Safety Precautions for Engineers

Lotem 400 Quantum

DRAFT

761-00006A-EN
Internal 731-XXXXXA-EN Rev A

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	

Creo Inc.
3700 Gilmore Way
Burnaby, B.C., Canada
V5G 4M1
Tel: +1.604.451.2700
Fax: +1.604.437.9891

http://www.creo.com

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Safety Precautions for Engineers

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Introduction

Read the following safety precautions carefully before installing, operating, servicing or maintaining the Lotem 400 Quantum Family platesetter.

Extensive means were taken in the design and manufacturing of the platesetter to eliminate the hazards to users and service personnel.

Follow the instructions in this chapter to ensure your safety and the safety of others when installing and servicing the platesetter.

These instructions are also required for the user's safety. Read the user laser and safety precautions for the Lotem 400 Quantum platesetter, an indispensable part of the service engineer's precautions. See *Lotem 400 Quantum Family Safety Precautions for User,* 399Z1R515B.

The Lotem 400 Quantum platesetter is a **Class 1** laser product, according to IEC825-1 and USA 21 CFR 1040. This implies that there is no hazardous laser radiation, providing that the user and service safety precautions are followed.

Before Beginning Service on the Platesetter

- Post the following sign close to the keyboard and close to the platesetter: CAUTION: machine in service – do not operate.
- Remove any piece of clothing or object that may get caught in the revolving drum or in any other moving part of the platesetter. For example, remove ties, roll up long sleeves, remove rings and bracelets, and gather long hair.
- Remove jewelry, wristwatches and any reflective objects from your hands, wrists and shirt, and 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

- Only authorized service personnel should install and service the platesetter.
- Whenever possible, turn off the platesetter before performing service, as described in the *Power and Electrical Connections* section.
- For emergency shutdown, push one of the yellow on/off pushbuttons located on both sides of the rear panel near the plate exit. When either button is **off**, mechanical hazards are neutralized but the fans are not disconnected.



WARNING: Injury hazard! The drum does not stop rotating immediately when an on/off pushbutton is pressed or main power circuit breaker is activated.

- Never operate the laser thermal head unless it is properly installed inside the platesetter.
- Never electrically connect the laser thermal head unless it is properly installed inside the platesetter.
- **Never defeat any write laser interlock**.
- Take appropriate precautions before defeating the laser focus and motor interlock switches. Defeat these switches **only** when no alternative service option is possible.
- If there is any doubt regarding the proper functioning of the laser interlock system, turn the platesetter **off** and do **not** turn it on again until it is checked and found to be OK.
- If you suspect that the platesetter protective cover or barrier is broken, cracked or otherwise damaged, turn the platesetter **off** and do **not** turn it on again until it is checked and found to be OK.
- Use an anti-static belt when handling electronic boards.

Power and Electrical Connections

Overview

The total power consumed by your system depends on the specific site configuration. (See the *Lotem 400 Family / Lotem 400 Quantum Family Site Preparation Guidelines*, 707-00144A-EN.)

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

- Rating—200-240 Vac.
- Line voltage
  - ❒ Two-phase supply in a 120V 25A configuration
  - ❒ One-phase and neutral in a 230V 25A configuration
- Supply frequency—50/60 Hz ±2%.
- Power line connections **MUST** include three pins: two phases and one safety ground.



WARNING: Hazard of fatal electric shock if safety ground is not provided!

- The cable connector (male, 3-pin: 2 phases and safety ground) is supplied with the platesetter.
- Three power supply connections for the digital front end, digital front end monitor and the Lotem Controller monitor:
  120V +6% -10% or 230V ±10%, 16A.
- An additional isolated single-phase outlet for service purposes is required.
- Additional power is required for the processor, pre-heat ovens, and baking ovens.

Disconnecting the Platesetter from the Main Power Supply

Whenever possible, turn off the platesetter before performing service. To totally disconnect the platesetter from the main power supply, set the main power circuit breaker switch to "0"), or unplug the main power cable from the power connector.

Circuit breakers locations

- Main power
  - ❒ Two on/off pushbuttons—rear panel
  - ❒ Switch—distribution box
- Drum power—distribution box
- Drum vacuum pump—distribution box
- Electronic box—electronic box

Precautions

- When the platesetter is switched off, use the metal bar attached near the main switch to prevent you from accidentally switching it to on position.
- Before dismantling any board or power supply, shut down the main power circuit breaker on the distribution box.
- Whenever adjusting or checking an electrical board/unit, verify that you are using the correct test point.
- Whenever adjusting or checking an electrical board/unit, never touch any unit with bare hands. Use an anti-static belt.

Laser Safety

Even brief exposure of the eyes to the laser radiation or beam, or its reflections from shiny or matte objects, may cause permanent loss of eyesight or permanent damage to eyesight ! The laser beam and radiation of the platesetter contain invisible and visible components. Both are hazardous to the eye and skin. In the presence of flammable material, the laser beam is also a fire hazard!



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



DANGER: The above **CAUTION** note must be included in this manual according to USA 21CFR regulations. However, the hazards involved include not moderate, but **SERIOUS** bodily injury - especially to the eye!

This section includes the following topics:

- Avoiding laser exposure
- Thermal imaging head
- Enclosures
- Safety interlocks
- Warning labels



WARNING: Before entering the room where the platesetter is located when the platesetter is on, if you suspect that any of the following precautions were violated, **disconnect** the power supply to the platesetter !

Avoiding Laser Exposure

The platesetter is equipped with a **highly hazardous laser system** that exposes the media. However, the platesetter as a whole is a **Class 1 laser product**, compliant with laser safety requirements IEC825-1 and USA 21 CFR 1040. This implies that the operator and service engineer cannot access hazardous laser radiation, providing that the user and service safety precautions are followed.

- Never operate or electrically connect the laser thermal head unless it is properly installed inside the platesetter.
- Keep all external doors and internal protective barriers of the platesetter complete, unharmed and intact.

- **Never defeat the write laser interlock switches.**
- Motor or focus interlock switches may be defeated following safety instructions.
- Never leave any object between the laser thermal head and the drum.
- Do not operate the platesetter if there is any doubt regarding any of the above precautions.

Thermal Imaging Head

The Lotem 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)

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 feflections from shiny or matte objects, may cause permanent loss or permanent degradation of eyesight.

Precautions

- Never defeat the **write laser** interlocks.
- Do not operate the thermal imaging head outside the platesetter.
- Do not operate the thermal imaging head with any doors or panels open.
- Do not bypass any of the laser safety mechanisms.

Auto Focus Laser

The **auto focus laser** beam is visible (red, class IIIB, approx. 670 nm). The laser radiation can cause permanent damage to eyesight if reflected directly or indirectly into the eye.



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 defeated only by authorized service personnel, and only for the purpose of focus alignment.

Precautions

- Ensure that anyone else staying in the room while the platesetter's interlocks are defeated also follows these safety instructions.
- Never leave the platesetter while the interlocks are defeated.
- Stand so 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 screen.

To defeat the auto focus laser

1. To defeat the mechanical interlock system, insert the mechanical interlock cheater.



CAUTION: Beware of mechanical hazards when the mechanical interlock is defeated.

2. Before inserting the 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.



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

Enclosures

Together with the laser interlock system, the platesetter enclosures are designed to protect anyone in the platesetter vicinity from exposure to the laser radiation by enclosing the laser radiation within the platesetter.

The enclosures include the external doors and panels, and the internal protective barriers. The internal protective barriers prevent the laser radiation from escaping through the platesetter loading/unloading openings and through the ventilation openings on the side doors or lower panels. The outer enclosure and the internal protective barriers must be assembled correctly and completely to ensure protection.



WARNING: If the platesetter is ON and the enclosure is damaged or incomplete, even with the doors closed, visible or 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 loss or permanent damage to eyesight.**

Precautions

- When opening the two upper doors, keep your head away from the doors, as the opening of the two upper doors is controlled by a spring loaded mechanism.
- After performing any service activity, and before switching on the platesetter, check and ensure that all external and internal enclosures are complete, properly assembled, and are not broken or cracked.

Safety Interlocks

Safety interlocks provide the main protection against the severe laser and mechanical hazards of the platesetter, providing that you carefully follow all the safety precautions detailed in this chapter.

All doors on the platesetter and the rear panel have interlock switches that are designed to disconnect power from the laser system (write and focus), drum motor and other motor under the following conditions:

- The upper, left or right doors are open
- The left or right MCU internal covers are open
- The rear panel is removed
- The front door is open or the MCU (automatic loader) is dissasembled from the platesetter

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



WARNING: If a door or panel is open and the interlock switch is defeated, 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**.

The service engineer is allowed to defeat the motors and auto focus laser interlock switches only after taking appropriate safety measures. (See *To defeat the auto focus laser* on page 8.)

Precautions

- Never leave the platesetter while an interlock switch is defeated.
- If a side door or rear panel is open, keep one of the upper doors open.
- When you open any door, wait a few seconds before accessing the inside of the platesetter, as it may take up to two seconds for the laser interlock system to shut off the laser sources.
- Never defeat any of the write laser interlock switches.
- If you must defeat the focus or motor interlocks, use **only** the dedicated cheaters (Creo No. 290B8L064) that are supplied for Lotem 400 Quantum service. Using any other interlock cheater is **unsafe** and **forbidden**.

Platesetter Interlock Locations

Interlock location	Description of interlock switches	Defeat allowances for serviceman only
Upper front door (loading)	2 interlock switches	None
Lower front panel	1 interlock switch	None
Upper rear cover	2 interlock switches 1 motor and focus laser defeater 1 focus laser defeater	1 motor and focus laser defeater MCU covers require a motor interlock defeater for each cover 1 focus laser defeater
Rear panel	1 interlock switch	None
Left platesetter door	1 interlock switch	None
Right platesetter door	1 interlock switch	None



Note: In the above table, front side refers to the loading side of the platesetter. Rear side refers to unloading side of the platesetter. Upper doors may also be referred to as upper covers.

MCU Interlock Locations

Interlock Location	Description of interlock Switches	Defeat allowances for serviceman only
Left internal cover	2 laser interlock switches 1 motor interlock switch	1 motor interlock switch
Right internal cover	2 laser interlock switches 1 motor interlock switch	1 motor interlock switch
MCU upper cover	2 laser interlock switches 1 motor interlock switch	1 motor interlock switch
Counterparts of upper platesetter front door (loading side) on MCU	2 interlock switches (same as upper front door (loading) on platesetter)	None



WARNING: The **write laser** interlock system is equipped with a **buzzer**. If a failure is detected in the operation of the write laser interlock system, the buzzer is activated and the write laser is shut off. However, not every failure can be detected, especially failure of a single interlock switch.

Drum

The drum inside the platesetter revolves at approximately **450** revolutions per minute. If an object hits the rotating drum, the object may cause damage (including damage to the safety system and laser thermal head), or force the upper doors to open, or penetrate through the doors. The revolving drum can cause serious injury to anyone near the platesetter unless the relevant safety precautions are observed.

Special safety precautions, including solenoids and an interlock system, prevent the drum from rotating while the upper doors are open. When you open the upper doors from the the Lotem Controller application, it activates the solenoids that release the upper door locks, thus enabling you to open the door. By this time, the drum must be almost stationary.



WARNING: After the door is unlocked, if it takes **more than 5 seconds** for the drum to become completely stationary, the machine must be repaired.

Precautions

- 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.
- Because of the potential danger of loose parts inside the platesetter, be sure to replace, reconnect or adjust any drum component according to the correct procedure.
- Do not leave any object, tool or part inside or on the platesetter enclosure.



WARNING: If you defeat the motor interlocks, all motors, including the drum motor, can work, and the drum can rotate. When you remove the defeater or push one of the two yellow pushbuttons, the drum continues to rotate at high speed for several minutes!

Vacuum Pump

The vacuum pump inside the platesetter contains a filtering device that extracts dust, fumes, contaminants and solvent vapors from the platesetter during normal operation.

The filter may be replaced only by the service engineer!



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

Cooling System

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

To prevent coolant leakage, the cooling system pump contains an 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: Electrical shock hazard and fire hazard are present if the coolant leaks and the platesetter is not turned off.

Precautions

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

Lithium Battery

The CPU board in the platesetter contains a Lithium battery. Since the incorrect replacement of the battery could cause an explosion, only qualified service personnel should replace the battery. Users must **not** replace the battery.



WARNING: Hazard of explosion if battery is incorrectly replaced

Precautions

- Verify that the replacement battery is the same or equivalent type recommended by the manufacturer.
- Follow the manufacturer's safety instructions provided with the battery.
- Dispose of the used batteries according to the manufacturer's instructions.

Warning Labels

This section contains the following topics:

- Non-English warning labels
- Warning labels displayed
- Platesetter warning label locations
- MCU warning label locations

Non-English Warning Labels

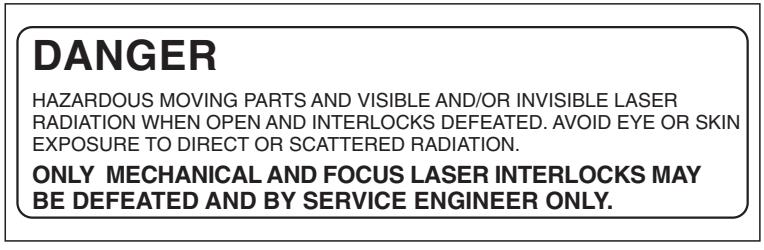
Translated warning labels are attached to the platesetter. Where a language other than English is spoken, during installation, stick the translated warning labels, in the relevant language, in their designated locations next to the English text.

Note: The catalog numbers for English labels contain the letter A. Labels in all other languages contain the letter K instead. For example, cat. no. 374A8L697 is the English label; cat. no. 374K8L697 is for all other languages.

Warning Labels Displayed

The following pages show the warning labels and their locations. The labels show the English catalog numbers..

Note: Labels with the same text but different shapes or sizes have different catalog numbers.



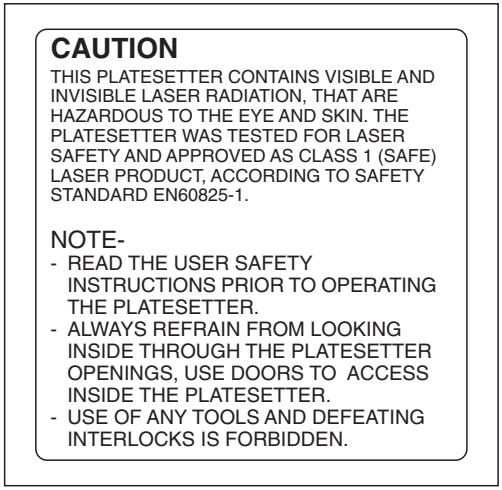
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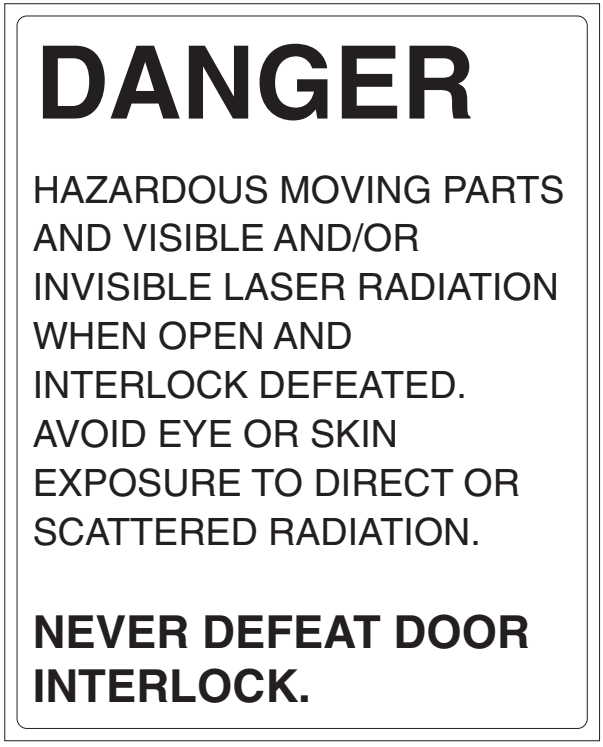
K6B002



K6B003



K6B006



K6B009



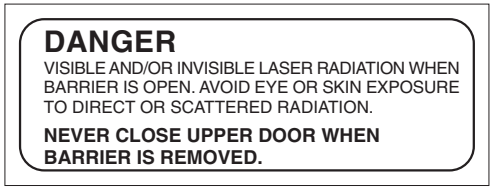
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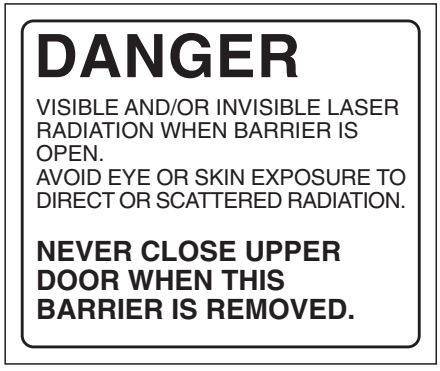
K6B012



K6B013



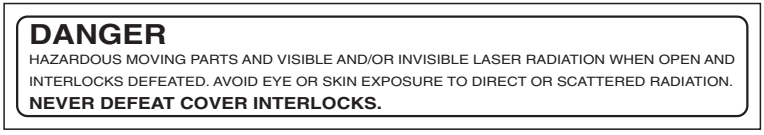
K6B014



K6B015



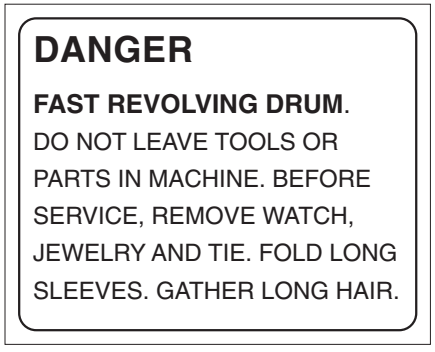
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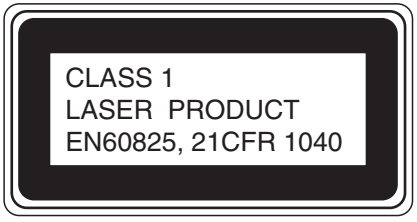
K6B891



K7L412A



K7L413



K2G957



K8L535



374A7B951 (374A30170)

SEE INSTALLATION INSTRUCTIONS BEFORE CONNECTING TO THE SUPPLY

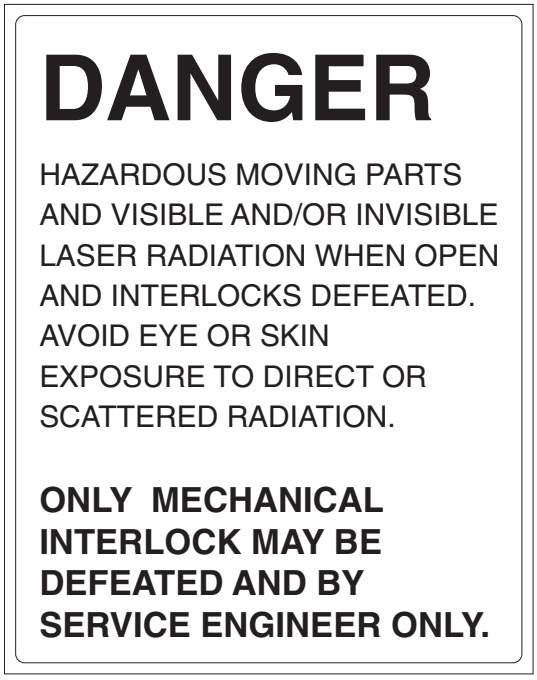
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37400011



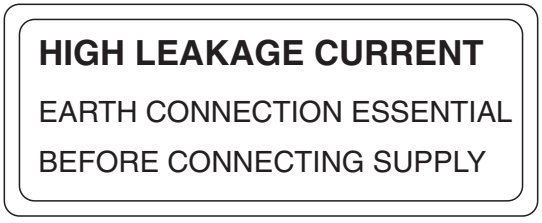
74A9C009



K7B154



K7L667



K2R605

Warning Label Locations

The following figures show the locations of the warning labels. Make sure that all warning labels are displayed properly, and renew warning labels if required.

WARNING: Some of these figures show protective panels and internal barriers removed. However, all protective covers and internal barriers **must be in place** before you operate the platesetter!

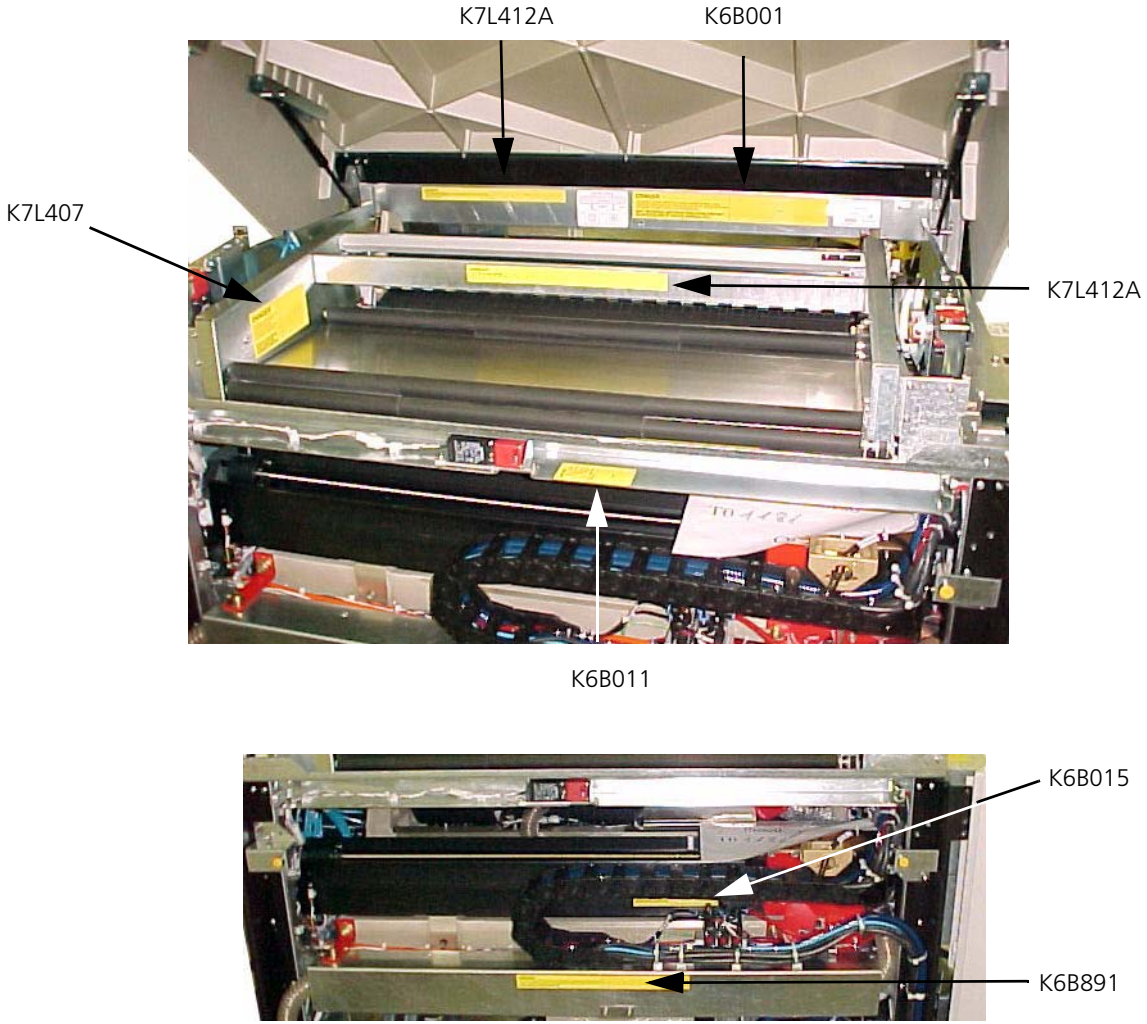


Figure 1. Platesetter rear view with unloading tray

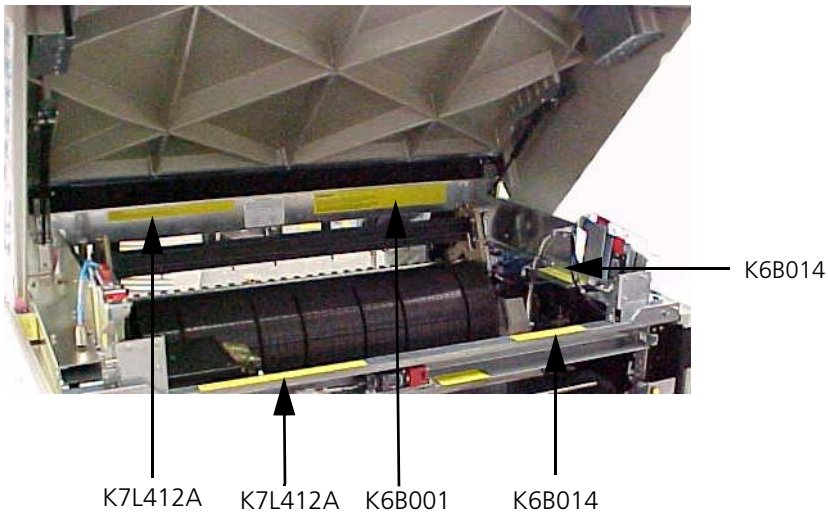


Figure 2: Platesetter rear view, top open

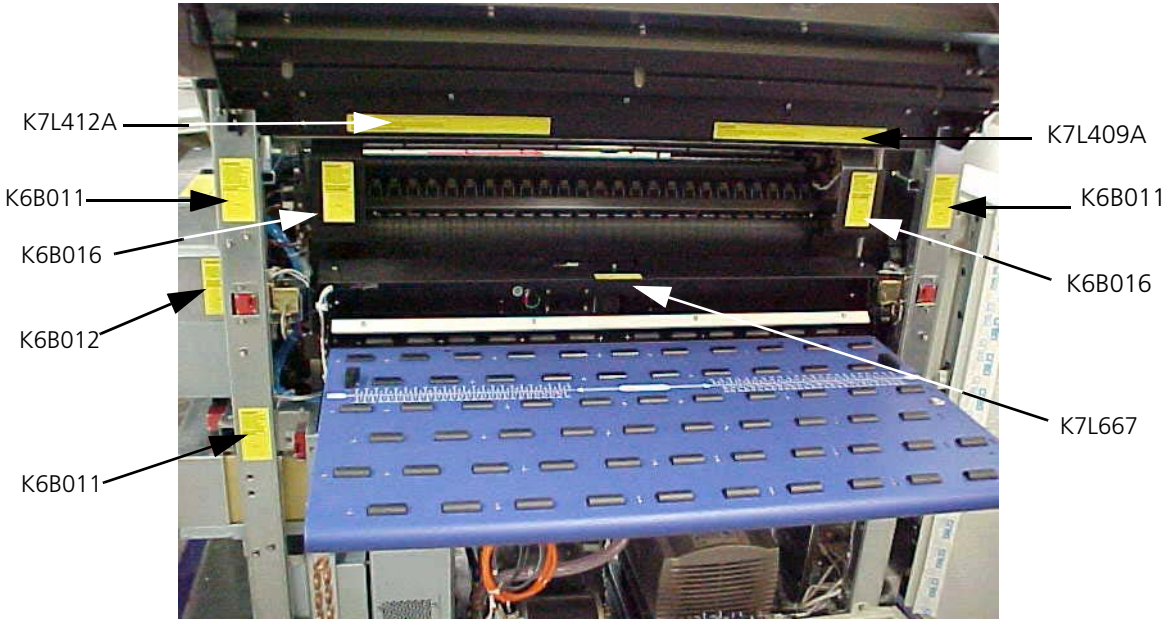


Figure 3: Platesetter front view with loading tray

WARNING: For Lotem 400 configuration without MCU, the protective laser barriers, with label K6B016, must be installed on both sides of the drum as shown in Figure 3. If the machine arrives without the left protective laser barrier installed, you must install the barrier with the label before connecting the machine to the electrical power supply.

Note: The Lotem 400 configuration without MCU has an additional interlock for the lower front panel. The corresponding label is K6B011.

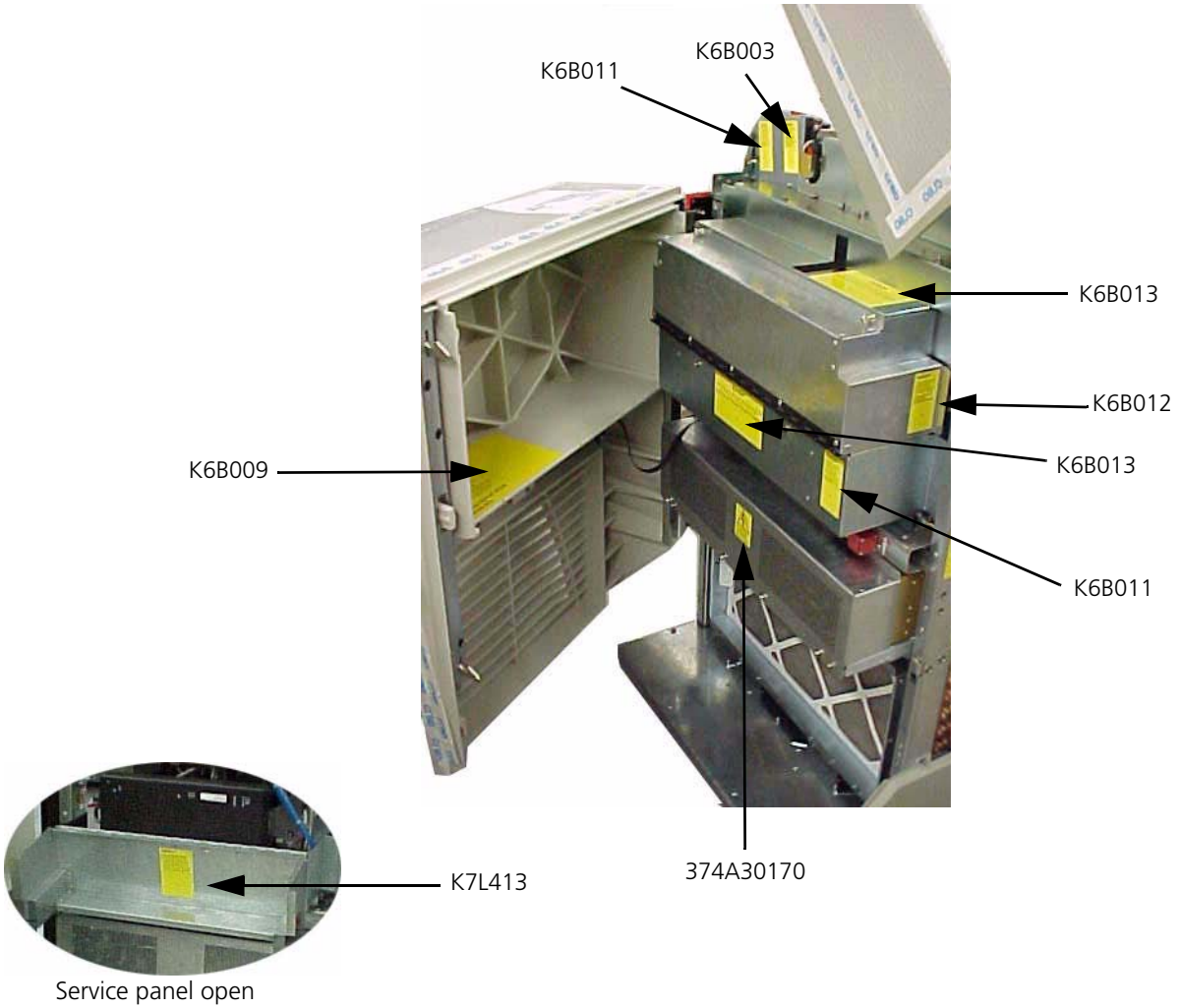


Figure 4: Platesetter left side door open (electrical protective panel removed)

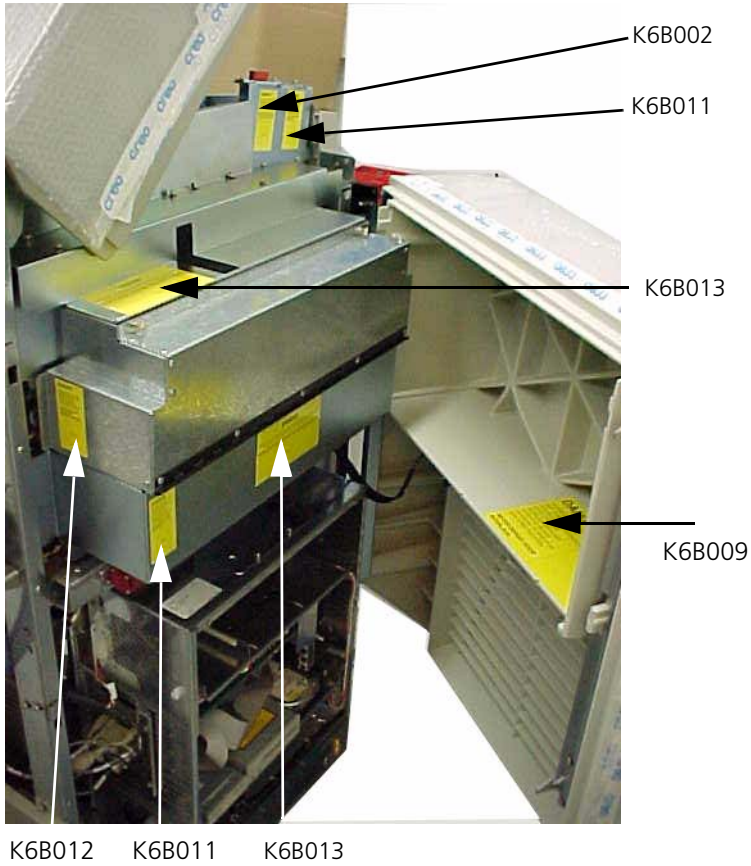


Figure 5: Platesetter right side door open

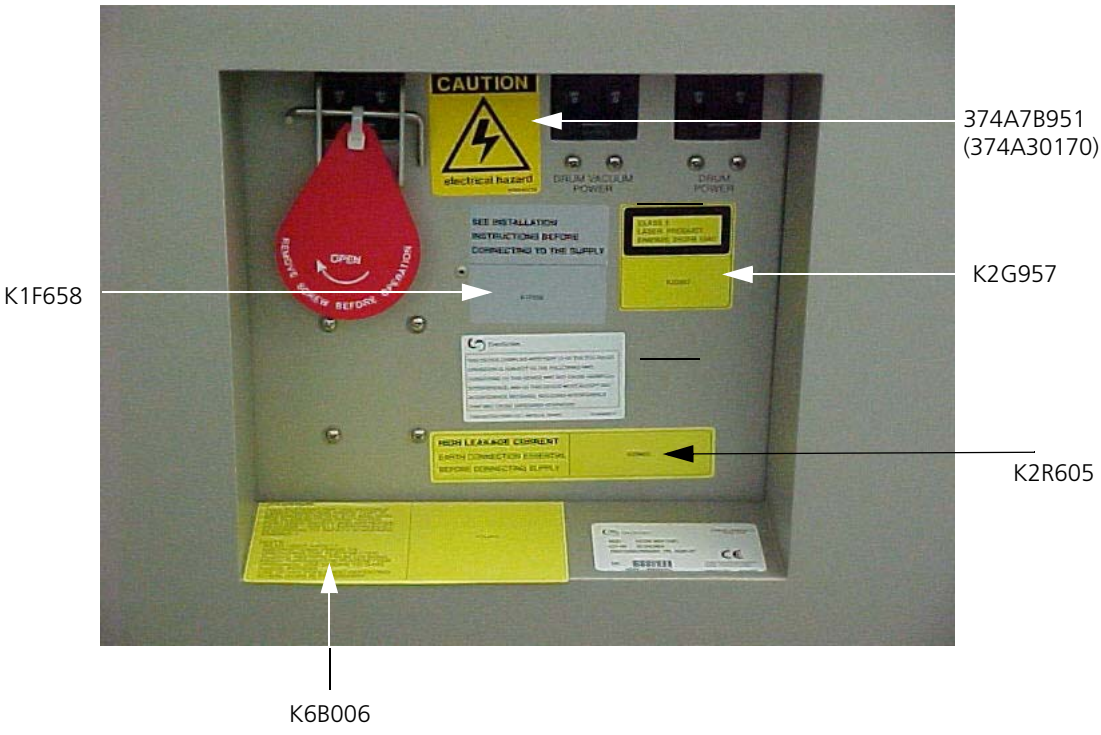


Figure 6: Distribution box

MCU Warning Label Locations



Figure 7: Lotem 400 Quantum with MCU (automatic loader)

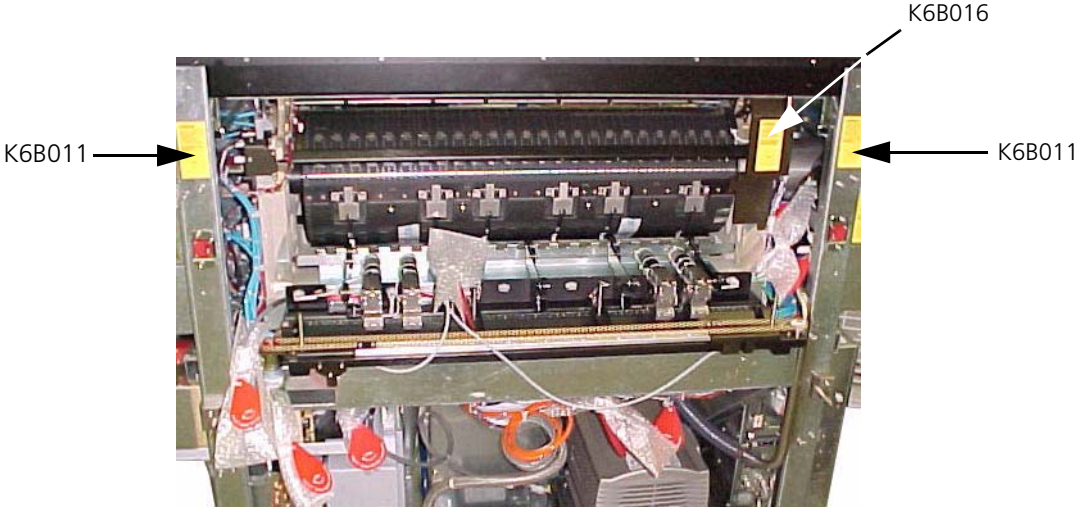


Figure 8: Platesetter rear view, right side door open (MCU ready)

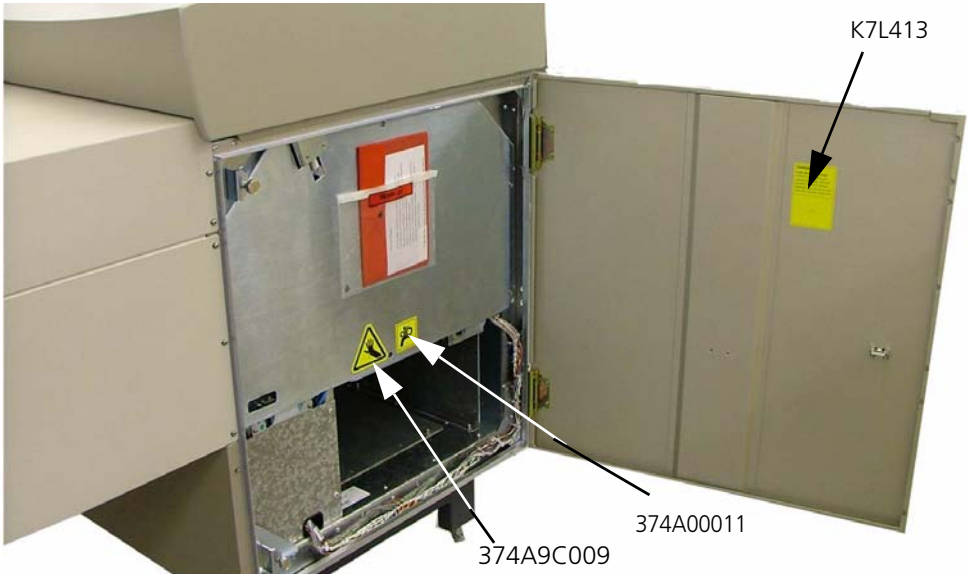


Figure 9: MCU left side door open

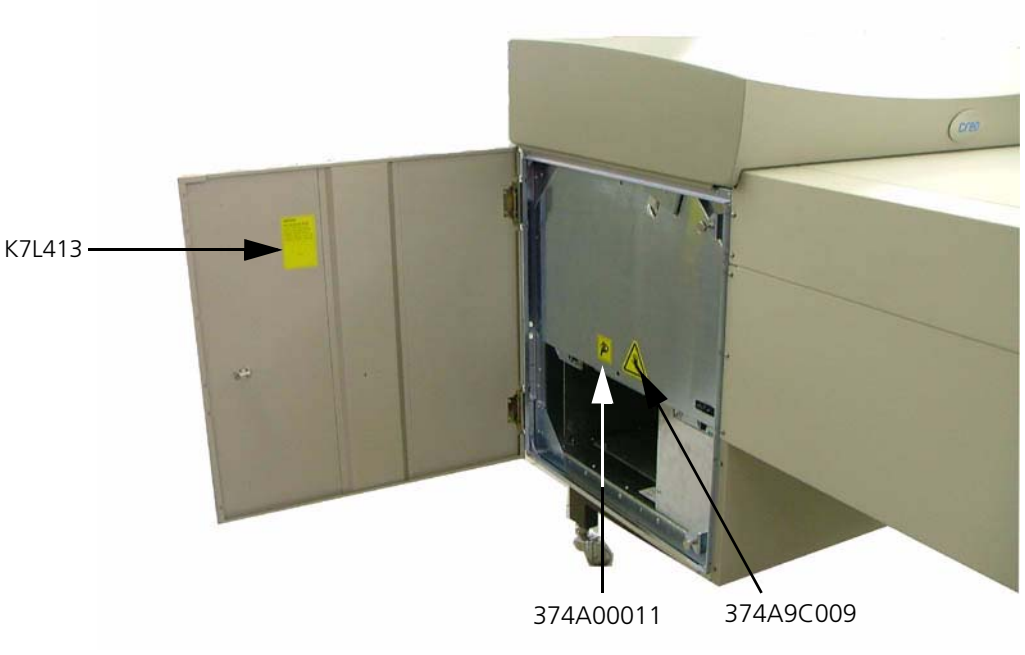


Figure 10: MCU right side door open

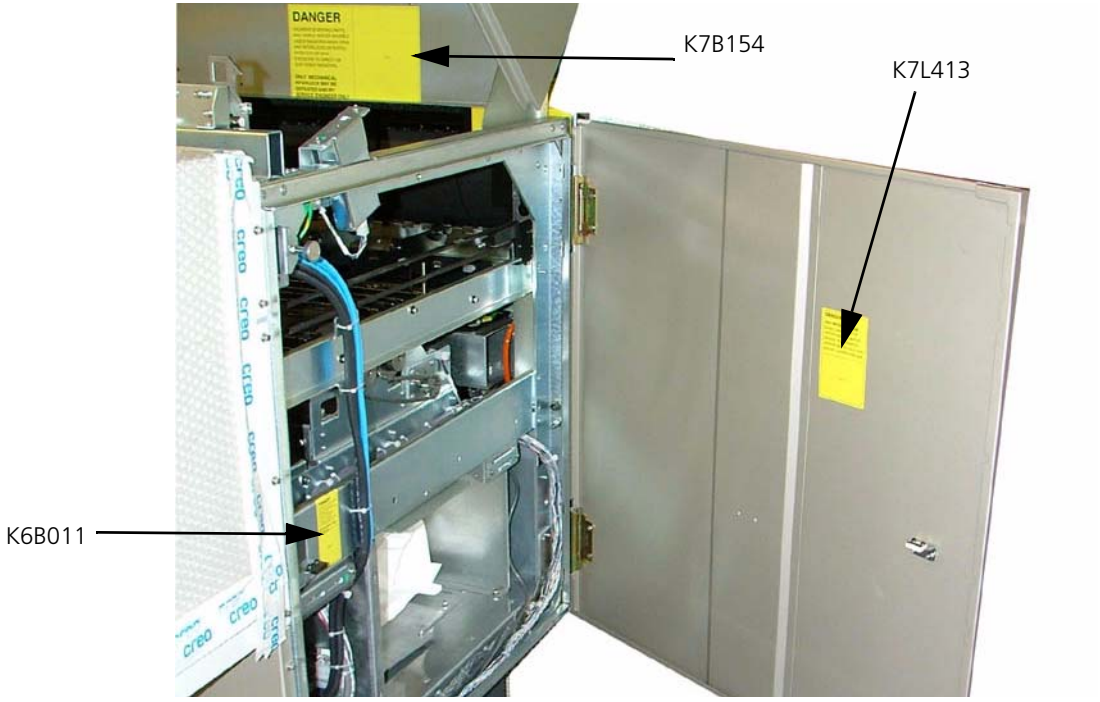


Figure 11: MCU right side view, right and upper doors open, internal right panel removed

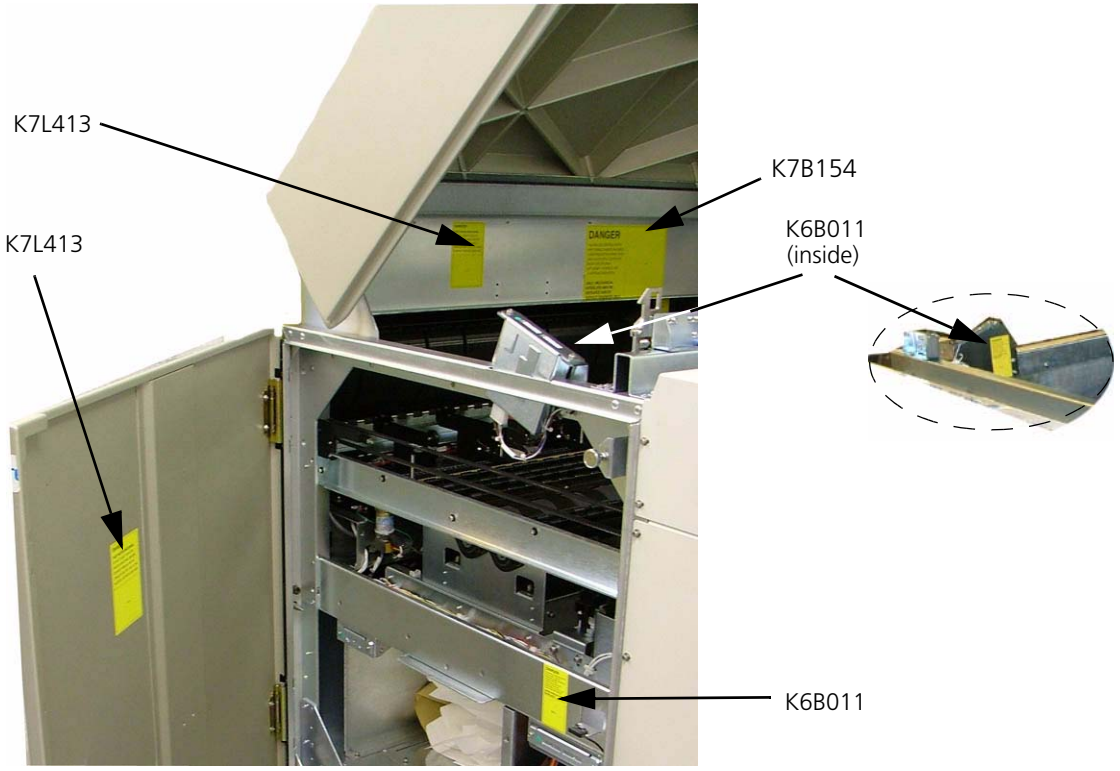


Figure 12: MCU, left side and upper doors open, internal left panel removed