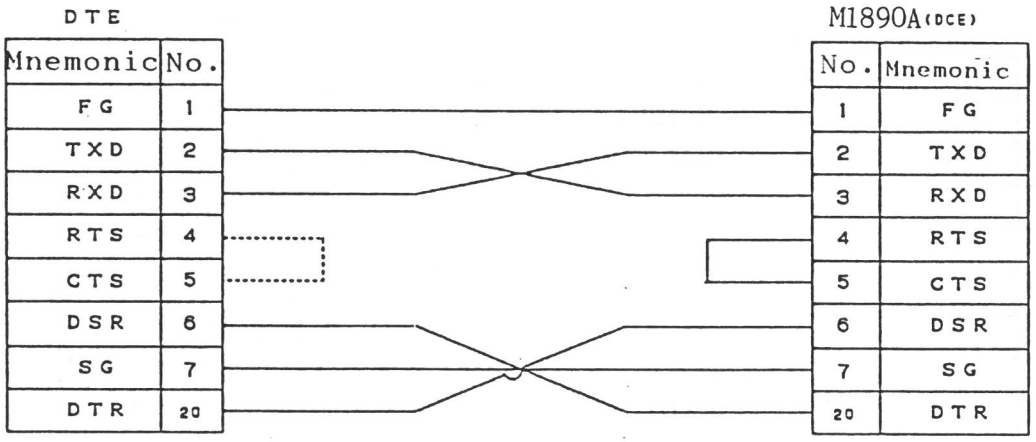
Others

9-3-2 Connections to Data Communication Equipment (DCE)

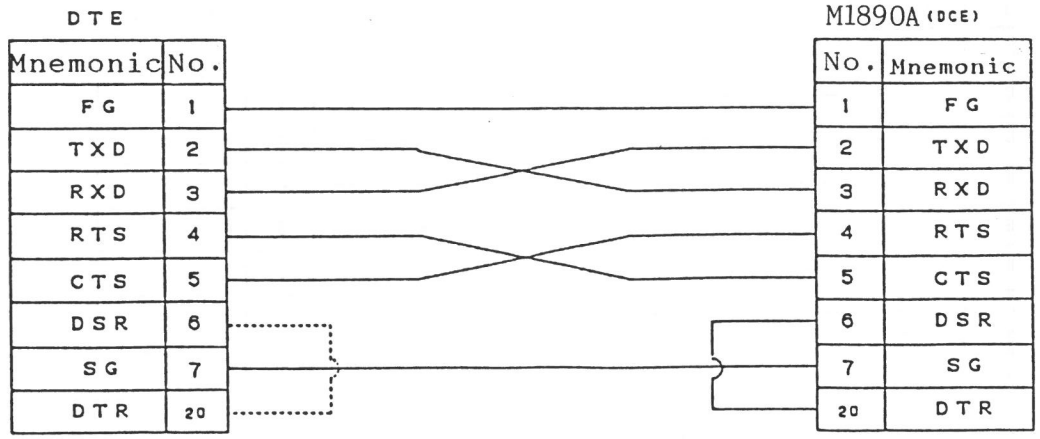
* DCE that use DTR and RTS



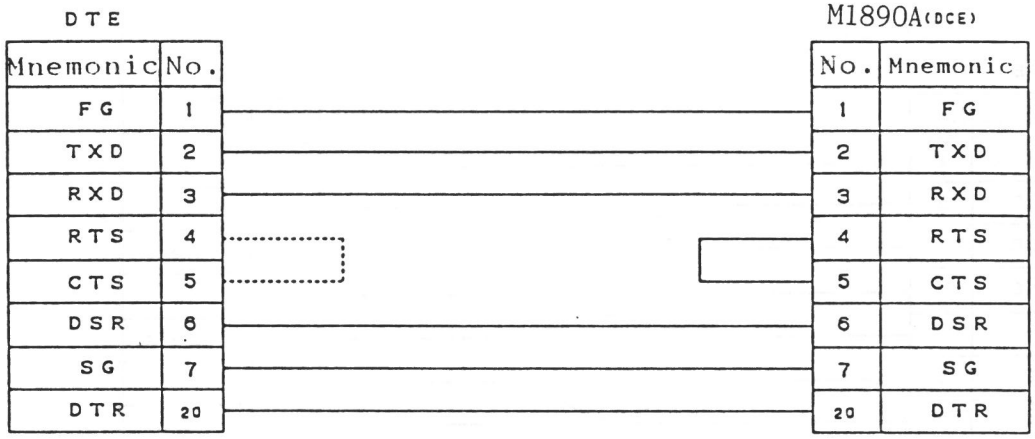
* DCE that use DTR



* DCE that use RTS

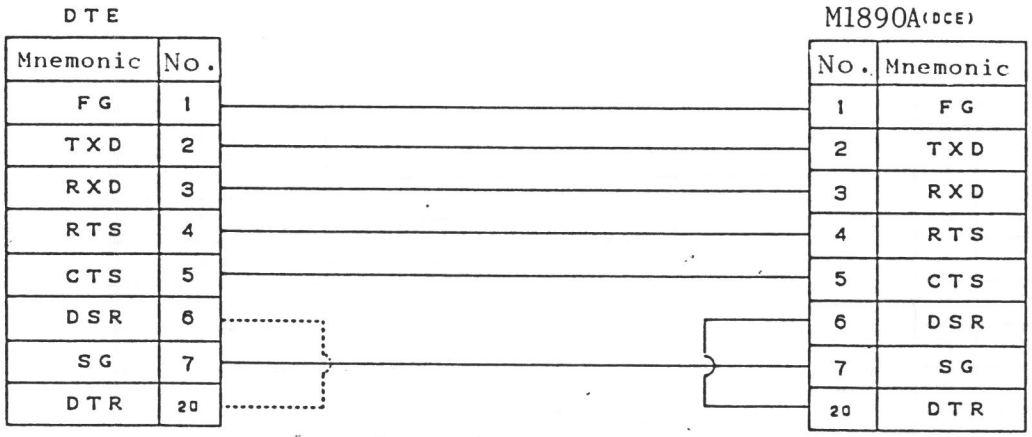


* DTE that use DTR



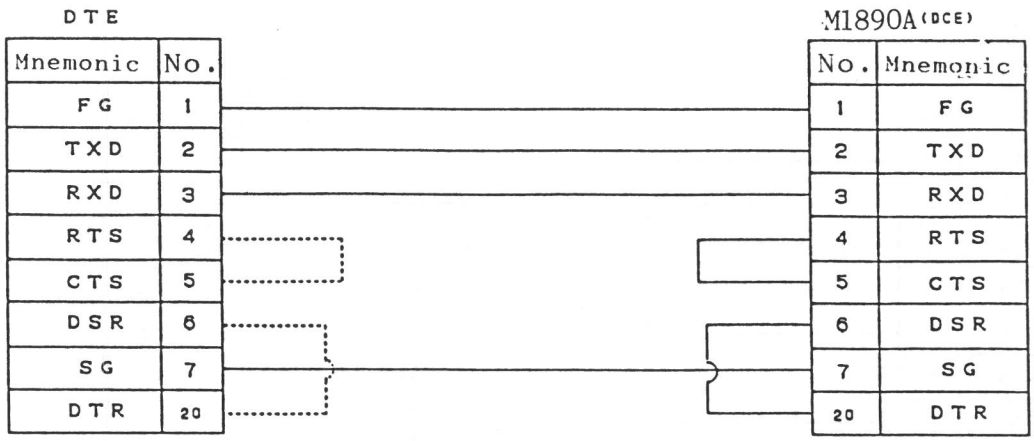
NOTE: For 4-5 short of DTE, see the appropriate Operation Manual.

* DTE that use RTS



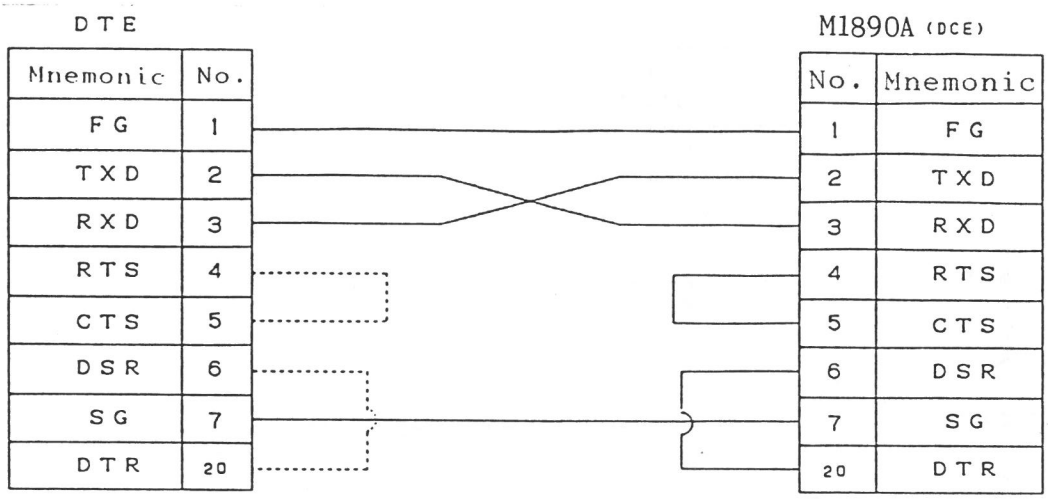
NOTE: For 6-20 short of DTE, see the appropriate Operation Manual.

* DTE that use no control signals



NOTE: For 4-5 and 6-20 shorts of DTE, see the appropriate Operation Manual.

* No Control Signals Used



NOTE: The connector pin assignments as DTE are specified by the RS232C standard. Therefore, if DCE equipment are connected to each other using a 1:1 cable, satisfactory results cannot be obtained.

Sections 2-3-1 and 2-3-2 describe the typical connections of the Model 1890A to DCE and DTE. Refer to these and determine the connecting cable in consideration the connector signal assignments and the data transmit and receive control method of your external equipment.

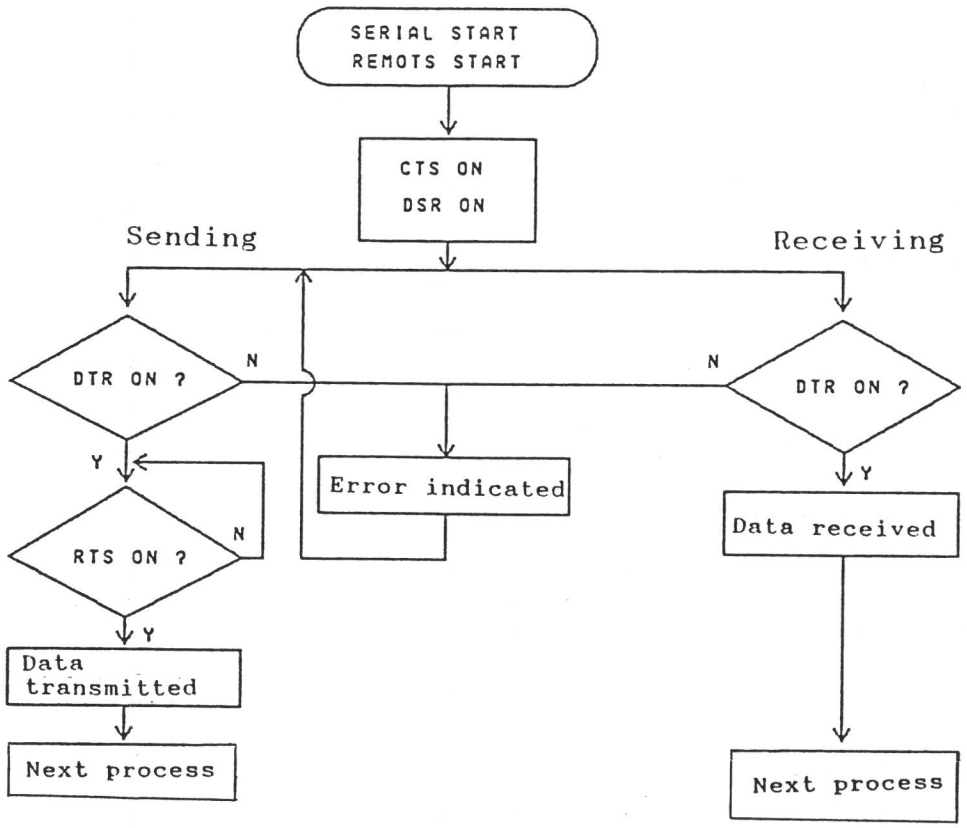
9-4 Control Method and Transmission Procedure

The data transmit and receive control and the transmission procedure (protocol) are not standardized in the RS232C Interface.

Various control methods and transmission procedures are used from equipment to equipment.

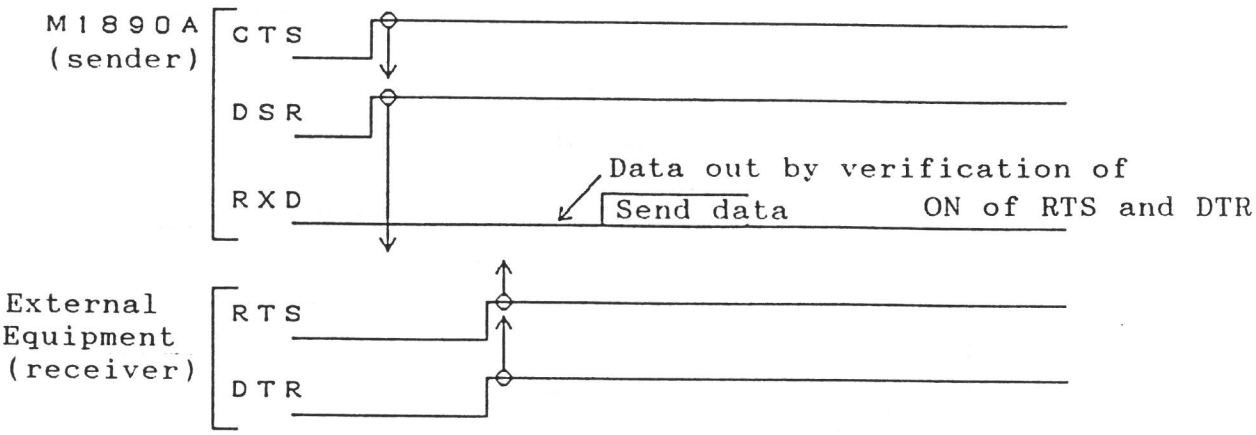
The control method and the transmission procedure used in the 1890A is given below.

9-4-1 Control Method

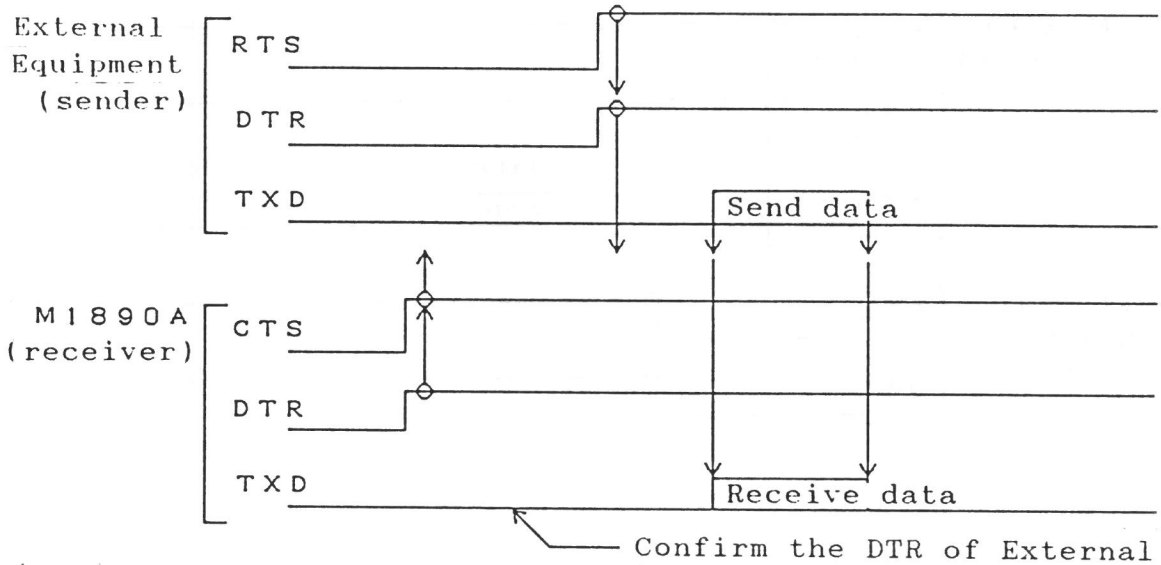


A communication interface IC equivalent to the 8251A is employed in the RS232C interface of the Model 1890A.
Therefore, note that data cannot be sent unless the RTS signal is turned ON.
(The 8251A prohibits this transmission on hardware.)
In addition, switching to the ON state of the DTR signal allows both data reception and transmission. If the DTR is OFF, the programmer will indicate an error on the display panel and wait for the DTR signal to be turned ON.

* Sending (Example of Signals)



* Receiving (An Example of Signals)



9-4-2 Transmission Procedure

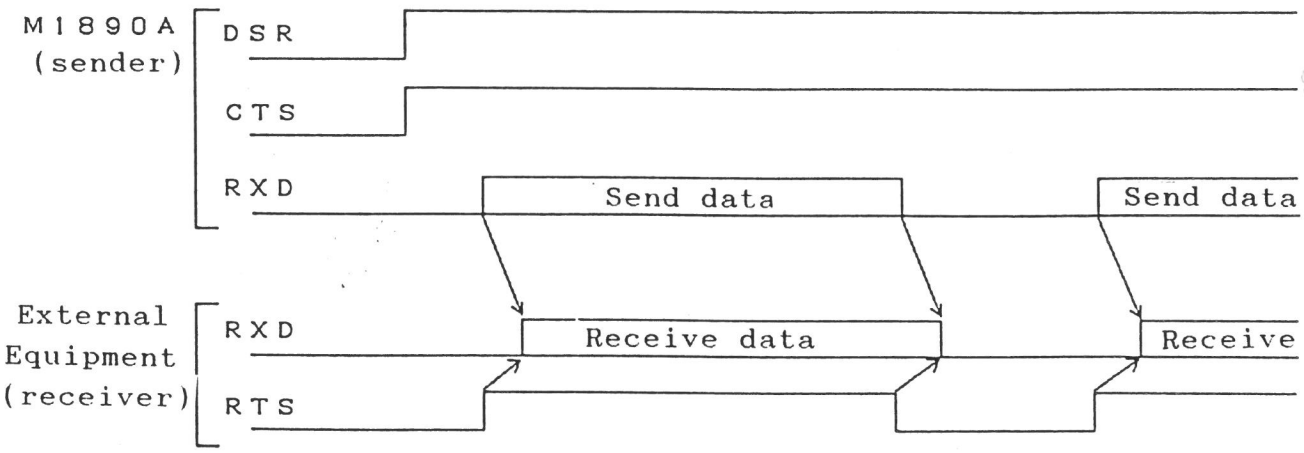
The 1890A supports the two data communication control procedures:

(1) Non-Control

(2) X/ON-X/OFF Control

Also, the 1890A contains a 2-Kbyte receive data buffer.

(1) Non-Control

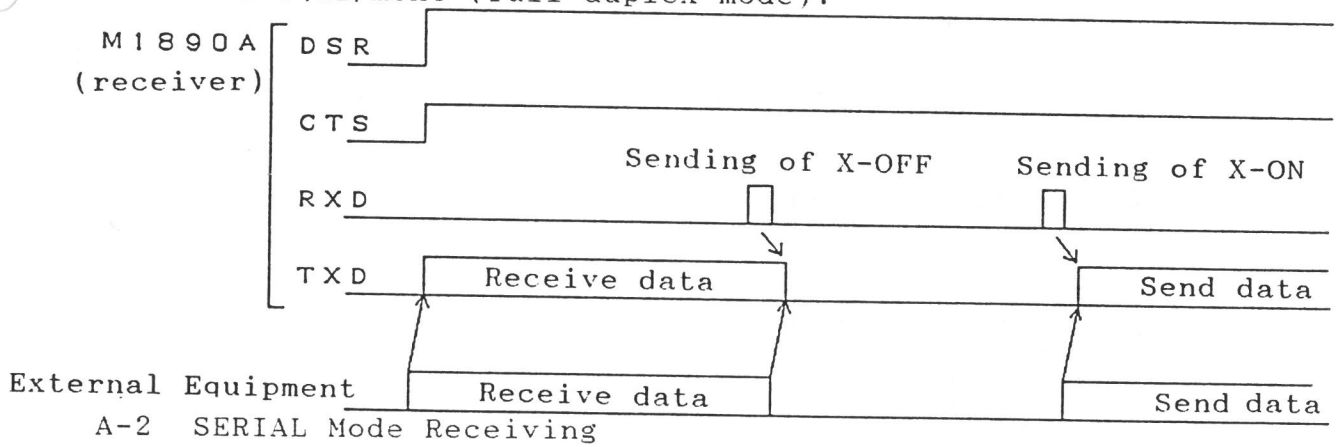


(2) X/ON-X/OFF Control

A-1 REMOTE Mode Receiving

When data input into the receive data buffer occupies not smaller than two third of the capacity during receiving of the data from external equipment, the 1890A will send the "X-OFF (13H)" code to the equipment.

When data input into the buffer occupies less than one third of the capacity, the 1890A will send the X-ON (11H) code to the external equipment (full-duplex mode).

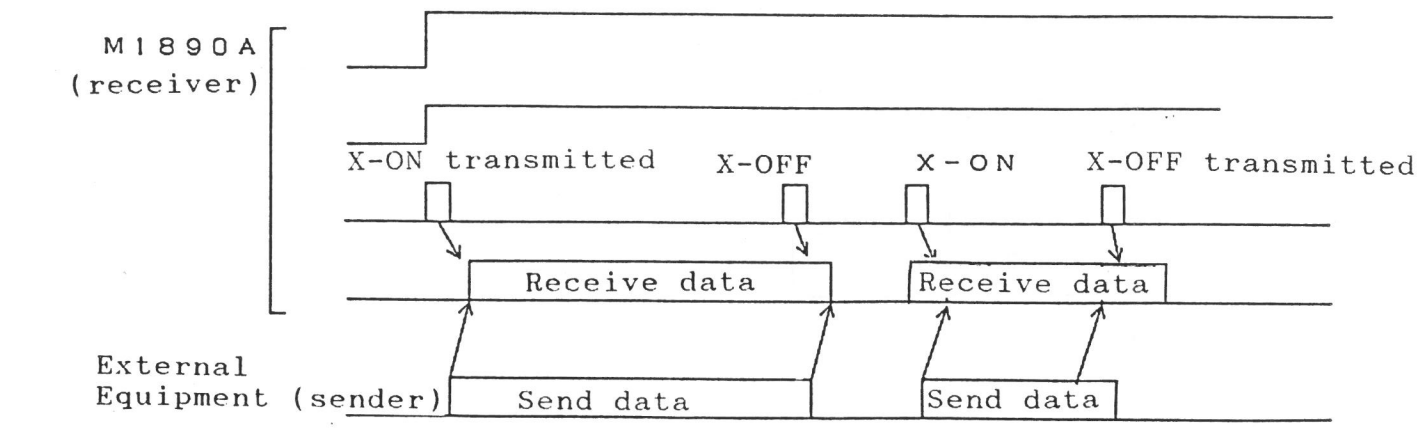


A-2 SERIAL Mode Receiving

This is partially added to the REMOTE Receiving feature.

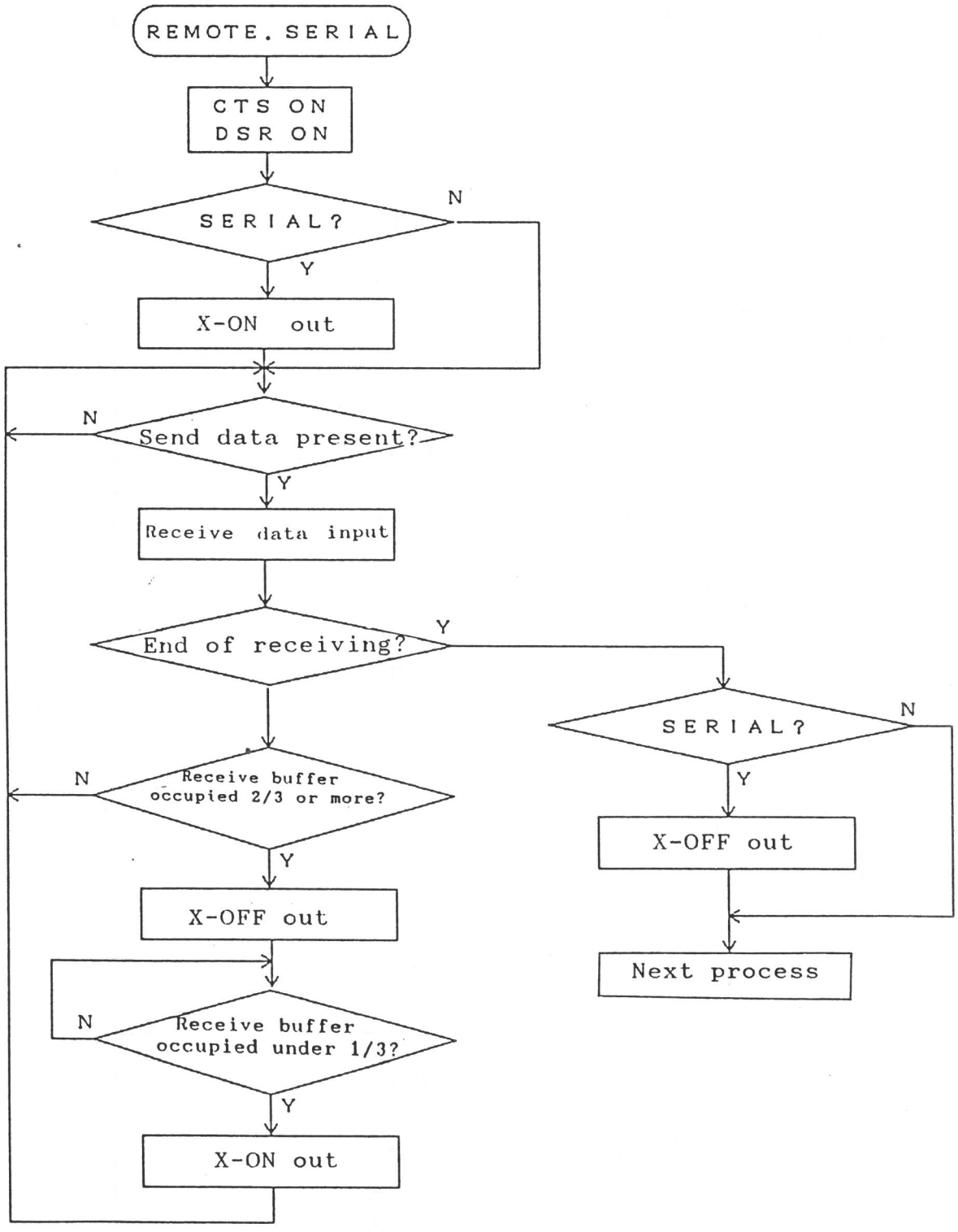
Upon start of the SERIAL mode, the 1890A will send "X-ON" code.

Upon completion of receiving all data, the 1890A will send the "X-OFF" code.



A-3 Flow Chart of X-ON/OFF Control Receiving

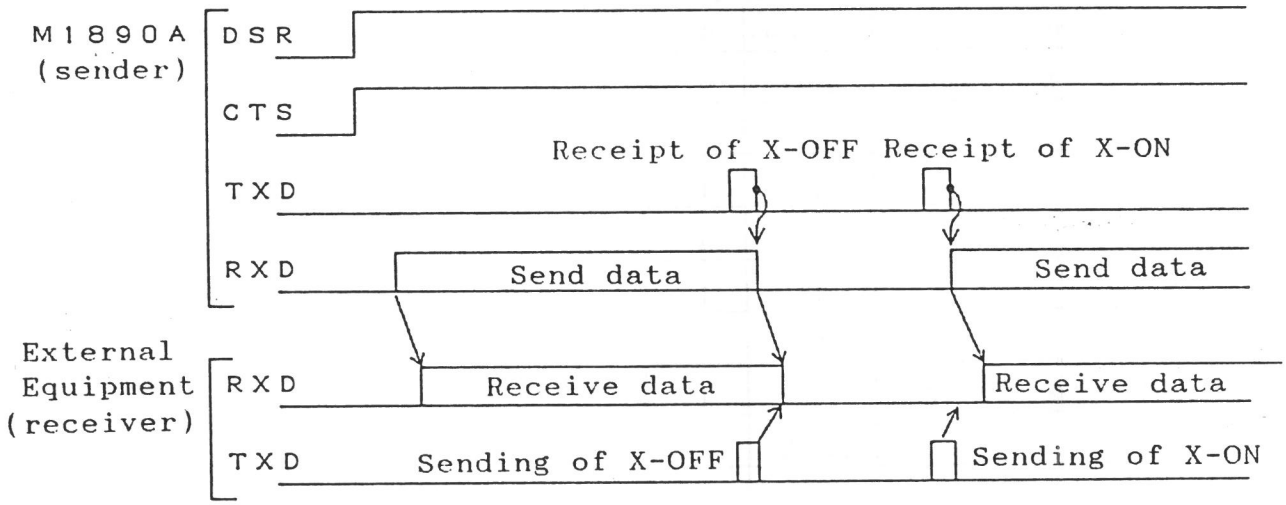
(1) X-ON out (2) Send data present? (3) Receive data input



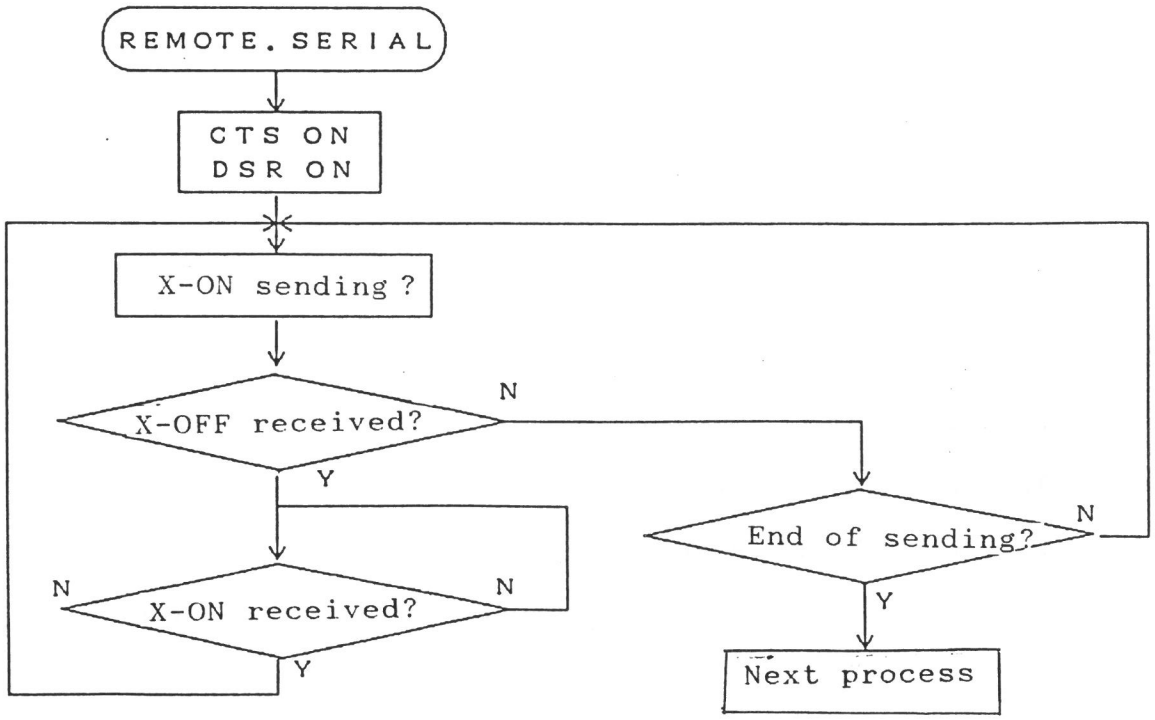
B-1 REMOTE and SERIAL Sending

When the "X-OFF" code is received from external equipment during sending of data to the equipment, the 1890A will stop transmitting the data. When the "X-ON" code is receive, the 1890A will resume to transmit the data.

<Dull-Duplex Mode>



B-2 Flow Chart of X-ON/OFF Control Sending



10. PARALLEL INTERFACE

The parallel interface of the 1890A can be used for I/O of data.

10-1 Output of Data

For output of data, this interface is in accordance with the Centronics specifications.

Signal name	I/O	Pin No.	Logic
DATA 1 ~ 8	Output	2~9	1
DATA STB	〃	1	1
ACK	Input	10	0
BUSY	〃	11	1
PE	〃	12	1
FAULT	〃	32	0
INPUT·PRIME	Output	31	1
S. G.		19~29	
F. G.		17	

Data 1-8: Output data.

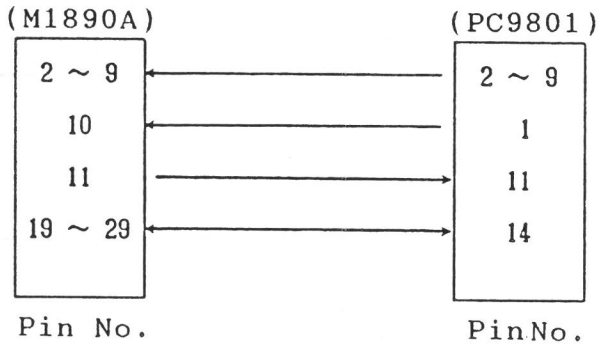
DATA STB: The data strobe signal to inform external equipment of data being ready.

BUSY, PE, FAULT, and INPUT PRIME: Unused. Do not connect to these.

10-2 Input of Data

For input of data, this interface uses the following signals only.

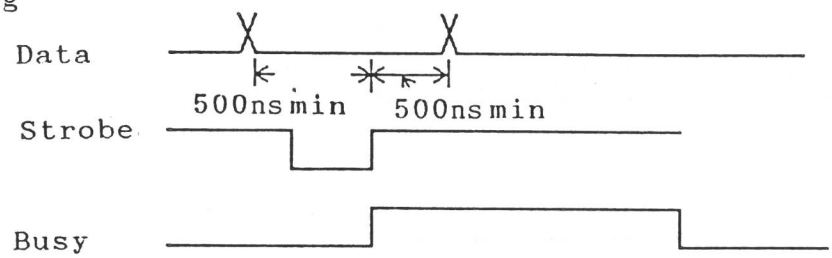
Signal name	I/O	Pin No.	Logic
DATA 1 ~ 8	Input	2~9	1
DATA STB	Input	1	1
			1
S. G.			19~29
F. G.		17	
BUSY	Output	11,18, 36	1



DATA 1-8: Output data.

DATA STB: The signal to inform external equipment of the completion of inputting data.

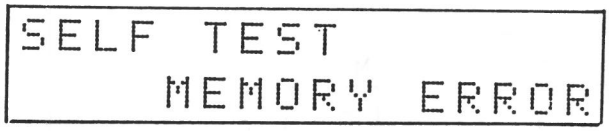
Timing



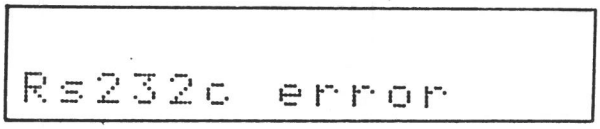
In the 1890A system, data is input at the leading edge of the strobe signal. Once data has been input, the busy signal will output for a certain period of time. Thus, the sender must output data and the strobe signal when the busy signal is in the state of "0".

11. ERROR MESSAGES LIST

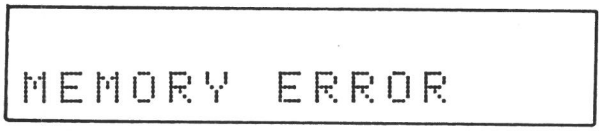
Error detected during memory self tests.



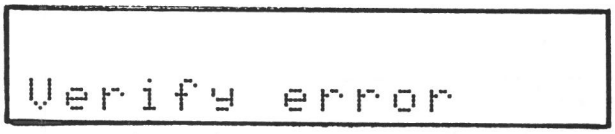
Error such as overrun occurred in RS232C communications.



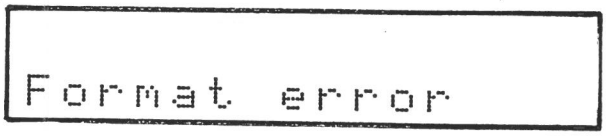
Memory parity error detected.



Verify error occurred when the RLV or RHV command is issued.



Format error detected.



Check sum error detected.