



Denford Ltd
Birds Royd
Brighouse
West Yorkshire
HD6 1NB

Tel 01484 712264
Fax 01484 722160

Mitsubishi

RV-M1 Robot
Training

July 2000

RV-M1 Robot Training Course Notes

DATE :- 20.1.97

FILENAME :- U:\TECHINFO\ROBOTS\RVM1\TRAINING.DOC

Robot - Controller - Computer layout.	(page 1-3)
Location and description of controller switches.	(page 2-13 to 2-16)
Drive Unit layout	(page 1-11)
Hand type switch AC/DC	(page 2-17 to 2-18)
"E" Stop link/switches	(page 2-17)
Describe the purpose of the STOP, START and RESET buttons	(page 2-13)
Difference between ERROR MODE 1 and ERROR MODE 11	(page 2-42 to 2-43)
Origin setting and associated switch (NST)	(page 1-10 to 2-18)
SW1 Switch settings -	(page 2-15)
SW2 Switch settings - RS232 settings	(APP-7)
SW3 Switch settings - Baud rate settings	(APP-6)
Teach Box - Description of buttons	(page 2-19)
Describe purpose of NST (Datumming)	(page 2-20)
Describe Origin setting and how to modify (Mech wear)	(page 2-30)
Describe difference between PTP and XYZ	(page 2-20)
Describe Grip Pressure	(page 3-55)
Describe how the memory is split into two sections - positions and program	
Demonstrate position setting and associated numbers	
Describe a Robot program structure - Flow chart, loop, speed, debounce and sub routines etc	
Describe CIM link - how tasks are sent from the cell controllers to the robot (Binary code)	
Describe Move functions :-	
Comment (eg REM)	
SP (H,L) Speed	(page 3-29)
MO (O,C) Move	(page 3-12)
MS Move straight (if having problems with MO)	(page 3-12)
GP Grip pressure	(page 3-55)
GO Gripper Open	(page 3-54)
GC Gripper Closed	(page 3-52)
Describe conditional functions :-	
OD Output Direct	(page 3-59)
ID Input Direct	(page 3-56)
TB Test bit	(page 3-61)
EQ If equal (Decimal & Hex) Advantage when using 1 port for different devices)	(page 3-38)
NE If Not Equal	(page 3-44)
GT Go To	(page 3-41)

GS	Go Sub	(page 3-40)
RT	Return	(page 3-49)
TI	Timer (Debounce for Noise problems)	(page 3-30)
NW	New program	(page 3-45)
DL	Delete Line	(page 3-35)

Describe Interlocking by only checking for certain conditions at certain points

Write a Robot program for the CIM

Describe the use of EPROMS (Different positions and programs can be stored on different chips and run in a matter of minutes)

Investigate commands not currently used, in particular :-

Counters and other conditionals :- XO, SM, LG, AN these have been used before in a CIM where I robot serves 2 machines and generate Chess pieces

Palletising :- How can this help in packaging and multi component movement on the AGV ?

Draw and Draw straight command

Using the TOOL Command (page 2-31)

NOTES ON THE OPERATION OF THE RV-M1 ROBOT USING WINDOWS 'NOTEPAD' & WINDOWS 'TERMINAL' OR DOS COMMANDS FOR DOWNLOADING PROGRAMS.

DATE :- 10.2.98

FILENAME :- C:\TECHINFO\ROBOTS\RV-M1\RV-M1RUN.DOC

To run the RV-M1 Robot from WINDOWS 'TERMINAL' option proceed as follows :-

1. Create a TERMINAL program called 'RV-M1.TRM' by going into the 'SETTINGS' option and selecting 'COMMUNICATIONS'. Input all the relevant information i.e. :-

Baud rate	4800	
Data bits	7	
Stop bits	1	(Use 2 STOP BITS sometimes to get it to work)
Parity	None	
Flow Control	XON / XOFF	
COM	2 (optional)	

Ensure STRIP LF is active

2. Turn ON the Robot teach box and press the button :- NST
This is the Nesting button and will move all the robot axes back to their datum positions.
3. Using the Teach Box, move the robot axes to any arbitrary positions and press the buttons :-
PS (Position Set)

1 (Position Number)
ENT (Enter)

This as created the Position No 1. Repeat the above sequence and create Positions 2 and 3

4. Switch OFF the Robot Teach Box
5. Ensure both the Toggle switches in the RHS Robot Controller Panel are "DOWN".
6. Go into the WINDOWS 'NOTEPAD' option and create the following small test program

```
DL 1,2048        (Deletes any old Programs in the Robot controller)
10 RC 5         (Cycle 5 Times)
20 MO 1         (Move to Position No 1)
30 GC           (Gripper Closed)
40 MO 2         (Move to Position No 2)
50 GO           (Gripper Open)
60 MO 3         (Move to Position No 3)
70 NX           (Next)
80 ED           (End)
```

Save this program as 'TESTPROG.TXT'

7. Go into the WINDOWS 'TERMINAL' option and load the 'RV-M1.TRM' Program previously created. Select 'TRANSFERS' and then 'SEND TEXT FILE'. Now select 'TESTPROG.TXT' previously created and the Program created above will appear on the screen. Note ? (The 'TESTPROG.TXT can be copied from 'NOTEPAD' and Pasted into 'TERMINAL' RV-M1.TRM using standard Windows operations)

Note ? The "EDIT" then "CLEAR BUFFER" commands reset the RS232 Buffer and also clears the screen figures.

8. TYPE the Command
RS (RESET)

This Resets the Robot Controller (i.e. The RED Error LED will go OUT)

9. TYPE the Command
NT (NEST)

10. TYPE the Run the Program NEST)

The Robot should Cycle through the Program 5 times.

11. To stop the Cycle press the 'START / STOP (TEST)' Button on the front of the Robot Controller. Pressing the 'RESET' Button on the front of the Robot Controller Resets the Robot Program back to its beginning.

Note? Because the XON / XOFF command was selected in 1. this could cause Program corruption when been Down Loaded due to the fact that when XON / XOFF is selected the robot Controller Buffer does not send back a Control Character to stop the flow of data. To overcome this problem if it occurs select 'SETTING' in the 'TERMINAL' Options with RV-M1.TRM loaded and then select 'TEXT TRANSFER' and change the 'DELAY BETWEEN LINES' to a bigger value.

12. If you get NO response from the Robot i.e. No movement, try typing the command

WH (WHERE)

If a line of figures appear on the screen as follows :-

+451, -432, -45 etc.

Then Serial Communications is established between the computer and the Robot Controller, since the Robot Controller is transmitting the numerical position of each of the Robot axes to the computer.

DOS DOWN LOAD PROCEDURE.

1. In DOS set the following parameters

MODE COM2: 4800,e,7,1 (See DOS Help)
Com Port :- COM2
Baud Rate :- 4800
Even Parity :- e
Data Bits :- 7
Stop Bits :- 1

2. In DOS type the following command

TYPE TESTPROG.TXT>COM2:

3. The Green LED on the front of the Robot Control box should flash momentarily to

indicate that the program is been down loaded.

DENFORD TYPICAL DIP SWITCH SETTINGS FOR RV-M1 ROBOTS

FILE NAME: - U:\ROBS\RVM1\DIPSWIT1.DOC

DATE: - 22.7.99

SW1

BIT No

1. The terminator for Data transmission from the drive unit through the RS232 interface
Upper position CR+LF
Lower position CR
2. Selects whether to check if the contents of the RAM data are retained upon power up
Upper position Check is performed
Lower position Check is not performed
3. Selects the type of I/O card used
Upper position Type A16 or B16
Lower position Type A8 or B8
4. Selects whether or not to set, change, or delete the reference position data in the Cartesian co-ordinate system
Upper position Enable
Lower position Disable
5. Selects whether to enable either the drive unit front control switches or external signals for running the program while type A16 or B16 I/O card is being used
Upper position External signals
Lower position Front control switches
6. Selects whether to enable the ENT key on the teaching box to release Robot brakes
Upper position Disable
Lower position Enable
7. Not used
8. Selects whether to turn ON or OFF the buzzer
Upper position Buzzer On
Lower position Buzzer Off

SW2

Bit No	Null	1 bit	1-1/2 bits	2 bits
8	0	<u>0</u>	1	1
7	0	<u>1</u>	0	1
	Even Parity	Odd Parity		
6	<u>1</u>	0		
	Parity	Parity		

