## 3.13 ROBOT PAYLOAD SETTING

## 3.13.1 Overview

Robot payload is the weight of the robot end-of-arm tooling and workpiece. If you have not set up the proper robot payload during software installation, or if you need to change the robot payload because you have changed end-of-arm tooling or the workpiece, you must set robot payload.

#### Note

Be sure to set payload values as accurately as possible. The more accurate the values, the more effective features such as Collision Guard will be.

Note

More accurate values can also improve position accuracy and cycle time.

You can define up to ten different payload schedules. You can then specify a payload schedule by using the payload setup screens and by using the payload teach pendant program instructions. You can set up payload schedules from the MOTION PERFORMANCE screen.

Refer to <u>Section 8.23</u> for more information on the payload teach pendant program instructions.

## 3.13.2 Setting the Active Payload Schedule

You can set the active payload schedule:

- Manually (<u>Procedure 3.50 Manually Setting the Active Payload Schedule</u>)
- In a teach pendant instruction (<u>Procedure 3.51 Using Teach Pendant</u> Instructions to Set the Active Payload Schedule)

Refer to <u>Table 3.45 MOTION PERFORMANCE Screen Items</u> through <u>Table 3.48</u> <u>MOTION/ID POS1 ID Items</u> for information on each Payload screen item.

#### Table 3.45 MOTION PERFORMANCE Screen Items

| ITEM | DESCRIPTION                                     |
|------|---|
| No.  | This item displays the payload schedule number. |

| PAYLOAD[kg] | This item displays the payload in kilograms.                           |
|-------------|--|
| Comment     | This item displays any comments associated with each payload schedule. |

You can set up the payload schedule parameters from the MOTION/PAYLOAD SET screen.

## Table 3.46 MOTION/PAYLOAD SET Screen Items

| ITEM                                       | DESCRIPTION  |
|--|--|
| Schedule No [<br>]                         | This item displays the payload schedule number.  |
| PAYLOAD<br>Units: kg                       | This item is the weight of the end-of-arm tooling. <b>Note</b> : There are 2.21 pounds in a kilogram.  |
| PAYLOAD<br>CENTER X<br>Units: cm           | This item is the up and down offset of the payload center of gravity from the center of the faceplate. Positive (+) values are up. There are 0.39 inches per centimeter.   |
| PAYLOAD<br>CENTER Y<br>Units: cm           | This item is the side offset of the payload center of gravity from the center of the faceplate. Positive (+) values are to the right of the faceplate when viewed from behind the faceplate. There are 0.39 inches per centimeter. |
| PAYLOAD<br>CENTER Z<br>Units: cm           | This item is the offset of the payload center of gravity from the center of the faceplate. Positive (+) values are out from the faceplate. There are 0.39 inches per centimeter.   |
| PAYLOAD<br>INERTIA X<br>Units:<br>kgfcms^2 | This item is the moment of inertia of the payload around an axis parallel to<br>the X-direction for the tool frame and through the center of gravity of the<br>payload.  |
| PAYLOAD<br>INERTIA Y<br>Units:<br>kgfcms^2 | This item is the moment of inertia of the payload around an axis parallel to<br>the Y-direction for the tool frame and through the center of gravity of the<br>payload.  |
| PAYLOAD<br>INERTIA Z<br>Units:<br>kgfcms^2 | This item is the moment of inertia of the payload around an axis parallel to the Z-direction for the tool frame and through the center of gravity of the payload.  |

### Procedure 3.50 Manually Setting the Active Payload Schedule

#### Note

You cannot update payload values when a program is running or if the active schedule number is the same as the schedule you want to modify.

#### Conditions

- SRDY is on.
- No motion commands have been issued.
- \$PARAM\_GROUP[].\$MOUNT\_ANGLE has not been set.
- Robot mastering/calibration has been performed.

#### Steps

- 1. Press MENUS.
- 2. Select SYSTEM.
- 3. Press F1, [TYPE].
- 4. Select Motion. You will see a screen similar to the following.

| MOTION | I PERFORMANCE    |   |         |   |
|--------|------------------|---|---------|---|
| Group  | 1                |   |         |   |
| No.    | PAYLOAD[kg]      |   | Comment |   |
| 1      | 120.00           |   | [       | ] |
| 2      | 120.00           |   | [       | ] |
| 3      | 120.00           |   | [       | ] |
| 4      | 120.00           |   | [       | ] |
| 5      | 120.00           |   | [       | ] |
| б      | 120.00           |   | [       | ] |
| 7      | 120.00           |   | [       | ] |
| 8      | 120.00           |   | [       | ] |
| 9      | 120.00           |   | [       | ] |
| 10     | 120.00           |   | [       | ] |
| Active | e PAYLOAD number | = | 1       |   |

- 5. To set the active payload, you must do the following:
  - a. Press PREV until the payload schedule listing screen is displayed.
  - b. Press F5, SETIND.

#### Note

If you see the message, "Running program already exists," you will not be able to change the index. You cannot change the index when a teach pendant program is running. Check whether any teach pendant program is running and abort it, if possible. Then, repeat the step.

c.

d. Type the number of the payload schedule you want and press ENTER.

# Procedure 3.51 Using Teach Pendant Instructions to Set the Active Payload Schedule

#### Note

Some applications and the Collision Guard function require the proper setting of payload information. If the payload changes during your application, you must use the PAYLOAD[x] instruction to select the appropriate payload schedule.

#### Note

The PAYLOAD[x] instruction allows you to specify the *payload schedule* to use. You can specify up to 10 different sets of payload information. Each set of payload information corresponds to a schedule number.

#### Conditions

- You have set up the payload schedule that corresponds to the one you specify.
- For a multi-group application, you must use the PAYLOAD[GPx:y] instruction to select the appropriate payload schedule, y, for the specified motion group, x. Refer to <u>Section 8.23</u> for details on the PAYLOAD[GPx:y] instruction.

#### Steps

- 1. Edit the teach pendant program in which you want to include PAYLOAD instructions.
  - a. Press NEXT, until F2, [INST], is displayed then press F2, [INST].
  - b. Select Payload and press ENTER.
  - c. Select PAYLOAD[...] and press ENTER.
- 2. Type the value of the of the payload schedule:
  - Direct type a schedule number and press ENTER.
    - Indirect select INDIRECT, type a register number, and press ENTER.

## 3.13.3 Setup of Payload Schedules

There are two ways of setting the payload schedule parameters:

- **Manual entry** Refer to <u>Procedure 3.52 Manually Setting Robot Payload</u> <u>Schedule</u> for more details.
- Automatic estimation Refer to <u>Procedure 3.53 Automatic Payload</u> <u>Estimation</u> for more details.

#### Note

Automatic robot payload estimation is available for some robot models. If your robot model does not have the payload setting feature, the message, "IDENT is not supported to this robot," will be displayed when you press F2, IDENT.

٠

If you change any mechanical parts on the robot, such as a motor, you need to perform payload calibration before payload estimation.

If you do not want to perform payload estimation, but want to return the payload settings to the default values, you can reset them to the default values.

Table 3.47 MOTION/PAYLOAD ID Items lists the items on the Motion/Payload ID screen.

Table 3.48 MOTION/ID POS1 ID Items lists the items on the Motion/ID POS1 ID screen.

Use <u>Procedure 3.52 Manually Setting Robot Payload Schedule</u> to set up the Robot Payload Schedule.

#### Table 3.47 MOTION/PAYLOAD ID Items

| ITEM                  | DESCRIPTION  |
|-----------------------|--|
| PAYLOAD<br>ESTIMATION | This item allows you to estimate payload automatically.  |
| MASS IS KNOWN         | This item allows you to set whether or not the mass is known and the value, ranging from 0 to 999.99 kg. |
| CALIBRATION<br>MODE   | This item allows you to calibrate the robot.   |
| CALIBRATION<br>STATUS | This item indicates whether the robot has been calibrated.   |

### Table 3.48 MOTION/ID POS1 ID Items

| ITEM   | DESCRIPTION   |
|--|---|
| POSITION FOR<br>ESTIMATION   | This item can be changed, depending on whether you want to use POSITION1 or POSITION2 for estimation. |
| J5<br>Default: -90.000   | This item displays the J5 robot position.   |
| J6<br>Default: -90.000   | This item displays the J6 robot position.   |
| SPEED<br>Range: 1% - 100%<br>Low default: 1%<br>High default: 100% | This item displays the Low and High speeds.   |
| ACCEL<br>Range: 1% - 100%<br>Low default: 1%<br>High default: 100% | This item displays the Low and High acceleration rates.   |

## Procedure 3.52 Manually Setting Robot Payload Schedule

| Note  |
|---|
| You cannot update payload values when a program is running and<br>the active schedule number is the same as the schedule you want to<br>modify. |

## Conditions

- SRDY is on.
- No motion commands have been issued.
- \$PARAM\_GROUP[].\$MOUNT\_ANGLE has not been set.
- Robot mastering/calibration has been performed.
- The active payload schedule is set. Refer to Section 3.13.2.

## Steps

- 1. Press MENUS.
- 2. Select SYSTEM.
- 3. Press F1, [TYPE].
- 4. Select Motion. You will see a screen similar to the following.

```
MOTION PERFORMANCE
Group 1
No. PAYLOAD[kg]
                      Comment
       120.00
120.00
1
                       [
                                       ]
2
                       [
                                       ]
        120.00
120.00
120.00
3
                       [
                                       ]
                      [
4
                                       ]
                      [
5
                                       ]
        120.00
                      [
6
                                       ]
        120.00
                      [
7
                                       ]
8 120.00
9 120.00
10 120.00
                      [
                                       ]
                      [
                                       ]
                                        ]
                      ]
Active PAYLOAD number = 1
```

5. **To set up payload information manually** for the schedule you chose, move the cursor the payload schedule you want and press F3, DETAIL. You will see a screen similar to the following.

| MC | MOTION/PAYLOAD SET |           |            |        |  |
|----|--------------------|-----------|------------|--------|--|
| Gı | oup 1              |           |            |        |  |
| 1  | Schedule           | e No[ 1]: | [********* | *****] |  |
| 2  | PAYLOAD            |           | [kg]       | 120.00 |  |
| 3  | PAYLOAD            | CENTER X  | [cm]       | 30.00  |  |
| 4  | PAYLOAD            | CENTER Y  | [ cm ]     | 25.00  |  |
| 5  | PAYLOAD            | CENTER Z  | [cm]       | 25.00  |  |
| б  | PAYLOAD            | INERTIA X | [kgfcms^2] | 77.00  |  |
| 7  | PAYLOAD            | INERTIA Y | [kgfcms^2] | 306.00 |  |
| 8  | PAYLOAD            | INERTIA Z | [kgfcms^2] | 306.00 |  |

- a. **To display help** for the items on the screen, press F5, HELP. To display more information, use the arrow keys. When you are finished displaying help information, press PREV.
- b. To set the value, move the cursor to the items you want to set and set them as desired. When you set payload, you set the values of several items related to payload. Refer to <u>Table 3.49 SYSTEM</u> <u>Payload Screen</u> for a short description of the items you must set. Direction is relative to the robot tool frame with x, y, z, w, p, and r set to zero, and robot joint angles at the zero positions. Refer to <u>Figure 3.49 Inertia Equations</u> for additional equations used to calculate payload inertias.

#### Table 3.49 SYSTEM Payload Screen

| ITEM DESCRIPTION |
|------------------|
|------------------|

| ITEM   | DESCRIPTION  |
|--|--|
| Payload (kg)                                 | This item is the weight of the end-of-arm tooling. There are 2.21 pounds in a kilogram.  |
| Payload Center X<br>(cm)                     | This item is the up and down offset of the payload center of gravity from the center of the faceplate. Positive (+) values are up. There are 0.39 inches per centimeter.   |
| Payload Center Y<br>(cm)                     | This item is the side offset of the payload center of gravity from the center of the faceplate. Positive (+) values are to the right of the faceplate when viewed from behind the faceplate. There are 0.39 inches per centimeter. |
| Payload Center Z<br>(cm)                     | This item is the offset of the payload center of gravity from the center of the faceplate. Positive (+) values are out from the faceplate. There are 0.39 inches per centimeter.   |
| Payload Inertia X<br>(kgfcm s <sup>2</sup> ) | This item is the moment of inertia of the payload around an axis parallel to the X-direction for the tool frame and through the center of gravity of the payload.  |
| Payload Inertia Y<br>(kgfcms <sup>2</sup> )  | This item is the moment of inertia of the payload around an axis parallel to the Y-direction for the tool frame and through the center of gravity of the payload.  |
| Payload Inertia Z<br>(kgfcms <sup>2</sup> )  | This item is the moment of inertia of the payload around an axis parallel to the Z-direction for the tool frame and through the center of gravity of the payload.  |
| Arm load axis #1<br>(kg)                     | This item is the additional weight mounted to axis 1.  |
| Arm load axis #3<br>(kg)                     | This item is the additional weight mounted to axis 3.  |



Refer to <u>Figure 3.49 Inertia Equations</u> for inertia equations to use in calculating inertia.

#### **Figure 3.49 Inertia Equations**



- 6. **To select a different motion group**, press F2, GROUP, and specify the motion group you want.
- 7. **To select a different schedule number**, press F3, NUMBER, and enter the number of the payload schedule for which you want to set up payload information manually.
- 8. To set payload values to the default values set at FANUC Robotics, press and hold SHIFT and press F4, DEFAULT, and then perform one of the following:

- To confirm the change to the factory default values, press F4, YES.
- To cancel the default settings and return to the previous settings, press F4, NO.

#### **Procedure 3.53 Automatic Payload Estimation**

#### Note

You cannot update payload values when a program is running and the active schedule number is the same as the displayed schedule you want to modify.

#### Conditions

- SRDY is on.
- No motion commands have been issued.
- \$PARAM\_GROUP[].\$MOUNT\_ANGLE has not been set.
- Robot mastering/calibration has been performed.

#### Steps

- 1. Press MENUS.
- 2. Select SYSTEM.
- 3. Press F1, [TYPE].
- 4. Select Motion. You will see a screen similar to the following.

|   | MOTION PERFORMANCE |                |         |   |   |
|---|--------------------|----------------|---------|---|---|
|   | Group 2            | L              |         |   |   |
|   | No. H              | PAYLOAD[kg]    | Comment | 5 |   |
|   | 1                  | 120.00         | [       | ] |   |
|   | 2                  | 120.00         | [       | ] |   |
|   | 3                  | 120.00         | [       | ] |   |
|   | 4                  | 120.00         | [       | ] |   |
|   | 5                  | 120.00         | [       | ] |   |
|   | б                  | 120.00         | [       | ] |   |
|   | 7                  | 120.00         | [       | ] |   |
|   | 8                  | 120.00         | [       | ] |   |
|   | 9                  | 120.00         | [       | ] |   |
|   | 10                 | 120.00         | ]       | ] |   |
|   | Active             | PAYLOAD number | = 1     |   |   |
| ľ |                    |                |         |   | _ |

## Note

Automatic robot payload estimation is available for some robot models. If your robot model does not have the payload setting feature, the message, "IDENT is not supported to this robot," will be displayed when you press F2, IDENT. 6.

#### 7. To perform automatic payload estimation:

- a. Press PREV until the payload schedule listing screen is displayed.
- b. Press NEXT, >, and then press F2, IDENT. You will see a screen similar to the following.

```
MOTION/PAYLOAD ID
Group 1
1 PAYLOAD ESTIMATION
                                   * * * * * * * * * *
Previous Estimated value (Maximum)
Payload [Kg] : 0.00 ( 165.00)****
Axis Moment [Nm]

    J4:
    0.00E+00
    (9.02E+02)

    J5:
    0.00E+00
    (9.02E+02)

    J6:
    0.00E+00
    (4.41E+02)

J6:
                  0.00E+00 ( 4.41E+02)
Axis Inertia [Kgf cm^2]
J4: 0.00E+00 ( 8.82E+05)
                             ( 8.82E+05)
J5:
                  0.00E+00
J6: 0.00E+00 ( 4.41E+05)
2 MASS IS KNOWN [NO ] 165.000 [Kg]
3 CALIBRATION MODE
                                          [OFF]
4 CALIBRATION STATUS
```

- c. Check the calibration status:
  - If the status is DONE, continue to Step 7.
  - If the status is not DONE, you must perform payload calibration first. Refer to <u>Step 6</u>.
- 8. If calibration status is not DONE, perform the following steps for Payload Calibration:

#### Note

If the calibration values for the robot are known, they may be entered directly into the system variables. The values are entered at \$PLCL\_GRP [n] .\$TRQ\_MGN []. Set the proper values for each axis. When this is done, set \$PLCL\_GRP [n] .\$CALIB\_STAT=1.

9.

#### Note

If axis 5 or axis 6 motors are replaced, the robot must be recalibrated. To ensure that this is done, set \$PLCL\_GRP[n].\$CALIB\_STAT=0, when one of these motors are replaced. This will change the calibration status from DONE, back to \*\*\*\*. After calibration is completed, \$PLCL\_GRP[n].\$CALIB.STAT will be set to 1.

#### 10.

| Caution   |
|---|
| Do not use calibration data from a different robot.<br>Otherwise, estimation might become inaccurate. |

#### 11.

a. Make sure that the end-of-arm tooling is**not attached** to the robot arm.



#### b.

c. Jog the robot to the position of the calibration. The suggested position for calibration is the zero position for all axes.

#### Note

When the calibration is executed, the J5 and J6 axes move between POS1 and POS2, set on the ID POS1 and ID POS2 screens. Axes 1-4 will not move during calibration.

#### d.

- e. For calibration, the values of POS1 and POS2 must be set to the default.
- f. Press NEXT, >, and then press F4, DETAIL. You will see a screen similar to the following.

| MOD | DTION/ID POS1 |     |          |     |      |           |         |  |
|-----|---------------|-----|----------|-----|------|-----------|---------|--|
| Gro | oup 1         |     |          |     |      |           |         |  |
| 1   | POSITION      | for | ESTIMATI | ON  |      | PO        | SITION1 |  |
| J1  |               |     |          |     | <**  | * * * * * | * * * > |  |
| J2  |               |     |          |     | <**  | * * * * * | * * * > |  |
| J3  |               |     |          |     | <**  | * * * * * | ***>    |  |
| J4  |               |     |          |     | <**  | * * * * * | ***>    |  |
| 2   | J5            |     |          |     |      | < -       | 90.000> |  |
| 3   | JG            |     |          |     |      | < -       | 90.000> |  |
| J7  |               |     |          |     | <**  | * * * * * | * * * > |  |
| J8  |               |     |          |     | <**  | * * * * * | ***>    |  |
| J9  |               |     |          |     | <**  | * * * * * | ***>    |  |
| 4   | SPEED         |     | Low      | <   | 1%>  | High      | <100%>  |  |
| 5   | ACCEL         |     | Low      | <10 | 00%> | High      | <100%>  |  |

g. Press F3, DEFAULT.

Note Speed and accel must be set to DEFAULT. The default values are shown on the above screen.

h.

i. Press F2, POS2. You will see a screen similar to the following.

```
MOTION/ID POS2
Group 1
1 POSITION for ESTIMATION
                              POSITION2
                         <*******
J1
                         ~****
J2
                          ~****
J3
                          <********
J4
2 J5
                                90.000>
                            <
3 J6
                                90.000>
                            <
                         <*****
J7
                         <********
J8
J9
                         <********
4
   SPEED
                 Low < 1%> High <100%>
5
   ACCEL
                 Low
                     <100%>
                            High <100%>
```

- j. Press F3, DEFAULT.
- k. Press PREV until the PAYLOAD ID screen is displayed.
- I. Move the cursor to CALIBRATION MODE and press F4, ON.

#### Note

After calibration has been performed, CALIBRATION MODE automatically turns OFF.

m.

| Caution   |
|---|
| Do not change the CALIBRATION MODE during the calibration estimation process. Otherwise, the calibration will be incorrect or incomplete. |

n.

- o. Turn the teach pendant ON/OFF switch to OFF and release the DEADMAN switch.
- p. Move the cursor to Calibration Status.
- q. Press F4, EXEC. You will see a screen similar to the following.

| Robot mo<br>YES I | oves and estimates.<br>NO | Ready?     |                    |
|-------------------|---------------------------|------------|--------------------|
|                   | Warning                   |            |                    |
|                   | In the next step, the ro  | bot will m | ove. Make sure all |

personnel and unnecessary equipment are out of the workcell and that all safeguards are in place; otherwise, you could injure personnel or damage equipment.

s.

- t. Decide whether to run the calibration:
  - To run the calibration, press F4, YES.
  - To cancel the calibration, press F5, NO.

When the robot has stopped moving, the payload calibration has been completed and you can continue to payload estimation.

#### 12. Continue the automatic payload estimation:

a. Jog the robot to the position of the estimation.

| Caution   |
|---|
| If calibration status is not DONE, you must perform calibration ( <u>Step 6</u> ) before payload estimation. If you do not perform calibration first, the payload estimation will be incorrect. |

b.

**Note** When the estimation is executed, the J5 and J6 axes move between POS1 and POS2, set on the ID POS1 and ID POS2 screens, and the other axes keep the current positions. (<u>Step 7.f</u> and <u>Step 7.h</u>)

c.

#### Note

If the axis of J5 rotation is vertical (J4 is at  $\pm$ 90 degrees), the estimation cannot be done. Make sure that the axis of J5 rotation is as horizontal as possible.

- e. Press F3, NUMBER, and enter the number of the payload schedule for which you want to perform payload estimation.
- f. If the mass of the payload is known, move the cursor to MASS IS KNOWN, select YES, type the mass of the payload, and press ENTER.

#### Note

Specifying the value of the mass is recommended.

#### g.

- h. A good estimation needs the following conditions:
  - The range of J5 between POS1 and POS2 is 180 degrees.
  - The range of J6 between POS1 and POS2 is 180 degrees.
  - The x and/or y CG values of the payload to be estimated must be significant for the payload to be a viable candidate for estimation. If both the x and y values are near or at zero the estimation might be inaccurate. See <u>Figure 3.50 Valid Payload</u> <u>Configuration for Accurate Estimation</u> for more detail.

## Figure 3.50 Valid Payload Configuration for Accurate Estimation



• POS1 and POS2 are recommended to be set such that the (user-estimated) center of gravity (CG) will be on the plane formed by the axis of rotation of J5 and the axis or rotation of J6. See Figure 3.51 J5 and J6 Orientation for POS1.

Figure 3.51 J5 and J6 Orientation for POS1



i. Press NEXT, >, and then press F4, DETAIL. You will see a screen similar to the following.

| MOTION/ID POS1   |                        |
|------------------|------------------------|
| Group 1          |                        |
| 1 POSITION for B | ESTIMATION POSITION1   |
| J1               | <********              |
| J2               | <********              |
| J3               | <********              |
| J4               | <********              |
| 2 J5             | < -90.000>             |
| 3 J6             | < -90.000>             |
| J7               | <********              |
| J8               | <********              |
| J9               | <********              |
| 4 SPEED          | Low < 1%> High <100%>  |
| 5 ACCEL          | Low <100%> High <100%> |

- j. Perform**one** of the following:
  - Type the angle of each axis of POS1 (in degrees), or

- Jog axes J5 and J6 to the position you want to record as POS1 and press SHIFT and F5, RECORD, to record the J5 and J6 axis positions.
- k. Press F2, POS.2. You will see a screen similar to the following.

| MO  | MOTION/ID POS2 |     |          |     |      |           |         |
|-----|----------------|-----|----------|-----|------|-----------|---------|
| Gro | oup 1          |     |          |     |      |           |         |
| 1   | POSITION       | for | ESTIMATI | ION |      | PO        | SITION2 |
| J1  |                |     |          |     | <**  | * * * * * | ***>    |
| J2  |                |     |          |     | <**  | * * * * * | ***>    |
| J3  |                |     |          |     | <**  | * * * * * | ***>    |
| J4  |                |     |          |     | <**  | * * * * * | ***>    |
| 2   | J5             |     |          |     |      | <         | 90.000> |
| 3   | JG             |     |          |     |      | <         | 90.000> |
| J7  |                |     |          |     | <**  | * * * * * | ***>    |
| J8  |                |     |          |     | <**  | * * * * * | ***>    |
| J9  |                |     |          |     | <**  | * * * * * | ***>    |
| 4   | SPEED          |     | Low      | <   | 1%>  | High      | <100%>  |
| 5   | ACCEL          |     | Low      | <1  | 00%> | High      | <100%>  |

- I. Performone of the following:
  - Type the angle of each axis of POS2 (in degrees), or
  - Jog axes J5 and J6 to the position you want to record as POS2 and press SHIFT and F5, RECORD, to record the J5 and J6 axis positions.
- m. The high and low accel values (item 5 on the previous Motion/ID POS1 screen) can be modified, under certain conditions, to optimize estimation. If the actual mass of the payload is less than the maximum for the robot model, then refer to <u>Figure 3.52 Acceleration</u> <u>Equation</u> for the equation to calculate the new values.

#### Figure 3.52 Acceleration Equation

| Maximum Payload | х | 100 = Accel value (max 255) |
|-----------------|---|-----------------------------|
| Actual Payload  |   |                             |

- If calculated values exceed the maximum value of 255, set the values to 255. The high and low accel values must be set to the same number.
- If excessive vibration occurs during estimation, reduce the values and repeat the estimation. Continue to reduce the values until the vibration diminishes.
- n. Press PREV until the PAYLOAD ID screen is displayed.
- o. Turn the teach pendant ON/OFF switch to OFF and release the DEADMAN switch.

p. Press F4, EXEC. You will see a screen similar to the following.

```
Robot moves and estimates. Ready?
YES NO
```

| warning   |
|---|
| In the next step, the robot will move. Make sure all      |
| personnel and unnecessary equipment are out of the        |
| workcell and that all safeguards are in place; otherwise, |
| you could injure personnel or damage equipment.           |

r.

- s. Decide whether to run the payload estimation:
  - To run the estimation, press F4, YES.
  - To cancel the estimation, press F5, NO.

The robot will perform the estimation at the current robot position for axes 1 through 4. When the robot has stopped moving, the payload has been estimated and the screen will be updated to the new values.

#### Warning

Do not attempt to adjust the override while the robot performs the estimation. This will cause the results to be inaccurate.

t. Press F5, APPLY, to apply the estimated value to the payload schedule. You will see a screen similar to the following.

```
Path and Cycletime will change. Set it?
YES NO
```

| Warning  |
|--|
| Make sure that the payload schedule you define matches |
| the correct payload information before you continue;   |
| otherwise, the robot will not move the way you expect, |
| and could injure personnel or damage equipment.        |

۷.

- w. Decide whether to accept the estimated payload:
  - To accept the payload, press F4, YES.
    - To reject the payload, press F5, NO.

x. If the load is over the specification, you will see a screen similar to the following.

```
Load is OVER spec ! Accept ?
YES NO
```

- y. Decide whether to accept the estimated payload:
  - To accept the payload, press F4, YES.
    - To reject the payload, press F5, NO.
- 13. **To select a different motion group**, press F2, GROUP, and specify the motion group you want.

#### Note

If you see the message, "Running program already exists," you will not be able to change the index. You cannot change the index when a teach pendant program is running.

#### 14.

#### Note

If you have installed the Material Handling Shell option, the program MULTI\_IO.TP runs every time you turn on the controller. You cannot abort this program. To avoid getting this message, go to MENUS, SETUP, Shell Config. Set the Using Multiio task item to NO from YES and then turn off the controller and turn it on. After you have set the index and want to run MULTI\_IO.TP again, go back to the Shell Config screen, set NO to YES, and then cycle power again.

#### 15.

## 3.13.4 Setting Up Arm Load Information

<u>Table 3.50 MOTION/ARMLOAD SET Items</u> displays the items you can set up on the Motion/Armload screen.

Use Procedure 3.54 Arm Load Information to set up arm load information.

#### Table 3.50 MOTION/ARMLOAD SET Items

| ITEM                  | DESCRIPTION   |
|-----------------------|---|
| ARM LOAD AXIS #1 [kg] | This item is the additional weight mounted to axis 1. |

| Units: kg             |   |
|-----------------------|---|
| ARM LOAD AXIS #3 [kg] |   |
|                       | This item is the additional weight mounted to axis 3. |
| Units: kg             |   |

#### **Procedure 3.54 Arm Load Information**

#### Steps

1. **To set arm load information**, press PREV until the payload schedule listing screen is displayed, and press F4, ARMLOAD. You will see a screen similar to the following.

MOTION PERFORMANCE Group 1 1 ARM LOAD AXIS #1 [kg] 250.00 2 ARM LOAD AXIS #3 [kg] 20.00 Please power off/on after modification

- a. **To display help** for the items on the screen, press F5, HELP. To display more information, use the arrow keys. When you are finished displaying help information, press PREV.
- b. Move the cursor to the item you want to set and set it as desired.

#### Note

Arm load includes any additional weight, such as tooling that is mounted on robot axes.

c.

- 2. When you are finished setting all arm load payload information, CYCLE POWER.
  - a. Press FCTN.
  - b. Select CYCLE POWER, and press ENTER.
  - c. Select OK and press ENTER.