Chapter 1

OVERVIEW

Contents

1.1 OVERVIEW

Note Refer to the *Error Code Manual* for error code listings, causes, and remedies.

Errors occur because of

- Hardware problems - a broken cable or tooling
- Software problems - incorrect program or data
- External problems - an open safety door or an overtravel has occurred

Depending on the severity of the error, you must take certain steps to recover from it.

A complete listing of error codes is provided in the *Error Code Manual*. Use Procedure 1-1 as the recommended error recovery procedure.

Some errors require minimal corrective action to recover from them. Others require more involved procedures. The first step in the error recovery process is to determine the kind and severity of the error. After you determine this information, the appropriate error recovery procedure can be used.

Procedure 1-1 Error Recovery Recommendation

Conditions

- An error has occurred.

Steps

1. Determine the cause of the error.
2. Correct the problem which caused the error.
3. Release the error.
4. Restart the program or robot.

   If the basic recovery procedures do not clear the error, try restarting the controller. Refer to Table 1–1 for the methods of starting the controller. First try a Cold start. If Cold start does not solve the problem, try a Controlled start and then a Cold start. If the problem still exists, refer to the *Software Installation Manual* to reload software if necessary.

Table 1–1. Startup Methods

Start Method	Description	Procedure
Cold start (START COLD)	Initializes changes to system variables Initializes changes to I/O setup Displays the UTILITIES Hints screen	Turn the power disconnect circuit breaker to ON. When the BMON screen is displayed on the teach pendant, press and hold the SHIFT and RESET keys. After you see files beginning to load on the teach pendant screen, release all of the keys.
Controlled start (START CTRL)	Allows you to set up application specific information Allows you to install options and updates Allows you to save specific information Allows you to start KCL Allows you to print teach pendant screens and the current robot configuration Allows you to unsimulate all I/O Does not allow you to load teach pendant programs	Press FCTN and select CYCLE START, select YES, and press ENTER. When the BMON screen is displayed on the teach pendant, press and hold the PREV and NEXT keys. After the Configuration Menu screen is displayed, release the keys. Select Controlled start and press ENTER.

1.2 ERROR CODE PROPERTIES

1.2.1 Overview

An error code consists of:

- The facility name and error code number
- The severity of the error
- The message text of the error

Refer to Section 1.2.2 , Section 1.2.3 , and Section 1.2.4 .

The error code will be displayed as follows:

```
FACILITY_NAME - ERROR_CODE_NUMBER Error message text
```

The Alarm Log screen displays a list of errors that have occurred. There are two ways to display alarms:

- **Automatically** using the Active Alarm screen. This screen displays only active errors (with a severity other than WARN) that have occurred since the last time RESET was pressed.
- **Manually** using the History Alarm screen. This screen displays up to the last 100 alarms, regardless of their severity. You can also display detailed information about a specific alarm. Optionally, you can set up your system to store additional alarms in an alarm log called MD:errext.ls. If you have the Extended Alarm Log option installed and set up, then this file, stored on the MD: device, will display up to the last 1000 alarms. In this case, the alarms are numbered and contain the date, time, error message, cause code, and severity. Programming events will be displayed the same as error messages but will not have cause codes or severities.

  For information on setting up the Extended Alarm Log, refer to the *Software Installation Manual*.

Table 1–2 through Table 1–7 describe each kind of alarm that can be displayed.

Table 1–2. Alarm Log Screen

ITEM	DESCRIPTION
Alarm Status	This item allows you to monitor the entire list of active alarms. Press F3, HIST, to display the history of alarms.

Table 1–3. Application Alarm Screen

ITEM	DESCRIPTION
Application Alarm Status	This item allows you to monitor application alarms. Application alarms include anything that is related to the given application-specific tool that is loaded.

Table 1–4. Comm Log Screen

ITEM	DESCRIPTION
Comm Log Status	This item allows you to monitor any communication alarms when a communication option is loaded.

Table 1–5. Fault Recovery Screen

ITEM	DESCRIPTION
Fault Recovery Status	This item allows you to monitor fault recovery status.

Table 1–6. Motion Alarm Screen

ITEM	DESCRIPTION
Motion Alarm Status	This item allows you to monitor the Motion Alarm screen status such as, SRVO alarms or any other alarms related to robot movement.

Table 1–7. System Alarm Screen

ITEM	DESCRIPTION
System Alarm Status	This item allows you to monitor system alarm messages such as SYST alarms.

Use Procedure 1-2 to display the Alarm Log screen.

Procedure 1-2 Displaying the Alarm Log Automatically

Conditions

- To display the Active Alarm screen automatically,
  - — Set the system variable $ER_AUTO_ENB to TRUE either on the SYSTEM Variables menu or by setting Auto display of alarm menu to TRUE on the SYSTEM Configuration menu. Then perform a Cold start.
  - — An error, whose severity is either PAUSE or ABORT must have occurred.

Steps

1. The following screen will automatically be displayed. It lists all errors with a severity other than WARN, that have occurred since the last controller RESET. The most recent error is number 1.

```
SRVO-007 External emergency stop
TEST1           LINE 15           ABORTED
Alarm: ACTIVE
1 SRVO-007 External emergency stop
```

2. To toggle between the Active Alarm screen and Hist Alarm screen, press F3 (ACTIVE or HIST).
3. If you are using an *i*Pendant and are in Single Display Mode, you can toggle between wide screen and normal screen. Press F2, [VIEW] and select Wide or Normal.
4. To disable the automatic display of all errors with a certain severity type, modify the value of the system variable $ER_SEV_NOAUTO[1-5]. These errors will still be logged in the Active Alarm screen, but they will no longer force the screen to immediately become visible. Refer to the *Software Reference Manual* for more detailed information about how to set these variables.
5. To disable the automatic display of a specific error code, modify the $ER_NOAUTO.$noalm_num and $ER_NOAUTO.$er_code system variables. These errors will still be logged in the Active Alarm screen, but they will no longer force the screen to immediately become visible. Refer to the *Software Reference Manual* for more detailed information about how to set these variables.
6. To display the screen that occurred immediately before the alarm, press RESET. If you have toggled between HIST and ACTIVE, the previous screen might not be available.

When there are no active alarms (the system is not in error status), the following message will be displayed on the Active Alarm screen.

```
There are no active alarms.
Press F3(HIST) to enter alarm history screen.
```

Note When you reset the system by pressing the RESET key, the alarms displayed on this screen are cleared.

Procedure 1-3 Displaying the Alarm Log Manually

Steps

1. Press MENU.
2. Press ALARM.
3. Press F3, HIST.
4. Press F1, [TYPE].
5. Select Alarm Log. The alarm log will be displayed. This lists all errors. See the following screen for an example.

```
SRVO-007 External emergency stop
TEST1          LINE 15         ABORTED
Alarm: HIST
1 SRVO-007 External emergency stop
2 SRVO-001 Operator panel emergency st
3 R E S E T
4 SRVO-029 Robot calibrated (Group:1)
5 SRVO-001 Operator panel emergency st
6 SRVO-012 Power fail recovery
7 INTP-127 Power fail detected
8 SRVO-047 LVAL alarm (Group:1 Axis:5)
9 SRVO-047 LVAL alarm (Group:1 Axis:4)
10 SRVO-002 Teach pendant emergency stop
```

Note The most recent error is number 1.

- To display the complete error message that does not fit on the screen, press F5, DETAIL, and the right arrow key on the teach pendant.

- To display the cause code for an error message, press F5, DETAIL. Cause codes provide further information about the cause of the error. If the specified error has a cause code, the cause code message is displayed immediately below the error line, on the status line. When you press RESET, the error and cause code disappears and the status line is redisplayed.

6. **To display the motion log**, which lists only motion-related errors, press F1, [TYPE], and select Motion Log.
7. **To display the system log**, which displays only system errors, press F1, [TYPE], and select System Log.
8. **To display the application log**, which displays only application-specific errors, press F1, [TYPE], and select Appl Log.
9. **The Fault and Incident Reporting option displays the reporting log. The reporting log displays the top five alarms that occurred while the robot was in Auto mode** , press F1, [TYPE], and select Reporting.

    1. **To view the top five faults by incident**, press F2, INCIDENT.
    2. **To view the top five faults by total asserted time**, press F3, T_TIME.
    3. **To view the top five faults by longest asserted time** for any given fault, press F4, L_TIME.

10. **To display the communication log**, which displays only communication-specific errors, press F1, [TYPE], and select Comm Log.
11. **To display the password log**, which displays only password-specific errors, press F1, [TYPE], and select Password Log.
12. **To display more information about an error**, move the cursor to the error and press F5, DETAIL. The error detail screen displays information specific to the error you selected, including the severity. If the error has a cause code, the cause code message will be displayed. When you are finished viewing the information, press PREV.
13. **To display cause and remedy information specific to an error,** move the cursor to the error and press SHIFT and the Help/Diag button on the *i*Pendant.
14. **To remove all of the error messages displayed on the screen**, press and hold SHIFT and press F4, CLEAR.
15. To change the view displayed on the screen, press F2, [VIEW]. To show or hide the cause codes for each alarm, select Show Cause or Hide Cause. If an alarm has no cause code, the time the alarm occurred will be shown instead. If you are using an *i*Pendant and are in Single Display Mode, you can also toggle between wide screen and normal screen by selecting Wide or Normal.

1.2.2 Facility Name and Code

The facility name and code identify the type of error that occurred. Facility information is displayed at the beginning of the error code:

```
PROG-048 PAUSE Shift released while running
```

In the example, the facility name PROG corresponds to facility code 3. The error code number is 048. Facility codes are used in error handling from a KAREL program. The facility codes are listed in Table 1–8 .

Table 1–8. Error Facility Codes

Facility Name	Facility Code (Decimal)	Facility Code (Hexadecimal)	Description
ACAL	112	0x70	AccuCal II error code
APSH	38	0x26	Application shell
ARC	53	0x35	Arc welding application
ASBN	22	0x16	Mnemonic editor
ATGP	102	0x66	Attach gro lead through and force control
ATZN	138	0x8A	Autozone
BBOX	118	0x76	Position BumpBox
BRCH	144	0x90	Brake Check
CALM	106	0x6A	CalMate
CD	82	0x52	Coordinated motion softpart
CMND	42	0x2A	Command processor
CNTR	73	0x49	Continuous turn softpart
COND	4	0x4	Condition handler
COPT	37	0x25	Common options
CPMO	114	0x72	Constant Path error code
CUST	97	0x61	Customer specific errors
CVIS	117	0x75	Integrated Vision (Controller Vision)
DIAG	148	0x94	iRDiagnostics
DICT	33	0x21	Dictionary processor
DJOG	64	0x40	Detached jog

Table 1–8. Error Facility Codes (Cont'd)

Facility Name	Facility Code (Decimal)	Facility Code (Hexadecimal)	Description
DMDR	84	0x54	Dual Motion Drive
DMER	40	0x28	Data monitor
DNET	76	0x4C	DeviceNet
DTBR	149	0x95	Data Transfer Between Robots
DX	72	0x48	Delta Tool/Frame softpart
ELOG	5	0x5	Error logger
FILE	2	0x2	File system
FLPY	10	0xA	Serial floppy disk system
FRCE	91	0x5B	Impedance control (force control)
FRSY	85	0x55	Flash file system
FXTL	136	0x88	C-flex tool
HOST	67	0x43	Host communications general
HRTL	66	0x42	Host communications run time library
IBSS	88	0x58	Interbus-S
ICRZ	124	0x7C	IC RailZone
IFPN	153	0x99	Interface Panel
INTP	12	0xC	Interpreter internal errors
IRPK	127	0x7F	iRPickTool
ISD	39	0x27	ISD (Integral Servo Dispenser)
ISDT	95	0x5f	Integral Servo Driven Tool
JOG	19	0x13	Manual jog task
KALM	122	0x7A	KAREL Alarm

Table 1–8. Error Facility Codes (Cont'd)

Facility Name	Facility Code (Decimal)	Facility Code (Hexadecimal)	Description
LANG	21	0x15	Language utility
LECO	109	0x6D	Arc errors from Lincoln Electric
LNTK	44	0x2C	Line tracking
LSTP	108	0x6C	Local Stop error codes
MACR	57	0x39	MACRO option
MARL	83	0x53	Material removal
MASI	147	0x93	Multi-Arm Sync Instructions
MCTL	6	0x6	Motion control manager
MEMO	7	0x7	Memory manager
MENT	68	0x44	ME-NET
MHND	41	0x29	Material Handling shell and menus
MOTN	15	0xF	Motion subsystem
MUPS	48	0x30	Multi-pass motion
NCBN	150	0x96	NC to Bin Conversion
OPTN	65	0x41	Option installation
OS	0	0x0	Operating system
PALL	115	0x73	PalletTool
PALT	26	0x1A	Palletizing application
PICK	132	0x84	PickTool
PMON	28	0x1C	PC monitor
PNT1	86	0x56	Paint Application Errors POST V6.31
PNT2	137	0x89	PaintTool Application Errors #2
PRIO	13	0xD	Digital I/O subsystem

Table 1–8. Error Facility Codes (Cont'd)

Facility Name	Facility Code (Decimal)	Facility Code (Hexadecimal)	Description
PROC	146	0x92	Process Logger
PROF	92	0x5C	Profibus DP
PROG	3	0x3	Interpreter
PTPG	140	0x8C	Paint Plug-In
PWD	31	0x1F	Password logging
QMGR	61	0x3D	KAREL queue manager
RIPE	130	0x82	Ros IP errors
ROUT	17	0x11	Softpart built-in routine for interpreter
RPC	93	0x5D	RPC
RPM	43	0x2B	Root Pass Memorization
RRMC	126	0x7E	Redundant Robot Motion Control
RTCP	89	0x59	Remote TCP
SCIO	25	0x19	Syntax checking for teach pendant programs
SDTL	123	0x7B	System Design Tool
SEAL	51	0x33	Sealing application
SENC	143	0x8F	Secondary Encoder
SENS	58	0x3A	Sensor interface
SHAP	79	0x4F	Shape generation
SPOT	23	0x17	Spot welding application
SPRM	131	0x83	Ramp motion softpart
SRIO	1	0x1	Serial driver
SRVO	11	0xB	FLTR and SERVO in motion sub-system
SSPC	69	0x45	Special space checking function
SVGN	30	0x1E	Servo weld gun application

Table 1–8. Error Facility Codes (Cont'd)

Facility Name	Facility Code (Decimal)	Facility Code (Hexadecimal)	Description
SYST	24	0x18	Facility code of system
TAST	47	0x2F	Through-Arc Seam Tracking
TCPP	46	0x2E	TCP speed prediction
TG	90	0x5A	Triggering accuracy
THSR	60	0x3C	Touch Sensing softpart
TJOG	116	0x74	Tracking Jog
TMAT	119	0x77	Torch Mate
TOOL	29	0x1D	Servo tool change
TPIF	9	0x9	Teach pendant user interface
TRAK	54	0x36	Tracking softpart
TRSV	134	0x86	Tray server task error text
VARS	16	0x10	Variable Manager Subsystem
WEAV	45	0x2D	Weaving
WNDW	18	0x12	Window I/O manager sub-system
XMLF	129	0x81	XML errors

1.2.3 Severity Descriptions

The severity of the error indicates how serious the error is. The severity is displayed after the error number. For example:

```
PROG-048 PAUSE Shift released while running
```

Note You can display the severity of the error code on the ALARM screen. Refer to Procedure 1-2 .

$ER_SEV_NOAUTO[1-5] System Variable

The $ER_SEV_NOAUTO[1-5] system variable enables or disables the automatic display of all error codes with a particular *severity.* This is used in conjunction with the $ER_AUTO_ENB system variable.

Table 1–9. Severity Descriptions

SEVERITY	$ER_SEV_NOAUTO[1-5]
PAUSE	[1]
STOP	[2]
SERVO	[3]
ABORT	[4]
SYSTEM	[5]

WARN

WARN errors only warn of potential problems or unexpected circumstances. They do not directly affect any operations that might be in progress. If a WARN error occurs, you should determine what caused the error and what, if any, actions should be taken.

For example, the WARN error **Singularity position** indicates a singularity position was encountered during a move. No action is required. However, if you do not want the motion to encounter a singularity position, you can reteach the program positions.

PAUSE

PAUSE errors pause program execution but allow the robot to complete its current motion segment, if any are in progress. This error typically indicates that some action must be taken before program execution can be resumed. PAUSE errors cause the operator panel FAULT light to go on and the teach pendant FAULT LED to go on.

Depending on the action that is required, you might be able to resume a paused program at the point where the PAUSE error occurred after you have corrected the error condition. If the program can be resumed, you can either select the RESUME function key or press the operator CYCLE START button, or press the UOP CYCLE START button if the setting of the REMOTE/LOCAL setup item on the System Configuration menu is set to LOCAL.

STOP

STOP errors pause program execution and stop robot motion. When a motion is stopped, the robot decelerates to a stop and any remaining part of the current motion segment is saved, meaning the motion can be resumed. STOP errors usually indicate that some action must be taken before the motion and program execution can be resumed.

Depending on the action that is required, you might be able to resume the motion and program execution after correcting the error condition. If the motion and program can be resumed, you can either select the RESUME function key or press the operator CYCLE START button if the setting of the REMOTE/LOCAL setup item on the System Configuration menu is set to LOCAL. If the robot is in production mode, you must choose the appropriate recovery option.

SERVO

SERVO errors shut off the drive power to the servo system and pause program execution. SERVO errors cause the operator panel FAULT light to go on and the teach pendant FAULT LED to go on.

SERVO errors are usually caused by hardware problems and could require trained service personnel. However, some SERVO errors require you to reset the servo system by pressing the operator panel FAULT RESET button or the teach pendant RESET key. Others require a Cold start of the controller.

ABORT

ABORT errors abort program execution and STOP robot motion. When an ABORT error occurs, the robot decelerates to a STOP and the remainder of the motion is canceled. An ABORT error indicates that the program has a problem that is severe enough to prevent it from continuing to run.

You will need to correct the problem and then restart the program. Depending on the error, correcting the problem might mean editing the program or modifying the data.

SYSTEM

SYSTEM errors usually indicate a system problem exists that is severe enough to prevent any further operation. The problem could be hardware or software related.

You will need the assistance of trained service personnel to correct SYSTEM errors. After the error has been corrected, you will need to reset the system by turning off the robot, waiting a few seconds, and turning on the robot.

If a program was executing when the error occurred, you will need to restart the program.

NONE

NONE errors can be returned as status from some KAREL built-in routines and can also be used to trigger KAREL condition handlers. NONE errors are not displayed on the teach pendant or CRT/KB. They also are not displayed on the alarm log screen. NONE errors do not have any effect on programs, robot motion, or servo motors.

Table 1–10 summarizes the effects of error severities.

Table 1–10. Effects of Error Severity

Severity	Program	Robot Motion	Servo Motors
WARN	No effect	No effect	No effect
PAUSE	Paused	The current move is completed then the robot stops.	No effect
STOP	Paused	Decelerated STOP, motion retained	No effect

Table 1–10. Effects of Error Severity (Cont'd)

Severity	Program	Robot Motion	Servo Motors
SERVO	Paused	Decelerated STOP, motion retained	Power shutdown
ABORT	Aborted	EMERGENCY STOP, motion canceled	No effect
SYSTEM	Aborted	EMERGENCY STOP, motion canceled	Power shut down Requires a FCTN:CYCLE POWER
NONE	No effect	No effect	No effect

1.2.4 Error Message Text

The message text describes the error that has occurred. Message text is displayed at the end of the error code. For example:

```
PROG-048 PAUSE Shift released while running
```

Some error messages might contain cause codes, or percent (%) notation. For more information on displaying cause codes, refer to Procedure 1-2 .

Percent Notation (%)

A percent sign followed by the letter *s* (%s) indicates that a string, representing a program name, file name, or variable name, actually appears in the error message when the error occurs.

A percent sign followed by the letter *d* (%d) indicates that an integer, representing a program line number or other numeric value, actually appears in the error message when the error occurs.

For example:

```
INTP-327 ABORT (%^s, %d^5) Open file failed
```

When this error occurs, the actual name of the file that could not be opened will appear on the teach pendant error line instead of %s. The actual program line number on which that error occurred will appear on the teach pendant error line instead of %d.