4. 

   The movement mode is programmed.

8.2.2 Storage of position

In order to enter a position, the TCP is moved to the desired position with one of the operating modes in the menu 'COORD'.

The position is entered with the following program steps:

1. Move TCP to the desired position.
2. 

3. 

   The position is taken over into the program as normal position in Frame 0.

8.3 CONTROL OF THE PERIPHERAL EQUIPMENT

The peripheral equipment and the robot control communicate with each other via digital signals.

User inputs provide the control with information about the peripheral conditions (e. g. finish message of a processing machine, rotary table in correct position, clamping device closed, deposit free etc.).

User outputs give information to the peripheral equipment and execute commutations (e. g. signal to a processing machine that the robot is moving into the operating range of the machine, switching on or off a conveyor, switching on a spindle, open/close gripper, feed out pallet etc.).

Also direct voltages coming from peripheral units can be interrogated in the user program.

8.3.1 Switching of digital outputs

Digital outputs are switched on and off by setting (level 1) or resetting (level 0) a bit. The corresponding CAN node switches the output corresponding to the programmed bit.

Programming is made with the command WRITE_BIT (write bit) from the command group LOG.

8.3.1.1 Switch on output

Example: Set output 0.1 (e.g. in order to start a conveyor belt)

1. F1

   Display:

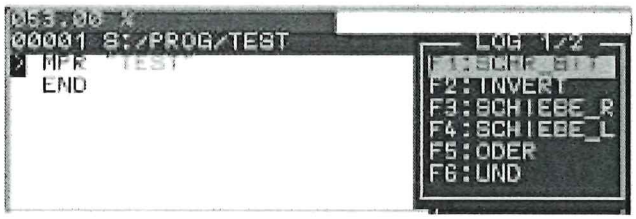

Fig. 8-1: Selection menu command group LOG

2. F1 "WRITE_BIT"

   Selection menu appears.

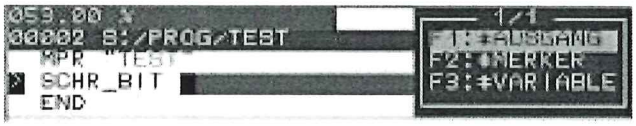

Fig. 8-2: Selection menu WRITE_BIT

3. F1 "#OUTPUT"

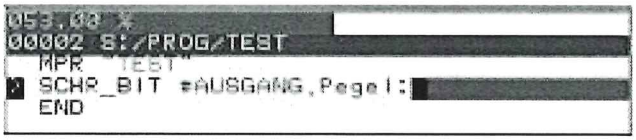

Fig. 8-3: Display after selection of the command #OUTPUT

4. ↑ / ↓

5. Enter

6. ← / →

7. Enter

8. ↑ / ↓

9. Enter

   Subsequently the command is contained in the program as follows:

WRITE_BIT #OUTPUT, level: 1, Byte: 0, Bit: 1

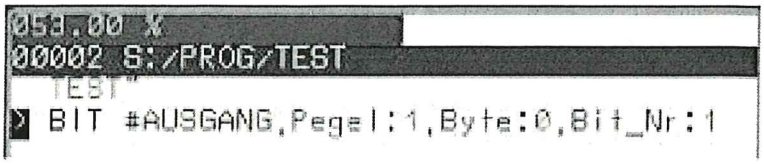

Fig. 8-4: Display of the command line

8.3.1.2 Switch off output

As example, the a. m. belt shall be stopped. For programming proceed as above, only a 0 has to be entered for the level.

1. 

   LOG menu appears.

2.  "WRITE_BIT"

   Selection menu appears.

3.  "#OUTPUT"

4. 

5. 

6. 

7. 

8. 

9. 

   Subsequently the command is contained in the program as follows:

   WRITE_BIT #OUTPUT, level: 0, Byte: 0, Bit: 6

8.3.2 Inquiry of digital input signals

The input signals are treated in the same manner like the output signals. Bits are set or reset via CAN-bus according to the node number. If 24 Volt are applied on a connection on the hardware side, the corresponding bit will be set, if 0 Volt is applied, it will be reset.

Different reactions to input signals are possible. In the program sequence, a signal may be waited for, or a conditional program branch may be executed depending on an input signal.

8.3.2.1 Waiting for input signal

The example program will stop at this command until 24 Volt are applied to input 0.5. Then program treatment will be continued with the next step. The parameter 'Max_Zeit' is indicated to be 0.0 seconds in this case, which means waiting without time limitation. Designation of the label is arbitrary, because the program will always continue with the next step.

If another value is programmed in the parameter 'Max_Zeit', for instance:

WAIT_BIT #INPUT, level: 1, Byte: 0, Bit_Nr: 5, Max_Zeit: 10.0, Label: "ABC"

the program will also stop and wait for the signal. If the signal is applied within the indicated time (in the example 10 seconds), processing will be continued with the next step. If the programmed time is exceeded without a signal being applied, the program will branch to the label indicated in the last parameter (in the example 'ABC').

Before a part can be extracted from the processing machine, the control waits until the signal 'processing finished' is applied. According to circuit diagram this signal is applied to input 0.5.

1. 

   CONTR menu appears.

2.  "WAIT_BIT"

   Selection menu appears.

3.  "#INPUT"
4. Level: <1>
5. Byte: <0>
6. Bit: <5>
7. Max_Zeit <0.0>

   a. 

   b. 

c. 

8. Label: <X>

Subsequently the command is contained in the program as follows:

WAIT_BIT INPUT, level: 1, Byte: 0, Bit_Nr: 5, Max_Zeit: 0.0, Label: X

8.3.2.2 Input signal as branch condition

Program branches can be programmed which will only be executed if level 1 or level 0 is applied to an input.

This branch is realized with the command TEST_BIT. Conditions for the branch are as follows:

#=0: the branch will be executed if 0 Volt is applied to the input.

#=1: the branch will be executed if 24 Volt is applied to the input.

If the branch condition is not fulfilled, processing of the program will be continued with the next step.

Example: Programming with a branch condition.

The subprogram CLEANING will be executed if 24 Volt are not applied to input 0.6. If 24 V are applied, the subprogram call will be skipped.

1.  'Contr'

   CONTR menu appears.

2. 

"TEST_BIT"

   Selection menu appears.

3. 

"#INPUT"

4. 

Branch condition: "#=1"

5. Byte: <0>

6. 

7. Bit: <6>

8. 

9. Label: <CDE>
10. 

11. 

12. 

"CALL"
13. Name <CLEANING>
14. Label: <CDE>

Subsequently the commands are contained in the program as follows:

TEST_BIT #INPUT, #=1, Byte: 0, Bit_No: 6, Label: 'CDE'

CALL Name: 'CLEANING'

LABEL 'CDE'

8.3.3 Control of analog outputs

Peripheral units are controlled by means of a variable direct voltage via analog outputs, e. g. speed of a machine, weld parameters etc.

In the command group PERI the output of a direct voltage to an analog output can be programmed with the command ANA_OUTP. After selection of the command first the voltage has to be indicated in Volt (-10 V to + 10 V), then the number of the analog output to which the voltage shall be applied.

The voltage can be entered with the numeral keys or taken from a real constant or real variable. In this case the name of the constant or variable has to be indicated as first parameter.

1. 

'Peri'

PERI menu appears.

2. 

"ANA_OUTP"
3. Enter nominal voltage in Volt or name of constant or variable.
4. 

5. Channel: <number of analog output>

6. Enter

8.3.4 Inquiry of analog inputs

The analog voltage applied to an analog input can be filed in a real variable for further treatment.

The command ANA_INP is selected from the function group PERI. After selection, first of all the number of the analog input has to be indicated from which the analog voltage shall be taken over, then the name of the variable where the voltage value will be stored.

1. 'Peri'

   PERI menu appears.

2. F2 "ANA_INP"
3. Channel: <number of the analog input>
4. Enter
5. Variable: <name of the destination variable>
6. Enter

Tab. 8-2: Example for a program with inquiry of analog inputs

Step	Commands	Inputs
S1	MPR	ANALOG_TEST
S2	LOC_VAR	RDRUCK
S...		
S14	POSITION	
S15	WRITE_BIT	#OUTPUT, 1, 0, 4
S16	LABEL	REPEAT
S17	ANA_INP	2,RDRUCK
S18	TEST	VARIABLE,RDRUCK,#<,5.0,REPEAT
S19	CALL	COAT
S...		
S39	END	

In step 16 a dosing system is switched on via output 0.4 which gradually builds up the required operating pressure for coating. The current pressure is signalized to analog input 2 via an analog signal.

The applied analog voltage is loaded into the variable RDRUCK in step 17 and compared with the minimum value 5.0 Volt in step 18.

The subprogram for coating will only be called if this minimum voltage is applied to analog input 2, i. e. if the minimum pressure is reached.

8.4 COMMANDS FOR PROGRAM CONTROL

8.4.1 Program branches

Conditional and unconditional (absolute) branches can be programmed within a program. For all branch commands a branch destination must be indicated from where program treatment shall be continued. It does not matter whether the branch shall be executed forward or backward. Branches from one program into another one are not possible.

8.4.2 Input of the branch destination

The command for the branch destination is called LABEL. It is selected from the function group CONTR and after input of a freely selectable name (e. g. LABEL_1) is taken over into the program with the 'Enter' key. Within one program, another name must be entered for each LABEL command.

Since branches from one program into another one are impossible, identical names may be used in different programs.

Input of the command sequence for a branch destination:

1.  'Contr'

   CONTR menu appears.

2.  'LABEL'
3. <name of branch destination>
4. 

8.4.3 Input of an absolute branch

For programming of an absolute (unconditional) branch the command BRANCH has to be selected and the name of the label (branch destination) has to be entered (e. g. LABEL_1). The indicated label must be contained in the same program as the branch command.

When this command is processed in automatic or test mode, program treatment will be continued at the branch label with the same name.

If no label with the same name exists in the program, an error message will be displayed.

Input of command sequence for an absolute branch:

1.  'Contr'

   CONTR menu appears.

2.  "BRANCH"
3. <name of branch destination>
4. 

8.4.4 Input of a conditional branch

Contrary to the absolute branches, with the command for a conditional branch decision is made whether the branch will be executed or whether processing of the program is continued with the next step. The condition may be the status of a single bit or the content of a byte or of a variable.

⇨  'Contr'

CONTR menu appears.

⇨  "TEST_BIT"

⇨ select operand

⇨ select conditons of branch

⇨ insert number of byte or variable

⇨ 

⇨ insert number of bit

⇨ 

⇨ <name of branch destination>

⇨ 

8.4.5 Programming of waiting times

The waiting time is the delay time before the program sequence will be continued with the next command.

This time is programmed with the command WAIT from the command group CONTR. As parameter, the time for which the program shall stop has to be entered in seconds. The waiting time is effective in automatic mode and in all test operating modes and is activated with the following program steps:

1.  'Contr'

   CONTR menu appears.

2.  "WAIT"

3. Enter time in seconds.

4. 

8.5 PROGRAM CALLS

The following program types are available: Main program, subprogram, macro, PLC program.

8.5.1 main program (MPR)

The command PROGRAM in the command group PROG is available for changing from one main program into another main program. It effects a branch from one main program to step 1 of another main program. After selection of the command the name of the main program to be changed to has to be entered. If the program with the indicated name doesn't exist or isn't a main program, corresponding error messages will be given during sequence in automatic or test operation.

8.5.1.1 Change into a main program

1.  'Prog'

   PROG menu appears.

2.  "PROGRAM"

3. <name of main program>

4. 

8.5.2 subprogram (SPR)

After selection of the command CALL from the command group PROG the name of the subprogram you want to branch to has to be entered. In automatic or test operation a branch to step 1 of the indicated subprogram will be made during processing. This subprogram is processed. After the last step of the subprogram, the calling program will be returned to. Program treatment here is continued with the command following the subprogram call.

8.5.2.1 Call of a subprogram

1.  'Prog'

   PROG menu appears.

2.  "CALL"
3. <name of subprogram>
4. 

8.5.3 macro (MAC)

A macro must not contain a position!

In a macro it is possible to call further macros and subprograms (up to nesting depth 12!).

8.5.3.1 Call of a macro

➪ see separate documentation about RobAssist

9 USER-ORIENTED DOCUMENTATIONS

10 ERROR MESSAGES RSV

10.1 GENERAL SURVEY

10.1.1 Survey of system errors

Error number	Message	Cause	Remedy
S000	External program stop		
S10	Sytem error		
S21	Drives off	The command AXIS is activated with drives being switched off.	Use the command only with drives being switched on.
S27	Programmed limit switch	The axes indicated in the message were displaced up to the software limit switch.	Move away the axes into the opposite direction. If possible, select another axis position. Limit the way of displacement.
S29	Inadmissible movement range	The robot wants to approach a position which it cannot reach.	Change settings. Perhaps the robot must be freed in axis-specific manual movement.
S44	Sensor error		
S45	<S 45> Wrong station selection	The PLC marker bit for station monitoring is not set.	Examine the PLC program and set the corresponding marker bit in the markers 936 ... 939.
S46	Step not defined	Structure error in the user command. Either the AXIS command or a variable used in it is concerned.	Delete the defective step and program anew.
S54	No transformer axis	An axis was entered in the group table for which there exists no transformation matrix.	Execute correct calibration. Check machine data IAXES_DESCR and ITOOLAXES_DESCR!

Error number	Message	Cause	Remedy
S56	No valid station marker recognized	There is more than one PLC marker bit set for station monitoring.	Examine the PLC program and make sure that a maximum of one single station is monitored.
S58	Movement range exceeded	The axes indicated in the message were displaced too much. The admissible range from _RFMOT_LIM_P and _RFMOT_LIM_N was exceeded.	Check the admissible range in the system variables _RFMOT_LIM_P and RFMOT_LIM_N and adapt, if necessary. Limit the way of displacement.
S61	PLC error		
S67	SPLINE neighbor point after step xx in the program not found	In the SPLINE movement mode the previous and the following point must be available for the path interpolation. The following point cannot be determined definitely, because a branch command follows (e. g. TEST_...-command).	Remove branch command or select other movement mode.
S100	Operating error	10.1.2 S100 / operating error	
S104	The command AXIS is only allowed in INTERPOL #PTP!	Wrong INTERPOL is active, e. g. #LIN	Change program. Insert the command INTERPOL #PTP before the command AXIS.
S108	A TOOL change can only be executed in INTERPOL #PTP.	At the moment of the TOOL command the movement mode PTP is not active.	Insert PTP mode.
S111	Programming error	10.1.3 S111 / Programming errors	
S112	Wrong device or wrong path	Selection of a program which doesn't exist	Enter correct program name

Error number	Message	Cause	Remedy
S113	definition not found	The variable used in the mathematical operation is not defined	Define variable e.g. by using the VAR or the LOC_VAR command.
S114	variable not initialized	The source operand contains a not initialized variable definition which, of course, must not be read-in	Initialization of the variable in the robot program memory
S117	Content beyond range of values	The argument violates the range of validity, e. g. with the SQRT command or trigonometric functions	The argument in the SQRT command must not be negative. The argument in ARCSIN and ARCCOS is only defined in the range -1 to +1.
S118	The operand is no variable	The destination operand in the COPY command does not represent a definition of a variable, but e. g. a definition of a constant	Change the destination operand to a definition of a variable.
S119	Wrong operand types	The types of source and destination don't match, a conversion of type is impossible. This error occurs e. g. during copy actions between structural components of different element groups	Adapt source and destination operands accordingly
S120	Transformation error	The position could not be transformed forward/back.	Check RELATIVE offset. In case of offline settings check POSITION step and check machine data adjustments. Consultation with manufacturer.
S126	Trafo_6D error		

Error number	Message	Cause	Remedy
S129	Maximum number of pulses already active!	The control is already processing eight pulses and cannot start another pulse.	Change program structure.
S137	Program doesn't exist	Access to a program which doesn't exist	Read-in program
S138	Program name invalid	Faulty program name	Correction of name
S140	Program memory is full	No storage location for programs available	Delete all programs which are not needed any more
S143	Wrong program types	Access to programs with faulty type indication	Correction of program type
S144	Definition already exists	Multiple definitions	Check definitions
S145	Program exists already	Transfer of a program to the control which exists already	Delete the old program
S155	Step not defined	Structure error in the user command. Either the AXIS command or a variable used in it is concerned.	Delete the defective step and program anew.
S156	No access authorization	Program or variable in the program memory is protected	Check access authorization and change, if necessary
S163	Process controller error arc doesn't ignite!	The acknowledge message „Welding on" has not been given within the requested time	Check weld source Set correct input/output ports
S164	Process controller error arc doesn't extinguish!	The acknowledge message „Welding off" has not been given within the requested time	Check weld source, set correct input/output ports

Error number	Message	Cause	Remedy
S165	Process controller error arc has broken!	Arc extinguished during weld monitoring	Check weld source and workpiece, then start anew
S166	Process controller error weld wire is stuck!	Weld wire is still connected with the weld seam	Loosen wire
S167	Process controller error time error in sensor preliminary correction!	Sensor preliminary correction was not terminated within the timeout time	Switch on sensor in the program or Switch off preliminary correction (_RT_SEN_START=0)
S168	Process controller error Range of values in variable was exceeded!	Inadmissible input/output channel, marker or _IPC_SWITCH or _RPC_TIME [X] < 0	Enter valid values
S169	Process controller error! Flame extinguished	The heating or cutting flame extinguished	Check torch and workpiece, then start anew
S181	Variable reading not allowed	Variable is protected against reading	
S182	Variable writing not allowed	Variable is write protected	Due to the system there must not be made any write access to this system variable
S183	No DNC order free	In the DNC order list there is no more space for another order	Execute DNC reset
S184	Addressee: Incorrect name length	Incorrect name length in the macro command	Check macro command
S185	DNC transmission error	Faulty check sum during data transmission	Repetition of telegram, check of connection
S186	Drives not switched on		Switch on drives

Error number	Message	Cause	Remedy
S190	Program doesn't exist	Access to a program which doesn't exist	Read-in program, check path
S197	Index variable not found	The array index was programmed with an integer variable. This integer variable, however, is not defined.	Define integer variable
S198	Index variable not initialized	The array index variable is not correctly initialized.	Initialize array index variable
S199	Index too big or too small	The array index used in the COPY command has the value zero or exceeds the value indicated in the variable definition	Adapt array index to the definition
S200	Definition is no array	The variable name used in the COPY command contains an array indication. The variable definition, however, doesn't represent an array.	Adapt the variable access accordingly
S201	Definition is an array	The variable name used in the COPY command doesn't contain any array indication. The variable, however, is defined as an array	Change-over variable access to array
S202	No storage location available	Program memory is full	Delete all programs which are not needed any more
S211	Program not inserted	Error in the program code, program defective	Check program code, perhaps store anew

Error number	Message	Cause	Remedy
S234	Path switch error	Error related to the PATH_SWITCH command	See documentation of path switch function
S266	String length too big/small		Correct string length
S267	Fatal error module: xx line: xx	Internal error in the control	Notify manufacturer.
S268	Internal pointer error	Internal error in the control	Notify manufacturer.
S269	Inadmissible operating mode		Set operating mode correctly
S270	Abortion by the user		
S272	No AUTO operating mode		
S273	AUTO operating mode		
S281	Multi-layer welding: Name of root layer program incorrect or too long		Abridge name of the root layer program.
S282	Multi-layer welding: Number of top layer too high	Top layer numbers up to 999 are allowed.	Correct number of top layer in the TOPLAYER command.
S283	Multi-layer welding: Error X during processing of sample program		
S284	Multi-layer welding: Error during generation of top layer program		
S285	Multi-layer welding: Sample program wrong	The sample program doesn't exist.	Adapt program name or generate sample program.
S286	Multi-layer welding: Root layer program not found	The root layer program doesn't exist.	Adapt program name or generate root layer program.

Error number	Message	Cause	Remedy
S291	Sensor recording mode: File name in the system variable _SSENFILE wrong or too long	Entry in _SSENFILE faulty.	Adapt system variable _SSENFILE.
S292	Wrong sensor mode in the system variable _ISENSPEC.	The sensor operation was incorrectly initialized.	Use one of the values 0 (standard), 1 (recording mode) or 2 (playback mode) for the system variable
S326	Function not implemented	Inadmissible variable types were programmed in the source/destination variable. The control word contains a not defined transformation mode.	Only VECTOR and POSITION are allowed as source variable types. A system variable of POSITION type must be used as destination variable type. Set the value of the control variable to the correct transformation mode.
S349	Robot is asynchronous		Synchronize robot
S364	Wrong OCS fine mode	The system variable _IOSC_SUBMOD was incorrectly programmed.	Select one of the following values: - 0: binormal= neg. Z-axis of the tool frame) - 1: binormal= neg. X-axis of the tool frame) - 2: binormal= neg. Y-axis of the tool frame)

Error number	Message	Cause	Remedy
S365	Wrong OCS mode	The system variable _IOSC_MODE was incorrectly programmed.	Select one of the following values: - 0: Programmed OCS - 1: Auto-OCS with path-specific constant binormal. - 2: Auto-OCS with variable binormal. - 3: Auto-OCS with OCS completely from the tool coordinate system.
S366	Oscillation auxiliary point and start point are identical	The oscillation auxiliary point must be at least 5mm away from the oscillation start point - this is the last position programmed before the oscillation auxiliary point.	Increase distance of oscillation auxiliary point.
S367	Oscillation auxiliary point and start point in different frames	The oscillation auxiliary point and the oscillation start point - this is the last position programmed before the oscillation auxiliary point - are programmed in different coordinate systems.	Select identical coordinate systems. Change oscillation auxiliary point or oscillation start point.
S368	No oscillation auxiliary point programmed	„programmed OCS“ is requested with the system variable _IOSC_MODE, but no oscillation auxiliary point was programmed.	Program oscillation auxiliary point or adapt oscillation mode IOSC_MODE.
S388	DNC connection interrupted	Bad transmission quality	Check communication interface

Error number	Message	Cause	Remedy
S389	Control not ready for reception	Program memory processing is active if a program shall be read-in via DNC	Repeat program transmission
S412	Conveyor error: Jump-on/-off only allowed in movement mode PTP and LINEAR.	For conveyor jump-on the programming of movement mode CIRC or SPLINE is useless, because anyway an interpolation matched for the conveyor movement and based on the LINEAR move mode is executed.	Program INTERPOL #PTP or #LINEAR prior to conveyor jump-on or jump-off.
S413	Conveyor error: Counter of conveyor axis was not reset.	A jump-on shall be executed without the synchronization pulse being given once since the last control start.	Release synchronization pulse before executing a conveyor jump-on.
S427	Physical connection disturbed	Timeout during data communication due to lack of connection	Check hardware components (cables, converters, ...) and correct, if necessary
S437	Backup could not be established	Defective program memory	Storage of the individual programs on disk Program memory must be completely restaured
S438	There hasn't been established any backup yet	Access to R: Device before a bakkup was established for the first time	Establish backup via Menu (Funct)
S439	Not sufficient memory available to establish a backup.	A CPU60 with 4MB dynamic RAM was used	Backup is only possible with use of a CPU60 with 32 MB DRAM
S443	Marking not possible	Attempt to mark program start, program end, „.“ and/or „..“ steps	These steps must not be marked.

Error number	Message	Cause	Remedy
S448	Directory is not empty	Deletion of a directory program which is not empty	Delete the directories and programs under this directory
S450	Program is invalid	Attempted access to an invalid program	Remove program and read-in anew
S506	Calibration error		
S507	Syntax error in the calibration program XXX XXX= 500 XXX= 501 - 507	The following is missing in the calibration program: Tool step Position step (1 - 7)	Insert missing element
S508	Distance of tool flange between pos. X and pos. Y too small	Distance between: Pos. 1 and 2 Pos. 1 and 3 Pos. 1 and 4 Pos. 2 and 3 Pos. 2 and 4 Pos. 3 and 4 Pos. 5 and 6 Pos. 5 and 7	Re-teach the corresponding positions correctly.
S509	The orientations of pos. 5- 7 are not identical.	The orientation of pos. 6 or 7 was changed	Re-teach the corresponding positions correctly.

Error number	Message	Cause	Remedy
S510	Internal calculation error XXX XXX= 508 XXX= 518 XXX= 519	Central point of the sphere cannot be calculated Error in transformation	Error during programming of the calibration positions: one or several of the positions 1 - 4 was programmed too inexactly

10.1.2 S100 / operating error

Error number	Message	Cause	Remedy
S100,4016	Operating error	Step preselection to„Search"-step is not allowed.	Step preselection to a position preceding the corresponding step or to the next step. Step preselection is only finished if a position in the program was approached.
S100,4018	Operating error	In the operating modes AUTO, TEST2, TEST3, TEST4 a step preselection to an oscillation auxiliary point or into a CIRC bracket is not allowed.	Approach of the position with step preselection is only possible in TEST1.
S100,4019	Operating error	In TEST1 more than one step backward was moved while oscillation is active, or the oscillation auxiliary point is not defined.	Start with step preselection to the first position before the oscillation auxiliary point.

Error number	Message	Cause	Remedy
S100,4030	Operating error	As destination program the program was indicated in which the TRAFO_6D command was called.	Check parameters of TRAFO_6D; rename destination program
S100,4031	Operating error	Storage and 6D-shifting must not be active at the same time.	Terminate storage prior to program start
S100,4032	Operating error	A constant was indicated as control variable.	Change definition of the control variable
S100,4125	Operating error	Transmission error in the CAN-bus. (connection)	Check connection cables; reduce line failures as far as possible; use shielded transmission cable
S100,4126	Operating error	Transmission error in the CAN bus. (M-module)	Test M-module; (only trained personnel; perhaps consultation with Reis service or Reis development department)
S100,4127	Operating error	Access to system variable _CAM_TCP with laser camera being switched on	Switch off camera via the LS_SERVICE command before making read access to the system variable
S100,4128	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	
S100,4129	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	

Error number	Message	Cause	Remedy
S100,4129	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	
S100,4130	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	
S100,4131	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	
S100,4132	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	
S100,4133	Operating error	Operating errors in conjunction with a laser camera calibration (see separate documentation 'LS_CALIB')	
S100,4134	Operating error	The command LS_SERVICE 0,7 doesn't work correctly (see separate documentation 'LS_SERVICE')	Check whether the processing edge has been programmed correctly- Check that the processing edge is situated in the shooting field of the laser camera.

10.1.3 S111 / Programming errors

Error number	Message	Cause	Remedy
S111,1201	Programming error	The path acceleration value transferred from the CP_V to the PTP_V exceeds the representable number range.	Reduce path acceleration.
S111,1202	Programming error	The axis speed resulting from the path speed for one or several axes is bigger than the maximum value defined in the machine data.	Reduce path speed and/or reduce path to the additional axes or increase path of the path-controlled axes.
S111,1203	Programming error	The axis acceleration resulting from the path acceleration for one or several axes is bigger than the maximum value defined in the machine data.	Reduce path speed and/or reduce path to the additional axes or increase path of the path-controlled axes
S111,1204	Programming error	Approximation with path zero steps is active.	Smaller values must be chosen for path acceleration resp. path speed.
S111, 4001	Programming error	(Technology data) Subprogram not found	The subprogram indicated in the 'OSC_PATTERN_E' command for execution of the 'oscillation amplitude controlled parameter output' (PAGA) could not be found. Please check the indications and generate the desired subprogram, if necessary.

Error number	Message	Cause	Remedy
S111, 4002	Programming error	Double key word	The code words for the PAGA function indicated in the (technology data) subprogram occur several times, however, the use is only permitted once according to the operating manual.
S111, 4003	Programming error	Invalid code word	A code word for the PAGA function indicated in the (technology data) subprogram is not known here, only code words acc. to the operating manual are allowed.
S111, 4004	Programming error	Inadmissible AWP_step in the (technology data) subprogram	A user command programmed in the (technology data) subprogram for the PAGA-function must not be used here. Only the commands acc. to operating manual are allowed.
S111, 4005	Programming error	(Technology data) subprogram is no subprogram	The program indicated in the 'OSC_PATTERN_E' command for execution of the 'oscillation amplitude controlled parameter output' (PAGA) must be a subprogram.
S111, 4006	Programming error	Output number is no number found	In the output commands of the (technology data) subprogram all indications must be registered as number constants, variables are not allowed here.

Error number	Message	Cause	Remedy
S111, 4007	Programming error	Output value is no number found	In the output commands of the (technology data) subprogram all indications must be registered as number constants, variables are not allowed here.
S111, 4010	Programming error	The total of oscillation partial phases in the 'OSC_PATTERN_E' command must be 100(%).	Please verify the indications and rectify the indicated values of the oscillation phase time, if necessary.
S111, 5000	Programming error	Step is not defined, delete! A not defined control step was recognized during processing of the program.	The program belongs to another machine type or is faulty. Further processing of the program should be omitted. Read-in program anew or adjust.
S111, 5001	Programming error	The command READ_PROG#WAIT_NOT is active at the same time with READ_PROG#WAIT.	Change the program in such way that first all #WAIT_NOT activities will be finished before #WAIT comes.
S111, 5002	Programming error	The command READ_PROG#WAIT_NOT was called more than 20 times within a very short time and therefore could not be processed.	The program must be changed in such way that the commands READ_PROG#WAIT_NOT have sufficient time for processing.
S111, 5006	Programming error	Image processing is still active and cannot take over the new command.	Program waiting loop.
S111, 5007	Programming error	Branch destination not found	Program branch destination

Error number	Message	Cause	Remedy
S111, 5011	Programming error	Nesting depth 12 for subprograms is reached.	Change program structure in such way that the nesting depth doesn't exceed 12
S111, 5012	Programming error	'SEN'-step or 'PEN'-step recognized, the oscillation plane not being defined.	Program oscillation auxiliary point.
S111, 5013	Programming error	Additional axes were moved during CP operation.	Program movement steps anew without moving additional axes. In software versions >V0805 the error message can only be given if the machine data or the user program don't belong to the robot.
S111, 5014	Programming error	No oscillation pattern defined.	
S111, 5015	Programming error	Inadmissible control step between a position and the oscillation auxiliary point resp. oscillation parameter.	Find out the inadmissible control step by means of the operating manual and remove it.
S111, 5017	Programming error	Switch-over to PTP while the sensor is active.	Switch off sensor.
S111, 5018	Programming error	More than one sensor control step is programmed between two positions.	Remove one sensor control step.
S111, 5040	Programming error	The user command AXIS... is in a CIRC bracket.	Select control mode PTP or CP_LIN before the command AXIS...
S111, 5041	Programming error	Between the commands AXIS#PASSIVE and AXIS#ACITIVE there is a position step.	Delete position step.

Error number	Message	Cause	Remedy
S111, 5043	Programming error	One of the axes which had been freed reached the software limit switch during free movement.	Move the machine in manual operation into the admissible area; modify installation.
S111, 5045	Programming error	Step preselection to the command INDEX was made.	Make step preselection to the position before INDEX.
S111, 5046	Programming error	The axis to be freed doesn't exist.	
S111, 5048	Programming error	The axis to be activated was moved over the software limit switch after the INDEX command.	Move axis in HAND/A mode back into the allowed area.
S111, 5051	Programming error	Position and oscillation auxiliary point are not filed in the same coordinate system.	File oscillation auxiliary point in the same coordinate system as the preceding position step.
S111, 5052	Programming error	Position types of a path don't match. - Two ZPOS steps are programmed on a path, but the station numbers of the steps are different. - In a CIRC bracket auxiliary point and end point are of same position type or have different station numbers.	Teach positions anew.
S111,5053	Programming error	The command MOVE_AXES was recognized during movement mode CP.	Switch-over to movement mode PTP prior to the command MOVE_AXES.

Error number	Message	Cause	Remedy
S111,5075	Programming error	A path movement mode is still active when leaving the root subprogram. Only PTP must be active.	
S111,5078	Programming error	When leaving the root subprogram the sensor functino must not be in recording mode. Also after 'SENSOR OFF' the sensor may still be active if the sensor offset couldn't be established yet.	
S111,5081	Programming error	The output text of the INPUT resp. OUTPUT field doesn't fit into the window.	
S111,5082	Programming error	Wrong format designator indicated for the INPUT or OUTPUT command!	
S111,5083	Programming error	Wrong format parameter indicated for the INPUT or OUTPUT command!	
S111,5101	Programming error	Tool change step is not allowed while dynamic corrections are active.	Switch off sensor, oscillation prior to tool change step.
S111,5103	Programming error	Search function is not allowed while dynamic corrections are active.	Prior to 'SEARCH' step sensor oscillation and conveyor.
S111,5106	Programming error	Tool change step is not allowed during control mode CP.	Remove tool change step or switchover to control mode PTP.
S111,5120	Programming error	The sample program was not found.	

Error number	Message	Cause	Remedy
S111,5121	Programming error		The sample program must be a main program.
S111,5122	Programming error	Wrong step sequence in the sample program during definition of OCS or invalidated step.	
S111,5123	Programming error	Wrong step sequence in the sample program during definition of top layer positions or invalidated step.	
S111,5124	Programming error	Distance between root and top layer too small.	The distance between root and top layer must be more than 0.1 mm.
S111,5125	Programming error	The name of the root layer program is too long.	Only 8 characters are allowed!
S111,5126	Programming error	The root layer program was not found.	
S111,5127	Programming error	Not enough free user program memory available.	Delete programs which are not needed any longer.
S111,5128	Programming error	An error occurred when opening the program.	
S111,5129	Programming error	The OCS data file was not found or it doesn't have the correct content. Has perhaps the root program been subsequently changed?	
S111,5130	Programming error	The data file is empty.	
S111,5131	Programming error	Error in step incrementation or the data in the OCS data file are not available in ascending order.	

Error number	Message	Cause	Remedy
S111,5132	Programming error	The recorded data are not suitable for the root layer program. Modifications were made in the root layer program after recording of data.	The root must be moved along anew.
S111,5133	Programming error	The root layer program contains position variables (command VAR_POS). Transformation is impossible.	Replace position variables by POSITION steps.
S111,5134	Programming error	The transformations TDW or TKR were terminated with an error.	
S111,5135	Programming error	When reaching the END command in the root layer, path or circular movement was active. .	Only the PTP movement mode must be active when leaving the root
S111,5136	Programming error	The positions in the sample program must all be of the same type.	
S111,5137	Programming error	The positions in the root layer program must be of the same type as those of the sample program.	
S111,5138	Programming error	When reaching the END command in the root layer subprogram, the ROOTLAYER command recognized that the sensor function is in recording mode.	Only either an active sensor or a playback sensor may be selected.
S111,5139	Programming error	The TOPLAYER command recognized that the sensor function is in recording mode.	Only either an active sensor or a playback sensor may be activated.

Error number	Message	Cause	Remedy
S111,5140	Programming error	Parallel operation storage / top layer generation is inadmissible.	
S111,5141	Programming error	In the sample programs, for the command OSC_ANGLE there must not be indicated any variables, but only numerical values as parameters.	
S111,5150	Programming error	The first position variable was not found.	
S111,5151	Programming error	The second position variable was not found.	
S111,5152	Programming error	The first position variable is not valid.	
S111,5153	Programming error	The second position variable is not valid.	
S111,5154	Programming error	The two position variables contain coordinates which are defined in different coordinate systems.	
S111,5155	Programming error	The selected operating mode and the coordinate systems of the position variable are incompatible.	If #WORLD was selected, the coordinates must not be registered in the table coordinate system.
S111,5156	Programming error	Transformation error in the not displaced position (working range exceeded)	

Error number	Message	Cause	Remedy
S111,5157	Programming error	Transformation error in the displaced position (working range exceeded)	
S111,5158	Programming error	One of the selected programs contains a tool change command the variable of which was not found.	
S111,5159	Programming error	One of the selected programs contains a tool change command the variable of which is invalid.	
S111,5200	Programming error	A PLC command was inserted in a robot program.	PLC commands must only be used in PLC programs.
S111,5300	Programming error	Division by 0 in operation 'DIV'	
S111,5308	Programming error	The program change from a subprogram into another program is not allowed.	

10.1.4 S597 / Storage errors

S597,1	Storage error File wasn't stored Error: 1	Reading from disk not possible	Insert disk, read-in directory anew
S597,2	Storage error File wasn't stored Error: 2	Writing on disk not possible	Remove write protection, insert disk

S597,3	Storage error File wasn't stored Error: 3	Disk defective	Use new disk
S597,4	Storage error File wasn't stored Error: 4	Formatting error	Format disk (only possible on separate PC)
S597,5	Storage error File wasn't stored Error: 5	Disk access error (volume already mounted)	Start new access, if necessary reset disk driver software via <Order><reset>
S597,6	Storage error File wasn't stored Error: 6	Disk access error (cannot unmount volume)	Reset disk driver via <Order><reset>
S597,7	Storage error File wasn't stored Error: 7	Disk access error (volume not mounted)	Reset disk driver software via <Order><reset>
S597,8	Storage error File wasn't stored Error: 8	Error in the file name	Read-in directory of the disk anew, repeat reading process
S597,9	Storage error File wasn't stored Error: 9	File name exists already	e.g. during storage of directories, change of directory name

S597,10	Storage error File wasn't stored Error: 10	Disk is full	Use new disk or delete files on the disk which are no longer needed
S597,11	Storage error File wasn't stored Error: 11	Disk access error (semaphore error)	Reset disk driver software via <Order><reset>
S597,12	Storage error File wasn't stored Error: 12	Disk access error (read error on disk)	Reset disk driver software via <Order><reset>
S597,13	Storage error File wasn't stored Error: 13	Disk access error (write error on disk)	Reset disk driver software via <Order><reset>

11 APPENDIX

11.1 SYNOPTICAL TABLES OF THE OPERATING MODES

Tab. 11-1:EDIT–mode– menu 1/3

	Step edit	Step mark	Step del	Step v/i	Prog open	Pos edit	
							

Tab. 11-2:EDIT–mode– menu 2/3

	cut	copy	paste	Blck valid	Blck inval	Drive	
							

Tab. 11-3:EDIT–mode– menu 3/3

	Find repl	Code word			Edit mem		
							

Tab. 11-4:DIR–mode– menu 1/3

	Prog new	Prog mark	Prog del	Prog copy	Prog open	Drive	
							

Tab. 11-5:DIR–mode– menu 2/3

	Find repl	Code word	Disk open	Disk Eras	Edit mem	Prog ren	
							

Tab. 11-6:DIR–mode– menu 3/3

	Upd init	Upd					