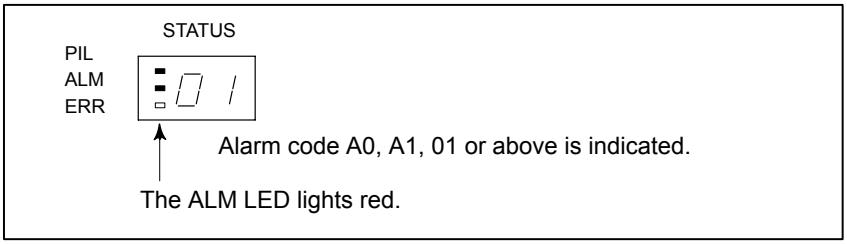
3.4 SPINDLE AMPLIFIER MODULE

If an alarm occurs in the spindle amplifier module, the ALM LED lights red in the STATUS display, and the two–digit 7–segment LEDs indicate the alarm code.



3.4.1 Alarm A0, A1

(1) Meaning

The control program is not running.

(2) Cause and corrective action

(a) ROM installed improperly or yet to be installed

Make sure that the ROM is attached properly to the socket and there is no imperfect contact due to a broken or bent pin.

⇒ Install the ROM properly.

(b) Incorrect ROM installed

The series number of the software is printed on the ROM package and is displayed at power–on. See Section 4.3.3 of Part I.

⇒ Replace it with the correct ROM.

(c) Printed–circuit board defective

⇒ Replace it with a normal printed circuit board.

3.4.2 Alarm AL–01

(1) Meaning

The temperature inside the motor is higher than the rating.

(2) Cause and corrective action

(a) Over loaded operation

Check the cutting conditions, the state of the cutting tool, and the load meter reading during cutting.

⇒ Examine the cutting conditions and the tool.

(b) The cooling fan inside the motor is defective.

Check whether the cooling fan rotates smoothly.

⇒ Replace the cooling fan.

(c) The motor cooling system is dirty.

⇒ Clean the cooling system with a vacuum cleaner or the factory air blower.

(d) Motor overheat signal wire discontinued or loosely connected

Check the motor overheat signal wire for secure connection.

⇒ Connect the signal wire properly.

(e) Invalid detector parameter setting

Check the detector and its parameters.

⇒ Set the parameters that match the detector correctly.

(f) Motor or thermostat defective

⇒ Replace the motor.

3.4.3 Alarm AL–02

(1) Meaning

The actual motor speed is largely deviated from the commanded speed.

(2) Cause and corrective action

(a) Over loaded operation or too heavy load
Check the load meter to see if the load is too heavy.
⇒ Examine the cutting conditions and the tool again.

(b) Abnormal power line connect
Check the power line for disconnection or poor contact.
⇒ Connect the power line properly.

(c) Incorrect acceleration/deceleration duration parameter setting
Check the parameter setting and the actual acceleration / deceleration duration.

FS0	FS15	FS16/18, PM–D/F	Description
6582	3082	4082	Acceleration/deceleration duration setting

⇒ Set the parameter with a value somewhat greater (margin) than the required acceleration/deceleration duration.

(d) Incorrect speed detector parameter setting
Check the parameter setting and the speed detector.

FS0	FS15	FS16/18, PM–D/F	Description
6511 #2, 1, 0	3011 #2, 1, 0	4011 #2, 1, 0	Speed detector setting

⇒ Set the parameter correctly according to the speed detector.

(e) IGBT module/IPM defective
Replace the IGBT module/IPM.

(f) Speed feedback signal faulty
Check the speed feedback signal level.
⇒ Check the speed detector. Also check the signal cable for continuity.

3.4.4 Alarm AL–03

(1) Meaning

The fuse at the DC link has blown.

(2) Cause and corrective action

(a) Overcurrent flowed in the main circuit.
Check the IGBT module/IPM. If the IGBT module/IPM is defective, it allows overcurrent to flow in the main circuit.
⇒ Replace the fuse and/or IGBT module/IPM.

3.4.5 Alarm AL–07

(1) Meaning

The actual motor speed exceeded 115% of the maximum allowable motor speed (standard parameter setting).

Cause and corrective action

(a) Incorrect speed detector parameter setting

Check the parameter setting and the speed detector.

FS0	FS15	FS16/18, PM–D/F	Description
6511 #2, 1, 0	3011 #2, 1, 0	4011 #2, 1, 0	Speed detector setting

⇒ Set the parameter correctly according to the speed detector.

3.4.6 Alarm AL–09

(1) Meaning

The temperature of the main circuit heat sink has risen abnormally.

(2) Cause and corrective action

(a) Cooling fan defective

Check whether the cooling fan rotates smoothly.

⇒ Replace the cooling fan.

(b) Overloaded operation

Check the load meter to see if the load is too heavy.

⇒ Examine the cutting conditions again.

(c) Cooling fan clogged

⇒ Clean the cooling fan with a vacuum cleaner or the factory air blower.

3.4.7 Alarm AL–12

(1) Meaning

Excessive current flowed in the DC section (DC link) of the main circuit.

The main circuit power module (IPM) detected an error.

(2) Cause and corrective action

(a) Short–circuit between the amplifier output terminals or inside the motor

Check the power line connection for a short–circuit.

⇒ Make a correct connection. Replace the motor if it is defective.

(b) IGBT (or IPM) defective

Replace the IGBT (or IPM).

(c) Printed–circuit board defective

⇒ Replace the printed circuit board.

(d) Incorrect model–specific parameters.

Check the model–specific parameter settings with the model – specific parameter list.

⇒ Set the parameters with the values that match the motor used.

3.4.8 Alarm AL–13

(1) Meaning

The memory inside the CPU is abnormal. It is checked when power is switched on.

(2) Cause and corrective action

(a) Printed–circuit board defective

⇒ Replace the printed circuit board.

3.4.9 Alarm AL–15

(1) Meaning

A sequence of switching operations was incorrect during speed range switching control or spindle switching control.

Cause and corrective action

(a) Switching unit (magnetic contactor for power line switching) defective

Check the operation of the switching unit.

⇒ Replace the switching unit.

(b) Loose contact of the magnetic contactor state signal (auxiliary contact signal)

Make sure that the magnetic contactor state signal is switched properly.

⇒ Connect the magnetic contactor correctly.

(c) Improper sequence

⇒ Adjust the switching unit for the correct sequence.

3.4.10 Alarm AL–16

(1) Meaning

The memory (RAM) is abnormal. It is checked when power is switched on.

(2) Cause and corrective action

(a) Printed–circuit board defective

⇒ Replace the printed–circuit board.

3.4.11 Alarm AL–19

(1) Meaning

The offset voltage for the phase U current detection circuit is too high. This check is made when power is switched on.

(2) Cause and corrective action

(a) Loose contact of the printed–circuit board

Check that the printed–circuit board is connected to the power circuit securely.

⇒ Connect the printed–circuit board securely.

(b) Phase U current detection circuit defective.

⇒ Replace the printed–circuit board.

(c) A/D converter defective

⇒ Replace the printed–circuit board.

3.4.12 Alarm AL–20

(1) Meaning

The offset voltage for the phase V current detection circuit is too high. This check is made when power is switched on.

(2) Cause and corrective action

(a) Loose contact of the printed–circuit board

Check that the printed–circuit board is connected to the power circuit securely.

⇒ Connect the printed–circuit board securely.

(b) Phase V current detection circuit defective.

⇒ Replace the printed–circuit board.

3.4.13 Alarm AL–24

(1) Meaning

The serial communication data between the CNC and spindle amplifier is abnormal. (This alarm occurs also when the CNC power is switched off.)

(2) Cause and corrective action

(a) The CNC power is off.
⇒ Switch on the CNC power.

(b) Serial communication cable defective
Check the connection of the cable. Also check for a broken wire.
⇒ Connect the cable correctly. If any wire in the cable is broken, replace it.

(c) Serial communication LSI chip defective
⇒ Replace the LSI chip or the printed–circuit board with the LSI on it.

(d) I/O link adapter defective (if used)
⇒ Replace the I/O link adapter.

3.4.14 Alarm AL–25

(1) Meaning

Serial communication between the CNC and the spindle amplifier has stopped.

(2) Cause and corrective action

(a) Serial communication cable defective
Check the connection of the cable. Also check for a broken wire.
⇒ Connect the cable correctly. If any wire in the cable is broken, replace it.

(b) Serial communication LSI chip defective
⇒ Replace the printed–circuit board.

3.4.15 Alarm AL–26

(1) Meaning

The Cs contouring control speed detection signal (detector on the motor side) is abnormal.

(2) Cause and corrective action

(a) Feedback signal cable defective
Check the connection of the cable. Also check for a broken wire.
⇒ Connect the cable correctly. If any wire in the cable is broken, replace it.

(b) Feedback signal level insufficient
Check the feedback signal level with an oscilloscope.
⇒ Adjust so that the feedback signal level becomes the rated value.

(c) Feedback signal cable not shielded properly (circuit malfunction due to noise)
Check whether the cable is shielded properly.
⇒ Shield it correctly.

(d) Detection circuit defective
⇒ Replace the printed–circuit board.
(e) Incorrect parameter setting
Check the parameter setting for use of the Cs contouring control detector.

FS0	FS15	FS16/18, PM–D/F	Description
6511#5	3011#5	4011#5	Parameter set to specify use of the Cs contouring control detector

⇒ Set the parameter correctly according to the detector used.

3.4.16 Alarm AL–27

(1) Meaning

Position coder signal error

Cause and corrective action

(a) Feedback signal cable defective
Check the connection of the cable. Also check for a broken wire.
⇒ Connect the cable correctly. If any wire in the cable is broken, replace it.
(b) Position coder defective
Check the position coder signal.
⇒ Replace the position coder.
(c) Feedback signal level insufficient (for built–in sensor or the high–resolution magnetic pulse coder)
Check the feedback signal level with an oscilloscope.
⇒ Adjust so that the feedback signal level becomes the rated value.
(d) Feedback signal cable not shielded properly (circuit malfunction due to noise)
Check whether the cable is shielded properly.
⇒ Shield it correctly.
(e) Detection circuit defective
⇒ Replace the printed–circuit board.
(f) Incorrect parameter setting
Check the parameter set to specify use of the Cs contouring control detector.

FS0	FS15	FS16/18, PM–D/F	Description
6501#2	3001#2	4001#2	Parameter set to specify use of the Cs contouring control detector

⇒ Set the parameter correctly according to the detector used.

3.4.17 Alarm AL–28

(1) Meaning

The Cs contouring control speed detection signal (detector on the spindle side) is abnormal.

(2) Cause and corrective action

(a) Feedback signal cable defective

Check the connection of the cable. Also check for a broken wire.

⇒ Connect the cable correctly. If any wire in the cable is broken, replace it

(b) Feedback signal level insufficient

Check the feedback signal level with an oscilloscope.

⇒ Adjust so that the feedback signal level becomes the rated value.

(c) Feedback signal cable not shielded properly (circuit malfunction due to noise)

Check whether the cable is shielded properly.

⇒ Shield it correctly.

(d) Detection circuit defective

⇒ Replace the printed–circuit board.

(e) Incorrect parameter setting

Check the parameter set to specify use of the Cs contouring control detector.

FS0	FS15	FS16/18, PM–D/F	Description
6501#2	3001#2	4001#2	Parameter set to specify use of the Cs contouring control detector

⇒ Set the parameter correctly.

3.4.18 Alarm AL–29

(1) Meaning

Excessive load (at least 90% of the maximum output as set initially by a parameter) was applied continuously for a certain period (30 seconds as set initially by a parameter).

(2) Cause and corrective action

(a) Overloaded operation, or too heavy load

Check the load meter to see if the load is too heavy.

⇒ Examine the cutting conditions and the tool again.

3.4.19 Alarm AL–31

(1) Meaning

The motor cannot rotate at a specified speed. It rotates at very low speed, or even stops.

(2) Cause and corrective action

(a) Motor locked

Check whether the motor cannot accelerate because it is physically locked.

⇒ Remove the cause.

(b) Motor speed feedback cable defective

Check the connection of the cable. Also check for a broken wire.

⇒ Connect the cable correctly. If any wire in the cable is broken, replace it

(c) Motor speed feedback signal abnormal
Check the speed feedback signal with an oscilloscope.
⇒ Adjust so that the feedback signal level becomes the rated value.

(d) Incorrect power line wire connection
Check the connection of the power line wires (for phase order, etc.)
⇒ Connect the power line correctly.

3.4.20 Alarm AL–32

(1) Meaning

The memory in the serial communication LSI chip is abnormal. It is checked when power is turned on.

(2) Cause and corrective action

(a) LSI chip defective
⇒ Replace the printed–circuit board.

3.4.21 Alarm AL–34

(1) Meaning

The parameter setting is invalid.

(2) Cause and corrective action

(a) Incorrect parameter setting
Check the parameter setting
⇒ Set the parameter with a valid value.

3.4.22 Alarm AL–35

(1) Meaning

The value set in the gear ratio data parameter is greater than the limit allowed in the internal processing.

(2) Cause and corrective action

(a) Incorrect gear ratio parameter setting
Check whether the specified gear ratio is too high.

FS0	FS15	FS16/18, PM–D/F	Description
6556 to 6559	3056 to 3059	4056 to 4059	Spindle–to–motor gear ratio

⇒ Use the appropriate value.

3.4.23 Alarm AL–36

(1) Meaning

The error counter overflowed.

(2) Cause and corrective action

(a) Incorrect parameter setting
Check whether the values set in the gear ratio and position gain parameters are too large.

FS0	FS15	FS16/18, PM–D/F	Description
6556 to 6559	3056 to 3059	4056 to 4059	Spindle–to–motor gear ratio data
6560 to 6563	3060 to 3063	4060 to 4063	Position gain during orientation
6565 to 6568	3065 to 3068	4065 to 4068	Position gain during servo mode/synchronization control of the spindle
6569 to 6572	3069 to 3072	4069 to 4072	Position gain during Cs contouring control

⇒ Use the appropriate values.

3.4.24 Alarm AL–37

(1) Meaning

When an emergency stop signal was entered, the motor did not decelerate, rather accelerate, or the motor was kept excited even after acceleration/deceleration duration (10 seconds as set initially by a parameter).

(2) Cause and corrective action

(a) Incorrect speed detector parameter setting

Check the parameter setting and the speed detector.

FS0	FS15	FS16/18, PM–D/F	Description
6511 #2, 1, 0	3011 #2, 1, 0	4011 #2, 1, 0	Speed detector setting

⇒ Set the parameter to the value that matches the speed detector used.

(b) Incorrect acceleration/deceleration duration parameter setting

Check the parameter setting with the required deceleration time.

FS0	FS15	FS16/18, PM–D/F	Description
6582	3082	4082	Acceleration/deceleration duration setting

⇒ Set the parameter with a value somewhat greater (margin) than the required deceleration duration.

3.4.25 Alarm AL–39

(1) Meaning

The Cs contouring control one–rotation signal has not been detected correctly.

(2) Cause and corrective action

(a) Feedback signal cable not shielded properly

Check whether there is noise on the feedback signal.
Also check whether the cable is shielded properly.

⇒ Shield it correctly.

(b) Feedback signal level insufficient

Check the feedback signal level with an oscilloscope.

⇒ Adjust so that the feedback signal level becomes the rated value.

(c) Incorrect parameter setting
Check the parameter setting for use of the Cs contouring control detector.

FS0	FS15	FS16/18, PM–D/F	Description
6503 #7, 6, 4	3003 #7, 6, 4	4003 #7, 6, 4	Parameter set to specify use of the Cs contouring control detector

⇒ Set the parameter correctly according to the detector used.

(d) Detection circuit defective
⇒ Replace the printed–circuit board.

3.4.26 Alarm AL–40

(1) Meaning

The Cs contouring control one–rotation signal is not generated.

(2) Cause and corrective action

(a) Feedback signal cable defective
Check the connection of the cable.
⇒ Connect the cable correctly.

(b) Feedback signal level insufficient
Check the offset of the Cs contouring control one–rotation signal with an oscilloscope.
⇒ Adjust the offset of the Cs contouring control one–rotation signal.

(c) Detection circuit defective
⇒ Replace the printed–circuit board.

3.4.27 Alarm AL–41

(1) Meaning

The position coder one–rotation signal was not detected correctly.

(2) Cause and corrective action

(a) Feedback signal cable not shielded properly
Check whether there is noise on the feedback signal. Also check whether the cable is shielded properly.
⇒ Shield it correctly.

(b) Position coder defective
Check the position coder signal.
⇒ Replace the position coder.

(c) Feedback signal level insufficient (for built–in sensor)
Check the feedback signal level with an oscilloscope.
⇒ Adjust so that the feedback signal level becomes the rated value.

(d) Incorrect parameter setting
Check the parameter setting and the Cs contouring control detector.

FS0	FS15	FS16/18, PM–D/F	Description
6503 #7, 6, 4	3003 #7, 6, 4	4003 #7, 6, 4	Position coder signal setting

⇒ Set the parameter correctly according to the detector used.

(e) Detection circuit defective

⇒ Replace the printed–circuit board.

3.4.28 Alarm AL–42

(1) Meaning

The position coder one–rotation signal was not generated.

(2)Cause and corrective action

(a) Feedback signal cable defective
Check the connection of the cable.
⇒ Connect the cable correctly.

(b) Position coder defective
Check the position coder signal.
⇒ Replace the position coder.

(c) Feedback signal level insufficient (for built–in sensor)
Check the feedback signal level with an oscilloscope.
⇒ Adjust the feedback signal level.

(d) Detection circuit defective
⇒ Replace the printed–circuit board.

3.4.29 Alarm AL–43

(1) Meaning

The position coder signal used for the main spindle during the differential speed mode was disconnected.

(2) Cause and corrective action

(a) Feedback signal cable defective
Check the connection of the cable. Also check for a broken wire.
⇒ Connect the cable correctly. If any wire in the cable is broken, replace the cable.

(b) Feedback signal cable not shielded properly
Check whether the cable is shielded properly.
⇒ Shield it correctly.

(c) Position coder defective
Check the position coder signal.
⇒ Replace the position coder.

(d) Incorrect parameter setting
Check the parameter setting for the differential speed mode functions.

FS0	FS15	FS16/18, PM–D/F	Description
6500#5	3000#5	4000#5	Setting to specify use of the differential speed mode functions

⇒ Set the parameter correctly according to the function used.

(e) Detection circuit defective
⇒ Replace the printed–circuit board.

3.4.30 Alarm AL–44

(1) Meaning

An A/D converter error occurred.

(2) Cause and corrective action

(a) A/D converter defective.

⇒ Replace the printed–circuit board.

3.4.31 Alarm AL–46

(1) Meaning

The position coder one–rotation signal was not detected correctly during thread cutting.

(2) Cause and corrective action

(a) Feedback signal cable not shielded properly

Check whether there is noise on the feedback signal. Also check whether the cable is shielded properly.

⇒ Shield it correctly.

(b) Position coder defective

Check the position coder signal.

⇒ Replace the position coder.

(c) Feedback signal level insufficient (for built–in sensor)

Check the feedback signal level with an oscilloscope.

⇒ Adjust so that the feedback signal level becomes the rated value.

(d) Incorrect parameter setting

Check the parameter setting and the Cs contouring control detector.

FS0	FS15	FS16/18, PM–D/F	Description
6503 #7, 6, 4	3003 #7, 6, 4	4003 #7, 6, 4	Position coder signal setting

⇒ Set the parameter correctly according to the detector used.

(e) Detection circuit defective

⇒ Replace the printed–circuit board.

3.4.32 Alarm AL–47

(1) Meaning

A pulse count for the position coder signal is abnormal.

(2) Cause and corrective action

(a) Feedback signal cable not shielded properly

Check whether there is noise on the feedback signal. Also check whether the cable is shielded properly.

⇒ Shield it correctly.

(b) Position coder defective

Check the position coder signal.

⇒ Replace the position coder.

(c) Feedback signal level insufficient (for built–in sensor)

Check the feedback signal level with an oscilloscope.

⇒ Adjust so that the feedback signal level becomes the rated value.

(d) Incorrect parameter setting
Check the parameter setting and the detector.

FS0	FS15	FS16/18, PM–D/F	Description
6503 #7, 6, 4	3003 #7, 6, 4	4003 #7, 6, 4	Position coder signal setting

⇒ Set the parameter correctly according to the detector used.

(e) Detection circuit defective
⇒ Replace the printed–circuit board.

3.4.33 Alarm AL–49

(1) Meaning
During differential speed mode, the sub–spindle motor speed converted from the main spindle motor speed exceeded the limit.

(2) Cause and corrective action
(a) The differential speed is calculated by multiplying the main spindle motor speed by the gear ratio.
Make sure that the calculation result does not exceed the maximum motor speed.
⇒ Do not exceed the maximum motor speed.

3.4.34 Alarm AL–50

(1) Meaning
During the synchronization control of the spindle, the calculation result for the speed command exceeded the limit.

(2) Cause and corrective action
(a) The motor speed command is calculated by multiplying the spindle speed command by the gear ratio.
Make sure that the calculation result does not exceed the maximum motor speed.
⇒ Do not exceed the maximum motor speed.

3.4.35 Alarm AL–53, AL–53

(1) Meaning
The ITP signal (sync signal for sync with the CNC) stopped.

(2) Cause and corrective action
(a) CNC error
⇒ Check the operation of the CNC.
(b) Serial communication LSI chip defective
⇒ Replace the printed–circuit board.

3.4.36 Alarm AL–54

(1) Meaning
It was detected that a high current flowed in the motor for a long period.

(2) Cause and corrective action
(a) Overloaded operation, or frequent acceleration/deceleration
Check the load meter to see if the load is too heavy. Also check that acceleration/deceleration was repeated frequently.

⇒ Examine the cutting conditions again.

3.4.37 Alarm AL–55

(1) Meaning

During spindle switching control or speed range switching control, there was a conflict between the switch request signal (SPSL or RSL) and the power line state confirmation signal (MCFN, MFNHG, or RCH, RCHHG).

(2) Cause and corrective action

(a) Switching unit (magnetic contactor for power line switching) defective

Check the operation of the switching unit.

⇒ Replace the switching unit (magnetic contactor for power line switching).

(b) Loose contact of the magnetic contactor state signal (auxiliary contact signal)

Make sure that the magnetic contactor state signal is switched properly.

=> Connect the magnetic contactor correctly.

(c) Incorrect parameter setting

Make sure that the parameters for the power line state signals related to spindle switch control and output switch control are set correctly.

FS0	FS15	FS16/18, PM–D/F	Description
6514#2	3014#2	4014#2	Parameter to specify the power line state signal for spindle switching control
6514#3	3014#3	4014#3	Parameter to specify the power line state signal for speed range switching control

Set the parameter correctly according to the system used.

3.4.38 Alarm AL–56

(1) Meaning

The cooling fan for the control circuit stopped.

(2) Cause and corrective action

(a) Cooling fan defective

Check whether the cooling fan rotates smoothly.

⇒ Replace the cooling fan.