Laser machine check list

Aamada Laser America

Ver. 1.0

Jan. 27 2003

Z-Axis sensor

1. Will not calibrate.
2. Z-Axis going up.
3. Z-Axis bounces.
4. Z-Axis smash the material
5. TRACE ALARM
6. TRACE DATA ERROR

1. Will not calibrate.

1-1. ☐ Small connector on the sensor cone is not damaged?
1-2. ☐ Check wire connection. (Sensor cone, BNC relay bracket, HS-3(brown cable) and BNC bracket)
1-3. ☐ Nozzle is tightened enough?
1-4. ☐ Check the nozzle tip and clean up to make sure no sludge and no spatter.
1-5. ☐ No sludge and spatter around female thread for nozzle on the sensor cone?
1-6. ☐ Washer for nozzle is clean?
1-7. ☐ Check conduction of sensor cone. (See figure on following page.)
1-8. ☐ Check conduction of sensor cable. (See figure on following page.)
Only WACS
1-9. ☐ Inner nozzle and Outer nozzle have proper O-Ring?
1-10. ☐ Mist angle is OK? (O8000)
1-11. ☐ Run "Water flashing program (O8002)".
1-12. ☐ Check inside of inner nozle, to make sure no sluge and no spatter.

2. Z-Axis going up.

2-1. ☐ Small connector on the sensor cone is not damaged?
2-2. ☐ Nozzle is not hot?
2-3. ☐ Nozzle is tightened enough?
2-4. ☐ Check the nozzle tip and clean up to make sure no sludge and no spatter.
2-5. ☐ Check wire connection. (Sensor cone, BNC relay bracket, HS-3(brown cable) and BNC bracket)
2-6. ☐ Run "Calibration program (O8010)".
2-7. ☐ Check Z-Axis motion commanding "G31R_(R:Nozzle gap)" in MDI mode.
Only WACS
2-8. ☐ Inner nozzle and Outer nozzle have proper O-Ring?
2-9. ☐ Amount of water is not too much?
2-10. ☐ Mist angle is OK? (O8000)
2-11. ☐ Outside of cone has no condensation?
2-12. ☐ Use distilled water or drinking water for tank?
2-13. ☐ Use proper solution for the tank and mix ratio is 1-3%?
2-14. ☐ Check inside of inner nozzle to make sure no sluge and no spatter.
2-15. ☐ Check Z-Axis motion with "Motion check program"(O8003).

3. Z-Axis bounces.

3-1. ☐ Check the nozzle tip and clean up to make sure no sludge and no spatter.
3-2. ☐ Nozzle is tightened enough?
3-3. ☐ Material is not vibrating?

3-4. ☐ Nozzle is not too close to the edge?
3-5. ☐ Sensor gain parameter (P15540) is OK? (See information on following page.)
3-6. ☐ Sensor parameter (P15550 and 15551) is OK? (See information on following page.)
Only WACS
3-7. ☐ Inner nozzle and Outer nozzle have proper O-Ring?
3-8. ☐ Amount of water is not too much?
3-9. ☐ Mist angle is OK? (O8000)
3-10. ☐ Use distilled water or drinking water for tank?
3-11. ☐ Use proper solution for the tank and mix ratio is 1-3%?
3-12. ☐ Check inside of inner nozzle to make sure no sluge and no spatter.
3-13. ☐ Check Z-Axis motion with "Motion check program"(O8003).

4. Z-Axis smash the material

4-1. ☐ Z-Axis sensor is ON? ("Trace OFF" lamp should OFF)
4-2. ☐ Material thickness on the cutting condition table is the same or thicker than material on the machine?
4-3. ☐ "Follow start height" on the parameter screen is more than 10mm?
4-4. ☐ No "G93Z_" command in the program?
4-5. ☐ Check wire connection. (Sensor cone, BNC relay bracket, HS-3(brown cable) and BNC bracket)
4-6. ☐ Check Z-Axis motion commanding "G31R_(R:Nozzle gap)" under the MDI mode.
4-7. ☐ Slat height is not higher than normal?

5. TRACE ALARM

5-1. ☐ Check the nozzle tip and clean up to make sure no sludge and no spatter.
5-2. ☐ Nozzle is tighten enough?
5-3. ☐ Check wire connection. (Sensor cone, BNC relay bracket, HS-3(brown cable) and BNC bracket)
5-4. ☐ Z-Axis sensor followed the material?
5-5. ☐ Z-Axis position is not above 25mm? (Cancel switch is in the Electric box.)
5-6. ☐ Not to use "A3 Pierce" with "Trace OFF"?
Only WACS
5-7. ☐ Inner nozzle and Outer nozzle have proper O-Ring?
5-8. ☐ Amount of water from nozzle is not too much?
5-9. ☐ Mist angle is OK? (O8000)
5-10. ☐ Use distilled water or drinking water for tank?
5-11. ☐ Use proper solution for the tank and mix ratio is 1-3%?
5-12. ☐ Check inside of inner nozleto make sure no sluge and no spatter.
5-13. ☐ Check Z-Axis motion with "Motion check program"(O8003).

6. TRACE DATA ERROR

6-1. ☐ Nozzle gap on the cutting condition (E1-E10) should 2.2mm (0.866inch) or less.

15540	ZTCGM
0296	ZTCGM

ZTCGM Conversion factor for feedrate control voltage in Z–axis tracing control

Type of Machine	15540
LCA, LCV-B, Theta, Delta	400-800
FO 30 I/F (Ser.001-022, 024-25)	400-800
FO 24 I/F (Ser.023, 036 and after)	50-100

15550	APRCH
0251	APRCH

APRCH Approach completion detection range
Set a range of displacements assumed to represent approach completion in Z–axis tracing control. Approach completion is assumed when the state where displacements lie within a specified approach completion detection range continues for the approach completion time interval (APINT) or longer.

[Setting range] 0 to 32767

[Unit] 0.001 mm

Original setting	Setting range
100	100-200

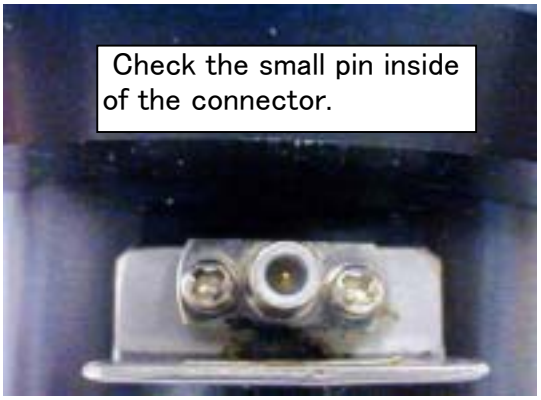
15551	APINT
0298	APINT

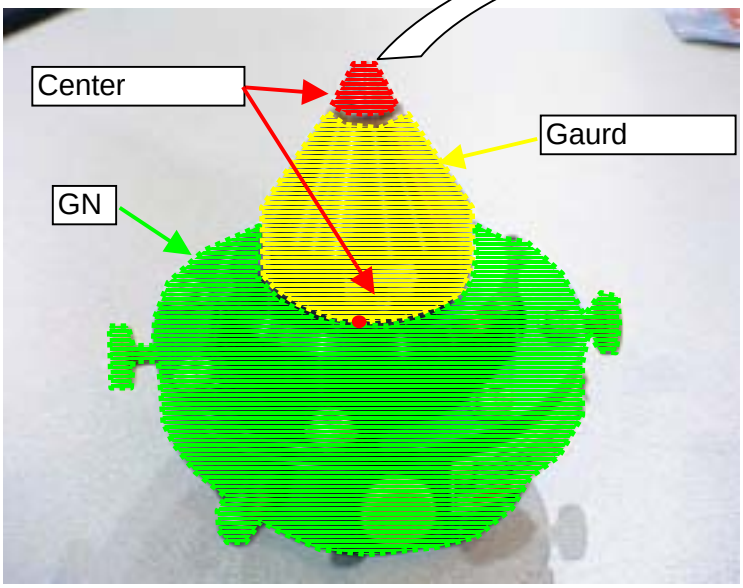
APINT Approach completion time interval
When the state where displacements lie within the specified approach completion detection range continues for the time set in this parameter or longer, approach completion is assumed in Z–axis tracing control.

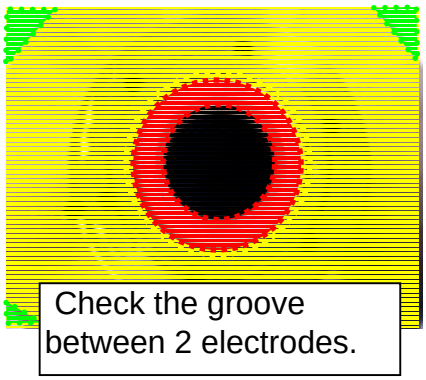
[Setting range] 0 to 32767

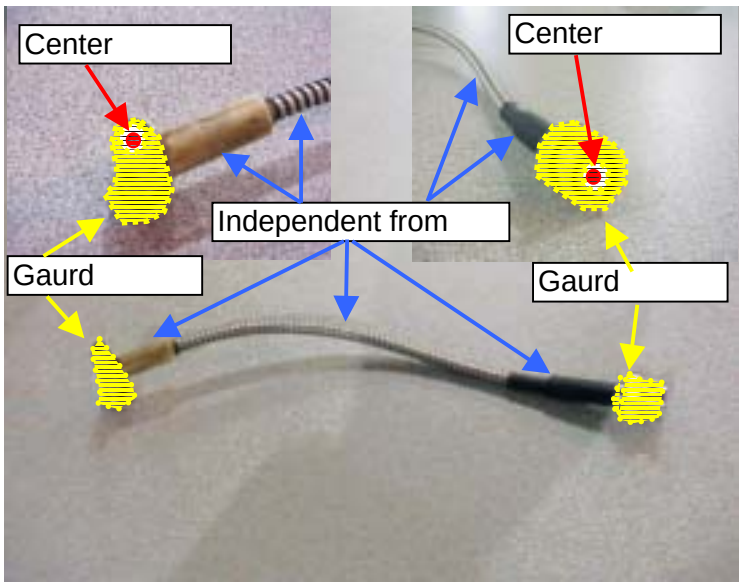
[Unit] msec

Original setting	Setting range
15	10-15









Sensor head has 2 different electrodes, ("Center Electrode" and "Guard Electrode"). These 2 electrodes should be isolated from machine frame, (GND). Furthremore, connector on each side of the cable and BNC relay bracket are not insulated. Check these connectors, make sure they do not to touch GND.

WACS

1. No water coming out.
2. Amount of water is unstable
3. Water leak from Cutting head

1. No water coming out.

1-1. ☐ Any air supply to the tank?
1-2. ☐ Any water in the tank?
1-3. ☐ Quick connector is hooked up?
1-4. ☐ No air bubbles in the line?
1-5. ☐ Air coming out from cutting head?
1-6. ☐ Proper clearance between inner nozzle and outer nozzle?

2. Amount of water is unstable

2-1. ☐ Proper pressure to the tank?
2-2. ☐ Proper level of the water in the tank?
2-3. ☐ No air bubbles in the line?
2-4. ☐ Filter beside the tank is clean?
2-5. ☐ Proper clearance between inner nozzle and outer nozzle?
2-6. ☐ Flush out the gummy inside of the spray block?*
* Solution will bacome gummy after water evapolation.

3. Water leak from Cutting head

3-1. ☐ Proper pressure to the tank?
3-2. ☐ Inner nozzle is tight enough?
3-3. ☐ Outer nozzle is tightened to proper position?
3-4. ☐ Inner nozzle and Outer nozzle have proper O-Ring?
3-5. ☐ Every fitting has teflon tape and tightened enough, if leaking from fitting?
3-6. ☐ Plastic parts around nozzle thread is not damaged?
3-7. ☐ Have ever burned the nozzle or O-Ring around the nozzle?*
*O-Ring on the other side of thread may damaged, because of heat.

Assist gas

1. Cannot get any pressure on the cutting head
2. Cannot get commanded pressure on the cutting head
3. Gas pressure undershoot
4. ASSIST GAS PRESSURE BELOW MINIMUM Alarm

1. Cannot get any pressure on the cutting head

1-1. ☐ Valve on the tank is open?
1-2. ☐ Enough pressure to machine?
1-3. ☐ Pressure on the regulator (beside tank) drops greatly when solenoid open?
1-4. ☐ The line between tank and machine is OK?
1-5. ☐ Sensor head flange has a O-Ring?
1-6. ☐ Any lens in the cutting head?

2. Cannot get commanded pressure on the cutting head

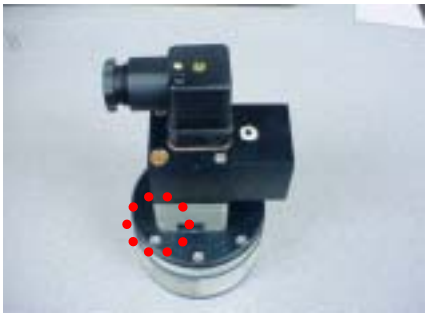
2-1. ☐ Enough pressure to machine?
2-2. ☐ The line between tank and machine is proper size (1/2")?
2-3. ☐ Filters, (machine inlet and beforeNC gas regulator) are clean?
2-4. ☐ Pressure on the regulator (beside tank) is not drop so much when open the solenoid?
2-5. ☐ Sensor head flange has a O-Ring?
2-6. ☐ Any lens in the cutting head and lens is tight?
2-7. ☐ Adjustments of the "NC gas regulator" and "NC gas control board" are OK?
2-8. ☐ "Pilot orifice screw", on NC regulator, screen is clean? (See following picture.)

3. Gas pressure undershoot

3-1. ☐ Quick Exaust solenoid is enable? (Macro value #905 should "1")*
* FO series only
3-2. ☐ Adjustments of the "NC gas regulator" and "NC gas control board" are OK?

4. ASSIST GAS PRESSURE BELOW MINIMUM Alarm

4-1. ☐ Gas tank is not empty?
4-2. ☐ Actual gas pressure reached to commanded pressure?
4-3. ☐ Adjustments of the "NC gas regulator" and "NC gas control board" are OK?



Lens

1. General check
2. Lens gets spots

1. General check

1-1. ☐ Focal length matches material type & thickness on chart?
1-2. ☐ Lens is clean? Not clouded? Not spattered?
1-3. ☐ Lens adapter is the one for the lens?
1-4. ☐ Lens case and lens adapter is clean? Dust may drop onto lens.
1-5. ☐ Lens does not have spots? If it has several spots, cannot get good performance.
1-6. ☐ Lens and adapter are tightened enough to the cutting head?

2. Lens gets spots

Lens gets spot with following condition.
(High gas pressure, High laser power and narrow nozzle gap.)

2-1. ☐ Using "Shutterless mode" for piercing?
2-2. ☐ Pierce type is match to chart?
2-3. ☐ Enough gas flow (0.05MPa or more) for pierce?
2-4. ☐ Nozzle gap is OK?

Nozzle

1. General check
2. Nozzle getting hot

1. General check

1-1. ☐ Nozzle type matches material type & thickness on chart?
1-2. ☐ Not using "Double Nozzle" with "5 inch" lens?
1-3. ☐ Nozzle does not have damage, (inside & outside)?
1-4. ☐ Nozzle tip is clean? (No sludge? No spatter?)
1-5. ☐ Nozzle is tighen enough?

2. Nozzle getting hot

2-1. ☐ Lens adapter is the one for the lens?
2-2. ☐ Nozzle alignment is OK?
2-3. ☐ Not using "Double Nozzle" with "5 inch" lens?
2-4. ☐ Focal base point and focal point are OK?
2-5. ☐ Quick connecter is hook up and air coming out, if using ECO head?
2-6. ☐ Cutting was OK? (No blow out? No reflection beam?)

Beam delivery

1. Beam alignment movement
2. External mirrors getting dirt at the short term

1. Beam alignment movement

1-1. ☐ Bend mirrors are set on the bend mirror block steady? No play?
1-2. ☐ The knobs to hold bend mirrors are OK?
1-3. ☐ Lock screws next to the alignment screws are tightened enough?
1-4. ☐ Water line and cable for the mirrors are not makinig stress to bend mirrors?
1-5. ☐ Nothing makes stress to bend mirror when move axis?
1-6. ☐ Any jack bolts are not loosen? No play in the base plate?
1-7. ☐ All jack bolts are tightend against the base plates?
1-8. ☐ All base plates are tightend against the foundation?
1-9. ☐ No big vibrations on the same foundation? (Acceleration:0.05G or less, Vibtarion amplitude:5μm)

2. External mirrors getting dirt at the short term

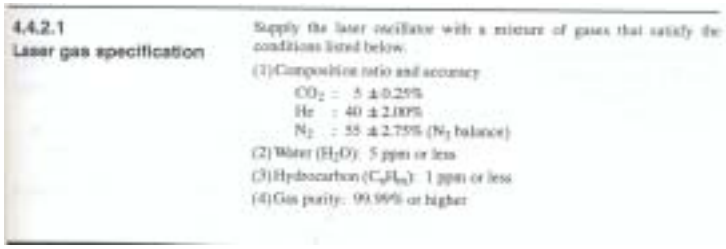
2-1. ☐ All of the covers for the beam path is closed? No break, no hole on the bellows?
2-2. ☐ All of the beam purge is through the ORION Filter?
2-3. ☐ The volume from ORION Filter is proper?
2-4. ☐ Shop air is clean enough? No water mist? No oil mist?
2-5. ☐ Power cable inlet to oscillator is plugged with expandable form?
2-6. ☐ Inside of beam path is clean enough?

Oscillator

1. Power supply alarm

1. Power supply alarm

1-1. ☐ Temperature of the water is OK?
1-2. ☐ Laser gas mixture is correct? (See information below)
1-3. ☐ No external leak? No leak from regulator?
1-4. ☐ No internal leak?
1-5. ☐ The tube for the laser gas is the one FANUC authorized?
1-6. ☐ The gas bottle is from reliable supplier?
1-7. ☐ Check the parameteres for oscillator to "Data Sheet"?
1-8. ☐ Compare "Voltage" and "Current" to "Data Sheet" at 0W and full power.
1-9. ☐ Try to change to another gas bottle?



4.4.2.1
Laser gas specification

Supply the laser oscillator with a mixture of gases that satisfy the conditions listed below.

(1)Composition ratio and accuracy
CO_2 : 5 ±0.25%
He : 40 ±2.00%
N_2 : 55 ±2.75% (N_2 balance)
(2)Water (H_2O): 5 ppm or less
(3)Hydrocarbon (C_nH_m): 1 ppm or less
(4)Gas purity: 99.99% or higher