AMS “D” SERIES I/O EXTENSION UNIT INSTRUCTION MANUAL

1. Overview of I/O board

This is an optional board to be able to extend the external input/output signals for AMS “D” series.

Using this board enables to expand 8 x external output, 8 x external input, 8 x output signals to show the machine conditions, the functions of pattern data download by serial communications.

2. Preparation

Following preparations need to be done before using I/O board

1) Put the connector on the main board of sewing machine
2) I/O board implementations
3) Memory switch settings

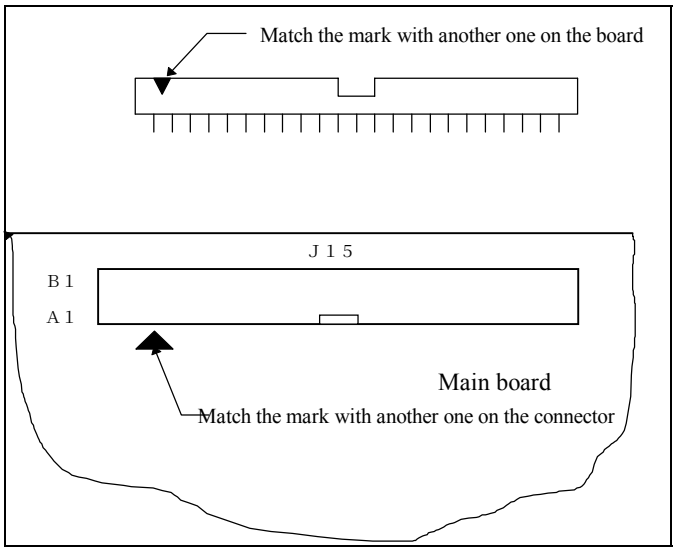
3. How to install I/O board connector

Please put I/O board connector as follows:

First, put I/O board connector on main board.

Solder I/O connector (HK024100640) onto “CN15” on main board.

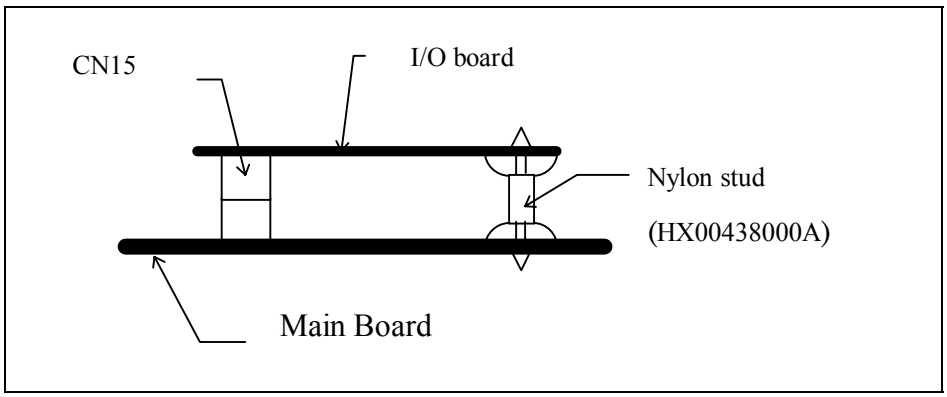
At this time, be sure to match the “▼” mark appearing on the board and the “▼” mark appearing the side of connector to put together. (refer the picture below)



(Picture 1)

4. **I/O board implementations**

Fix I/O board on main board by 2 x nylon-stud.



(Picture 2)

5. Input/output settings

5.1 Memory switch settings

Following memory switch settings need to be done to use the I/O board

1) Function number : No. 76 - 81 Output connection

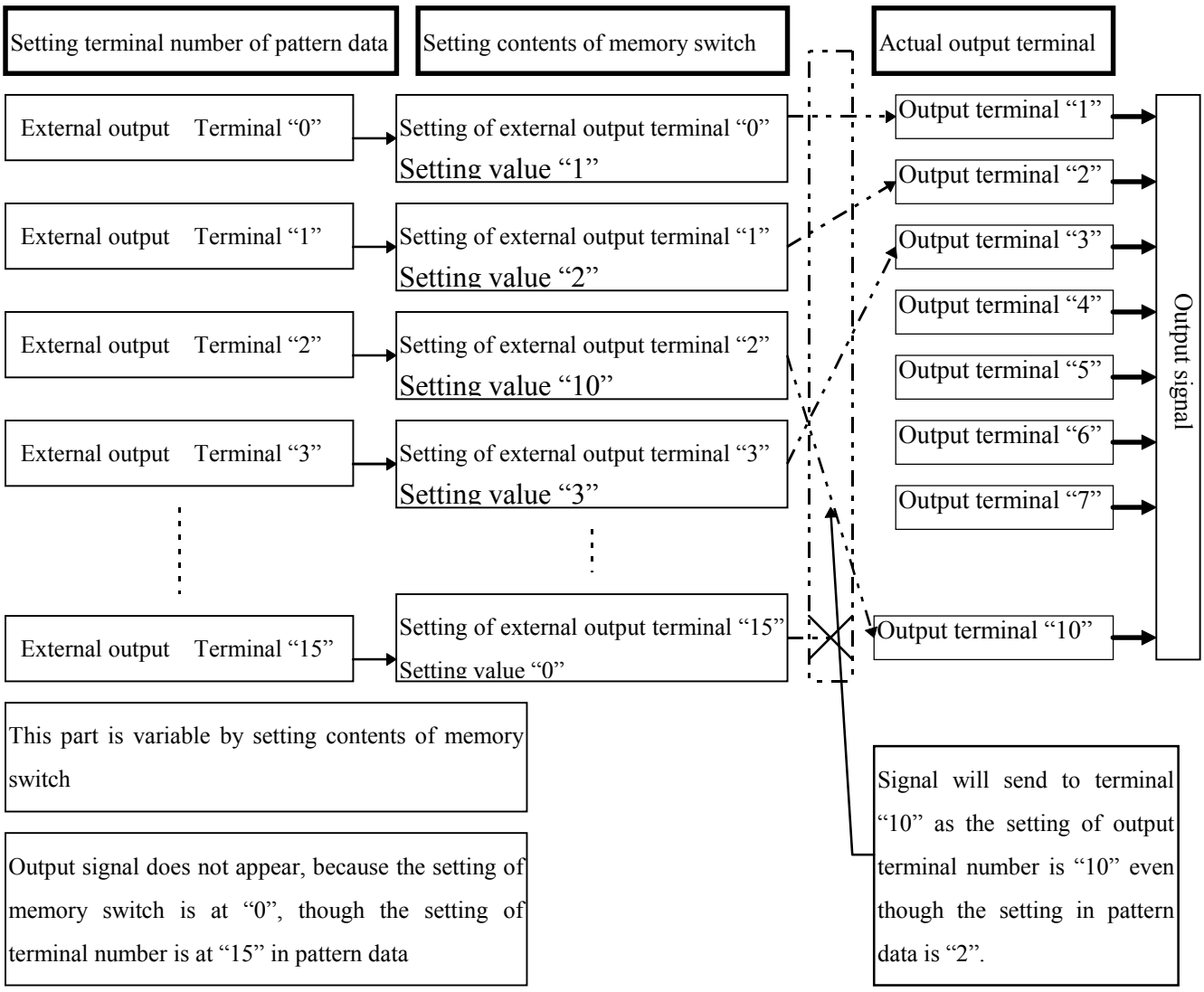
2) Function number : No. 82 - 87 Input connection

5.2 What to set by memory switch

Input terminal number simultaneously when input external input/output command by pattern data.

The terminal number is not fixed (numbers of actual I/O terminals are fixed) but controlled by memory switch. Therefore it is possible to change to which connector the signal will send when set terminal “0” with output command by memory switch settings.

5.3 Concept diagram



(Picture 3)

For example, if you made external output data specifying external output terminal number "2" in pattern data like in above diagram,

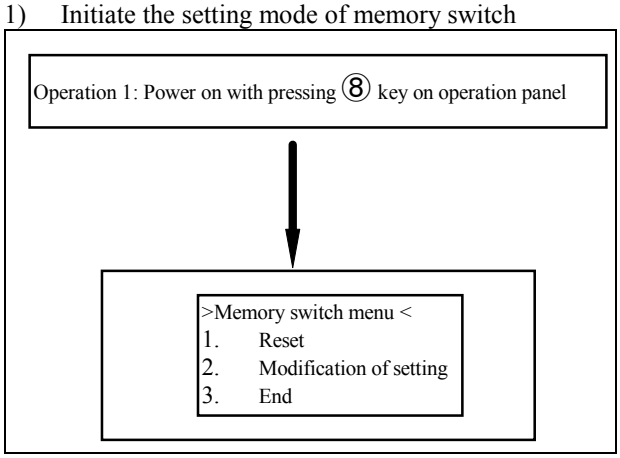
Even though you put "2" in output terminal, output signal will send to output terminal number "10", because memory switch setting value for pattern data terminal number "2" is set at "10". (refer picture 3 for output terminal numbers)

This enables you to set different terminal numbers from actual terminal numbers when you input data.

For external input, specify the input terminal to input by memory switch. (image to see picture 3 from right to left)

5.4 How to initiate memory switch

1) Initiate the setting mode of memory switch



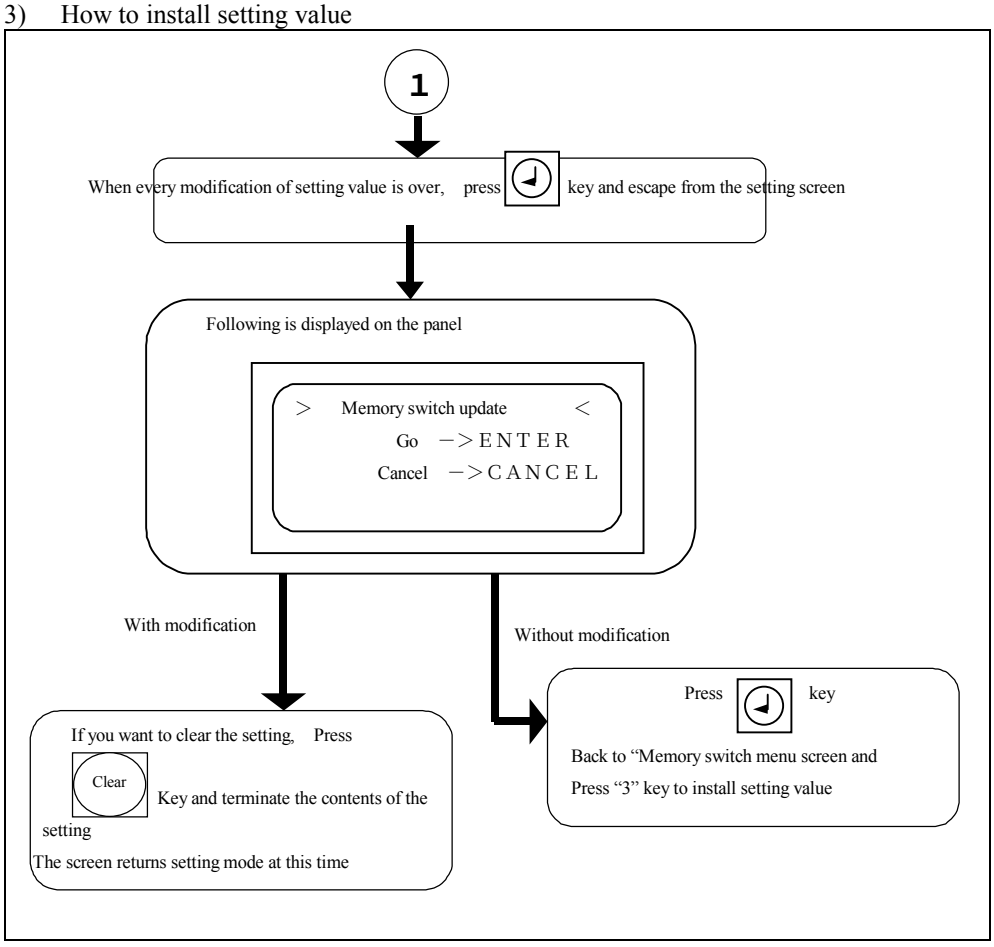
(Picture 4)

Enter setting value modification mode by pressing numeral key ②

2) Modification of setting

For modification of settings, refer to “how to use memory switch” in the instruction manual (pp. 23 - 25) or engineers manual (pp. 46 - 48).

3) How to install setting value



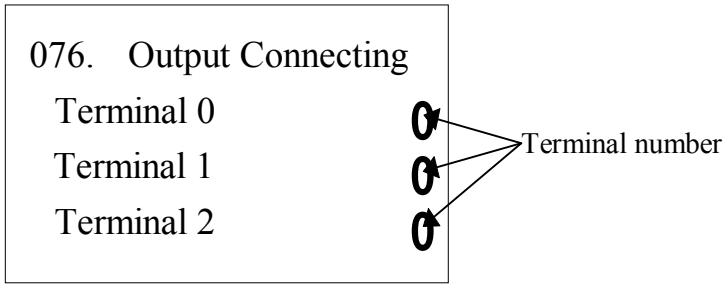
(Picture 5)

5.5 Setting examples

Setting to send external signal to pins No.1 and 2 of CN1 on I/O board by inputting terminal number “01” in pattern data.

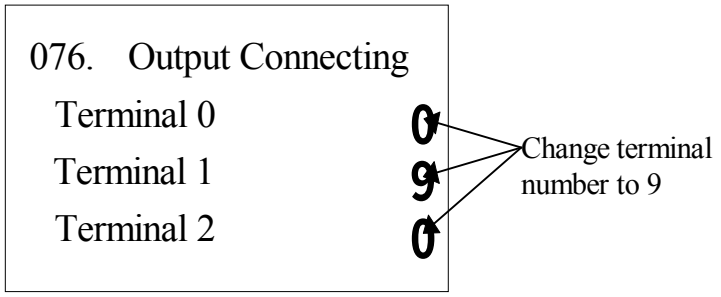
1) Initiate setting value modification screen on memory switch

2) Display the screen of the function number to modify. Here, we select function No. 76. (refer picture 6)



(Picture 6)

3) For setting of terminal number “1” in pattern data, set “terminal 1” in column 2 of No. 76 from Table 1.



(Picture 7)

4) The terminal number of pins No.1 and 2 of CN1 for external output becomes “9”, therefore input the setting value “9” of “Terminal 1” in column 2 of the function No. 76.

5) Write the modified contents of memory switch.

6) Now send output signal to pins No.1 and 2 of CN1 on I/O board when inputting external output, terminal No.1 in pattern data input.

5.6 Cautions about external output settings

Be sure NOT to modify the settings of external output terminal numbers 1-3.

6. Contents of memory switch needed to make settings

Following is the function number list for memory switches needed to make settings when doing external input/output.

6.1 Settings of external output

The setting range of the following list is 0-16. In the following setting, set the terminal number to which you want to send signals in the terminal numbers of Table 5.

No signal sends when setting “0” in setting value.

Necessary setting items of memory switch about external output

Function numbers	Items	Items	Setting range
７６	１	Output terminal No.0	Terminal number 0-16
	２	Output terminal No.1	〃
	３	Output terminal No.2	〃
７７	１	Output terminal No.3	〃
	２	Output terminal No.4	〃
	３	Output terminal No.5	〃
７８	１	Output terminal No.6	〃
	２	Output terminal No.7	〃
	３	Output terminal No.8	〃
７９	１	Output terminal No.9	〃
	２	Output terminal No.10	〃
	３	Output terminal No.11	〃
８０	１	Output terminal No.12	〃
	２	Output terminal No.13	〃
	３	Output terminal No.14	〃
８１	１	Output terminal No.15	〃

(Table 1)

6.2 Settings of external input

The setting range of the following list is 0-16. In the following setting, set the terminal number to which you want to send signals in the terminal numbers of Table 5.

No signal sends when setting “0” in setting value.

Necessary setting items of memory switch about external input

Function numbers	Items	Items	Setting range
82	1	Input terminal No.0	Terminal number 0-16
	2	Input terminal No.1	〃
	3	Input terminal No.2	〃
83	1	Input terminal No.3	〃
	2	Input terminal No.4	〃
	3	Input terminal No.5	〃
84	1	Input terminal No.6	〃
	2	Input terminal No.7	〃
	3	Input terminal No.8	〃
85	1	Input terminal No.9	〃
	2	Input terminal No.10	〃
	3	Input terminal No.11	〃
86	1	Input terminal No.12	〃
	2	Input terminal No.13	〃
	3	Input terminal No.14	〃
87	1	Input terminal No.15	〃

(Table 2)

7. **Explanation about respective I/O terminal**

7.1 External output terminal 1

Following shows the relations between terminal numbers of memory switch and connector pin numbers on I/O board.

List of external output terminal 1 Pin assignments

Connector on I/O board CN1			
Pin number	Signal names	Functions	Terminal number
1	OP_OUT1	External output 1 IN	9
2	OP_OUT1.COM	External output 1 COM	
3	OP_OUT2	External output 2 IN	10
4	OP_OUT2.COM	External output 2 COM	
5	OP_OUT3	External output 3 IN	11
6	OP_OUT3.COM	External output 3 COM	
7	OP_OUT4	External output 4 IN	12
8	OP_OUT4.COM	External output 4 COM	
9	OP_OUT5	External output 5 IN	13
10	OP_OUT5.COM	External output 5 COM	
11	OP_OUT6	External output 6 IN	14
12	OP_OUT6.COM	External output 6 COM	
13	OP_OUT7	External output 7 IN	15
14	OP_OUT7.COM	External output 7 COM	
15	OP_OUT8	External output 8 IN	16
16	OP_OUT8.COM	External output 8 COM	

(Table 3)

7.2 External output terminal 2

This terminal outputs the conditions of sewing machine by output terminal.

Always outputting without relate to the settings of memory switch nor pattern data input.

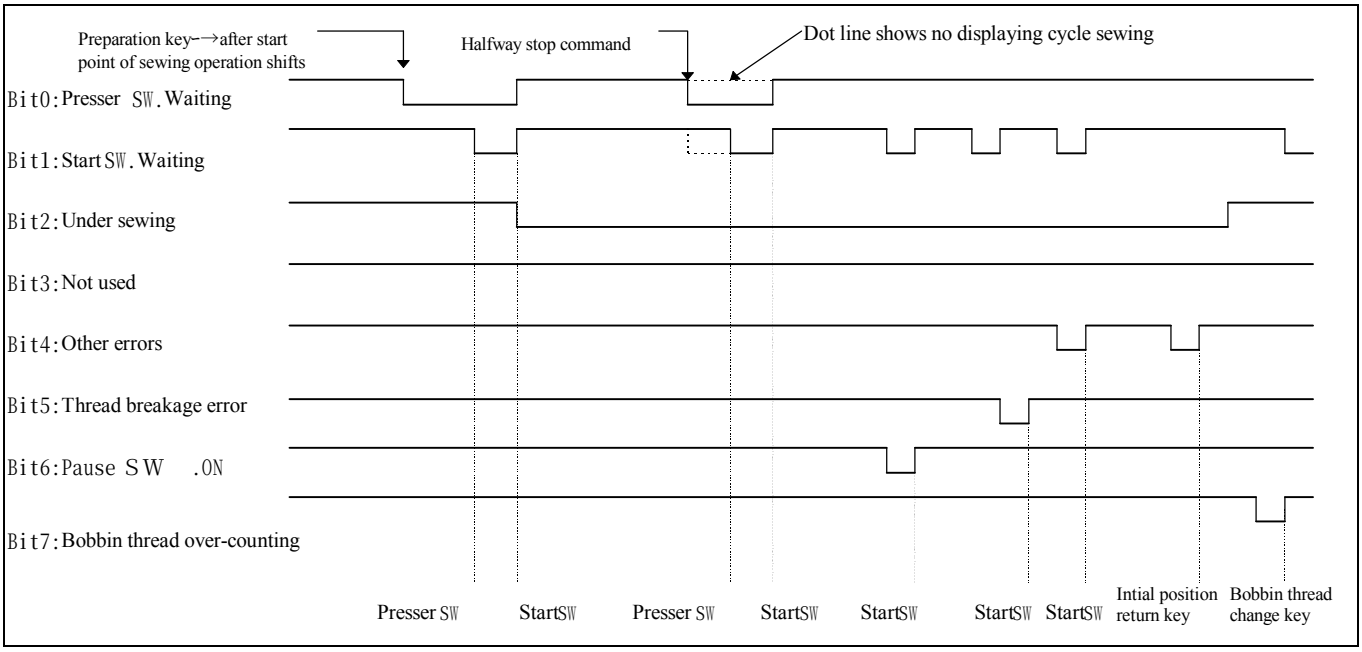
List of external output terminal 2 Pin configuration

Connector on I/O board CN2		
Pin number	Signal names	Remarks
1	OUT_PRE(N)	Out presser SW input waiting signal
2	OUT_PRE.COM	
3	START_SW(N)	Start SW input waiting signal
4	START_SW.COM	
5	READY(N)	Under sewing signal (including empty feed)
6	READY.COM	
7	NC	Not used
8	NC	Not used
9	ERROR_1.(N)	Error signal 1
10	ERROR_1.COM	
11	ERROR_2(N)	Error signal 2
12	ERROR_2.COM	
13	ERROR_3(N)	Error signal 3
14	ERROR_3.COM	
15	ERROR_4(N)	Error signal 4
16	ERROR_4.COM	

(Table 4)

7.3 Explanation about the signals of external output terminal 2

Time flowchart



(Picture 8)

7.4 (Explanation about each signal)

① Bit 0 Presser SW(switch) input waiting

Being active on condition of being able to input presser SW

Being active on condition that some switch is receivable, though presser SW is capable of receiving several signals.

Being active after presser lifts up, with start point of sewing operation shifts, after pressing preparation key.

② Bit 1 Start SW input waiting

Being active when being capable of inputting start SW.

Being active when being capable of inputting start SW after presser SW is received, and reset after receiving input of start SW.

Being active when being capable of receiving input of start SW after error maintenance under sewing and halfway stop command on sewing pattern.

③ Bit 2 Under sewing operation (including empty feed)

Being active after receiving input of start SW and reset after sewing operation (after presser lifts up with sewing initial position moves)

④ Bit 3 Not used

⑤ Bit 4 Error signal 1

Being active when occurring errors such as limit of shift error, air pressure drop, upper position error, machine lock, etc.

⑥ Bit 5 Error signal 2

Being active when occurring needle thread breakage. Reset after error is removed.

⑦ Bit 6 Error signal 3

Being active when detecting pause SW is on. Reset when start SW on.

⑧ Bit 7 Bobbin thread over-counting

Being active when bobbin thread counter is over. Reset when receiving input of bobbin thread change key.

7.5 External input terminal

Following list shows relations between terminal numbers on memory switch and connector numbers on I/O board.

List of external input terminal 1 Pin configuration

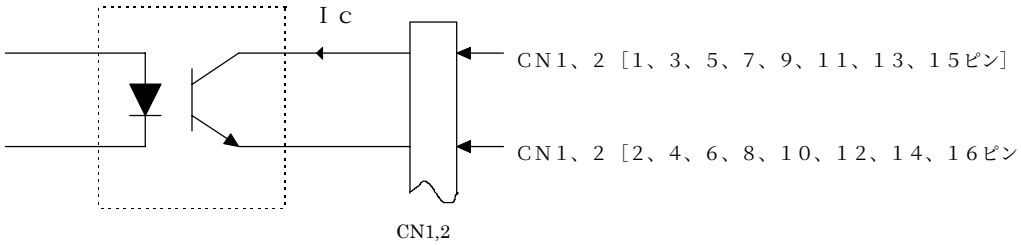
Connector on I/O board CN3			
Pin number	Signal names	Functions	Terminal number
1	OP_OUT1	External output 1 IN	7
2	OP_OUT1.COM	External output 1 COM	
3	OP_OUT2	External output 2 IN	8
4	OP_OUT2.COM	External output 2 COM	
5	OP_OUT3	External output 3 IN	9
6	OP_OUT3.COM	External output 3 COM	
7	OP_OUT4	External output 4 IN	10
8	OP_OUT4.COM	External output 4 COM	
9	OP_OUT5	External output 5 IN	3
10	OP_OUT5.COM	External output 5 COM	
11	OP_OUT6	External output 6 IN	4
12	OP_OUT6.COM	External output 6 COM	
13	OP_OUT7	External output 7 IN	5
14	OP_OUT7.COM	External output 7 COM	
15	OP_OUT8	External output 8 IN	6
16	OP_OUT8.COM	External output 8 COM	

(Table 5)

8. **Circuit of external output (Connector CN1, 2)**

Circuit configuration of external output is as follows.

(Circuit of connector CN1 and CN2)



(Picture 9)

Output of photocoupler

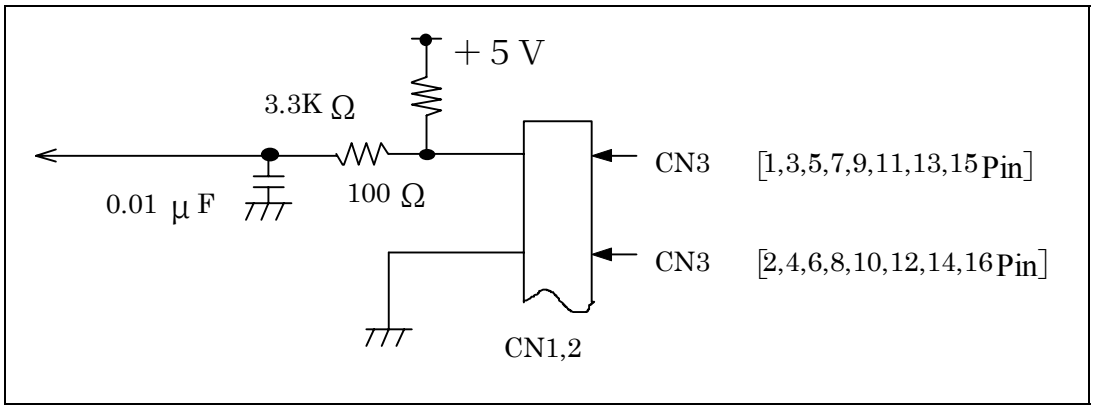
Electrical specifications Voltage Less than 50V

Current Ic = Less than 40mA

Above value is specifications per one circuit.

9. **Circuit of external input terminal (Connector CN3)**

Circuit of external input terminal is as follows.



(Picture 10)

10. Standard setting value of memory switch

This is the setting to set using all 8 pieces of external output on I/O board as output only.

(List of setting values of external output connection)

Function numbers	Items	Items	Setting value
076	External output connection 1	1. Output terminal number of external output 0	9
		2. Output terminal number of external output 1	10
		3. Output terminal number of external output 2	11
077	External output connection 2	1. Output terminal number of external output 3	12
		2. Output terminal number of external output 4	13
		3. Output terminal number of external output 5	14
078	External output connection 3	1. Output terminal number of external output 6	15
		2. Output terminal number of external output 7	16
		3. Output terminal number of external output 8	0
079	External output connection 4	1. Output terminal number of external output 9	0
		2. Output terminal number of external output 10	0
		3. Output terminal number of external output 11	0
080	External output connection 5	1. Output terminal number of external output 12	0
		2. Output terminal number of external output 13	0
		3. Output terminal number of external output 14	0
081	External output connection 6	1. Output terminal number of external output 15	0

(Table 6)

Note) This setting is NOT capable of producing output to J17 on main board.

External input connection

This is the setting to set using all 8 pieces of external input on I/O board as input only.

(List of setting values of external input connection)

Function numbers	Items	Items	Setting value
082	External input connection 1	1. Input terminal number of external input 0	3
		2. Input terminal number of external input 1	4
		3. Input terminal number of external input 2	5
083	External input connection 2	1. Input terminal number of external input 3	6
		2. Input terminal number of external input 4	7
		3. Input terminal number of external input 5	8
084	External input connection 3	1. Input terminal number of external input 6	9
		2. Input terminal number of external input 7	10
		3. Input terminal number of external input 8	0
085	External input connection 4	1. Input terminal number of external input 9	0
		2. Input terminal number of external input 10	0
		3. Input terminal number of external input 11	0
086	External input connection 5	1. Input terminal number of external input 12	0
		2. Input terminal number of external input 13	0
		3. Input terminal number of external input 14	0
087	External input connection 6	1. Input terminal number of external input 15	0

(Table 7)

Note) This setting is NOT capable of producing input of 2 x J16(empty) on main board.

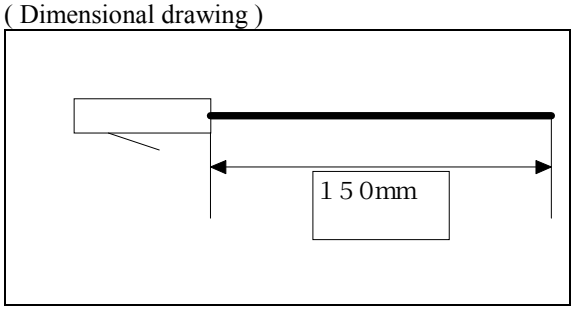
11. Other optional parts

We are providing the codes attaching electric wire to Pin contact as optional parts.

Name of product	Code	Remarks
I/O code (red) assembly	M903258 00A0	Color of code Red
I/O code (black) assembly	M903358 00A0	Color of code Black

(Table 8)

(Dimensional drawing)



Note) It is necessary to use the socket UFS-16B-04 (HK014820160) with the above code.

11.1 Applicable parts

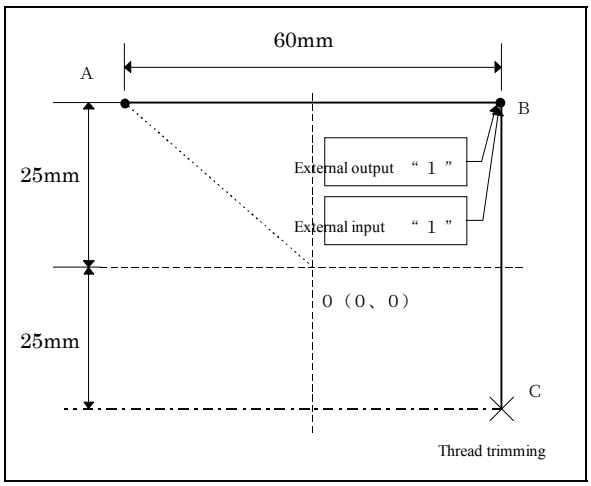
We recommend following as applicable parts of a bundle of codes CN1-3.

Name of product	Manufacturer	Manufacturers' format	JUKI product code
Socket	Yamaich electronics	UFS-16B-04	HK014820160
Contact	Yamaich electronics	Contact 66-1-BF	HP000100260

(Table 9)

12. Examples

This is an example of the pattern data to output external output terminal “1”.



(Picture 12)

As for the pattern on the left side :

1) Here is the procedure to input the pattern
This pattern is the one which waits for input signal in external output and external input after it shifts 60mm to X direction.

Note) Displayed contents show when setting the selection of coordinates of function No. 111 in absolute coordinate.

(1) Pattern input

1) Power on with pressing “Input selection” key.
Fall down presser and start searching initial point .

(Note) Keep on pressing “Input selection” key after displaying initial point search.

When it displayed, lift up and down the presser by out presser switch and insert something such as paper.

Initial point - > >
X=00000A
Y=00000
Select function

2) Press “Empty feed” key

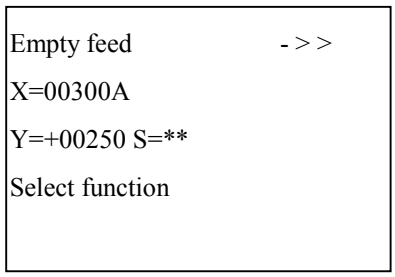
N=000
X=+00000A
Y=+00000
Empty feed

3) Shift the presser from O to A by direction key.
(The amount of shift is indicated per 0.1mm)

N=000
X=-00300A
Y=+00250
Empty feed

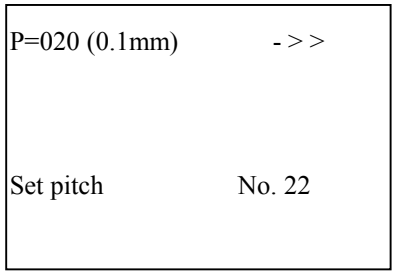
4) Press 

key and back to the initial position.
Start empty feed O to A.



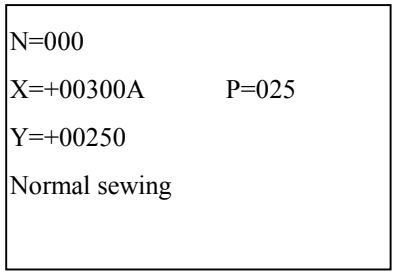
5) Select 

key.



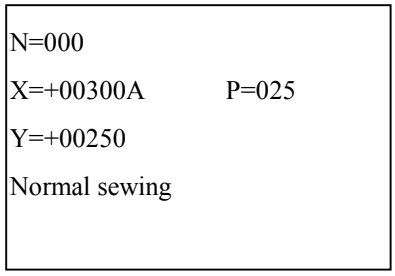
6) Input [0] [2] [5] by numeral key as to set the pitch 2.5mm and press 

key



7) Shift the presser from A to B by direction key and press 

key



8) Press Code key and select input menu in external output command.

N=000

Select function

9) Input [0] [1] [2] with ten key and select external output of function No.12.

Press Enter／End key for confirmation.

T=00

Select function

10) Input [0] [1] with ten key, select terminal number and

Press Enter／End key.

T=01

Set terminal No. No.012

11) External output command is input.
Output signal is sent to the specified terminal number (01).

External output ->>
X=+00300A T=001
Y=+00250
Select function

12) Press Code key and select input menu in external output command.

No=000

Select function

13) Input [0] [1] [1] with ten key and select external input of function No.11.

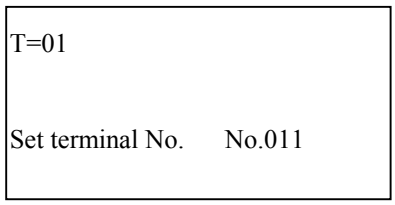
Press Enter／End key for confirmation.

T=00

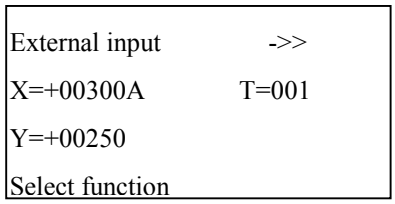
Set terminal No. No.011

14) Input [0] [1] with ten key, select terminal number

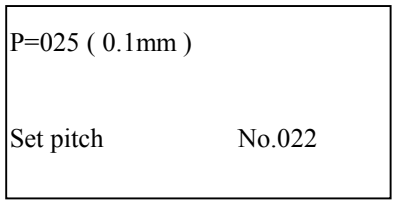
and press Enter／End key.



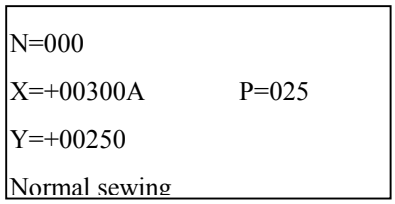
15) External input command is input.



16) Press Normal sewing key.

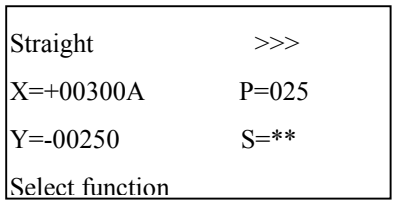


17) Press Enter／End key when the pitch is 2.5mm.

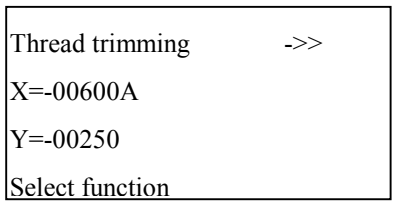


18) Shift the presser from B to C with direction key and

Press Enter／End key.



19) Press Thread trimming key and input thread trimming.



Now the input is over.

Write the data on floppy disk after the pattern is confirmed.

Please refer to the instruction manual for the way how to make a trial sewing and to write the patterns.

13. Serial communications

How to set serial communications

13.1 Precautions to use serial functions

1) NOT to modify W2, W3 and W4.
2) NOT available on main board (M8601580AA F/R-1). (This is because interrupt signal code from the main board is not enough. Boards produced after F/R-3 are required.)
3) For revision of system ROM, following system ROMs (or the ones produced after following revisions) are required.

Model	Revision of system ROM	Remarks
AMS-210D	005N	
AMS-215D, 221D	012E	

4) NOT possible to scale up and down the transmitted data with main unit of the sewing machine.
5) NOT possible to use bank mode and combination mode.

13.2 About communications cables

A cable to connect with personal computer etc. is required.

Following cable is recommended to use.

Manufactured by JUKI	Data communications cable ASM.	M90365800A0	Cross cable

Please refer to connector manufacturers' names in 13. 6 3) when you make the cable.

13.3 About connecting communications cables

Insert it with adjusting the position of polarity Pin to CN4 on I/O board.

It is possible to connect directly if connect with personal computer. **Please use a straight cable to extend the cable length.**

13.4 Settings

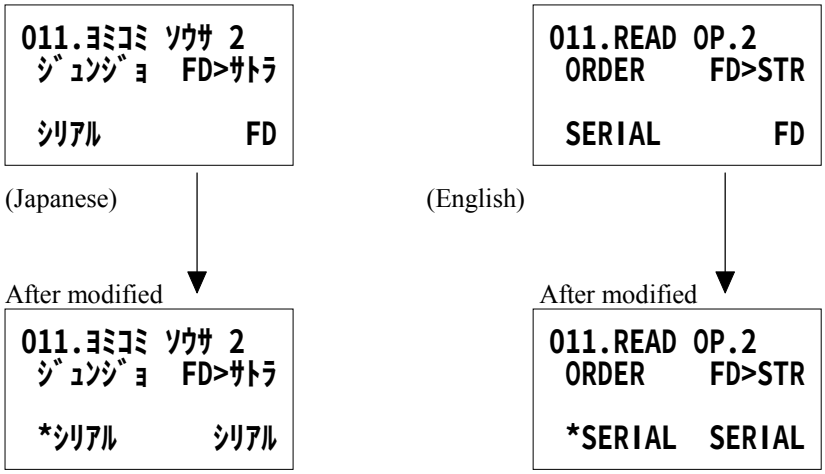
1) How to set the jumper pin on I/O board.
   Insert the jumper pin to socket JP2 on main board when using extension board.
2) Put the board subject to the procedure in Column 3, 4 (pp.1-2).

13.5 How to set memory switch

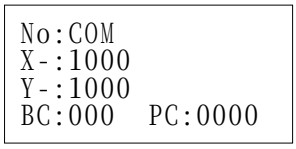
Modify the memory switch following the procedure to activate the memory switch at page 4.

Modify the function No. 11 as follows.

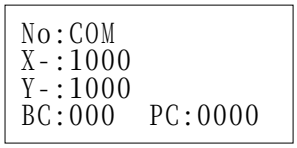
Before modified



Restart the sewing machine after writing the modified data. The screen menu after restarted is as follows.



13.6 Operational procedures



1) Power on the switch. The operation panel appears to be like above.
2) Make pattern data being transmitted from PC under this condition.
3) Press  key on operation panel to start reading the pattern data.
4) When transmission is over, the presser comes down, stops at the starting position and becomes being able to operate.
5) To modify patterns, bring the computer to a state of transmission and press  key twice to read the pattern data.

13.7 I/O board hardware specifications

About Jumper Pin and Pin assignment of connector.

1) How to set the jumper pin for setting a baud rate.

1. For setting of a baud rate, set SW1 on I/O board as follows.

Baud Rate （bps）	SW1	Remarks
19200	4	
9600	3	Standard setting
4800	2	
2400	1	

2. W2, W3, W4

Standard setting is a state which a socket plug is inserted into W3, W4.

NOTE that NOT to make any settings except for the above.

2) Pin configurations of CN4

Pin No.	Abbreviation	Name of signal
1	TxD	Transmit Data
2	RxD	Receve Data
3	RTS	Reruest to Send
4	CTS	Clear to Send
5	DTR	Data Terminal Ready
6	DSR	Data set Ready
7	GND	Reruest to Send
8	GND	Clear to Send
9	NC	
10	NC	
11	NC	
12	NC	

3) Manufacturers' models of connector

Following shows the name of manufacturers and models for connector using I/O board J4. Please utilize this when making cables, etc. by yourselves.

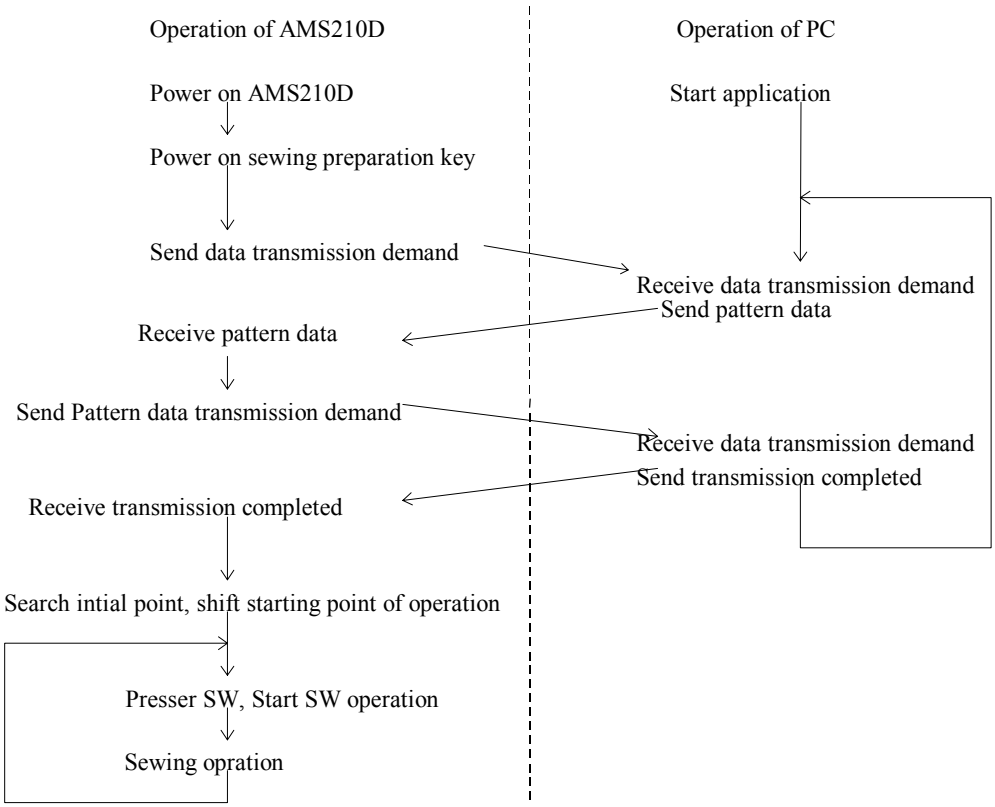
For other connectors refer to column 11.

Parts	Name of manufacture	Model	JUKI product code	
Header	Berg	６９１６８－２１２	ＨＫ０４８９００１２Ａ	on board
Housing	〃	６９１７６－０１２	ＨＫ０４８９１０１２０	cable side
Pin contact	〃	４８２３４	ＨＫ０４９２４００００	〃

13.8 Technical information

Following is technical information to use serial communications function of AMS.

1) Following shows overview of operation of serial communications.



13.8.1 Sending data of AMS210D

No.	Contents	Operation contents	Byte	Data formation
1	Data transmission demand	Make AMS210D be a state of receiving RS232C	1	(30)

(1) Data transmission demand

After transmitting data transmission demand to PC, make AMS210D be a state of receiving RS232C and execute in accordance with receiving data. State of receiving is removed by receiving transmission completed data from PC.

13.8.2 Receiving data of AMS210D

No.	Contents	Operation contents	No. of byte	Data formation
1	Pattern data	Under normal conditions, store receiving pattern data in the sewing area.	Variable-length	(31),(ff),(ff) (n3),(n2),(n1),(n0), (p0),(p1),…,(80),(fd) n3, n2=0 n1 = Pattern data length upper8 bit n0 = Pattern data length lower 8 bit p0,p1, …=Pattern data
2	Transmission completed	Complete the state of receiving RS232C of AMS210D and shift to next operation.	1	(32),(00),(00)

(1) Pattern Data

Store pattern data. When the data is sent twice consecutively, former data is cleared and new data is stored.

Pattern data length is 32 bit, but under present specs, using 16bit at low, not using 16 bit at high.

(2) Completion of transmission

Complete the state of receiving RS232C on AMS210D side, and move to next operation.

13. 8. 3 Errors

Following are errors displayed when using serial communications.

(1) Transmission error (TX Not ready)

This error will result if DSR signal is off when transmitting.

(2) Receiving time out error (RX Time Out)

This error will result when receiving action does not occur over 10 seconds under the state of receiving.

(3) Receiving error (RX Error)

This error will result if errors such as flaming error, parity error, overrun error and detecting of break etc. occur when transmitting RS232C.

(4) Data error (RX Data Error)

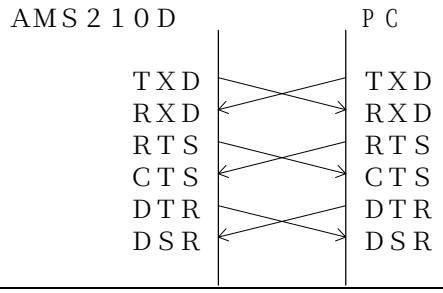
This error will result when data form is abnormal.

NOT store pattern data in error in memory.

No.	Overview	Japanese	English
９２	Transmission Error DSR signal off	ﾂｳｼﾝﾉ ｼﾞｭﾝﾋﾞｶﾞ ﾃﾞｷﾃｲﾏｾﾝ	TX Not Ready
９３	Receiving data time out Error No receiving data for 10 seconds	ｼﾞｭｼﾝ ﾀｲﾑｱｳﾄ ﾃﾞｽ	RX Time Out
９４	Receiving Error Serial line Error	ｼﾞｭｼﾝ ｴﾗｰ ﾃﾞｽ	RX Error
９５	Data Error Abnormality of receiving data	ｼﾞｭｼﾝ ﾃﾞｰﾀｶﾞ ｲｼﾞｮｳ ﾃﾞｽ	RX Data Error

13. 8.4

Interface specifications

Item	Contents
Forms of interface	Following RS232C
Control of sending and receiving	half-double
Speed of transmission	Choose following by jumper pin on the board. ２４００ｂｐｓ、４８００ｂｐｓ、９６００ｂｐｓ、１９２００ｂｐｓ （Factory-configuration is 9600bps）
Length of character	８ｂｉｔ
Parity	None
Stop bit	１ｂｉｔ
Control of XON/XOFF	None
Control of handshake	Hardware control by ＤＴＲ／ＤＳＲ、ＲＴＳ／ＣＴＳ
Cable	Cross-cable of Dsub-25pin, knife on AMS210D side. 

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