

OPTIMO Quick-Reference

This card incorporates information from the OPTIMO Operator manual, Programmer manual.

MACHINE Power-up Procedure

1. Make sure that the laser disconnect switch is OFF.
2. Turn the Main Disconnect ON
3. Turn the Main Power switch(on the cabinet that faces the MMI) ON.
4. Turn the main air valve ON.
5. If the MMI has a separate disconnect, turn it ON
6. Turn the laser disconnect switch ON.
7. ALL emergency push-buttons are released.
8. If the sensor is to be used, make sure that the reference arm is in position and latched.
9. Turn the CNC key switch ON, then release it. The handbox display will show "SELF TESTING" which indicates that the system is initializing and performing the self-diagnostic routine. If no controller hardware problems are found the display will show ERROR 958
10. Press the SERVO ON button to apply power to the servo drive system. (if the green SERVO ON lamp does not illuminate, check air pressure, E-stop switches, cabinet doors, etc.)
11. Press the ALARM RESET illuminated push-button (pbp 8).

(If the lamp goes on, check the MMI display or handbox display for alarm number.)

NOTE: Failure to clear the handbox alarm display can result in incorrect alarm numbers being reported at the MMI screen.

The handbox display should now show:

P = 00 S = 0000 I = XXXXXXX

LASER Power-up Procedure (EFA-51)

Turn the CHILLER selector switch to ON (PBP 26)

Turn the laser gas ON (105 psi minimum)

Turn the LASER keyswitch to START and release. (PBP 12)

The LASER POWER lamp (PBP 11) should be ON and the automatic start-up procedure should commence.

When turned ON, the laser will evacuate its resonator system to an absolute pressure of about 2 Torr, as indicated on the LCS screen. The laser then fills with working gas.

If system safeties permit, the laser discharge will start.

Allow the laser to warm up (making power) for 10-15 minutes before testing, tuning, or using.

11. ZERO the system by pressing the ZERO & HOME push-button (pbp 5). The handbox will indicate ZERO AXIS during the operation, then display the execution of the home return program. The MANUAL and AUTO lamps should flash when the operation is finished. If they do not, it means that the robot is not in the "home" position, or the photoelectric switch on the beam doesn't see the Y-carriage.

When the MMI computer has initialized, perform the login procedure. (press the USER LOGIN key on the screen, then select LOGON. At the prompt, type in your "username" and press ENTER. A prompt for PASSWORD should appear - type in your password, and press ENTER. If password and username are accepted, then the access level will be updated. Press the DONE key to continue the start-up sequence. At this point the system is ready for operation.

NORMAL POWER OFF PROCEDURE

Return the machine to the home position.

At the LCS screen, select **O**ptions, then **B**egin **L**aser **S**hutdown procedure

Follow the on-screen instructions.

Turn the CHILLER selector switch (PBP 26) OFF.

Perform the MMI Shutdown procedure. (System Manager screen, SYSTEM SHUTDOWN pb.)

Turn the CNC key selector on the pushbutton panel OFF (pbp 2).

Turn the dust collector and chiller OFF. (pbp 26, 27)

Shut the laser gas off

Turn the main power switch (on the cabinet facing the MMI) OFF.

Turn the system Main Disconnect OFF.

Turn the system main air valve OFF.

HANDBOX

The handbox may only be in REMOTE or MANUAL unless the system is in program mode. Removing the handbox from its cradle or switching it into SINGLE, CYCLE, or REPEAT creates a SYSTEM ALARM except during PROGRAM MODE.

PROGRAM MODE

To enter program mode:

1. Select MANUAL on the push-button panel. (Push Button Panel item 34)
2. Turn the SHUTTER ENABLE key to OFF. (pbp 12)
3. Turn the PROGRAMMING MODE selector to ON (pbp 36) .The green PROGRAM MODE lamp will flash. (pbp 35)
4. Remove the handbox from its cradle.
5. Open the operator entry door. The handbox must stay in "REMOTE" until the operator door is open. The green PROGRAM MODE lamp will now illuminate, indicating that program mode is active.

To exit PROGRAM mode:

1. Switch the handbox to REMOTE
2. Close the operator entry door. The green PROGRAM MODE lamp will flash.
3. Place the handbox in its cradle.
4. Turn the PROGRAMMING MODE key OFF. The AUTO and MANUAL lamps should now flash, indicating that the system is ready for further operations.

For further information, see the OPTIMO OPERATOR MANUAL or the OPTIMO PROGRAMMING MANUAL

OPERATIONAL MODES

(see also System States on the opposite side of this sheet)

When a SYSTEM ALARM occurs, any active console mode is cancelled.

CONSOLE STATE	HANDBOX "MODE"	PURPOSE
WAITING status	REMOTE	System is in "standby". MANUAL and AUTO pbs flashing. Select desired console or handbox mode.
MANUAL	REMOTE	HOLD, ZERO/HOME pbs flashing. Permits manual operation of gates, load/unload system. Run special programs (Z-UP, SENSOR CALIBRATE), error recovery
MANUAL / PROGRAM	ANY	Green PROGRAM MODE lamp is ON. For program creation/ test from handbox in work area.
none	MANUAL	Console lamps off. Can jog axes, turn outputs ON/OFF, etc. (handbox must remain in cradle to avoid SYSTEM ALARM)
none (SYSTEM ALARM)	ANY	Unless in PROGRAM mode, system alarm occurs when handbox is set to SINGLE, CYCLE, or REPEAT. Can't run program in alarm condition without using the ZERO key to "DISABLE AXIS".
AUTO	REMOTE	AUTO pb is ON. HOLD and CYCLE START pbs flashing. Run program(s) from console or gates for cutting test, production
The console must be in WAITING status (AUTO and MANUAL flashing, no alarms active) before a state may be selected.		

Program Number Assignments

Number	Purpose
1	Sensor auto-calibrate
2	Z-axis UP
3	used by the laser beam analysis system
4	Home Return.
5-7	used for optics alignment
8	console "launch" program
9	left gate "launch" program
10	right gate "launch" program
11-19	customer use (as sub-programs, or etc.)
20-79	part-programs
80-89	programmer utilities (customer use)
90	TCP instruction (for actual tip length)
91, 92, 97, 98	reserved for Laser Probe system (option)
93, 94	open
95	activate TCP (can activate by CALL or FUNCTION)
96	used for TCP setting
99	Rotary Table command LAUNCH Programs

Laser Control

The LCS has complete authority over the laser. Power, pulse mode, etc. are set using the LCS or by selecting "laser Schedules" from the handbox or part-program.

C-Axis Sensor

Sensor ON: OL[11] = ON

Cutting Gas Selection

Gas 2 select: OL[8] = ON

Gas 3 select: OL[9] = ON

Gas 1 select: both outputs (OL[8], OL[9]) = OFF

GAS/AIR selection done from CUTTING SETUP screen of MMI.

OR use PLC Communications to set I1520=1

(format: in Visualization Mode, type S11520=1)

Program variables

Variables are classified as logical, integer, and real (floating-point) variables.

Variables converted between Inch, Metric formats

LINEAR	ROTARY
(inch/mm for X, Y, Z axes)	(degree/radian for A, B axes)
VR[0], VR[1], VR[2].	VR[3], VR[4]
VR[5], VR[6], VR[7]	VR[8], VR[9]

VR[10], VR[11], VR[12]	VR[13], VR[14]
VR[15], VR[16], VR[17]	VR[18], VR[19]
VR[20], VR[21], VR[22]	VR[23], VR[24]
VR[80].VR[88]	VR[89], VR[90], VR[91]
VR[92], VR[93], VR[94]	VR[95], VR[96], VR[97]

All VR variables not listed above do not have any predefined units. Literals associated with these variables will not be converted. Integer and Logic variables and all I/O variables are unaltered by CONVERT.

Assignment of REAL variables

variables for customer use (coordinates, etc.)

Variable:	Purpose:
VR 0-25	These (VR[0] - VR[25]) have linear/rotary assignments
VR 26-39	open (not altered by CONVERT.)

These are suitable for passing values to the optional Rotary Table System (FUNCTION 99) and specifying laser Schedules in Workdef 1,nn and Workdef 2,nn

VR 40 - 42	* loader table offsets (not altered by CONVERT.)
VR 43-59	Reserved by AMADA (programs 1-7, etc)
VR 60-97	Customer use: suggested assignments follow
VR 60-63	work 1,00
VR 64	speed 1
VR 65-68	** work 1,01 (PROBE TCP)
VR 69	** speed 2 (PROBE TCP)
VR 70-73	work 1,02
VR 74	speed 3
VR 75-78	** work 1,03 (PROBE Scan Data)
VR 79	** speed 4 (PROBE Scan Data)
VR 80-83	TCP (if used, current TCP must be kept in program 90)
TCP (VR[80], VR[81], VR[82], VR[80], VR[81], VR[83])	
VR 84,85	open
VR 86-91	*** SYSDEF 1 (vr[86] = X, vr[87] = Y, vr[88] = Z)
VR 92-97	*** SYSDEF 2
VR 98-99	Reserved by the system.

* when Load-Unload system is present.

** when Optical Probe system is present.

*** Used by RMLSHIFT when Load-Unload system is present

READ ONLY variables

Variable	purpose
IL[16]	Status of START push-button: Can use in program as MOVE (X _n , Y _n , Z _n , a _n , b _n) /START (IL[16])
This means that the machine will not execute the MOVE instruction to (X _n , Y _n , Z _n , a _n , b _n) until a START pb (on console or at either gate) is pressed.	
IL 87-94	work flag process 0-7 (1=work ON)
IL 95	motion flag OPTIMO (1=moving)
IL 96-99	reserved
X = IA[0]	position values (X, Y, Z) when COORD ABSOL is active refer to the Tool tip
Y = IA[1]	When COORD ROBOT is active, values of X, Y, Z are for the Z-axis column at the intersection of A-Axis and B-axis centerlines. Head angles are the same in either ROBOT or ABSOL.
Z = IA[2]	
A = IA[3]	
B = IA[4]	
IA 09-35	reserved
OA 0	speed
VI 98	execution counter for current program
VI 99	most recent error code

System States

The system can be in any of several "states", determined by the system PLC. Here's a depiction of the main system "states"

