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Internal: 000-00000X-EN Rev X
Release date: XX Month Year

Procedure

Punch upgrade for the Magnus

Background

This document describes how to install weight offloading and internal punch

Requirements

Include the tools the user needs to complete this procedure:

- Magnus installation tool kit
- Metric and imperial Allan key sets (**Must be in new condition!**)
- Loctite® 242
- Screwdrivers
- 7, 8, 10, 13, 17mm sockets and ratchet (10mm socket should be thin walled)
- 5.5, 7, 8, 10, 13, 17mm combination wrenches
- Dead blow hammer (preferably rubber)
- Machinist level
- Machinist square
- 150mm and 300mm precision steel rules
- Lifting jacks X 4
- Reworking tools (various files, hacksaw)
- Drum support tool 92-0081A, which can be found in tool kits 90-1191B & 514-00095A
- Foam
- Long and short cable ties
- Easy out screw removal tools
- Center punch
- Drill and drill bits
- Drill jig 690-00859A
- Three large static bags
- Needle nose vise grips

- MAB squareness jigs 690-00136
- MAB shims 252-04602A
- Needle nose pliers
- MAB support leveling shims 252-05625A
- Mitutoyo Pro 3600 digital protractor, model # 950-316
- Molex pin extractor
- C-clamp
- Measuring tape
- Right angle drill (nice to have)
- Dremel tool and cutting disks and bits
- Tube cutter
- De burr tool

Supporting documents, drawings, and BOM's required

1) 518-01641A Weight offloading assemble
2) 500-03563A Punch service access
3) 500-03543A Chip collection system
4) 500-03535A Synchronizer shaft
5) 705-00006D Electrical wiring diagrams with punch option
6) 718-00023E Pneumatic schematics
7) 518-01686A Right lifting arm with punch support plate
8) 518-01687A Left lifting arm with punch support plate
9) 719-00696A Edge camera installation and calibration
10) 719-00439B Replacing a carriage

Additional documents, drawings, and BOM's for reference

1) 500-03510A	Rotary registration pin
2) 500-03511A	Suction cup manifold
3) 500-03512A	Registration bar up down cylinder
4) 500-03532A	Punch support plate away side
5) 500-03533A	Punch support plate home side
6) 500-03534A	Synchronizer rack
7) 500-03536A	Registration bar push cylinder
8) 500-03541A	Punch deflector with registration bar
9) 500-03542A	Tilting side registration
10) 500-03546A	Side registration assembly
11) 500-03566A	Punch side registration mounted to punch deflector
12) 500-03615A	Tilting registration up down cylinders
13) 500-03994A	Away sensor with damper
14) 719-00613A	Upgrading a TMCE board to a GMCE

Procedure

Unless it is explicitly stated, do NOT dispose of the parts as you remove them – they will be needed for reassembly.

It will be stated only once, that all parts when removed should be handled and stored carefully.

1) Backup the machine configuration:

   a) Backup all NVS on workstation

   b) Backup print console and run a bugzip

   c) Run the MCE board replacement script and select the option to backup all the nvs parameters in the machine

   d) Save the following parameters as they are not saved by the backup procedure: “set debris”, “set prd serialnumber”, “set prd customername”, and “set prd CANBAUD”.

2) Make some image quality baseline plates

3) Make series of plates for GC (5 plates). Record frame and lead screw temperature for each plate and write on back of plate

4) Put hardware in state for upgrade using the following FW commands:

   a) Carriage moveto 950

   b) Roller off, LEC off

   c) backbone tiltedload

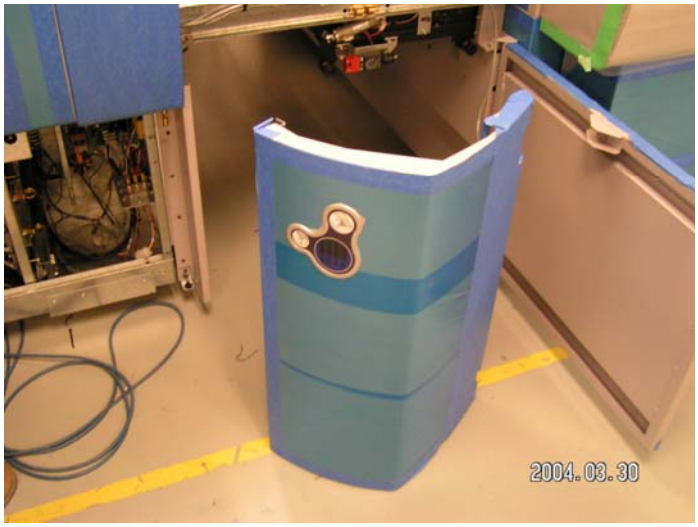
   d) Load table home

   e) door unlock, raise the rear and front hoods

5) The power for the Magnus can be shut off now (Do not turn off air yet)

6) Disconnect and move the drum vacuum out of the way

7) Remove SSR front cover (**P30**) and the slip-sheet bin



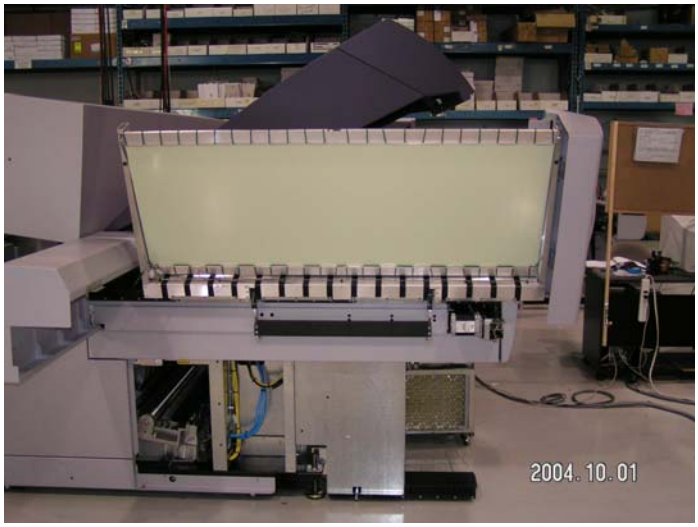
8) Remove the unload table panels **P57**, **59**, **60**, **61**, **62**, **63** and **65**



9) Remove load table rails **P66-72**



10) Remove the bridge assembly **C20**



a) Disconnect bridge sensor cables (**E36** and **E37**)

b) Loosen (don't remove) the 8 M5 screws holding the bridge on

c) Lift the bridge out

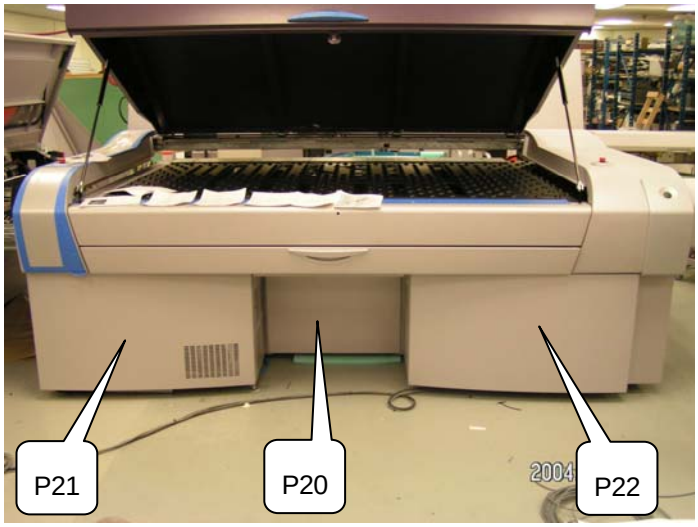
11) Remove the bridge top cover **P47**



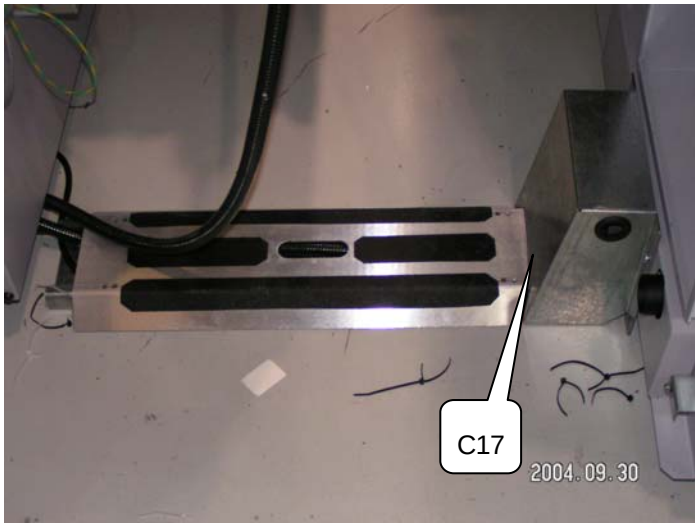
12) Remove the bridge rear panel **P46**



13) Remove all three front chin panels **P20-22**



14) Remove the Base to MCU cable channel **C17**



15) Remove the right front side panel **P24**



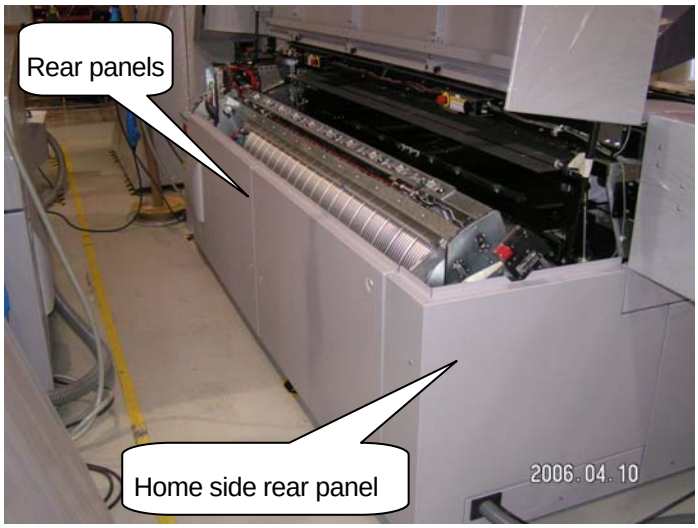
16) Remove the left front panel **P25**



17) Remove the SSR rear door **P33**



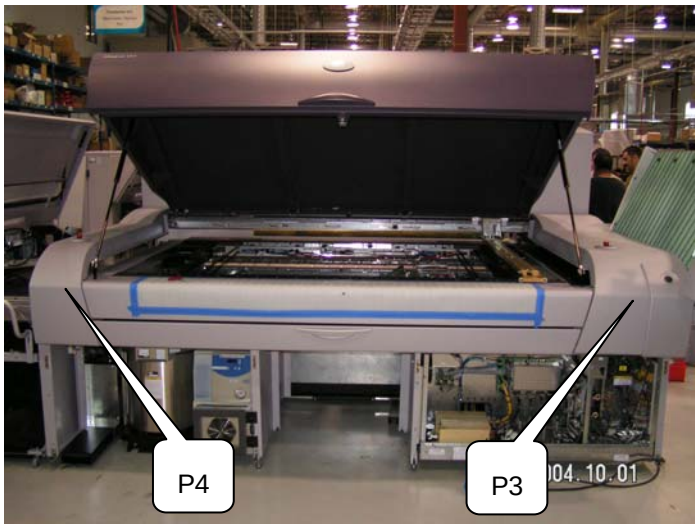
18) Remove rear panels



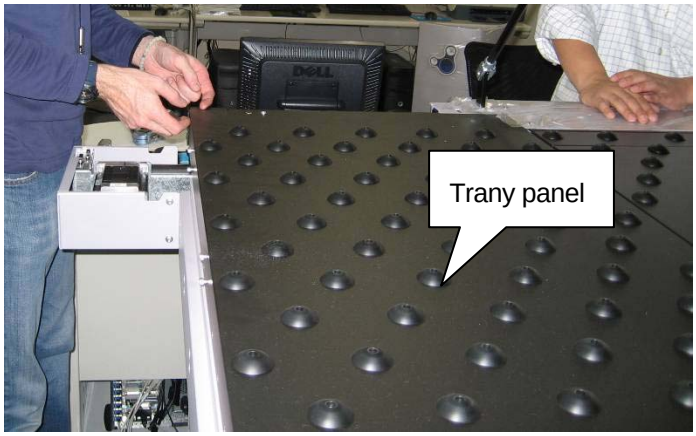
19) Remove home and away-side rear side panels (the away –side rear panel will be reworked for machines requiring the punch option, due to a chip collection feature added to the panel)

20) Remove away-side front shoulder panels **P3** unplugging cables **E38** and **E39** first

21) Remove home-side front shoulder panel **P4** unplugging cable **E40** first



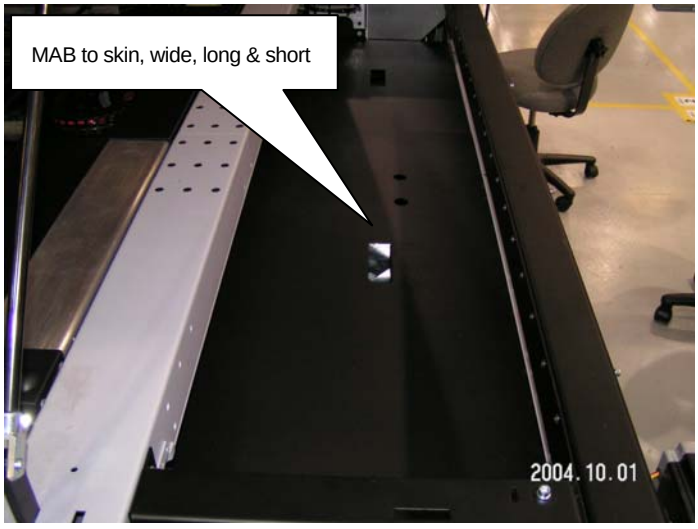
22) Remove bridge transition panel **P49**. Do not remove the locating screw; just the one clamping screw. This panel will be narrow or wide depending on if the machine is RTOL or LTOR, but will always be on the fetcher motor side



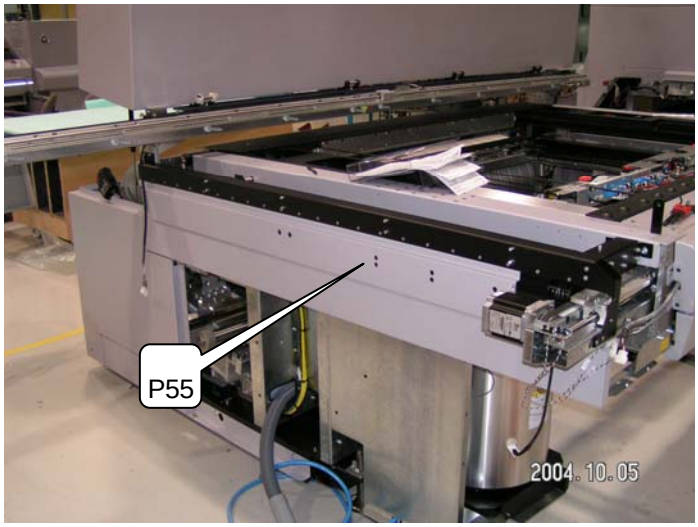
23) Remove fetcher motor cover **P54**



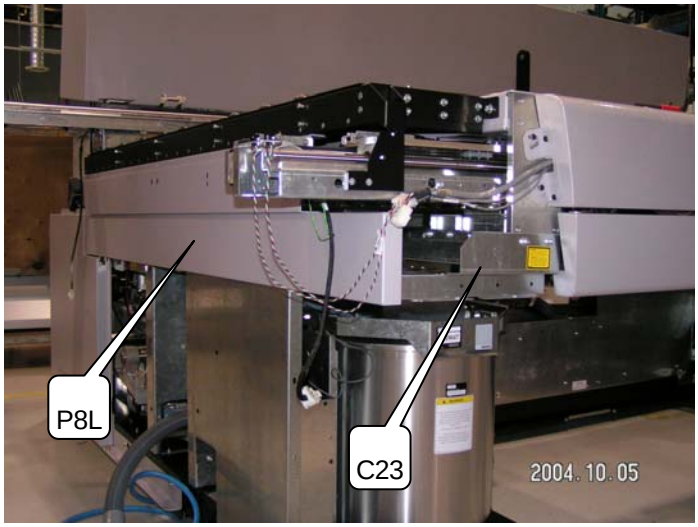
24) Remove away-side and home-side, MAB-to-skin panels **P50-53**. These panels can be located on the load table level and connect the path that the fetcher travels along from the home and away MAB to outer skin



25) Remove the fetcher level blanking panel **P55**

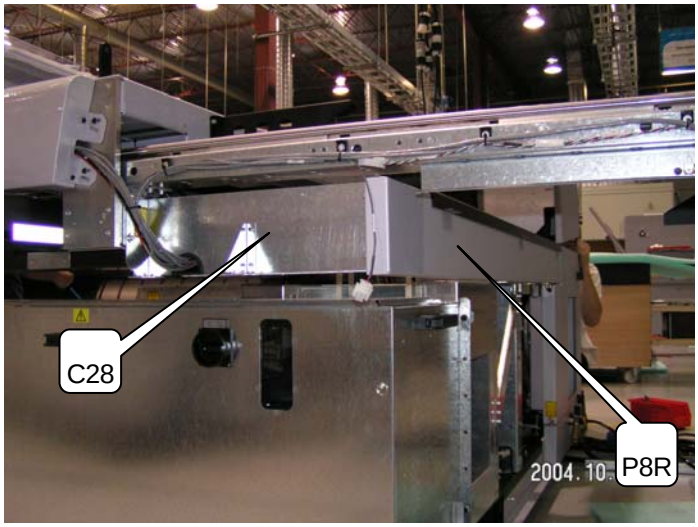


26) Remove the left lower shoulder bracket **C23**



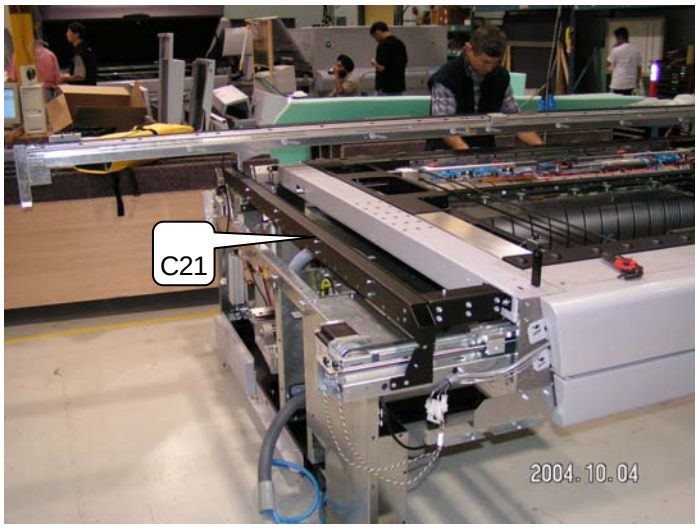
27) Remove the left lower shoulder panel **P8L**

28) Remove the right lower shoulder bracket **C28**

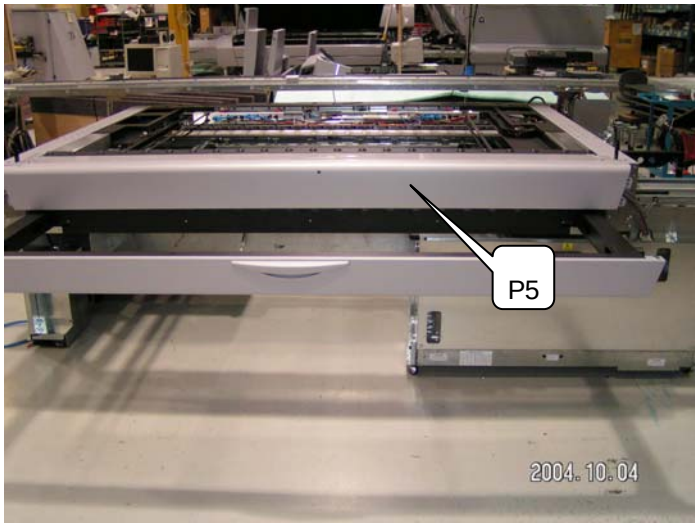


29) Remove the right lower shoulder panel **P8R**

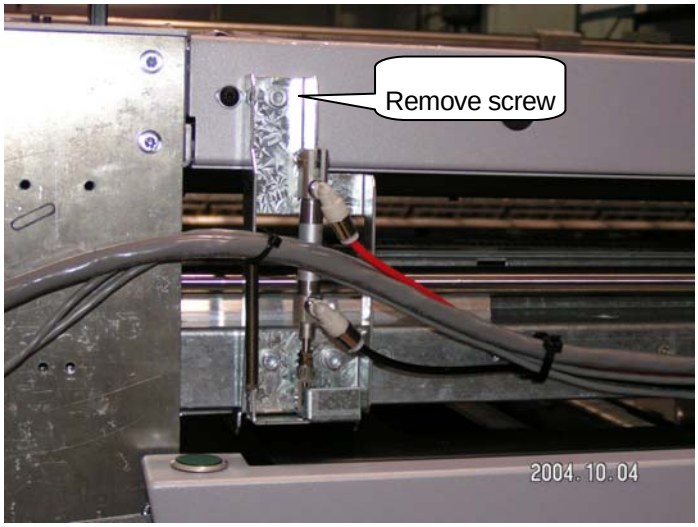
30) Remove the bridge support beam **C21**. A RTOL machine is shown in the picture. The beam will be wider on a LTOR machine



31) Remove the upper front chin panel **P5**



32) Remove the top securing screw from the pull out table locks (Both home and away sides)



33) Front hood removal:

a) Unplug Cable E26 that connects the front hood status LED's

b) Unlock the front hood by backing off the screws at the four hinge locations and pushing the locking bar towards the away side



c) HINT: Removal and reassembly is much easier if you tighten one of the hinge lock screws so that the hinge lock is in the "open" position during removal and installation

d) Remove the gas struts at the hood end. It's OK to leave them attached to the unload table

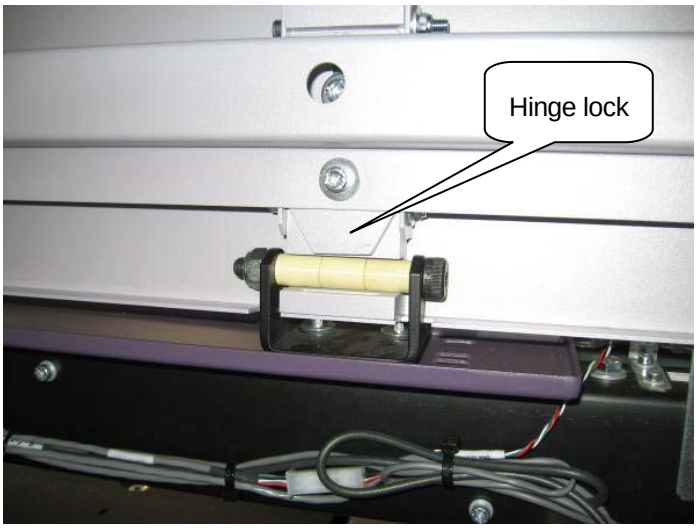
e) If there is limited space at the customer site then foam can be placed on top of the MCU, and the hood can be flipped upside-down and placed on top of the foam.



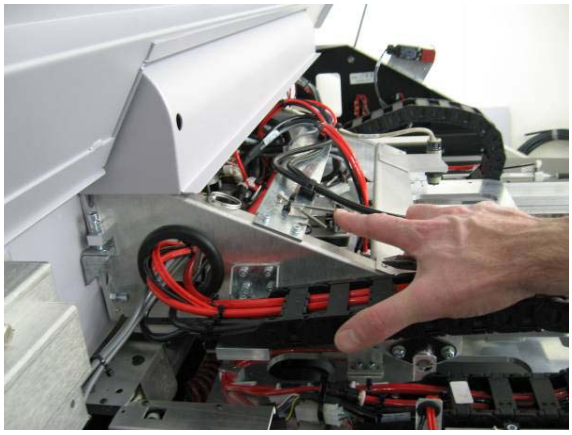
34) Remove the rear hood and gas struts. Rear hood can be discarded but struts will be re-used:

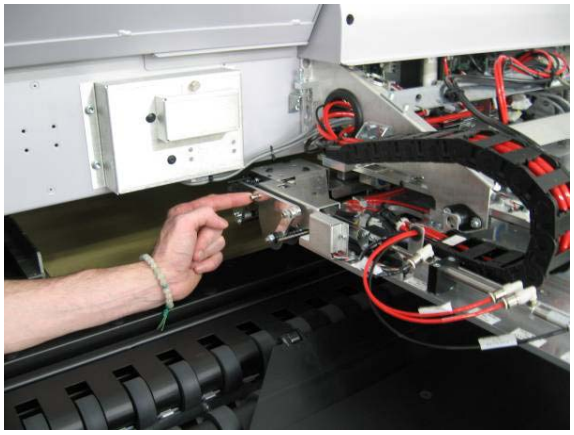
a) Remove the gas strut retaining clips at the top and bottom of each strut and then remove strut

b) HINT: It's easier to remove if you retighten the hinge locks in the UP position.



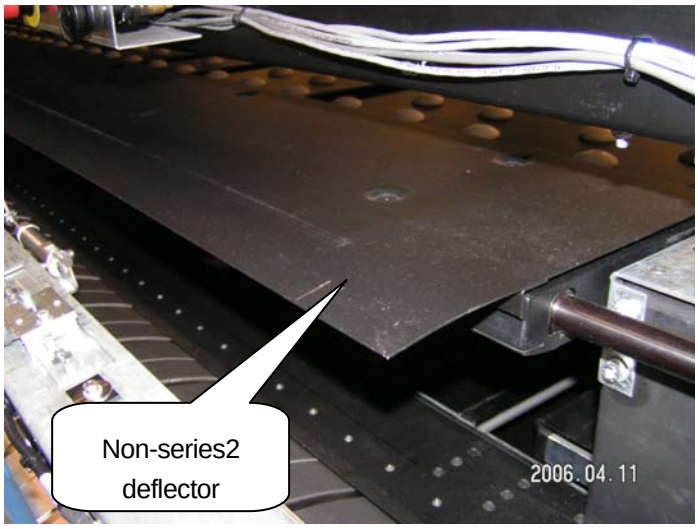
35) If this is a Delicate Media machine, secure the DM roller in the **up** position (Two M4 x 45 screws should be secured to the DM picker for this purpose). This is to prevent possible damage to the roller when the air is turned off





36) Turn off air supply

37) Remove the plate deflector from unload table if it is a non-series2 plate deflector. For machines that have a series 2 deflector, removal is optional



38) Remove the deflector bracket from machines with an old deflector (non-series2)

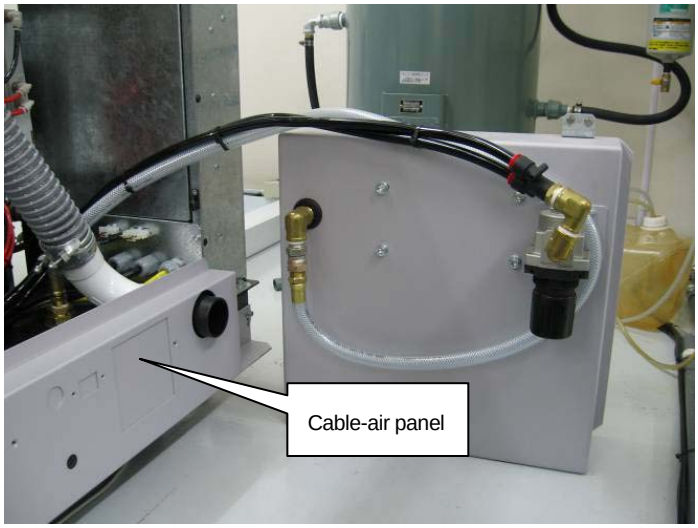
39) Remove Velcro strips from the unload frame (non-series2)

40) Remove the purple hood drip trays and the four hood hinges. The purple spacers will no longer be used and can be tossed. *Notice the Nylon washer on the hinge in the picture; this is to prevent the front hood from moving side to side. These washers will only be installed on one of the four sets of hinges. It is also easier to install the front hood if the hinge with the washer is mounted in one of the two center locations



41) Remove the air entry box and put to one side (no need to disconnect hoses)

42) Remove the away-side cable/air panel. Removal of this panel is optional, but it may be easier to work in the area with the panel off



43) Remove the cables, tubes and E-stops from the hood beam. Depending on if the machine is a RTOL or LTOR you can expect to find the following tubes and cables:

a) Front hood status cable, 220-00363A (Goes to center of beam on both LTOR and RTOL)

b) Bridge cover switch 11, 220-00377A (Goes to home side on RTOL)

c) Plate on processor, 220-00251B (Goes to home side on RTOL)

d) Bridge in position, 220-00251B (Goes to home side on RTOL)

e) Side eject away or home sensor, 220-00196 (I branch of cable will always go to the home side)

f) E-stop 5 to 6, 220-01337A (Comes up from casting on home side to ES5 on shoulder panel on both RTOL and LTOR)

g) E-stop 4 to 5, 220-00398B (From home side shoulder panel P4 to ES4 on hood beam, home side on both RTOL and LTOR)

h) Slip sheet underside sensor cable ext, 220-00425A, (Goes to home side on LTOR)

i) E-stop 3 to 4, 220-00399A (both RTOL and LTOR)

j) E-stop 2 ext, 220-00326A (Goes to away side on both RTOL and LTOR)

k) E-stop 3 splice, 220-01338A (Goes to away side on both RTOL and LTOR)

l) Two black 5/32 tubes

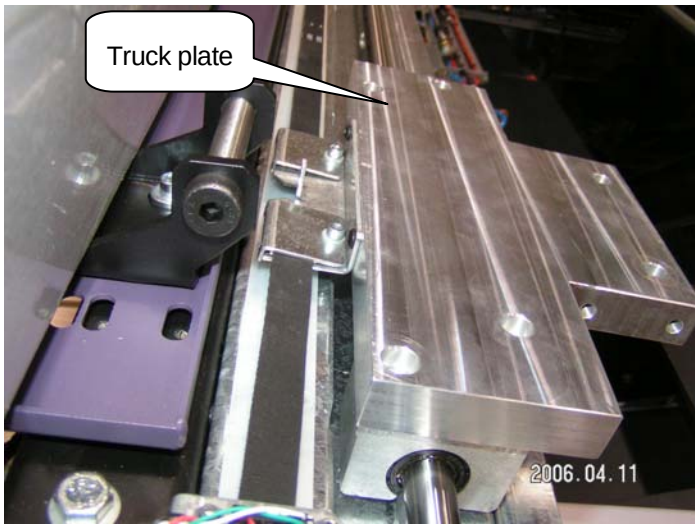
m) One red 5/32 tube going into a Y connector and two red 5/32 tubes exiting.



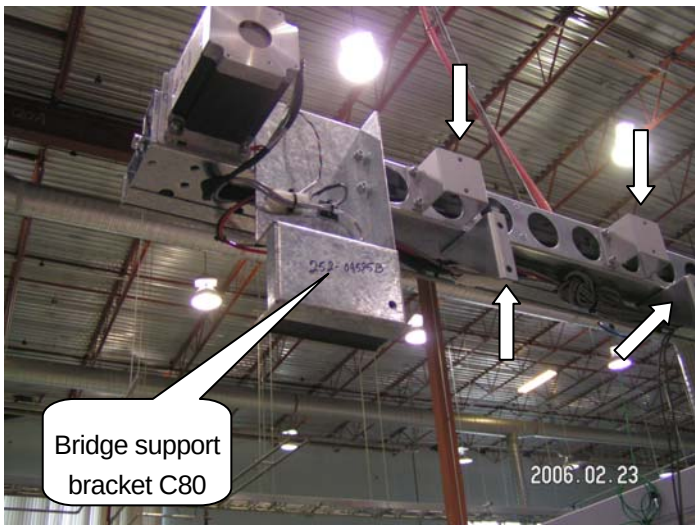
44) Pull the cable tie mounts out of the holes along the entire hood beam to get the cable off of the beam



45) Remove the ejector with truck plate from the ejector track. **Do not forget** to remove the **two M4 button** head screws that secure the truck to the belt



46) Remove the four rear bridge panel brackets and the bridge support bracket **C80**. These can be tossed after the sensor is removed from the support bracket



47) Remove the ejector track and store somewhere convenient as there will be modifications done to the track at a later time. You will need to unplug the motor cable **E24** and tubes going to the ejector cylinder

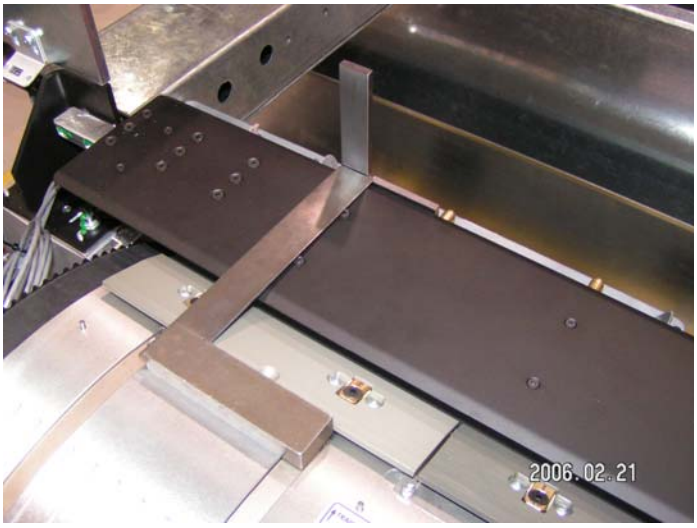
48) Remove the hood mount beam. There will be two shoulder panel brackets and an ejector sensor tab that can be left on the beam and tossed out

49) Marking the position of the load table front beam:

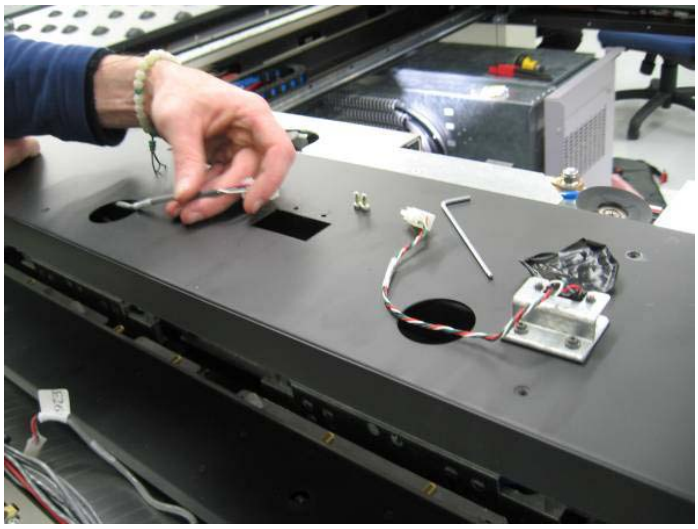
a) Use a drum support (92-0081A) to lock the drum in place for taking measurements. This lock is also used in the drum balancer replacement toolkit (514-00095A) as well as encoder alignment toolkit (90-1191B). Position the lock in place but do not lock drum yet



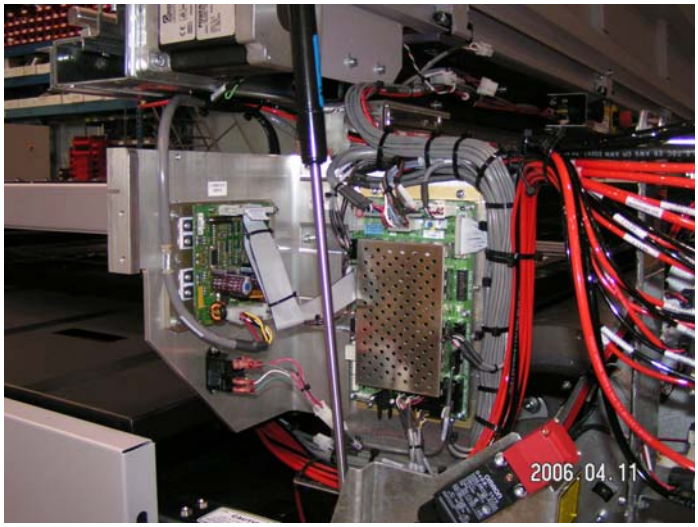
b) Use a machinists square and a straight edge (also could use a small square) to record the current position of the load table front beam as well as measuring the positions of the home and away sides relative to each other. Place the machinists square on the LEC's as shown in the picture. Then rotate the drum around until the square comes in contact with the straight edge. When contact is achieved lock the drum in place with the drum lock. Leave the drum locked in place and measure the other side to see the difference between the two sides, 1mm is acceptable, but some machines may have a greater difference in which case an attempt should be made during re-assembly to improve the difference. Leave the drum locked until all new hardware has been installed.



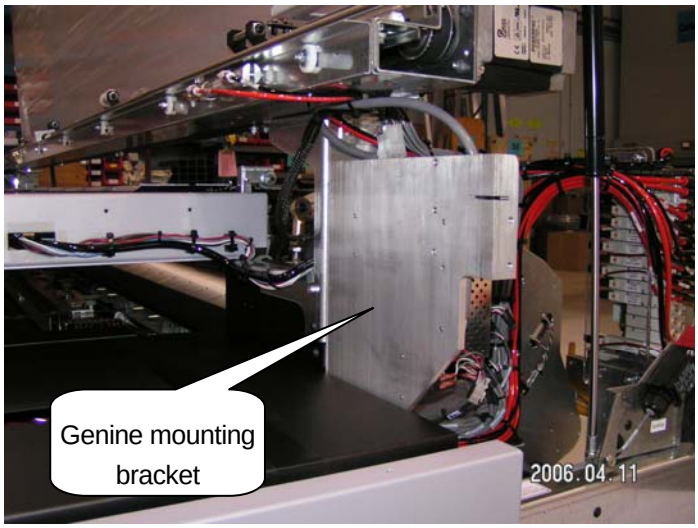
50) For non series2 re-route the plate deflector sensor cable (220-00246A). The sensor has moved from the middle of the unload table to the away side of the machine. There ***should*** be instructions for installing the new deflector in the series 2 upgrade procedure



51) Put on a static strap and unplug all cables going to the Genine 1, ejector carriage amp board and the relay K1. Remove the boards and relay once all cables have been unplugged and place in a static bag

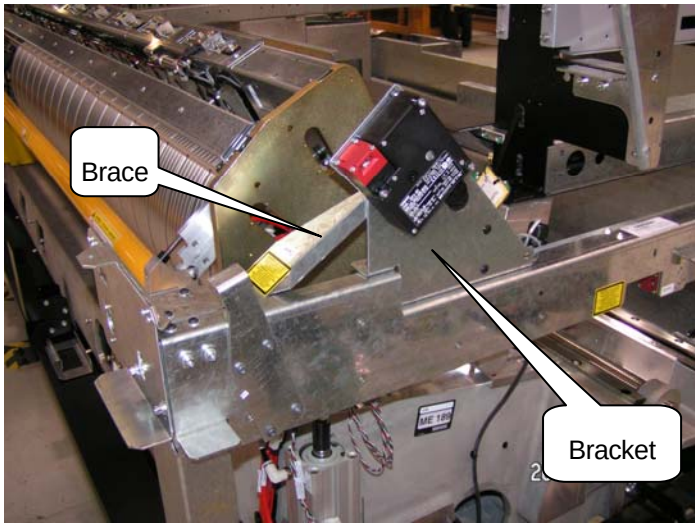


52) Remove the Genine board mounting bracket

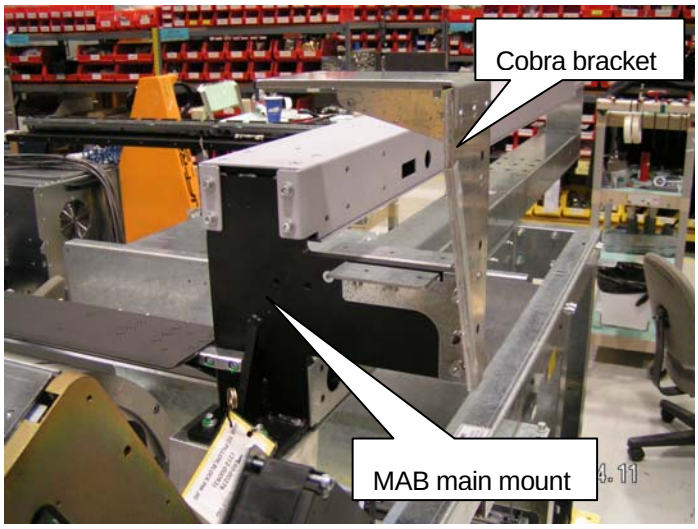


53) The rear hood has two safety switches, one locking and one non-locking, that sense when the hood is open. The locking switch must always be mounted on the handle side of the hood. The handle location of the rear hood has changed to the away side of the machine, so the location of the locking solenoid safety switch must also change to the away side of the machine. As a result new cables will need to be routed which will be described later in the procedure

54) Remove the rear hood locking solenoid bracket and brace from the home side of the machine. These can be tossed as new ones are provided

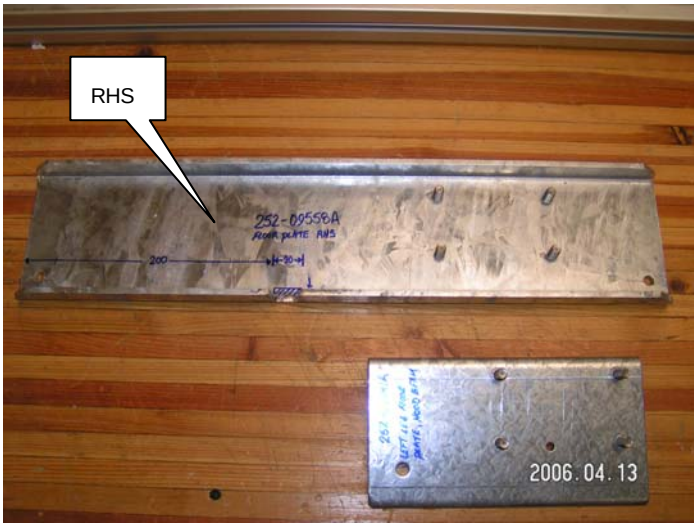


55) Remove the cobra brackets 252-01165A & 252-01164A from the MAB welded main mounts (252-01044D & 252-01163C) on the home and away sides

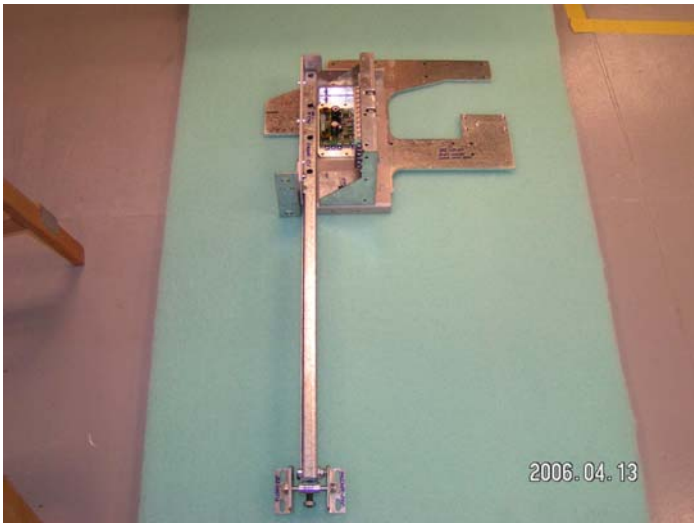


56) Weight offloading components, which can be found in assembly 518-01641:

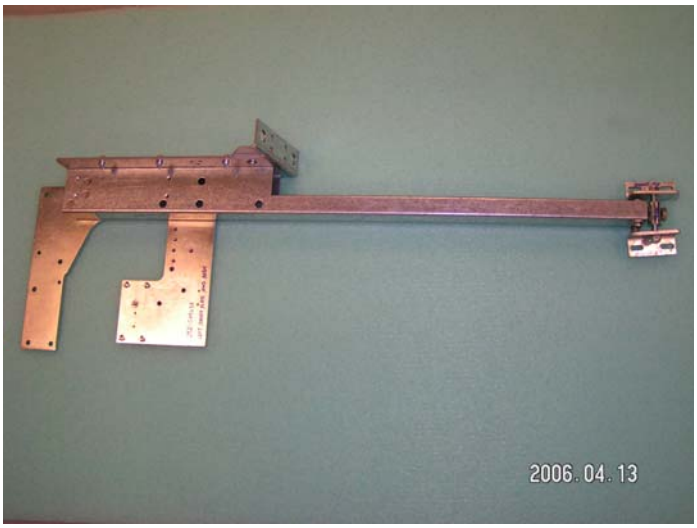
a) Floor plates RHS (away) 252-09558A and LHS (home) 252-09741A



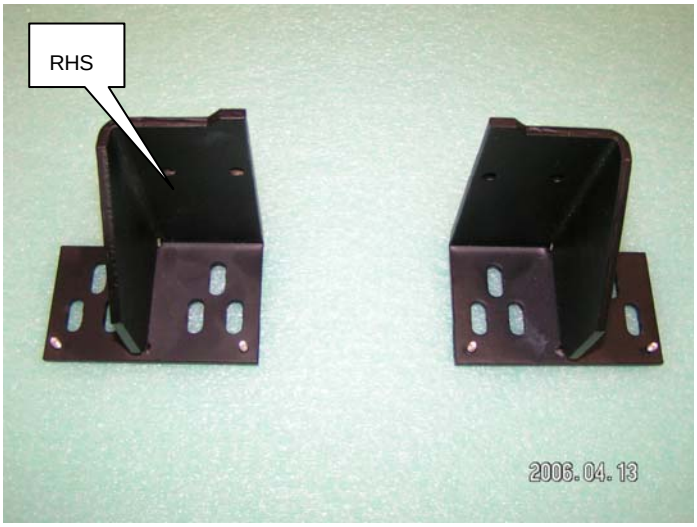
b) Away (RHS) vertical post and corner plate assembly 518-01740A. The picture shows a Beta version with the Genine board, carriage amp, and relay mounted. In future upgrades electrical components may be packaged separately and will need to be installed on site



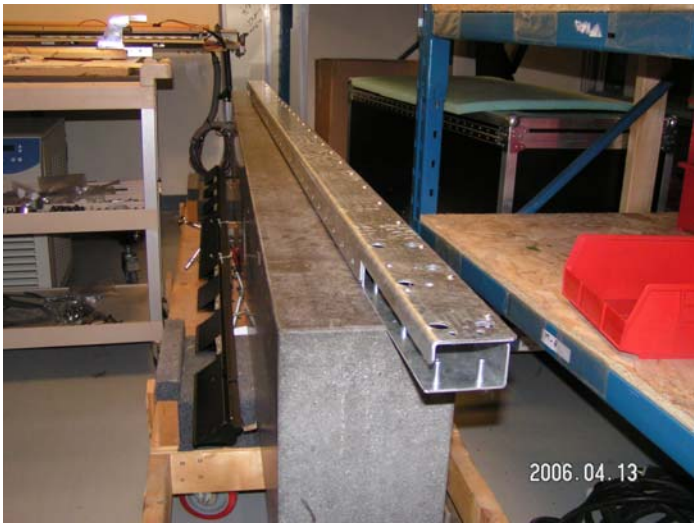
c) Home (LHS) vertical post and corner plate assembly 518-01741A. Picture shows beta assembly, production parts will look slightly different



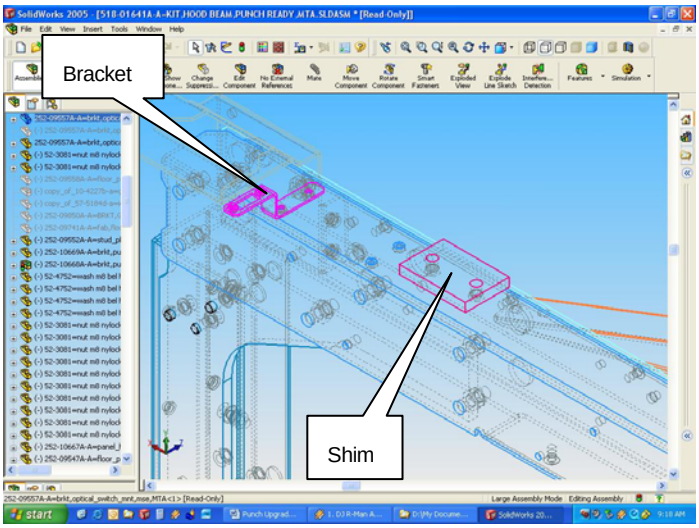
d) Load table front beam brackets, RHS (away) 252-09548A and LHS (home) 252-09551A



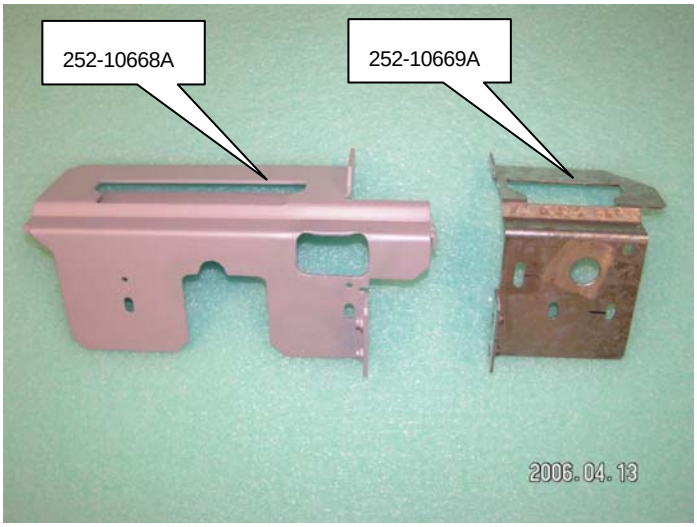
e) Hood beam 252-09546A



f) Hood hinge shims (X4) 252-02049B and optical switch mount bracket 252-09557A



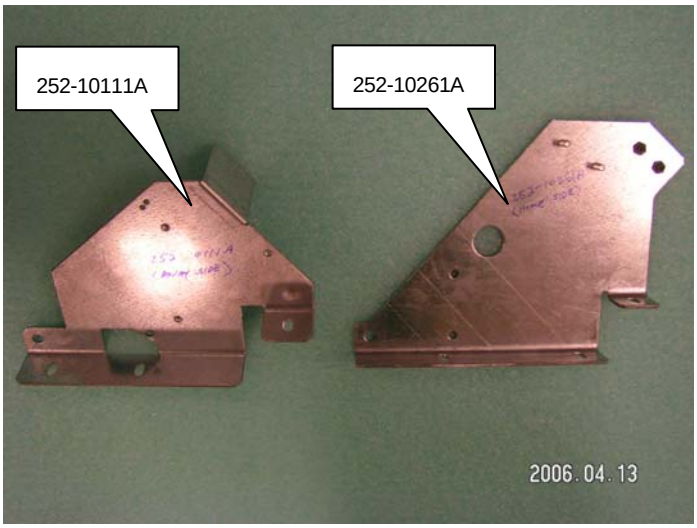
g) Shoulder panel brackets, P3 RHS (away) 252-10668A for a RTOL machine; 252-11220A for a LTOR machine and P4 LHS (home) 252-10669A



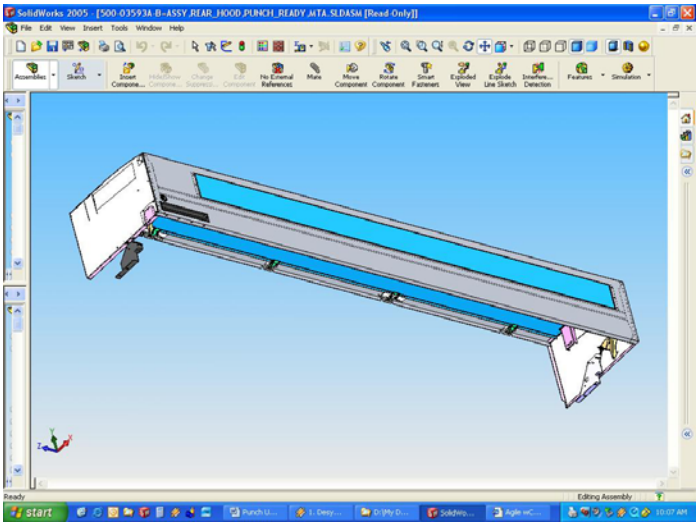
h) Rear hood safety switch bracket brace 252-04104A-B



i) Rear hood safety switch brackets 252-10261A (home) and 252-10111A (away)



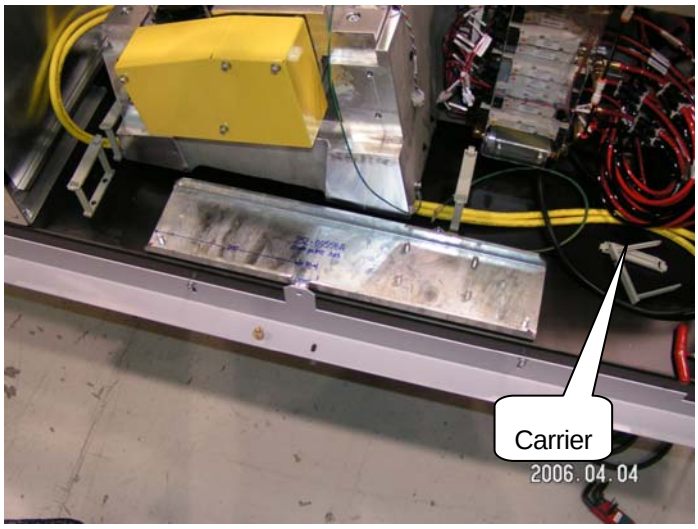
j) Rear hood 500-03593A. The above safety brackets actually belong to the hood assembly. The hood in the model also does not show the pocket installed, which receives the punch when the punch is raised for service access.



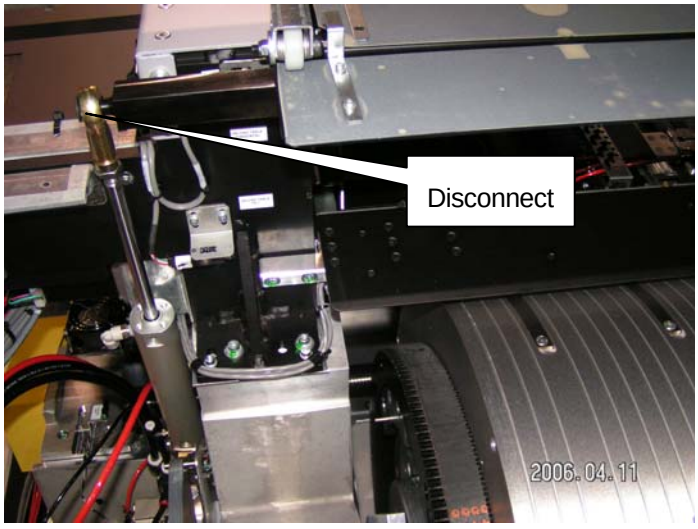
57) Install the home-side hood beam floor plate using two M6 and one M8 nylock nuts



58) Install the right away-side beam floor plate using two M8 nylock nuts. You will need to remove the plastic cable carrier on the away-side near the floor, and slide the floor plate underneath the cables (not shown)

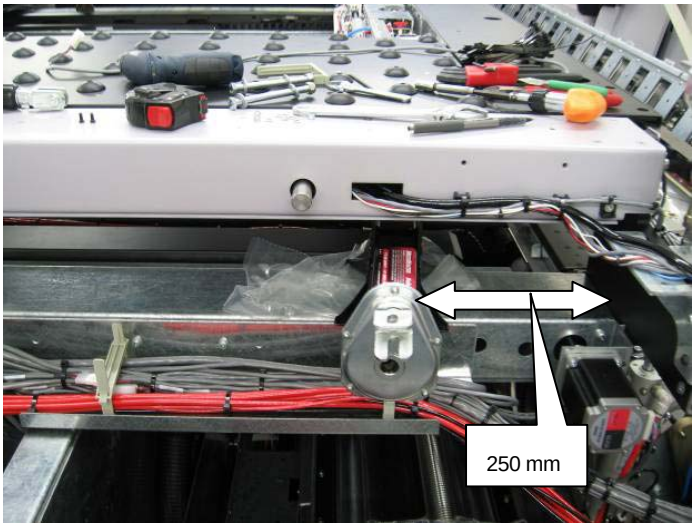


59) Disconnect both tilt cylinders from the unload table



60) Place four scissor jacks between the upper and lower MABs. Make sure there is at least 250mm of space between the jacks and the end of the MABs at the drum end, but at the same time **do not** place the jacks below the bearing covers located on the bottom of the top MABs. Note that in the future there will be some type of jig that secures to the MABs and jacks to make the whole operation safer:

a) Raise the jacks up just until there is contact between the jack and upper MAB

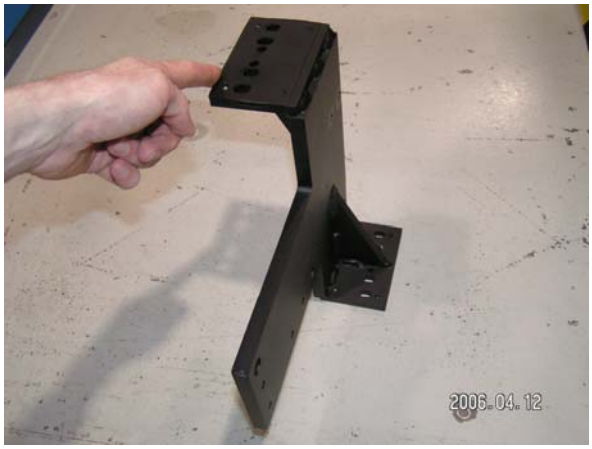


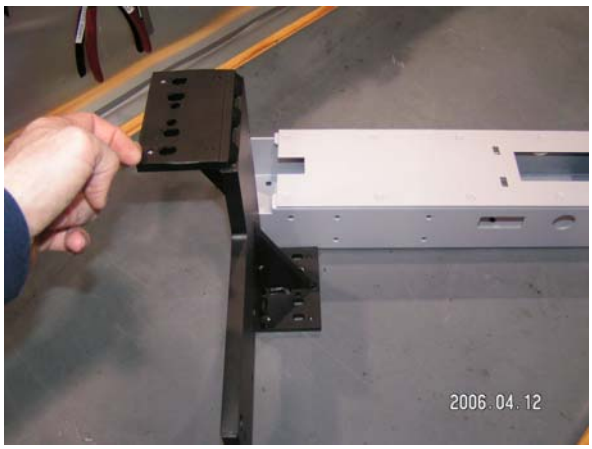
61) Removal of the MAB main mounts 252-01044D & 252-01163C (mirrored parts):

a) The MAB mounts are secured independently to the top MAB with eight screws

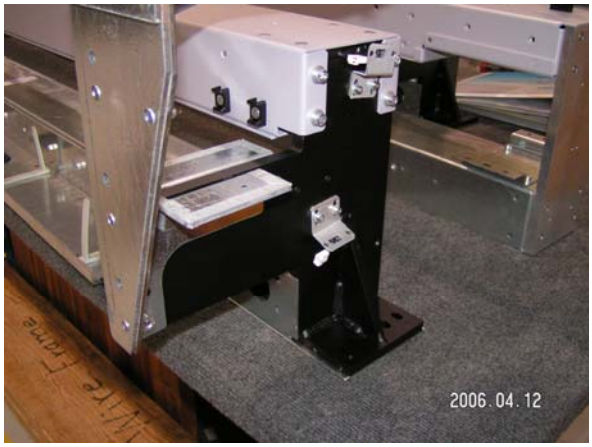
b) The MAB mounts are not independently secured to the bottom MAB, they are secured together to the pillow block (through an adaptor block to the pillow block for large drums)

c) To remove the mounts, the top MAB must be jacked up enough (aprox 110mm) so that the mounts are able to clear the bottom MAB and then tilt inward to be able to be removed from the top MAB.

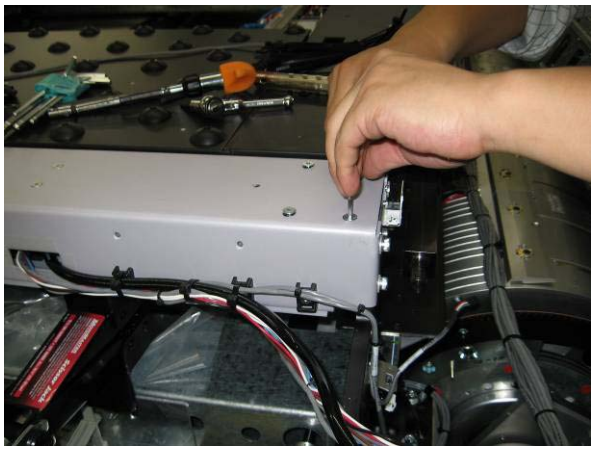
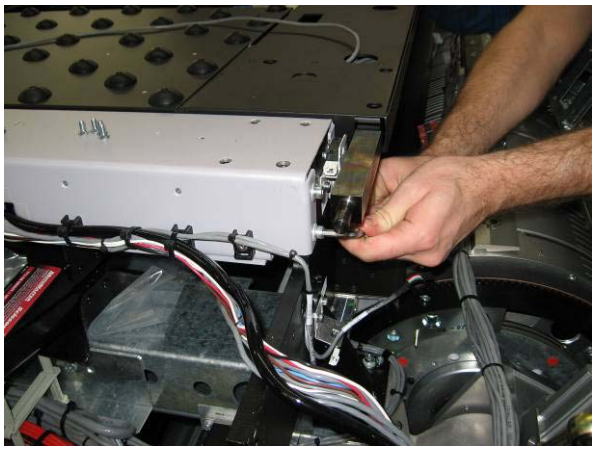


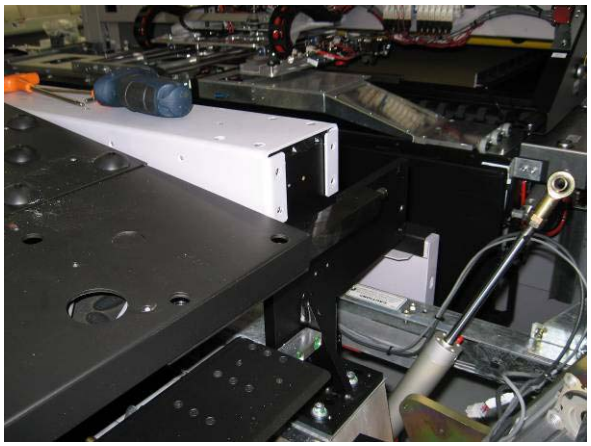




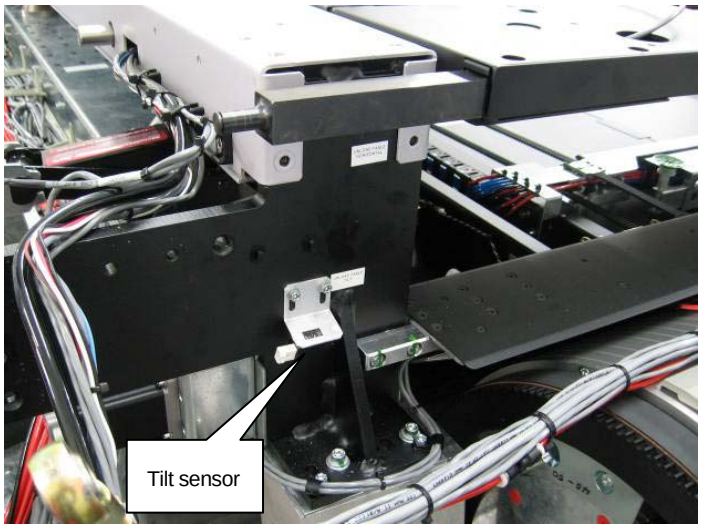


62) Remove the screws that secure the top MAB to the mount. There will be four flat head screws on the top side of the MAB and four cap screws at the rear. To remove the cap screws the unload table will need to be tilted momentarily

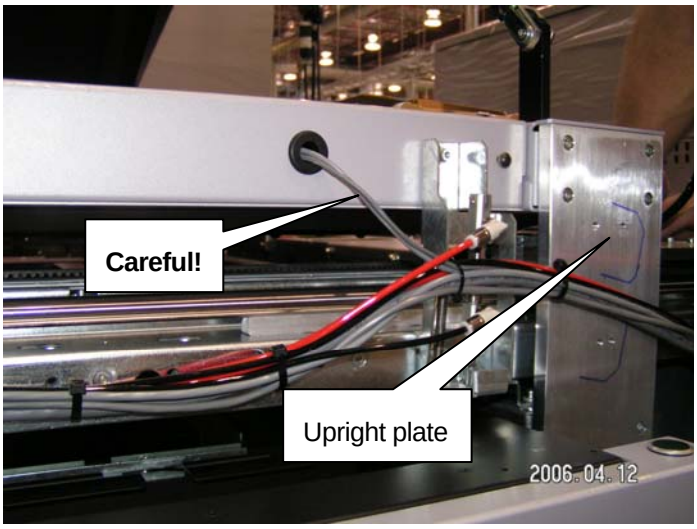


63) Unplug and remove the unload table tilt sensors and brackets (upper and lower)

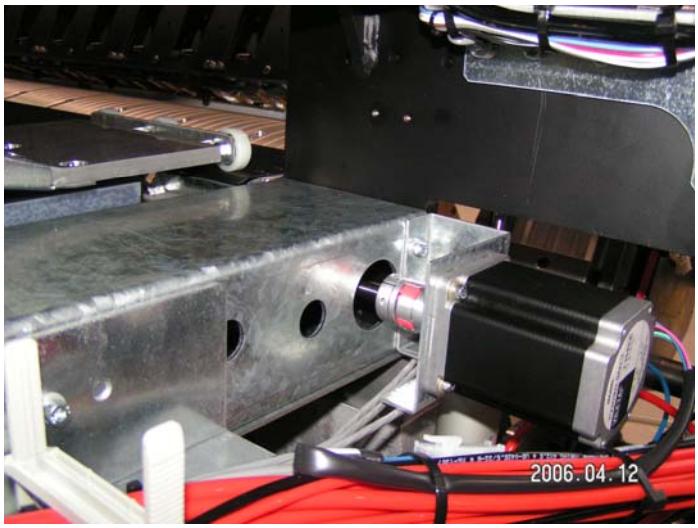


64) Remove the four screws that attach the MAB operator side upright plate to the top MAB. There is the possibility that the pem nuts spin. If this is the case either detach the plate from the bottom MAB or come up with a creative way of removing the screw from the pem:

a) During the jacking operation keep a close eye on the cable going to the front hood safety switch located in the upper MAB tie rod C29



65) Remove the load table motor. There should be no need to loosen the coupling, just remove the motor from its mounting bracket by way of four SHCS

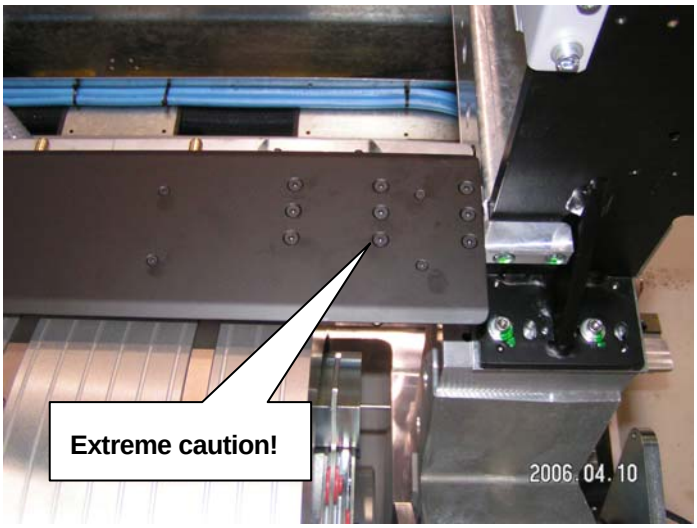


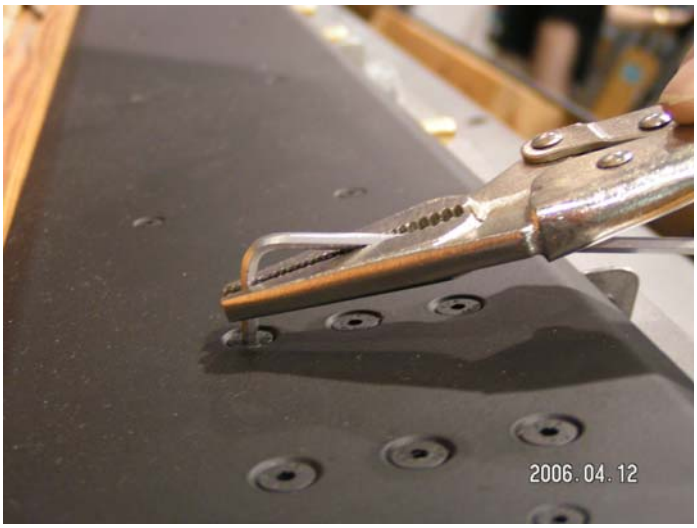
66) Remove the M4X12 sock-flat screws 52-4284 (nine per side), that attach the front beam mount 252-01113C to the load table front beam 500-00256B. **These screws strip very easily, only use a <u>new</u> Allan key and its best to pinch the key with vice grips to "crack" the screw.** If the screws do strip then try the following:

a) Apply some sort of gritty compound like lapping compound or even toothpaste mixed with sand or the like and apply to the end of the Allan key

b) Use a center punch at an angle to try and crack the screw

c) Last resort will be to drill the screw out using an easy-out or a combination of a countersunk bit, pliers and center punch. If this is the case there is a good chance you will not have access for a drill because of interference from the unload table. So you will have to either have access to a right angle drill or remove the unload table (**Could add on another six hours to the job**)



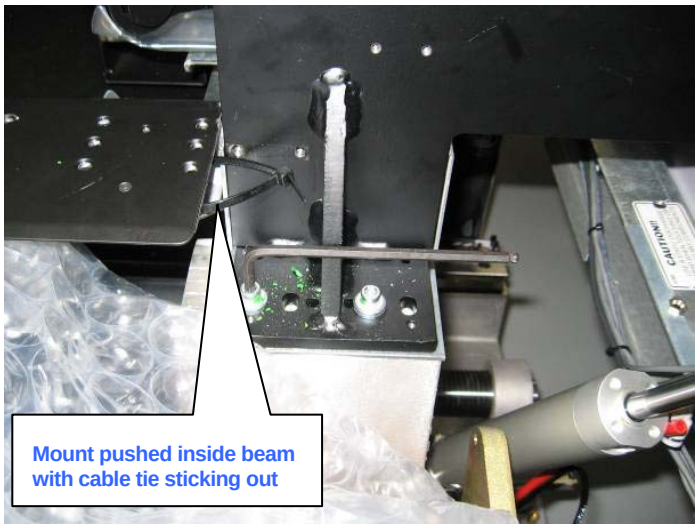


67) Place some sort of padding like foam or bubble wrap between the front beam and drum. Remove the two screws that secure the front beam mount to the MAB mount on both home and away sides

68) Put a tie-wrap through a hole at both ends of the front beam mounts. Then push the mounts inside the front beam just enough to clear the MAB mount. Do not push them in too far or retrieval will be difficult

69) Block and secure the front of the load table somehow so that it is not able to flex over after removing the screws that secure the MABs to the pillow block. If available an adjustable chair can be placed below the load table support beam or foam blocks can be placed between the lower MAB and power box on the away side and on the home side some sort of post will be required. There may be a jig available for this purpose in the future

70) Remove the two screws that secure the MAB mount to the pillow block on both home and away sides



71) It still has yet to be determined if two jacks at the engine end is sufficient for rising the unload table. For now use all four jacks, turning the front jacks one turn for every two turns of the engine side jacks. **Pay extra attention to the cable going through the MAB upper tie rod as shown in the picture of step 66 during the jacking operation**. The top MABs will need to be raised at least 110mm



72) Remove the MAB main mounts

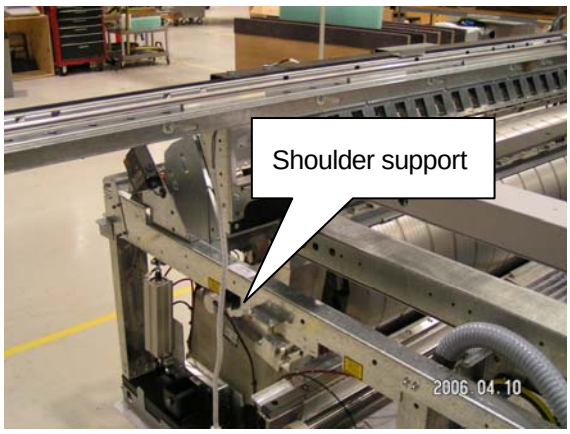




73) Lower the MABs back down to near proper position (115mm between MABs)

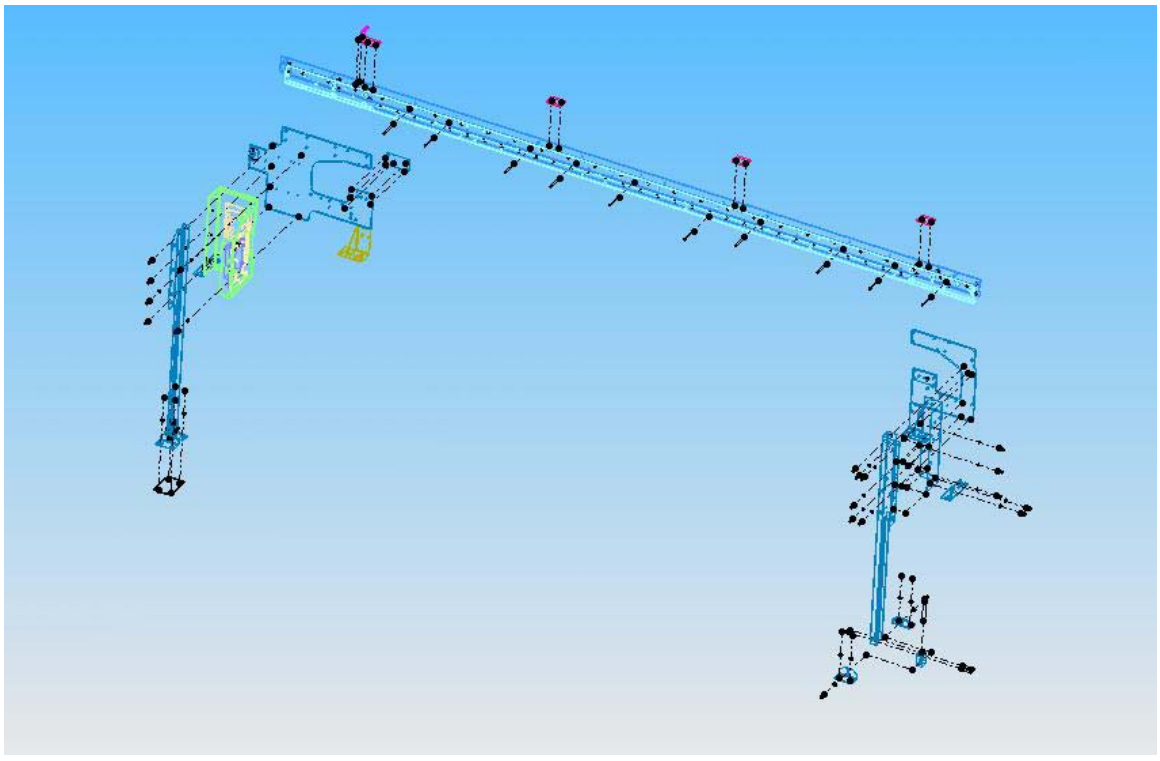
74) Remove the two banana jacks from each of the shoulder panel supports

75) Mounting holes will need to be drilled into the home and away shoulder panel supports 57-9684B &57-9683B. These holes will accommodate the hood beam vertical post brackets 252-09549A and the new locations for the safety switch brackets as well as new locations for the banana jacks that were just removed. A drill jig 690-00859A will be provided

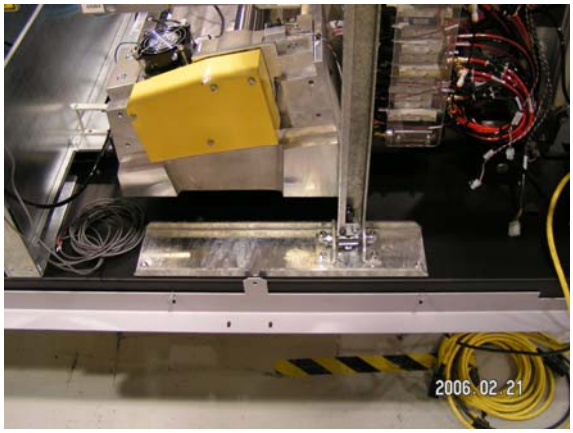




76) Weight offloading components will now be installed. Please refer to assembly drawing 518-01641A and BOM for fasteners and further assembly notes



77) Install the vertical post with corner plate assemblies on both the home and away sides. Leave all bolts and nuts loose for now. Do not hit the encoder as you may have to re-calibrate it. On A-rev parts, you may need to remove part of the lip of the home-side left lower shoulder panel to allow this bracket to fit. This is being corrected

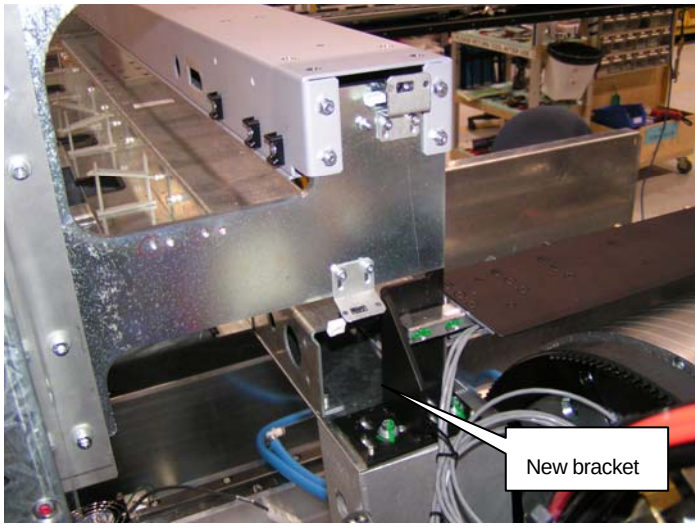




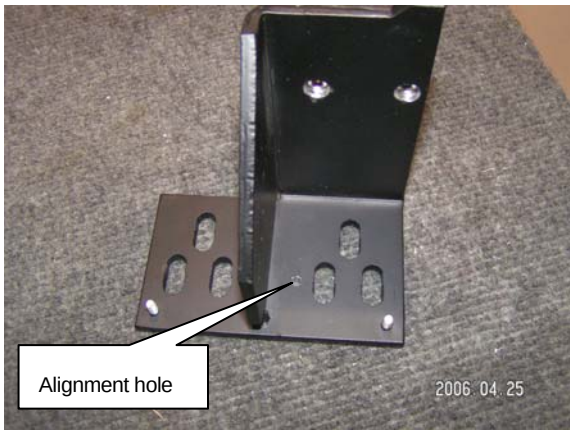
78) Re-attach the front beam mounts to the load table front beam using M4X12 sock-flat screws 52-4284 (nine per side) and one M3X10 sock-flat screw 52-7177 per side

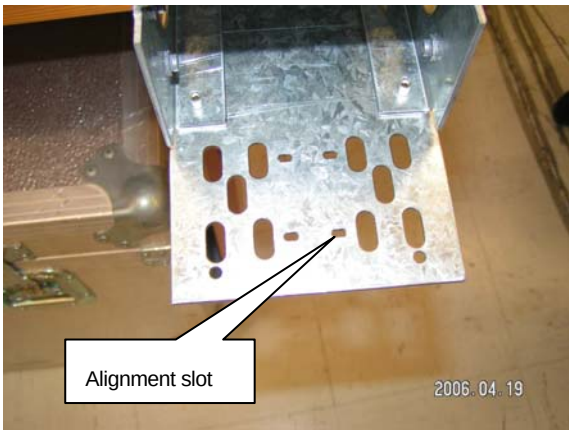
79) Secure the front beam to the new load table front beam brackets. RHS (away side) 252-09548A is shown in the picture. LHS (home side) is 252-09551A

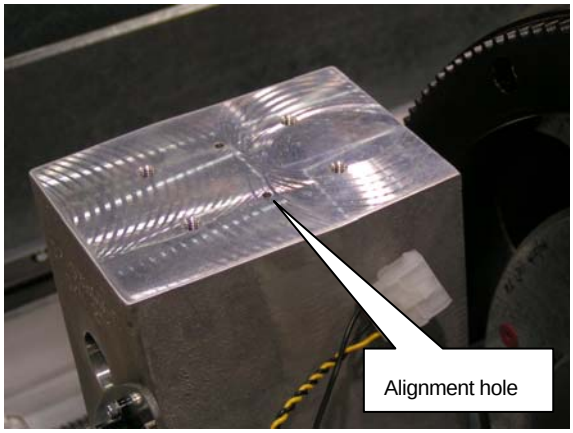
80) Loosely secure the new load table front beam brackets to the pillow blocks using two M6X30 sock-cap screws 52-3130 with a bell washers 52-4247 and heavy washers 52-3191 for small drum machines. On large drum machines there is an adaptor block attached to the pillow block and M6X80 sock-cap screws are used 52-4082 along with the heavy and bell washers

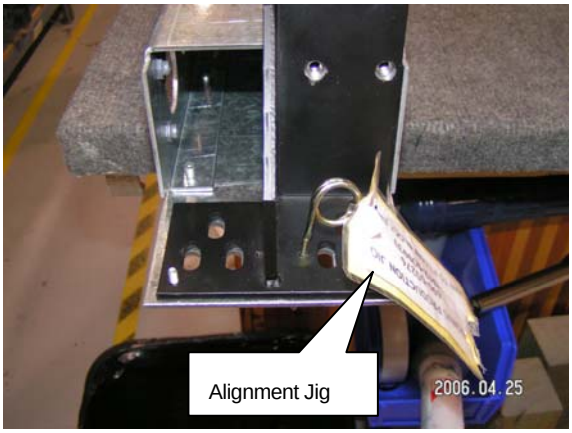


81) Install the MAB to pillow block pin jig 690-00276, which will roughly locate the for and aft position of the lower MAB. There will be one of these in the Magnus installation tool kit. **Note that it may be difficult to do this, especially on the MAB closer to the MCU as the fetcher track will still be secured to the lower MAB and is also secured to the MCU plenum. If the lower MAB's differ from the original measurements taken in step 50 by more than a couple of millimeters then it may be necessary to loosen the screws securing the fetcher track to the bottom MAB. More important is the for and aft position of the lower MABs relative to each other, which should be to within 1mm. Also The alignment hole in the front beam mounts may be too big and have a lot of slop, if this is the case try to get the alignment jig centered in the hole and use the procedure described in step 50 to make the front beam parallel with the drum. Having the front beam too far forward could result in the load table rails not being able to be installed or very tight to install**

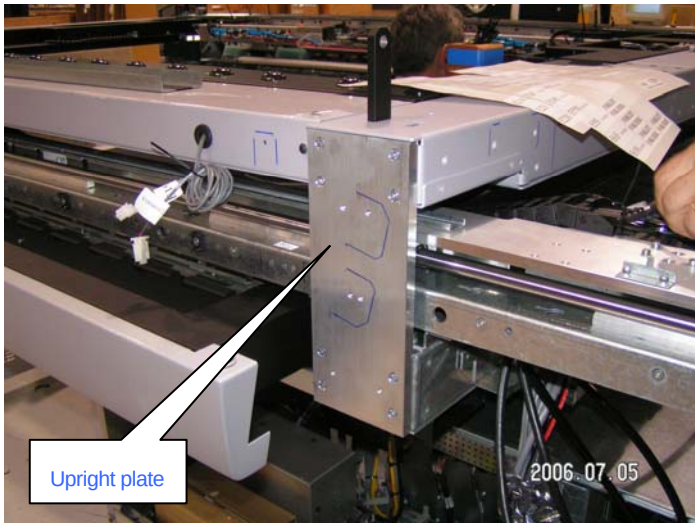




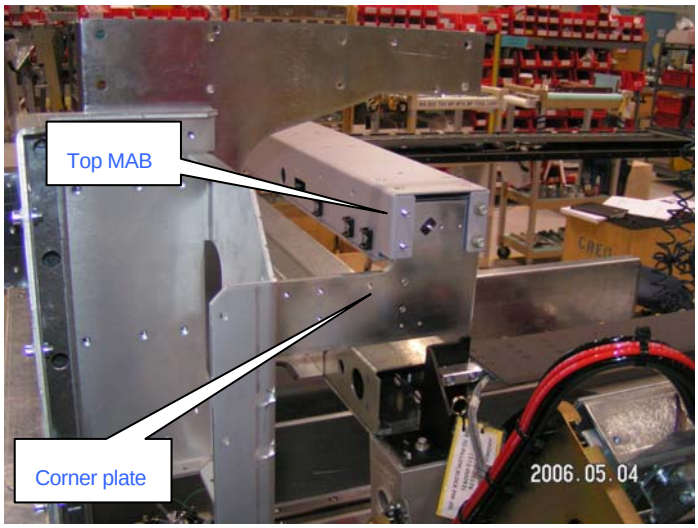




82) Re-attach the operator side MAB upright plates, but do not completely tighten yet



83) Lower the top MABs down onto the corner plates. The corner plates will have a stud plate attached to them for securing the MAB. The stud plate is attached to the corner plates with an M4 nylock nut, which may need to be backed off so that the MAB can be finessed into place over the studs. M6 nylock nuts and bell washers can be loosely attached to the two outside studs on each MAB. The inside studs will first have the unload table plate deflector actuators placed over them before securing with M6 nylock nuts (no bell washers)



84) Install the hood beam 252-09546A. It may be necessary and a lot easier to adjust the height of the vertical posts to approximately the same height to get the beam to fit in place see step 86H. If the beam is still difficult to get in, a long screwdriver or small crowbar may be needed to position the pem studs in the beam along with a good sized rubber mallet to finesse the beam into place

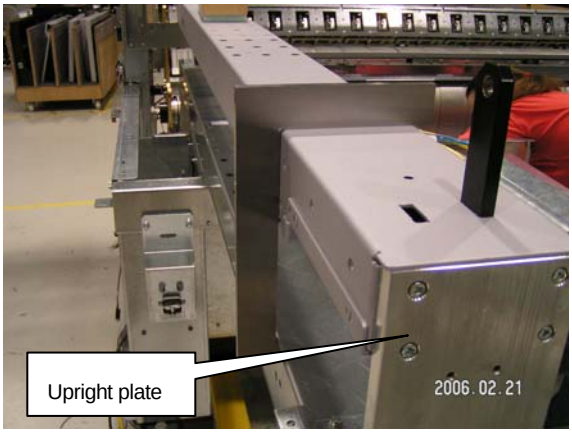




85) All of the scissor jacks can now be removed

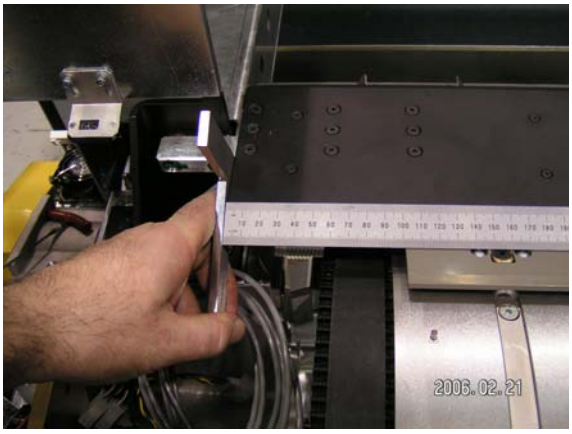
86) MAB and vertical post corner plate alignments. The MABS not only have to be parallel to each other but they must also be square (the same distance from the drum). The amount of adjustment necessary will be highly dependent on the quality of the original alignment from the factory:

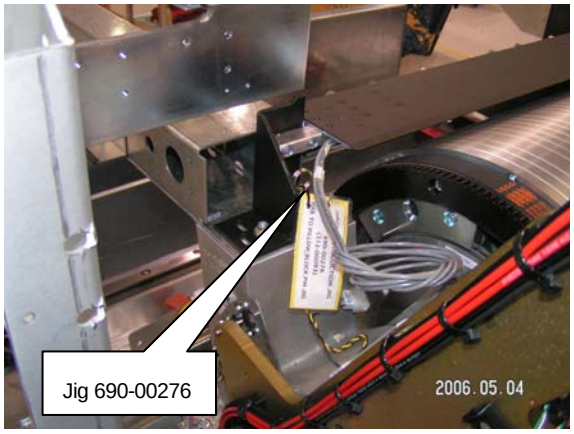
a) Use a square at the operator end to line up the upper and lower MABs before tightening the upright plate. There is very little slop in the upright plate so measuring with a square might not be necessary. Tighten up the screws (they should not have been tightened yet as indicate in step 82) A level can also be used across the MAB



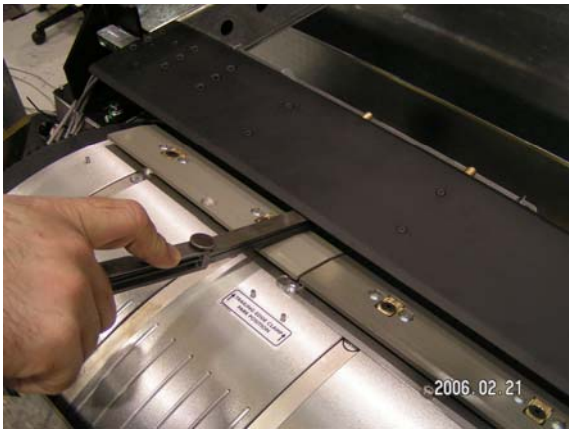


b) Align the lower MAB using a straight edge and steel rule to measure the distance between the end of the load table front beam and the edge of the LEC. The measurement should be roughly equal on both home and away sides to within 1mm. At the same time the MAB to pillow block pin jig 690-00276 should be used to align the for and aft location of the MAB's. This jig comes with the Magnus installation tool kit, and is described in step 81





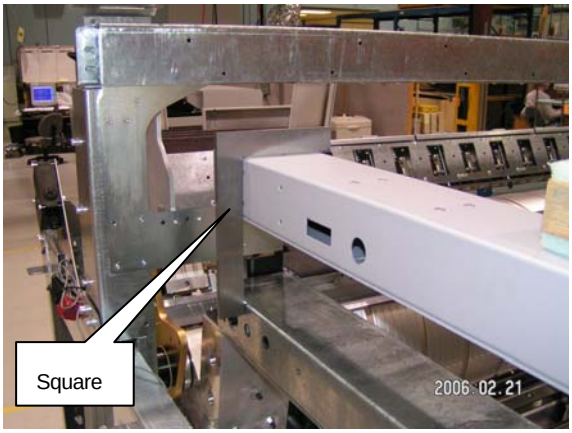
c) Adjust the for and aft position of the load table front beam. The MAB alignment jig 690-00276 described in step 81 should be able to make this adjustment, but to double check put a machinist square back on the LEC and see how close you are to the measurements you took during disassembly. Also feeler gauges can be used to check the gap between the LECs and the lip on the load table front beam. This distance should be roughly 2-4mm on a large drum machine and 6-8mm on a small drum machine. It is possible for the sheet metal on the beam to be bent though, so check at many spots along its length keeping in mind the reason for this check is to ensure the beam does not come close to rubbing the LEC's' but at the same time not too far forward as this will cause difficulties when trying to install the load table rails. **Note that it may be difficult to do this, especially on the MAB closer to the MCU as the fetcher track will still be secured to the lower MAB and is also secured to the MCU plenum. If the lower MAB's differ from the original measurements taken in step 49 by more than a couple of millimeters then it may be necessary to loosen the screws securing the fetcher track to the bottom MAB. More important is the for and aft position of the lower MABs relative to each other, which should be to within 1mm**



d) **Remove the Drum lock jig**

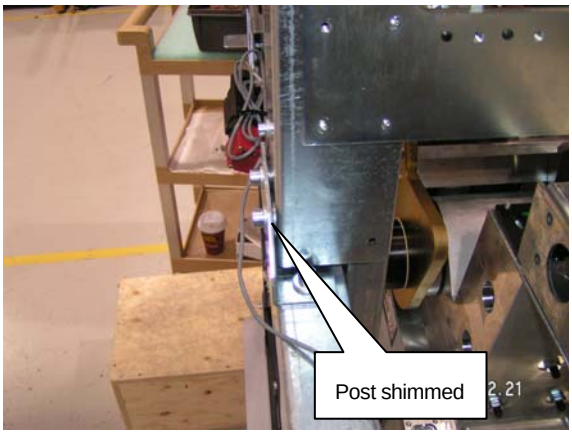
e) Re-attach the load table motor

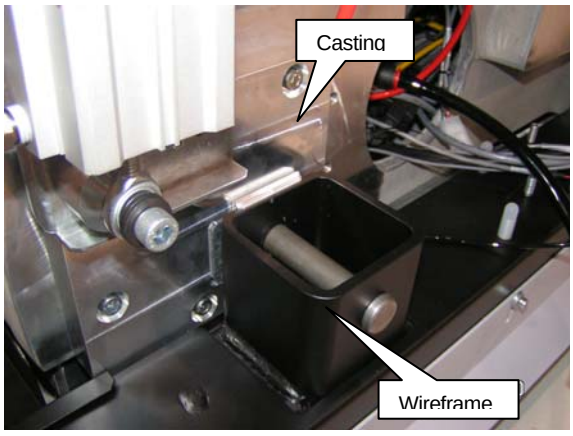
f) Use a square to line up the upper and lower MABs at the drum end. There are slots in the corner plate that receive the studs from the stud plate and secure the top MAB, so there is some movement available in the direction parallel to the drum. A level could also be used to line up top MAB and bottom MAB



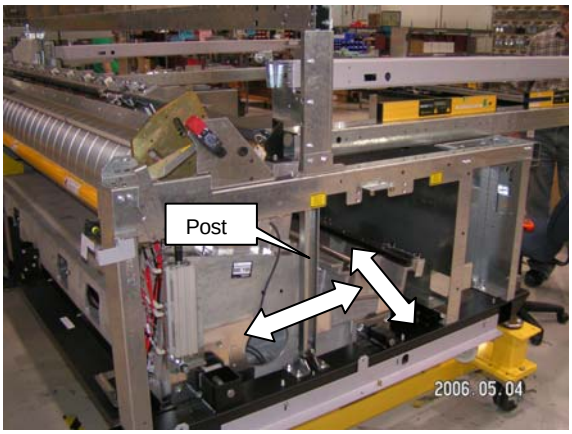


g) There could be some cases where the slots that make it possible for the upper MAB to be aligned to the lower MAB are at their max point of travel. This could be due to the wireframe of the machine not being centered on the machine casting. If this is the case, then it may be required to shim the vertical corner plates out a bit, which could be done with some heavy washers



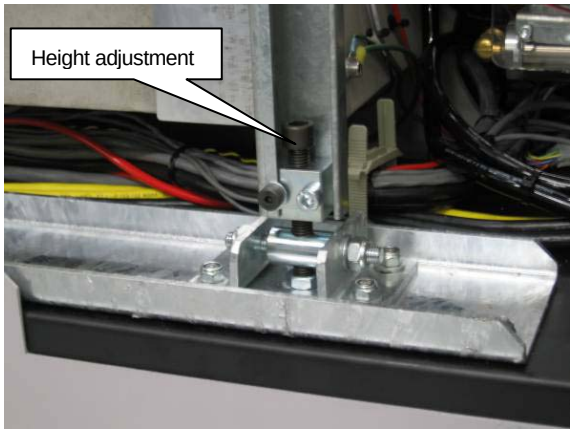


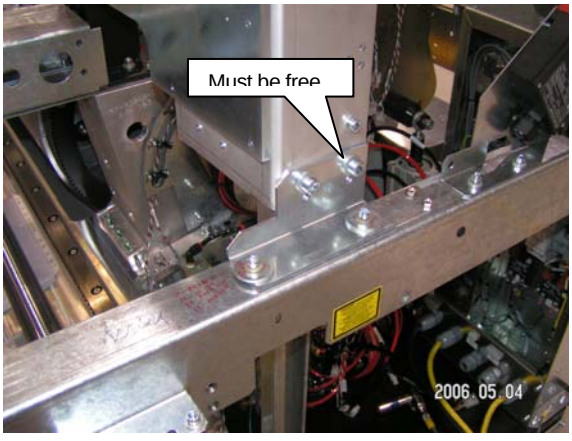
h) The posts of the vertical corner plates on both home and away sides should be checked for plum (90°) in both the x and y directions



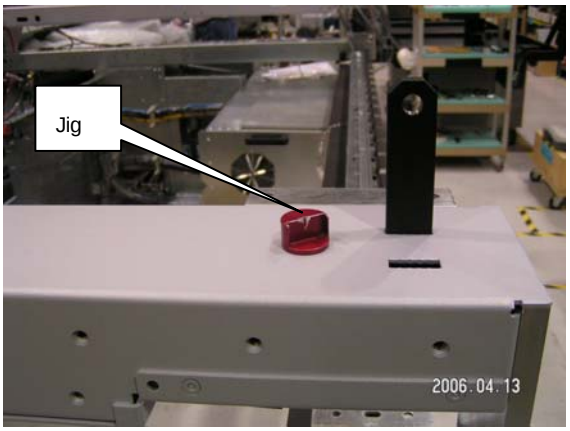
i) Now the vertical posts need to be jacked up so that there is approximately a 1-2mm gap between the corner plate and front beam mounts. **At the same time the hood beam should be level to well within 0.1 degrees.** Only 1mm is required, but once more weight has been added this gap will close up. If there is no gap then it means that weight is being transferred down through the pillow blocks, defeating the purpose of weight offloading. **The vertical post brackets that attach to the shoulder panel mounts must be free (loose) from the vertical post during jacking**



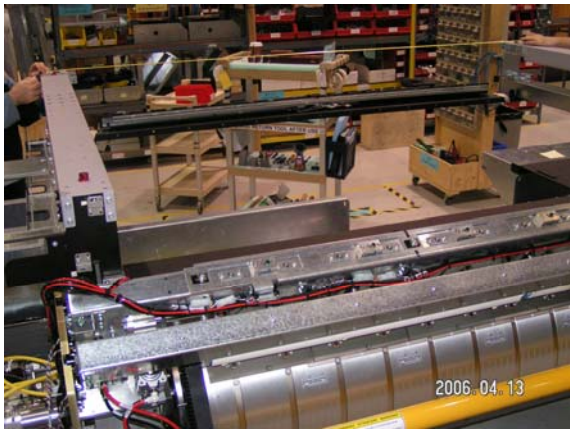




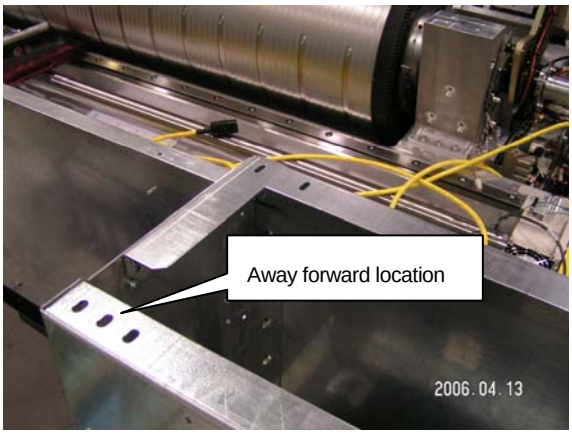
j) Place the MAB alignment jigs (690-00136A) (X4) into the top MABs and measure the distance between MABs at the operator end and drum end, the difference should be no more than 1mm. Measure the diagonals between MABS and this distance should also not have a difference of more than 1mm



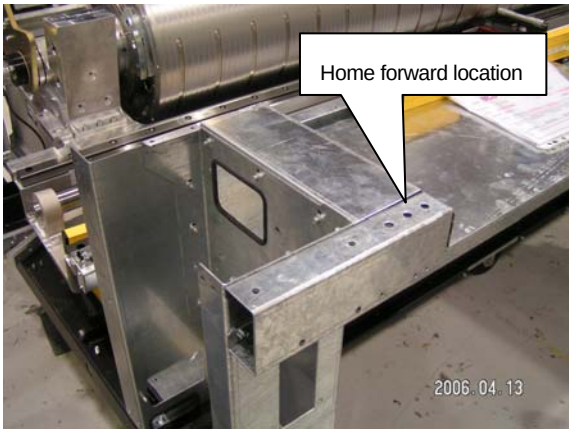




k) In extreme occurrences it may be necessary to adjust the front securing location of the lower MABs to achieve correct alignment. Both home and away MABs are secured by 3 M6 screws in the forward location. The holes in the forward location are larger than 6mm for the purpose of aligning the MABS. There are also usually several shims (252-04602A) under the front location that are used for fine adjustment of MAB level, which should be within 0.1 degrees relative to each other.

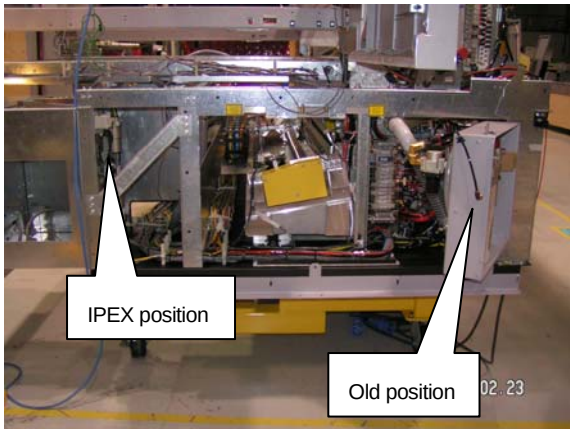






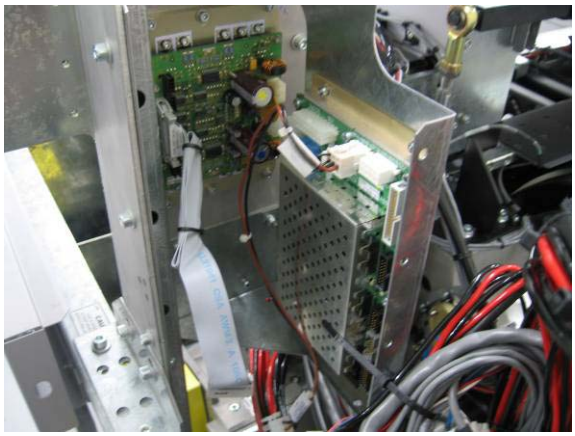


87) For machines with a TH3 option the extra air filters mounted on the side of the air entry box will have to be relocated. The new location will be where the internal chiller use to be located using a new bracket 252-11176A attached to the pull out table support beam (pictures show IPEX machine, which did not have a final decision on location) After removal from the old position do not forget to plug up the holes

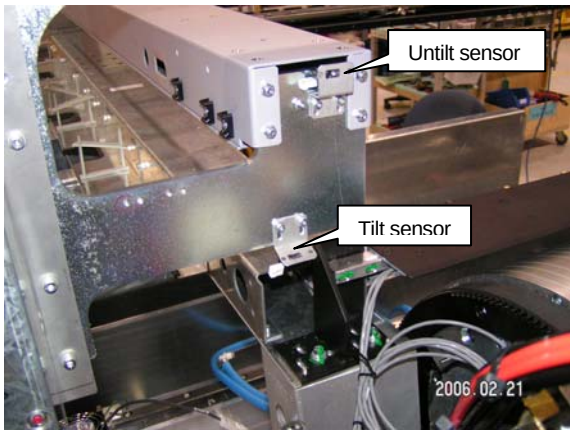




88) Install the Genine board, ejector carriage amp and relay if not done so already, but do not try to hook up the wiring just yet. Use a static strap for this operation

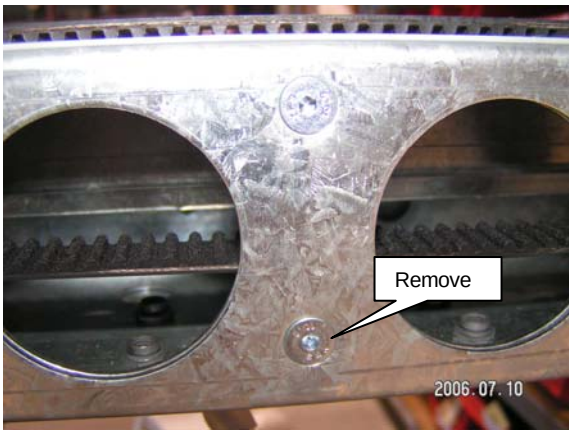


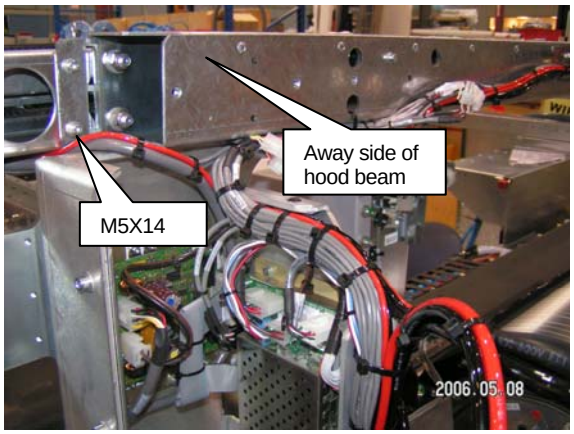
89) Reinstall the unload table tilt and untilt sensors. The brackets will be in the same location as they were before, but now they will be mounted on the away side corner plate



90) Install the ejector track onto the hood beam

a) You will need to remove the two counter sunk screws out of the ejector track before being able to mount the track onto the hood beam of a LTOR machine. The picture below shows a LTOR machine. ON a RTOL machine the tab at the end of the hood beam on the away side, will need to be bent so as not to interfere with the ejector motor

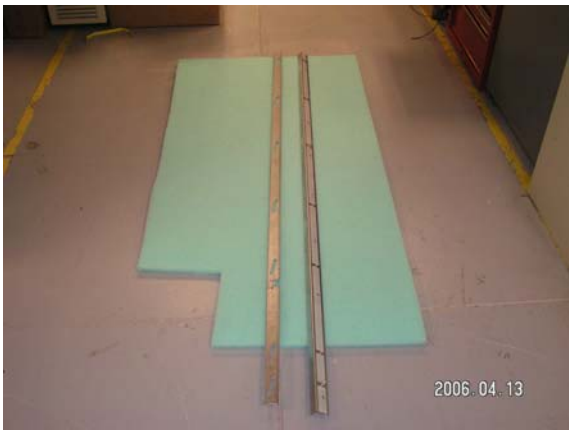




b) The ejector will be attached using M5X70 socket cap screws with bell washers and M5X14 socket cap screws. There is on hole at each end of the beam that is above the cut outs in the bottom of the beam. The M5X70 screws should not be used in these locations as they will pinch the beam, instead use the M5X14 screws. Use the M5X14 screws also to secure the tab on LTOR machines

91) The Ejector track now needs to be modified for the new ejector. This will involve removing and replacing the long ejector actuator rail (cylinder end) 252-10456A and the long ejector actuator base (cylinder end) 252-01289B. As well the cylinder will change from a two position to a three position cylinder, which will require a new solenoid, cable and tubing. The actuator assembly number is 500-03573A. The following are the new components:

a) Actuator base and actuator rail 252-10503A & 252-10456A





b) Three position cylinder 500-03572A and solenoid 55-0771 with cable 220-00483B





c) New fittings that must be installed on the load table manifold 336-00051 and 55-0072



d) New shuffling ejector, 500-03575A for a RTOL and 500-03576A for a LTOR

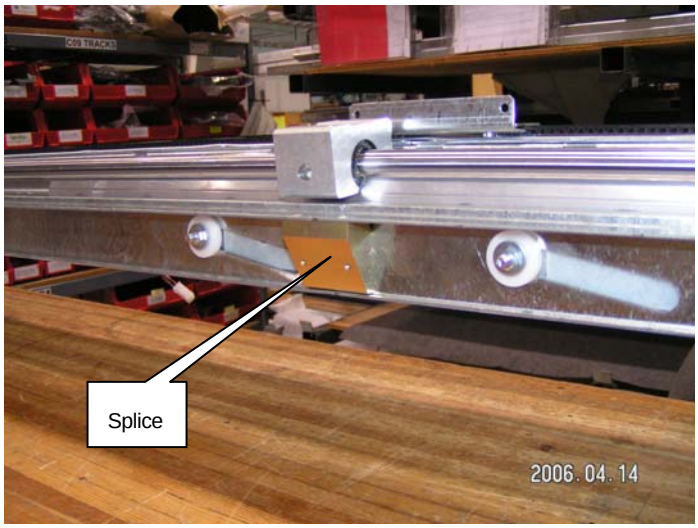




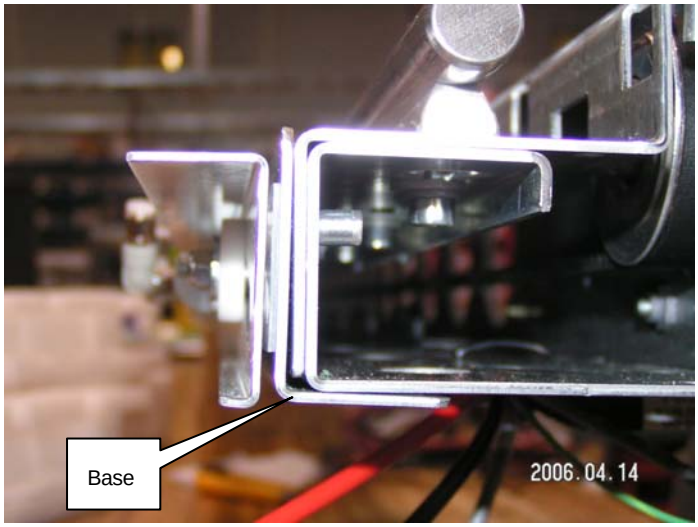
92) Remove the old cylinder from the track. The cylinder is secured with a M4 flat washer and nylock nut on one end, and the other end is secured with a 3/16 clip 52-4272



93) Remove the entire ejector actuator rail. The entire rail consists of a short rail and a long railed joined together by a splice block 252-03722A. The long rail which the cylinder is attached to, will need to be replaced with a new long rail 252-10456A



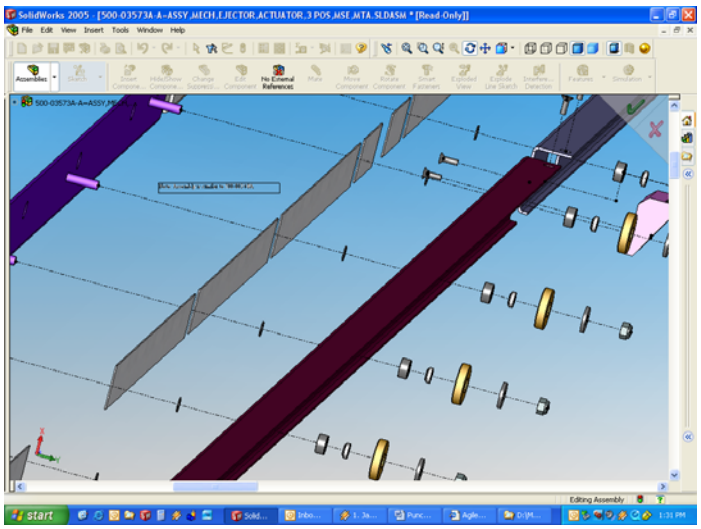
94) Remove the long ejector actuator base from the ejector track and replace with the new base. The base is attached with M5 flat head screws that may strip during removal, use a **new** Allan key pinched with vise grips to crack the screws during removal



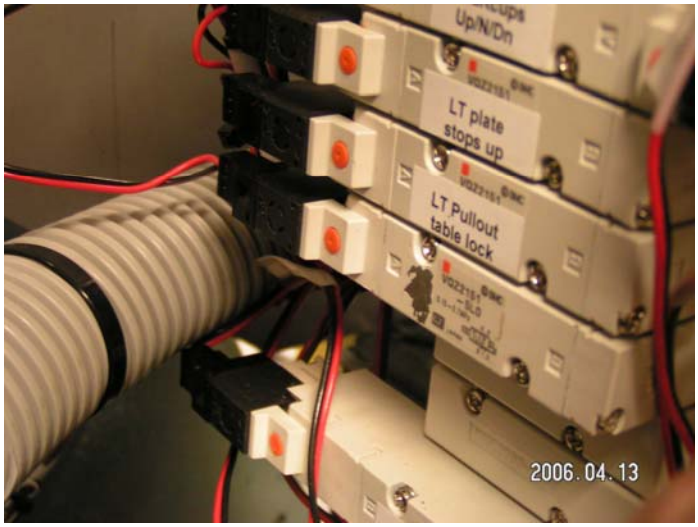
95) Remove the pivot pin 252-03207A from the old base and install on the new base. The new base may come with a pivot pin installed already



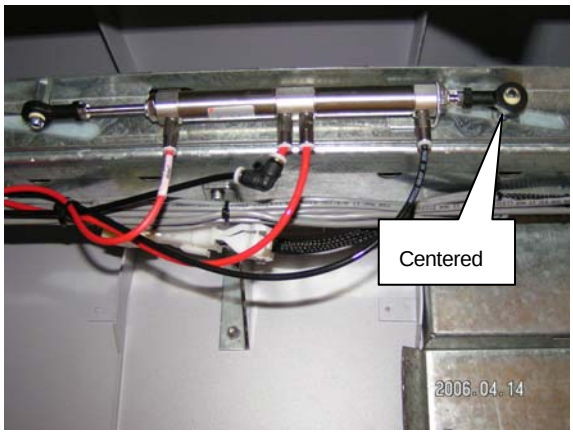
96) Re-install the actuator rail onto the base rail. First place the custom washer 304-00153 over each of the studs on the base rail. Install ball bearing 368-00003 and M5 pem nut 52-4440, then the actuator rail. Secure the actuator rail using retainer sliders 252-02699C, M5 heavy washers 52-3248 and M5 nylock nuts 52-3177. The model below also shows UHMW tape, which should already come applied to the base



97) Install the solenoid, elbow 55-0072 and tall elbow 336-00051 onto the load table manifold 500-00351A. There are 3 empty ports just below the LT pullout table lock solenoid on the manifold. Install the cable 220-00483B from the solenoid to the load table manifold interface board J4



98) Install the ejector actuator 3 position cylinder. The idle position for the actuator rail will be the center position. To eject the plate out of the machine ejector pusher 1 will be in the down position (rail will be all the way forward or back) ejector pusher 2 will be used for shuffling (new solenoid just installed) hook up the tubing accord ling. Picture shows a LTOR machine with red tube from pusher 1 hooked up to the home side of the cylinder (side closer to home side of machine), then black (normally pressurized) from pusher 1, then red from pusher 2 and black from pusher 2. Notice the rail in the center position, a RTOL machine will be a mirror image of this tube routing. The tubes should be routed such that they are not snagged by the ejector, when the ejector passes by



99) Install the unload table plate deflector if it was removed or if the machine has an old version deflector installed (part of the series 2 upgrade):

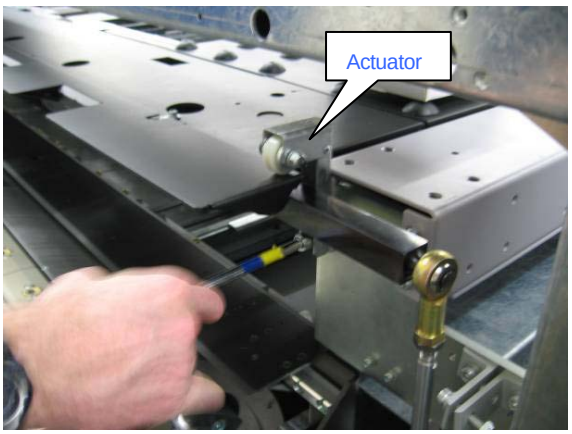
a) Install the unload table plate deflector actuators (2 pieces, one on home and one on away side)

b) Add M6 nylock nuts to the studs that the actuator goes over, and use M6 bell washers with nylock

c) nuts for the other studs

d) The unload table plate deflector should be pushed all the way toward when installing (there are slots on the hinges). There should be a gap of between 3 and 7mm between the LEC's and the deflector when the unload table is tilted. At the same time the home and away sides of the unload table should be within 0.1 degrees relative to each other. The angle of tilt of the unload table is approximately 20 degrees

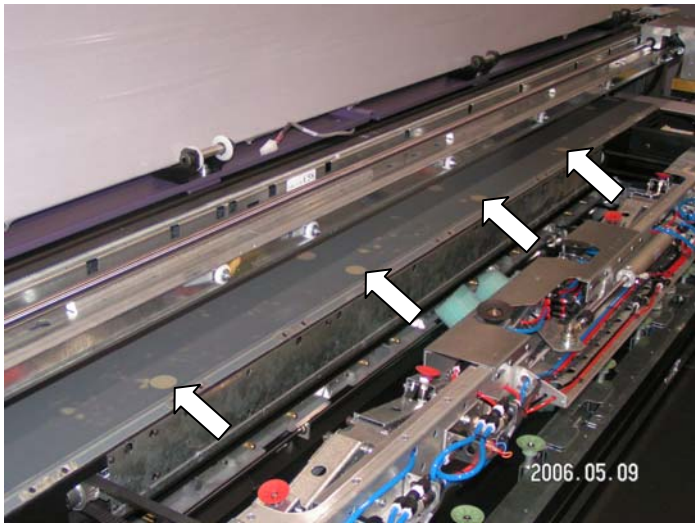
e) With the table in the untilted position the deflector should be approximately level in the direction perpendicular to the drum. If the deflector is sticking up past level when the unload table is in the untilted position, could result in the punch deflector being pushed up resulting in a marginal interface between punch deflector and unload table.



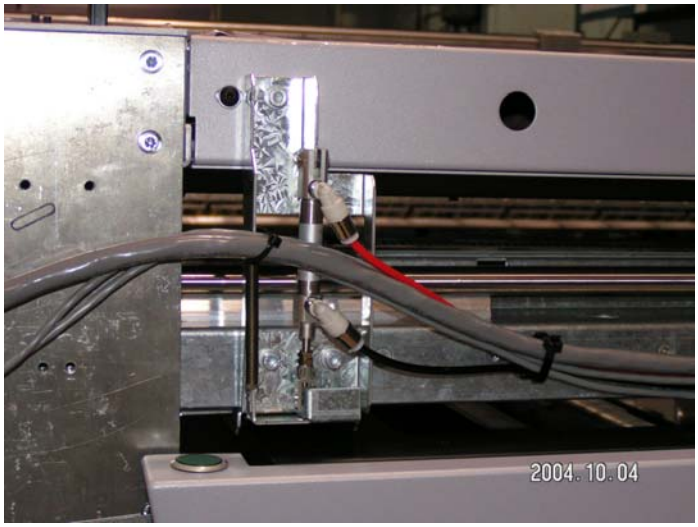


100) Reattach the unload table cylinders

101) The stationary part of the unload table, which is called the leading edge panel (500-03273A) needs to be secured at 4 extra locations, where normal production machines do not usually have screws. This is due to the unique requirements of the punch option. These locations will be covered with peak tape, which will be needed to be removed to add the M4X12 sock-but screws. No decision has been made at this time for the need to re-apply the peek tape. **As of July 27 2006 it has been decided that is may not be necessary to screw down this panel in the middle, and that the peak tape can be left on**



102) Re-attach the pull out table locks to the MAB upper tie rod



103) The locations of the rear hood safety switches must be reversed:

a) The locking solenoid switch number 2 normally located on the home side must be moved to the away side using a new safety switch bracket 252-10111A

b) Switch number 10 normally located on the away side must be changed to the home side using new bracket 252-10261A

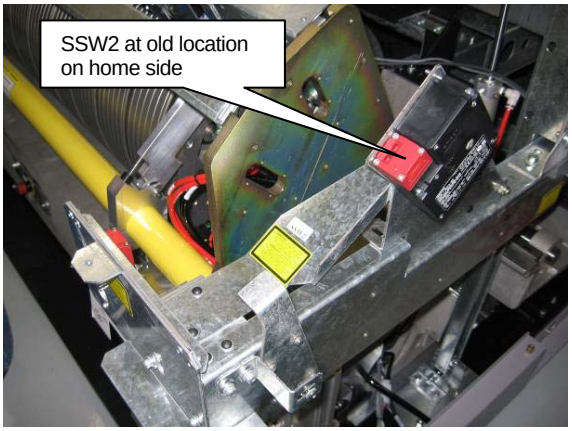
c) The home side safety switch bracket most also be re-enforced with a new brace 252-04104A, to which the punch plate will be secured

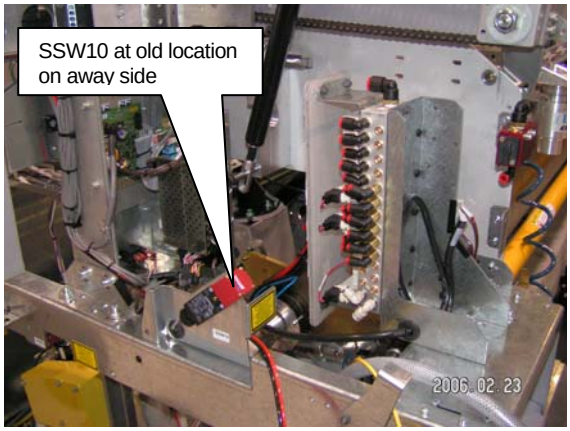
d) Cable 220-01660A will have three wires. One will supply power to the locking solenoid switch #2 and be connected to E1 & E2 of the solenoid and the other end will have to be routed to the power box and be connected to J28 of the PDB

e) Another wire of cable 220-01660A will be connected to 51 & 52 of the solenoid and the other end will be routed to the power box and connected to pins 1 & 6 of cable 220-00379B at J39 of the PDB

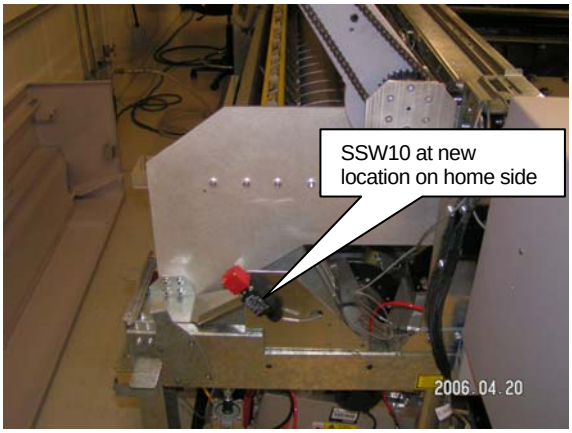
f) The last wire of cable 220-01660A will be connected to 11 & 12 of the solenoid and the other enc will be routed to the power box and connected to pins 3 & 8 of cable 10-5242B at J40 of the PDB

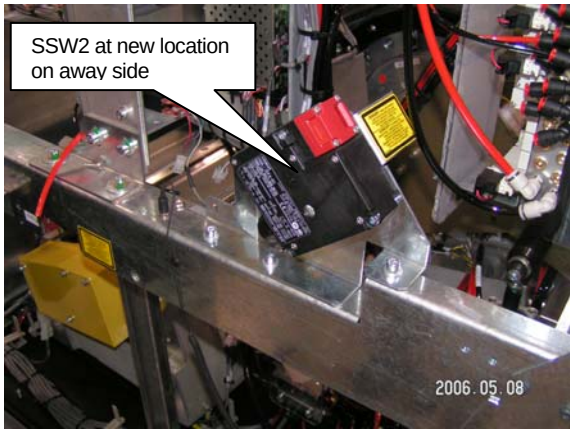
g) Cable 220-00397B will be connected to safety switch #1, which is mounted on the side of the power entry box at the away side rear of the machine, using terminals 12 & 22. The other end will be routed through the casting to safety switch #10 no located at the home side, and connected to terminals 11 & 21. **Remember to leave the jumper connected inside switch #10, connected to terminals 12 & 22.**





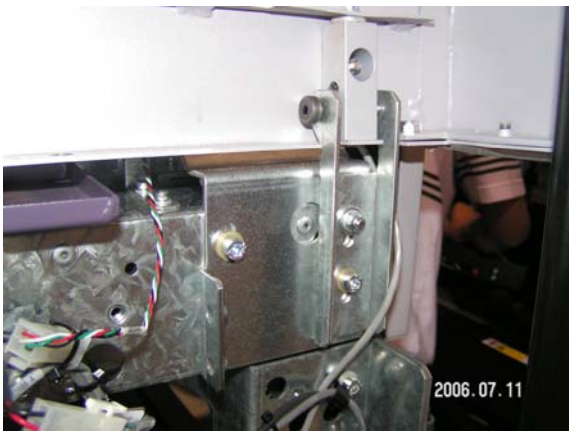
See next page for pictures of new brackets and locations



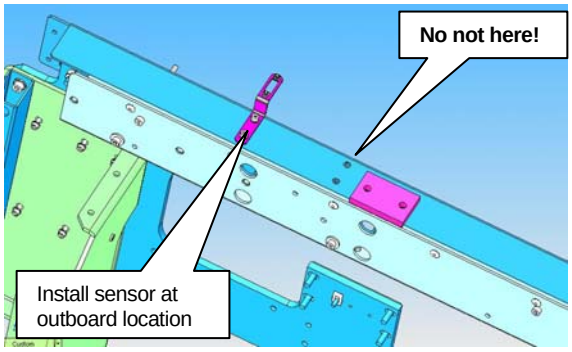


104) Install the home and away shoulder panel support brackets. The away side bracket in the picture on the left has two different part numbers, one for a LTOR machine and the other for a RTOL, which will both be connected with M6 shcs and bell washers. The home side bracket can be temporarily connected with two M6 shcs and bell washers, but later on the outboard screw will be removed to install outrigger hinges for the rear hood as shown in the pictures



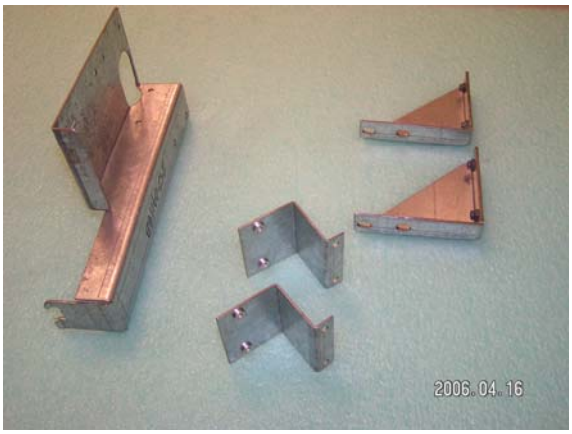


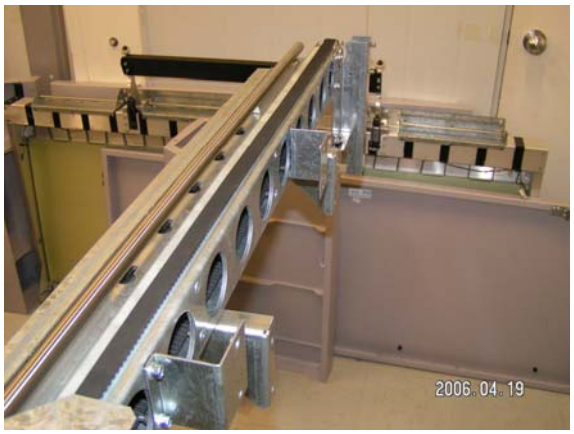
105) Install the ejector home sensor and bracket (252-09557A) onto the hood beam. **There are two possible locations to install the sensor on both home and away sides, make sure the sensor is installed in the outboard location.** Installing at the inboard location will cause the ejector to park nearly on top of the unload table, as well the hood drip tray will cover the sensor and replacement if ever needed would be impossible. **The home location of the ejector will be on the away side of the machine as in the picture for RTOL machines, and will be on the home side of the machine for LTOR machines**



106) Install the new bridge support bracket and bridge rear panel support brackets. It may be easier to temporarily install the bridge rear cover to line up the brackets:

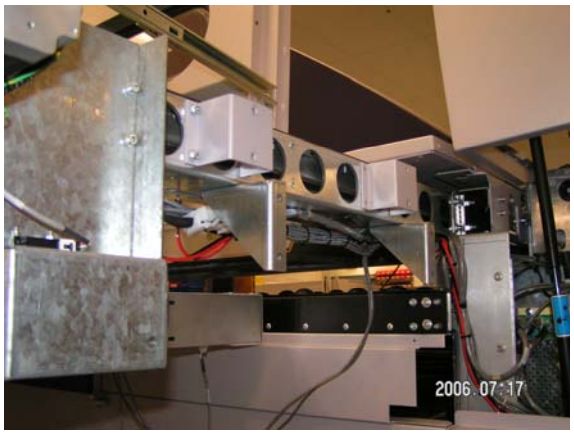
a) RTOL machines will use bridge support bracket 252-04118B and panel support brackets 252-04119B (x2) and 252-07122B (x2)





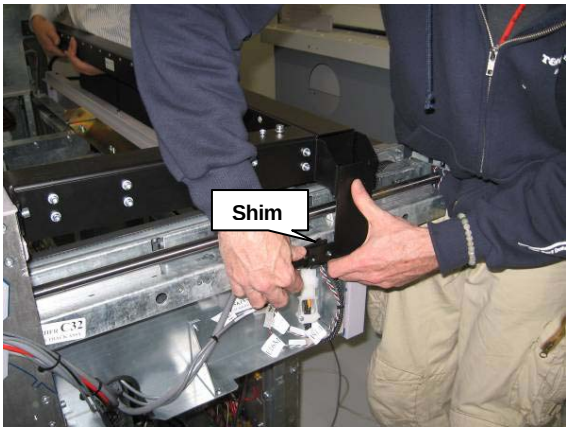
b) LTOR machines will use bridge support bracket 252-04595B and panel support brackets 252-04240D (x2)(*Note this number will be changed as it is for the entire rear panel) and 252-07122B (X2).





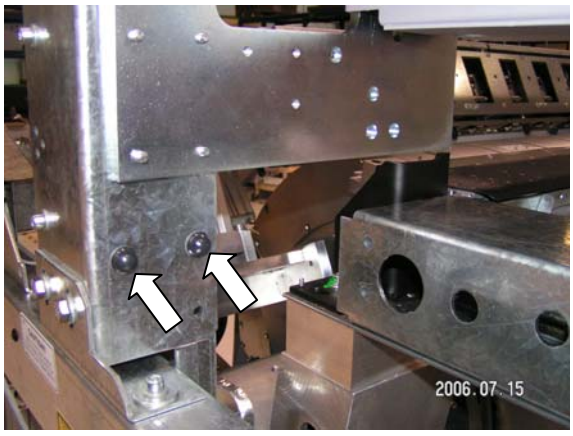
107) Install the bridge support beam C21, which attaches to the upper MAB, fetcher track, and the hood beam post of the weight offloading assembly. Be sure to install the metal shim in the front side for LTOR machines. This shim may be loose or welded in place depending on the age of the machine, and failure to install it will result in interference with the fetcher





108) Bumpers (59-3398) need to be added to the hood beam post assemblies so as to move the MAB to skin panels into the correct location. These bumpers may or may not have been installed by production, but failure to do so would cause the holes in the long MAB to skin panel to not line up with the slip sheet underside sensor

a) The pictures below show the home side, but the bumpers should be installed on both home and away sides. The away side will require 4 bumpers because the MAB to skin panels are wider on the away side





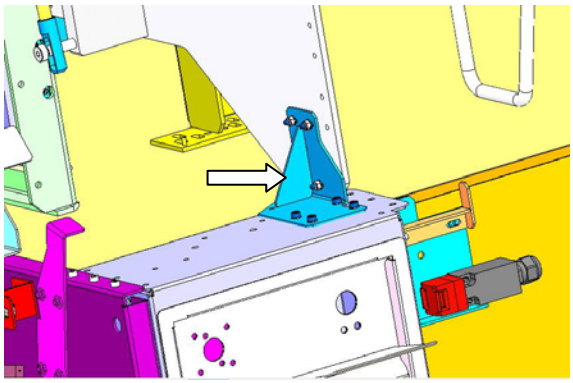
109) The punch support plates need to be installed next, but before this happens the power entry box should be checked for plum. Note that the picture shows a plum of 89.7 degrees, which is NFG. **All levels and plums should be within 0.1 degrees**:

a) If the plum is not good then shims 252-05625A or washers can be placed under the power entry box to adjust for plum. Shims 252-05625A are a generic shim used to level different parts of the wire frame and may need to be cut with sheet metal sheers to fit into desired location



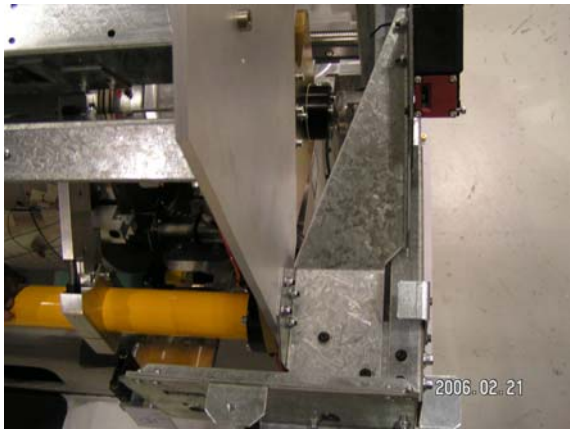


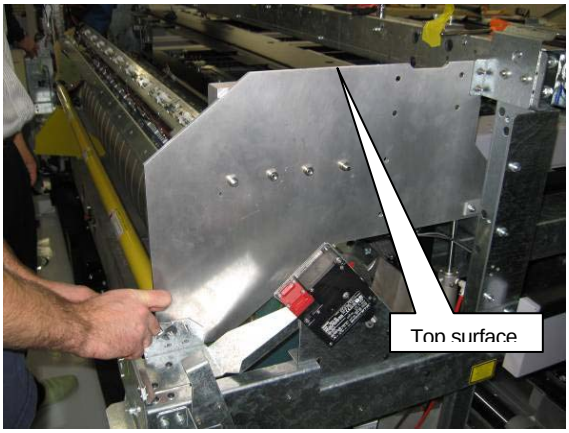
110) Install the lower RHS(away) punch support plate bracket onto the top of the power entry box

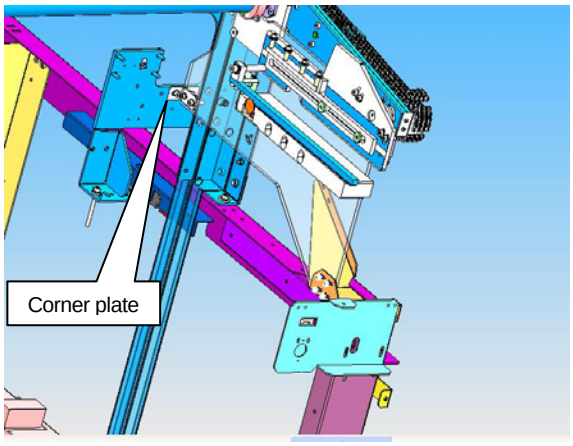


111) Re-check the level of the hood beam after the punch has been installed, and adjust through the vertical posts if necessary

112) Attach the LHS (home) punch support side plate 252-09728A. The plate is secured at three locations, which are to the shoulder panel support bracket, the rear hood safety switch bracket brace, and **two** lower punch plate brackets 252-09676A are required to secure the lower location to the corner plate. Assembly drawing 518-01687A is available for reference. The top surface of the plate should be level, and both home and away plates should be roughly the same distance to the hood beam if the **hood beam is level**, which it should be. If it is not possible to get the top surface of both plates the same distance to the hood beam, then make sure the top surface of each plate is level and note the difference in distance to the hood beam of the plates. Use this difference later on when installing the punch wheel guides

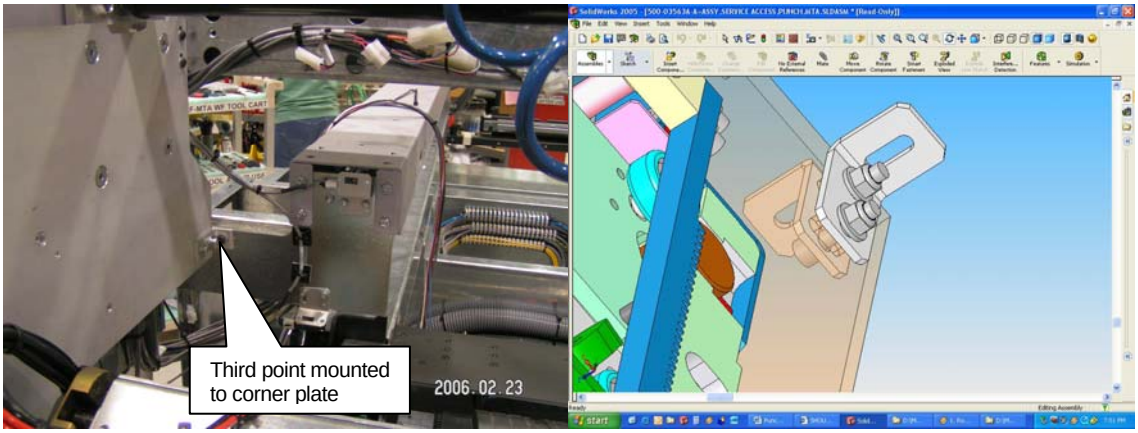








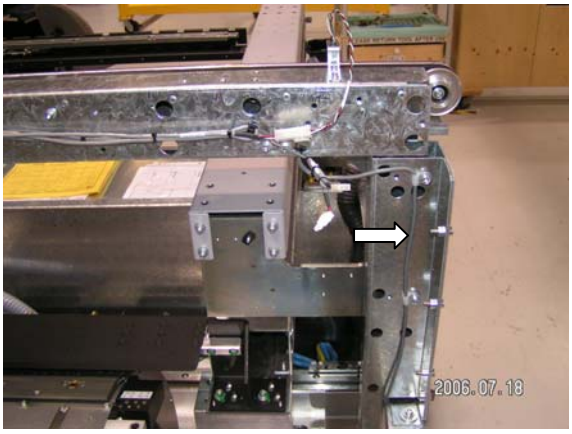
113) Attach the RHS (away) punch support side plate 252-09665a. The plate is secured at three locations, which are to the shoulder panel support bracket, the support bracket attached to the power entry box, and two lower punch plate brackets 252-09676A are required to secure the lower location to the corner plate. Assembly drawing 518-01686A is available for reference. The top surface of the plate should be level, and both home and away plates should be roughly the same distance to the hood beam if the **hood beam is level**, which it should be. If it is not possible to get the top surface of both plates the same distance to the hood beam, then make sure the top surface of each plate is level and note the difference in distance to the hood beam of the plates. Use this difference later on when installing the punch wheel guides



114) Run cables and tubes for a RTOL machine along the hood beam. The cables required can be found in step 43:

a) First determine if the machine you are working on has older version emergency stop cables. Find the home side shoulder panel and look at the cable coming out the back of it. There should be one cable that splits into a two. The two ends should be fitted with 2 pin Molex mini fit connectors and be labeled **220-00330B** (This is the new version) If this is not the case you will have to install the new version cable (comes with the rear fan upgrade kit)

b) Now go to the home side rear of the machine and look at the cable that goes from emergency stop 6 at the bottom home side rear of the machine, up to ES5 located on the home side shoulder panel. This cable should be **220-01337B**. If it is not then you will have to install this version (If the rear fans are already installed then you will not need to replace this cable, even if cable says A version)



c) If this is a punch ready only upgrade, ES3 (away side) and ES4 (home side) will be located on the hood beam and cable 220-00398B will go from ES4 to ES5 located on the home side shoulder panel.

d) Between ES3 and ES4 on the hood beam will be cable 220-00399A, connecting the two

e) From ES3 there is cable extension 220-01338A, which goes to 220-00326B explained below

f) The location of ES3 is on the away side shoulder panel, which will have wires 220-00402A & 220-00401A coming out of it. Cable 220-00401A will connect to 220-00328, which is the start button splice. Cable 220-00402A will connect to 220-00326B

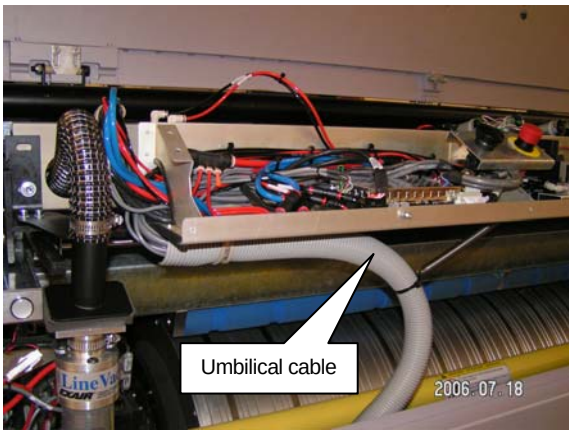
g) Cable 220-00326B has 3 branches, one going to the PDB0 J42, the second goes to the machine bulkhead, and the third goes to the ES3 extension 220-01338A

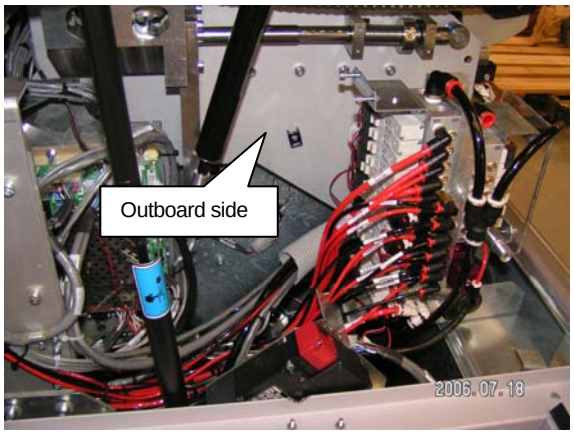


h) If this is a punch upgrade then ES3 & ES4 will be located on the electronics tray of the punch (Skip these steps until the punch is installed)

i) Cable 220-01401A will go from ES4 (home side) to ES5 (home side shoulder panel). This cable will have to be routed through the punch umbilical cable, along the outboard side of the punch support plate and then up to the hood beam and along the beam to 220-00330B

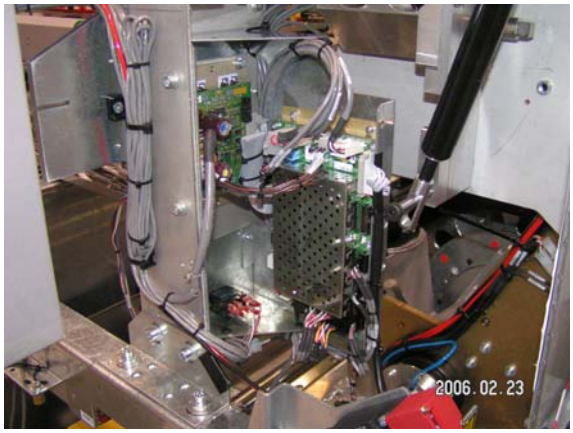
j) Cable 220-01399A will go from ES3 (away side) to ES2 (Away side shoulder panel). This cable to will go through the punch umbilical cable, along the outboard side of the punch support plate and then up to the hood beam, to cable 220-00326B

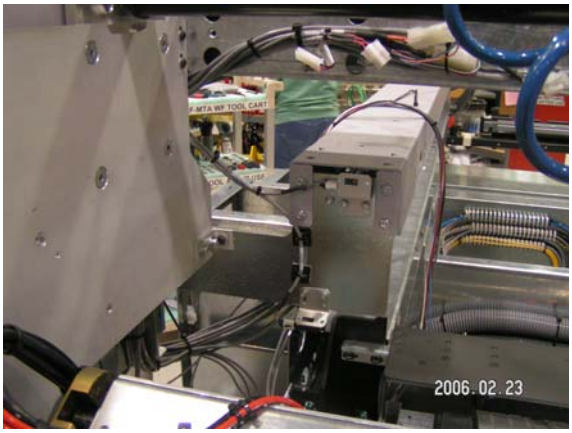




k) Route the cables as neat as possible to make any future FCO's, PM's, or trouble shooting easier. **It is also easier to start from the bridge in position sensor and make your way back along the hood beam to the load table GENINE board**

l) Some of the cables will have extra length depending on the direction of the machine. Wrap up the excess and tie neatly out of the way.





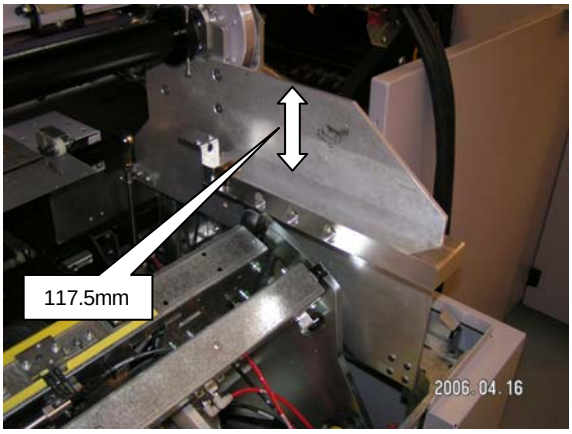
115) Install the RHS (away) and LHS (home) punch wheel supports 252-10278A and 252-10279A onto the punch support plates. Use assembly drawings 518-01687A & 518-01686A as reference

a) The support with the plunger switches and LED is mounted on the RHS (away)



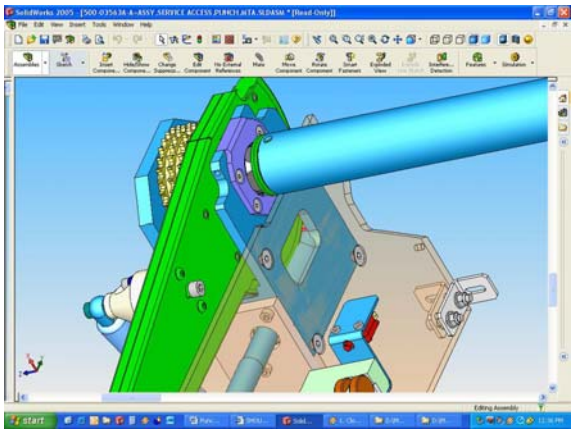


b) The face of the support that the punch wheel rides along should be approximately 117.5mm from the top of the punch support side plate. A level should also be placed on the wheel mount to ensure the level is to within 0.1 degrees. There may be a difference in distance of the top surface of the side plates to the hood beam. If this is the case factor in this difference when installing the wheel guides



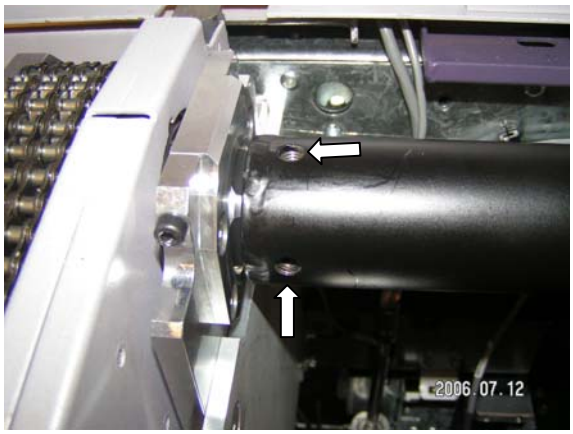


116) Install the RHS main punch arm 518-01723A; refer to drawing 500-03563A to install the following service access components. The two shorter M8 flat head screws are used in the upper two screw locations





117) Install the torque tube 252-09736A. The end of the torque tube with two set screws is mounted on the away side. The end of the torque tube with the collar on it is mounted to the home side. The picture on the left shows the two set screws for training purposes, but the tube actually needs to be rotated 90 degrees with one set screw facing down, so that the slots in the collar on the other end are orientated straight up and down. Do not tighten the set screws yet

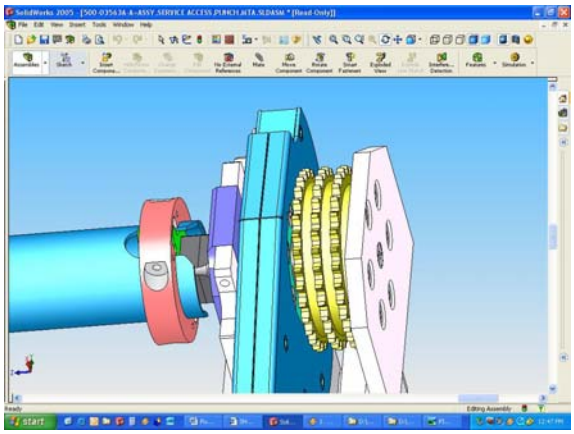


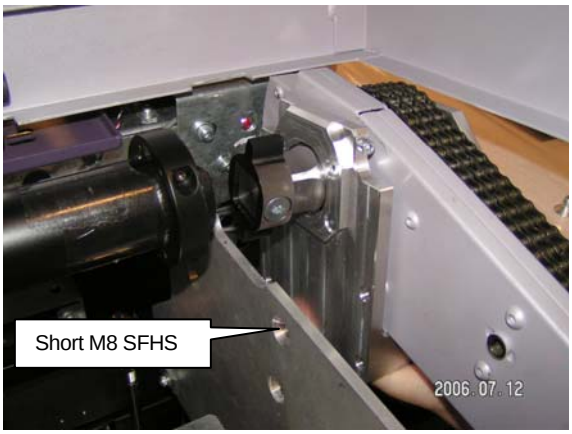


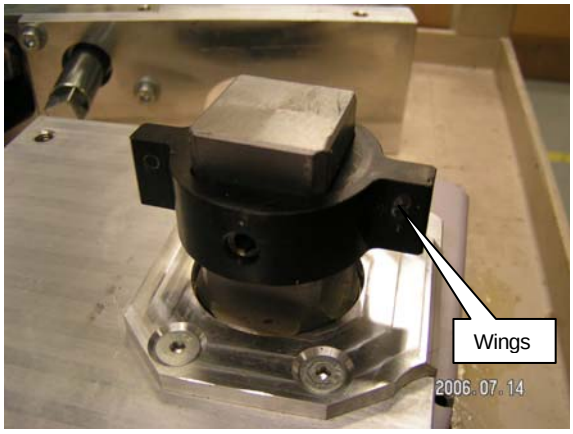
118) Install the LHS main punch arm 518-01687A. The arm itself has a collar with wings on it that is received by the collar on the torque tube, which has cut outs for the wings. The collar on the torque tube also has threaded holes for four screws that are used to adjust the level of the home side arm relative to the away side:

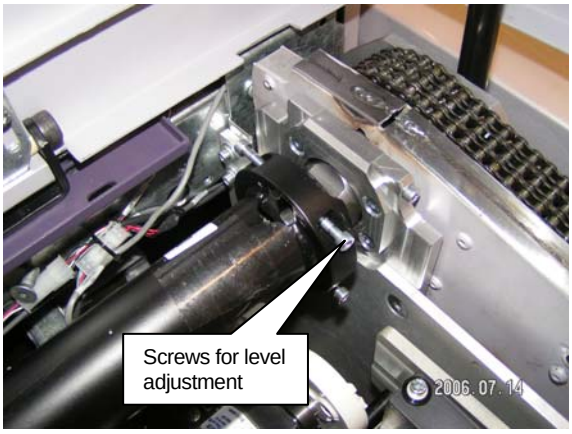
a) Once the home side arm has been attached to the punch support plate (using the two shorter M8 flat head screws in the two upper hole locations) slide the torque tube into a position such that the collar on the torque tube fully engages the wings on the arm

b) Tighten the two set screws on the away side end of the torque tube



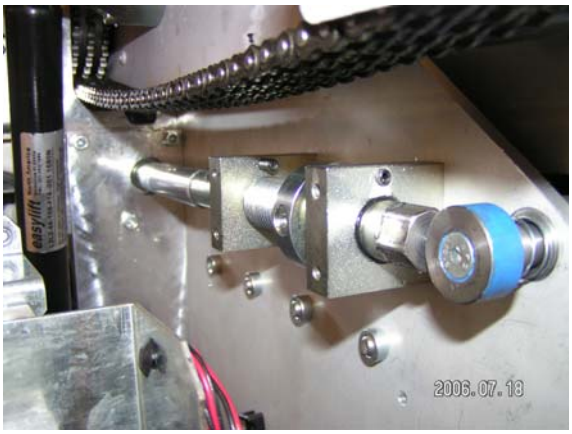




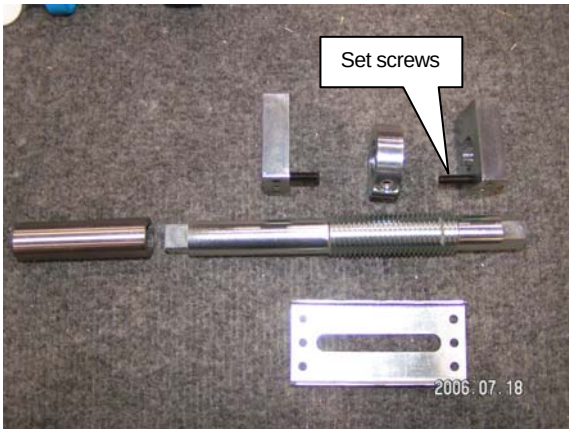


119) Install the crank shaft, crank shaft support , guide plate and lockout, refer to 500-03563A:





a) First install the crank and support. The M5 set screws are used to limit the travel of how far the punch can be raised and lowered, and are installed into the two crank shaft supports

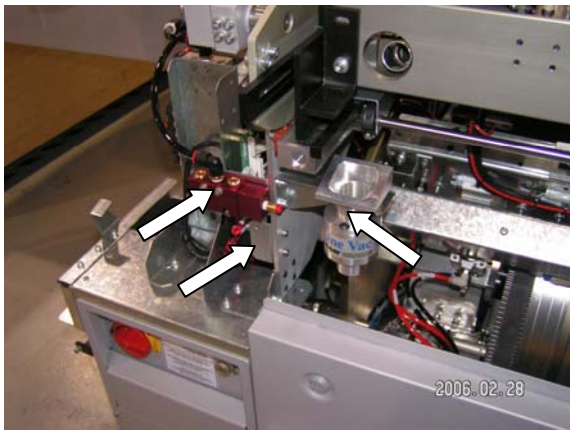


b) Next install the lockout, which is used to prevent the punch from being raised while in the forward position. The lockout threads into the support plate, and the round disk at the end is UHMW tape used to prevent the paint from flaking off. The blue knob is kept in place with a M6X12 SHFS

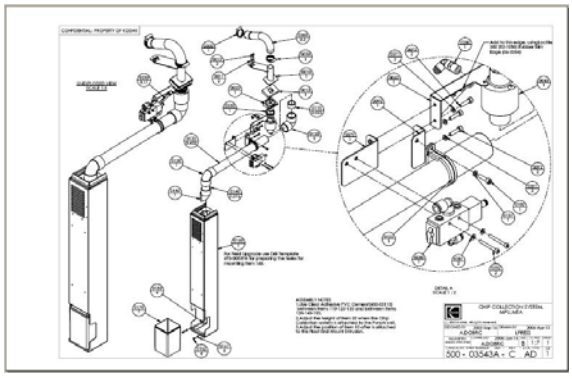


120) Install the air amplifier, pilot valve and tube support bracket onto the RHS punch support plate. Refer to assembly drawing 500-03543A:

a) Use drill template 690-00859A for preparing the holes that need to be drilled into the away rear side panel for mounting of the chip removal chute

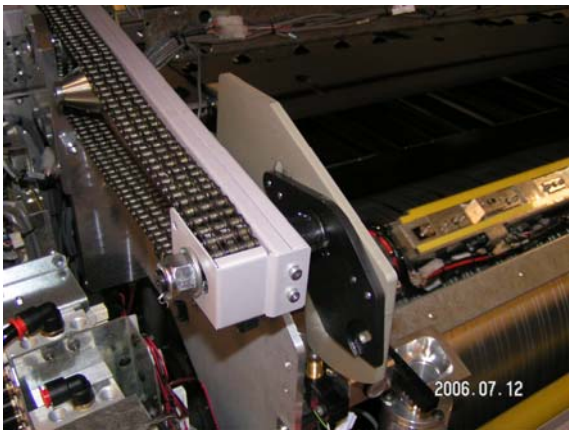


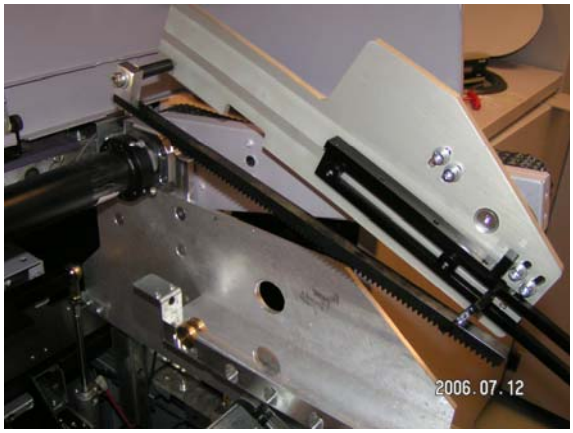




121) Install the LHS and RHS punch arms and synchronizers racks. The final angle of the arms will be set once the punch unit has been installed

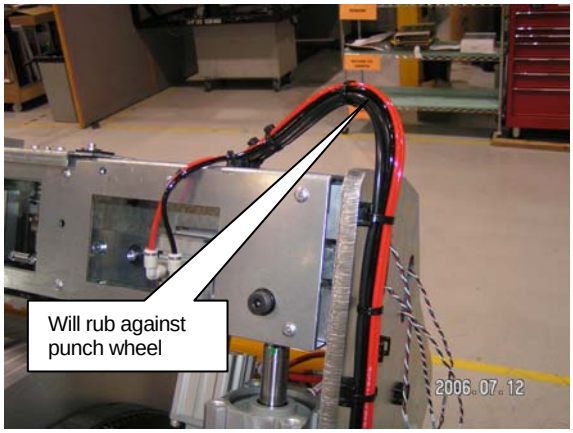


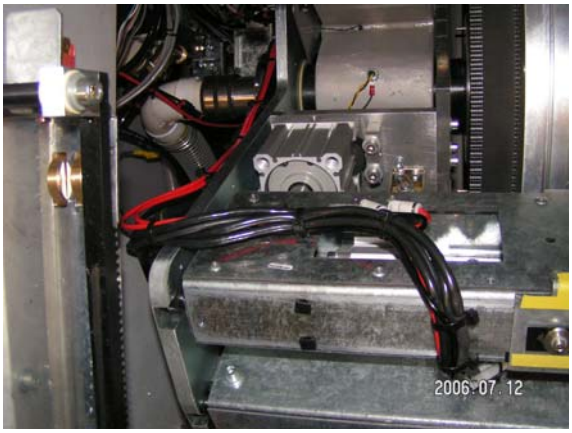




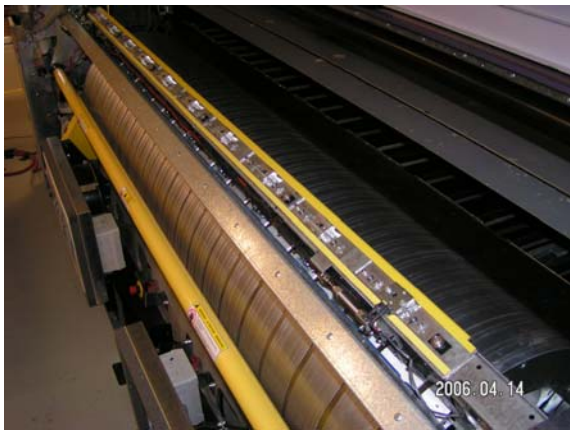


122) The tubing and cables that are that go along the backbone must be rerouted slightly. This is to ensure these tubes and cables do not rub against the punch wheel supports as the backbone tilts through its various positions





123) Install yellow tape onto the moving LEC actuator on the backbone

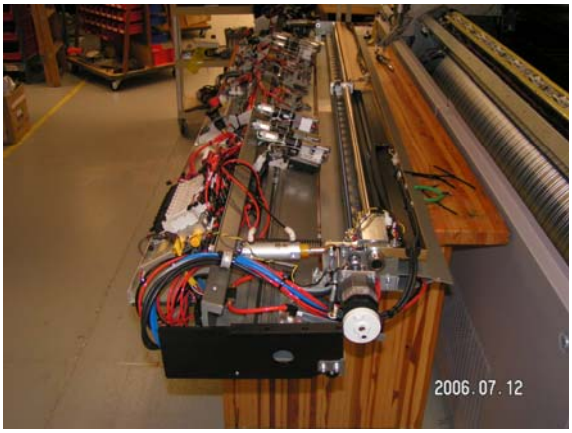


124) Install the punch assembly:

a) At least 4 people (or two Canadians) are required to lift the punch assembly (90 kg)

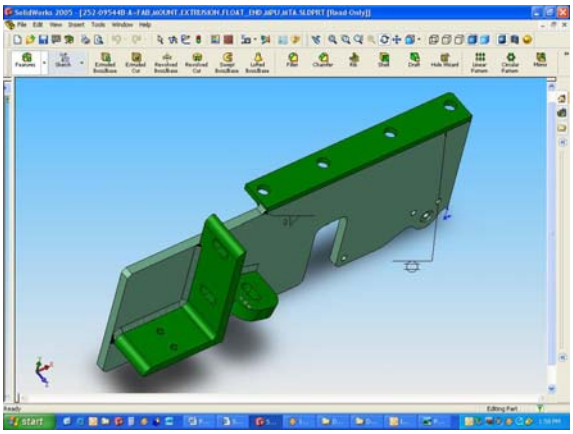
b) Check the orientation so that the punch assembly is carried to the Magnus the right way around. The emergency stops should be facing the back of the machine

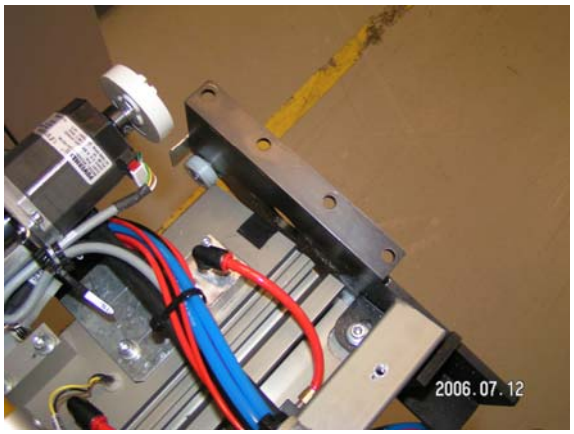
c) Clear a pathway and make sure that there are no obstructions along the way. If there is space a available place a table at the rear of the machine to rest the punch on, before putting it into its final position



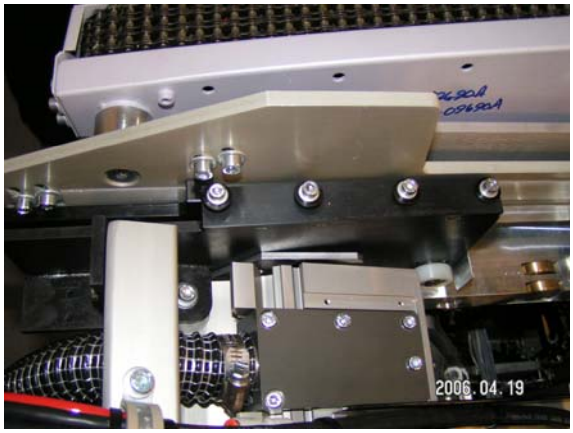


d) The extrusion mount float end, which will be attached to the punch extrusion will mount onto the punch arms and secured in place with 8 small flanged sleeves 252-10267A. The extrusion itself is able to move in slots in the mount, allowing the extrusion to be centered nicely between the wheel supports, which should be done now. Once the extrusion has been mounted onto the punch arms, **DO NOT TRY TO PUSH THE PUNCH INTO ITS FORWARD LOCATION AS THERE IS NO AIR YET AND DAMAGE WILL RESULT**









e) Connect all punch electrical and air connections, which include:

i) Punch being spliced into the SCON between Genine 1 and 2 (punch is Genine 4)

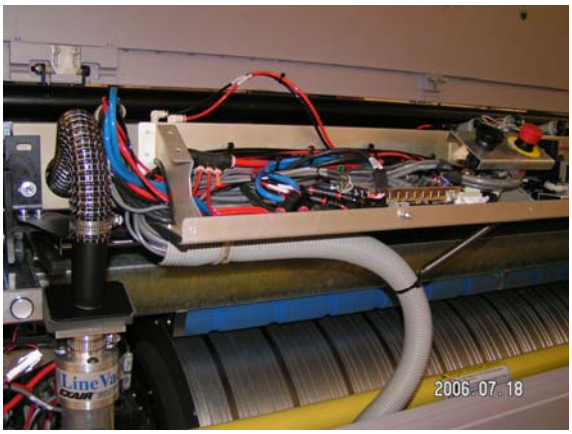
ii) Splice into the emergency stop loop. ES3 to ES2 and ES4 to ES5

iii) Punch main air and air to pilot valve for chip cannon

iv) Backbone release

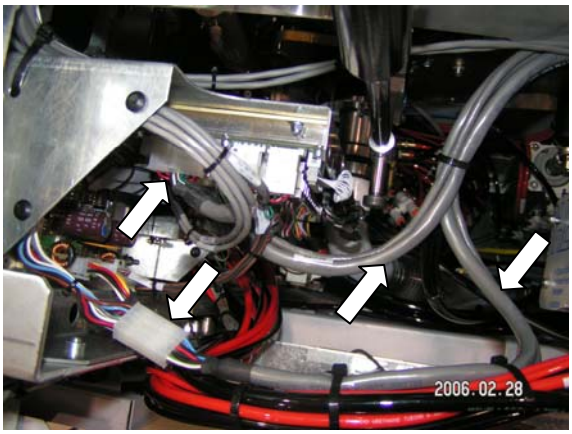
v) Punch in position sensors down and forward

f) Begin by securing the punch umbilical cable under the electronics tray with a hose clamp and then secure the loop of the umbilical cable with a spring attached towards the middle of the tray. The umbilical cable is wrapped in grey fire retardant split conduit tubing. The cable then should loop around and across the power entry box and be tied off to the outboard side of the punch support plate. The umbilical cable should also be cable tied to the plumbing of the chip chute

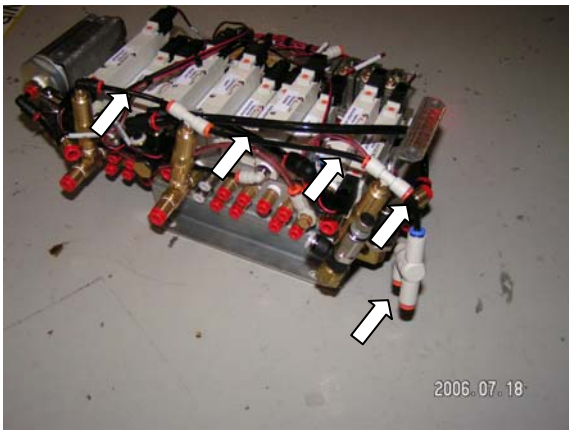




g) Connect the SCON cables one to GENINE 1 J24 located on the away side corner plate, and the second to cable 220-00171B coming from GENINE 2. Cables are well labeled



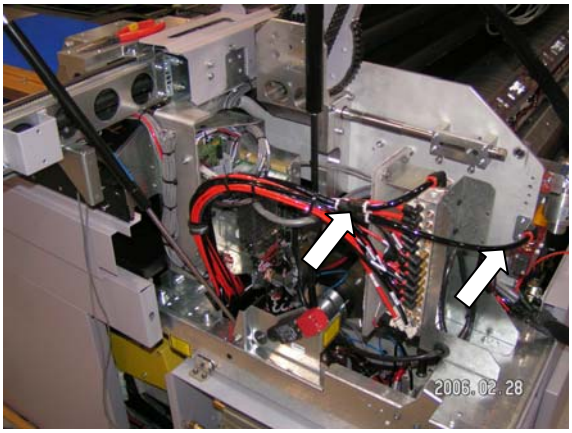
h) Connect the 5/32 red tube (there are two 5/32 red tubes coming from the punch, the other being for the pilot control) to the safety release on the main engine manifold port A. Connect the two 5/32 black tubes to the line coming up the side of the manifold as in the picture



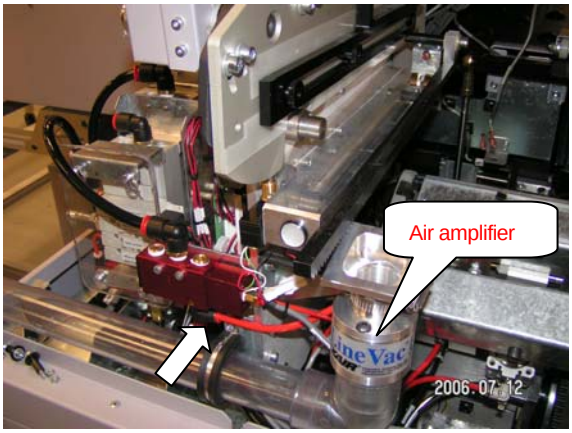
i) Two air supply lines and one pilot control line will need to be connected. Air needs to be taken directly off the main air entry (smaller lines have not been tested with punch and may not meet volume requirements of punch). For the 3/8" line coming from the punch manifold, plumb this line into one of the ½" coming off of the air entry box



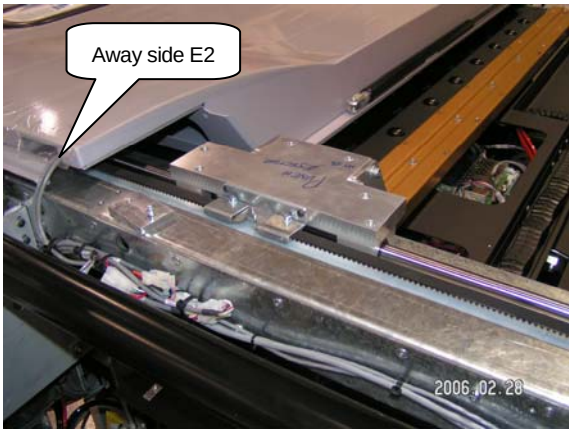
j) The air supply to the pilot valve can be taken from the 3/8" line going to the load table manifold

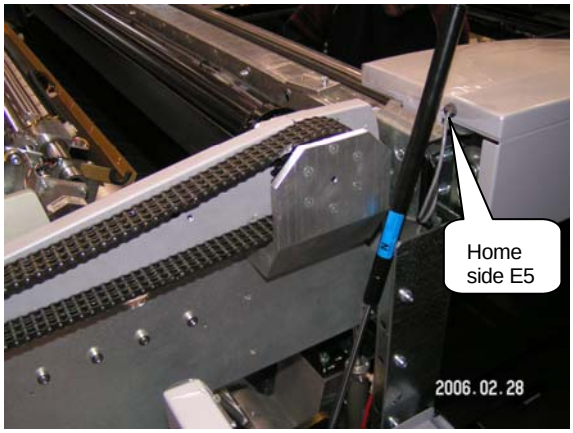


k) Connect the 5/32 red line to the pilot control valve (remember there are two 5/32 red lines, the other goes to the safety release, and both should be labeled). Also make sure that the outlet of the pilot valve is connected to the air amplifier of the chip collection system

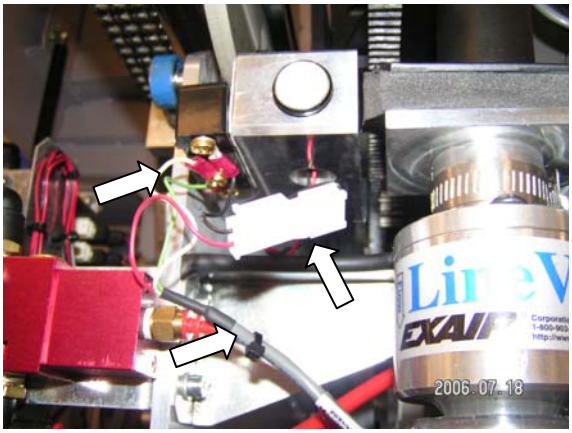


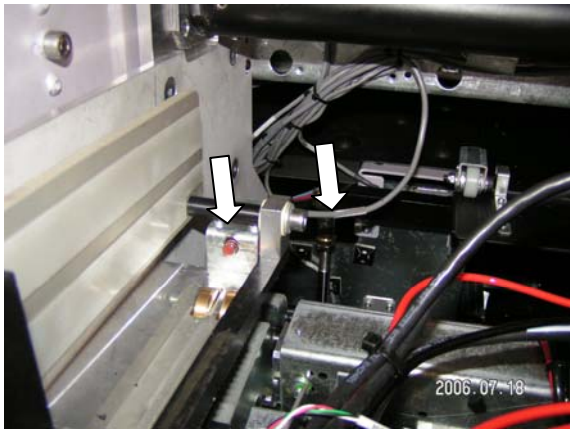
l) Connect the emergency stop cables E3 to E2 at the away side shoulder panel location, and E4 to E5 up along the hood beam to the home side shoulder panel location





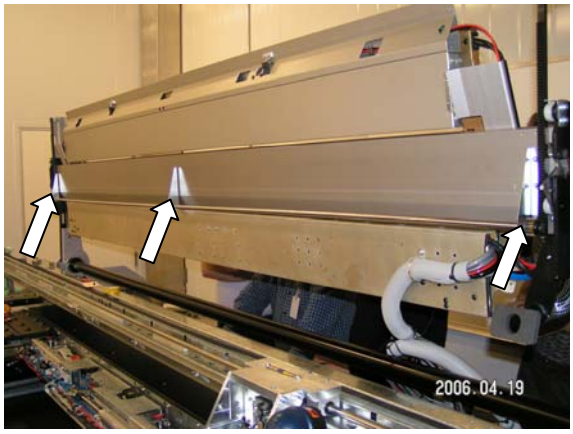
m) Route the punch in position sensor cables. The schematic for the punch forward position sensor is wrong and should indicate to connect to terminals 3 and 4. The punch down position cable will also have a connection for a LED. When the LED is illuminated this indicates the punch is not properly in its down position.

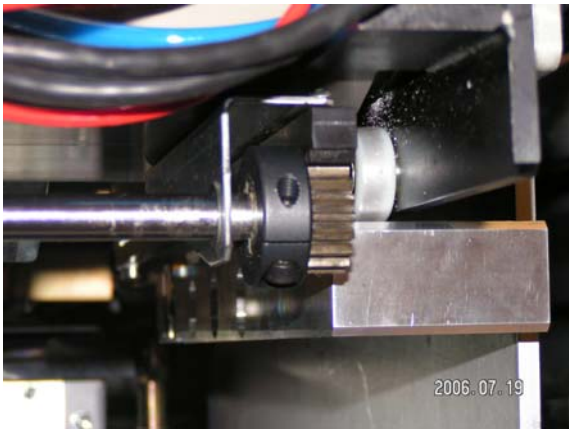




125) **Machine air should now be turned on**, and if there is a delicate media picker on the machine, the screws securing the roller should be removed now incase they are overlooked later on

126) Install the Synchronizer, which is shown on a raised punch for ease of viewing. The synchronizer shaft is mounted on three brackets which are attached to the punch extrusion. There is a pinion at each end of the shaft, which run along the synchronizer racks. The pinion is held onto the shaft by a collar, which will require imperial Allan key to tighten



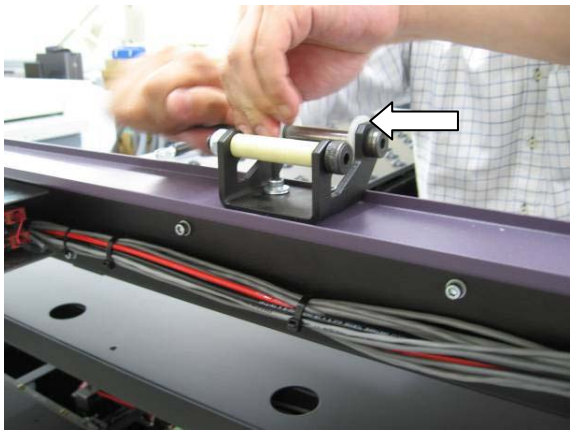


127) Install the rear hood:

a) **Put the rear hood locking solenoid into the unlock position**

b) Loosely attach the hood shims, drip trays and hinges to the hood beam. Reinstall the hood drip trays and hinges. Shims 252-02049B need to be placed under the drip trays and M6 SHCS with M6 bell washers and M6 heavy washers are used to secure the hinges to the hood beam (Do not tighten yet, this will be done after rear hood is installed). The part of the hinge with yellow bushings is facing the rear. There will be nylon shims on one of the hinges, to limit the side to side movement of the front hood, this hinge should be installed in on of the two center positions along the hood beam for ease of front hood installation





c) Temporarily install the home and away side rear panels as well as the two rear panels (this will help to align the hood)

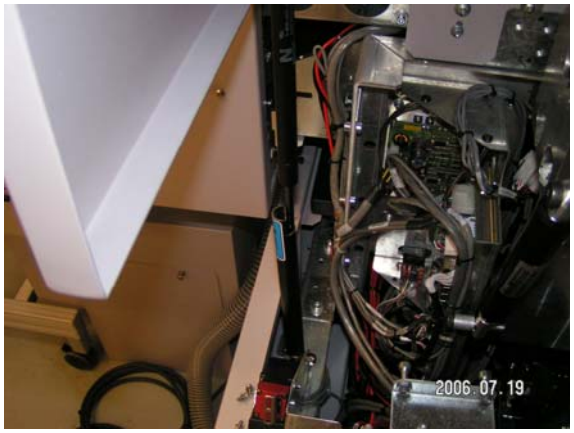
d) Install the hood and lock the hinges in place but do not install the side lock yet





e) Lower the hood and align the forward and back to the rear panels. One person may have to push the hood forward as one person tightens down the hinges. After this align the hood side to side and then raise the hood, and attach the gas struts, with the locking strut installed on the away side. Also install the side to side lock





f) Install the gas strut retaining clips 55-0202

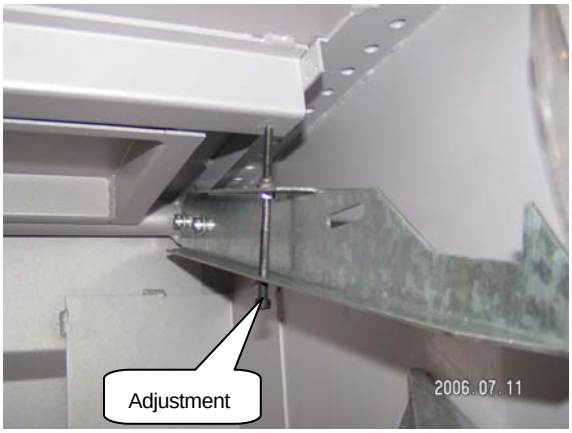


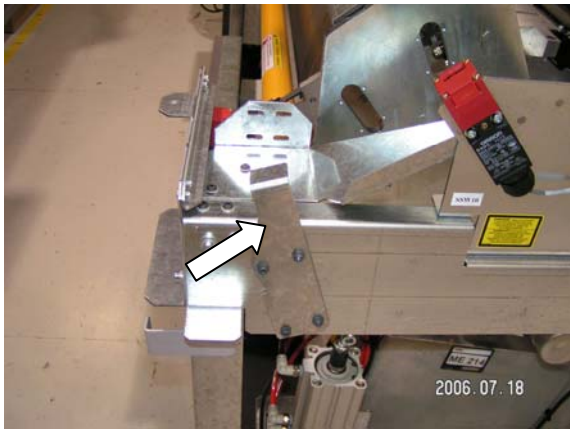
g) Align the safety keys on both home and away sides (the locking solenoid safety should be turned to the unlock position) the safeties also can be adjusted a small amount for alignment



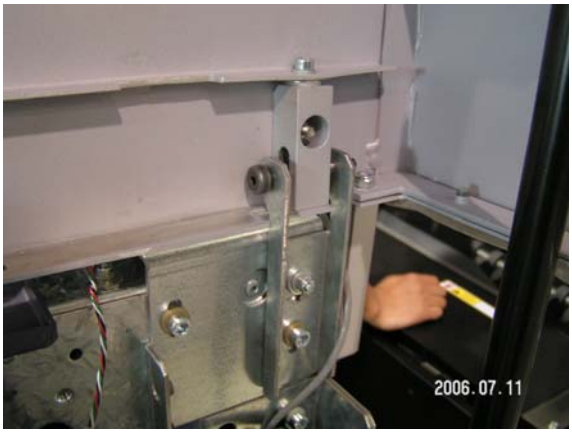


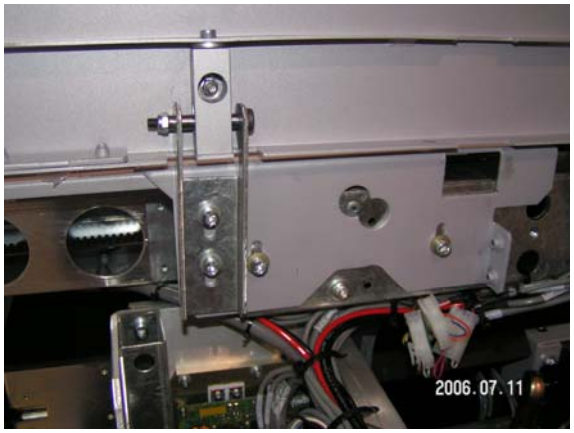
h) The locking mechanism might have to be adjusted for more or less engagement with the catches mounted on the base device. As well the catches should as high as possible (they are attached through slots)





i) Attach the outrigger hinges (252-11566A), which are used to keep the rear hood from warping up at the ends when in the down position due to the force of the gas struts. It may be necessary to adjust the forward and back position of the hood if there is difficulty installing the outriggers, which can be done by loosening the four hinges along the hood beam.

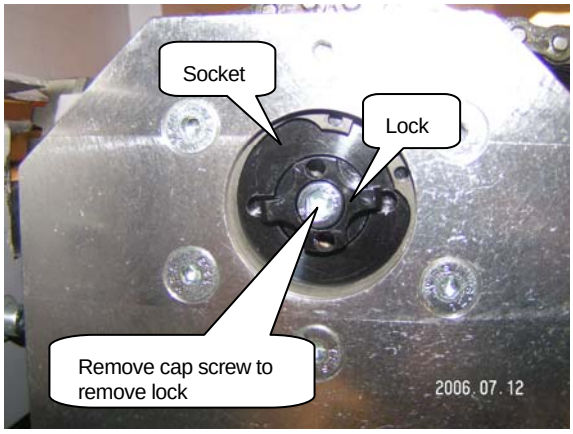




128) Raise the punch up so as to be able to connect the gas strut, while doing so check for smoothness of the crank (might be hard to turn after a few turns):

a) If the punch does not go up smoothly, this means that the position of the worm gear needs to be adjusted (a difference of only 75microns can mean the difference between working and not working)

i) The worm gear is located on the away side, and there is an adjustment threaded socket that is locked in place. This socket can move just short of one revolution for fine adjustments. Removal of the lock is required before turning, and then locking again once final position has been determined.

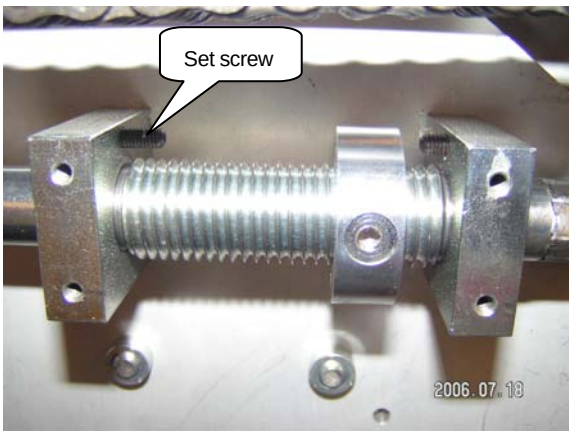


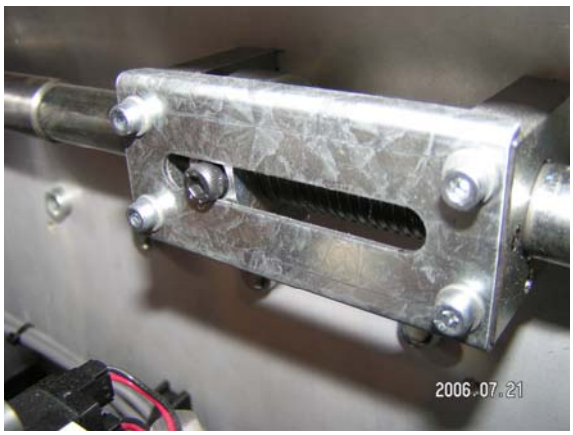
b) Once motion is good raise the punch all the way up, and attach the gas strut using a shoulder 60mm long shoulder bolt





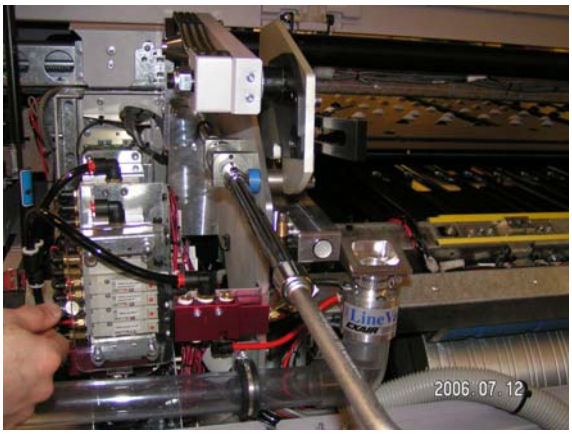
c) The amount that the punch arms can travel forward or back can be limited. This is so that the punch cannot be cranked so far forward that it damages itself on the rear hood, or does damage to the rear hood. To limit travel there are two set screws that stop the crank binding nut, thus preventing the crank from being turned any more. This adjustment should be done with the rear hood installed. The binding moves along the crank by way of a screw that sticks out and runs along the slot in the cover plate. The cover plate prevents the binding nut from rotating, and so runs along the slot in the cover plate as the crank is turned

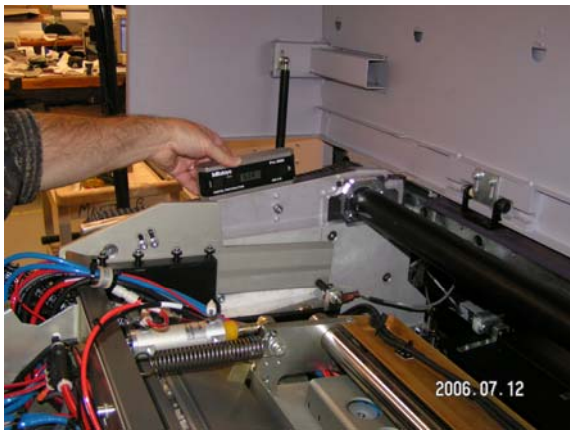




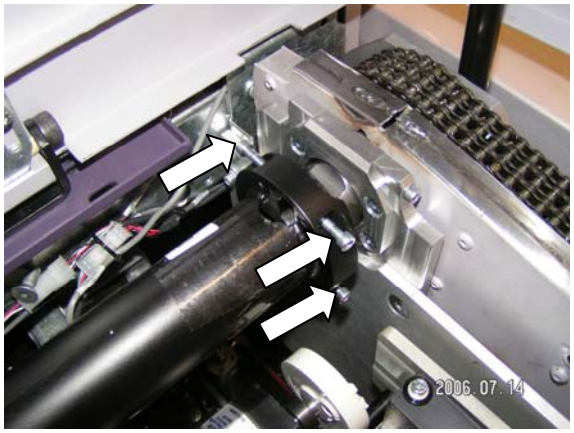
129) The punch arms need to be adjusted with respect to each other. If the arms are at different angles then when the punch is being cranked, one of the arms will not make it into the pocket of the rear hood:

a) Raise the punch up slightly and measure the angle of the away side punch arm, and make adjustments on the home side to match the away side. The adjustment to the home side is done by backing off and tightening opposite screws on the collar of the torque tube, which then will change the angle of the arm. **When making adjustments, left up on the arm a little to change screw position. The arm is heavy and the screws could snap if you try turning them with a full weight on the arm**









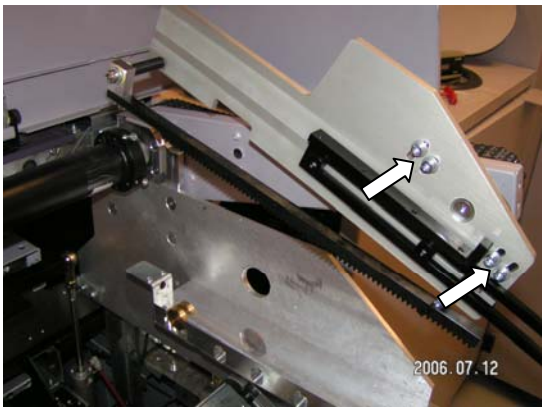
b) Raise the punch slowly and check for clearance into the pocket of the hood. If the punch does not clear the pocket, either the punch arms can be adjusted on the lifting arms or the hood can be adjusted further back





i) If there is an interference first try adjusting the punch arms, which are attached to the lifting arms with one FHCS and four SHCS through slots

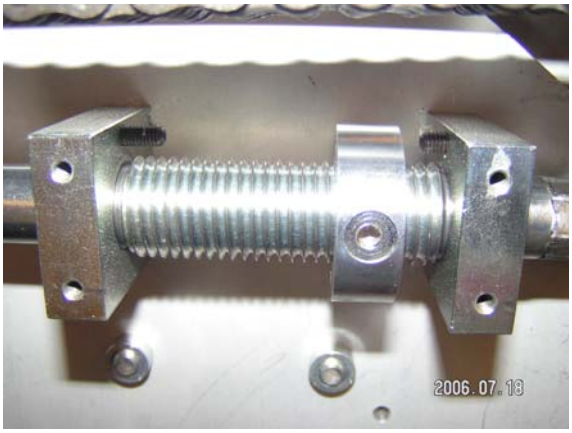


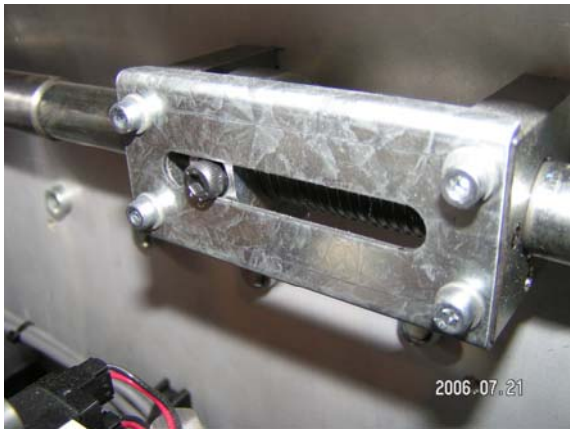


ii) If there is no adjustment available in the arms, then the hood can also be adjusted to clear the punch



c) Once the punch is able to be raised and clear the hood, set the crank binding nut and set screws that will limit travel of the punch. The forward set screw prevents the punch from being turned to far forward into the front hood, and the rear set screw prevents the punch from breaking the punch in position down sensor





130) Installation of new rear fans. The purpose of these fans is to bring the temperature of the punch to within the same mean temperature as the rest of the machine. They do not need to be referred to as GC fans, rear fans will do just fine. **Be aware that the fans for a small drum device differ from ones for a large drum device:**

a) There is a drill jig available to drill and tap the M8 holes required for securing the fans. The jig can be used to drill out the holes for both the home and away side fans. The jig has a chamfered corner that should be up and on the side closer to the middle of the machine. The jig uses the existing emergency stop hole locations as mounting locations. The emergency stops must be relocated and the drill jig has the new hole location incorporated into it as well



b) Mount the fans and the magnetic stops, as well as the thermistor that was originally mounted on the away side pillow block to its new location at the M8 threaded hole just below the left side of the new away side emergency stop mounting location. There is also a new extension cable 220-01495A for the thermistor



c) Remove the emergency stops from there old brackets and mount them onto the new brackets 252-01792B

d) **The following explanation for changing emergency stop cabling has been provided by the electrical engineer. Reference can be made to step 113 which also discusses these changes**

i) To relocate the rear lower emergency stop switches, ES6 and ES7, turn off the power to the Magnus VLF. See fig. f below and note that ES6 has been moved to the left of the rectangular hole in the engine frame and ES7 has been moved to the right of the other rectangular hole in the frame. The reason for this is that the lower E-Stop switches must be more accessible from the rear of the machine. The cables going to these switches are too short to accommodate the move and new cables will have to be installed. To relocate these switches will require determining which vintage of Magnus VLF is being upgraded and whether or not the punch option is also being installed. Go to the rear upper Home side E-Stop switch (ES4). If there is a cable coming from ES4 going to the right corner marked 220-00398A then it is an older machine. If the cable is 220-00398B, it's a newer machine

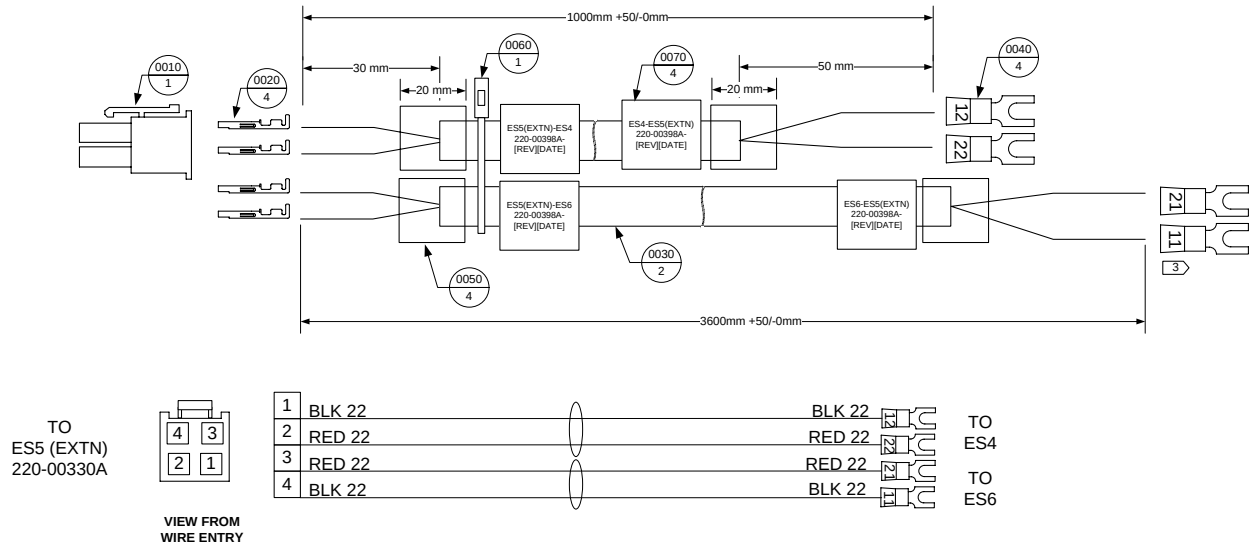


Fig. b- 220-00398A – Older Version – Remove and discard.

OLDER VERSION. Remove cable 220-00398A by disconnecting the wires from the terminals of both ES4 (Rear Upper Home E-stop switch) and ES6 (Rear Lower Home E-Stop switch). Disconnect the Molex 2x2 Minifit plug on 220-00398A from cable 220-00330A. Remove and discard cable 220-00330A from ES5 (Front Home E-Stop switch) and replace with cable 220-00330B. Plug cable 220-01401A (in case of punch and fan upgrade) or cable 220-00398B (in case of fan upgrade only) into newly installed cable 220-00330B. Terminate the wires on the other end of 220-00398B or 220-0401A on terminals 12 and 22 of ES4 (Rear Upper Home Side E-Stop switch). If this is a punch upgrade, cable 220-00401A is much longer than 220-00398B. 220-00401A must be routed along the back bulkhead behind the punch and onto the punch electronics tray to ES4. In case of the punch option, ES4 is mounted on the home side of the electronics tray; otherwise it is mounted on the rear upper bulkhead. Plug cable 220-01337B into cable 220-00330B. Route cable 220-01337B down along the home side bulkhead as shown in Figure d to the new location of ES6 (Rear Lower Home E-Stop switch). Attach to terminals 11 and 21 of ES6 (Rear Lower Home E-Stop switch)

NOTE: It is not absolutely necessary to remove cable 220-00398A as long as the ends of the cable are neatly tucked and tie wrapped away from view or where they could interfere with moving parts

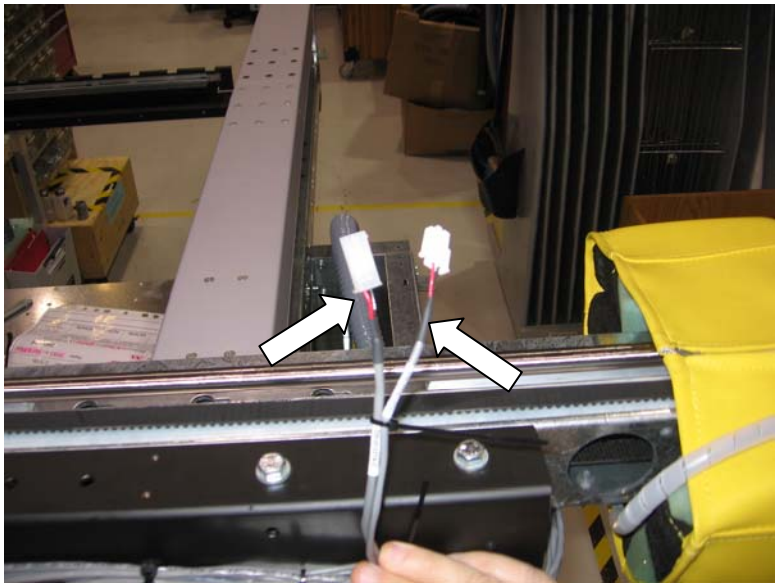


Fig. c – Cable 220-00398B (or 220-01401B) and 220-01337B.

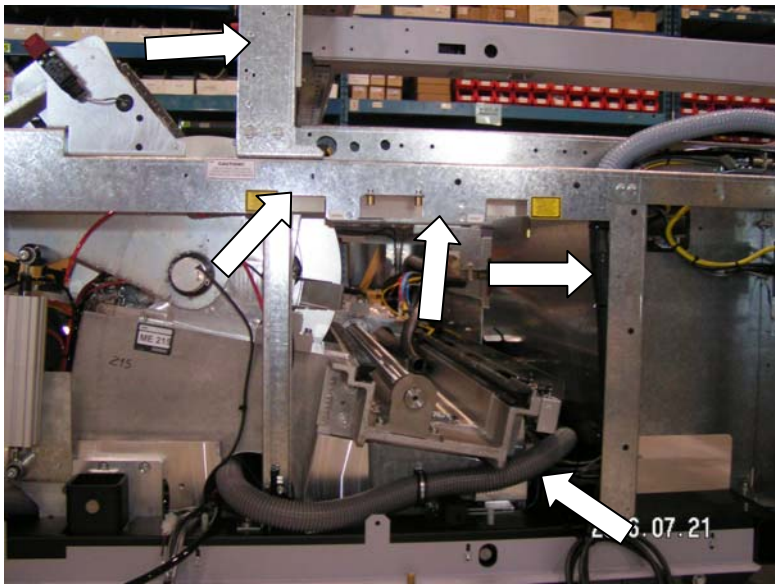


Fig. d – Cable 220-01337B – Routing from upper bulkhead through the Engine Frame Casting to ES6

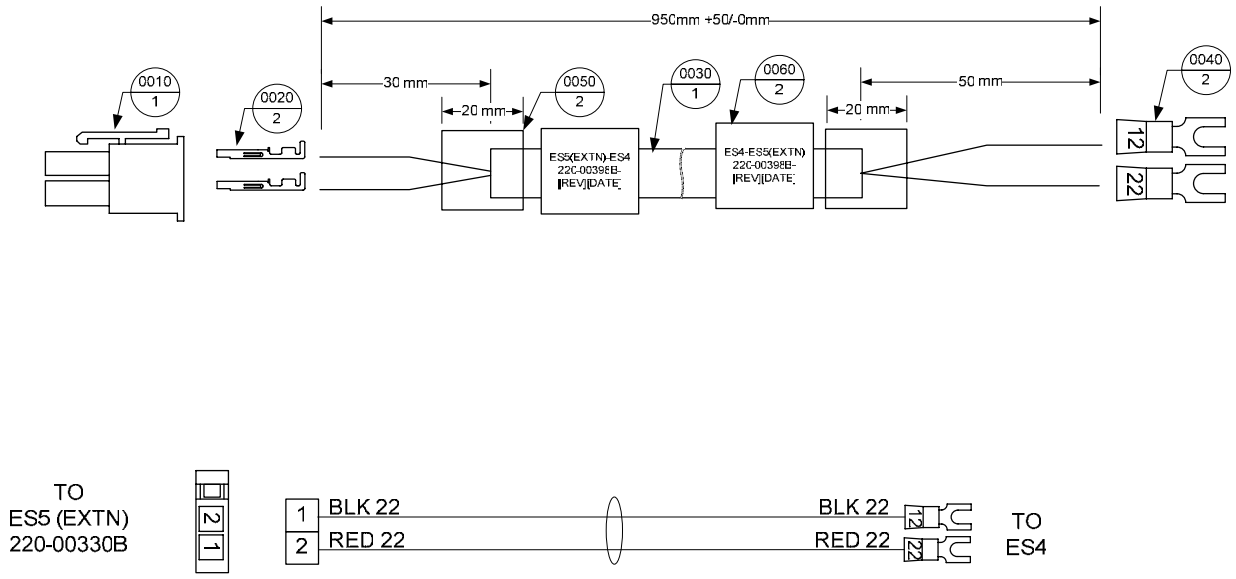


Fig. e - 220-00398B – Newer Version

ii) In case of fan upgrade only (non-punch upgrade) unplug cable 220-01337A from cable 220-00330B and remove the wires of 220-01337A from ES6 (Rear Lower Home E-Stop switch). Plug cable 220-01337B into 220-00330B. Ensure that cable 220-00398B is plugged into 220-00330B. Route cable 220-01337B down along the home side bulkhead as shown in Figure d to the new location of ES6 (Rear Lower Home E-Stop switch). Attach to terminals 11 and 21 of ES6. See fig. X below. Replace 220-00331A with 220-00331B. Cable 220-00331B allows for the extra length needed to go between ES6 (Rear Lower Home E-Stop switch) and ES7 (Rear Lower Away E-Stop switch)

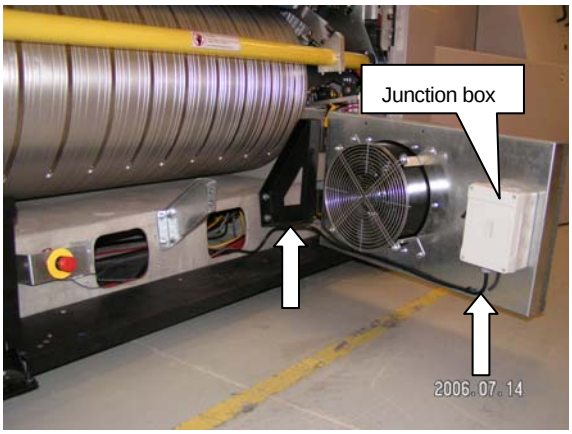
iii) In case of punch and fan upgrade follow the procedure in step 1 above except plug cable 220-01401A into cable 220-00330B instead of 220-00398B. Remove 220-00398B and discard it. You will have installed the other end of cable 220-01401A during the installation of the punch assembly on page X

NOTE: Cable 220-00325B going to ES7 does not need to be replaced. It is long enough for all configurations of Magnus VLF including rear fan and punch upgrades.



Figure f – New Positions of Rear Lower E-Stop Switches. (ES7 and ES6)

e) Route the home side fan power cable 220-01504A from the junction box along the bottom of the home side fan and into the casting toward the away side and again along the bottom of the away side fan into the away side junction box



f) Connect power cable 220-01504A (from the home side) into the junction box of the away side along with power cable 220-01441A, which will go on to be connected to the power distribution board at J26. Connect the power cables 220-01504A and 220-01441A as shown in the schematic of Fig. g. Ensure that the capacitors (13-4847) are also connected correctly. They are non-polarized AC caps. Tuck the caps into the box so that the wires are strain relieved

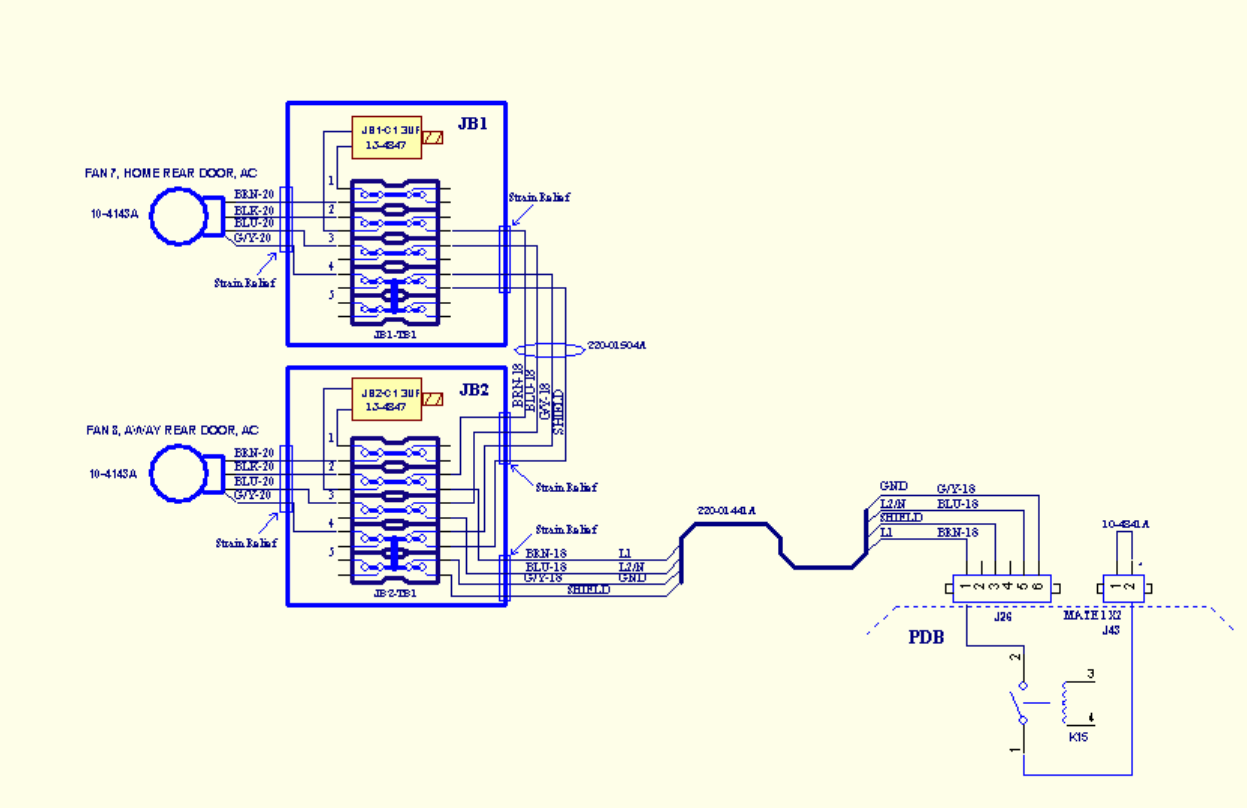
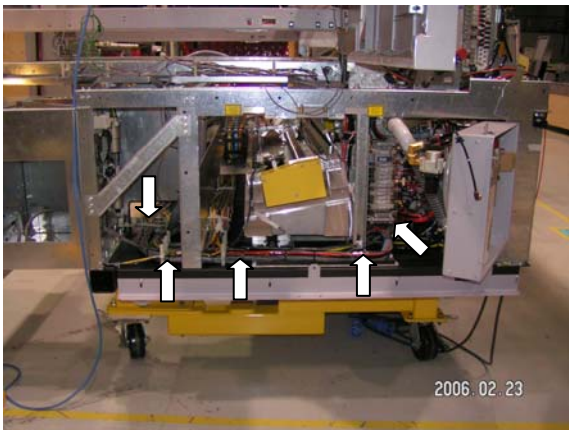
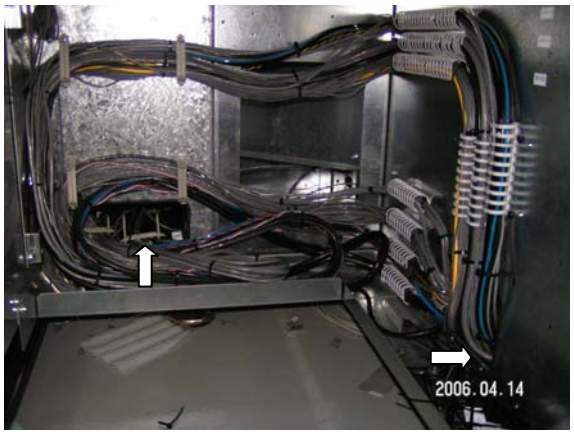


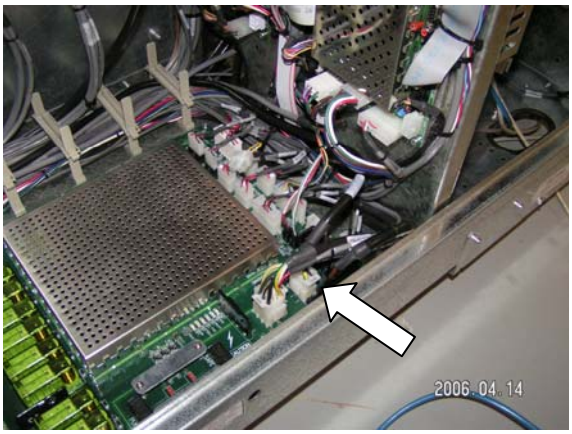
Figure g – Rear Cooling Fans – Connection Diagram.

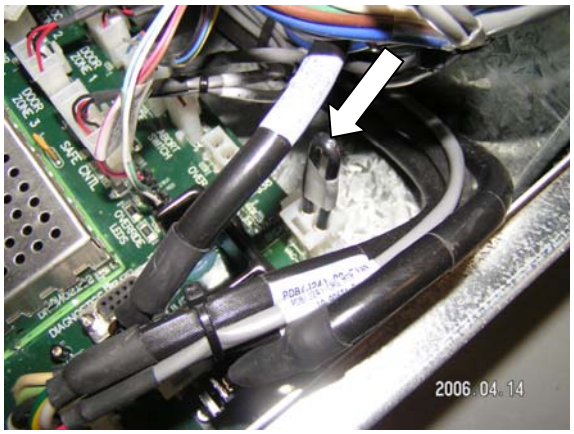
g) Now route power cable 220-01441A from the away side fan to the power box. Route the cable through the casting exiting beneath the main manifold and following the other cable bundles towards the power box. Note there should be approximately 1.7 meters of slack left behind the power box in case the power box ever has to be moved into its shipping position. If you are confident the machine will never be packed up then the extra slack in not necessary





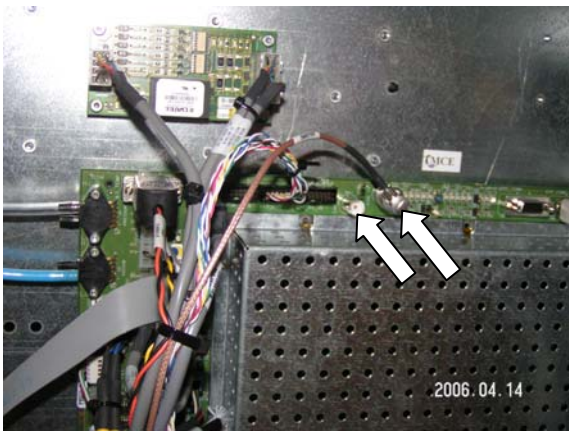
h) Plug the power cable 220-01441A into J26 of the power distribution board, and as well a jumper 10-4841A is needed to be plugged into J43.





131) The punch option requires a camera, which requires a GMCE board version D. The machine you are upgrading may only have a TMCE board or may have a GMCE board version C or later, in both cases the board will have to be replaced. Use a static strap for the following:

a) Camera edge detect requires a version D GMCE or later, which will have two extra connectors for hot link cables. The camera requires one hot link cable 10-9095A for the video signal and cable 220-01508A for power to the LED's, which will need to be routed along the head bundle of cables coming from the power box, through the flex track to the head





b) Disconnect all connectors and replace TMCE or old version GMCE with GMCE version D or later

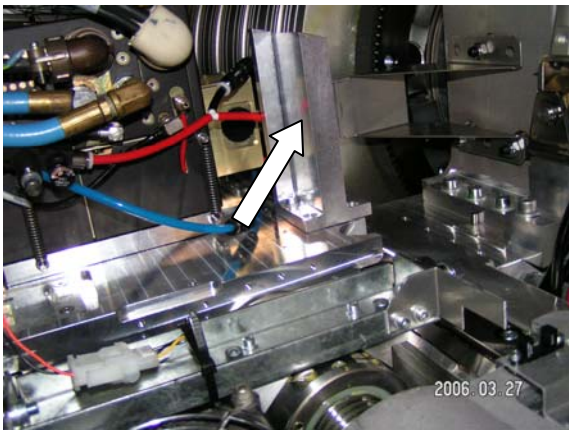
c) Remove the SCSI, WS Comm. and DIAG Comm. Cables if you are removing a TMCE board; these will be replaced with an Ethernet cable

d) After installing the GMCE board and connecting all cables, count up the connections on the wiring diagram and confirm that you have the same amount of physical connections (you may not have the 3 camera connections yet or the Ethernet cable connected).

132) Install Camera cables and hardware:

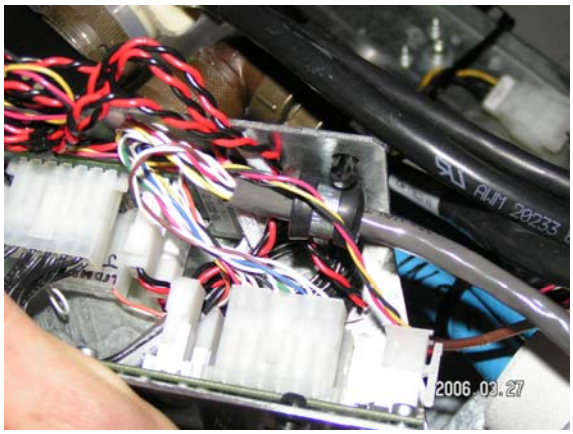
a) A universal carriage 500-03150A-G or later is required to be able to install camera, this revision of the carriage will have threaded holes machined into it for the camera post. If the carriage needs to be changed out there *should* be documentation in the series2 upgrade procedure, which can be found on Techplanet

b) Mount camera post onto the carriage. The first versions of this post had 3 pads on the bottom, which led to problems during installation if the two rear screws were not tightened down first. New versions of this post should have the pads machined off.

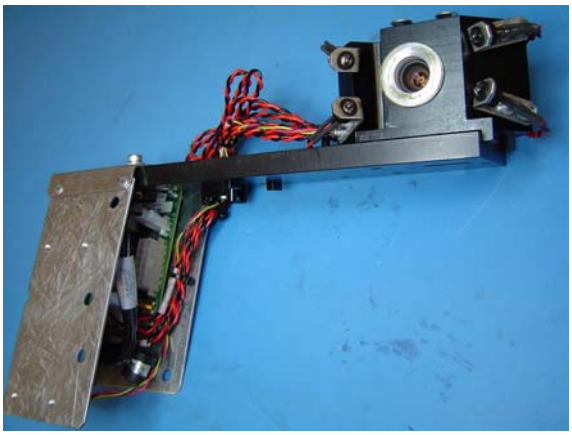


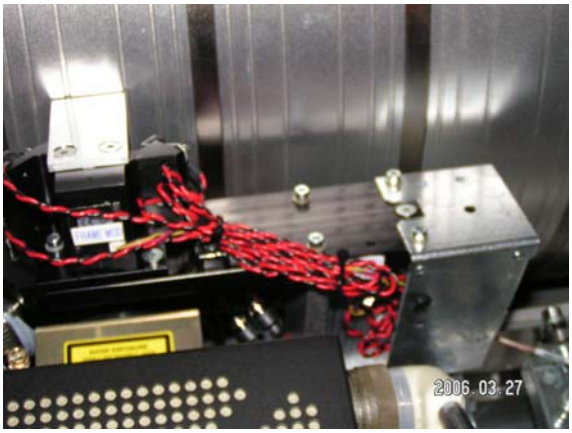
c) Connect hot link and LED power cable to the camera



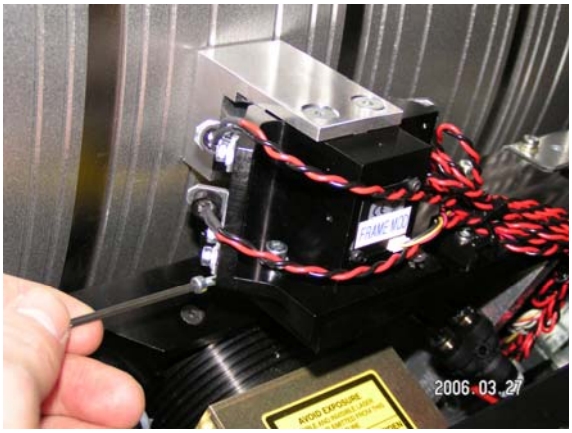


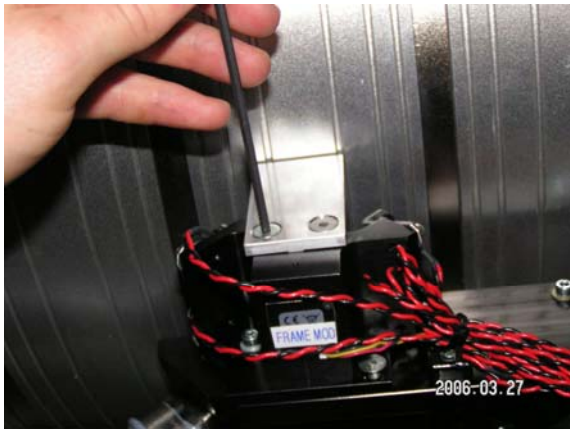
d) Mount the camera assembly to the post





e) As well as the following notes, please refer to document 719-00696A for camera installation and calibration. The camera is mounted on the camera assembly by way of three screws secured through slots. Loosen these screws, so that the camera can be moved back and forth along the slots. Then attach the camera to drum distance jig to the camera as in the picture. Push the camera forward so that the jig touches the drum and then tighten the three screws to set the camera in place. Some older versions of the camera assembly may have an adjusting wedge previously used to adjust the camera distance to drum, and it may be necessary to loosen the screw on the side of the assembly that pushes in on this wedge. **Remove the jig after doing this adjustment or serious damage will result**.





133) Some panels now need to be re-installed (pictures will not be shown as you can refer to the beginning of the procedure for these)

134) Install the upper chin panel P5

135) Install the right lower shoulder bracket C28 and then right lower shoulder panel P8R

136) Install the left lower shoulder bracket C23 and then left lower shoulder panel P8L

137) Install the MAB to skin panels on both the home and away sides

138) Install the fetcher level blanking panel P55

139) Install the fetcher motor cover P54

140) Install the transition panel P49

141) Install the front hood

142) Install the home and away shoulder panels P4 and P3

143) Install the home and away side rear panels

144) Install the rear panels

145) Install the SSR rear door P33

146) Install the left front side panel P25

147) Install the right front side panel P24

148) Install the MCU cable channel C17

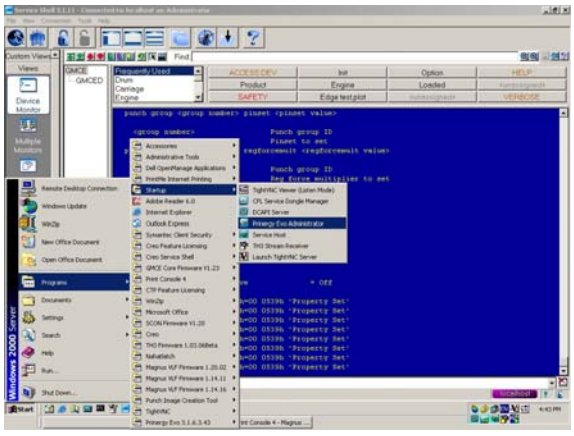
149) Install the bridge rear panel P46

150) Install the bridge top cover P47

151) Install the bridge C20

152) If the machine had a TMCE board then refer to procedure 719-00613A to upgrade to a GMCE. Part of this upgrade will be installing a new network card to the workstation

153) Power up the workstation and remove Print Console from the start-up menu (so the machine does not initialize when first powered up) right click on print console and select delete

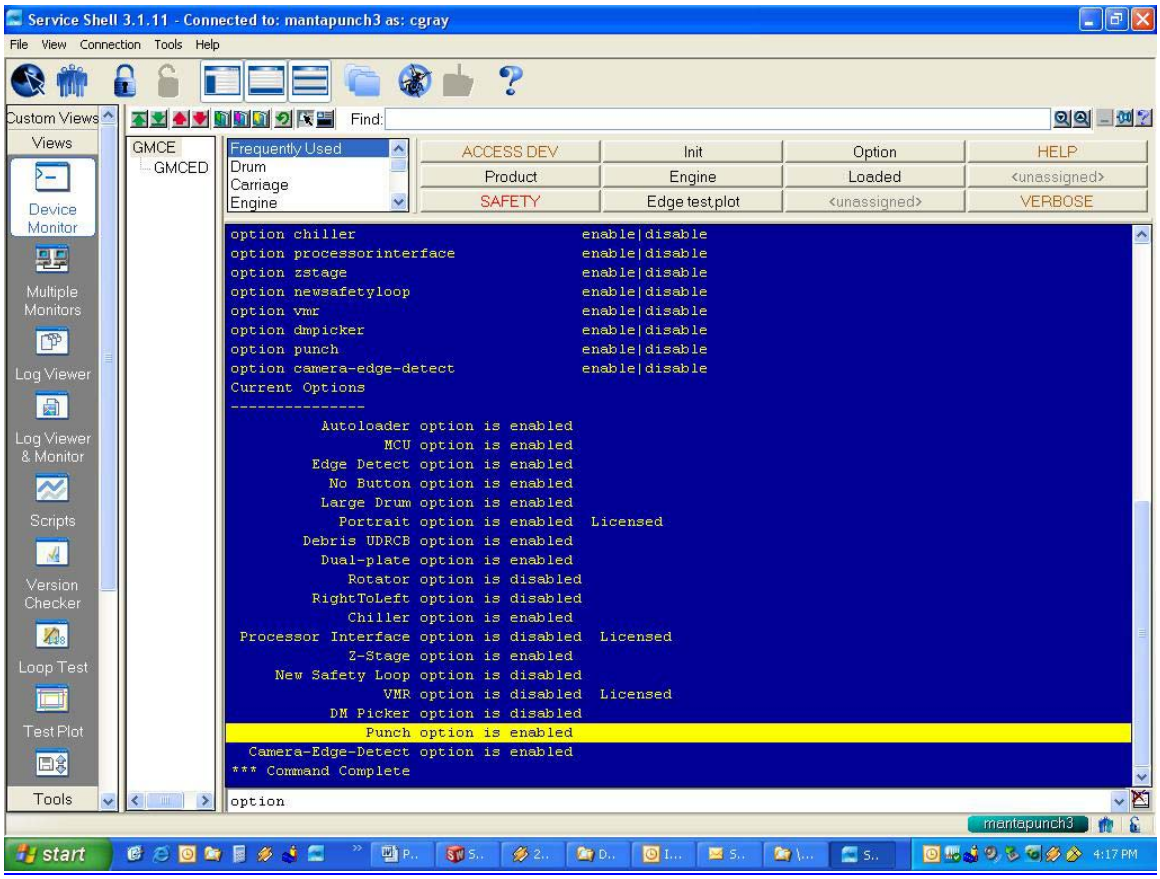


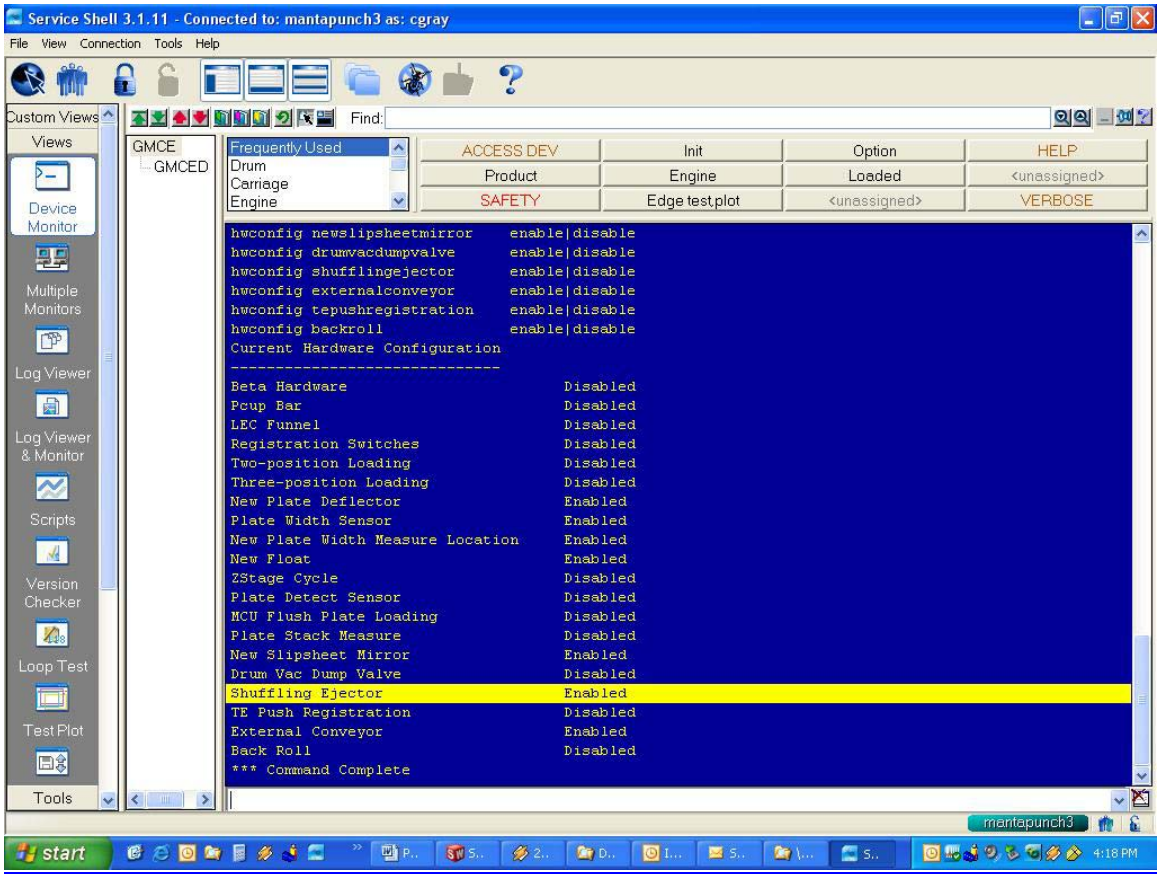
154) Power up the machine, wait for a few moments and try pinging the GMCE board at 192.168.100.193

155) Once you are sure the workstation is able to communicate with the GMCE board from the above ping, run the CR installer

156) After the installer has finished and the workstation has reset, run the Service shell host configuration utility, which will require a service dongle to complete

157) Start up Service Shell and enable options camera and punch, as well as hwconfig value for shuffling ejector





158) Reset the machine

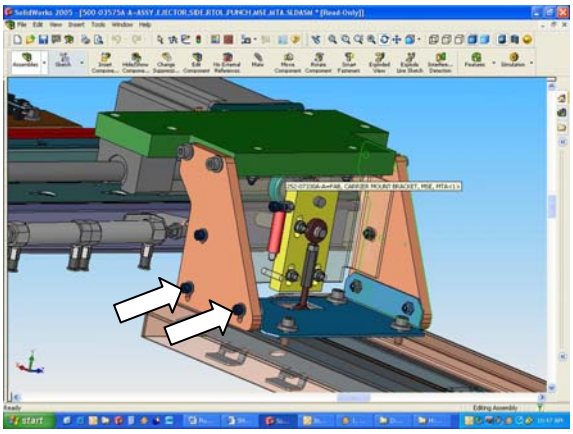
159) Ensure the ejector is idle by entering command *ejector idle*

160) Install the new shuffling ejector. The truck plate will be attached to the ejector already, and you will need to attach the truck plate to the two roller bearing blocks on the ejector track using a total of four M6 X 18 shcs (52-3263) and two M4 button head screws to secure the ejector belt onto the truck plate



161) After ejector is attached install a few of the unload table panels and align the ejector assembly so that the fingers are parallel with the unload table, the truck plate is 0 degrees, the body is a preset height from the unload table panels, and the body is at the same angle as the unload table (ideally this should be 0 degrees)

a) Back off the four SHCS (socket head cap screws) that secure the ejector carrier to the ejector arm

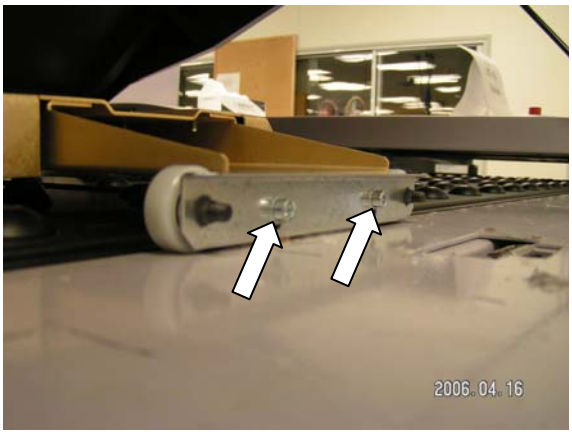


b) Enter the commands *ejector pusher1 up* and *ejector pusher2 up*. This will put the actuator rail into the center (neutral) position, if it does not then something may be wrong with the way the tubes have been hooked up to the ejector actuator cylinder

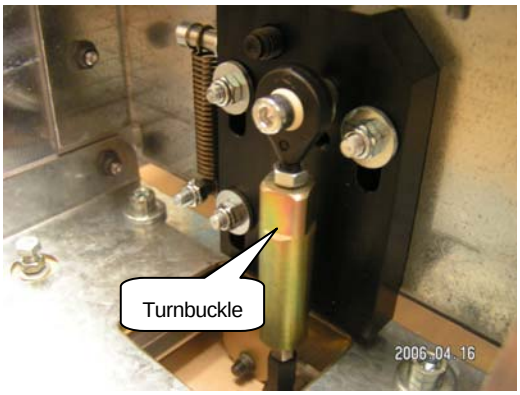
c) Place ejector height jigs 690-00845A under the ejector arm body on one of the unload table panels, with the body resting on the jigs adjust the carrier so that the **truck plate is at 0 degrees** and then tighten the four SHCS from step a

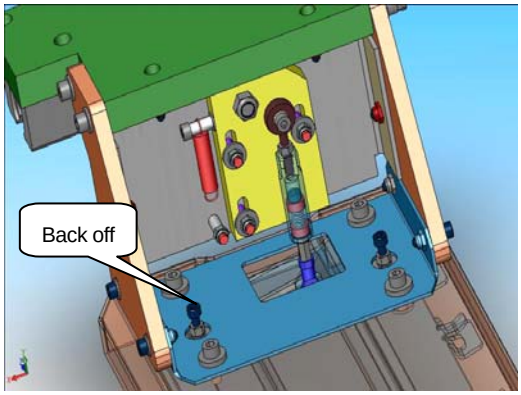


d) With the height jigs still in place, adjust the front guide wheels so that they are in contact with the MAB upper tie rod



e) Adjust the fingers next. The neutral position of the fingers is determined by adjusting the spring loaded turnbuckle located on the carrier slide block. The extreme positions of the fingers are determined by adjusting the M5 limit screws:

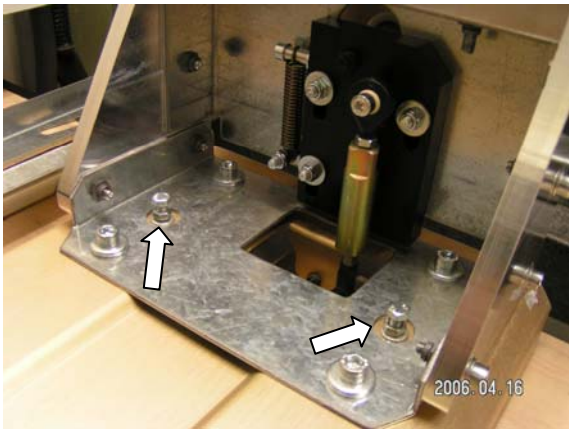


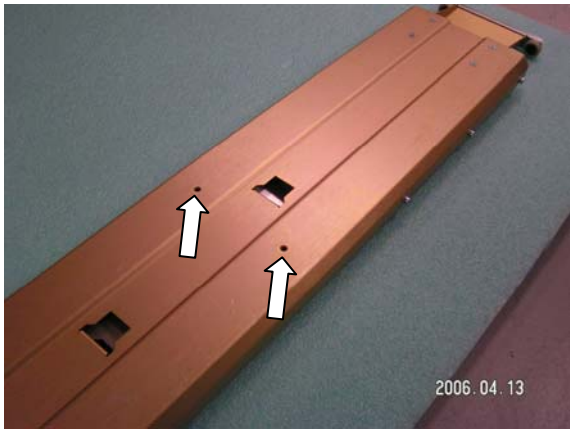


i) With the actuator rail in the neutral position, adjust the turnbuckle so that the bottom of the eject fingers and the bottom of the shuffle fingers are about the same height above the unload table. Lock the turnbuckle into place with the jam nut

ii) Enter the command “ejector pusher1 dn”. Set the eject finger height by adjusting the M5 limit screw located on the carrier end. The fingers should be about 1mm to 2mm above the unload table. Adjust the corresponding limit screw in the middle of the ejector arm to match the position of the fingers set by the limit screw on the carrier end. Check that the fingers are not touching any high spots on the unload table and that the limit screws in the middle of the ejector arm have sufficient clearance. Do the check by **slowly** (so as not to create a back EMF) pushing the ejector across the full length of its travel

iii) Enter the command “ejector pusher2 dn”. Set the shuffle finger height by adjusting the M5 limit screw located on the carrier end. The fingers should be about 1mm to 2mm above the unload table. Adjust the corresponding limit screw in the middle of the ejector arm to match the position of the fingers set by the limit screw on the carrier end. Check that the fingers are not touching any high spots on the unload table and that the limit screws in the middle of the ejector arm have sufficient clearance. Do the check by **slowly** (so as not to create a back EMF) pushing the ejector across the full length of its travel.





f) The ejector center engine position must now be adjusted as well as an adjustment to the hardware configuration must be made. Enter the command “access dev” then enter “hwconfig” and enable the new shuffling ejector option if not done so already. Next enter “*set mhauto*” and find the value for ejectorenginecenterpos. Move the ejector to this value and check that the center line of the ejector body lines up with the center of the unload table with will be the middle row of darts on the middle panel. If there is any problems with the ejector coming down over top of the plates then try changing the value of “ejectorenginecenterpos” in mhauto

g) Load and then unload a plate. Check the fast distance of the ejector, which is the point where the ejector stops moving fast and starts a slow push into the processor. Ideally this point should be when the plate just lines up with the sheet metal on the very end of the bridge. If an adjustment is necessary it can be made entering the command “set exit” and then changing the value of fastdistance, which is usually 3680 for LTOR machines and 3480 for RTOL machines. For dual plate punching with X speed, some customers will require a conveyer between the processor line and the Magnus device to achieve throughput specs. In this case external conveyor will have to be enabled in hwconfig, and there will be no slow push of the ejector.

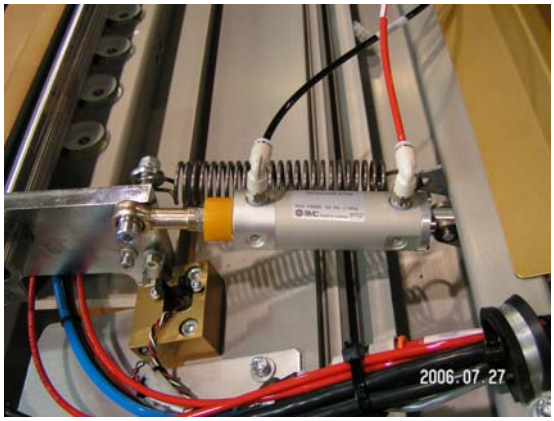
162) Check the interface between the punch deflector and the unload table deflector. The punch deflector must be slightly below the unload table deflector so that the plate can ride up onto the punch deflector:

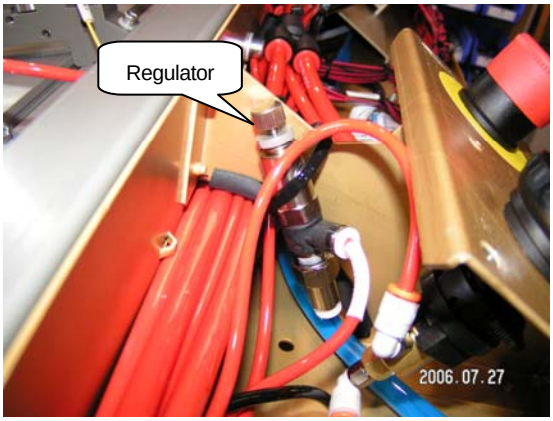
a) Enter the command *punch deflector down* then get a plate (thinner is better) place it onto the unload table and push it up into the punch deflector, do this at spots all along the length of the deflector checking to make sure the punch deflector is below the unload table



b) If the interface is not good then there could be three possible problems, not enough down pressure, unload table deflector is at wrong angle, punch and unload table are not at the same level to the horizontal or punch is sitting too low:

i) Try adjusting the pressure on the deflector up down cylinders. There is a manual pressure regulator for this, but be careful to not put too much pressure as this could split the seam in the punch deflector

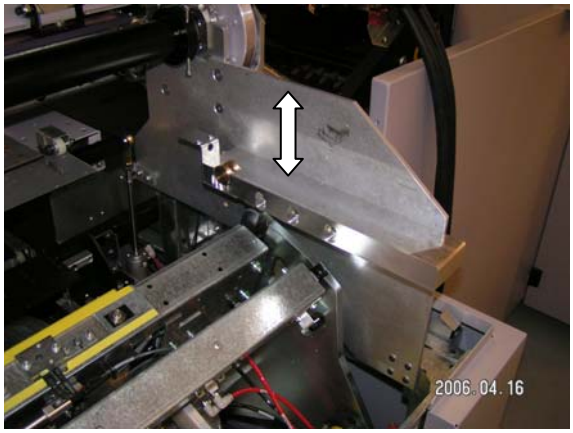




ii) The angle of the unload table deflector may not be zero, when the unload table is in the down position and may be pushing up on the punch deflector. Adjust the unload table deflector actuators to correct this problem

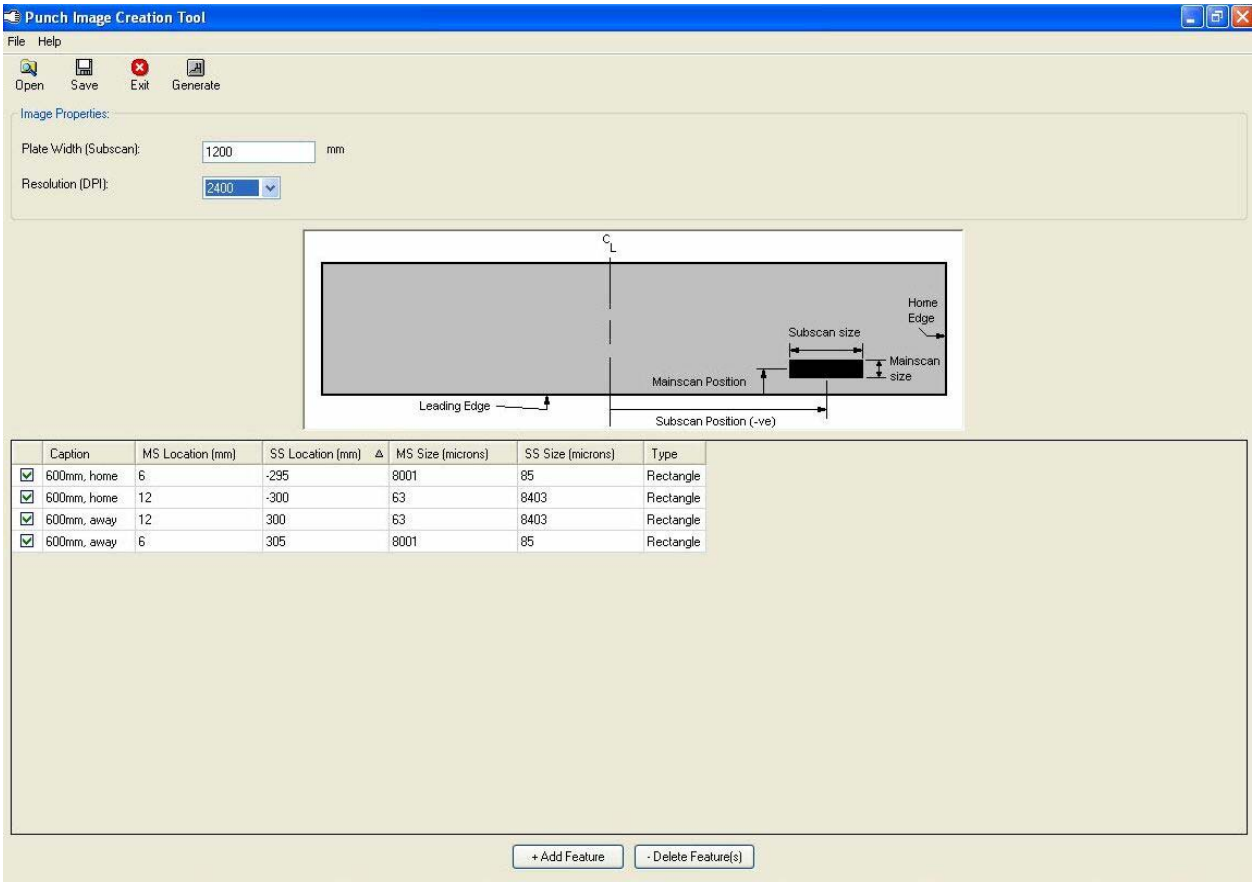


iii) The punch may be sitting slightly too low on the punch wheel guides, and the guides may have to be raised up a little bit. If this is the case make sure that there is no interference with the side registration pin and the lifting arm torsion bar in the new higher position. It could also be that the punch and unload table are not at the same level to the horizontal and may only be necessary to move one of the two punch wheel guides.

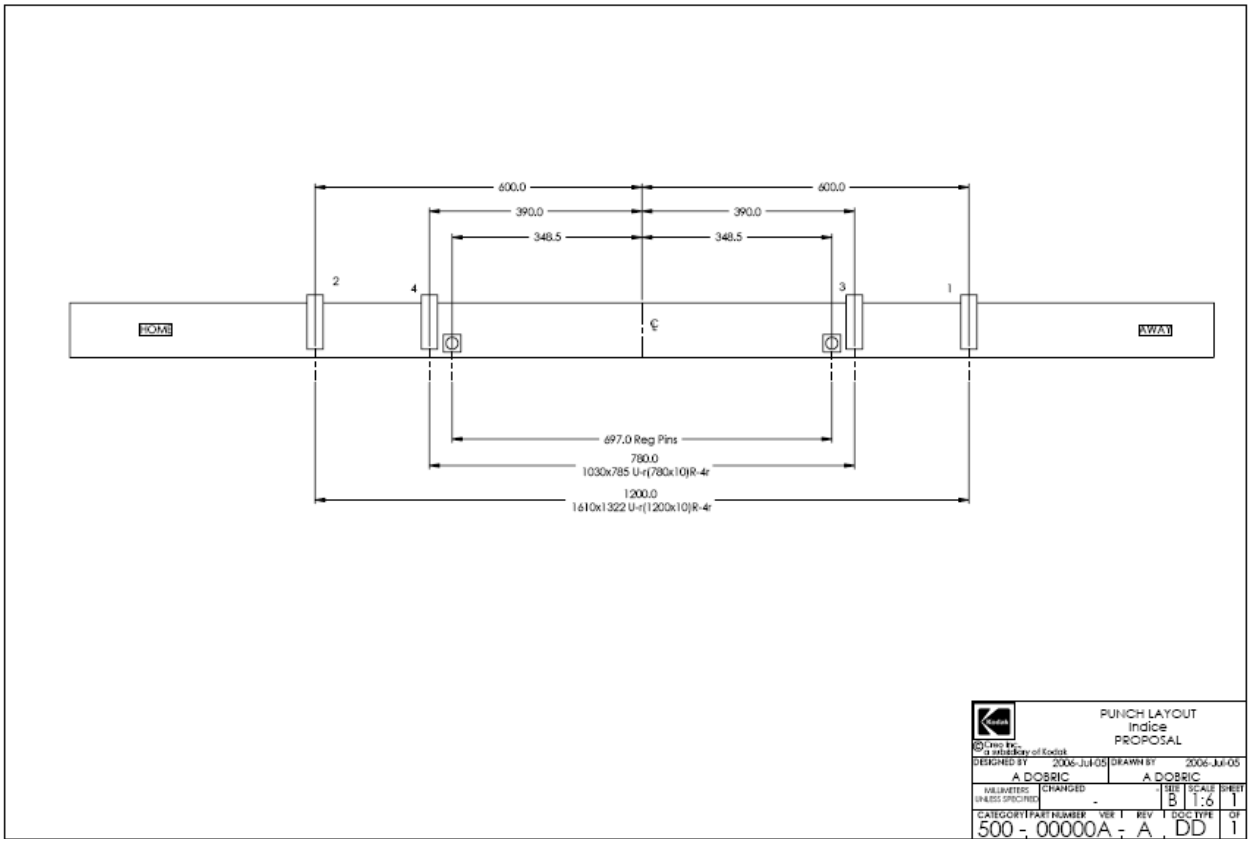


163) Gather the documentation needed to install and set up the punch heads. This information will include the plate sizes, location of registration pins, location of punches, type and size of punch (**this step can be skipped if the punches have already been installed**). This information will then be used to:

a) Enter this information into a punch configuration program that will produce a tiff image specific to each plate size that will be used to test the accuracy of the punches, and a layout drawing of where the punches should be placed on the extrusion



b) There should be available a PDF drawing showing the location of the punch heads to the center line of the extrusion, and will also show the location of the registration pins. The punch configuration program should be able to produce a drawing as well. Gather the punch heads required and the number registration pins (pins may already be installed during sub assembly)



c) The punch locations on the plate will always be centered on the center line of the plate in the subscan direction. So in the above template there is a 1610mm plate and a punch spacing of 1200mm, which would mean that the center of the punches are 205 from the home and away edges of the plate (205+205+1200=1610). If there was no 1610 plate to test with, then get the next larger size for example a 2082 plate. The punches would then be 441 from the home and away edges of this plate

d) Get a plate and scribe lines on the leading edge of this plate with the punch locations from the drawing. Also draw lines for the registration pins. Then take the plate and put it on the unload table

e) Accurately measure and mark the center line on the extrusion

f) Put the plate deflector down by entering the command *punch deflector down*

g) Next do an unload table init and then move the punch side registration pin to position X where **X = 1067.3 – (subscan size of plate used to scribe lines on / 2)** If a 1610 plate was used then X would equal 1067.3 – (1610 / 2) = **262.3** Move the punch side registration pin to this number by typing in the command *punch move 262.3.*

h) Slide the plate with the scribed punch and pin locations on it, up onto the plate deflector and up past the punch bar to the punch extrusion. Then slide the plate towards the home side until it hits the punch registration side pin

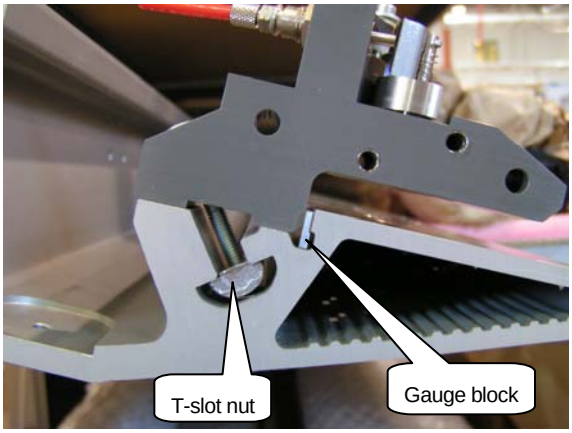
*****picture*****

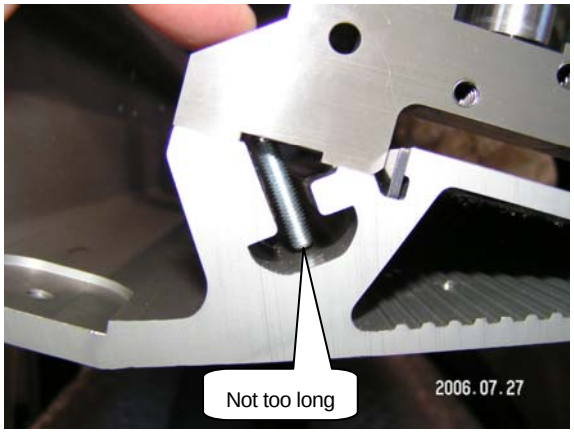
i) Transfer the lines on the plate to the extrusion, use a square to lengthen the line and make it perpendicular to the punch head channel in the extrusion

*****picture*****

j) Get the punch heads and registration pins and scribe lines along their centers **(Note this will only work for single punches, for double and triple punches more calculations will need to be made)**

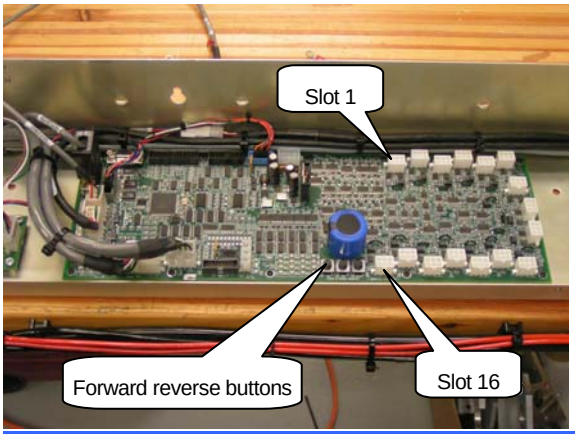
k) Place the registration pins so that the centerline on the pin lines up with the lines scribed into the extrusion. Place a 2mm gauge block behind the pin before tightening it down. Make sure the screw is not to long and does not bottom out into the extrusion (you will hear a metal grinding sound as you turn if this is the case) The screw secures into a t-slot nut 372E01011

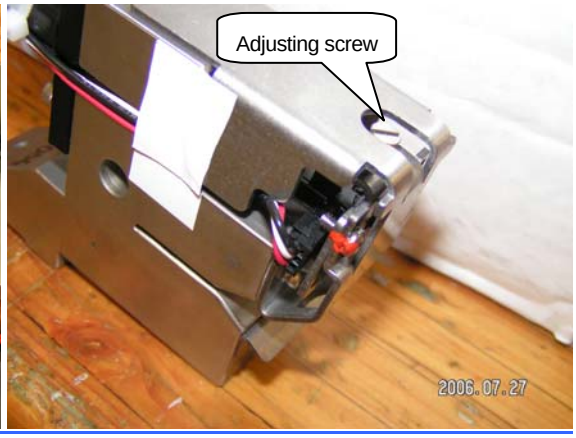




l) The distance from the face of the registration pin that the gauge block touches to the pin where the plate touches is 32.891mm. Every punch head will have a number on it that corresponds to the distance from the face of the punch to the furthest most point of the punch cut-out. Using this number along with the depth of the punch cut-out that will be provided in the configuration documentation plus the 2mm shim at the registration pin it will be possible to roughly calculated the stack height of gauge blocks that needs to be placed between the punch head face and the extrusion

m) Take the punch heads and plug them into motor slot 16 of the Daphne board and then press the forward or reverse buttons. If the punch does not stop then this means the sensor needs to be adjusted. When adjusted correctly the punch should go down and then up once





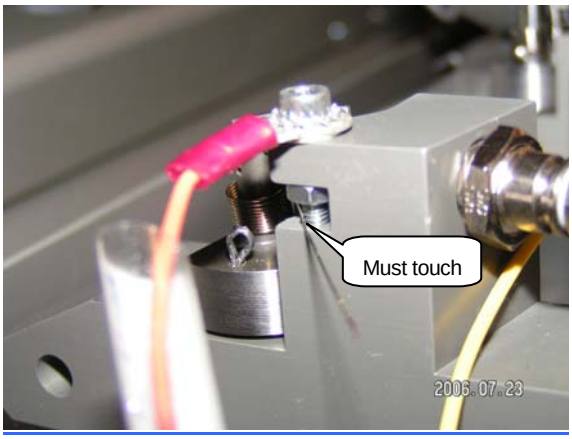
n) Once a rough estimate has been made for the punch head gauge block height, line up the punch center line with the marks made on the extrusion for that punch and secure the punch in place by screwing it into a t-slot. A heavy washer and bell washer should be used along with the screw

o) Attach punch motor cables to the punches. To try and keep things standardized is better to use motor slot number one for the punch closest to the home side of the machine, and then slot two for the next closest and so on

164) The punch registration pins work in pairs just as the pins on the drum of the machine work in pairs. The pin spacing used on the punch is also exactly the same as the pin spacing on the drum of the machine. There are three standard pin spacing's on four and six pin machines, which are 697, 504, and 280mm. In the future a universal pin system might be in place with pin spacing's of 697, 504, 280, 357, and 1411mm. Currently there are a total of five registration pairs available on the punch but it is likely for the moment that three will be the most ever used. There is a sixth pin and that is the side registration pin, which is like the side edge detection on the machine:

a) All pin pairs will usually be centered on the center of the punch extrusion, except in special cases where it is necessary to offset a pair due to physical interferences between punch heads. The plate can also be offset on the pins +/6mm and still have an acceptable accuracy for mainscan rotation

b) For each pin pair a drive wire needs to be connected to one of the pins and a sensor wire to the other pin. The drive and sensor wire pair will be the same color. If you have one or more pairs start with any pair you like and attach the yellow sensor and drive wires, which will be labeled as either, drive and senor 1 or 0 for earlier revisions, from cable 220-01382. This pin pair will be referred to as **pinset 1** in firmware



c) The spring wire of the registration pin must touch the screw that secures the wire in place or registration will not be possible

d) After hooking up the pin pair electrically it must also be hooked up pneumatically. The punch manifold will have one solenoid for each pin pair. There will only be one red 5/32 tube coming from the solenoid, which will then be split with a T connection and go to each of the pins in the pin pair. The solenoid and wire going to the solenoid should be labeled pinset 1 and so on

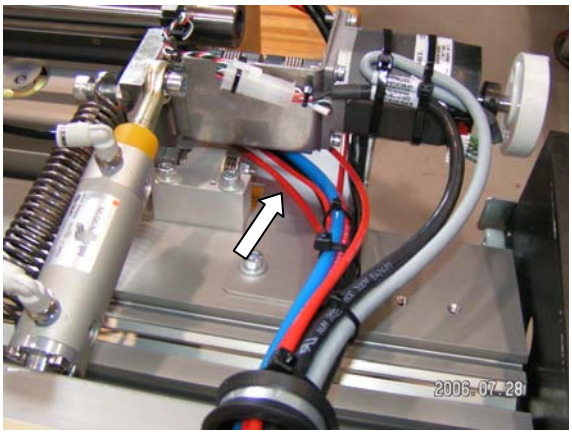
e) In Service Shell enter the command *punch pinset1 rotate* and check that the pins that rotated are the ones hooked up with yellow wires which will be labeled as either drive / sensor 0 or 1. The solenoid cables can be moved around if the wrong pinset has rotated

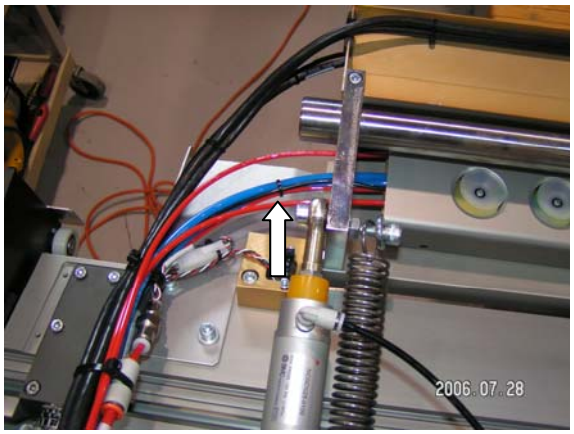
165) The punch bar now needs to be checked for free movement:

a) In Service shell enter the following commands *(punch deflector down)* then *(punch float on)*

b) Next enter the command (*punch bar forward 300)* Note this command should never be issued unless the punch float is on or damage could result

c) Go to the punch and check the movement of the punch by moving it around by hand. The bar should move easily, and when moving side to side check that the tubes exiting the end of the bar have enough freedom of movement and are not creating excessive friction





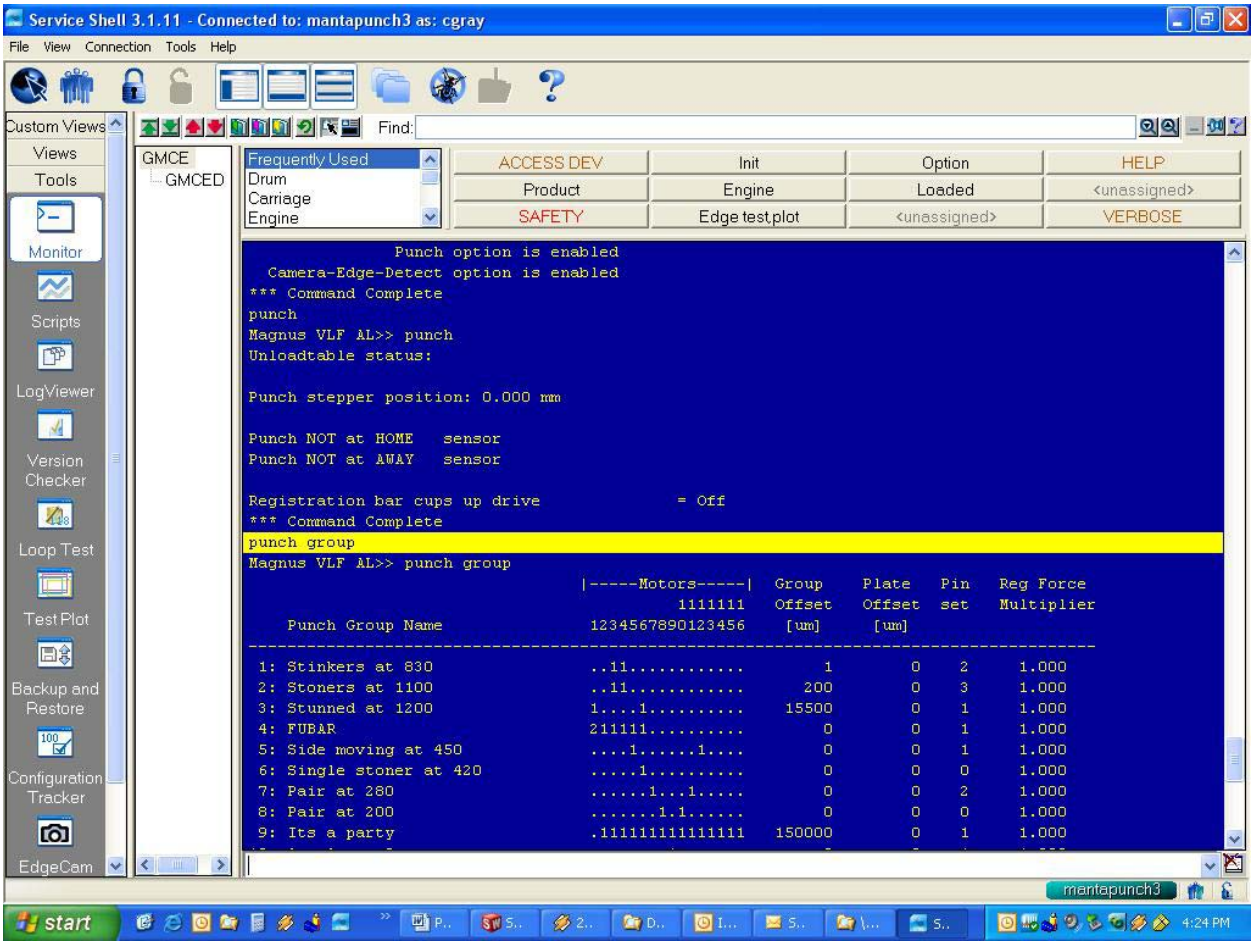
d) When finished enter the command *punch bar back* then *punch float off* and *punch deflector up.*

166) Punch groups now need to be set up in service shell. A punch group will consist of a pair of punches, (some customers will have a third punch that punches a hole in the middle of the plate) a pair of registration pins and a position of the group (group offset) which will usually be 0 if the punches are centered around the center of the extrusion:

a) All punch commands and syntax can be found in punch help, command (*help punch)*

b) Enter the command (*punch group)* all fields should be blank (for production you will have to reset your NVS if these fields are not blank)

c) First give punch group 1 a name. A good name will help the operator know on what plates this punch group is used, for example the name might be Kimori 1200 which would indicate the plate is used on a Kimori press and the punch spacing is 1200, command (*punch group 1 name "Kimori 1200")*



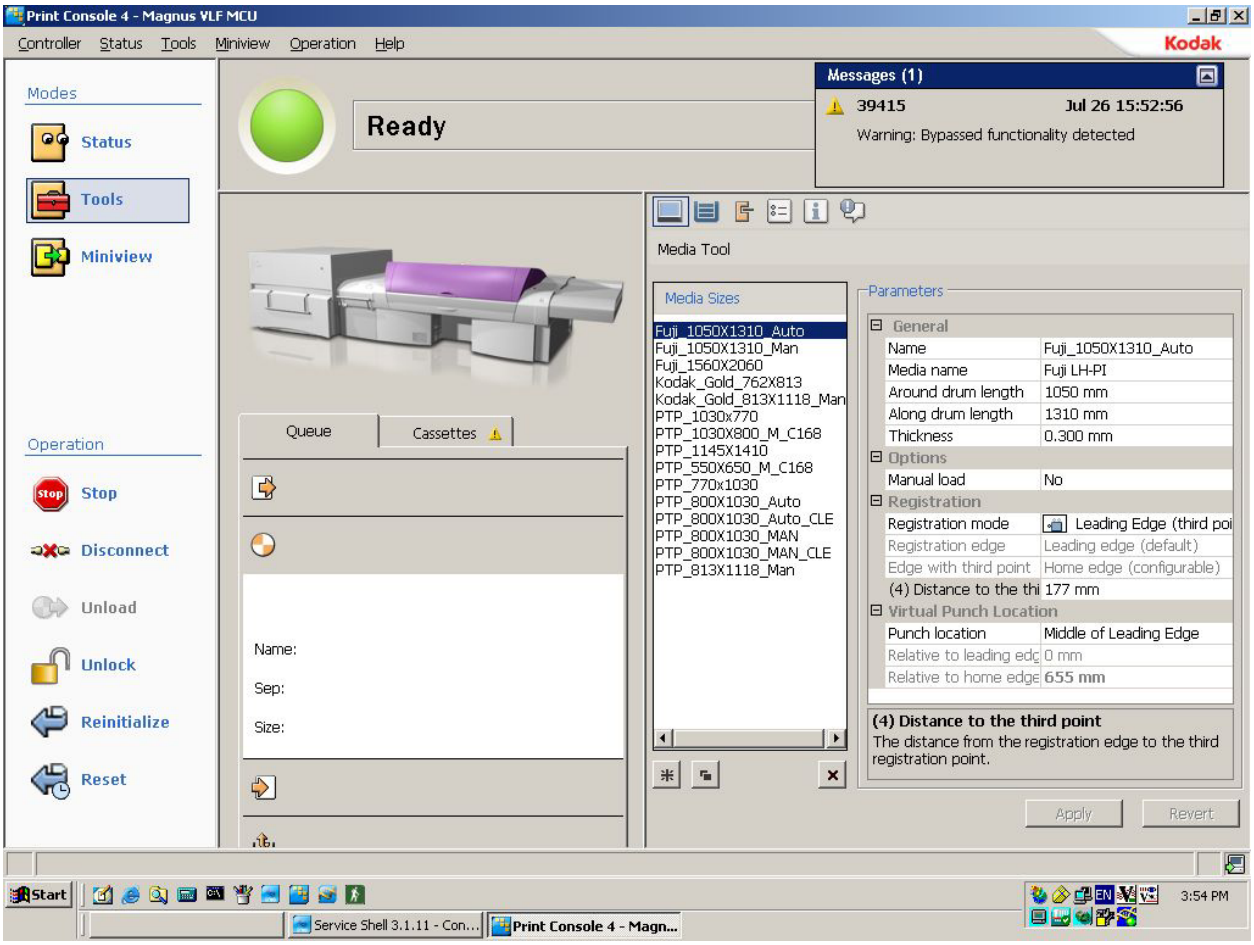
d) Once group 1 has a name you will then have to indicate what motors to use. In the picture above the motors used for punch group one are 3 and 4, command (*punch group 1 motors 3 4)*

e) Next choose the pinset for each group. This refers to punch registration pin pair and pinset one would be the pins with the yellow registration wires hooked up to them. The spacing of this pinset should be the same as the spacing that was used on the drum to image the plate

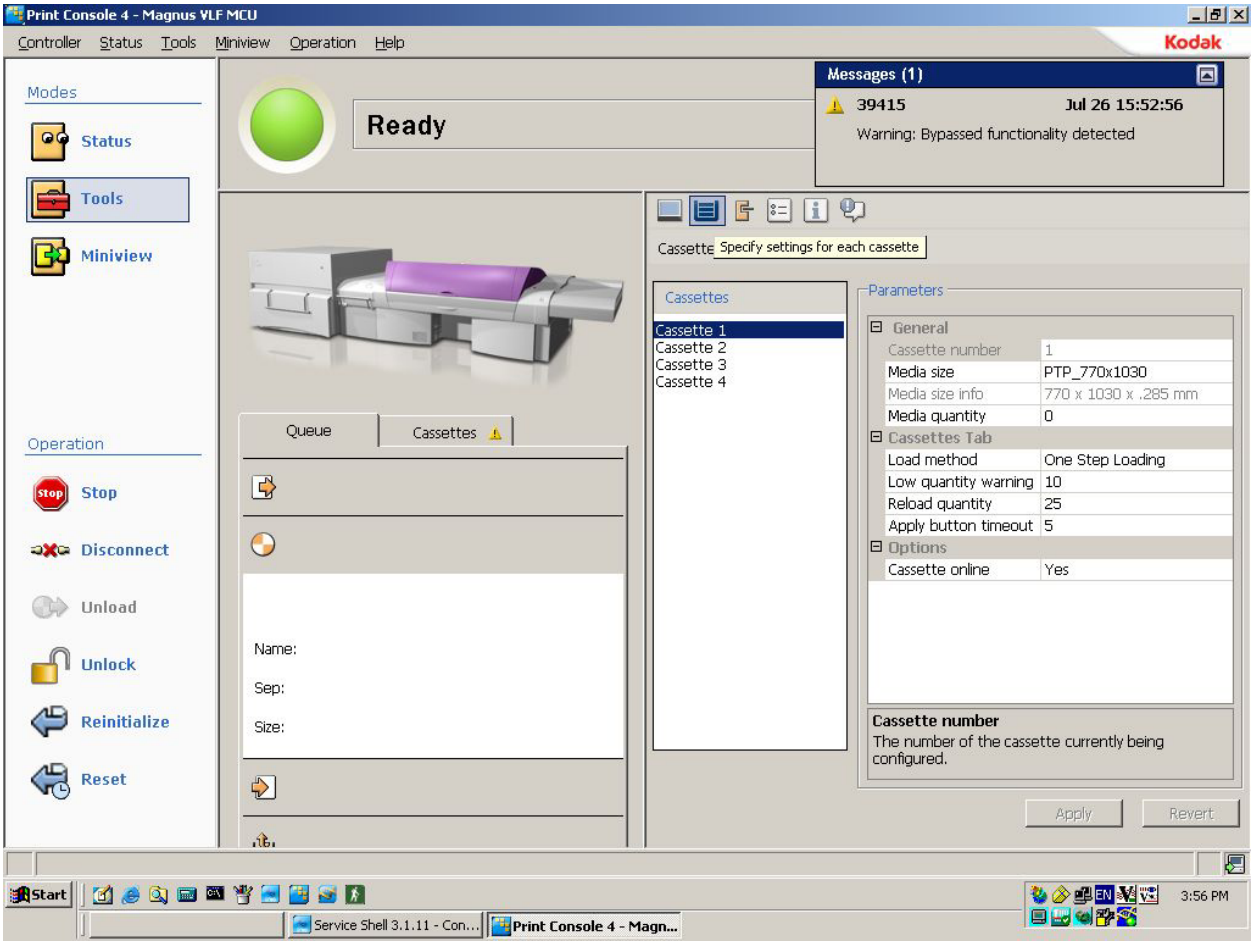
f) The other parameters will be covered later on in this procedure.

167) Print console will be set up next. Start PC but be aware that the machine will start to initialize, so it should be in a safe state to do so, in particular there is a chance that the drum drive direction is wrong and the drum could start running away:

a) Media sizes need to be set. Click on the add new media button and then enter a name for the media, the media name (this is the media that is set up via service shell, enter command *media* to see what medias have been set up), the size of the media, manual load yes or no, and the registration mode, which should be “leading edge third point configurable” and the distance to the third pin should be 177mm on punch machines, but the camera option must be enabled to make this possible. Punch location in PC has no meaning for Magnus VLF machines and can be ignored



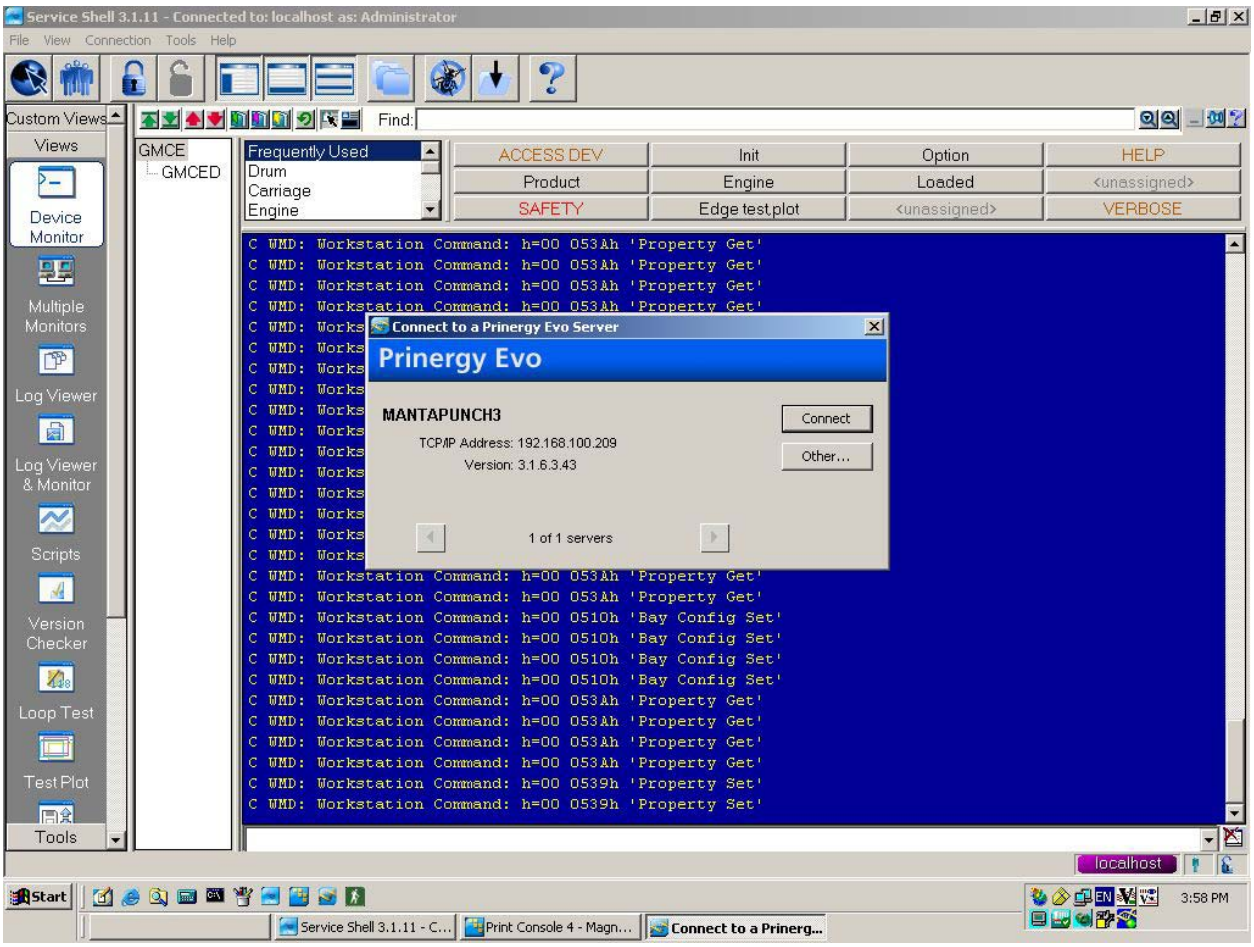
b) Set up the cassettes in PC. Choose the media size (media must be set up first) then the quantity, load method refers to doing a reload all in one step or having the cassette come out the door close and then to put the cassette back in a button must be pushed in PC to get the cassette back in the bay, which is called two step loading. Make sure that the cassette in online as well



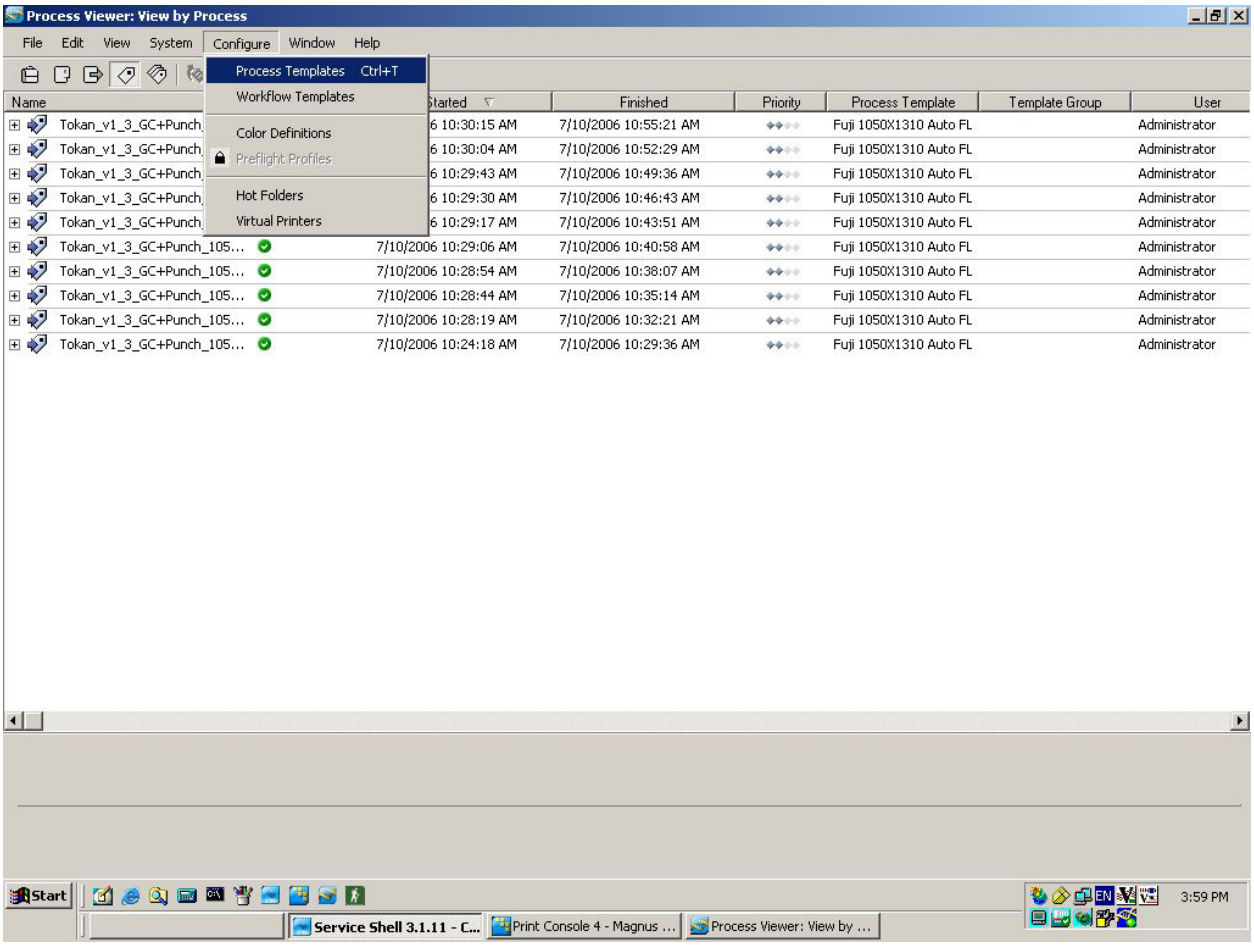
c) There is a punch button as well in PC, but this can be ignored for Magnus VLF and is only useful for knowing if the punch groups made up in service shell have been picked up by PC, if this is not the case then a restart of PC may be required.

168) Templates in Prinergy Evo must be set up:

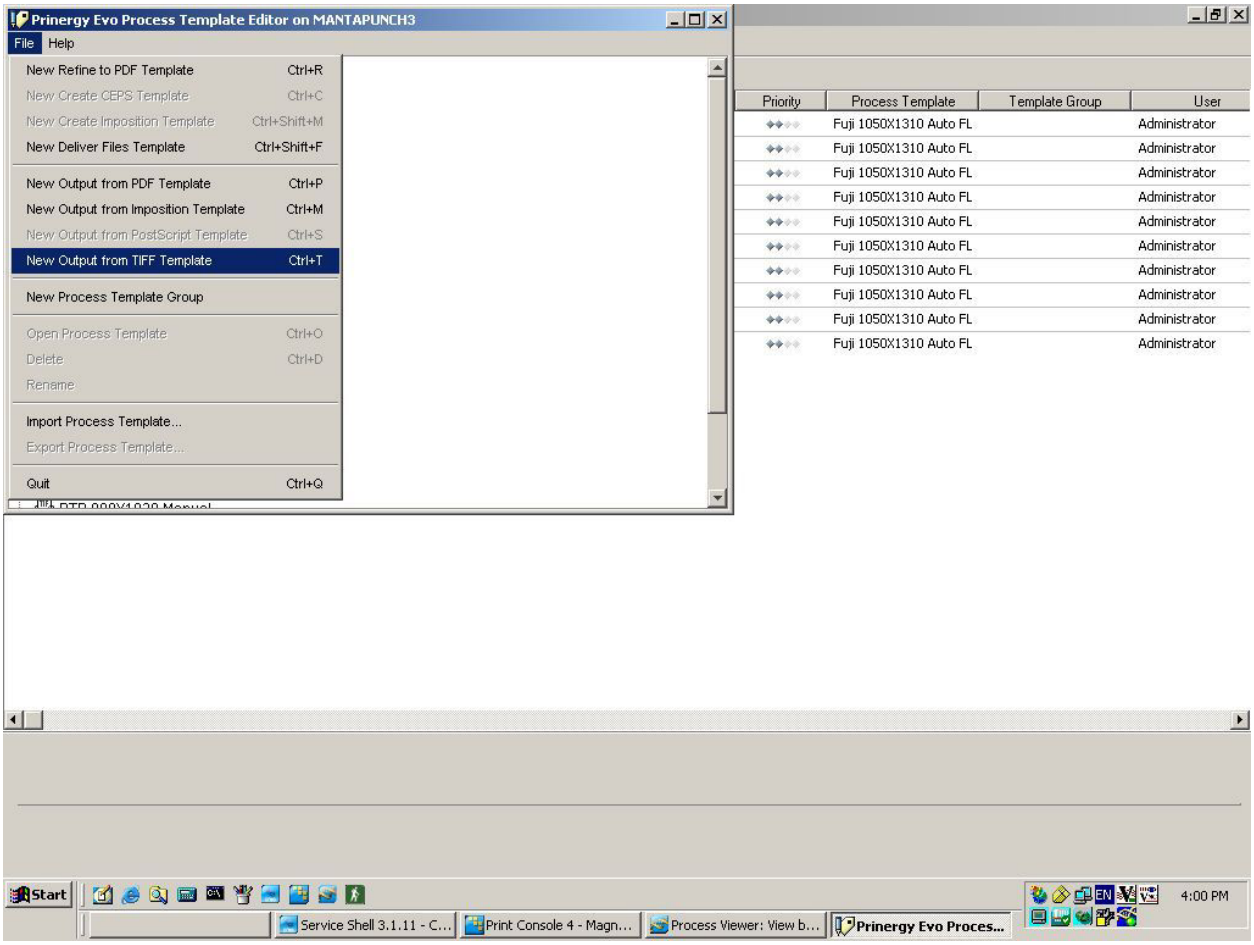
a) First connect to Evo, which should be trying to connect to 192.168.100.209, which is the address of the network card installed on the workstation. Once connected you will see the process viewer



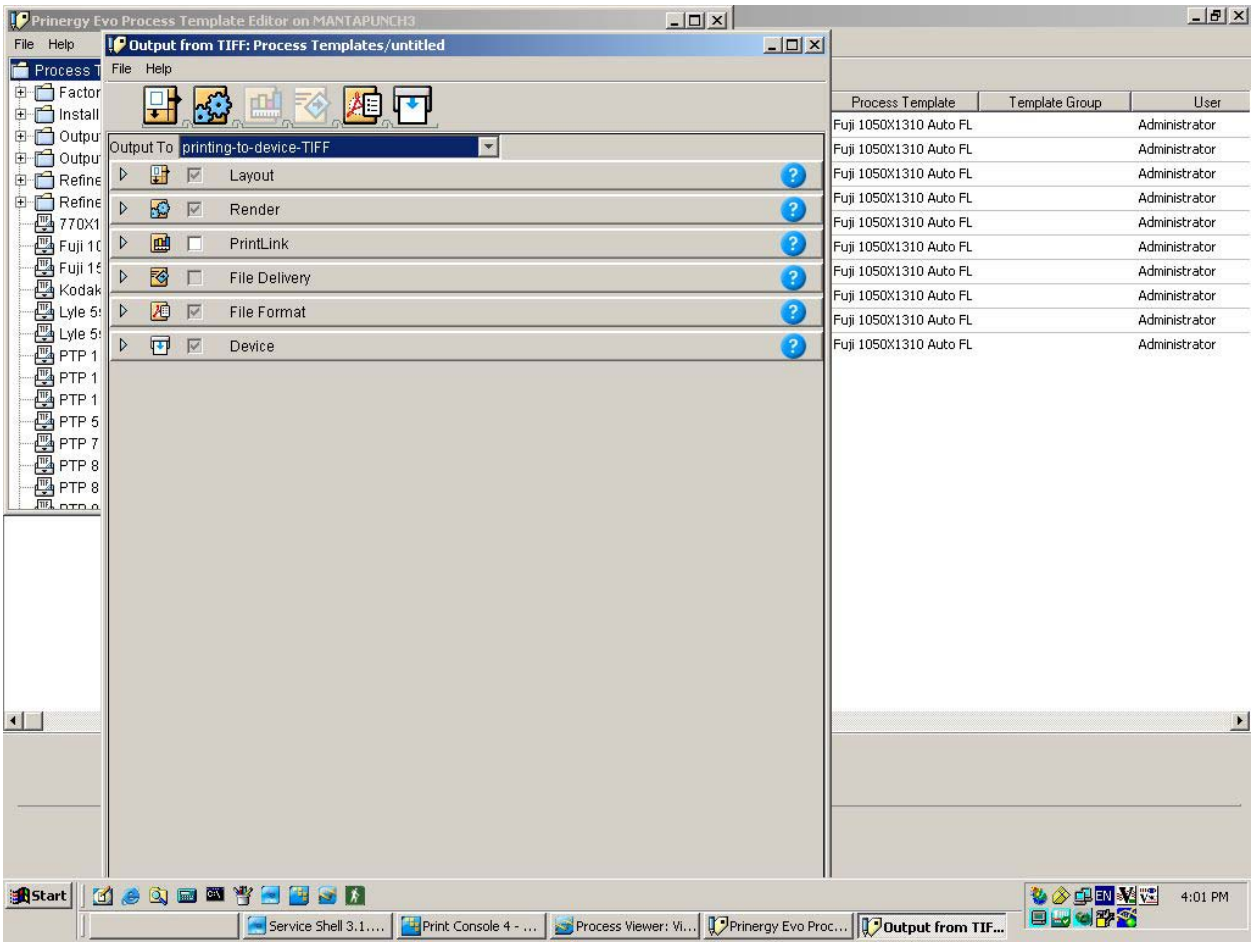
b) Next open up the process template editor



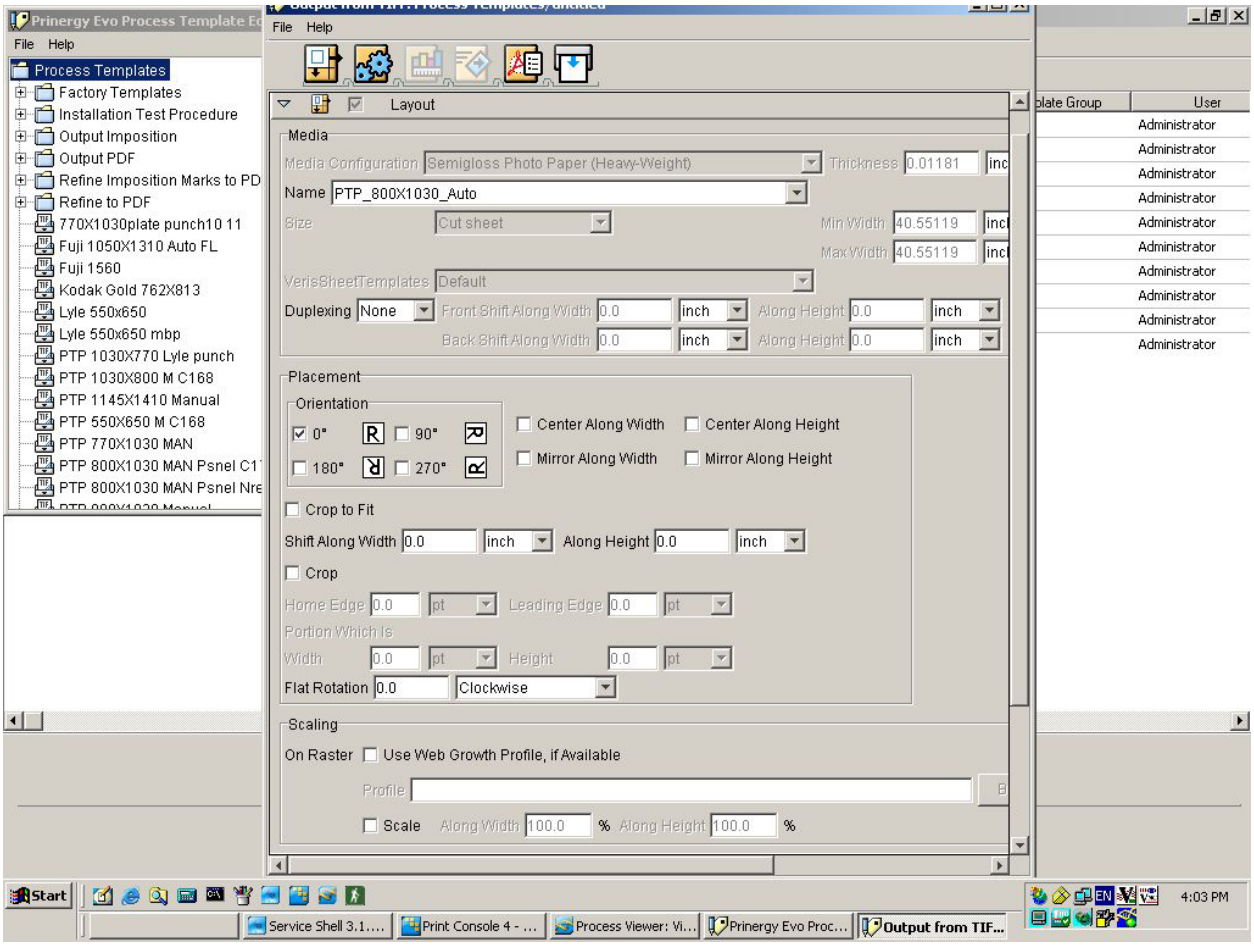
c) From the file menu choose New output from TIFF template



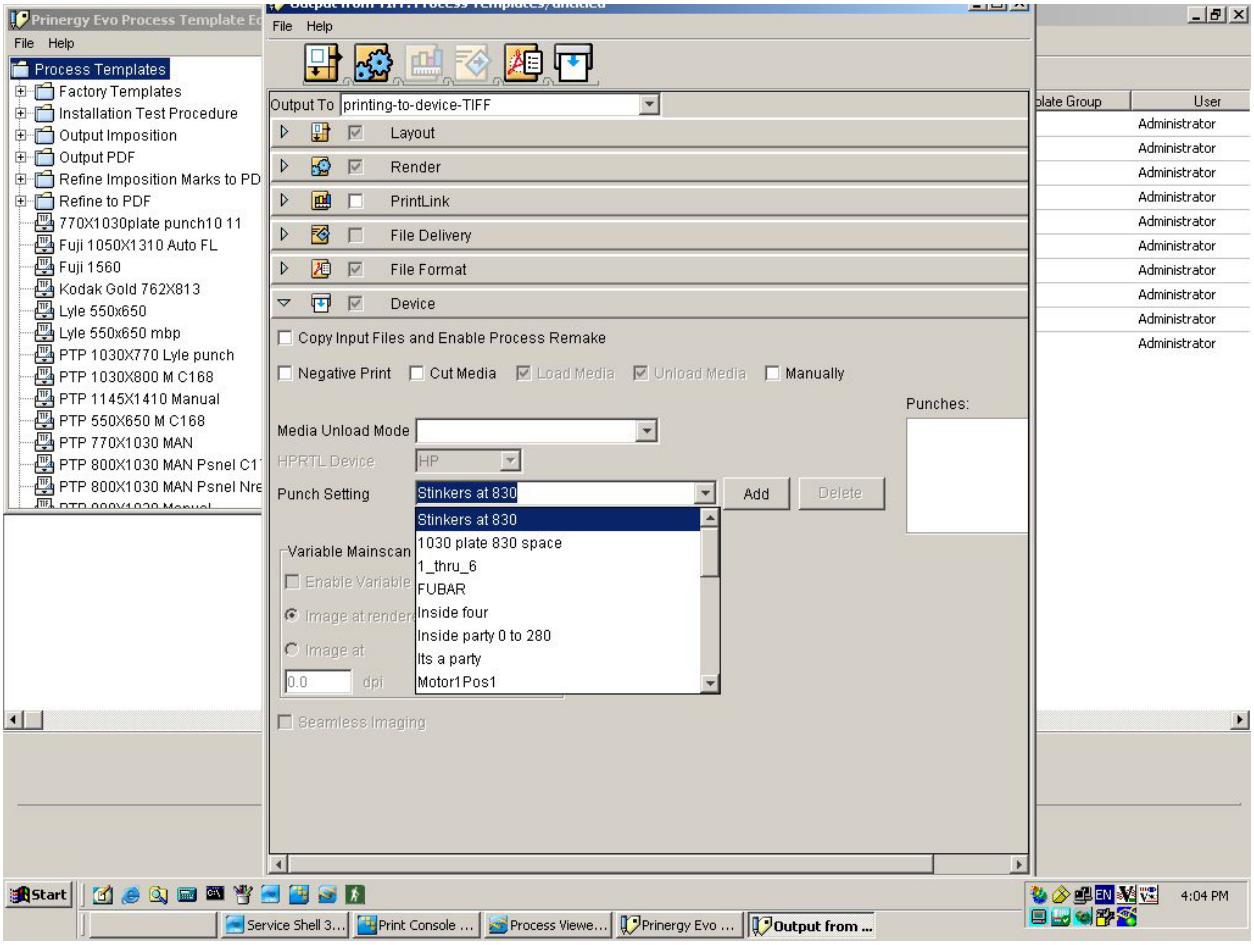
d) A blank template will appear, first choose “printing to device TIFF” in the drop down menu of “output to “



e) Expand the layout section next and choose the media wanted for this template in the drop down menu of “name”. Evo pulls this information from PC, so the medias in PC first must be set up



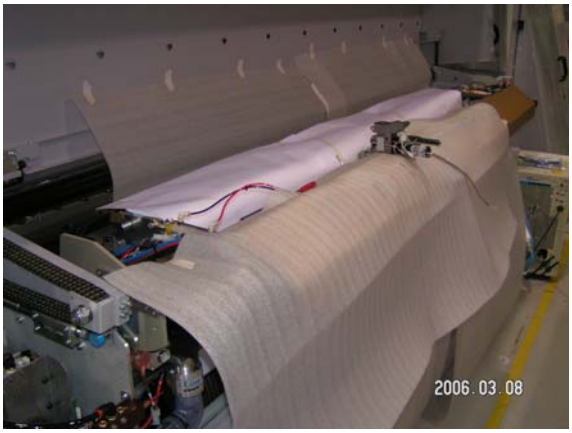
f) Expand the Device menu and choose the punch group desired for this particular template. From the drop down menu of punch setting, choose the name of the punch group wanted for this template and click on add. Also if this template is for a manually loaded plate, then check off manually



g) Finally save the template and give it an appropriate name, one that may refer to plate type, size and punch group used, as well as manually or auto loaded.

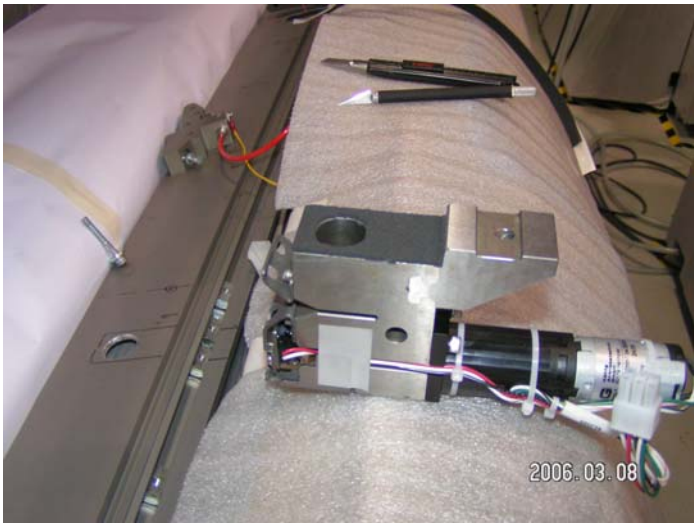
169) Drilling holes in punch extrusion and installing new punches:

a) If punches need to be added, first cover up the machine to protect it during the drilling operation



b) Use a 7/8” hole saw to drill hole into extrusion for new punch location ***explain***

c) Place foam tape xx-xxxx onto the bottom of the punch before installing



d) Subscan alignment can be done using an existing punched plate, and mainscan alignment is done with the use of gauge blocks

170) The machine can now be re-assembled

171) Unlock the rear hood locking solenoid

172) A new version of service shell will be needed as well as an extra camera applet for service shell

173) Punch firmware commands and set up will be explained during the course

Test

Include testing and verification steps if applicable:

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The leading provider of graphic communications solutions worldwide, Kodak's Graphic Communications Group (GCG) offers image capture systems; professional color, copydot, and high-speed document scanning systems; inkjet printing and proofing systems; workflow and color management software; thermal imaging devices for film, plates, and proofs; high-quality proofing media, printing plates, and recording film; on-demand color and black-and-white printing systems; data storage products; and professional services. Creo joined the GCG in June 2005, when it became a wholly owned subsidiary of Kodak. With corporate headquarters located in Rochester, N.Y., Kodak (NYSE: EK) had sales of $13.5 billion in 2004 and is committed to a digitally oriented growth strategy.

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