Safety Precautions for Service

English

Magnus 400 Quantum

731-00442A-EN Rev B

www.creo.com

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RE37,376	5,325,217	5,532,728	5,742,743	5,996,499	6,158,345	6,353,216
4,558,302	5,339,176	5,561,691	5,764,374	5,998,067	6,159,659	6,366,339
4,743,091	5,343,059	5,568,595	5,764,381	6,003,442	6,164,637	6,371,026
4,992,864	5,355,446	5,576,754	5,771,794	6,014,471	6,180,325	6,377,739
5,049,901	5,359,451	5,579,115	5,785,309	6,016,752	6,181,362	6,387,597
5,079,721	5,359,458	5,592,309	5,813,346	6,031,932	6,181,439	6,396,422
5,103,407	5,367,360	5,594,556	5,818,498	6,043,865	6,186,068	6,396,618
5,111,308	5,384,648	5,600,448	5,854,883	6,060,208	6,189,452	6,407,849
5,113,249	5,384,899	5,608,822	5,861,904	6,063,528	6,191,882	6,414,755
5,122,871	5,412,491	5,615,282	5,861,992	6,063,546	6,204,874	6,422,801
5,124,547	5,412,737	5,625,766	5,875,288	6,072,518	6,208,369	6,435,091
5,132,723	5,420,702	5,636,330	5,894,342	6,090,529	6,214,276	6,441,914
5,150,225	5,420,722	5,649,220	5,900,981	6,096,461	6,217,965	6,450,092
5,153,769	5,459,505	5,650,076	5,934,196	6,098,544	6,260,482	6,456,396
5,155,782	5,473,733	5,652,804	5,942,137	6,107,011	6,266,080	6,476,931
5,157,516	5,481,379	5,680,129	5,946,426	6,112,663	6,266,134	6,477,955
5,208,818	5,488,906	5,691,823	5,947,028	6,115,056	6,267,054	6,509,903
5,208,888	5,497,252	5,691,828	5,958,647	6,121,996	6,268,948	6,541,181
5,247,174	5,508,828	5,696,393	5,966,504	6,130,702	6,283,589	6,545,772
5,249,067	5,509,561	5,699,174	5,969,872	6,134,393	6,295,076	6,564,018
5,283,140	5,517,359	5,699,740	5,973,801	6,136,509	6,299,572	
5,291,273	5,519,852	5,708,736	5,986,819	6,137,580	6,318,266	
5,323,248	5,526,143	5,713,287	5,995,475	6,147,789	6,352,816	

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Introduction

Read the following safety document carefully before installing, operating, servicing, or maintaining the Magnus™ 400 Quantum platesetter and/or the Magnus 400 Quantum with Multi Cassette Unit (MCU).

Extensive care was taken in the design and manufacturing of the platesetter to eliminate hazards to operators and service personnel. Follow the instructions in this document to ensure your safety and the safety of others when operating or maintaining the platesetter.

These products are **Class 1** laser products, according to International Safety Standard IEC60825-1 and USA regulation 21 CFR 1040. This implies that there is no hazardous laser radiation, providing that the safety precautions are followed.

Note: For operator safety instructions, see *Magnus 400 Quantum Safety Precautions for User*.

Device Views

Platesetter:



Figure 1: Magnus 400 Quantum Manual Loader Platesetter Front View



Figure 2: Platesetter back view

Laser System

Figure 3: Null

Platesetter with MCU



Figure 4: Magnus 400 Quantum with MCU



Figure 5: MCU with tray opened



Figure 6: MCU with left door opened

Symbols Used in this Manual



DANGER: This indicates an imminently hazardous situation, which, if not avoided, will result in death or serious injury. This does not alert you to a property damage accident unless personal injury risks are associated with the accident.



WARNING: This indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury. This does not alert you to a property damage accident unless personal injury risks are associated with the accident.



CAUTION: This indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. This may also alert you to unsafe practices or potential property-damage-only accidents.



Note: A note provides additional information that you may need to consider.

Before Beginning Service

Never begin to perform service on the platesetter until you complete the following precautions:

- Post the following sign close to the keyboard and close to the platesetter:
  CAUTION: Machine in service—do not operate.
- Remove any clothing or objects that can get caught in a moving part of the platesetter. For example, remove ties, roll up long sleeves, remove rings and bracelets, and gather long hair.
- Remove any reflective objects such as jewelry, wristwatches and so on from your hands, wrists, and shirt. Use non-reflective tools. This reduces the risk of hazardous laser reflection in case of a failure in the laser interlock system or in a protective barrier.

General Safety Precautions

- Read the Magnus 400 Safety Precautions for User—an indispensable part of the service safety instructions.
- Many service procedures can be performed when the entire platesetter or some of its assemblies are switched off. Whenever possible, perform service when the platesetter is off.
- When the platesetter is off, use the metal bar near the main switch to prevent you from accidentally switching the platesetter on.
- Two yellow on/standby buttons are located on the back panel on both sides of the plate exit. These buttons are *not* emergency stop buttons. Stopping the revolving drum by pressing these buttons takes about one minute, or longer.



WARNING: It takes the drum one minute or longer to stop rotating when you push an on/standby button or when you activate the main power circuit breaker.

- Keep all external doors and internal protective barriers of the platesetter complete and undamaged.
- Never bypass the laser interlock switches.



WARNING: The laser beam and radiation are hazardous, but are invisible to the eye.

- Avoid using motor or focus laser interlock defeaters unless absolutely necessary.



WARNING: If you must bypass the motor or focus laser interlocks, use only the dedicated defeaters. Use of any other interlock defeater is forbidden.

- Never leave any object between the optical head and the drum.
- If there is any doubt regarding the proper function of the laser interlock system, or if you suspect that the platesetter protective cover or barrier is broken, cracked or otherwise damaged, turn off the platesetter. Do not turn the platesetter on until you have checked and fixed the problem.

- Only certified service personnel are allowed to attach the MCU to the Magnus 400 Quantum platesetter.
- Only certified service personnel are allowed to dismantle the MCU from the Magnus 400 Quantum platesetter.
- Do not move the platesetter with MCU attached

Power and Electrical Components

Many service procedures can be performed when the entire platesetter or some of its assemblies are switched off. Whenever possible, turn off the platesetter before performing service.

Electrical Safety Precautions

Electrical Safety is provided by electrical earthing of the device, electrical enclosures (earthed metal boxes that require a tool for opening), and double insulation of wires that carry hazardous voltages.



DANGER: The electrical hazards in the device are not neutralized by interlocks.

The electrical enclosures may have warning labels with the symbol of lightning in a triangular border (refer to label 374A7B951).



WARNING: Wires may be singly insulated near connectors. Do not touch singly insulated wires.

The device must be earthed.



WARNING: Do not alter the internal earthing means.

Power line

The total power consumed by your system depends on the specific site configuration. See the *Magnus 400 / Magnus 400 Quantum Site Preparation Guide* (part number 731-00352A-EN).

All voltage settings, fuses and cords should be in full compliance with local standards.

Magnus 400 platesetter connections:

- Rating: 200-240 Vac
- Line voltage
  - ❒ Two-phase supply in a 120 V configuration
  - ❒ One-phase and neutral in a 230 V configuration
- Supply frequency: 50/60 Hz ±1.5%
- Power line connections *must* include three pins: two phases and one safety ground.



DANGER: There is a hazard of fatal electric shock if a safety ground is not provided!

- The cable connector (male, 3-pin: 2 phases and safety ground) is supplied with the platesetter
- For branch circuit requirements, refer to the *Magnus 400/Magnus 400 Quantum Site Preparation Guide.*

Debris Removal Cabinet connections:

Refer to the *UDRC Site Preparation and Requirements.*

Disconnection from Mains Supply

The platesetter has circuit breakers that disconnect power from the entire platesetter, or from one of its assemblies.

Description	Location
Main power switch	distribution box
Drum motor power	distribution box
Drum vacuum pump power	distribution box

Table 1: Circuit breakers and their locations.



WARNING: Complete disconnection from the mains supply can only be achieved by setting the switch of the main power circuit breaker to **0** or by unplugging the main power cable from the power outlet.

Precautions to take when servicing boards or the power supply:

- Turn off the power by setting main power switch on the distribution box to 0.
- When the platesetter is switched off, use the metal bar near the main switch to prevent you from accidentally switching it on.
- Wear an anti-static wrist band
- Verify that you are using the correct test point.

Disconnection from Pneumatic Air Pressure

The Magnus 400 receives pneumatic air pressure from the filtration unit located on the wall.

Before working with any pneumatic component, shut down the main air pressure valve, and discharge the air pressure from the system.

➢ To turn off the air pressure, turn the valve on the air pressure unit on the wall.

Lithium Battery

The CPU board in the platesetter PC contains a Lithium battery.



WARNING: Danger of explosion if the battery is incorrectly replaced.

The battery must not be replaced by the user. Only qualified service personnel may replace the battery.

Precautions to take when replacing the battery:

- Turn off the power by setting the main power switch on the distribution box to 0.
- When the platesetter is switched off, use the metal bar near the main switch to prevent you or others from accidentally switching on the power
- Follow the battery manufacturer's instructions.
- Replace the battery with the same or equivalent type recommended by the manufacturer
- Never short the battery terminals
- Install the new battery in the correct polarity
- Dispose of the used battery according to the manufacturer's instructions.

Drum Safety Precautions

The Magnus 400 Quantum drum revolves inside the platesetter at about 385 revolutions per minute. If an object hits the rotating drum, the object may get dislodged inside the platesetter and cause damage (including damage to the safety system, laser head or optical fibers) or damage the platesetter enclosure.



WARNING: Do not leave any object, tool or part inside or on the platesetter enclosure. A loose object inside the enclosure may be hit by the revolving drum and create a safety hazard.

The plates are loaded, wrapped onto the drum, exposed and unloaded. Special safety precautions that include solenoids and an interlock system prevent rotation of the drum while the operator is loading or unloading media.

To prevent the operator or service engineer from accessing the drum while the drum is revolving, the following doors and covers are equipped with solenoids that lock the doors in a closed position. After a command is issued from the workstation, only when the drum has stopped revolving, the solenoids unlock these doors.

- Front door
- Upper rear door
- MCU upper door

Accessing the drum area through interlocked machine panels or the side doors requires the use of tools. During such access, the service person is exposed to the revolving drum for several minutes (due to inertia).



WARNING: Do not touch or get close to the revolving drum.



WARNING: When you open the front door or the upper rear door from the workstation, if the drum is not completely stationary within 3 seconds after the door is unlocked, you must repair the device.



WARNING: If you defeat the motor interlocks, all motors can work.



WARNING: When you stop the drum by pressing one of the two yellow on/standby buttons, or by turning the machine off, the drum continues to rotate at high speed for several minutes before it stops.

Precautions to take when accessing the drum area:

- Before performing service, remove any piece of clothing or object that may get caught in the revolving drum or other moving parts. Remove ties, roll up long sleeves, remove jewelry and gather long hair.
- If the drum motor interlock is defeated and the doors or panels are open, make sure no one is standing in front of the drum (even if the drum is stationary at the moment).
- Before touching the drum surface, make sure the drum motor circuit breaker on the Distribution box is switched off.
- If you must insert your fingers or hands anywhere near the drum, take care not to get them caught in the narrow gaps in the drum area

Gripper Actuators

Before working with any pneumatic component, shut down the main air pressure valve (located at the air pressure unit on the wall), and discharge the air pressure from the system.



WARNING: Never put your hand or fingers underneath the grippers or gripper actuators. If air pressure remains in the system, your fingers might get caught in a pneumatic component, such as the gripper actuators.

Safety Interlocks

Safety interlock switches provide protection against the severe laser and mechanical hazards, provided that you follow all the safety precautions in this document.

The safety interlock switches are located on doors and panels of the platesetter and the MCU (Table 2 and Table 3). The interlock switches disconnect power from the laser system (write and focus) and from the motors, including the drum motor and the MCU XY bar motor, under the following conditions:

- A door is open
- A panel is removed
- The MCU is dissasembled from the platesetter
- The left or right internal cover of the MCU is open



WARNING: It takes up to two seconds for the laser interlock system to shut off the laser sources. Therefore, when opening a door or panel, do not hurry to access the inside of the platesetter.

The two upper doors and the front door each have two interlock switches. The side doors and panels each have one interlock switch. In order not to depend on the reliability of a single switch, *keep the front door or one of the upper doors open when a side door or a panel is open.*

Interlock Location on Platesetter	Function	Description	Serviceman Bypass
Front door	Disable lasers and motors	2 interlock switches	no
Lower front panel	Disable lasers and motors	1 interlock switch	no
Upper rear door	Disable lasers and motors	2 interlock switches	no
Upper rear door	Right: enable motors Right and left together: enable motors and focus laser	2 bypass switches	yes
Lower rear panel	Disable lasers and motors	1 interlock switch	no
Left platesetter door	Disable lasers and motors	1 interlock switch	no
Right platesetter door	Disable lasers and motors	1 interlock switch	no

Table 2: Platesetter interlock functions and locations

Interlock Location on MCU	Function	Description	Serviceman Bypass
Left internal cover	Disable lasers and motors	2 laser interlock switches	no
Left internal cover	Enable motors	1 motor interlock switch	yes
Right internal cover	Disable lasers and motors	2 laser interlock switches	no
Right internal cover	Enable motors	1 motor interlock switch	yes
Upper door	Disable lasers and motors	2 laser interlock switches	no
Upper door	Enable motors	1 motor interlock switch	yes
Cassette trays	Disable motors	Motor magnetic interlock switch	no

Table 3: MCU interlock functions and locations



Note: MCU covers require a motor interlock defeater for each cover.

..



DANGER: If a door or panel is open and the interlock switch is bypassed, or if the interlock system failed, then severe mechanical hazards and visible and/or invisible laser radiation of up to several watts may be present. *The laser radiation is hazardous to eyes and skin. Even brief exposure of the eye to this radiation or its reflection from shiny or matte objects can cause permanent blindness, or damage to eyesight.*



WARNING: If there is any doubt regarding the proper function of the laser interlock system, or if you suspect that the platesetter protective cover or barrier is broken, cracked or otherwise damaged, turn off the platesetter. Do not turn the platesetter on until you have checked and fixed the problem.

Laser Interlocks

The Magnus 400 Quantum contains a highly hazardous laser thermal imaging head that exposes the media. The imaging head uses two separate laser emitters:

- Write laser— invisible
- Auto focus laser—visible (red)

The laser interlock system is equipped with a buzzer. If a failure is detected in the operation of the laser interlock system, the buzzer activates and the laser shuts off. In any case, not every possible failure in the interlock system can be detected.

Write Laser

The write laser beam is invisible to the eye (class IV, approx. 830 nm).



DANGER: The laser output can cause severe and permanent eye and skin damage and is a fire hazard in the presence of flammable materials. Even brief exposure of the eyes to the write laser radiation or beam, or its reflections from shiny or matte objects, may cause permanent loss or degradation of eyesight.

.



WARNING: The service engineer is forbidden under any circumstances to bypass any of the laser interlock switches.

Focus Laser

The auto focus laser beam is visible (red, class IIIB, approx. 670 nm).



WARNING: Do not look directly or indirectly into the auto focus laser. The laser radiation can cause permanent eye damage if reflected directly or indirectly into the eye.

The focus laser interlock may be bypassed only by authorized service personnel for the purpose of focus alignment.

Precautions

- While the platesetter's interlocks are bypassed, ensure that anyone else in the room also follows these safety instructions.
- Never leave the platesetter while the interlocks are bypassed.
- Stand so that the path of the beam between the head and the drum is concealed by the head enclosure. Stay behind the laser head and watch either the alignment LEDs located in the head, or the monitor.

To bypass the auto focus laser:

1. To bypass the auto focus laser, first bypass the mechanical interlock system by inserting the mechanical interlock cheater.



WARNING: Beware of mechanical hazards when the mechanical interlock is bypassed.



Note: The auto focus laser cheater bypasses the focus laser interlock system, provided that the mechanical cheater is also inserted.

2. Before inserting the auto focus laser interlock cheater, you must take precautions to avoid exposure to the focus laser during focus alignment. To ensure that the focus laser beam originating from the laser head is not hazardously reflected by any object, and that it hits only the plate placed on the drum directly, make sure that:
   - ❒ A plate is properly wrapped on the drum and held by grippers
   - ❒ The carriage and the drum are static and oriented so that the beam hits the middle of the plate, far from the grippers and the plate edges



WARNING: Failure to comply with the safety precautions during focus laser interlock bypass may cause permanent loss or degradation of eyesight.

Motor Interlocks

The service engineer is allowed to bypass the motors interlock using the intended defeater.

Bypass interlock switches only after taking appropriate safety measures.



WARNING: If you must bypass the motor interlocks, use only the dedicated defeaters (part number 290B2P411) that are supplied for Lotem 400 service. Use of any other interlock defeater is unsafe and forbidden.



WARNING: Never leave the room while a motor interlock is bypassed.

Laser Safety Precautions

General



WARNING: Use of controls or adjustments, or performance of procedures other than those specified in this manual may result in hazardous radiation exposure.

The platesetter is equipped with a highly hazardous laser system that exposes the media. However, the platesetter is a Class 1 laser product according to International Safety Standard IEC60825-1 and USA regulation 21 CFR 1040. This implies that the operator and service engineer cannot access hazardous laser radiation provided that the safety precautions are followed.



WARNING: The write laser beam and radiation are invisible to the eye, but are highly hazardous.



WARNING: The service engineer is forbidden under any circumstances to bypass any of the laser interlock switches.



WARNING: The write laser beam and radiation are invisible and are hazardous to the eye and skin. Even brief exposure of the eye to the laser radiation or beam, or its reflection from shiny or matte objects may cause permanent loss or permanent degradation of eyesight.



WARNING: In the presence of flammable material, the write laser beam is also a fire hazard.



WARNING: The focus laser beam and radiation are hazardous to the eye. Even brief exposure of the eye to the focus laser radiation or beam, or its reflection from shiny objects may cause permanent loss or permanent degradation of eyesight.



WARNING: If there is any doubt regarding the proper function of the laser interlock system, or if you suspect that the platesetter protective cover or barrier is broken, cracked or otherwise damaged, turn off the platesetter. Do not turn the platesetter on until you have checked and fixed the problem.



WARNING: If you must enter the room where the platesetter is located when the platesetter is on, and you suspect that any of the following precautions were violated, disconnect the power supply to the platesetter before entering the room.

Enclosures

Together with the laser interlock system, the platesetter enclosure is designed to protect anyone in the platesetter vicinity from exposure to laser radiation by enclosing the laser radiation within the platesetter. The enclosure includes the external doors and panels, and the internal protective barriers. The internal protective barriers, that may be dismantled by the service engineer, have warning labels on them indicating that the barrier must be in place. The internal protective barriers prevent the laser radiation from escaping through the platesetter loading/unloading openings, the ventilation openings and the gaps between the external doors and panels. This protection depends upon the completeness and correct assembly of the outer enclosure and the internal protective barriers.



WARNING: After performing any service activity and before switching on the platesetter, you must check and ensure that all external enclosures and doors, and internal protective barriers, are intact, not broken or cracked, and correctly assembled on the platesetter.



DANGER: If the platesetter is ON and the enclosure is damaged or incomplete, even with the external doors closed, invisible laser radiation of up to several watts may be present. This radiation is hazardous to the eye and skin. Even brief exposure of the eye to this radiation or its reflection from shiny or matte objects can cause permanent degradation or permanent loss of eyesight!

Thermal Imaging Head

Several tens of watts of hazardous invisible laser radiation at a wavelength of 810–860 nanometers and tens of milliwatts at a wavelength of 670 nanometers may be present at the output of the laser head.



DANGER: Do not activate the laser head if it is removed from its position on the guide beam. Do not activate the laser head if it is not in its proper position facing the drum, and with all the internal protective barriers assembled and all the doors closed.



WARNING: Never place any object in the path of the laser beam between the laser head and the drum.



DANGER: Several tens of watts of invisible laser radiation at a wavelength of 810-860 nanometers and tens of milliwatts at a wavelength of 670 nanometers may be present at the output of the Laser head. This laser radiation is hazardous to the eye and skin. Even brief exposure of the eye to this radiation or to its reflection from shiny or matte objects can cause permanent degradation or permanent loss of eyesight!



WARNING: In the presence of flammable material, the write laser beam is also a fire hazard.

Cooling System

The platesetter cooling system contains a water-based coolant to cool the thermal head. The cooling system is sealed to prevent coolant leakage. However, if coolant leakage inside the head occurs, it may cause electrical shock and fire hazards due to hazardous voltage inside the thermal head.

To prevent coolant leakage, the cooling system pump contains a safety valve that does not allow pressure to build to greater than 65 psi. Before shipment, the pump valves are tested for opening (release of pressure) point in the range of 60-65 psi. After passing this test, the pump is labeled accordingly..



DANGER: If the coolant leaks and the platesetter is not turned off, electrical shock hazard and fire hazard are present.

Precautions

- During maintenance, or when you perform service on the cooling system, follow the *Cooling System Pressure Test* maintenance procedure on TechPlanet.
- If you replace the pump, verify that the new pump has the test label.

Debris Removal System

The Magnus 400 configuration includes a filtering device—the Universal Debris Removal Cabinet (UDRC)—a separate component connected to the platesetter. The UDRC extracts dust, fumes, contaminants and solvent vapors that appear within the platesetter during normal operation and need to be removed.



WARNING: Please refer to the Debris Removal System Manufacturer's Operating and Safety Instructions.

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WARNING: The filtering device has been constructed according to recognized technical safety regulations. Nevertheless, danger to life of the operator or third parties or damage to property can occur if the filter is not handled and disposed of properly.

Precautions to take when replacing filters:

- Only a service engineer should replace the filter.
- Handle and dispose of filters according to manufacturer's instructions and the maintenance procedure in TechPlanet.

Plate Handling

The edges of the plates are sharp. Improper handling can result in cuts to the hands.



CAUTION: It is recommended to wear gloves when handling plates.

When working with the MCU, you may need to lift a box of 50 plates. The plates are heavy.



CAUTION: Make sure to lift the plates in a manner that will not cause injury to your back

Appendix 1: Warning Labels

The warning labels are provided for operator and service personnel safety. Do not fail to comply with the warnings.

Make sure that all warning labels are in good order. Renew warning labels if needed.

The following pages show the laser and other warning labels, and their locations.



Label 1: 382-00888A



Label 1: 382-00889A



Label 2: 382-00956A



Label 3: 382-01051A



Label 3: 382-01052A



Label 4: 382-01068A



Label 4: 382-01069A



Label 5: 382-00980A



Label 5: 382-00981A



Label 8: 382-00905A



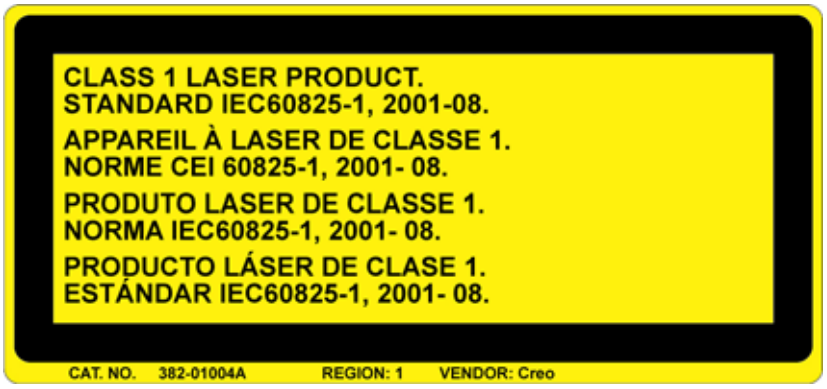
Label 8: 382-00906A



Label 10: 382-00939A



Label 10: 382-00940A



Label 12: 382-01004A



Label 16: 382-01016A



Label 19: 382-01028A



374A7B678



374A9C009



374A7B951



382-01209A

Appendix 2: Warning Label Locations

Platesetter Warning Label Locations

WARNING: Some of the figures show protective panels and internal covers removed. The operator is forbidden to dismantle any panel or cover that requires a tool to do so.



Figure 7: Front view, doors open, panels removed, with loading tray



Figure 8: Rear view, upper door open, panels removed, with unloading tray

Figure 9: Rear view, without unloading tray - NULL



Figure 10: Rear view, panel closed

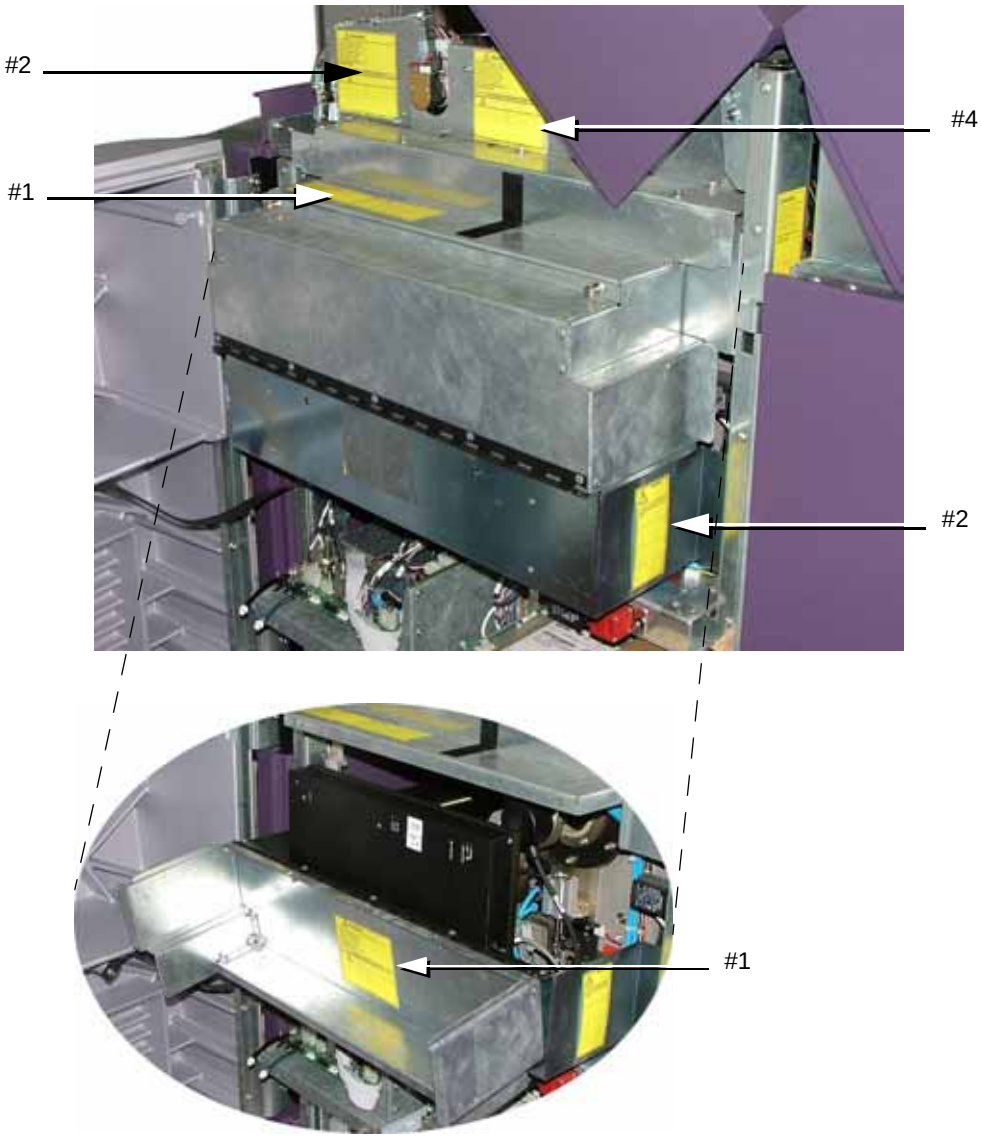


Figure 11: Left side door open

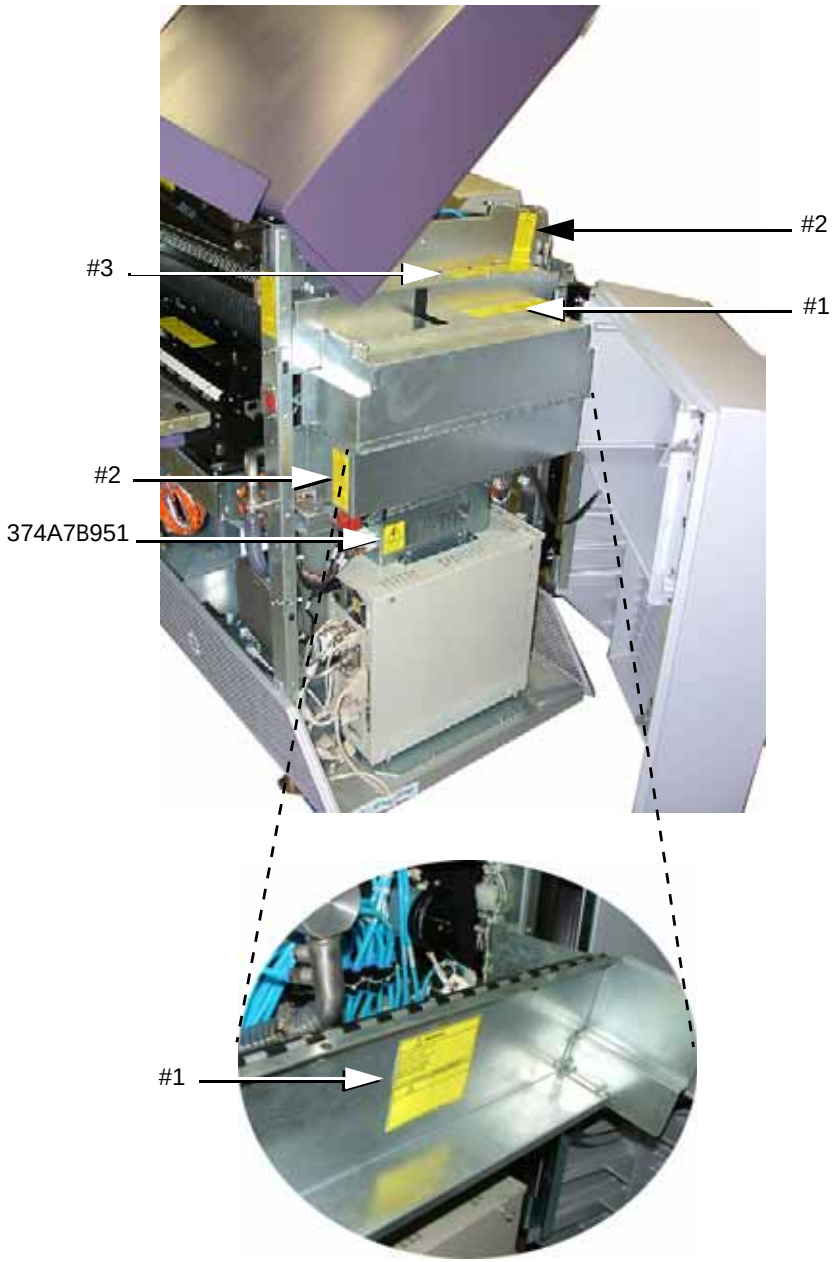


Figure 12: Right side door open

MCU Warning Label Locations



Figure 13: MCU right side door open

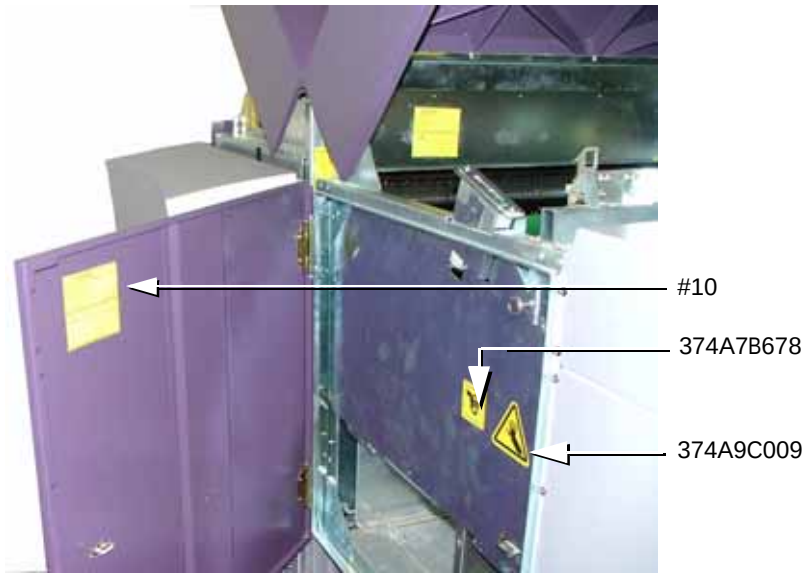


Figure 14: MCU left side door open



Figure 15: MCU right side view, right and upper doors open, right panel removed

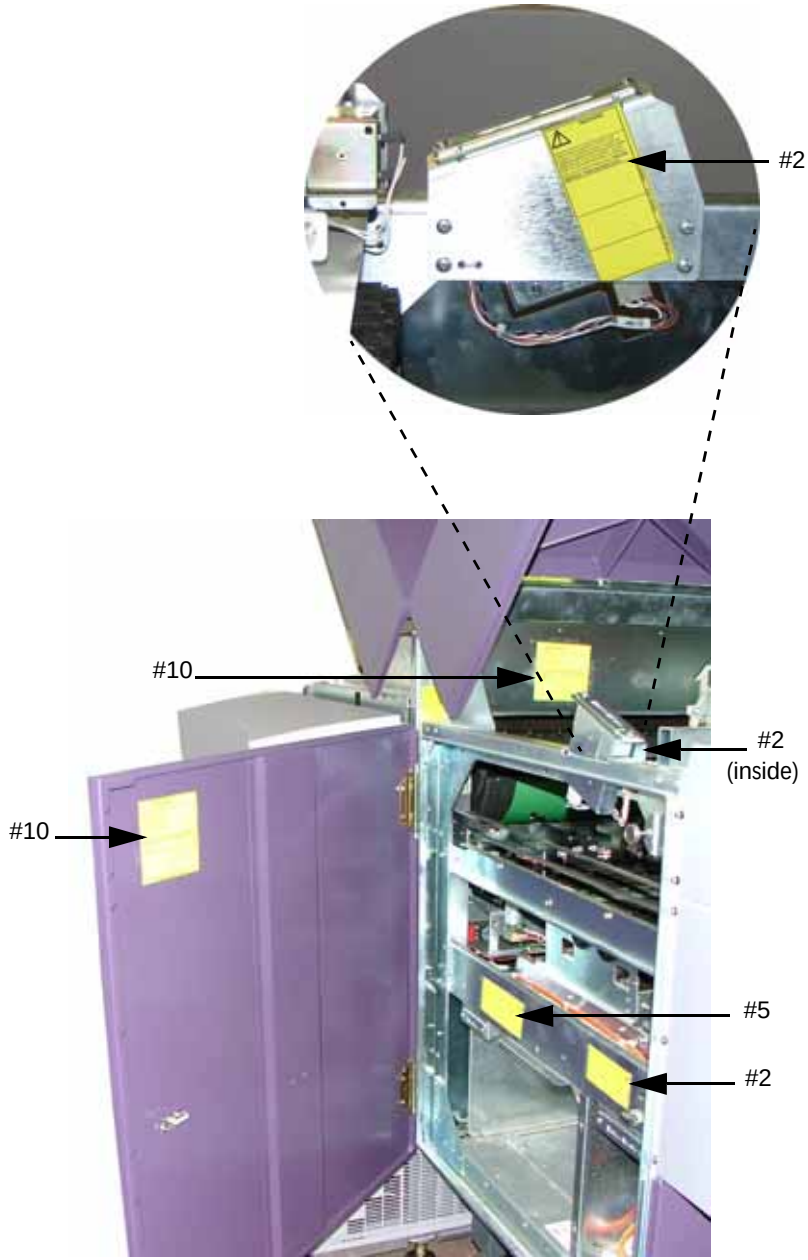


Figure 16: MCU, left side and upper doors open, internal left panel removed