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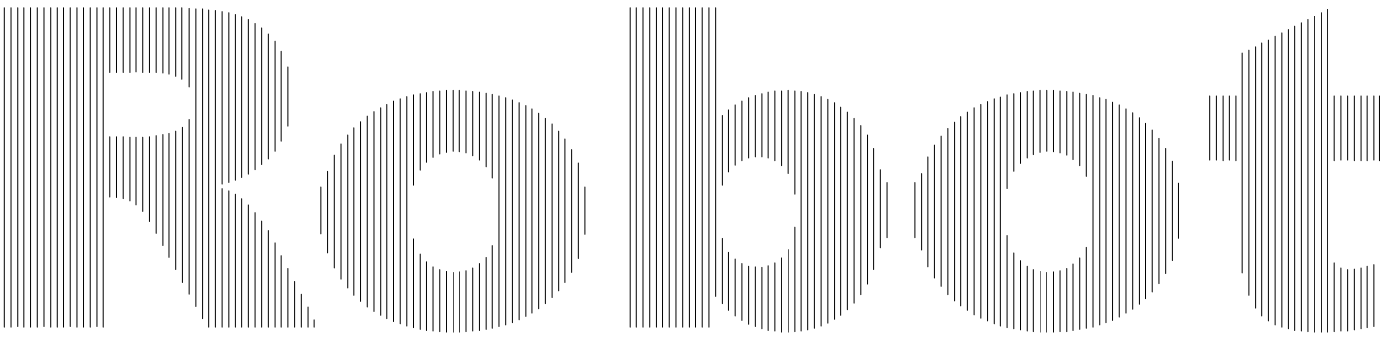
Kawasaki

Kawasaki Robot Controller
D Series

Arm ID Board Instruction Manual

(Option)



Kawasaki Heavy Industries, Ltd.

90210－1174DEA

PREFACE

This manual gives instructions for connecting and operating the Arm ID Board (Option) of the D Series Controller.

Read the D Controller Operation Manual (including safety manual), a separate-volume, without fail together with this manual. Do not perform any procedure described herein until the contents of this manual are fully understood.

1. This manual is informational, and in no way constitutes a guarantee for the outcome of the operation. Accordingly, Kawasaki is not responsible for any accidents, damages, and/or problems relating to industrial property rights as a result of using the system.

2. Kawasaki reserves the right to change, revise, or update this manual without prior notice.

3. This manual may not, in whole or in part, be reprinted or copied without the prior written consent of Kawasaki.

4. Though this manual was prepared to be as thorough and accurate as possible, the authors apologize should any information be found incomplete or erroneous.

SYMBOLS

The items that require special attention in this manual are designated with the following symbols.

Ensure proper and safe operation of the robot and prevent physical injury or property damage by complying with the safety matters given in the boxes with these symbols.

⚠ DANGER

Failure to comply with indicated matters can result in imminent injury or death.

⚠ WARNING

Failure to comply with indicated matters may possibly lead to injury or death.

⚠ CAUTION

Failure to comply with indicated matters may lead to physical injury and/or mechanical damage.

[NOTE]

Denotes precautions regarding robot specification, handling, teaching, operation and maintenance.

CONTENTS

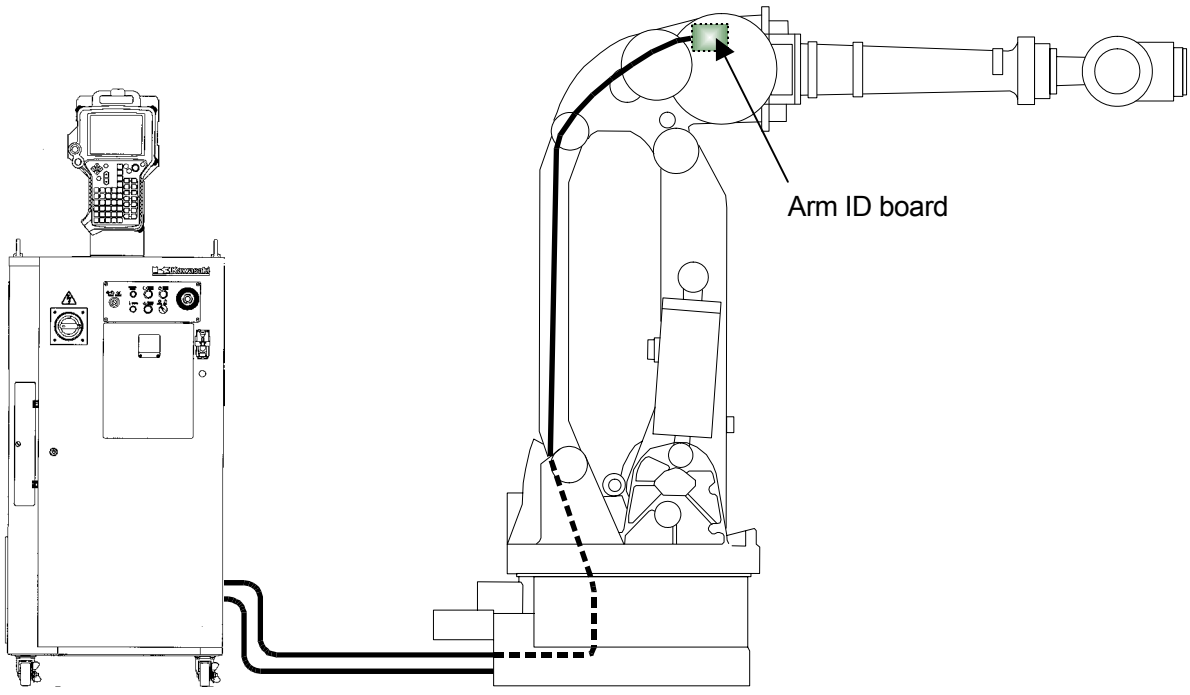

MEMO

1.0 Outline

Arm ID (1GV) Board is housed in a box that is installed on the robot arm. This board is equipped with memory for storing the robot model and maintenance information, and is equipped with signal contacts for I/O. The communication line connects Arm ID Board with the robot controller and enables execution of the following via the controller.

1. Registration/Display/Deletion of Maintenance Logs
2. Setting of I/O signals on the Arm ID Board

Additionally, it is possible to add more I/O signals by adding the I/O expansion (1JD) board, a sub board of the 1GV.



2.0 Hardware Specification

2.1 Function

Arm ID board is composed of the following board.

IGV board :CPU board

1. Data memory

Reads/writes data on the built-in flash memory via serial communication with the controller.

2. I/O function

Able to read 2 channels of input signals via serial/parallel communication with the controller.

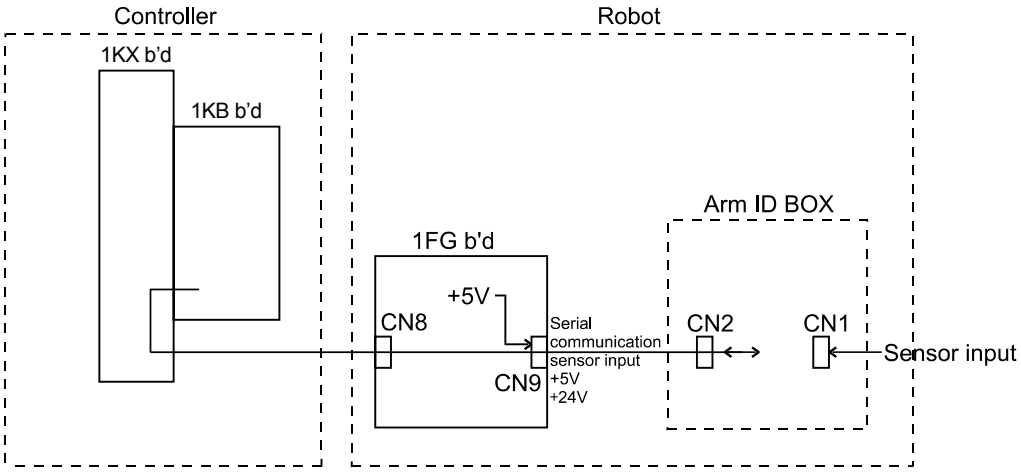
1JD board :For I/O expansion (Sub board of 1GV)

Addition of I/O

It is possible to add I/O: 22 input and 8 output signals.

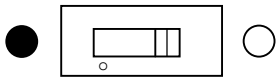
2.2 Connection

D4∗ Controller



[NOTE]

Set Dip Switches S3, 4, 5, 6 on 1KB board as described below when using the Arm ID Board.

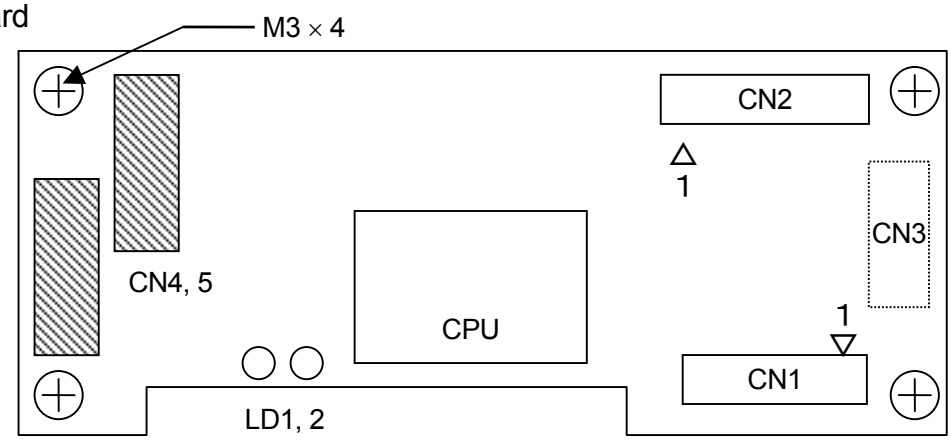


1. S5 and S6: both ◯ sides
   (Signal lines SIG1, SIG2 are used as serial communication lines in this setting.)

2. S3 and S4:
(1) When inputting signals SIG3, SIG4 via parallel signal : both ● sides
(2) When using signal lines SIG3, SIG4 as serial com. line : both ◯ sides

2.3 I/O Specification

1GV board



CN1 B07B-XASK-1 (JST)

Pin	Function	Note
1	IO common	
2	ID1	
3	ID2	
4	+24V (Max. 1A)	
5	+24G	
6	SIG3 (Sensor input)	
7	SIG4 (Sensor input)	

CN2 B09B-XASK-1 (JST)

Pin	Function	Note
1	Serial communication line +	
2	Serial communication line -	
3	+5V Power input	
4	GND	
5	+24V	
6	+24G	
7	SIG3	
8	SIG4	
9	Not used	

CN3 :For 1JD connection

CN4 :Not used

CN5 :Not used

2.4 Connection of I/O

This section gives connecting instructions when using I/O function on 1GV board. There are 4 input ports in CN1 of 1GV board. The connection changes depending on the port used as below.

1. Using SIG3, 4
SIG3, 4 are inside sensor input, and connected to 1KB board in the controller in parallel.
(For details, refer to External I/O Manual.)

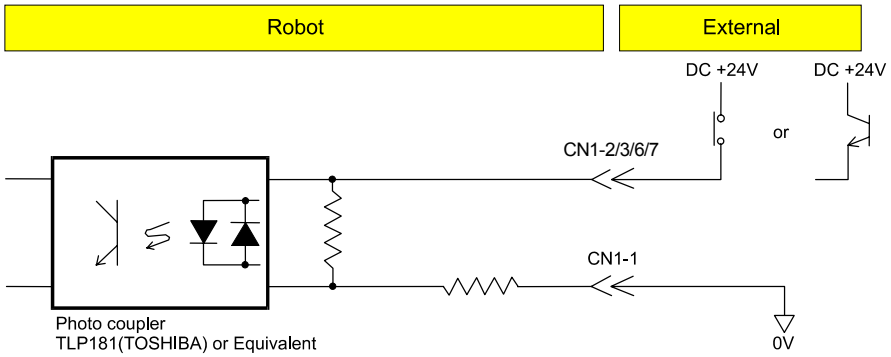
2. Using ID1, 2
ID1, 2 are input to the port on 1KB board, and sent via serial communication.

There are two types of input by (+) common circuit or (-) common circuit depending on the connection method as shown in the following figures.

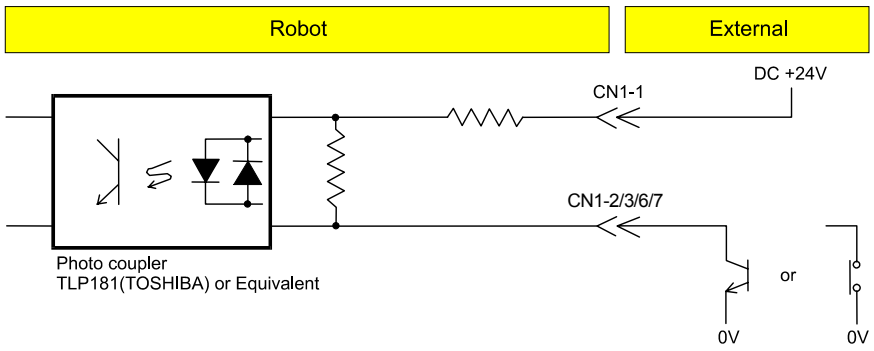
Input Specification

Input type :Photo coupler
Input voltage :DC24V +/-10%
Input current :10mA +/-20%
Connection type :Connector junction

(+) common input circuit



(-) common input circuit



CAUTION

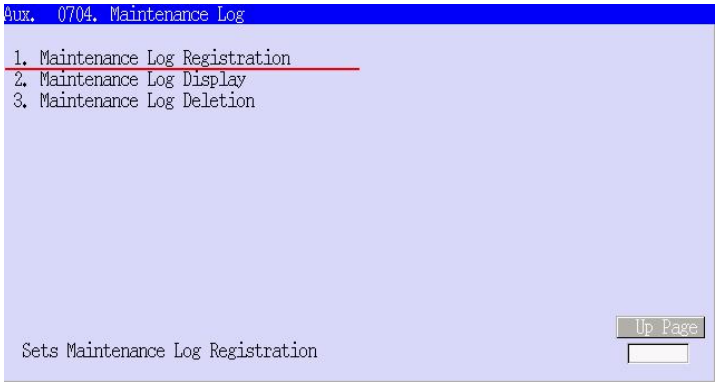
1. **Circuit will not function if only the contact between the common and the input are connected.**
2. **Note that input signal is recognized as continuously OFF if the polarity is mistaken.**

3.0 Maintenance Log

Executes registration, display and deletion of the maintenance log via Aux. 0704.

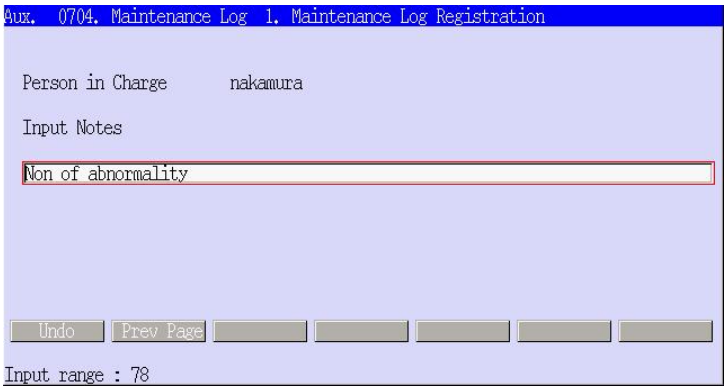
3.1 Registration of Maintenance Log

When registering a new maintenance log, position the cursor on 1 in the initial screen of the maintenance log and push SELECT. (To view a registered maintenance log, position the cursor on 2, or to delete a log position the cursor on 3, then push SELECT.)



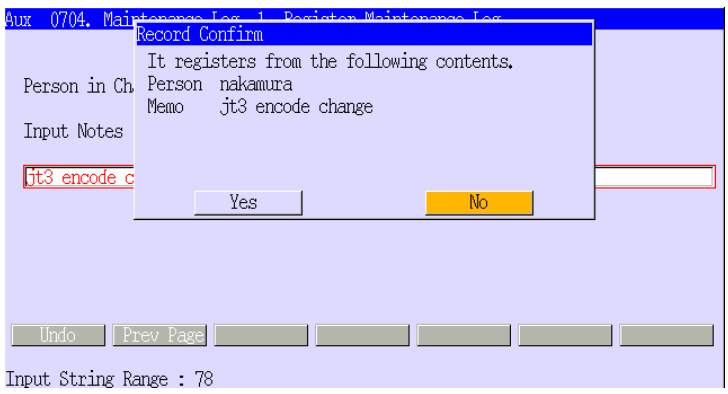
When the registration screen for the maintenance log is displayed, confirm that the cursor is positioned on [Person in Charge] and push SELECT. When the keyboard screen is displayed, input the person in charge and push <ENTER>.

Next, when ↵ is pushed a screen for entering message is displayed. If no messages are to be entered pushing ↵ again automatically registers the message “Non of abnormality”.



To enter a message push SELECT and use the keyboard screen that appears to input the desired message.

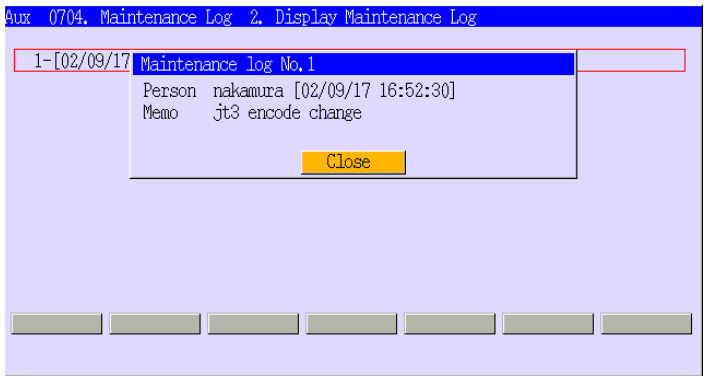
Pushing ↵ displays a confirmation pop-up window. To register the message entry move the cursor to <Yes>, or to cancel the message move the cursor to <No>, then push SELECT.



3.2 Display of Maintenance Log

To view the registered maintenance log, position the cursor to 2 and push SELECT. When the maintenance log is displayed, position the cursor on any item in the list.

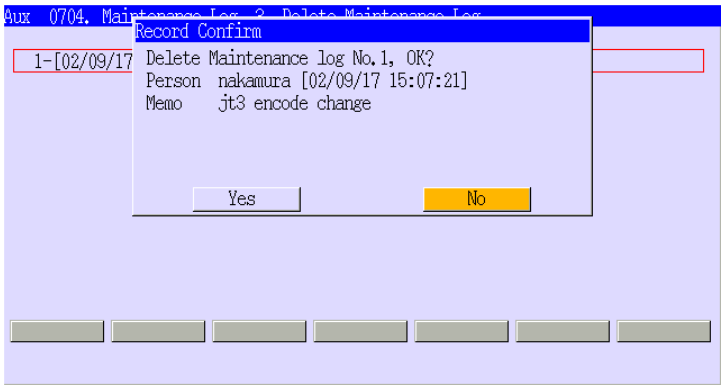
Pushing SELECT displays all the registered items in a pop-up window.



3.3 Deletion of Maintenance Log

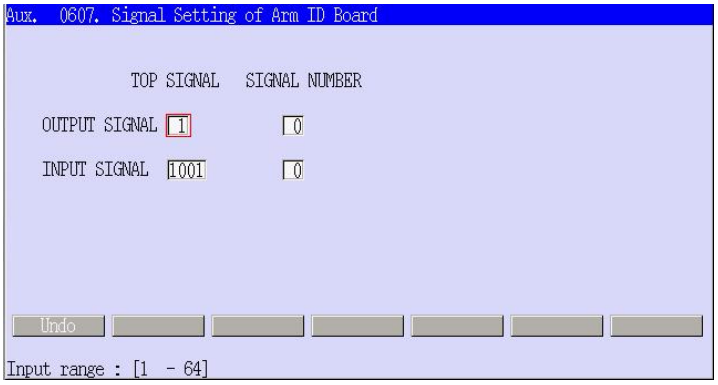
To delete a registered maintenance log, select 3 in the initial screen and push SELECT. When the maintenance log is displayed, position the cursor on the item in the list to be deleted.

A confirmation pop-up window is displayed after pushing ↵, position the cursor on <Yes> to delete or on <No> to cancel the deletion, and push SELECT.



4.0 Setting of Signals

I/O signal settings can be made for the Arm ID Board. To use the parallel I/O port on the Arm ID Board allocate signals as below. Position the cursor on the desired item and input the value to set by number key.



Refer to the following table for the number of signals.

	Number of input sig.	**Number of output sig.**
Standard	2 Ch.	0 Ch.
When I/O is added (Refer to 2.1 function.)	24 Ch.	8 Ch.

Setting Conditions

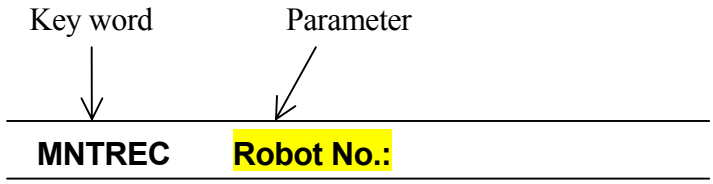
1. Output signals can be assigned to numbers 1 to 64, input signals to 1001 to 1064.
2. There is no need for the assigned signal numbers to be consecutive.
3. If there are two or more robots, it is impossible to allocate a signal redundantly.

5.0 AS Language Reference for Arm ID Board

In addition to the Aux. functions, the following commands in AS can be used for making log and signals settings on the Arm ID Board.

1. MNTREC command
2. MNTLOG command
3. ARMIOSET command

EXAMPLE



Parameters marked with [ ] can be omitted.
Always enter a space between the keyword and the parameter.

Monitor Command

MNTREC **Robot No.:**

Function

Registers and start recording of the maintenance log for the Arm ID Board.

Parameter

Robot No.

Specifies the number of the robot. If omitted 1 is assumed.

Details

The maintenance log stores the last 100 entries. When over 100 entries are made the oldest entry is deleted.

Example

```
>MNTREC
Person in charge of record (Input)? ******
Non of abnormality : 0   Memo input : 1? 1
Memo input: (Max. 78)
jt3 encode change

Content of registration
Person in charge : ******
Memo : jt3 encode change

Are you sure ? (Yes:1, No:0) 1
Arm ID board is busy.
Writing endend.
>
```

⚠ CAUTION

Log entries may be not registered normally if the control power to the controller is turned to OFF during recording of the maintenance log. DO NOT turn the control power to OFF until "Writing ended." is displayed.

Monitor Command

MNTLOG **Robot No.:**

Function

Displays the maintenance log up to the most current entry.

Parameter

Robot No.

Specifies the number of the robot. If omitted 1 is assumed.

Details

Displays the last 100 entries in maintenance log by the following format.

```
1-[**/XX/XX 12:00:00 kawasaki]          [Date  Time  Register name ]
  [jt3 encode change]                   [Registration data ]
2-[**/XX/XX 12:00:00 kawasaki]
  [Non of abnormality]
```

Example

```
>MNTLOG
1-[**/XX/XX 12:00:00 kawasaki]
  [jt3 encode change]
2-[**/XX/XX 12:00:00 kawasaki]
  [Non of abnormality]
```

Monitor Command

ARMIOSET	**Robot No.: Output signal No., Number of output signals, Input signal No., Number of input signals**

Function

Sets the I/O signals for Arm I/O Board.

Parameter

1. Robot No.

Specifies the number of the robot. If omitted 1 is assumed.

2. Output signal No.

Specifies the first number of the output signals. Integer value up to max. 64. (By ZSIGSPEC)

3. Number of output signals

Specifies the number of output signals. Integral value of 1~8.

4. Input signal No.

Specifies the first number of the input signals. Integer value up to max. 1064. (By ZSIGSPEC)

5. Number of input signals

Specifies the number of input signals. Integral value of 1~24.

Details

It is possible to set 8ch. (max.) of 1~64 for output signals, 24ch. (max.) of 1001~1064 for input signals. There is no need for the allocated signal numbers to be consecutive. It is impossible to allocate a signal redundantly, if there are two or more robots. If a non-existent robot number is specified then all parameters input are ignored and an error is returned. There is no inquiry if all parameters are designated.

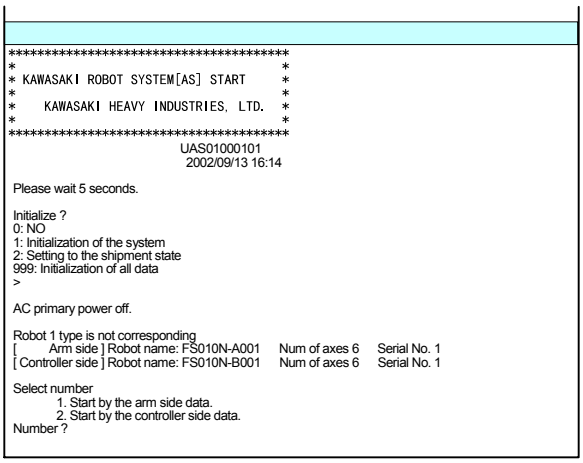
Example

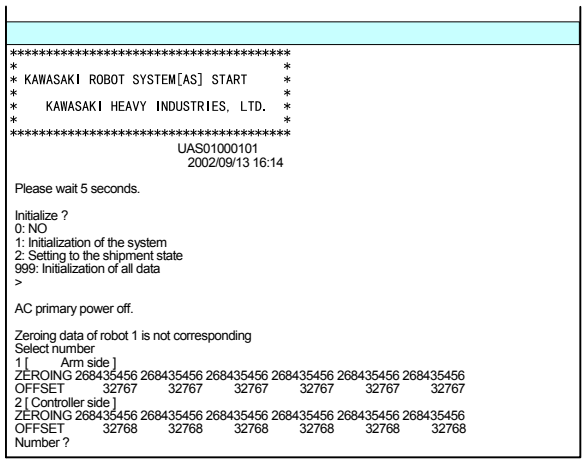
```
>ARMIOSET
                    TOP SIGNAL,   SIGNAL NUMBER
OUTPUT SIGANAL        1                 0
Change? (If not, Press RETURN only.)
6, 8
                    TOP SIGNAL,   SIGNAL NUMBER
OUTPUT SIGNAL         6                 8
Change? (If not, Press RETURN only.)

                    TOP SIGNAL,   SIGNAL NUMBER
INPUT SIGNAL          1001              0
Change? (If not, Press RETURN only.)
1012,24
                    TOP SIGNAL,   SIGNAL NUMBER
INPUT SIGNAL          1012              24
Change? (If not, Press RETURN only.)
>
```

6.0 Operation when Abnormality Occurs

If abnormality occurs in the Arm ID Board, the following messages may appear when supplying the control power to the robot controller.

6.1 Controller Start-up Screen1



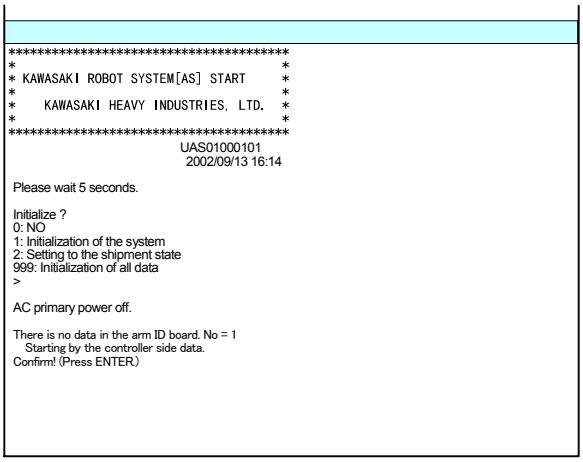


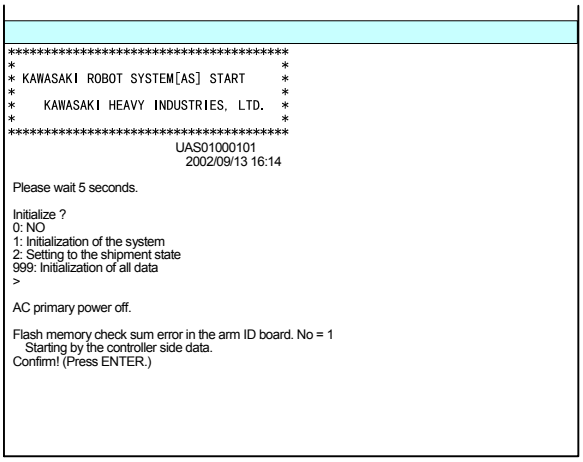
Abnormality may occur in any of the following situations:
1. In case of replacing the main CPU Board (or the controller itself), or initializing the system.
2. In case of replacing the robot.
3. In case of replacing Arm ID Board (in which different robot model data is registered).

Input 1 ↵ when selecting “Arm side”. In this case, the system starts using the model data saved in the Arm ID Board (including zeroing data). Also, the setting data on the controller side is overwritten by the data from the arm side. This message is not displayed from the next start-up.

Input 2 ↵ when selecting “Controller side”. In this case, the system starts using the model data set in the controller (including zeroing data). Also, the data on Arm ID Board side is overwritten by that on controller side. This message is not displayed from the next start-up.

6.2 Controller Start-up Screen2





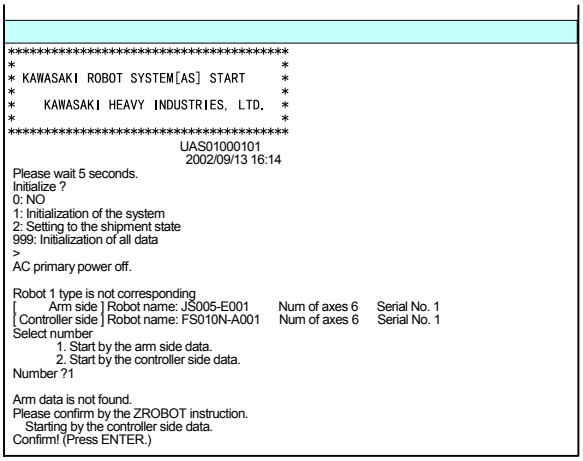
Abnormality may occur in either of these two situations:

1. In case of no data in the Arm ID Board. (When installing a new Arm ID Board)
2. In the case when a sum check error occurs in the data of the Arm ID Board.

Pushing <enter> at either of the two screens above, force starts the system using the set data on the controller side.

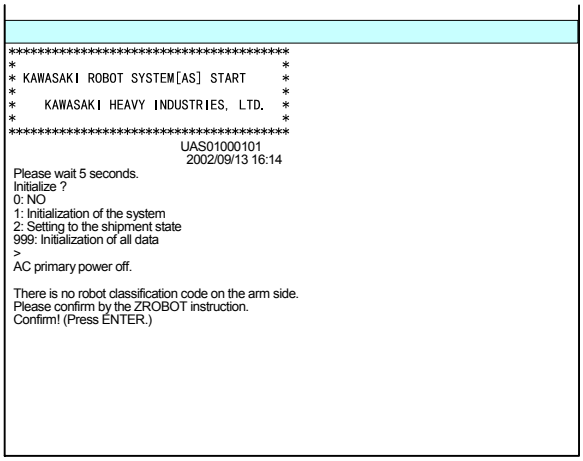
After the controller started up, the board may be damaged if error associated with Arm ID Board (Refer to 6.5 Controller Start-up Screen 5) occurs.

6.3 Controller Start-up Screen3



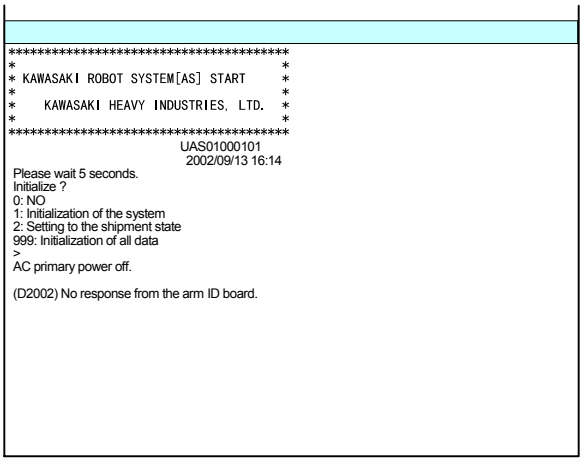
The above screen is displayed if the robot arm model that corresponds to the controller is not found, when starting up and selecting “Arm side”. Reconfirm the correct model setting for the robot.

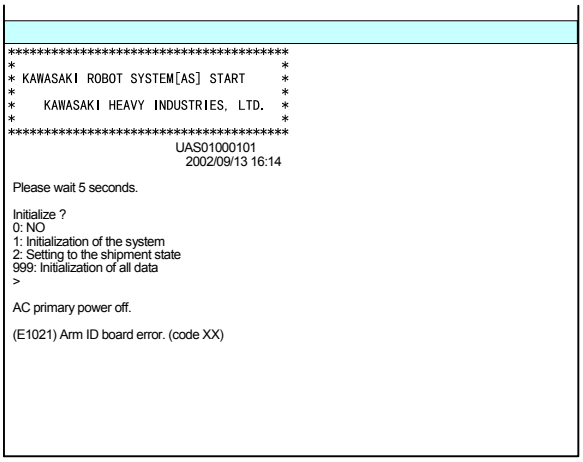
6.4 Controller Start-up Screen4

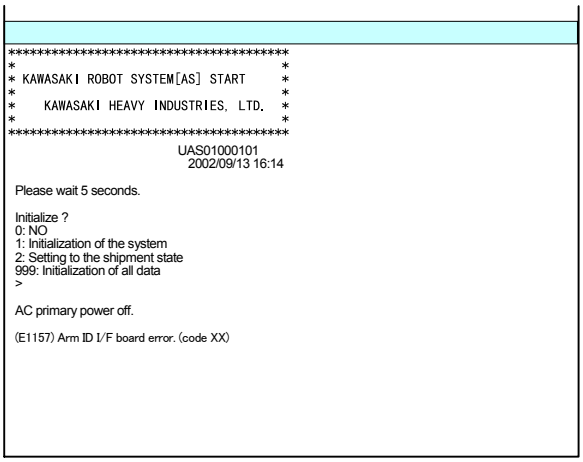


The above screen is displayed when attempting start-up of the D Controller using the same Arm ID Board that was used with the C controller. Reconfirm the correct robot model and controller for the Arm ID Board.

6.5 Controller Start-up Screen5







The board may be damaged or defective. For error code details, refer to 7.0 Error Code.

7.0 Error Code

(D2002) No response from the Arm ID Board.

It occurs in case of no response from the Arm ID Board. Arm ID Board or Arm ID I/F Board (arm control board) may be damaged.

(E1021) Arm ID board error. (Code XX)

Refer to the following code table. Arm ID Board or Arm ID I/F Board (arm control board) may be damaged.

(E1157) Arm ID I/F board error. (Code XX)

Refer to the following code table. Arm ID I/F Board (arm control board) may be damaged.

Code	Contents	E1021	E1157
4AH	Bad data	○	
4FH	Error occurred during overwrite of memory on Arm ID Board	○	
C1H	Sum check error in the communication data	○	○
C5H	Communication protocol error	○	○
C6H	Timeout error of communication response		○
FFH	Unknown error	○	○

4AH :The memory contents on Arm ID Board is abnormal/corrupted.

4FH :It is impossible to write on the memory of the Arm ID Board. Replace the Arm ID Board.

C∗H :The cable may be disconnected or cable/connections may be defective.

F∗H :Turn the control power from OFF to ON. If error still occurs, the board may be damaged.

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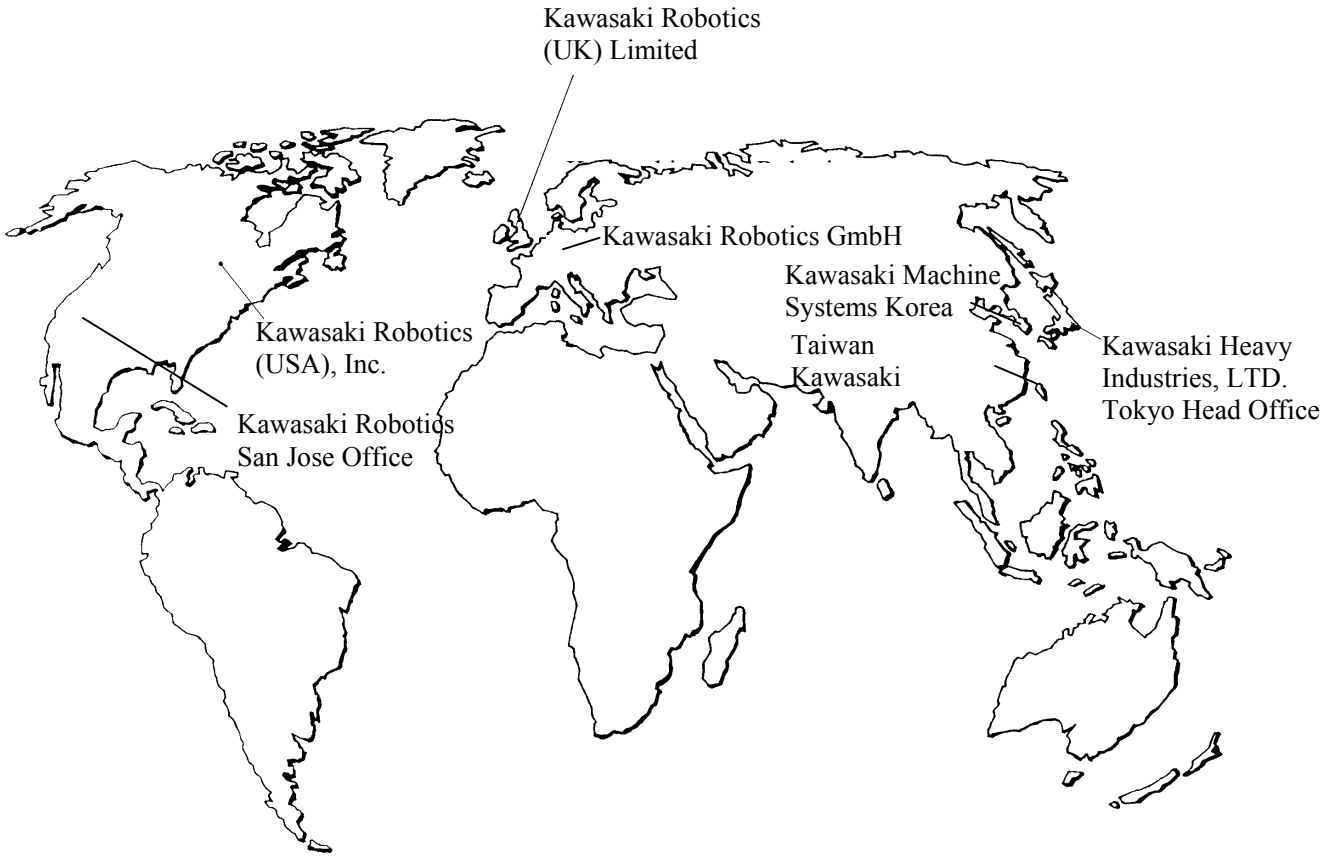

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