ready reference v1.0

for sorter users

NADA-ELITE tech

for ns series wafer sorters

safety – section 1

mechanical safety

- the system is designed with a cabinet that is mechanically locked with latches.
- requires a key or special tool to obtain access to electrical components.
- access to the locked areas are restricted to those authorized personnel with maintenance functions.

CAUTION

the robot is equipped with a torque-sensitive limit that terminates robot motion if resistance is encountered.

electrical safety

- there are no voltages exposed to the operators during normal equipment operation.
- maintenance safety is maintained by physical barriers plus adherence to the proper lockout / tag out procedure.
- there are additional safety barriers internal to the unit such as terminal guards over the EMO switch terminations and physical covers.
- voltages, internal to the unit, over 24v are covered in all cases.

CAUTION

There are no electrical interlocks on main units or internal power boxes.

operating noise level

- for aural safety, operating equipment measures no more than 80 dB(A).
- during operation, SMS noise levels are significantly less than 80 dB(A).

safety – section 1

safety labeling

- various labels appear at strategic locations on the equipment.
- this section shows labels used and their meanings.

1. moving parts present

- robot and pre-aligner move.
- NEVER put hands inside robotic work area.

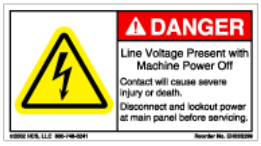
2. hazardous voltages inside

- system uses electricity to function.
- be aware that inside of tool cabinet, hazardous voltages are present.
- this label is found on all removable panels.

3. automated machinery

- equipment can run in ONLINE mode.
- in this mode, sorter may start unexpectedly.

4. internal voltages

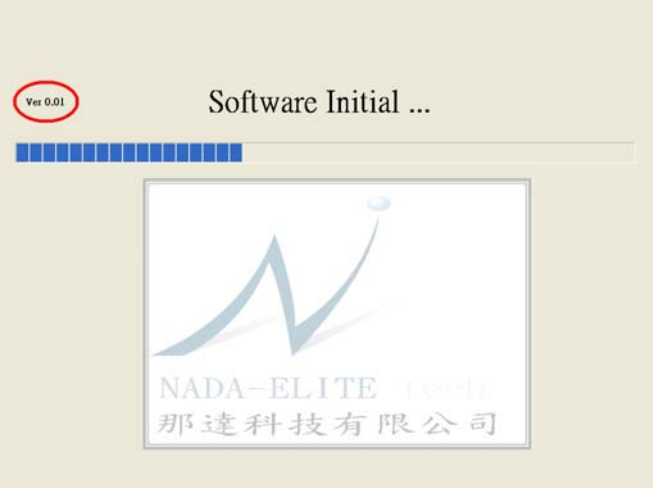


- internal labeling on power distribution boxes and ups cable labeling.
- system still has hazardous voltages present even with power turned off.

starting up - section 2

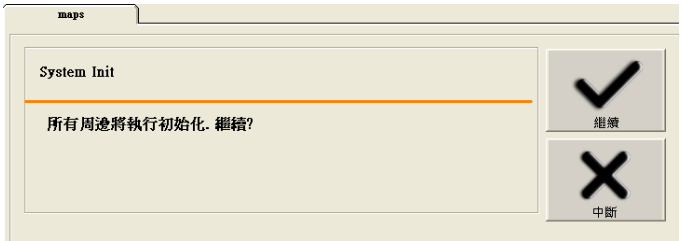
software startup

- tool automatically boots into NADASorter.exe.
- load screen indicates NADASorter.exe version.



- version number should be noted if technical help is required.

system initialization



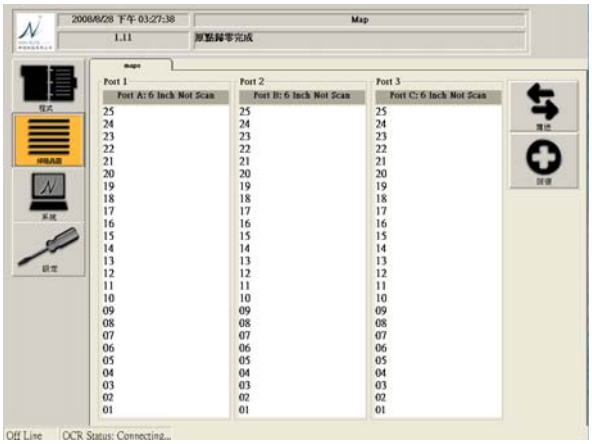
- press the ✓ button to begin system initialization.
- press the ✗ button to NOT init system. the tool cannot be run without being init.
- initialization will home robot and any peripherals.

starting up - section 2

- the init process should take less than 30 seconds to complete.
- check alarms **section 8** for details, if system fails to init or if abort is pressed during initialization.

successful system startup

- the Map run screen will be shown after successful initialization.



- the  button selects the screen for automated sorting recipes.
- the  maps button shows the system cassette maps.
- the  maps runtime screen also allows simple wafer transfers.
- the  system button selects system level functions screen.

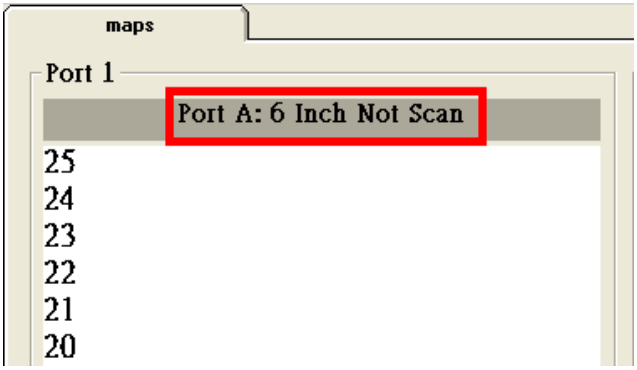
running the system

- to do simple wafer moves select  and go to section 4.
- to run recipes, stay on the  screen and go to section 6.

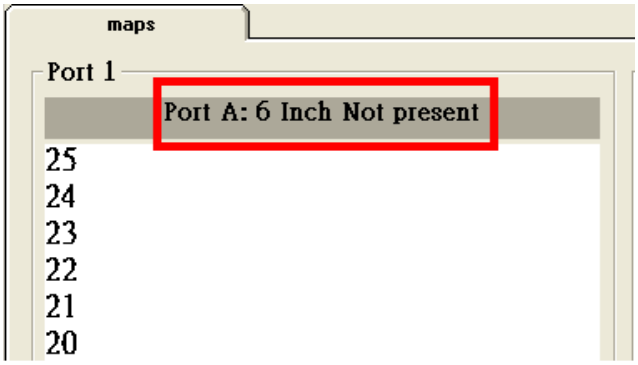
load/unload - section 3

place carriers onto station(s)

- for inx/tilt station A is on left side when facing the tool.
- for inx/tilt station B is on right side when facing the tool.
- place carrier squarely onto open/inx/tilt station.
- for tilt - H-BAR of carrier goes towards robot. handle end of cassette will be to outside of tool.
- carrier not present map indication.



- carrier successfully loaded map indication.



- be ABSOLUTELY sure carrier is squarely sitting in station after loading.
- if tool type is open carrier type go directly to moving wafers section 4 or recipes section 6.

load/unload - section 3

loading carrier to robot

- select the  maps button.
- select the  or  load carrier button.
- any inx/tilt station that detects that it has a carrier in place will be loaded to the robot.
- for tilt - NO WAFER ALIGNMENT WILL BE PERFORMED. this is to increase throughput for simple wafer transfer operations.
- robot will map carriers as shown below.

- after inx/robot has finished scanning, wafers are ready to be moved. see section 4.
- example of carriers at robot, scanned and ready for moves.

move wafers - section 4

transfer wafers button

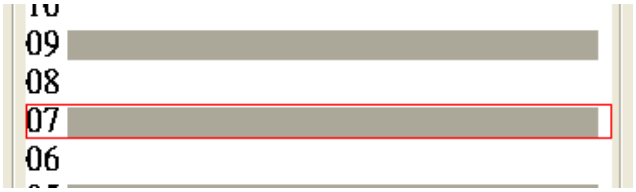
- select the  transfer button.
- the transfer dialog will be displayed.

- this dialog allows moving of wafers from any slot to any slot.
- the “start” button begins the wafer moves.
- the “same order” check box, keeps the wafer order the same as wafers are transferred.
- under select tools there is an “undo” feature. to “undo” the last wafers selected and a “group select” feature to move wafers in groups.
- the “Keep slot” check box, keeps the wafer order the same as wafers are transferred, an engineer can change and user can’t change.

selecting wafers

- using the left mouse button, click on a wafer to be moved.
- the wafer selected will then have a box around it.

move wafers - section 4

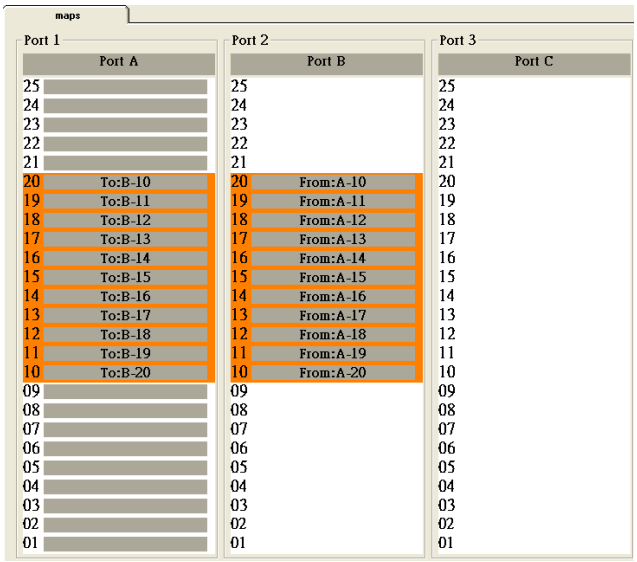


selecting wafers

- continue clicking on wafers and they will continue to be highlighted.
- IMPORTANT: on last wafer to be selected, click and hold down button.
- selected wafers have to be “dragged” to open slots so last wafer to be selected must remain selected.

moving wafers

- IMPORTANT: if you forget to leave last wafer in transfer selected, simple click on it again, and hold mouse button down.
- with last wafer to move still selected with mouse down, drag the wafer to empty slots.
- the “To” and “From” slots and wafers will be indicated inside each object.

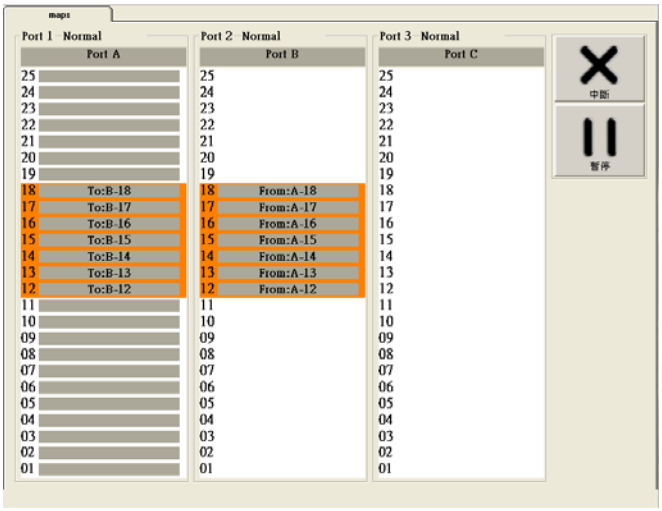


- the undo button can be hit to undo any incorrect transfers.

move wafers - section 4

moving wafers

- wafers in transit shown.



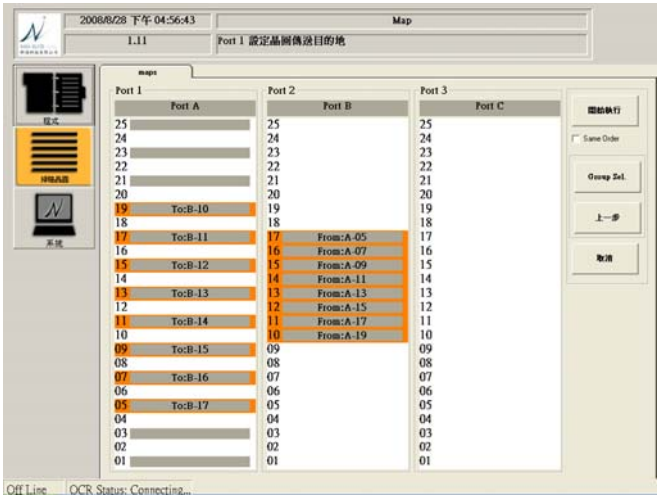
- press the “abort” button, to stop transfers. the abort will stop at the next wafer to move.

moving with group select

- select the 

group select button.
- select the first wafer in the group (block) of wafers to move.
- select and hold button on end wafer in group (block) of wafers to be moved.
- all wafers between the first and end selected wafers will become highlighted.

move wafers - section 4



- proceed with drag transfer and press start button.

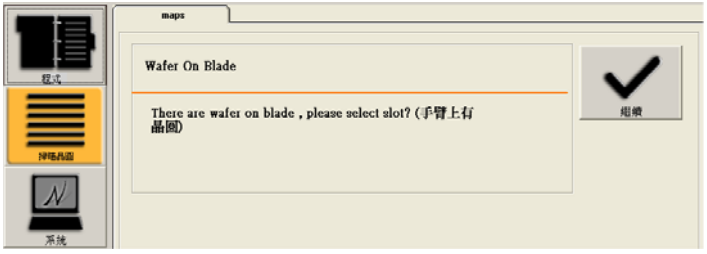
wafer rescue - section 5

stranded wafers

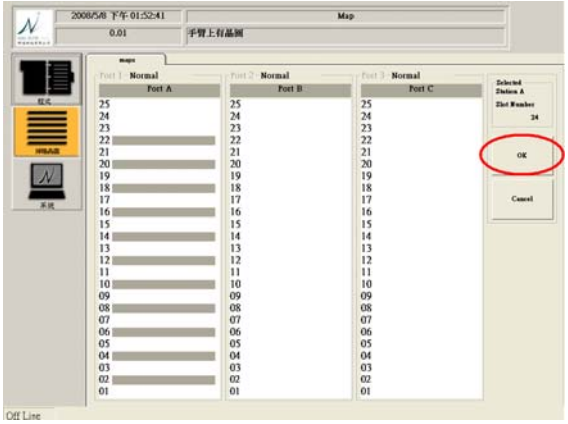
- stranded wafers are wafers which have been left in system.
- stranded wafers are typically the result of a process being canceled or aborted.
- stranded wafers need to be “rescued” back to a cassette.

wafer rescue

- select the  maps button to show the system cassette maps.
- select the  rescue button.
- if a wafer is found on a robot paddle the following dialog will be displayed.



- press the  button to start rescue.
- the slot/wafer don’t selection dialog will be presented.
- Press “ok” to rescue the wafer off robot to a cassette.
- the cancel button will NOT allow exiting. the wafer MUST be rescued to continue.



recipes – section 6

recipe overview

- rbuilder is a gui based recipe building utility.
- built upon simple sorting script language.
- complex sorts can be created in a few script lines.
- series of gui helpers facilitate script input.
- editing can be done in password level 0 or lower. running can be done at 0,1 or 2.
- click on the  icon to display the rbuilder recipe screen.

- select a recipe in recipe listing box.
- ”run recipe” and ”edit recipe” buttons are available on the recipe screen depending on password level.
- pressing the “run recipe” button will run the selected recipe.
- pressing the “edit recipe” button will edit the recipe selected.

recipes – section 6

pressing run

- select recipe.
- select options if available.
- press the run button.
- recipe will start processing and run screen will appear.

- section 7 on pausing and aborting.
- after recipe has completed, recipe tab will be available again.

pressing edit

- the recipe information + cassette and station setup screen will display.
- recipes can be controlled from this screen.
- recipe name, description and date of last modification will display.

recipes – section 6

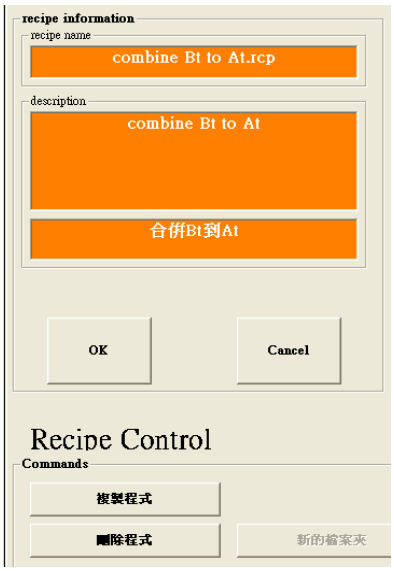
- rbuilder can also display Chinese friendly names.

recipe control

- an existing recipe can be copied as new recipe with new name.
- new recipe sub folder can be created.
- recipes can be deleted.
- changes to a recipe can be saved.
- user can return to recipe run screen with “exit editor” button.

creating new with copy

- recipe are created by taking an existing one and creating a new one with the copy command.
- this method allows the transfer of typical setup to flow from one recipe to the next.
- click the "copy recipe" button.
- the recipe “name” and “description” box background color will change to orange.
- enter the new name of the recipe in the “recipe name” text box. the “.rcp” extension is required.
- enter a short description of what the recipe does in the “recipe information” text box.



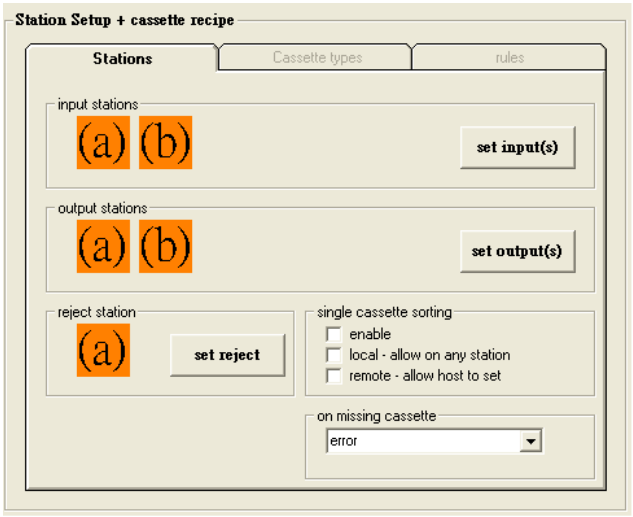
recipes – section 6

creating new with copy

- press ok to save the new recipe or cancel to return to original.
- by pressing ok, you will be able to make changes to the new recipe. the original recipe is un-effected.

station setup

- on the stations tab, user can set input, output, and reject stations.

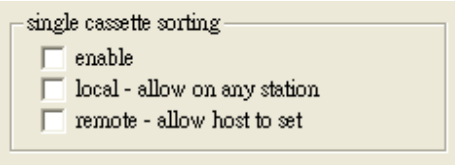


- to select input, output and reject stations click the appropriate button, a list of options will appear.
- from the list you can add stations, remove stations, clear or exit.
- select the stations you wish to use as input, output and reject.
- TIP: you can reset input, output and reject station settings, click on the “single cassette sorting” “enable” checkbox to select it, then deselect “single cassette sorting”.

single cassette sorting

- single cassette sorting is VERY important feature.

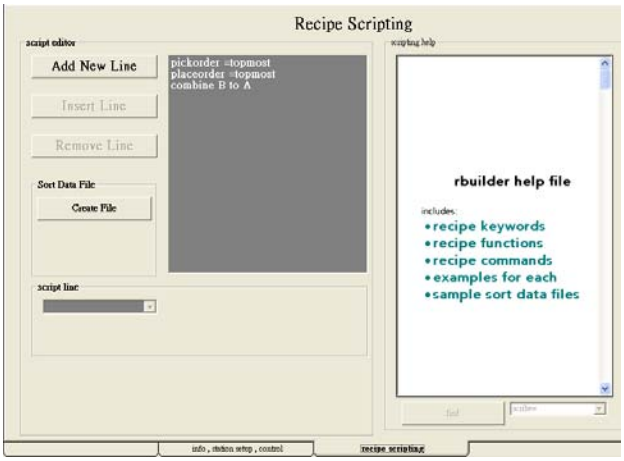
recipes – section 6



- enabling this feature forces the recipe to only work inside of one cassette.
- cassette works as input and output.
- this allows for 2 very important features.
  1. the ability for sort to be used on any port in local mode.
  2. ability for sort to be used on any port in remote mode.
- this allows recipe to in fact be “queue-able” on a multi-port tool.

scripting

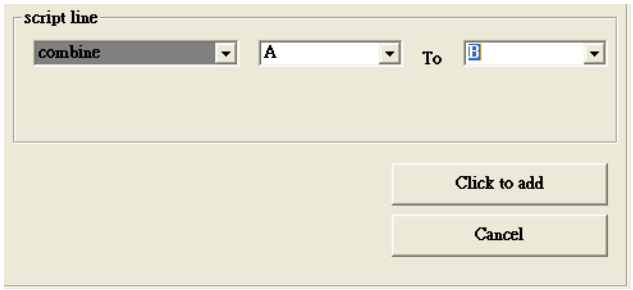
- click the recipe scripting tab.
- a recipe’s “process” is created here.



- recipe executes each line, top down, line by line.
- use “add new line” to create new recipe step. “cancel” will abort line add.
- “insert line“ allows the insertion of code between existing lines of script.
- “remove line” deletes a selected line.
- “create file” moves user to helper to create data files for file based sorts.
- help screen on right gives all information on script syntax.

recipes – section 6

- when adding a line or inserting a line, the script helper will appear below the script window.



- here recipe keywords, command and functions can be added.
- helpers appear to allow selection of parameters that go with each command.
- press the “click to add” to add line to script or cancel.
- the new script line will appear if added at bottom of script.
- if inserted it will appear on the line before the one selected for inserting.

script keywords

- keywords are recipe setup options.
- they can be completely omitted or set to "unused".
- keywords can be used at any point in recipe file to affect recipe behavior.

pickorder=

describes the direction wafers are picked from. ie bottom up / top / keepslot down.

pickorder=bottom
pickorder=top
pickorder=keepslot
pickorder=unused (this is the don't care setting)

placeorder=

describes the direction wafers are place. ie bottom up / top down.

placeorder=bottom
placeorder=top
placeorder=keepslot
placeorder=unused

recipes – section 6

"keepslot" maintains the slot location from where wafer was picked. cassette is don't care.

scribe=

sets the single scribe type to use for ocr sorting.

scribe=InHouse
scribe=Production
scribe=Vendor
scribe=unused

script keywords

loop=

another way to create a looping type recipe for testing the parm is the line # of the command or keyword you need to jump to. this is limited # of loops by the second parm. abort must be pressed to stop recipe execution.

loop=0,10 - goes to top of recipe and starts over
loop =0,5000
loop =unused

* in smif and tilt type hardware configs loop to line 0. this will force an auto reload of carriers.

script functions

combine

combines contents of entire cassette using pick and place order keywords.
combine (source station) to (destination station).
example:
pickorder=bottom
placeorder=keepslot
combine a to b
combine b to a

pack --- all forms

compresses or packs wafers in a carrier.

packup (station)
packdown (station)
packup_inorder (station)
packdown_inorder (station)

recipes – section 6

example:
packdown_inorder a

move

moves wafers without ocr step. called from file or directly in script slot can also be topmost or bottommost.
move (source station,slot) to (destination station,slot)

example:
move a,24 to b,25
move a,24 to a,25

read

reads wafers called from file, operator select, or directly in script.
all keyword apply.

* = all wafers found

example:
read a,* to a,*
read a,13 to a,13
read a,13 to b,13
read a,* to b,*

order

orders wafers based on 1-25 ID in ascending or descending order. ascend: slot 1 = id 01 descend: slot 1 = id 25.
example:
order a,ascend
order b,descend
order a to b,ascend

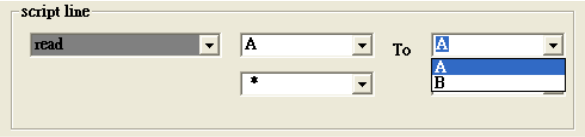
scripting

- rbuilder recipes can be divided into three general types.
- recipes which act upon whole cassettes.
- recipes that act on a single or a few wafers.
- or recipe that act upon a subset of wafers.

recipes – section 6

whole cassette parameters

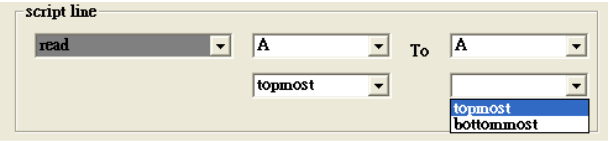
- for whole cassette recipes the use wild card character “*” in the helper setup screens.



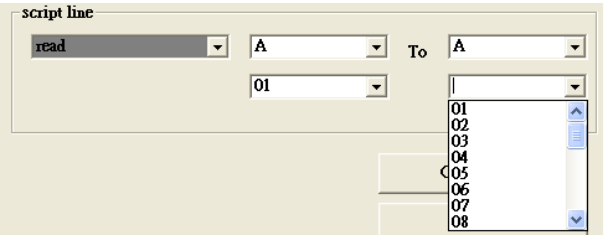
- on recipes with both input and output cassettes, selecting a “*” for input will force “*” to be the only output option.

single or few wafer parameters

- single wafers can be selected by simply scrolling down list further to access 1 thru 25/26 or topmost/bottommost parameters.



- example above shows setting a read transfer from A:4 to the topmost empty slot in A.



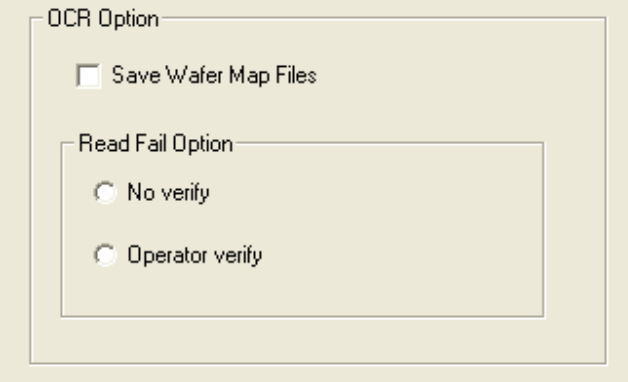
- any parameter in ‘single quotes’ refers to a wafer ID number. above swaps the wafer ID ‘06’ found in A with whatever is in B6.

recipe reporting options

- click the final tab to find the recipe and wafer ID reporting options.
- select the options that you wish to enable with the recipe.
- click the "save wafer map files" checkbox to enable the save wafer maps function.

recipes – section 6

- Click the ”Read Fail Option ” ， select read ID fail after that no verify or operator verify.



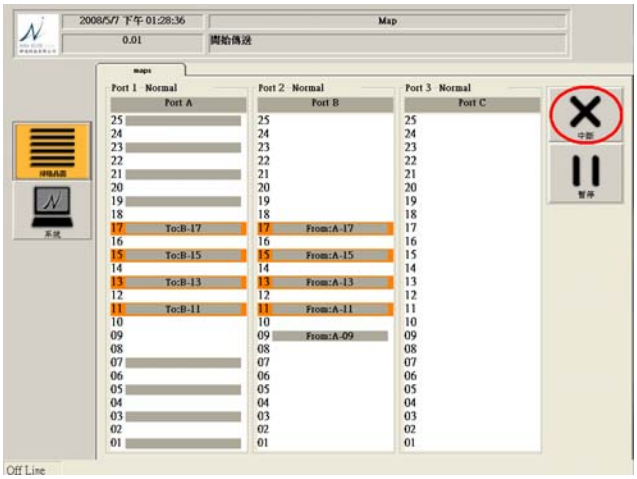
recipe save and exit

- click the "info, station setup, control" tab.
- save the recipe by clicking the "save recipe" button.
- click the "exit editor" button to return to the run screen of rbuilder.
- at this time you might wish to test your new recipe to verify that it runs correctly.

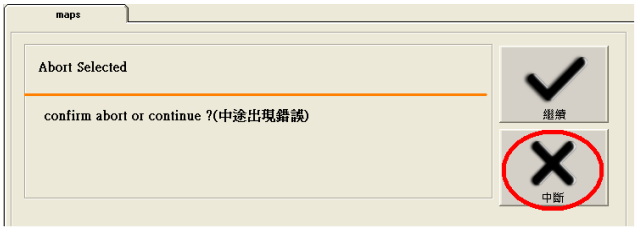
abort/pause – section 7

aborting a running recipe

- press the  abort button.



- then the abort confirmation screen will appear.



- the recipe will continue to execute until you confirm the abort.
- press the  abort button again to confirm that you really wish to abort and exit the recipe.
- press the  continue button if you wish to return to the recipe run screen without aborting.

pausing a running recipe

- press the  pause button to pause the executing recipe.
- the recipe will pause at end of any current robotic motion.
- press the  continue button to resume recipe operation.

alarms – section 8

re-initializing the tool

- re-initializing the system software will typically resolve many of the alarms listed below. check specific alarm for information and remedies.
- goto to the  system tab.
- select the control tab.
- under admin/tools select the “init/home” button.
- standard init screen will appear.
- press the  button to begin system initialization.

alarms by alarm id

id	103
english	cassette removed incorrectly
chinese	晶舟不正常被取出

description

a cassette was removed while the robot was acting on it. this can easily damage wafers.

remedy

remove or replace cassette and re-initialize system.

id	102
english	robot servo failure
chinese	伺服電源供應失敗

description

the robot has failed to keep control position and actual position within tolerances. this could be caused from several sources. 1. the robot hit something. 2. the servo is weak and cannot maintain motion tolerances. 3. the robot is mechanically decomposing and the servo can no longer drive thru the axial problem area.

id	104
english	vacuum failed
chinese	真空異常

alarms – section 8

description

system incoming vacuum fell below a preset lower limit. wafers currently being process will be rescued to their input cassette and recipe will exit with this alarm, and system need restart.

remedy

check incoming vacuum. tool cannot be used until vacuum is above preset. check incoming vacuum line sensor. a red display indicates below preset and not able to process. a green display indicates that vacuum is above preset. retry recipe.

Id	107
English	operator aborted
Chinese	操作放棄

description

in some recipe execution states, operator aborts may cause this alarm. this is simply an indication that the operator chose to abort at a step that alarms if aborted.

remedy

use wafer rescue if any stranded wafers.

Id	109
english	Wafer get failed
chinese	晶圓取出失敗

description

vacuum required to hold wafer to robot could not be achieved. this could be due to any number of reasons. 1. misaligned carrier 2. warped carrier 3. improperly adjusted vacuum sensor 4. improperly leveling adjustment between robot and carrier.

remedy

check alignment of carrier. use a different carrier. maintenance - check alignment between robot and carrier. maintenance – check sensor setting.

id	110
english	Wafer put failed
chinese	晶圓放回失敗

alarms – section 8

description

robot was unable to place wafer to carrier. this could be due to any number of reasons. 1. misaligned carrier 2. warped carrier 3. improperly adjusted vacuum sensor 4. improper leveling adjustment between robot and carrier

remedy

check alignment of carrier. use a different carrier. maintenance - check alignment between robot and carrier. maintenance – check sensor setting.

id	118
english	scanning error"
chinese	掃描異常

description

any error associated with the scan function not being able to map a cassette. might result for protrusion sensor detecting a protruding wafer. also can result from scan sensor detecting a wafer present prior to starting Z axis motion.
check the comment line associated with alarm for more details.

remedy

if sorter is equiped with protrusion sensors, be sure there are no protruding wafers. if robot begins to scan and detects a wafer prior to Z motion, Z axis scan position needs to be lowered. consult maintenance guide for scan teaching procedure. NOTE: bad carrier tolerances can also cause this. check with multiple carriers before adjusting Z position.

Id	122
English	Initialization error"
Chinese	初始化異常

description

a failure occurred during the initial bootup of system.

remedy

try 1st with a software restsrt . if error reoccurs next try full power cycle ti restart.

Id	124
English	cross slotted wafers detected
chinese	晶圓斜放被偵測出

alarms – section 8

description

wafers were detected in scan map that are cross slotted. recipe cannot continue.

remedy

check cassette for cross slots. if none are found, contact maintenance for scanner adjustment.

Id	047
English	Wafer Align fail
chinese	晶圓在 Aligner 上動作失敗

description

wafers were rotate on Aligner that the original manuscript angular magnitude and practically are different.

system incoming vacuum fell below a preset lower limit.

remedy

check alignment of Aligner. use a different carrier. maintenance - check alignment between Aligner and control. maintenance – check sensor setting t. check incoming vacuum

id	046
english	"PortAAbnormalUnLoad"
chinese	Port A 的 cassette 被拿走

Description

If robot is moving while a cassette was removed.

remedy

check the Alarm Acknowledge .remove or replace cassette and re-initialize system

if error reoccurs next try full power cycle restart.

push down Recover button

id	046
english	"PortBAbnormalUnLoad"
chinese	Port B 的 cassette 被拿走

Description

If robot is moving while a cassette was removed.

remedy

check the Alarm Acknowledge .remove or replace cassette and re-initialize system

alarms – section 8

If error reoccurs next try full power cycle restart.
push down Recover button

id	046
english	"PortCAbnormalUnLoad"
chinese	Port C 的 cassette 被拿走

Description
If robot is moving while a cassette was removed.

remedy
check the Alarm Acknowledge .remove or replace cassette and re-initialize system
if error reoccurs next try full power cycle restart.
push down Recover button.

id	048
english	"EMO Alarm"
chinese	緊急按鈕被按下

Description
Push down EMO button.

remedy
check EMO button and re-initialize system.

id	050
english	"obstacleDetected Alarm"
chinese	障礙物感知偵測到障礙物

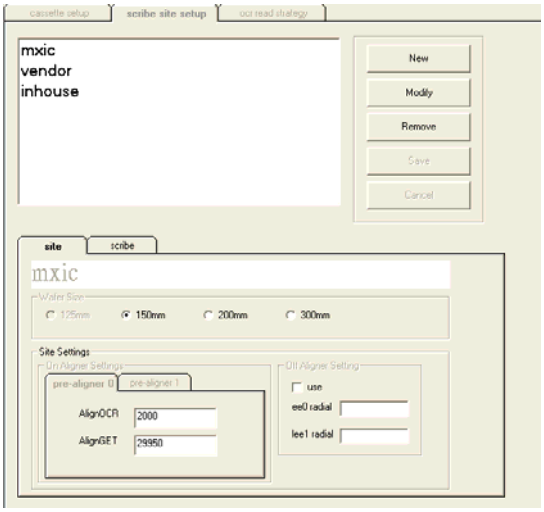
Description
Obstacle sensor detect Obstacle.

remedy
check Obstacle sensor .

setup – section 9

accessing setup mode

- enter maint mode thru the  system "control" tab.
- a level 0 password is required.
- you MUST press the "press to set new level" button to change access level.
- once the password is entered correctly, the setup  tab will become available.
- press the  button to enter the setup screens.

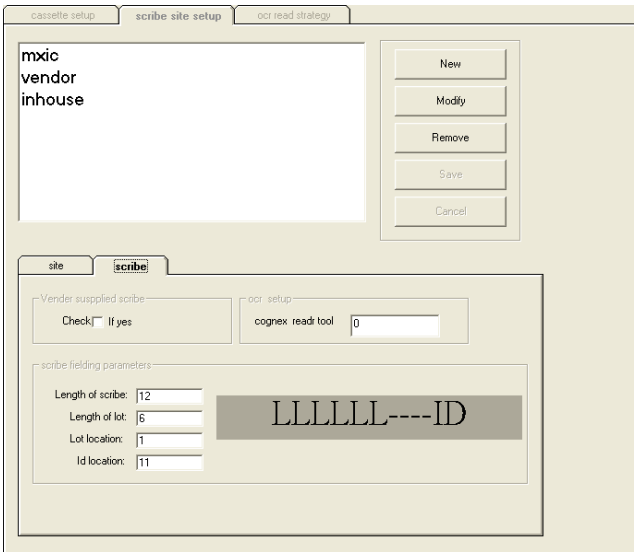


- use the new button to create a new type.
- 1st fill in the name field. replace "New Cassette" with meaningful name such as "shipping cassette" or vendor of cassette name such as "Entegris Teflon".
- add slots, pitch and T,R,Z offsets.
- typically "scan" value is identical to pick/place value.
- press "save" or "cancel".
- new type is now ready for use in recipe definitions.

setup – section 9

scribe and site setup

- following screen shows the scribe setup screen.



- scribe sites can be added with the new button.
- existing scribe sites can be modified with the modify button.
- unused scribe sites can be deleted with the remove button.

site definitions

- site is defined as a place on a wafer were an ocr or align process is needed.
- site sets the wafer size and the align angle and exit angle for wafer being aligned.
- tilt type tools do not employ the exit angle.
- use new button to add a new scribe/site type.
- use a meaningful name for site such as “vendor”, “inhouse”, “crown”, “notch” to clearly indicate what this site setup is.

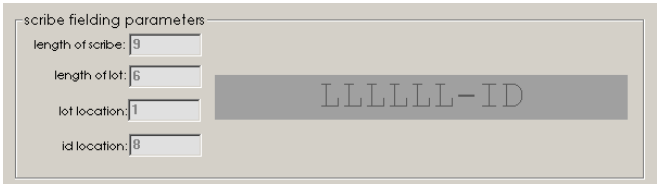
setup – section 9

- read angle is angle where wafer scribe is read with OCR.
- tilt type stages use align “read” angles entered in degrees 0 thru 360.
- single wafer “equip” style aligners need angles setup in thousands. ie. 9000 = 90 degrees.
- exit angle is the angle of notch/flat inside cassette after align process.
- exit angle is ALWAYS the relative theta angular motion required to get notch/flat from read angle to angle desired inside cassette after align/OCR process.
- “off” aligner reading sites are not yet supported.

scribe definitions

- check box for “vendor scribe” defines that the scribe does NOT have a 01 thru 25 designation. this is VERY important. vendor scribes MUST have this checked.
- cognex reader tool is the number of the reader tool used to read the scribe being setup. consult cognex manual for details. this is a number 0 thru 99.
- length of scribe defines the total number of characters in the scribe being setup. max = 19
- length of lot defines the length in characters in the lot number. must be less than the length of scribe.
- lot location is the location of the first character in the lot number.
- id location is the location of the first character in the 2 digit (01 thru 25) id code.
- sample scribe definition.

setup – section 9



- the graphic shows “L” for where Lot number is and “ID” for where the wafer ID is.
- IMPORTANT: both lot location and id location values start at left most character and count starting at 1 over to position of ID.
- example:

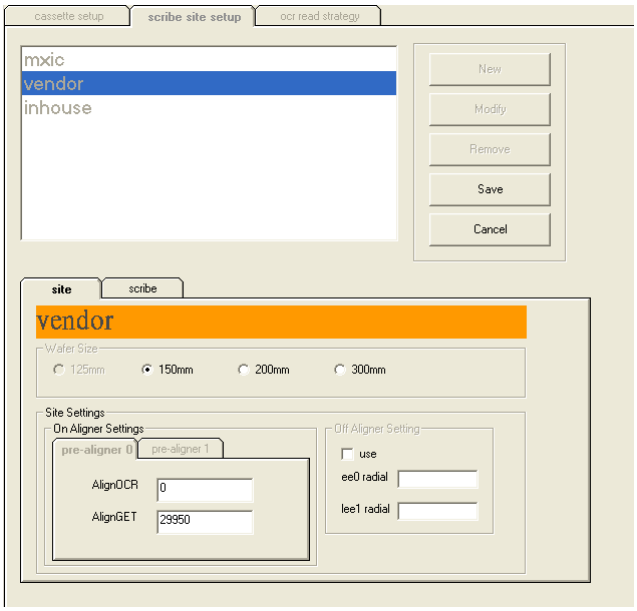
sample scribe	V	G	E	1	0	0	-	2	5
graphic	L	L	L	L	L	L	-	I	D
location	1	2	3	4	5	6	7	8	9

- lot location = 1
- id location = 8

read strategies

- uses scribe sites and rules to create a read strategy.
- this is a way to execute a series of steps on scribe in order to read them better.
- or achieve some other goal that is not possible with a single scribe site.
- same as all other setups, strategies use a common meaningful name to describe what they are.

setup – section 9



strategy setup

- the same – “new”, “modify”, “remove” methods apply.
- click new and enter a meaningful strategy name.
- then go to the “scribe site index” on right half of screen.
- the scribe site index is a top down listing of sites that will be read in order.
- press the “add” button.
- a drop down box will appear that shows all scribe sites that are available.
- select in order the sites that you wish to be stepped thru in order to achieve your strategy.