Yaskawa Motoman DX100, DX200 Programming Pendant

Labels on the pendant diagram:
- Mode Selection Switch (Key Slot) - Teach - Pay - Remote
- Start Button
- Hold Button
- Emergency Stop E-Stop
- Operation Keys
- USB located on back
- 5.7" Color LCD Display - Runs Windows CE - Touch Screen
- Compact Flash Card Slot
- COORD Select 1 of 5 coo'dinate systems
- Direct Open Opens program to be called
- MULTI (Layout) Switch between multiple and single windows
- Page Advances to next page of commands
- Cursor Key
- Area Shifts display from menu, general-purpose display, message, and main menu, also use this button to select languages
- MAIN MENU
- SIMPLE MENU
- Select Key
- SERVO ON READY Turns on servo power supply
- CANCEL Cancels current operation, sub-menu, data, or multiple views.
- Main Axis Keys (Both sides)
- Manual Speed Keys
- Assist Displays help menu
- Supplemental Axis Keys (Both sides)
- SHIFT (BOTH SIDES) Changes the functions of other keys when simultaneously pressed
- INTERLOCK Changes the functions of other keys when simultaneously pressed
- ROBOT (Green light ON) Enables axes operation
- TEST START When pressed with Interlock robot moves through one continuous cycle
- INFORM LIST (Green light ON) View and add commands available
- FWD Moves robot through movements one at a time
- EX-AXIS (Green light ON) Enables external axis operation
- BWD (BACK) Moves robot through movements in reverse
- MOTION TYPE Selects interpolation type
- INSERT Enters a new instruction
- Quick Disconnect Cable
- Numerical Keys
- MODIFY Changes instruction or taught position selected
- DELETE Deletes instruction selected
- ENTER Registers and completes data entered or modified

Pendant CF and USB Connections

Labels:
- Insertion slot for the Compact Flash
- Insertion direction
- top surface
- Notch / Click
- USB Connector
- Insertion position
- Top surface
- USB memory stick
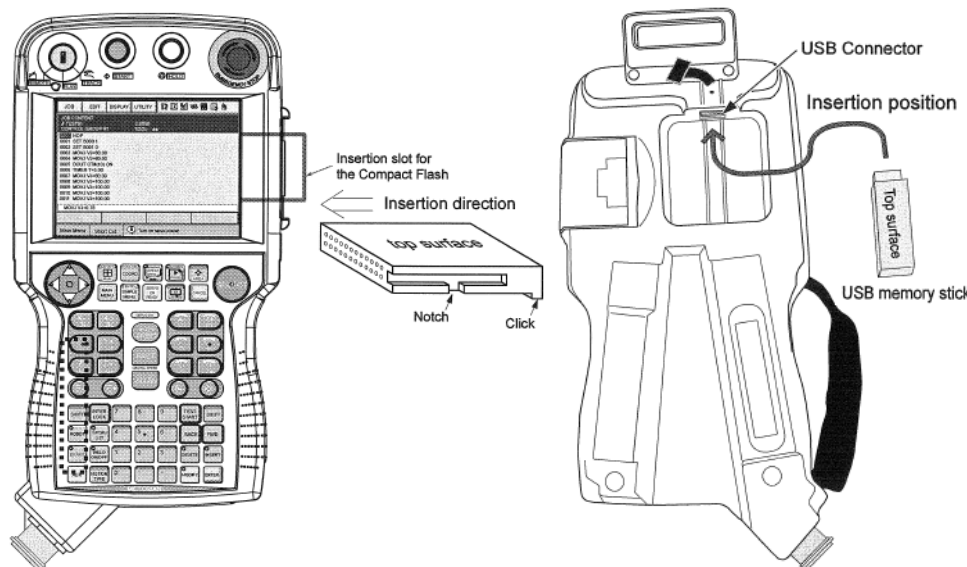
Turning Off Power To The DX100 Controller

Before turning off the DX100 controller power, all servo motors should be shutdown via any E-Stop if the system will be left in the PLAY mode, or place the system in TEACH mode before shutdown.

E-STOP Servo Motors before Shutdown

The servo power should not be left ON when the system is not Operating. Press an E-Stop or switch to TEACH mode. (All preventive maintenance grease procedures are based on accumulated Servo Power Hours.)
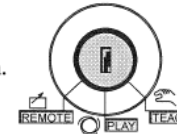
After servo motors are shutdown, turning the Main Circuit Breaker OFF removes all external power to the DX100 controller.

Main Power Switch (OFF)
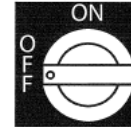
Mode Selection Switch

Three mode selections determine control of the robot system. These are Teach, Play, and Remote [Play].
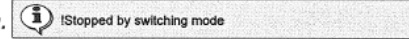
Teach Mode; Status Icon

In TEACH mode, the user has control for jogging the robot(s) and External Axis motors. Programming, editing, customizing, and other menu choices become available based on the level of Security.

Play Mode; Status Icon

In PLAY mode, the START button becomes functional and the DX100 has control of job execution. Special playback UTILITY menu choices become available.

Changing modes from PLAY to TEACH during playback will cause the program to cease execution. !Stopped by switching mode
To resume, select PLAY, SERVO ON, and START.

Remote [Play] Mode; Status Icon

The REMOTE mode allows control from an optional external device such as a remote operator station, programmable logic controller or a host computer.

In order to turn on servo power in Teach mode, perform the following:

1. Release all E-Stops.
2. Press the SERVO ON/READY button. The SERVO ON lamp will blink signifying "ready" status.
3. Hold the SERVO ENABLE switch in its middle ON position.

Fully released or fully compressed causes the servo motors to turn OFF and all brakes to be applied.

Release -> OFF   Squeeze -> ON (Serve On)   Squeeze Tightly -> OFF

Area Key

The Status Display line is not an accessible area.

The AREA key can be used in place of touching the screen to access the following areas for editing and selection purposes: Main Menu, Menu Area, General Display Area, the Inform List menu if active, as well as the Human Interface Area when the edit buffer line is active. The background surrounding the active area is blue.

Start ⬤ Button; Status icon

In Play mode, with servo power ON, pressing the START button will begin execution of a job from the line the cursor is on in the JOB CONTENT.

The START button remains lit the entire time the controller is running the program.

Also, the START button's indicator light will be ON whenever the TEACH mode INTERLOCK+TEST START method of operation is performed.

Hold ⬤ Button; Status icon

Pressing the HOLD button stops execution of a job in the PLAY mode; the START light turns off. The HOLD button light does not latch ON while the system is in this pendant HOLD. Servo power remains ON, and the brakes are not applied.

To resume execution of the program, press the START button.

If the system was put into hold remotely [External Hold] from an Operator's Station button, etc., the message line will display External holding.
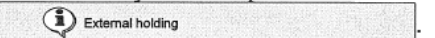
It must be released before restart is possible.

A HOLD (or E-stop) activated by Shock Sensor setting must also be released/RESET before resuming.

Servo On/Ready [SERVO ON READY] Button

In PLAY mode, pressing the SERVO ON/READY button initiates a sequence that sends power to the servo motors and releases all brakes. The SERVO ON light will indicate the status. Playback of any job (with or without motion steps) is not possible unless servo power is applied.

In TEACH mode, pressing the SERVO ON/READY button will only cause the indicator SERVO ON to blink that it is "ready" for the servos to be engaged. Servo power can be applied by activating the Servo Enable Switch located on the back left side of the pendant.

All Alarms, Errors, and E-STOPs must be cleared prior to pressing the SERVO ON/READY button in either PLAY mode or TEACH mode.

Cursor Key
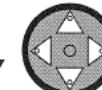
The CURSOR key moves the active cursor up/down or right/left to highlight a desired item on any screen. When the cursor is on an item that has a black background with yellow characters, such as the job list names, the highlighted selection cannot be accessed by touching the screen; the SELECT key must be used.

Holding Up or Down will activate rapid scroll to top/bottom of a job or list.

Use SHIFT + Up/Down for previous/next section of screen view within a job content or list.

Select Key [SELECT]

The SELECT key is used to choose the item currently highlighted by the cursor or to open the prompt window to enter data. INTERLOCK + SELECT is used to force Universal Outputs ON/OFF, and SHIFT + SELECT can be used to highlight a section of a job content for COPY, CUT, CHANGE SPEED, and TRT.

Cancel [CANCEL] Also, CANCEL key is used to clear all ERROR ⊗ Messages.

The CANCEL key is located next to the SELECT key. If an undesired selection or entry has been made, press CANCEL.

WELDING   HANDLING   PACKAGING   PALLETIZING   MACHINE TENDING   REMOVAL   PAINTING   CLINICAL LAB
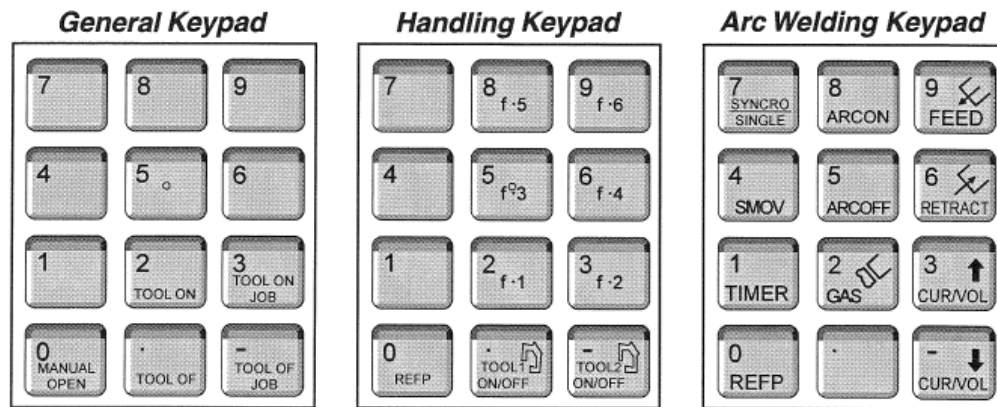
Assist Key Undo/Redo

The ASSIST key provides the UNDO/REDO feature enabled in the EDIT menu.

Also, the ASSIST key can be used in conjunction with the SHIFT key and the INTERLOCK key to view a list of uses for either of these two keys.

Editing Keys

SHIFT	INTER LOCK	7	8	9	TEST START	SHIFT
ROBOT	INFORM LIST	4	5	6	BACK	FWD
EX AXIS	WELD ON/OFF	1	2	3	DELETE	INSERT
AUX	MOTION TYPE	0	.		MODIFY	ENTER

Number Keypad

The Programming Pendant number keypad is used primarily for entering numeric values. A negative [-] or decimal number [.] may be entered where applicable.

These keys are also labeled with device operating instructions specific to the application for which the controller has been initialized.

General Keypad

7	8	9
4	5 ○	6
1	2 TOOL ON	3 TOOL ON JOB
0 MANUAL OPEN	. TOOL OF	TOOL OF JOB

Handling Keypad

7	8 f·5	9 f·6
4	5 f·3	6 f·4
1	2 f·1	3 f·2
0 REFP	TOOL1 ON/OFF	TOOL2 ON/OFF

Arc Welding Keypad

7 SYNCRO SINGLE	8 ARCON	9 FEED
4 SMOV	5 ARCOFF	6 RETRACT
1 TIMER	2 GAS	3 CUR/VOL ↑
0 REFP		CUR/VOL ↓

Enter ENTER

The ENTER key must be pressed after each completed data entry from the numeric keypad or to accept characters/symbols entered on the Result Line for editing.

Insert INSERT

The INSERT key is functional within a JOB CONTENT only on the Address Side while in at least EDITING mode. The INSERT key must be selected before pressing ENTER in order to add/insert any type of additional instruction between existing lines in a job. It is not required when the cursor is immediately before the END instruction performing progressive line-by-line programming.

Modify MODIFY

The MODIFY key is functional within a JOB CONTENT only on the Address Side while in at least EDITING mode. The MODIFY key must be on before pressing ENTER while servos are enabled in order to change/modify the servo Command Position of a step highlighted within a job content.

Also, the MODIFY key may be used to replace an existing line's non-motion instruction for another.

Delete DELETE

The DELETE key is functional within a JOB CONTENT only on the Address Side while in at least EDITING mode. The DELETE key must be selected before pressing ENTER in order to remove/delete an existing line in a job.

Programming Keys

There are only two keys, MOTION TYPE and INFORM LIST, required for accessing all programming instructions. The Security level must be at least Editing Mode and the cursor must be on the Address Side of the JOB CONTENT.

Motion Type Key MOTION TYPE

The MOTION TYPE key is used to program Servo Command Positions of the robot or station axes with MOVJ (Joint motion type) or to program tool control point motion types MOVL (Linear), MOVC (Circular), or MOVS (Spline).

Inform List Key INFORM LIST

The INFORM LIST key is used to program all non-motion instructions.

Shift Keys SHIFT

There are two SHIFT keys on either side of the pendant keypad. These are used in conjunction with another key; particularly those having a silver-blue bar across the top labeled with the alternate function.

Press ASSIST + SHIFT to view displays/functions associated with the SHIFT key.

Interlock Key INTER LOCK
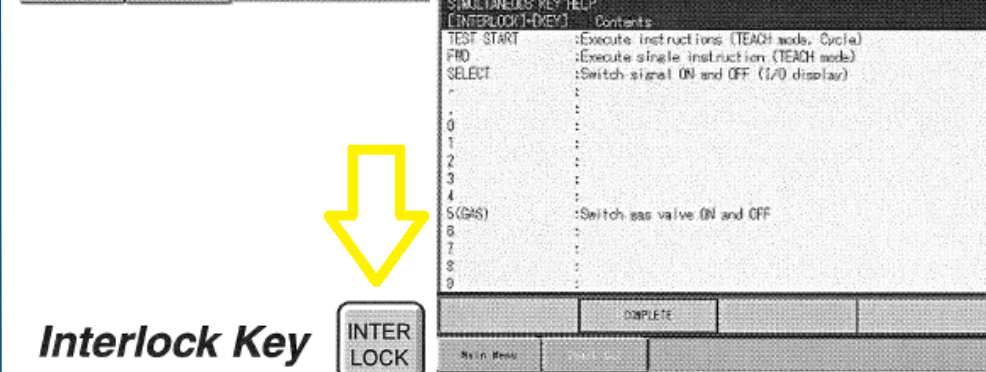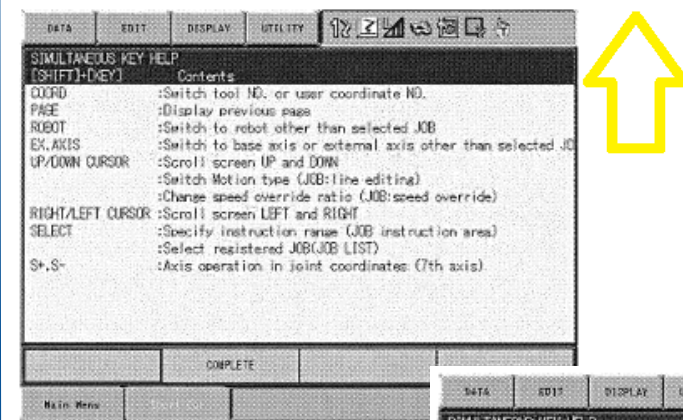
The INTERLOCK key is used in conjunction with keys labeled in blue and outlined in bright orange.
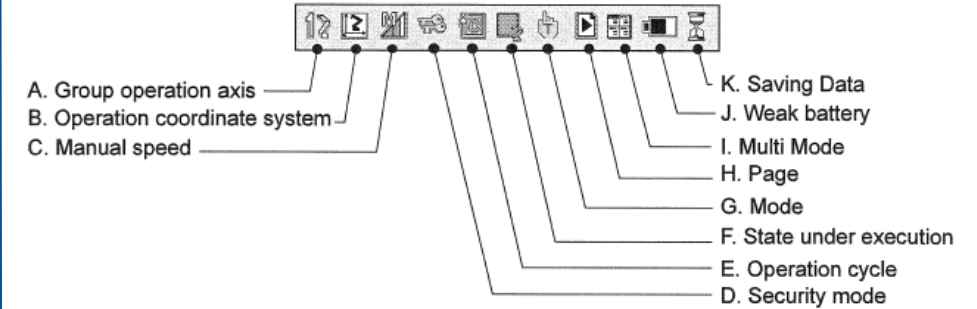
Press ASSIST + INTER LOCK to view displays/functions for the INTERLOCK key.

Status Display

The Status Display shows the current controller condition and pendant settings. The cursor cannot access this display; changes are made via the appropriate keys.

⇒ **WARNING!** ⇐
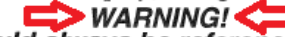
The status line should always be referenced before operating the system in TEACH. Always set (A) Control Group, (B) Coordinate System, and (C) Manual Speed before jogging any component!

A. Group operation axis
B. Operation coordinate system
C. Manual speed

K. Saving Data
J. Weak battery
I. Multi Mode
H. Page
G. Mode
F. State under execution
E. Operation cycle
D. Security mode

A. Control Group

to	: Robot Axes
to	: Base Axes
to	: Station Axes

B. Coordinate Systems

: Joint Coordinates
: Cartesian Coordinates
: Cylindrical Coordinates
: Tool Coordinates
: User Coordinates

C. Manual Speed

: Inching
: Low Speed
: Medium Speed
: High Speed

D. Security Mode

: Operation Mode
: Edit Mode
: Management Mode

E. Operation Cycle

: Step
: Cycle
: Continuous

F. State Under Execution

: Stop Status
: Hold Status
: Emergency Stop Status
: Alarm Status
: Operating Status

G. Mode

: Teach mode
: Play mode

H. Page

I. Multi-Window

J. Weak Battery

K. Busy!

NOTE:
Do not interrupt the pendant when busy with the hour-glass status. Also, all Errors and Alarms must be cleared before operation/programming is possible.

Main Menu Key MAIN MENU   "Display Brightness"

The MAIN MENU key is used to display the top level menu choices on the left side of the pendant screen. Pressing the MAIN MENU key toggles the display on and off.

MAIN MENU + ⬦ UP/DOWN CURSOR increases/decreases brightness.

Linear Motion Type (MOVL)

Linear is an interpolated motion for the robot's Tool Control Point (TCP). Choosing this motion type for a step has the controller move the robot's TCP in a straight line path during travel to the robot Pulse Command Position.

If there is a change of tool angle of orientation from its previous position to the destination, the posture will gradually adapt as it follows a linear path.

The speed tag used on a MOVL instruction when the TCP is actually traveling is the "Velocity" tag V– Control_point_speed. Another type, the "Velocity of Rotation" tag VR= Angle_Speed, is used when the TCP is just pivoting in place.
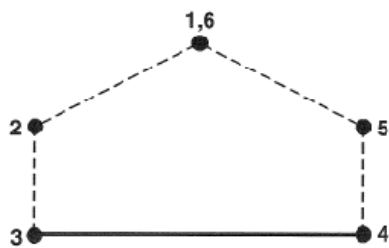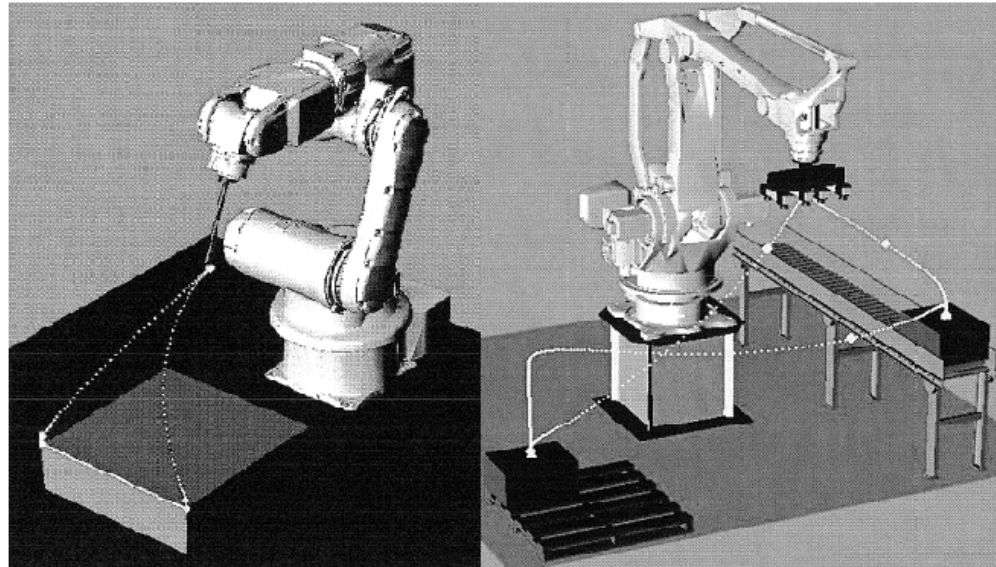
LINE	INSTRUCTION
0000	NOP
0001	MOVJ VJ=0.78
0002	MOVJ VJ=100.00
0003	MOVJ VJ=25.00
0004	**MOVL V=276**
0005	MOVJ VJ=50.00
0006	MOVJ VJ=100.00
0007	END

To program the last step at same location as the first step as, complete the following procedure:

1. Move the cursor to the Address side of the first step (Step 0001).
2. Ensure a clear path, then press and hold the FWD key until the robot comes to a stop at Step 0001. The cursor will stop flashing.
3. Move the cursor to the last recorded step (Step 0005).
4. Press the MOTION TYPE key to set the motion type to MOVJ .
5. Set the appropriate play speed tag (VJ=100.00).
6. Press ENTER.

In the example below, the last step (Step 0006) is now programmed at the same location as the first step (Step 0001).

LINE	STEP	INSTRUCTION	
0000		NOP	
0001	0001	**MOVJ VJ=0.78**	⬅ Home Position Slow Speed
0002	0002	MOVJ VJ=100.00	
0003	0003	MOVJ VJ=25.00	
0004	0004	MOVL V=138	
0005	0005	MOVJ VJ=50.00	
0006	0006	**MOVJ VJ=100.00**	
0007		END	

Same Point

Circular Motion Type (MOVC)

Programming at least three *consecutive* taught points with MOVC motion type has the controller move the robot's Tool Control Point (TCP) in a circular arc.

The three positions allow the controller to determine the plane, radius, and center of the interpolated circle. Programming additional MOVC steps unnecessarily will require the controller to recalculate a new plane, radius, and center with each additional MOVC point.
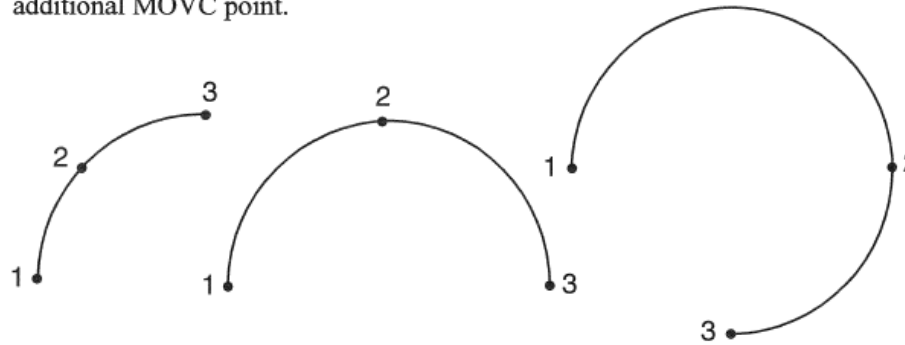
**To program a circular arc, perform the following:**

1. With the cursor on the address side, press the MOTION TYPE key until MOVC is displayed on the Edit Buffer Line.
2. Set an appropriate V=Control_point_speed.
3. Jog the robot to the beginning point of the arc; with servos enabled, press [INSERT], ENTER.

NOTE: The controller uses <u>linear</u> path interpolation for the <u>first</u> MOVC.

4. Jog the robot to any location *on* the arc; with servos enabled, press [INSERT], ENTER.
5. Jog the robot to the ending point of the arc; with servos enabled, press [INSERT], ENTER.   ⟹ *CAUTION!* ⟸

If the operator puts the cursor on each MOVC individually with the Cursor Key, then using the FWD key will move the robot in a linear path to each MOVC. Only the FWD/BACK key and INTERLOCK+TEST START methods of path verification will follow the interpolated Circular path.
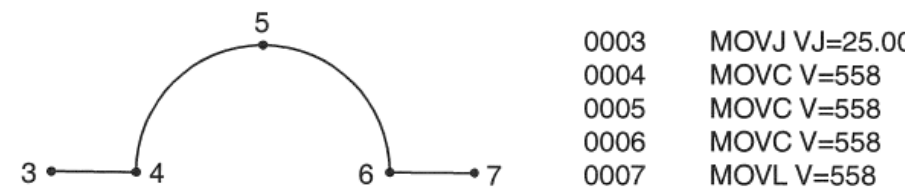
0003	MOVJ VJ=25.00
0004	MOVC V=558
0005	MOVC V=558
0006	MOVC V=558
0007	MOVL V=558

Four MOVC steps can be used to create either a full circle or an overlapping circle. To complete a full circle, a fourth MOVC can be programmed at the same point as the first MOVC.
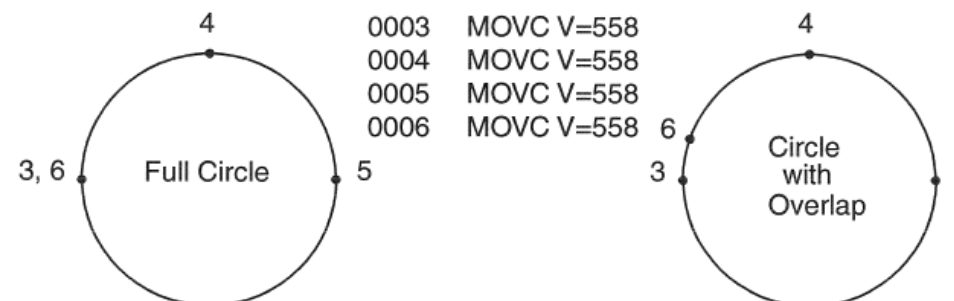

0003	MOVC V=558
0004	MOVC V=558
0005	MOVC V=558
0006	MOVC V=558

Spline Motion Type (MOVS)

Programming three consecutive points with MOVS has the controller move the robot's TCP through a parabolic path. The middle MOVS point must be programmed on the spline path approximately midway between the first and third as shown in the figure below. The controller will calculate the actual apex point equidistant between the spacing of the first and third points.
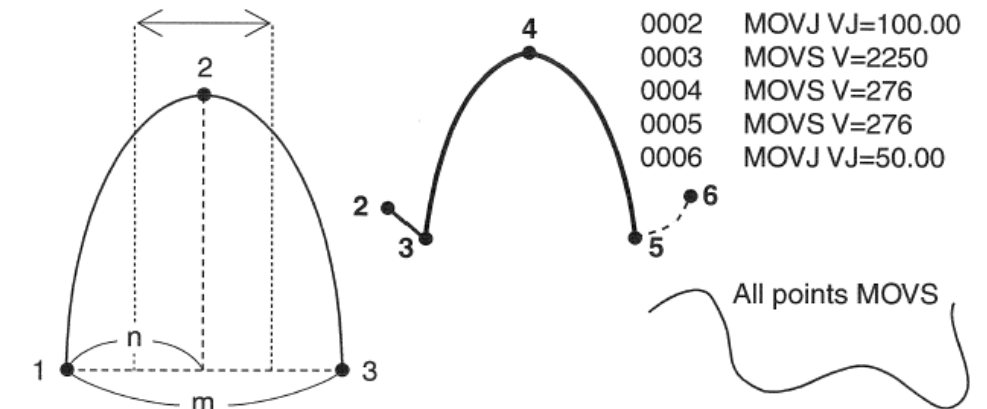
0002	MOVJ VJ=100.00
0003	MOVS V=2250
0004	MOVS V=276
0005	MOVS V=276
0006	MOVJ VJ=50.00

All points MOVS

To program a parabolic path with spline motion type, perform the following:

1. With the cursor on the address side, press the MOTION TYPE key until MOVS is displayed on the Edit Buffer Line.
2. Set an appropriate V=Control_point_speed.
3. Jog the robot to the beginning point of the parabola; with servos enabled, press [INSERT], ENTER.

NOTE: The controller uses <u>linear</u> path interpolation for the <u>first</u> MOVS.

4. Jog the robot to the desired apex of the parabola; with servos enabled, press [INSERT], ENTER.
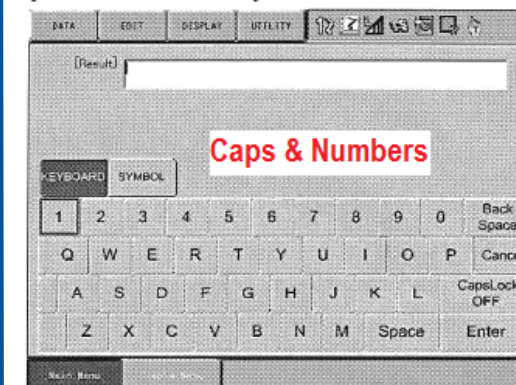5. Jog the robot to the ending point of the parabola; with servos enabled, press [INSERT], ENTER.   ⟹ *CAUTION!* ⟸

If the operator puts the cursor on each MOVS individually with the Cursor Key, then using the FWD key will move the robot in a linear path to each MOVS. Only the FWD/BACK key and INTERLOCK+TEST START methods of path verification will follow the interpolated Spline path.

Character Screens

The character screens available for entering job names, comments, labels, I/O names, etc., include a dual keyboard (Caps Lock ON/OFF), Symbols, Space, Back Space for deleting characters, and Cancel for clearing the entire [Result] edit line.

The [Result] line can be accessed by touch to put the cursor between characters for individual removal to the left using Back Space. In addition, by "dragging" the touch, consecutive characters may be highlighted and then removed simultaneously with one press of the Back Space.
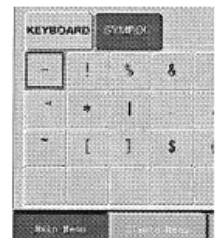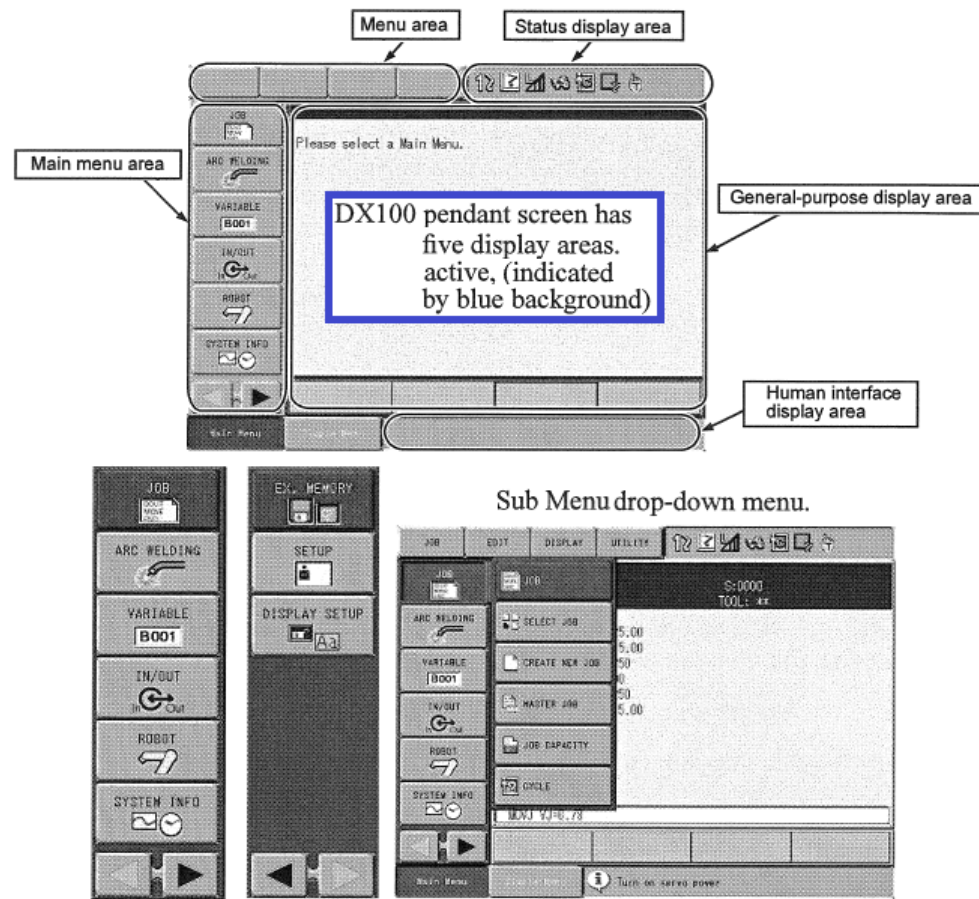

Very Important to name all items

Caps & Numbers

Lower Case & Numbers

Symbols

Menu area

Status display area

Main menu area

DX100 pendant screen has
five display areas.
active, (indicated
by blue background)

General-purpose display area

Human interface
display area

Sub Menu drop-down menu.

Multi-Window Function

The multi-window function divides the general-purpose display area from just 1
to 2, 3, or 4 windows to be shown simultaneously.
There are seven dividing patterns to be optionally chosen as desired.

Access to the Seven Different Window Patterns

The title of the active window is displayed in deep blue and the non-active are light
blue. The active window is the subject of key operation.

To toggle between Single/Multi Window, press SHIFT + [LAYOUT/Multi] keys.

Simple Menu Key

The SIMPLE MENU key is used to display up to 8 pre-registered sub-menu choices.
Pressing the SIMPLE MENU key toggles the display on and off.
The Simple Menu may be concealed or re-displayed by toggling SIMPLE MENU
key, or by touching the screen's Simple Menu softkey.

**To register the currently displayed
screen perform the following:**
1. Press the Simple Menu key.
2. Choose REGIST.
3. Choose "YES".

**To display a screen from the Simple
Menu perform the following:**
1. Press the Simple Menu key.
2. Choose the desired icon.

**To delete a registered screen
perform the following:**
1. Press the Simple Menu key.
2. Choose EDIT.
3. Cursor to desired screen number
   to be deleted.
4. Press SHIFT and SELECT.
   A circle with appear to the left
   of the selected screen number.
5. Choose DATA in the Menu Area.
6. Choose DELETE MENU
   in the drop down.
7. Choose "YES"

In the Main Menu area under the DISPLAY SETUP icon, the four options given
are as follows: CHANGE FONT, CHANGE BUTTON, WINDOW PATTERN, and
INITIALIZE LAYOUT.   CHANGE FONT selection allows the user to customize the font style and size
within the General Purpose Display area. There are four different font sizes available,
from very large to very small.   CHANGE BUTTON selection allows the user to customize the font style and
size of the buttons within three areas: the Main Menu area, the Menu area, and
the Inform List area. This figure shows all three areas with the font enlarged
and boldfaced.

CONTROL GROUP & JOGGING COORDINATE

Before jogging any component of the system, set or verify the active Control Group and a desired jogging coordinate with appropriate manual speed.

Control Groups

The DX100 system can be configured with multiple robots, station axes, and base axes; therefore, for jog operations, the appropriate group of axes to be controlled must be selected by the operator. The active selection is displayed in the status line.

ROBOT Key

The ROBOT selection is active by default at power ON. Pressing the ROBOT key chooses the desired robot, R1 to R8. The jogging Axis keys on the Pendant are labeled for both single motor/link operation of the robot with (+/-) [SLURBT], and also for manipulating a robot's tool control point, TCP, in (+/-) X, Y, Z and rotating the tool's posture with the (+/-) Rx, Ry, & Rz keys. Robots with more than 6 axes use the "E" and "8" keys also.

EX. AXIS Key

Pressing the EX. AXIS key configures the axis keys to move the servo motors for STATION axes S1 to S24 or BASE track axes B1 to B8. Typically, the setup uses the first pair of keys, [-X/S] & [+X/S], for the first Station S1 axis or Base B1 track, the second pair for S2 or B2, third for S3 or B3, etc.

Pressing SHIFT+ ROBOT or SHIFT+ EX. AXIS is required when the desired control group for jogging is not identified in the selected job.
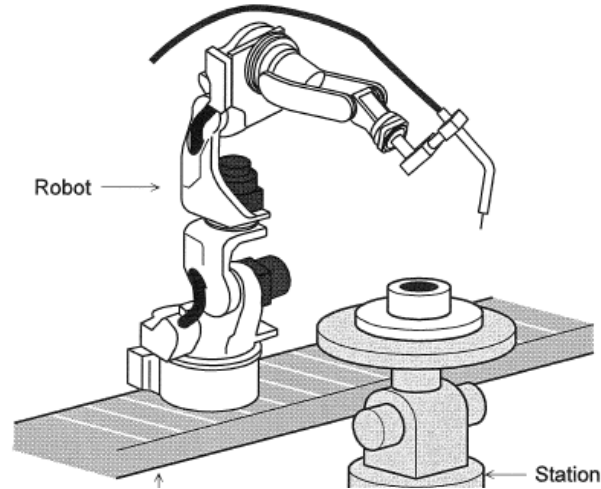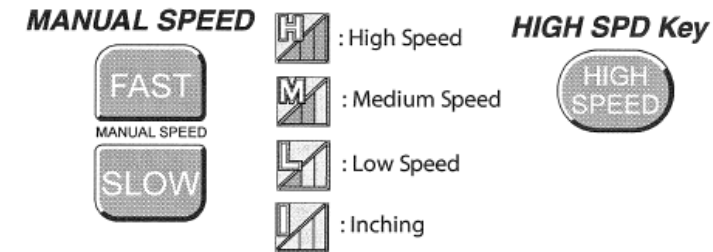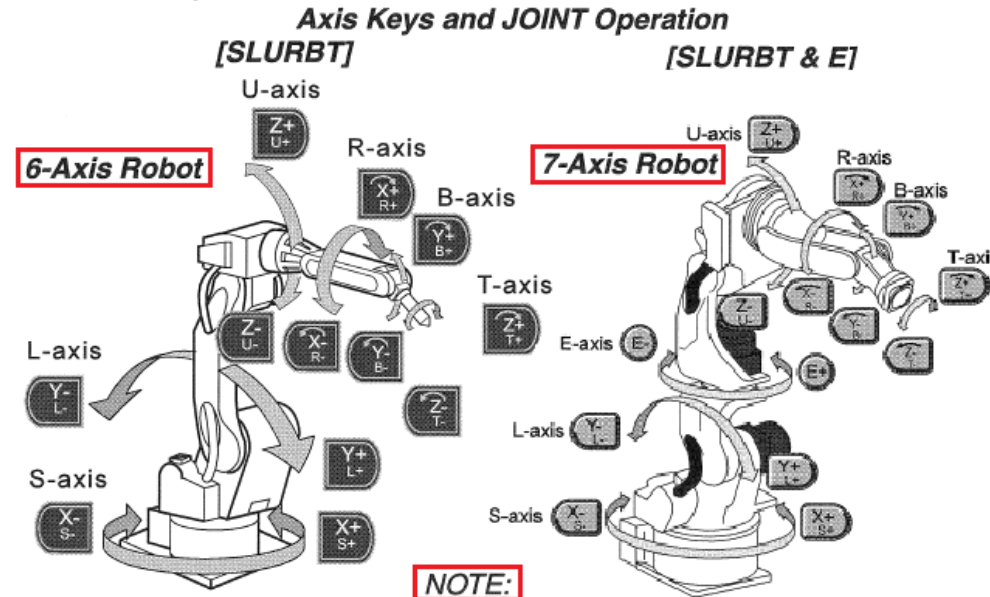

Coordinates

The active Coordinate system, identified in the status line, determines how each of the eight sets of multifunctional axis keys with "+" and "-" will operate. Four of the five types are actively available on the COORD key. (Either RECT or CYL is SETUP on the TEACHING CONDITION list.) The X, Y, Z, Rx, Ry, & Rz labels are active for all jogging Coordinates except when set for Joint [SLURBT].

: Joint Coordinates [SLURBT]

: Robot Frame Rectangular Coordinates [RECT]

: Cylindrical Coordinates [CYL]

: Tool Frame Coordinates [Tool No.00-63]

: User Frame Coordinates [UF#1-63]

Joint Coordinates (S,L,U,R,B,T) (S,L,U,R,B,T, & E)

When in Joint coordinates, the letters S, L, U, R, B, T on the six pair of axis keys are applicable, allowing the operator to move each motor/link in a positive or negative direction. JOINT is the default coordinate system upon power up.

When in Joint coordinates, the additional 7th Axis, *E-Axis*, can be jogged by pressing the ⊙ ⊙ keys.

Axis Keys and JOINT Operation
[SLURBT]   [SLURBT & E]

6-Axis Robot   7-Axis Robot

NOTE:

When two or more axis keys are pressed simultaneously, the robot will perform a compound movement, but if two opposites are pressed at the same time, such as [X-/S-] and [X+/S+], then neither operates.

MANUAL SPEED   HIGH SPD Key

FAST   : High Speed   HIGH SPEED
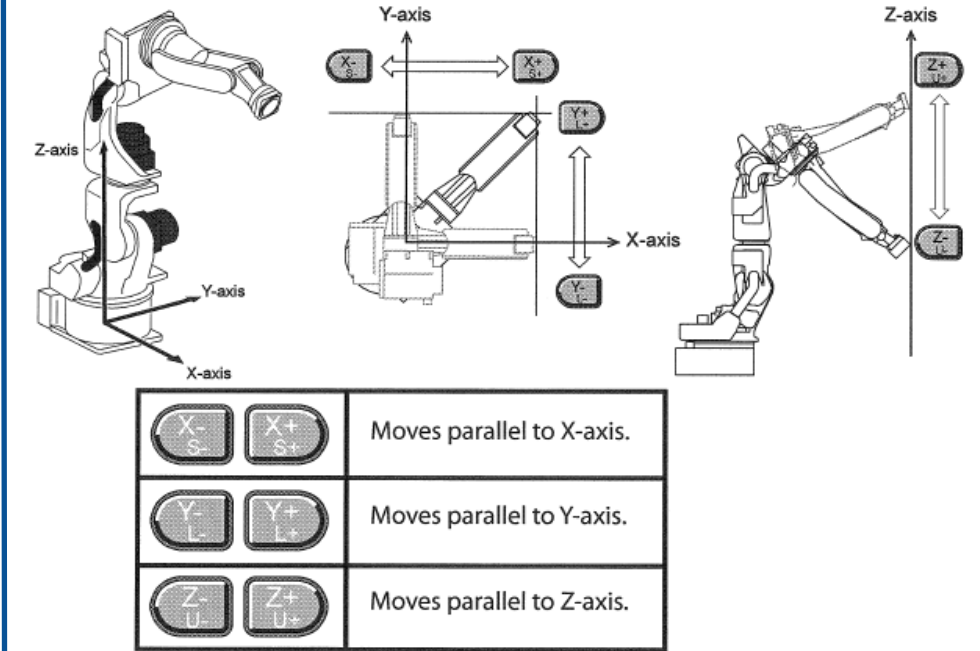MANUAL SPEED : Medium Speed
SLOW   : Low Speed
            : Inching

When INCHING has been selected, each press of +/- S,L,U,R,B,T will move the Robot/Station/Base motor one pulse count in JOINT coordinate system.


User Frames

A User Frame Coordinate is based on a user-defined origin for an XYZ frame aligned parallel with a fixture's plane of work. Up to 63 User Frames can be defined.
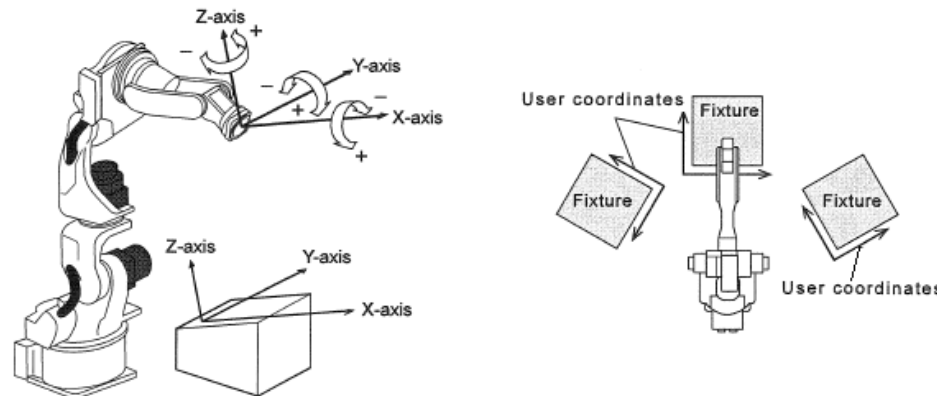

Operation of the X, Y, and Z-axis keys with moves the active TCP as illustrated in the figure below.

|	Description
X-/S- , X+/S+	Moves parallel to X-axis.
Y-/L- , Y+/L+	Moves parallel to Y-axis.
Z-/U- , Z+/U+	Moves parallel to Z-axis.

The Cylindrical coordinates are, set as CYL, takes the place of access to RECT.

Operation of the X, Y, and Z-axis keys with moves the active TCP as illustrated in the figure below.
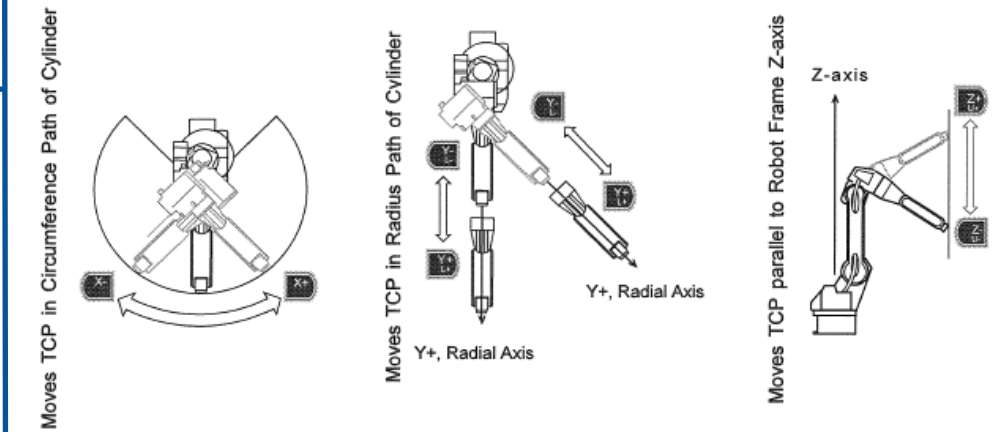
Tool Coordinates

The TOOL coordinate system allows the jogging of the robot's TCP based on the current Tool No. Selection. The Cartesian X, Y, Z directions in Tool Frame [TF] are oriented to the active TCP, and move with the tool.

WELDING HANDLING PACKAGING PALLETIZING MACHINE TENDING REMOVAL PAINTING CLINICAL LAB
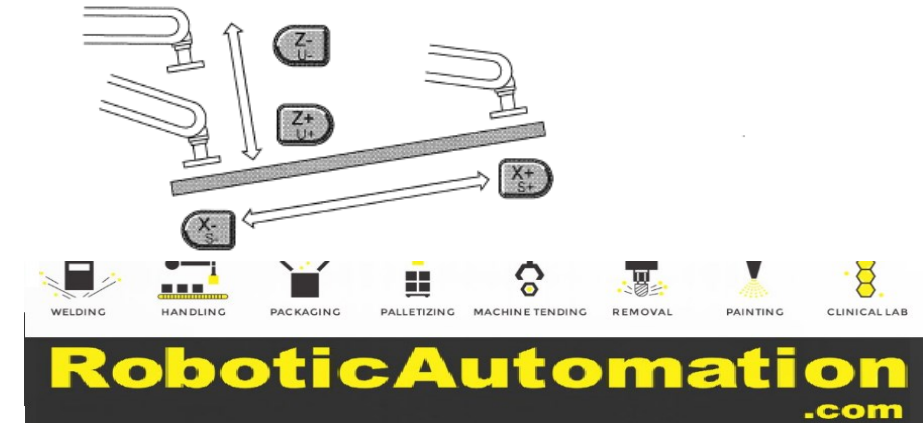
ALARMS & ERRORS

ERROR messages appear in the Message Line at the bottom of the pendant screen.

⊗ ERROR 0 20 : Set to PLAY mode   cleared by pressing the [CANCEL] key.

An ERROR message occurs when a keystroke mistake has been made. An example of a keystroke error is when pressing the START button while not being in PLAY mode. This would cause the following ERROR message:

All ALARM information appears in the General Display Area, and the icon indicating alarm status appears on the status line. No further operation or editing is possible until all ERROR/ALARM situations are cleared.

Minor Alarms

Minor Alarms usually indicate a jogging problem or programming mistake that requests the controller to perform tasks it is not capable of performing. The four-digit alarm code and description appear in the General Display area. Minor Alarm codes begin with "4xxx through 8xxx" and also "9xxx" for Application/User type.

Job execution is stopped, but Servo Power remains ON. Minor Alarms are cleared by touching the RESET softkey on the pendant screen. The cause of any minor alarm should be fixed immediately to avoid reoccurrence.
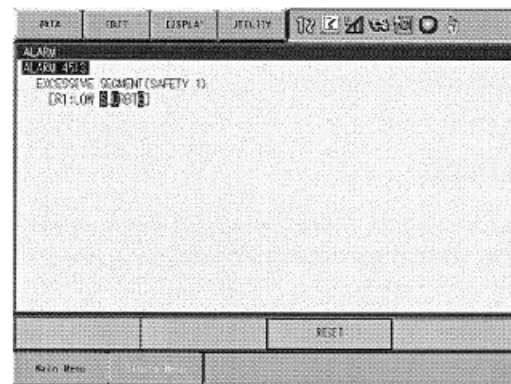
NOTE:
An additional procedure, "Check Position," is required after a RESET for ALARM 4107: ABSO DATA OUT OF RANGE.
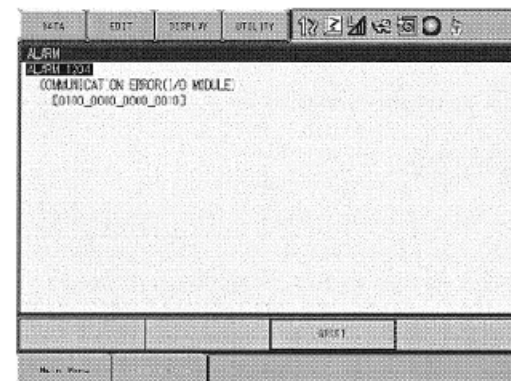
Major Alarms

A Major Alarm may occur because of equipment failure or what the controller considers a potential failure during operation. Any hardware failures will require repair or replacement of the affected components.

The alarm code and text description appear in the General Display area. The four-digit alarm codes for all Major Alarms begin with "1xxx, 2xxx, or 3xxx." Servo power turns OFF. A Major Alarm can only be cleared by cycling the DX100 controller power OFF/ON.

An Off-line Alarm occurs during initial diagnostics upon detection of a failure that requires a maintenance procedure. These four-digit alarm codes that begin with a "0xxx" cannot be cleared by simply cycling the DX100 controller power.

Note:
It is also possible for several alarms to appear simultaneously.
Multiple alarms are displayed in order of occurrence.
If any of the multiple alarms are Major Alarms, the controller must be powered down to resolve these Major Alarms.

Alarm Detail

The DX Pendant is capable of displaying the alarm details. The alarm details include the alarm content, the cause of the alarm and the measure needed to remedy the alarm. **To display the alarm details perform the following:**
1. With the cursor on the alarm number press SELECT.
2. Scroll through the desired section.
3. Touch RETURN to return back to the alarm.

Overrun & Shock Sensor Action

The OVERRUN switch is located on the robot's S-axis. Jogging the robot past this switch could cause damage to the internal harnesses. Opening this switch causes ALARM: 4100 OVERRUN IN ROBOT AXIS.

In some robot installations, there is a device called a "shock sensor" mounted between the robot flange and the tool. This device helps protect the robot/tool from damage in the event of a crash. Crashing the tool causes loss of signal from this device to the DX100. The ALARM: 4110 SHOCK SENSOR ACTION will be displayed on the teach pendant screen.
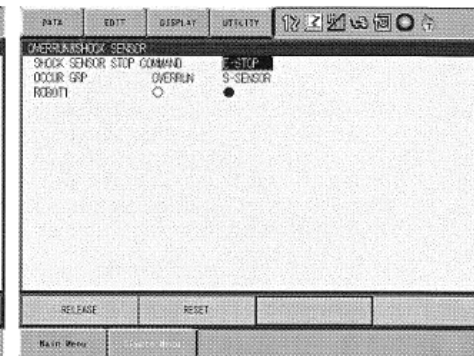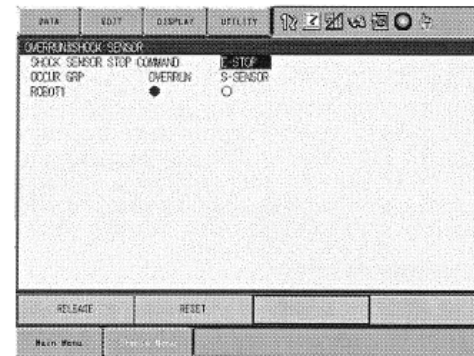
Note:
E-STOP is the default setting for overrun &shock sensor activation.
A HOLD setting is also available.

To perform Overrun or Shock Sensor recovery, perform the following:
1. From MAIN MENU, choose ROBOT, or use cursor keys and SELECT key.
2. Choose OVERRUN&S-SENSOR.
3. Choose RELEASE   **See Notes Below**
4. Choose RESET

NOTE: This selection is only available in the Editing and Management modes. Servo Power may now be turned on in the TEACH mode only. The robot may be jogged in any coordinate system.

NOTE: The "RELEASE" is only in effect when this screen is displayed. If the screen is changed to any other prior to the Shock Sensor being reset, the controller will return to an Alarm condition and E-Stop the robot.

Internal Shock Sensor / Collision Detection

The DX100 controlled robot has a torque monitoring system to protect both the tool and the robot arm. If the torque exceeds a specified value, the Alarm:4315 COLLISION DETECT will be generated. The Alarm screen will show one or more highlighted axes in which the collision took place.
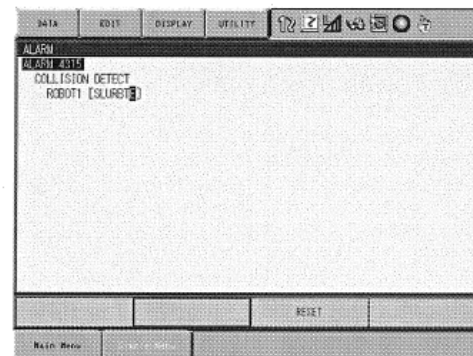
To recover from Internal Shock Sensor action after RESET of the Alarm:4315 COLLISION DETECT, perform the following procedure:
1. With the controller in TEACH, from MAIN MENU, choose ROBOT.
2. Choose SHOCK SENS LEVEL.
3. Press PAGE in the General Display Area, enter "9" and press ENTER.
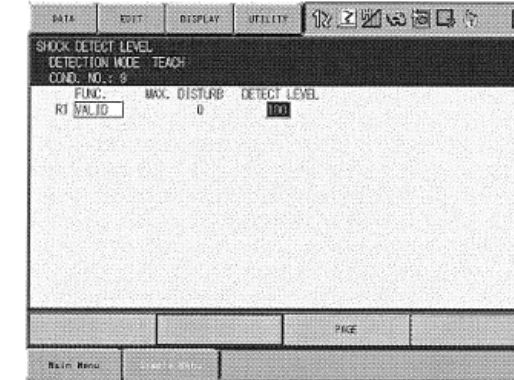
(The COND. NO.:9 file is for TEACH only).

4. Cursor to VALID and press SELECT, changing the function to INVALID.

Servo power can now be applied when set to INVALID.

5. Choose the desired COORD and jog the robot in LOW manual speed until clear of all interfering objects.
6. Restore the VALID setting by selecting INVALID.

NOTE:
Shock Sensor Detection may be set in both PLAY and TEACH. Setting any one of the 9 Condition Files to INVALID will make all of the files INVALID.

NOTE:
The Detection setting can only be changed in the Management Mode Security Level. The range of setting Disturbance Level is 1- 500.

CREATING A JOB

To create a new job, the job must first be named with any combination of numbers, capital letters, and symbols. A job name may contain no more than 32 characters.

NOTE:

The controller must be set for either the EDITING or MANAGEMENT Security Level in order to access CREATE NEW JOB in the JOB menu.

To create a new job name, complete the following steps:
1. In TEACH mode from the MAIN MENU, choose JOB.
2. Choose CREATE NEW JOB.
3. With cursor on the asterisks next to JOB NAME press SELECT.
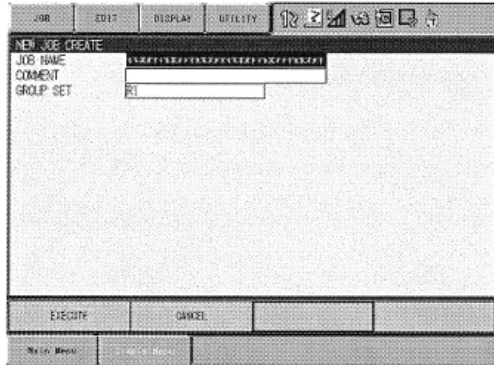
NOTE:

**Multi-axis jobs, select the correct group set.**

Allways add comments

4. Enter the job name using numeric keypad choose up to 32 characters
Pressing CANCEL will clear the entire line.
5. Press ENTER to accept the JOB NAME RESULT line.
6. If a COMMENT is desired, cursor down and press SELECT. Enter up to 32 characters for viewing when DETAIL DISPLAY is active on the JOB LIST. Press ENTER to accept COMMENT.
7. If the GROUP SET is different than R1, press SELECT, cursor to the desired group axes combination and press SELECT.
8. Touch EXECUTE or press ENTER to complete the creation of the new job.

Only the Active Job can be accessed during program execution in Play mode.

(Start Lamp ON 🟢 and Status icon ◀ displayed for Running.)

To return to the active JOB CONTENT, perform the following:
1. From MAIN MENU, choose the JOB icon.
2. Choose JOB. The currently active job will appear on the screen.
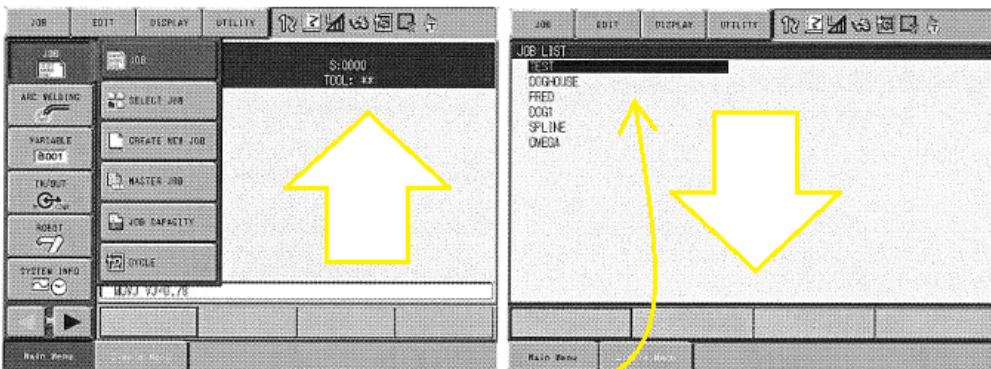
Selecting A Job

All job names appear on the JOB LIST from the SELECT JOB menu. Any job can be selected while in TEACH mode. In PLAY mode, any job can be selected if a job is not currently running.
Another job cannot be selected during program execution in Play mode.
1. From MAIN MENU, choose JOB.
2. Choose SELECT JOB to access the JOB LIST.
3. Cursor to the name of the desired job and press SELECT.

COPY, DELETE, & RENAME JOB

In EDITING or MANAGEMENT Mode, any job can be copied. Jobs that are not edit protected can be renamed or deleted. These functions can be performed from the actual JOB CONTENT screen or from the JOB LIST display. Also, the JOB LIST can be organized by NAME or DATE with a DETAIL DISPLAY enabled or disabled.

Copy Job

The COPY JOB function makes an identical copy of a job where only the job name is different. Use this function to create jobs whenever a cell has multiple jobs with minor differences. COPY JOB should also be used when doing extensive editing of an existing job as not to corrupt the original.

To copy a job, perform the following steps:
1. In TEACH from MAIN MENU, choose JOB; then SELECT JOB.
2. Cursor to highlight the job to be copied.
3. Choose JOB in the Menu Area.
4. Choose COPY JOB.
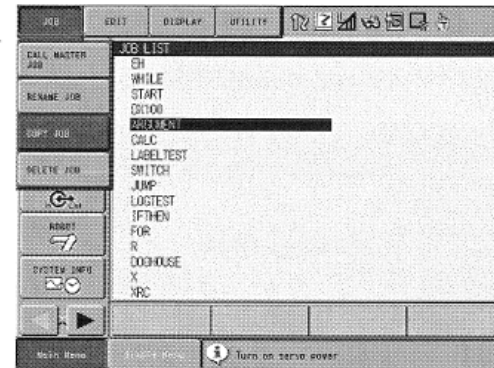
NOTE:
COPY JOB may also be performed from the JOB CONTENT screen.
Use steps 3 through 6 only.

5. Choosing from desired Character Screens (Numbers or Symbols), touch to enter each character for the copy job name on the result line and touch ENTER when complete.
6. Choose YES on the "Copy?" screen.

Delete Job
Enable Undelete Job Function
UNDELETE JOB FUNCTION allows recovery of jobs from the TRASH JOB LIST.
UNDELETE JOB, perform the following steps:
1. In TEACH from MAIN MENU, choose SETUP.
2. Choose TEACHING COND.
3. Cursor to highlight the JOB UNDELETE FUNCTION indicator box.
4. Press SELECT to toggle between INVALID or VALID.

Delete Job perform the following steps:
1. In TEACH from MAIN MENU, choose JOB; then SELECT JOB.
2. Cursor to highlight the job to be deleted.
3. Choose JOB in the Menu Area.
4. Choose DELETE JOB and press ENTER.

NOTE:
DELETE JOB may also be performed from the JOB CONTENT screen.
This will only delete the currently displayed job.
Use steps 3 through 5.

5. Choose YES on the "Delete?" screen.

Undelete Job perform the following steps:
1. In TEACH from MAIN MENU, choose JOB.
2. Choose TRASH JOB LIST.
3. Cursor to the Job name to undelete.
4. Choose JOB in the Menu Area.
5. Choose UNDELETE JOB.
6. Choose YES on the "Undelete?" screen.

Rename Job from the job list display, perform the following steps:
1. In TEACH from MAIN MENU, choose JOB; then SELECT JOB.
2. Cursor to highlight the job to be renamed.
3. Choose JOB in the Menu Area.
4. Choose RENAME.

NOTE:
RENAME JOB may also be performed from the JOB CONTENT screen.
Use steps 3 through 6 only.
If loading from Memory and it has the same file name it will need to be renamed.

5. Select the desired Character Screen (keyboard or symbols), enter the new job name on the Result line, and press ENTER.
6. Choose YES on the "Rename?" screen.

Job Header

The Job Header is like the title page of the job. It displays additional detailed information about the job currently selected. The Job Header shows the job name, comment, the date and time it was last edited, if edit protect has been set, and if the job has been saved.

To display a JOB HEADER complete the following from the JOB CONTENT screen:
1. Choose DISPLAY in the Menu Area.
2. Choose JOB HEADER.
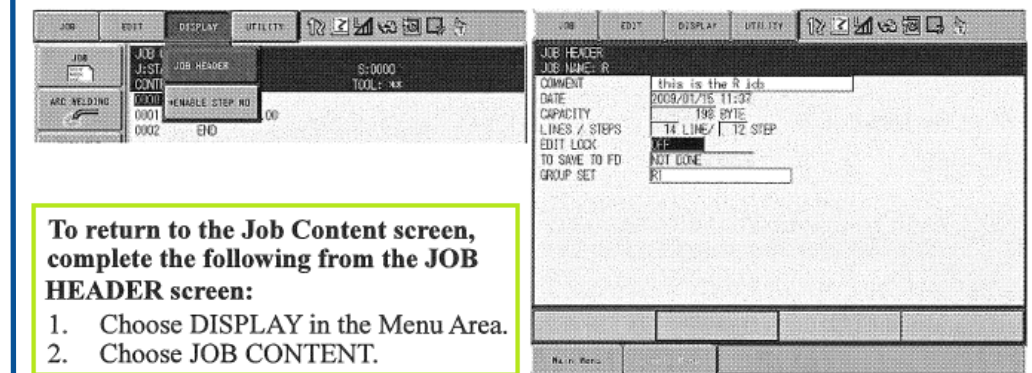
To return to the Job Content screen, complete the following from the JOB HEADER screen:
1. Choose DISPLAY in the Menu Area.
2. Choose JOB CONTENT.

JOB EDITING

There are several ways to edit a Job Content. This includes path adjustment by modifying Command Positions or changing Motion Types, as well as adding or removing Position Level/Accuracy, Comments, and other details. Also, the EDIT menu features Cut, Copy, Paste, Reverse Paste, and Reverse Path.
The Job Content screen is divided into two sections, as shown below.

The cursor must be on the Address side for initial programming and to use the INSERT, MODIFY, or DELETE keys.

L.E.D. to indicate its active status.
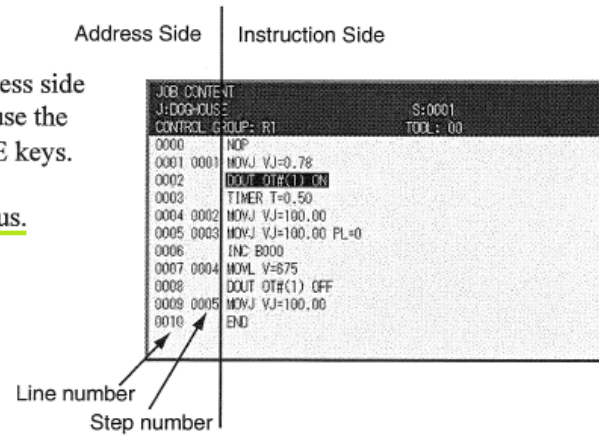
A Line number (L:0000) identifies every address in the job.
MOVJ, MOVL, MOVC, or MOVS has a Line and Step associated with it.
Current or last active Step indicated in the upper part of the Job Content screen (S:0001).

The Address Side may include each Step number next to the Line number address by activating the ENABLE STEP NO under the DISPLAY menu.

UNDO/REDO feature, perform the following:
1. In TEACH on the JOB CONTENT screen from the Address Side, choose EDIT.
2. Choose ENABLE UNDO from the Edit menu.
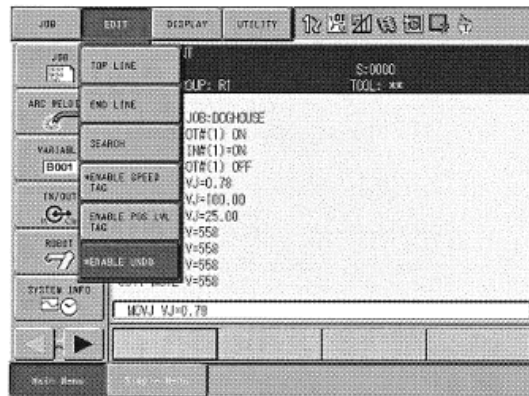
Modifying a Step Command Position

The MODIFY key, with servos enabled, allows only the COMMAND POSITION for a motion step address to be recaptured with ENTER. The Instruction Side information does not change.

To modify the position of a step in a job, perform the following steps:
1. In TEACH mode, select the Job Content to be edited. Cursor to the Address Side of the step to be modified.
2. If multiple tools in use, choose appropriate Tool No. 00-63. Jog the robot /TCP to new desired position. (The cursor will now be blinking.)
3. Press MODIFY.
4. With servos enabled, press ENTER. (The cursor will stop blinking.)

NOTE:

The pendant beeps when the cursor stops blinking as confirmation that the position data was accepted for that motion step address.

Inserting a Step

To insert a motion step between existing program lines/steps in a job, perform the following steps:
1. In TEACH mode, select the Job Content to be edited. Cursor to the Address Side of the line above the step to be inserted.
2. Choose the desired Motion Type.
3. Set the desired Play Speed.
4. If multiple tools in use, choose appropriate Tool No. 00-63. Enable the Servos and jog the robot/TCP to the desired Command Position.
5. Press INSERT.
6. With servos enabled, press ENTER.
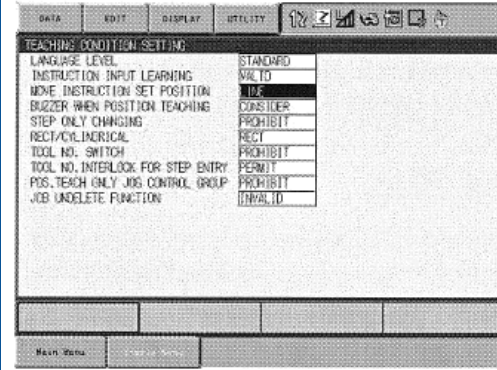
NOTE:
The new line number and all addresses below the inserted address will renumber accordingly.

➡ **CAUTION!** ⬅

Always confirm the newly inserted path before running in PLAY mode. First use FWD/BACK with desired Manual Speed, and second use INTERLOCK+TEST START.

Deleting a Step   NOTE:

To delete a step, the robot must be positioned at the step to be deleted. When the robot is at the Command Position, the cursor will not blink.

To delete a step in a job, perform the following steps:
1. In TEACH mode, select the Job Content to be edited. Cursor to the Address Side of the step to be deleted.
2. FWD the robot to the COMMAND POSITION. (The cursor will not be blinking when at the exact taught point).
3. Press DELETE.
4. With servos enabled, press ENTER.

deleted address will renumber accordingly.

CAUTION!
Before running the job in PLAY mode, always confirm the edited path by first using FWD/BACK with desired Manual Speed, and secondly by using INTERLOCK+TEST START.
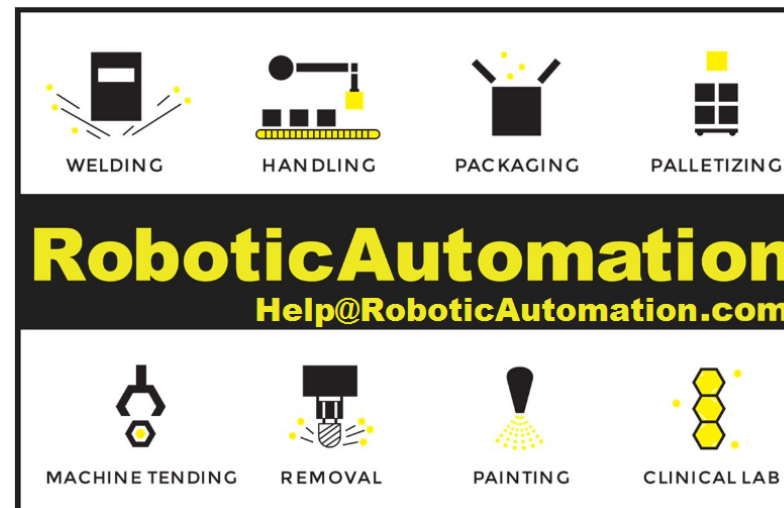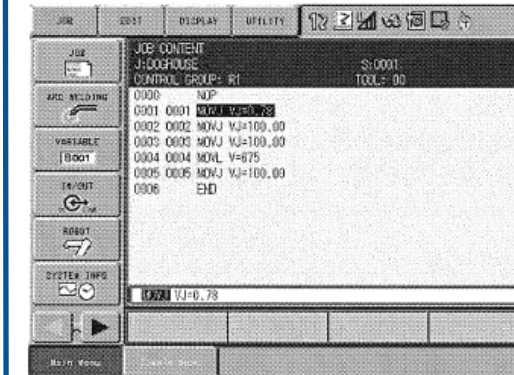

Changing Step Motion Type

The Motion Type of a step can be changed from the Instruction Side of a Job Content. When changing to/from MOVJ from/to MOVL, MOVC, or MOVS, the speed tag will adjust the units accordingly.

To change the Motion Type of a programmed step, perform the following:
1. In TEACH mode, select the Job Content to be edited. Cursor to the Instruction Side of the step to be modified. (The instruction appears in the Edit Buffer Line.)
2. Press SELECT to move the cursor to the Edit Buffer Line and highlight the Motion Type instruction.
3. Hold the SHIFT key and cursor up/down to choose the desired motion type.
4. Press ENTER.

CAUTION!
Changing the motion type of a step will alter the programmed path.

Always confirm the edited path by first using FWD/BACK with desired Manual Speed, and secondly by using INTERLOCK+TEST START.
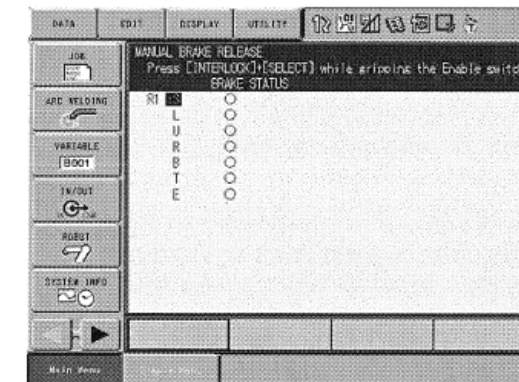
Manual Brake Release

Brakes may be manually released in the DX100 controller using the Programming Pendant. Brakes may be released one at a time while in Teach or Play Modes using the following keystrokes and procedures.

WARNING!
Insure all personnel are clear of the robot. When the brake release operation is performed the axis may fall or move in an unexpected direction. Only trained personnel should perform this operation.

To display the Manual Brake Release screen, complete the following:
1. From MAIN MENU, choose ROBOT.
2. Choose MANUAL BRAKE RELEASE.
3. Select YES.
4. Cursor UP or DOWN to select the desired axis.
5. Depress the ENABLE SWITCH to the middle position, while holding the INTERLOCK and SELECT KEY. The selected brake will be released as long as the ENABLE SWITCH INTERLOCK and SELECT KEYS are depressed.

To Cancel the Manual Brake Release screen, complete the following:

From MAIN MENU, choose any other menu to exit MANUAL BRAKE RELEASE Screen, and restore normal servos on operation.

RoboticAutomation
Help@RoboticAutomation.com

WELDING   HANDLING   PACKAGING   PALLETIZING

MACHINE TENDING   REMOVAL   PAINTING   CLINICAL LAB