Service Manual

for the

KODAK Point-of-Care CR 360 System

 Important

- Qualified service personnel must install this modification.

- See the Service Portal for possible updates before doing this modification.

- When doing the procedures in this document, you must use safe work practices and wear the correct personal protective equipment (for example, safety eyewear) according to your company's standard operating procedures.

Carestream
H E A L T H

None

KODAK Point-of-Care CR 360 System Service Manual

Publication Number: 6H4869

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Use of Manual

The KODAK Point-of-Care CR 360 System is designed to meet international safety and performance standards. Personnel operating the unit must have a thorough understanding of the proper operation of the system. This manual has been prepared to aid medical and technical personnel to understand and operate the system. Do not operate the system before reading this manual and gaining a clear understanding of the operation of the system. If any part of this manual is not clear, please contact your Carestream Health representative for clarification.

Authorized European Representative

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Section 1: Safety and Regulatory Information

Introduction

The information contained herein is based on the experience and knowledge relating to the subject matter gained by Carestream Health prior to publication. No patent license is granted by this information.

Carestream Health reserves the right to change this information without notice, and makes no warranty, express or implied, with respect to this information. Carestream Health shall not be liable for any loss or damage, including consequential or special damages, resulting from any use of this information, even if loss or damage is caused by Carestream Health's negligence or other fault.

⚠ Caution

Cautions point out procedures that you must follow precisely to avoid damage to the system or any of its components, yourself or others, loss of data or corruption of files in software applications.

▷ Note

Notes provide additional information, such as expanded explanations, hints, or reminders.

✳ Important

Importants highlight critical policy information that affects how you use this guide and this product.

General Safety Guidelines

- This product was designed and manufactured to ensure maximum safety of operation. Operate and maintain it in strict compliance with the safety precautions and operating instructions contained in this guide.
- This product meets all the safety requirements applicable to medical equipment. However, anyone attempting to operate the system must be fully aware of potential safety hazards.
- There are no user serviceable parts in this system. The product must be installed, maintained, and serviced by qualified service personnel according to procedures and preventive maintenance schedules in the product service manual. If your product does not operate as expected, contact your Service Representative.
- The product in whole or in part shall not be modified in any way without prior written approval from Carestream Health, Inc.
- Personnel operating and maintaining this system should receive training and be familiar with all aspects of operation and maintenance.
- To ensure safety, read all user guides carefully before using the system and observe all Cautions, Importants, and Notes located throughout the guide.
- Keep this guide with the equipment. Reading this guide does not qualify you to operate, test, or calibrate this system.
- Unauthorized personnel shall not be allowed access to the system.
- If the product does not operate properly or fails to respond to the controls as described in this guide:
    - Follow the safety precautions as specified in this guide.
    - Stop using the system and prevent any changes to it.
    - Immediately contact the service office, report the problem, and await further instructions.
- Use only legally marketed cassettes. Periodically check the quality of the cassettes, and replace if any defects are apparent.
- The images provided by this system are intended as tools for the trained user. They are explicitly not to be regarded as a sole incontrovertible basis for clinical diagnosis.
- Be aware of the product specifications and of system accuracy and stability limitations. Consider these limitations before making a decision based on quantitative values. If you have any doubts, consult the Sales Representative.
- This system is Class I continuous operated stationary equipment without applied parts and has one signal input/ output part.

Electrical Hazards

⚠️ **Caution**

- Do not remove or open system covers or plugs. Internal circuits use high voltage capable of causing serious injury.

- Fuses blown within 36 hours of being replaced by a qualified technician may indicate malfunctioning electrical circuits within the system. Have the system checked by qualified service personnel. Do not attempt to replace any fuse.

- Fluids that seep into the active circuit components of the system may cause short circuits that can result in electrical fires. Therefore, do not place any liquid or food on any part of the system.

Explosion and Implosion Hazards

⚠️ **Caution**

- Do not operate the equipment in the presence of explosive liquids, vapors, or gases.

- Do not plug in or turn on the system if hazardous substances are detected in the environment. If these substances are detected after the system has been turned on, do not attempt to turn off the unit or unplug it. Evacuate and ventilate the area before turning off the system.

Overheating

Do not block the air circulation around the scanner. Always maintain at least 6 inches (15 cm) clearance around the scanner to prevent overheating and damage to the system.

Laser Safety Instructions

- During nominal operation, the unit is closed and sealed with a protective cover for safety reasons.

- During nominal operation, the cover should not be removed. Removing of the cover shall be done only for service purposes, and by a qualified technician for service operations.

- Service operations that do not require the laser should be done without activating the laser unit. Switching OFF the DIP switch on the laser board will disconnect the power supply to the laser, and deactivate the laser unit for service operations.

- In case the laser must be operated during service operation, the service technician shall make sure that the optical unit is located within the scanner drum, where the laser beam is blocked.

⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in . If the laser must be activated during the service procedure, wear protective safety glasses at all times. The required laser safety eyewear must be intended for HeliumNeon/PDT lasers, have an optical density of 4-5 wavelengths of 610-695 nm, and be marked as having CE approval.

Recycling the Unit

	In the European Union, this symbol indicates that when the last user wishes to discard this product, it must be sent to appropriate facilities for recovery and recycling.

Contact your local Carestream Health representative or refer to http://recycle.carestreamhealth.com for additional information on the collection and recovery programs available for this product.

Labelling Summary

Safety Labels		Consignes de Sécurité
	Laser Laser-emitting product	Laser Appareil émetant de laser
	Class 3B laser product inside scanner	Rayonnement de laser évitez l'exposition au faisceau laser de la classe 3B. Appareil à laser de classe 3B a l'intérieur du scanner.
	High voltage	Haut voltage
	Chassis ground stud	Point de mise en terre du chassis
	Attention: Consult accompanying documents	Attention: consulter les documents joints

IEC Symbols Used

The system may have labels with one or more of the following symbols. These symbols indicate the IEC standards to which the system conforms.

	Warning, Caution – consult accompanying documents
	Protective ground points
	Power ON
	Power OFF
	Caution – Electrical shock hazard

Device-specific Safety Information

Safety Information		Consignes de Sécurité
	LIFTING HAZARD The KODAK Point-of-Care CR 360 scanner weighs 39 kg (86 lb). Do not try to lift the scanner by yourself. Always seek assistance from another person. Lifting equipment that is too heavy may result in injury to personnel and/or damage to the scanner.	DANGER POIDS LOURD Le scanner KODAK Point-of-Care CR 360 pèse 39 kg (86 lb). N'essayez pas de porter le scanner par vous-même. Demandez toujours de l'aide d'une autre personne. Porter un équipement trop lourd peut provoquer des dommages physiques et/ou endommager le matériel.
	WARNING The KODAK Point-of-Care CR 360 scanner is a CLASS 1 Laser product. • Do not remove the scanner cover. • Cover removal shall be done only by authorized service personnel!	ATTENTION Le scanner KODAK Point-of-Care CR 360 est un produit laser de la Classe 1. • Ne pas retirer le couvercle du scanner. • Le retrait du couvercle doit s'effectuer uniquement par un personnel compétent.

Regulatory Information

Introduction

This product conforms to the following safety standards: IEC 601–1 Medical Electrical Equipment General Requirements for Safety, EN60601–1–2 Medical Electrical Equipment Electro-Magnetic Compatibility Requirements and Tests, IEC 60825-1 Safety of Laser Products.

This device complies with 21CFR 1040.10.

CE Conformity

This product conforms to the requirements of council directive 93/42/EEC. The KODAK Point-of-Care CR 360 is a Class I medical device. The KODAK Point-of-Care CR 360 bears the following mark of conformity:

The name and address of the CE representative appears on the back of the front page of this manual.

USA Regulations

The FDA cleared the system for sale in the USA.

⚠ Caution

Federal US law restricts this device for sale by or on the order of a physician.

Section 2: System Description

Introduction

Throughout this manual the KODAK Point-of-Care CR 360 System will be referred to as the Point-of-Care CR 360.

The Point-of-Care CR 360 is designed for the reading of phosphor X-ray screens (CR) by medical professionals.

The system consists of the Point-of-Care CR 360 scanner and the software package that includes:

- The KODAK QC Software that operates the scanner.
- An image viewing and archiving software package that supports the DICOM 3.1 standard and was approved by Carestream Health.
- The system features 8 x 10 in., 10 x 12 in., 14 x 17 in., 9.5 x 9.5 in., 11 x 14 in., 14 x 14 in., 14 x 33 cm, 24 x 30 cm, and 15 x 30 cm digital image reading and viewing archive.

> **Note**

Throughout this manual *Front* of the unit refers to the side where the cassettes are inserted. *Right* and *Left* are as viewed when facing the front of the unit.

Operational Principles

The Point-of-Care CR 360 is a digital imaging system for image acquisition and processing of static projection radiography that uses a phosphor screen with energy storage capability as an X-ray image receptor.

After exposure, a laser beam, which stimulates luminescence proportional to the local X-ray exposure, reads the screen. The luminescence signal is digitized. The data is then subjected to digital image processing.

The Point-of-Care CR 360 enables the user to read a screen quickly, and then erase it to be ready for the next scan. The scanner is compact and easy to use.

Using the Point-of-Care CR 360 enables medical professionals to "go digital" without changing their work practices or X-ray equipment.

System Overview

Component Names and Descriptions

Part Name	Description
Controller Board	The controller board is the main board on the scanner. The controller board connects the scanner to the host PC workstation via the USB port. The controller board runs the firmware, and receives operational commands from the host PC workstation via the USB cable, and transforms the commands to the appropriate scanner hardware commands. The controller board generates the +/- 15 Vac to the DPMT and the +/- 12 Vac to the IMCS. It builds the scanned images and sends them via the same USB cable to the PC workstation. The controller board serves as the link between all peripherals in the scanner (i.e., Erase lamp, IMCS, Laser Board, and DPMT)
Integrated Motion Control System (IMCS) Board	The motion (IMCS) board controls and drives the four motors: • Loader motor • Linear motor • Rotation motor • Roller drive motor The IMCS board receives feedback from the encoders and sensors. The sensor board is a plug-in board in the IMCS board.
Linear Slide Assembly	The linear slide assembly moves the optical head and PM assembly along the X-axis (slow scan) during the scan.
Optical Head Assembly	The optical head assembly includes the laser module and the rotation motor that rotates the laser tube and a mirror during scanning. The laser module's beam is reflected by the revolving mirror to different points on the phosphor screen inside of the drum. Simultaneously, the optical head travels along a linear axis, so the laser beam covers the full area of the screen one line at a time (fast scan). Another mirror collects and reflects the light returned from the screen to the PM assembly window.
Photo Multiplier Assembly (PM)	The photo multiplier (PM) tube collects the photons emitted from the screen and transforms the light into a current, which is then converted to voltage and digitized to pixel value by an ADC.
Roof Assembly and Tray Assembly	These two interconnected components receive and direct the cassette into position in preparation for loading into the drum.
Power Supply	The AC/DC power supply provides DC power to the scanner components.
Loader Stepper Assembly	The loader stepper assembly extracts the phosphor screen from the cassette in preparation for insertion into the drum, and assists in inserting the phosphor screen into the cassette. It is powered by the loader motor which works in an open loop (no encoder).
Roller Drive Motor Sub-System	The roller drive motor pulls the phosphor screen, when loading the phosphor screen into the drum, and pulls the phosphor screen back into the cassette when unloading the phosphor screen back into the cassette. The roller motor has a closed loop control which enables you to change the motor speed and thus control the erase time.
Laser	The laser beam stimulates the phosphor screen.
Laser Board	The laser board activates the optical head assembly. The laser board receives rotation motor phases and laser power, and enables laser signals. It transfers the rotation motor encoder signals to the controller board.
Barcode Reader	The barcode reader reads the screen size after the cassette is inserted into the scanner and locked into place.
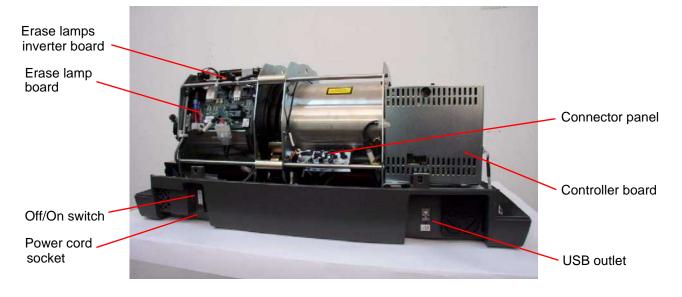
Part Name	Description
LED Indicator	The LED indicator indicates the scanner's main status such as **ready for scan, erasing,** and so on.
Erase Lamps Assembly	The erase lamps assembly brightly illuminates the phosphor screen after scanning, to erase the image so that the screen is ready to be used again.
Erase Lamps Inverter Board	The erase lamps inverter board converts the 21 VDC input to high voltage output which drives the erase lamps (CCFL tubes).
CCFL Board	The CCFL board monitors the erase lamps current (CCFL tubes) and the erase lamps assembly temperature.
Sensor Board	The sensor board is a plug-in board in the IMCS board.
Sensors	
Roller Motor Forward Limit Sensor (J502)	Forward limit sensor that stops the roller motor upon reaching the end of travel during screen loading.
Autoloop Sensor (J504)	Detects that the auto-loop mechanism is in activated position.
Left and Right Limit Sensors (J515/J516)	Left and right limit sensors indicate that the linear slide assembly has reached the end of its travel. The right limit sensor (J516) is Home position.
W0 Sensor (J511)	The W0 sensor determines the activation and deactivation of the rollers according to screen presence at the entrance to the drum.
Z0 Sensor (J505)	Detects the presence of the screen in the drum.
Loader Back Sensor (J508)	Back limit sensor that stops the roller motor when moving in a backwards direction.
Cover Safety Interlock Sensor (J510)	Detects presence of system cover. When the cover is not detected, the system motors, laser, and erase assembly will not work.
15x30 Sensor (J512)	Detects if the 15 x 30 in. dental adapter is installed.
Cassette In Place Sensor (J513)	Signals to the control system when the cassette is inserted and locked into the scanner.
Cassette Hold Sensor (J514)	Reverse limit sensor that stops the loader motor upon reaching the end of travel position in a forward direction.

Views of the Point-of-Care CR 360
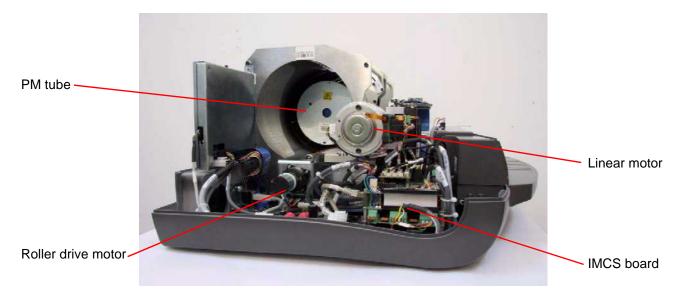
Scanner Front View

Drum

Laser board

Lead screw

Roof assembly

LED indicator

Tray assembly

Scanner Rear View

Erase lamps
inverter board

Erase lamp
board

Connector panel

Controller board

Off/On switch

Power cord
socket

USB outlet

Scanner Left View

PM tube

Linear motor

Roller drive motor

IMCS board

Scanner Right View

Laser unit

Power supply
unit
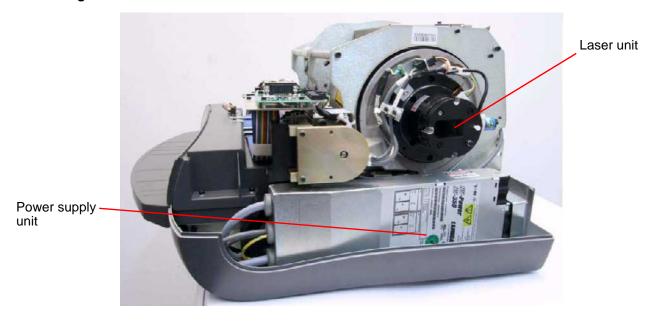
Component Description
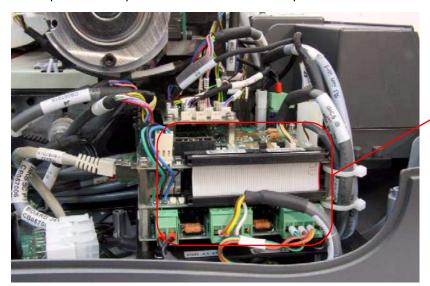
Power Line Filter Module

The power line filter module filters the AC supply to the scanner. The power inlet socket, ON-OFF switch, and two fuses are located on the module.

IMCS Board

The IMCS board is a module stacked in four layers. It comprises the motion board and the sensor board, which is on the top layer. The IMCS board controls all four scanner motors and is responsible for all scanner sequences: loading, scanning, erasing, unloading, and ejecting the cassette.

The motion board and sensor board can be replaced either separately or as a single component. The supplied replacement unit is an entire IMCS board assembly. If you need to replace one of these boards separately you must first separate the replacement board from the replacement unit.
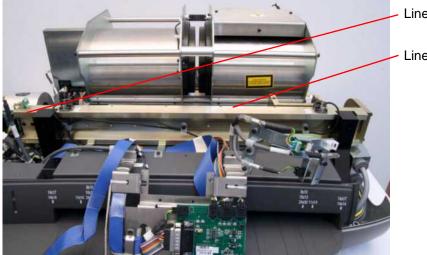
Motion board

Sensor Board Connectors	
J501	Reserved
J502	Roller Forward Sensor
J503	Reserved
J504	Loop Solenoid
J505	Screen Carriage Sensor (Z0)
J506	Reserved
J507	Reserved
J508	Loader Back Position
J510	Cover Sensor
J511	W0 Sensor
J512	15 x 30 Cassette Adapter Sensor
J513	Cassette Presence Sensor
J514	Cassette Hold Sensor
J515	Left Limit Sensor
J516	Right Limit Sensor (Home Sensor)
J517	Reserved
J519	Reserved

Linear Slide Assembly

Overview

The linear slide assembly moves the PM assembly and the laser within the drum to read the phosphor screen.

Linear motor
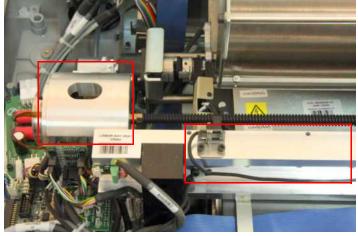
Linear screw

There are two replacement procedures for the linear slide assembly:
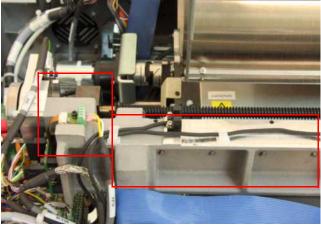
- Linear screw replacement. See Replacing the Linear Screw Type A on Page 48.
- Linear motor replacement. See Replacing the Linear Motor Type A on Page 54.

Two Types of Linear Screws

Type A   **Type B**
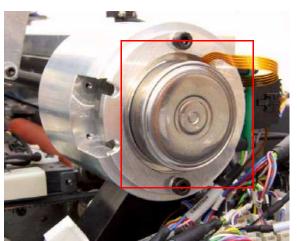
Linear Motor
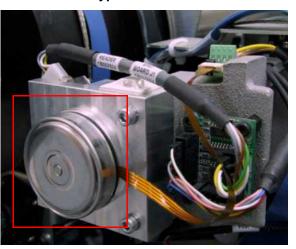
The linear motor operates the linear slide assembly.

Two Types of Linear Motors

Type A   Type B

Optical Head Assembly

The optical head assembly controls the laser module beam. The laser module beam emits the light to energize the phosphor screen.
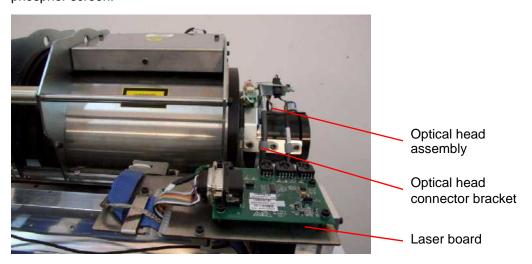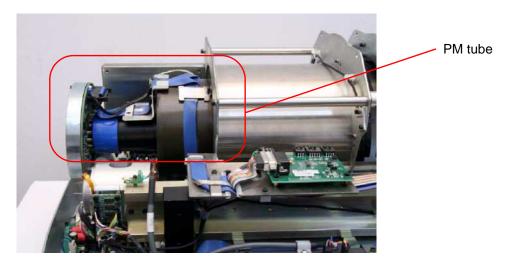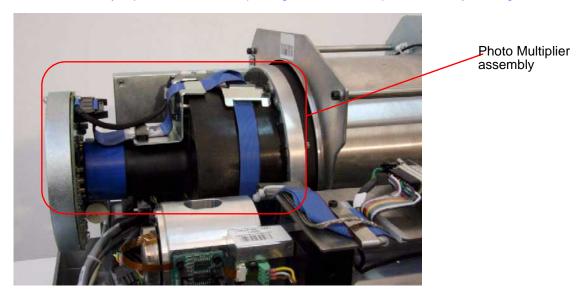
Optical head
assembly

Optical head
connector bracket

Laser board

Photo Multiplier Assembly (PM)

The photo multiplier (PM) tube collects the photons emitted from the screen.

PM tube
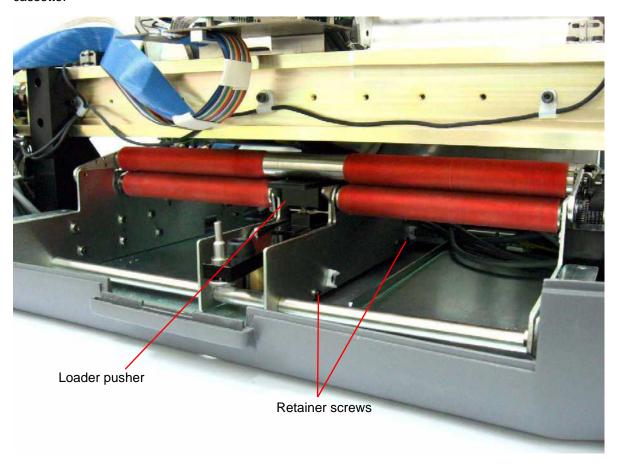
There are two replacement procedures for the photo multiplier:

- PM board replacement. See Replacing the Photo Multiplier Board on Page 39.
- PM assembly replacement. See Replacing the Photo Multiplier Assembly on Page 41.

Photo Multiplier assembly

Loader Stepper Assembly
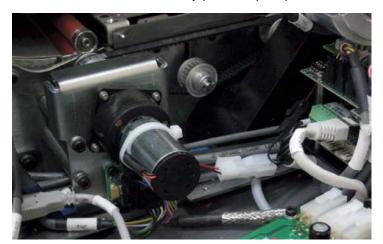
The loader stepper assembly extracts the screen from the cassette and assists in inserting the screen into the cassette.

Loader pusher

Retainer screws
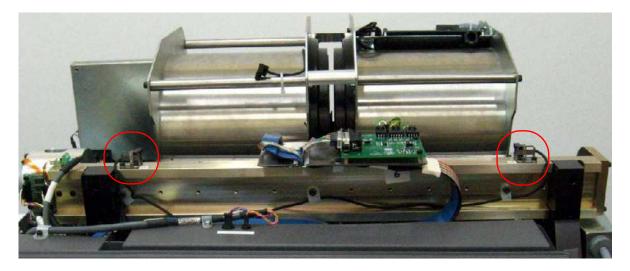
Roller Drive Motor Assembly

The roller drive motor assembly pulls the phosphor screen from the cassette into the drum.

Right and Left Limit Sensors

The right and left limit sensors control the maximum left/right (X-axis) movement of the linear motor of the PM mounted on the slide.

Section 3: Service Procedures

Service Tools

The following is a list of tools required for service operations:

- Phillips (cross-head) screwdriver (medium)

- Flat screwdriver

- Allen wrenches (metric): 0.89, 1.5, 2, 2.5, 3, 3.5, 4, 5

- Open-ended wrenches (metric): 5.5, 7

- Wire cutters

- Long-nose pliers

- Multi-meter / avo (DVM)

- Safety activation key (SK000100)

- Scanning head alignment gauge (SK000099)

- Trolley roller gauge (0.3 mm and 0.4 mm) (SK000024)

- Safety eyewear (The required laser safety eyewear must be intended for HeliumNeon/PDT lasers, have an optical density of 4-5 wavelengths of 610-695 nm, and be marked as having CE approval.)

Removing the Scanner Cover

[1] Switch OFF the scanner.

[2] With the system upright, pull the scanner to the edge of the table so that the front side is extended slightly over the table edge.

Scanner cover screws

[3] Remove the 2 scanner cover screws using a 5 mm Allen wrench.

[4] Remove the 2 scanner cover screws at the back of the scanner (one on each side) using a 5 mm Allen wrench.

[5] Lift off the cover.

Installing the Scanner Cover

[1] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser board DIP switch is switched ON.

[2] Install the scanner cover.

[3] Install the 4 scanner cover screws.

[4] Switch ON the scanner.

Activating the Scanner Without the Cover

Activation Procedures

⚠️ **Laser Warning**

Do not operate the unit while the laser is connected without proper eye protection. Safety glasses (see Laser Safety Instructions on Page 10) must be worn by all personnel in the area of the unit! Only authorized personnel may remove the cover. Before operating the unit without the cover, disconnect the laser (see Activating the Scanner Without the Cover (Laser Deactivated) on Page 26).
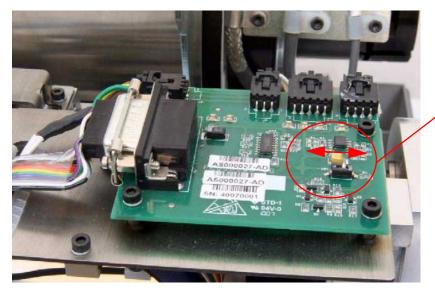
When the scanner cover is removed, the safety electrical interlock switch disconnects the erasing CCFL assembly, the laser, and all motors.

To activate the scanner without the cover, use the applicable procedure:

- If the laser is not needed. See Activating the Scanner Without the Cover (Laser Deactivated) on Page 26.

- If the laser is needed. See Activating the Scanner without the Cover (Laser Activated) on Page 27.
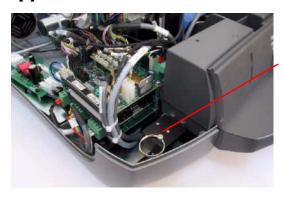
Activating the Scanner Without the Cover (Laser Deactivated)

Before Service Operations
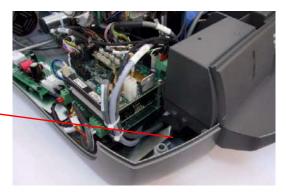
Laser board DIP switch

[1] Switch OFF the DIP switch on the laser board.

Activation key inserted

Activation key not inserted

[2] Insert the safety interlock activation key into the safety interlock to the left of the roof assembly.

[3] Switch ON the scanner and perform the necessary operations.

After Service Operations

After performing service operations, before installing the scanner cover:

[1] Switch OFF the scanner.

[2] Remove the safety interlock activation key from the safety interlock.

[3] Switch ON the DIP switch on the laser board.

Activating the Scanner without the Cover (Laser Activated)

Before Service Operations

⚠️ **Laser Warning**
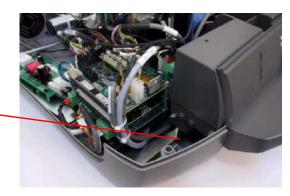
Refer to Laser Safety Instructions on Page 10.

Activation key inserted

Activation key not inserted

[1] Insert the safety interlock activation key into the safety interlock.

[2] Switch ON the scanner and perform the necessary operations.

[3] If the laser is no longer needed, switch OFF the DIP switch.

After Service Operations

After performing service operations, before installing the scanner cover:

[1] Switch OFF the scanner.

[2] Remove the safety interlock activation key from the safety interlock.

[3] If the DIP switch on the laser board is OFF, switch it ON.

Replacing the Power Line Filter Module

Tools Required

- Socket wrench
- 2.0 mm Allen wrench
- 2.5 mm Allen wrench
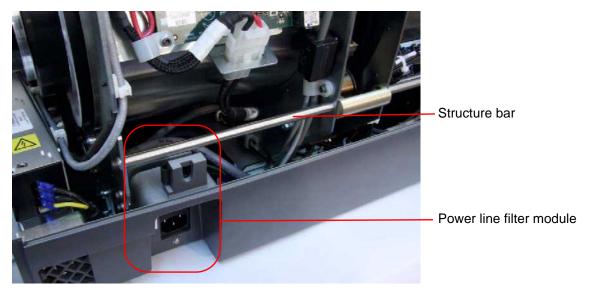
Removing the Power Line Filter Module

⚠ Laser Warning
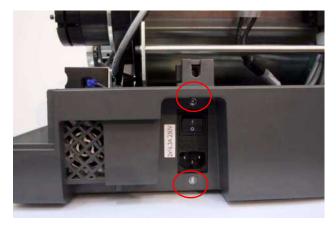
.Refer to Laser Safety Instructions on Page 10.
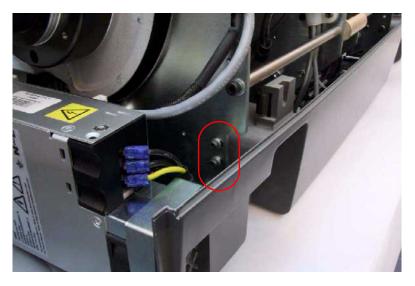
[1] Switch OFF the power and disconnect the power cable from the power inlet socket of the scanner.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Structure bar

Power line filter module

[3] Remove the lower left structure bar using a 2.5 mm Allen wrench.
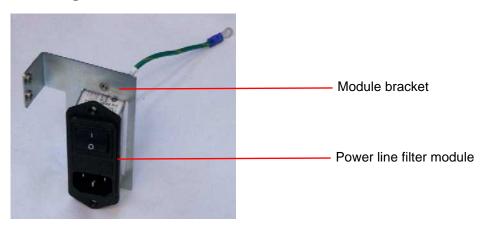
[4] Remove the 2 screws above and below the ON/OFF switch using a 2 mm Allen wrench.

[5] Remove the 2 screws retaining the module bracket using the 2.5 mm Allen wrench.

[6] Remove the nuts retaining the ground cables to the ground stud using a socket wrench.

[7] Remove the ground cable of the power line filter from the stud.

[8] Disconnect the 2 power connectors.

[9] Remove the module together with the module bracket from the scanner.

Installing the Power Line Filter Module

Module bracket

Power line filter module

[1] Set the new power line filter module into the module bracket.

[2] Insert the module into the scanner.

[3] Connect the 2 power connectors to the module.

> **Note**

Connect black wire No. 1 to **P** and black wire No. 2 to **N**.

[4] Connect the 3 ground wires to the stud and tighten the nut.

[5] Insert the bracket screws.

⚠ **Laser Warning**

Refer to <u>Laser Safety Instructions on Page 10</u>.

[6] Connect the system to the main power and confirm that the system is operating properly.

[7] Install the scanner cover. See <u>Installing the Scanner Cover on Page 25</u>.
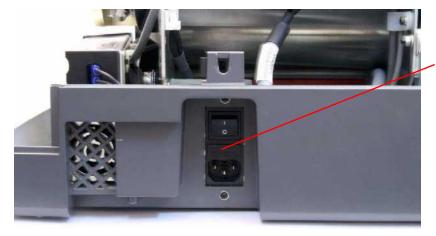
Replacing the Fuses

Tools Required

- Flat screwdriver
- Replacement fuses (2)
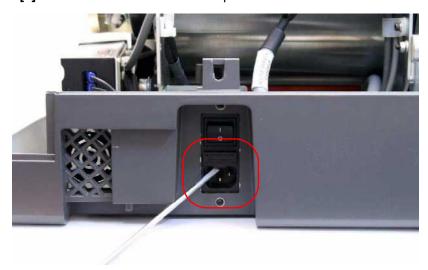
Procedure

[1] Switch OFF the scanner.

[2] Disconnect the scanner from the main power.

Fuse drawer

[3] Locate the fuse drawer on the power inlet module.

[4] Open the drawer using a flat screwdriver, prying gently from the plastic tab.

[5] Remove the blown fuse.

[6] Install a new fuse.

[7] Close the fuse drawer.

[8] Turn on the system.

[9] Verify that the system functions properly.

Replacing the Controller Board

Tools Required

- 2.5 mm Allen wrench
- 5 mm Allen wrench
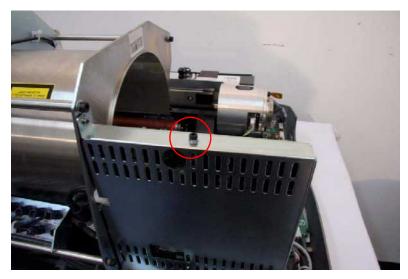
Removing the Controller Board

⚠️ **Important**

When changing the controller board, first back up the scanner settings, if it is possible to do so, by copying the **Calib** folder to a secure location.
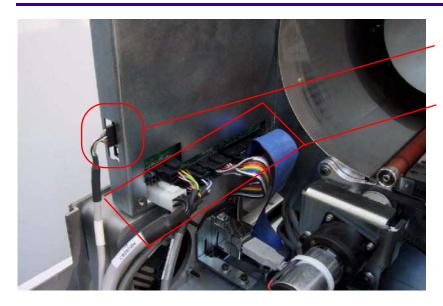
[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)

[3] Remove the 2.5 mm Allen retaining screw from the top of the controller board housing bracket.

[4] Remove the controller board housing bracket.

[5] Move the PM assembly all the way to the right in order to reach the controller board connectors.

Cable on right side
of the controller board
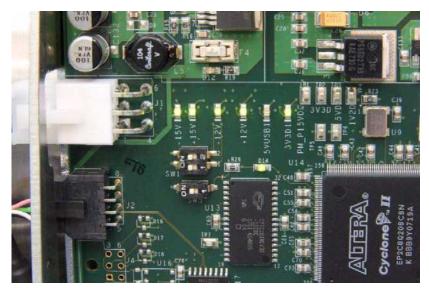
Cables on the back
of the controller board

> **Note**
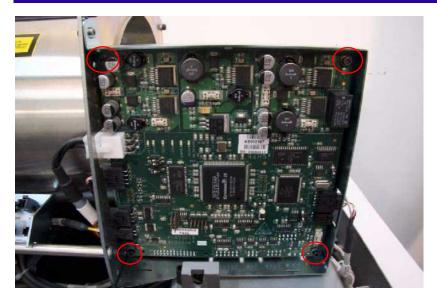
Unfasten the clips on the sides of the wide blue cable to remove it.

Hold the cables by their connectors when removing them, not by the cables themselves.

[6] Disconnect the cables from the back of the controller board (accessible from the front side of the scanner).
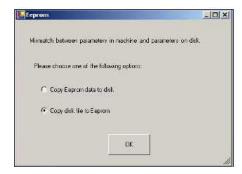
[7] Disconnect the cables from the right and left sides of the controller board.

[8] Remove the 4 screws from the corners of the controller board that fasten it to the bracket using the 2.5 mm Allen wrench.

[9] Remove the controller board.

Installing the Controller Board

[1] Position the controller board in the bracket and install the 4 screws connecting the controller board to the bracket using the 2.5 mm Allen wrench.

[2] Connect the connectors on the left side of the controller board.

[3] Connect the cable on the right side and the cables at the back of the controller board.

[4] Install the housing bracket and the retainer screw.

[5] Connect the scanner to the PC:

    (a) Connect the scanner to the same PC as before.

    (b) Switch ON the scanner.

    (c) The EEPROM screen appears. Choose **Copy disk file to EEPROM**, then click **OK**.

Laser Warning

.Refer to Laser Safety Instructions on Page 10.

[6] Before installing the scanner cover, perform a test scan. Check that the system functions properly. The preview image should be black.

[7] Check (in this order):

    a. The safety interlock key is not in the interlock.

    b. The laser DIP switch is switched ON.

[8] Position the scanner cover without installing the scanner cover screws.

[9] Switch ON the scanner.

[10] Perform a test scan. The preview image should be white.

[11] Install the scanner cover screws.

[12] Go to **Settings>Calibration** and check that the calibration values are marked with a green check mark. If not perform a full calibration. (See Calibrations on Page 114.)

[13] Go to **Settings>About** and check that all version numbers of the hardware and software are correct.

Replacing the IMCS Board

Tools Required
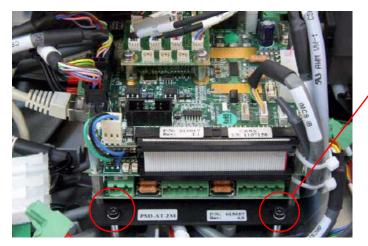
- 2.5 mm Allen wrench
- 5 mm Allen wrench
- Phillips (cross-head) screwdriver
- Wire cutter

> **Note**
>
> If you replace only the motion board or only the sensor board, return the unused board together with the replaced board to your Service Representative, noting clearly which is new and which was replaced.

Removing the IMCS Board

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)

Allen screw
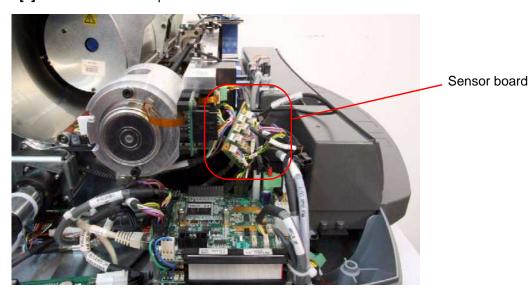
[3] Disconnect the connectors from the IMCS board.

[4] Cut the plastic ties.

[5] Remove the four 2.5 mm Allen screws retaining the IMCS board.

[6] Lift the board from the scanner.

Separating the Sensor Board from the Motion Board

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)

[3] Remove the 2 Phillips screws from the sensor board.

Sensor board

[4] Lift the sensor board without disconnecting its connectors and position it on its side.

[5] Remove the connectors from the motion board.

[6] Cut the plastic ties.

[7] Remove the four 2.5 mm Allen screws retaining the motion board and lift the board from the scanner.

Installing the IMCS Board

[1] Connect the connectors to the back of the motion board.

[2] Insert the IMCS board in to the scanner housing.

[3] Install the 4 retaining screws.

[4] Install new plastic ties.

[5] Connect the rest of the connectors to the board.

⬜⟩ **Note**

The connectors on the right are identical. Each connector socket on the board is has a connector number.

[6] If you replaced only the motion board, then attach the sensor board to the motion board by inserting the 2 retaining screws.

⚠ **Laser Warning**

.Refer to <u>Laser Safety Instructions on Page 10</u>.
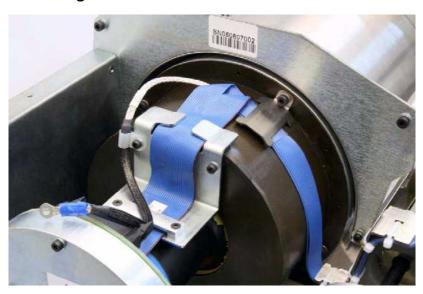
[7] Before installing the scanner cover, activate the scanner and:

    (a) Insert the safety interlock activation key into the safety interlock.

    (b) Switch ON the scanner.

    (c) Perform a scan to verify that the IMCS board functions properly and that all systems move freely.

    (d) Switch OFF the scanner.

    (e) Check that the safety interlock key is not in the interlock.

    (f) Check that the laser DIP Switch is switched ON.

[8] Install the scanner cover.

[9] Install the scanner cover screws.

[10] Switch ON the scanner.

[11] Perform a scan to verify that the IMCS board functions properly and that all systems move freely.

Replacing the Photo Multiplier Board
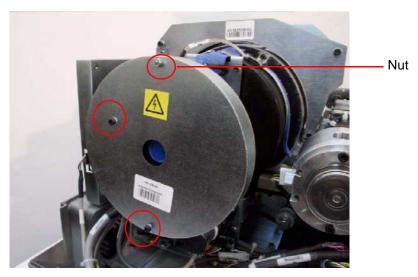
Tools Required

- Replacement PM tube
- 3.0 mm right-angle Allen wrench
- 3.5 mm right-angle Allen wrench

Removing the PM Board

[1] In **Settings>Diagnostics**, move the linear slide assembly to the left limit.

[2] Disconnect the scanner from the main power.

[3] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Nut
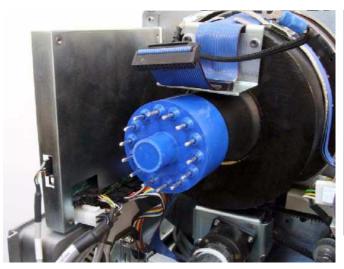
[4] Disconnect the blue ribbon cable on the PM board.

[5] Remove the two 2.5 mm Allen screws and the 5.5 mm nut retaining the PM board cover.

[6] Remove the cover.

The ground connector
is behind the board

[7] Remove the top bolt screw and the ground connector.

[8] Remove the PM board.

Installing the PM Board

[1] Position the PM board in correct alignment to fit with the PM tube pins.

[2] Install the PM board and the ground connector.

[3] Install the PM board cover and tighten the screws.

[4] Connect the blue PM ribbon.

[5] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[6] Install the scanner cover.

[7] Install the scanner cover screws.

[8] Switch ON the scanner.

[9] Perform an offset calibration and a PM gain calibration. (See Offset Calibration on Page 116 and System Gain Tuning Procedure on Page 117.)

[10] Perform a scan on a phantom object.

Replacing the Photo Multiplier Assembly
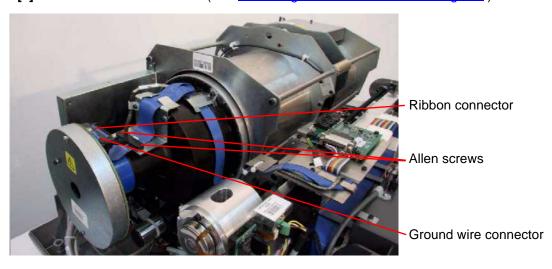
Tools Required

- Replacement PM assembly
- 2.5 mm Allen wrench
- 3.0 mm right-angle Allen wrench
- 3.5 mm right-angle Allen wrench
- Scanning head alignment gauge
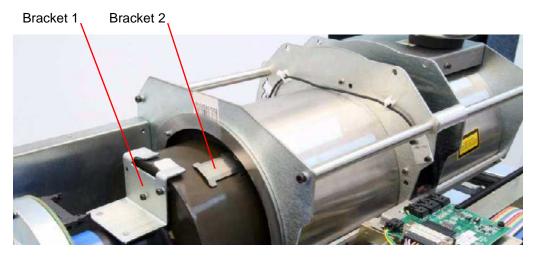
Removing the PM Tube
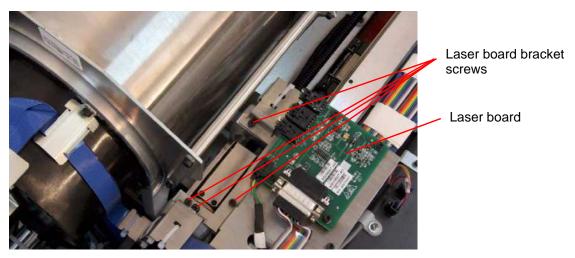
[1] In **Settings>Diagnostics** move the linear slide assembly to the left limit.

[2] Disconnect the scanner from the main power.

[3] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Ribbon connector

Allen screws

Ground wire connector
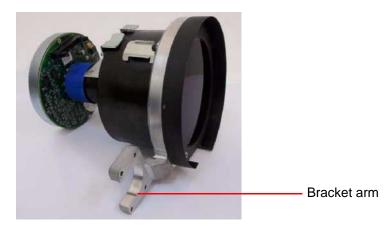
[4] Disconnect the ground wire connector from the PM board using a 2.5 mm wrench.

[5] Cut the plastic ties retaining the ground wire to the bracket.

[6] Disconnect the blue ribbon cable from the PM board.

[7] Loosen the Allen screws holding the blue ribbon cable in position.

[8] Remove the ribbon cable.

Bracket 1   Bracket 2

[9] Loosen Bracket 1 and Bracket 2 holding the cables to the PM assembly using a 3 mm Allen wrench and 2.5 mm Allen wrench.

[10] Remove the blue ribbon cable and ground cable from the PM assembly.

Laser board bracket screws

Laser board

[11] To remove the PM assembly bracket arm, first remove the 4 screws retaining the laser board bracket to the linear slide assembly.

[12] Remove the 4 screws that hold the PM assembly bracket arm to the linear slide assembly using a 3 mm Allen wrench.

Bracket arm
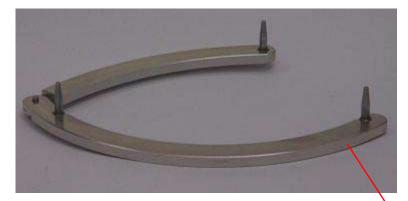
⚠ **Caution**
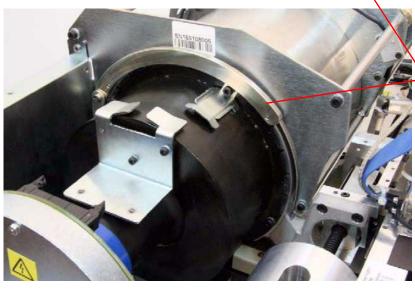
Stand the PM assembly on the wider end or on the side to prevent damage.

[13] Carefully remove the PM assembly.

Installing the PM Tube

[1] Insert but do not tighten the 3.5 mm bottom bracket retaining screw.

[2] Insert but do not tighten the 3.5 mm right-side bracket retaining screw.

[3] Move the PM tube forward towards the drum by manually turning the lead screw until the screws align with the holes.

[4] Insert but do not tighten the retaining screws.

[5] Align the PM with the edge of the drum.
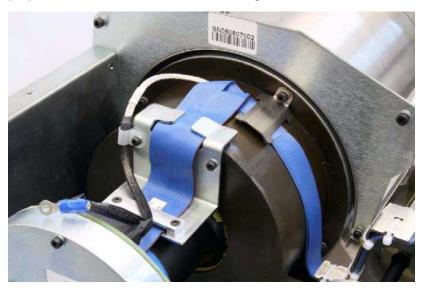
Alignment gauge

[6] Insert the scanning head alignment gauge with the **narrow parts of the prongs** between the PM tube and the drum.

[7] Hold the PM tube against the alignment gauge and tighten the screws.

[8] Move the linear slide assembly to the right until the gauge is released from between the PM tube and the drum.

[9] Connect the blue ribbon cable to the top of the PM board.

[10] Install the blue ribbon cable and the ground cable into the bracket and plastic clip on the PM tube.

[11] Attach to the PM assembly the brackets and plastic clip that hold the blue ribbon cable and the ground cable.

[12] Connect the ground wire connector to the slide body.

[13] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[14] Install the scanner cover.

[15] Install the scanner cover screws.

[16] Switch ON the scanner.

[17] Perform an offset calibration, PM gain calibration, and OCPC calibration. (See Offset Calibration on Page 116, System Gain Tuning Procedure on Page 117, and OCPC Process Calibration Procedure on Page 118.)

[18] Perform a scan on a phantom object.
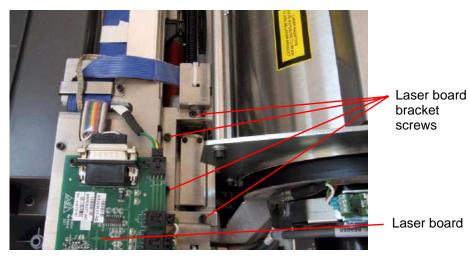
Replacing the Optical Head Assembly

Tools Required
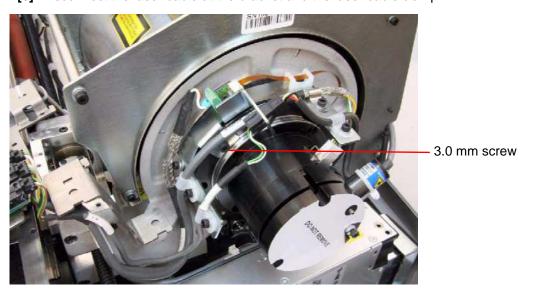
- Replacement optical head assembly
- 2.0 mm Allen wrench
- 2.5 mm Allen wrench
- 3.0 mm Allen wrench
- Scanning head alignment gauge

Removing the Optical Head Assembly
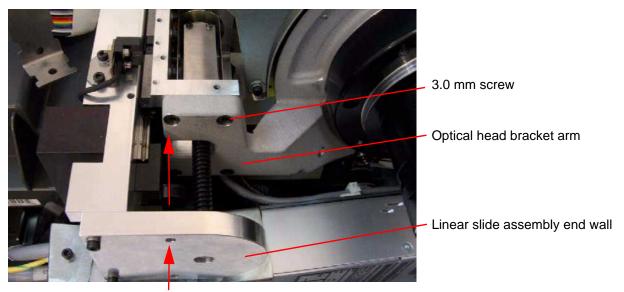
[1] Disconnect the scanner from the main power.

[2] Move the optical head assembly to the right.

Laser board bracket screws

Laser board

[3] Remove the 4 screws that fasten the laser board bracket to the linear slide assembly.

[4] Disconnect the encoder reader cable CB0570710.

[5] Disconnect the ribbon cable and remove it from the plastic holder.

[6] Disconnect the laser cable at the bracket and the laser cable clamp.

3.0 mm screw

[7] Remove the 3.0 mm Allen screw holding the cable bracket.

3.0 mm screw

Optical head bracket arm

Linear slide assembly end wall

Wrench access

[8] Remove the four 3.0 mm screws retaining the optical head bracket arm. Use a long wrench extended through the linear slide assembly end wall.

[9] Remove the optical head assembly.
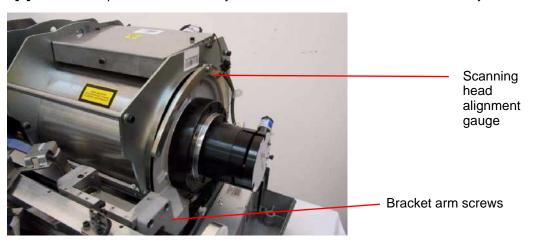
Installing the Optical Head Assembly

> **Note**

Do not touch the blue surface or the stainless surface of the optical head assembly.

[1] Install the optical head assembly and insert the four M4 x 12 screws loosely.

Scanning head alignment gauge

Bracket arm screws

[2] Insert the thin ends of the alignment gauge prongs between the optical head assembly and the drum.

[3] Tighten the screws.

[4] Manually move the linear slide assembly to the left until the alignment gauge is released from between the optical head assembly and the drum.

[5] Attach the optical head assembly connector bracket.

[6] Connect:

    a. The ribbon cable to the driver.

    b. The encoder cable to the encoder.

    c. The laser board cable to the laser board.

[7] Install the laser board bracket.

[8] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[9] Install the scanner cover.

[10] Install the scanner cover screws.

[11] Switch ON the scanner.

[12] Perform an offset calibration, PM gain calibration, and OCPC calibration. (See Offset Calibration on Page 116, System Gain Tuning Procedure on Page 117, and OCPC Process Calibration Procedure on Page 118.)

[13] Perform a scan on a phantom object.

Replacing the Linear Screw Type A

Tools Required
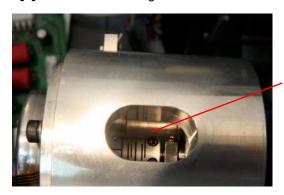
- 1.5 mm Allen wrench
- 2.0 mm Allen wrench
- 2.5 mm Allen wrench

Removing the Linear Screw Type A

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)
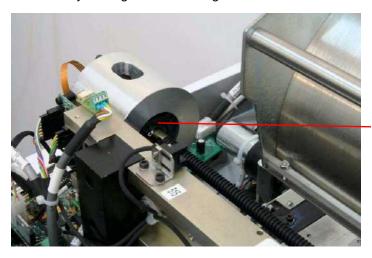
[3] Move the scanning head to the middle of the drum.
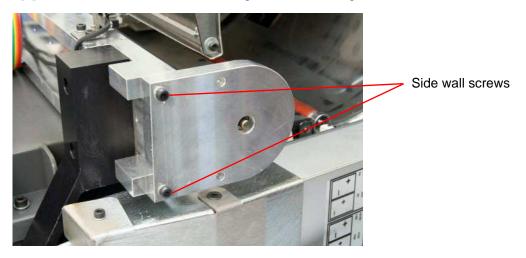
Coupling screw

[4] Loosen the coupling screws that secure the linear screw using a 1.5 mm Allen wrench. Check that the screw is free by turning it while holding the motor.

Angular contact screws

[5] Remove the 4 screws from the angular contact using a 2.0 mm Allen wrench.

Side wall screws

[6] Remove the side wall screws.

[7] Move the scanning head to the right together with the linear screw.

[8] Carefully remove the linear screw by moving it to the left while holding the scanning head in place. Slightly rotate the flexure and the screw to let it pass freely though the base of the scanning head.

Installing the Linear Screw Type A

Perform in reverse order:

⚠️ **Caution**

Do not damage the linear screw's TEFLON coating while inserting it!

[1] Install the left side wall and secure the screws.

[2] Install the flexure screws.

[3] Install the four angular contact screws.

[4] Install the coupling screw and fasten the nut.
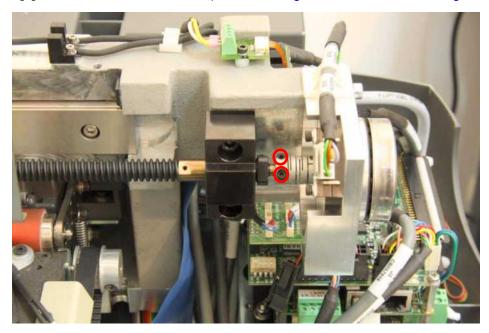
Replacing the Linear Screw Type B

Tools Required
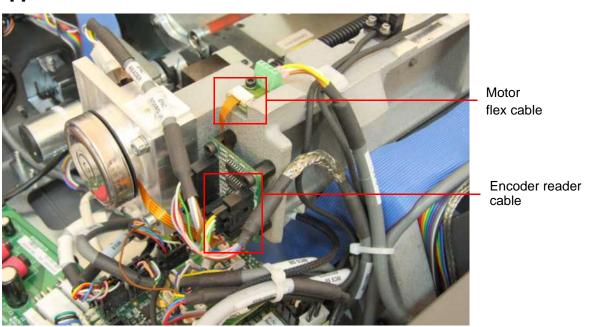
- 1.5 mm Allen wrench
- 2.5 mm Allen wrench
- 3.0 mm Allen wrench
- 4.0 mm Allen wrench
- Alignment gauge

Removing the Linear Screw Type B

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)
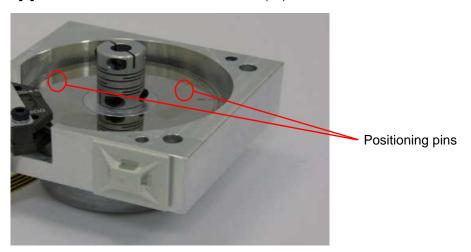
**[3]** Remove the two 2.0 mm Allen screws closest to the linear screw that secure the linear motor coupling.

Motor flex cable

Encoder reader cable

[4] Disconnect the motor flex cable.
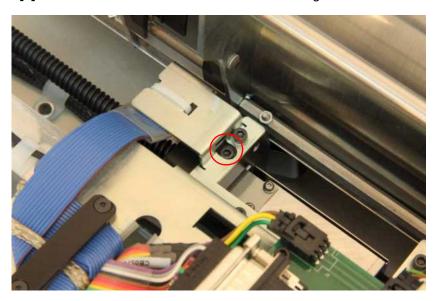
[5] Disconnect the encoder reader cable (J1).

Positioning pins
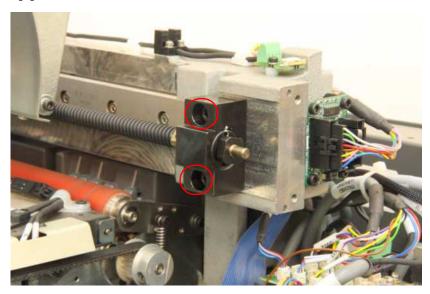
◇ **Note**

When removing the linear motor, make sure the positioning pins are in place.

[6] Remove the two 4.0 mm Allen screws securing the linear motor and gently remove the motor.
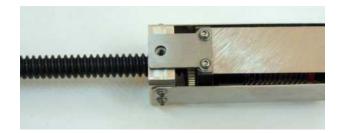
[7] Remove the 3.0 mm Allen screw on the flexure.

[8] Remove the two 5.0 mm mounting screws securing the linear screw assembly to the side block.

[9] Gently pull out the linear screw with its components.
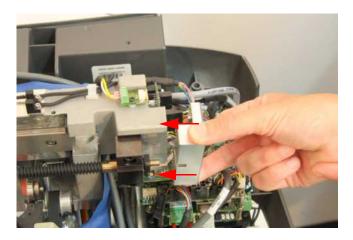
Installing the Linear Screw Type B
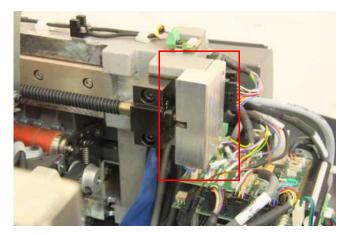
⚠️ **Caution**

To avoid damaging the linear screw, make sure it does not contact other parts of the system.

[1] Gently insert the new linear screw in its position:

    (a) Position the flexure so the hole is facing up. (See figures above.)

    (b) Align the bearing on the right side of the linear screw with the hole in the slide block.

[2] Insert but do not tighten the two 5.0 mm mounting screws to the mounting block.

[3] Take the positioning pins from the motor holder. (See) and place them in the alignment gauge.

[4] Align the gauge with the edge of the side block.

[5] Insert the alignment gauge and secure the two 4.0 mm Allen screws, securing the mounting block.

[6] Remove the alignment gauge.

[7] Secure the flexure with the 3.0 mm Allen screw.

[8] Replace the linear motor and secure it with the two 4.0 mm Allen screws.

📝 **Note**

Make sure the positioning pins are in place.

[9] Secure the coupling with the two 2.0 mm Allen screws.

[10] Connect:

    (a) Flex cable

    (b) Encoder reader cable (J1)

Test Procedure

⚠ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

Before installing the scanner cover, confirm that the left and right limit sensors function properly:

[1] Go to **Settings>Diagnostics>Motion**.

[2] In the **Linear Motor** section, enter **5** in **Required Speed** field.

[3] Click **Set.**

[4] In the **Linear Motor** section, click **<<** to activate the linear motor until it reaches the left limit sensor.

[5] Click **>>** to move the motor until it reaches the right limit sensor.

[6] Verify that the indicator light illuminates.

[7] In the **Linear Motor** section, enter **10** in the **Required Speed** field.

[8] Repeat Step 3 - Step 6.
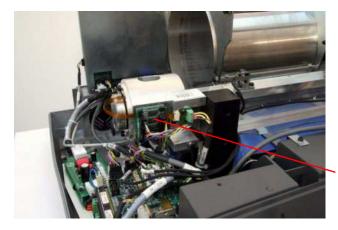
Replacing the Linear Motor Type A

Tools Required

- 3.0 mm Allen wrench
- 2.0 mm Allen wrench
- 1.5 mm Allen wrench
- 0.89 mm Allen wrench
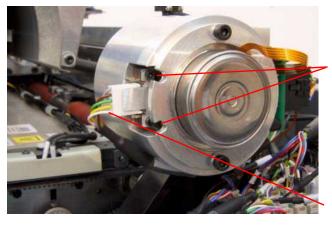
Removing the Linear Motor Type A

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Motor flex cable

[3] Disconnect the motor flex cable.

[4] Disconnect the encoder reader cable.
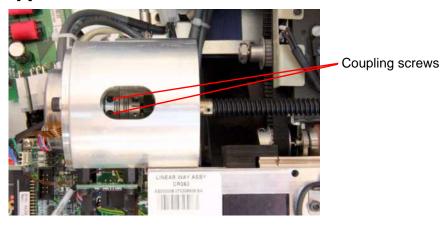
Allen screws
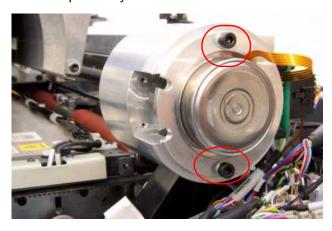
Encoder reader cable

[5] Remove the two 2.0 mm Allen screws from the encoder reader connector.

[6] Remove the encoder reader.

Coupling screws

[7] Remove the two 1.5 mm Allen screws from the linear motor coupling. Check that the motor revolves freely and independently of the lead screw.

[8] Remove the two 3.0 mm retaining screws.

[9] Remove the linear motor.
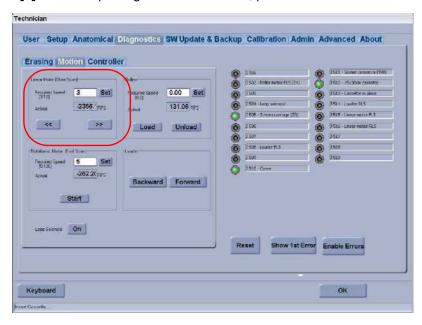
[10] Remove the 0.89 mm Allen screw from the encoder.

[11] Remove the encoder from the linear motor axis.

Installing the Linear Motor Type A

1.5 mm gap

[1] Install the old encoder on the new linear motor. Before tightening the 0.89 mm Allen screw, position the encoder with a 1.5 mm gap between the encoder and the motor body. Use the 1.5 mm Allen wrench to set the gap.

[2] Install the linear motor on the scanner and secure the 3.0 mm Allen screws.

[3] Install the linear encoder board to the linear slide assembly.

[4] Secure the coupling screws.

[5] Attach the encoder reader. Make sure that the reader is positioned in the center before fastening the 2.0 mm Allen screws.

[6] Attach the linear motor flex cable.

[7] Before replacing the scanner cover, perform this test:

    (a) Go to **Settings>Diagnostics>Motion**.

    (b) Click the linear motor left and right arrows to move the slide from side to side.

    (c) Check that the optical head assembly moves smoothly and that there is no interference in the movement of the wires.

[8] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[9] Install the scanner cover.

[10] Install the scanner cover screws.

[11] Switch ON the scanner.

[12] After replacing the scanner cover:

    (a) Go to **Settings>Diagnostics>Motion**.

    (b) Click the linear motor left and right arrows to move the slide from side to side.

    (c) Check that the optical head assembly moves smoothly and that there is no interference in the movement of the wires.

[13] Perform a flat field scan and check the origin. If the image is not centered, perform an origin calibration. (See Origin Calibration on Page 115.)

[14] After performing the origin calibration perform a flat field scan to verify that the calibration was successful.
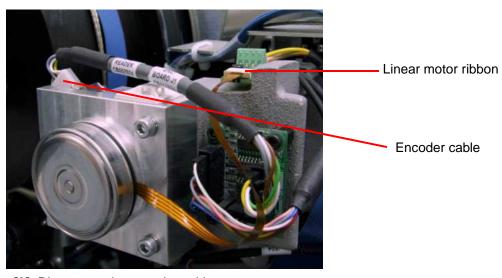
Replacing the Linear Motor Type B

Tools Required
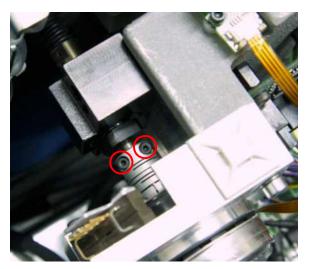
- 3.0 mm Allen wrench
- 2.0 mm Allen wrench
- 1.5 mm Allen wrench
- 0.89 mm Allen wrench

Removing Type B Linear Motor
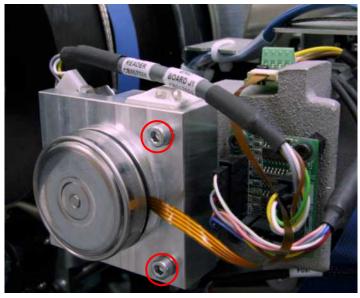
[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Linear motor ribbon

Encoder cable
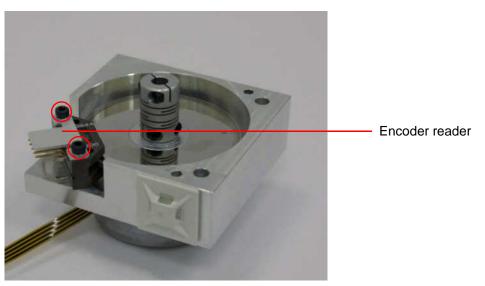
[3] Disconnect the encoder cable.

[4] Disconnect the linear motor ribbon.

[5] Remove the 2 screws securing the coupling to the linear screw using the 1.5 mm Allen wrench.
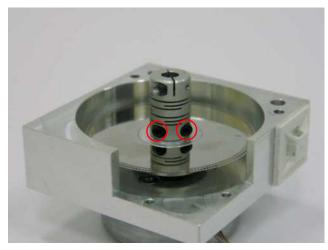
[6] Remove the 2 screws securing the motor assembly to the linear slide assembly using the 3 mm Allen wrench.

Encoder reader

[7] Gently pull out the linear motor assembly.

[8] Remove the 2 screws securing the encoder reader to the linear motor assembly using the 2 mm Allen wrench.

[9] Remove the encoder reader from the linear motor assembly.
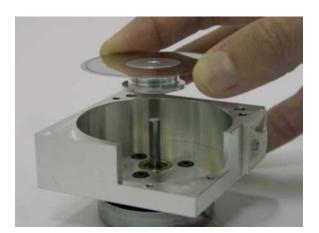
[10] Remove the 2 screws securing the coupling adjacent to the encoder disc using the 1.5 mm Allen wrench.
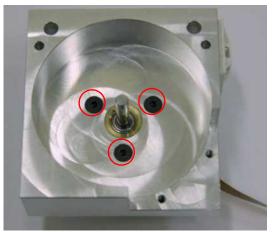
[11] Remove the coupling.

[12] Loosen the screw securing the encoder disc to the motor using the 0.89 Allen wrench.

[13] Remove the encoder disc.
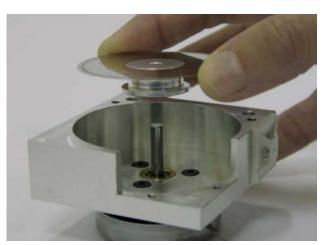
[14] Remove the 3 screws securing the linear motor to the bracket using the 2 mm Allen wrench.

[15] Remove the linear motor from the bracket.

Installing the Linear Motor Type B

[1] Install the new linear motor.

[2] Install the 3 screws securing the linear motor to the bracket using the 2 mm Allen wrench.
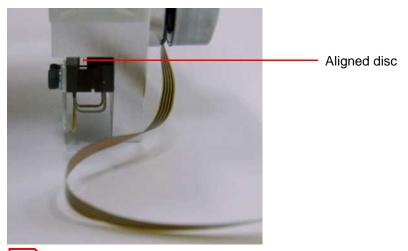
[3] Install the encoder disc, pulley side face down, as shown in the figure above.

▷ **Note**

Do not tighten the screw securing the encoder disc to the motor.

[4] Install the encoder reader.

Aligned disc

> **Note**

The encoder disc should be aligned with but not touch the encoder reader.
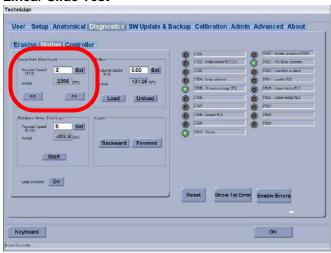
[5] Install the 2 screws securing the encoder reader to the linear motor assembly using the 2 mm Allen wrench.

[6] Tighten the screw securing the encoder disc to the motor using the 0.89 Allen wrench.

> **Note**

Keep the encoder disc as centered as possible so that it does not touch any surface.

[7] Install the coupling.

[8] Tighten the 2 screws securing the coupling adjacent to the encoder disc using the 1.5 mm Allen wrench.

[9] Install the linear motor assembly.

[10] Install the 2 screws securing the linear motor assembly to the linear slide assembly using the 3 mm Allen wrench.

[11] Tighten the 2 screws securing the coupling to the linear screw using the 1.5 mm Allen screw.

[12] Connect the encoder cable.

[13] Connect the linear motor ribbon.

[14] Before replacing the scanner cover, perform this test:

Linear Slide Test

    (a) Go to the **Settings>Diagnostics>Motion**.

    (b) Click the linear motor left and right arrows to move the slide from side to side.

    (c) Check that the optical head assembly moves smoothly and that there is no interference in the movement of the wires.

[15] Check (in this order):

    1. The scanner is switched OFF.

    2. The safety interlock key is not in the Interlock.

    3. The laser DIP switch is switched ON.

[16] Install the scanner cover.

[17] Install the scanner cover screws.

[18] Switch ON the scanner.

[19] After replacing the scanner cover:

    (a) Go to the **Settings>Diagnostics>Motion**.

    (b) Click the linear motor left and right arrows to move the slide from side to side.

    (c) Check that the optical head assembly moves smoothly and that there is no interference in the movement of the wires.

[20] Perform a flat field scan and check the origin. If the image is not centered, perform an origin Calibration. (See Origin Calibration on Page 115.)

[21] After performing the origin calibration perform a flat field scan to verify that the calibration was successful.
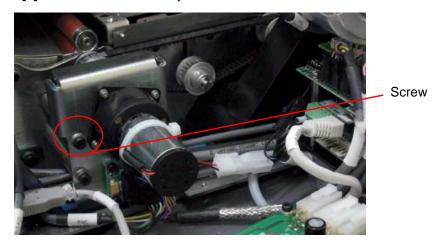
Replacing the Roller Drive Motor Assembly

Tools Required

- 3.0 mm Allen wrench
- 1.0 mm Allen wrench

Removing the Drive Roller Motor Assembly
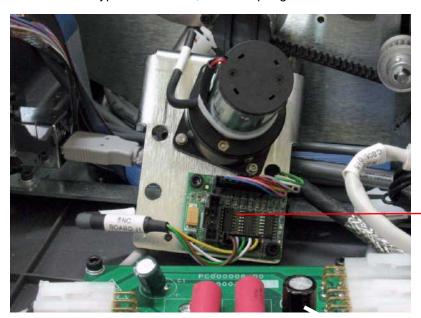
[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)

[3] Move the PM assembly into the drum.

Screw

[4] Disconnect the white roller drive motor connector from the connector panel.

> **Note**
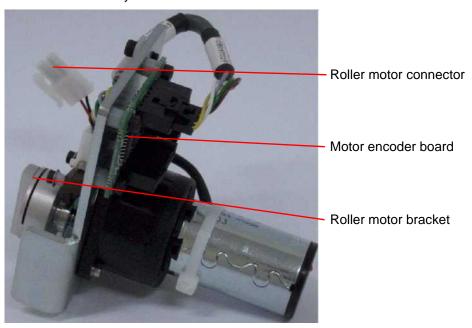
There are two types of washers, flat and spring. The washers must be removed and installed in order.

Motor encoder board
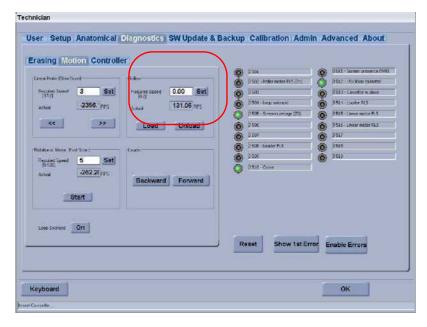
[5] Remove the three 3.0 mm screws from the base of the roller drive motor assembly and pull back the roller drive motor assembly.

Roller motor connector

Motor encoder board

Roller motor bracket

[6] Disconnect the 2 connectors from the motor encoder board.

Installing the Roller Drive Motor

[1] Connect the 2 motor encoder board connectors.

[2] Install the roller drive motor. The roller drive motor cog drive mechanism must fit into the drive adapter.

[3] Install the three 3.0 mm Allen screws.

[4] Connect the white roller drive motor connector to the connector panel.

[5] Before replacing the scanner cover:

    (a) Go to **Setup>Diagnostic>Motion.**

    (b) Operate the rollers forward and backward (Load, Unload).

    (c) Load a cassette into the scanner and check that the scanner loads and unloads the cassette correctly.

[6] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[7] Install the scanner cover.

[8] Install the scanner cover screws.

[9] Switch ON the scanner.

[10] Load and unload a cassette a few times to verify that the rollers are functioning properly.

Replacing the Loader Stepper Assembly

Tools Required

- Cassette Loader Kit
- Long-shaft 2.5 mm Allen wrench
- 2.5 mm x 100 mm cable ties
- Wire cutters
- Tape

Removing the Loader Stepper Assembly

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Remove the roof assembly and the tray assembly. (See Removing the Roof Assembly on Page 83 and Removing the Tray Assembly on Page 85.)

[4] Disconnect the stepper motor cable CB057022.

[5] Disconnect sensor CB057040 from J508 on the connector panel.

[6] Remove the 4 screws that attach the loader stepper assembly to the loader frame using the 2.5 mm Allen wrench.
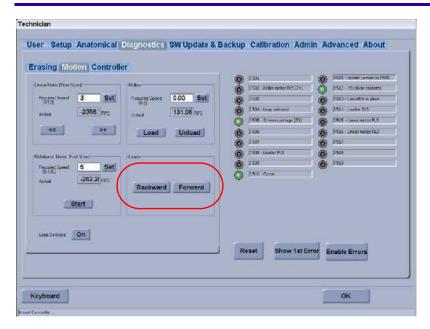
⚠ **Caution**

Be sure to remove the cables carefully.

[7] Pull the loader stepper assembly towards the front of the unit and carefully remove it from the unit.

Installing the Loader Stepper Assembly

[1] Pass the stepper motor cables under the drum.

[2] Install the two Allen screws in the back.

[3] Install the loader stepper assembly into the motor frame.

[4] Insert but do not tighten the front two 2.5 mm screws.

[5] Connect the sensor cable to the sensor board and the motion cable to the motion board and fasten the cable ties.

[6] Adjust the loader pusher position. (See Adjustment Procedure on Page 129.)

[7] Before replacing the scanner cover:

    (a) Go to **Setup>Diagnostic>Motion.**

    (b) Operate the rollers forward and backward (Load/unload).

    (c) Load a cassette into the scanner and check that the scanner loads and unloads the cassette correctly.

[8] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

 [9] Install the scanner cover.

[10] Install the scanner cover screws.

[11] Switch ON the scanner.

[12] Load/unload a cassette a few times to verify that the rollers are functioning properly.
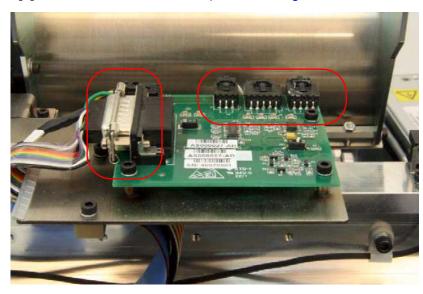
Replacing the Laser Board

Tools Required
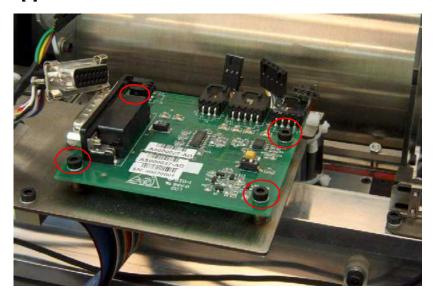
- 2.5 mm Allen wrench

Removing the Laser Board

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)

[3] Disconnect the connectors on the laser board.

[4] Remove four 2.5 mm screws from the laser board.

[5] Remove the laser board.

Installing the Laser Board

[1] Place the new laser board in position and install the four 2.5 mm screws.

[2] Connect the connectors to the laser board.

⚠ **Laser Warning**

See <u>Laser Safety Instructions on Page 10</u>.

[3] Before installing the scanner cover, perform a scan. Make sure that the laser unit is functioning properly and that a steady beam is produced.

[4] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[5] Install the scanner cover.

[6] Install the scanner cover screws.

[7] Switch ON the scanner.

[8] After installing the scanner cover, perform a scan. Make sure that the laser unit is functioning properly and that a steady beam is produced.

[9] Perform a scan on a phantom object to check that the quality of the scan is good.

Replacing the Power Supply

Tools Required
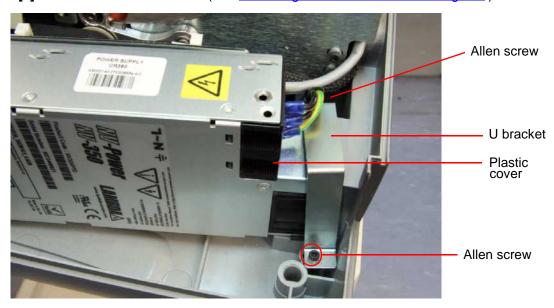
- Power supply kit (SK000088)
- Long-shaft 7 mm socket wrench
- Long-shaft 2.5 mm Allen wrench
- Phillips (cross-head) screwdriver

Removing the Power Supply Unit

☐▷ Note

After installation of the new power supply, mark the number **1** in the modification label located at the back of the scanner.

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Allen screw

U bracket

Plastic cover

Allen screw

[3] Loosen the 2 Allen screws retaining the U bracket.

[4] Slide the bracket to the side.

[5] Remove the black plastic cover.

[6] Unscrew the 3 power cable lugs with a cross-head screwdriver.

⚠️ **Caution**

Make sure not to lose any screws or washers in the machine.
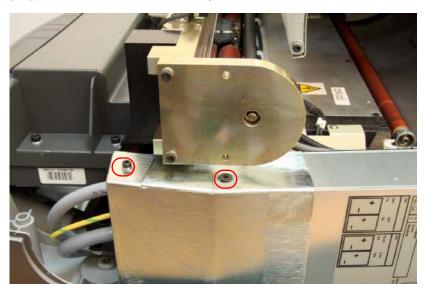
Each screw has a spring (locking) washer and a regular washer.

[7] Remove the two 7 mm nuts using a long-shaft socket wrench.

[8] Remove the 2 nuts with the 4 washers.
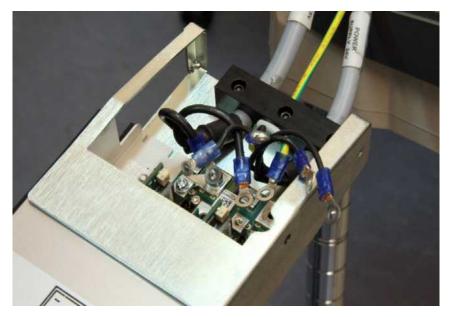
[9] Remove the 2 plastic cable holders.
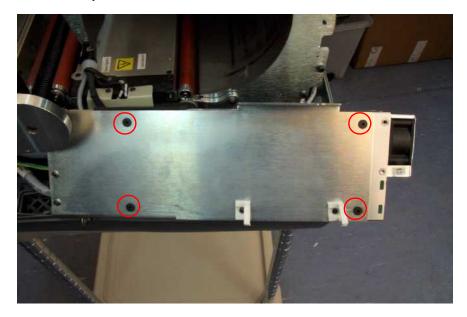
[10] Pull the cables out of the way.

[11] Remove the 2.5 mm Allen screw (set screw) and washer.

[12] Remove the 2.5 mm Allen screw (cone).

[13] Remove the cover of the power supply cable terminal.

[14] Gently lift the power supply out of the scanner.

[15] Remove all 7 cables connected to the power supply, while ensuring that no washers or screws have been lost in the system.
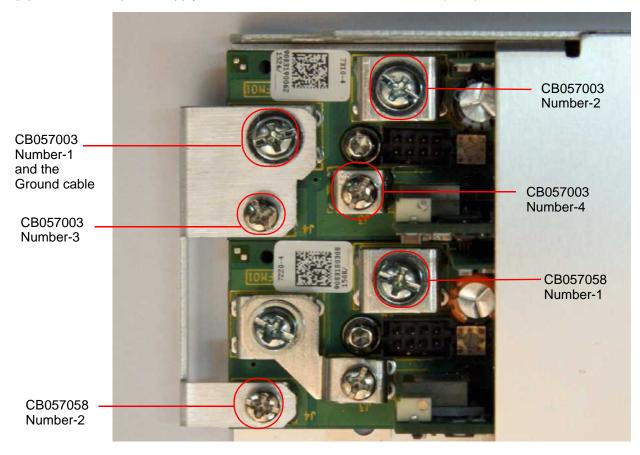
[16] Turn the power supply on its underside and remove the four 2.5 mm Allen screws (cone).
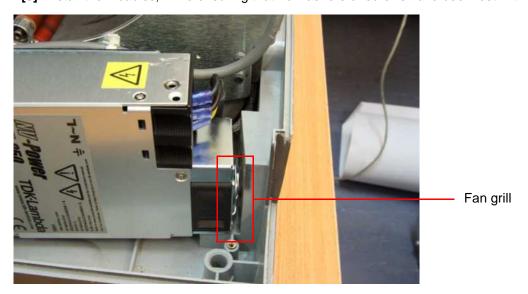
[17] Slide the power supply out of the power supply housing bracket.

Installing the Power Supply Unit

[1] Slide the new power supply into the power supply housing bracket.

[2] Turn over the power supply and install the four 2.5 mm Allen screws (cone).

CB057003
Number-2

CB057003
Number-1
and the
Ground cable

CB057003
Number-3

CB057003
Number-4

CB057058
Number-1

CB057058
Number-2

[3] Install the 7 cables, while ensuring that no washers or screws have been lost in the system.

Fan grill
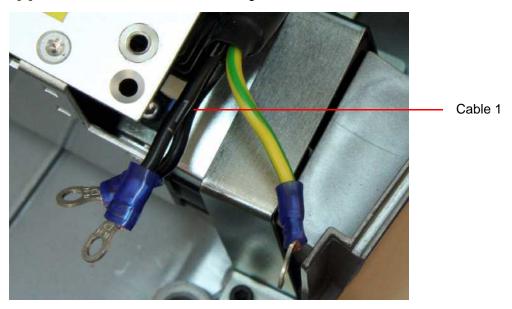
⚠ **Caution**

Be careful not to damage the fan grill when sliding the new power supply into its housing.

[4] Gently install the power supply into the scanner.

[5] To install the cover of the power supply cable terminal:

    a. Install the 2.5 mm Allen screw (set screw) and washer.

    b. Install the 2.5 mm Allen screw (cone).

[6] Place the cables back in the two plastic cable holders and close the two cable holders.

[7] Install the two 7 mm nuts with a long-shaft socket wrench.

Cable 1

[8] Replace the 3 power cables with a cross-head screwdriver.

▷ Note
- The first (top) cable is marked 1.
- The second cable is marked 2.
- The third cable is ground.

[9] Install the black plastic cover.

[10] Slide the bracket back in its place.

[11] Install the 2 Allen screws holding the bracket.

[12] Install the scanner cover.
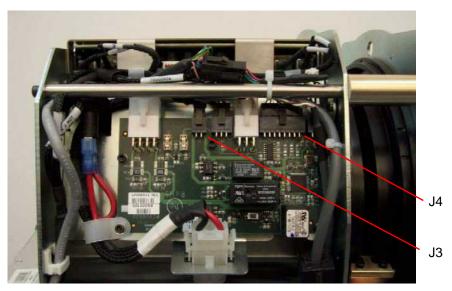
Replacing the Erase Lamps Assembly

Tools Required
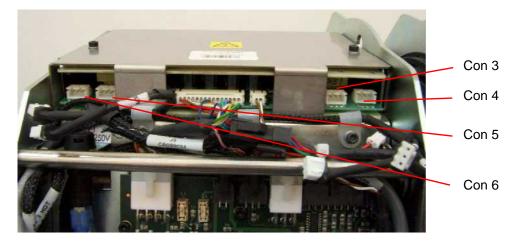
- 2.5 mm Allen wrench
- 3.0 mm Allen wrench
- 2.5 x 100 mm cable ties
- Wire cutters

Removing the Erase Lamps Assembly

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Bring the drive head to the middle.

J4

J3

[4] Disconnect cable CB000024 from the erase lamp board (J3, J4).

Con 3

Con 4

Con 5

Con 6
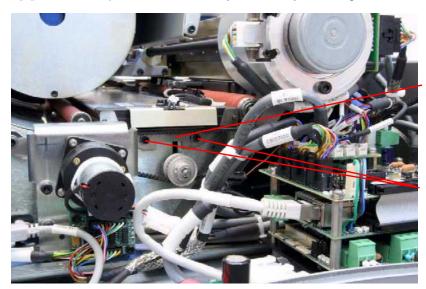
[5] Disconnect cable CB000023 (connectors 3, 4, 5, and 6) from the erase lamps inverter board.

> **Note**

Do not remove the cable from the cable holders on the erase lamps assembly.

[6] Remove the erase lamp cable from the cable holders on the base of the scanner.

[7] Cut the wire ties holding the cable with the wire bundles on the base of the scanner.

[8] Move the optical head assembly all the way to the right.

Erase lamps
assembly bracket

Erase lamps assembly bracket
retaining screws

[9] Remove the two 2.5 mm retaining screws from the left side of the erase lamps assembly.

[10] Remove the erase lamps assembly retainer bracket from the left side.

[11] Pull the erase lamps assembly out of the drum from the left side of the scanner.

Installing the Erase Lamps Assembly
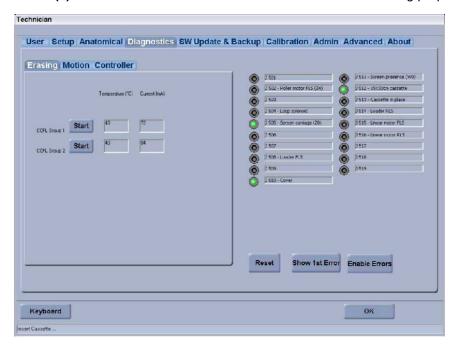
[1] Install the erase lamps assembly into the drum. Make sure that the pins on the right side fit into the bracket..

[2] Install the retainer bracket:

   (a) Slide it between the assembly side and the belt.

   (b) Install the two 2.5 mm Allen screws holding it in position.

[3] Secure the cables with wire ties to the wire bundles and cable holders.

[4] Connect cable CB000023 to the erase lamps inverter board (make sure to insert the connectors by number).

[5] Connect cable CB000024 from the erase lamp board (J3, J4).

⚠ **Laser Warning**

See .

[6] Before replacing the scanner cover:

    (a) Perform a scan. Check that all the motors are functioning properly.

    (b) Go to **Settings>Diagnostic>Erasing**.

    (c) Activate each set of erase lamps and check that a current is generated.

[7] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[8] Install the scanner cover.

[9] Install the scanner cover screws.

[10] Switch ON the scanner.

[11] Perform this test procedure:

    (a) Go to **Settings>Diagnostics>Erasing.**

    (b) Activate erase lamps Group 1. Check that the current reading is between 2800 mA and 3600 mA.
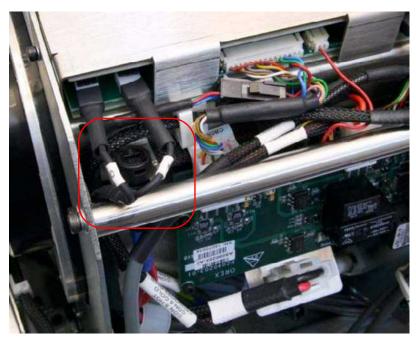
Replacing the Erase Lamps Fuse

Tools Required

- Flat screwdriver

Installing the Erase Lamps Fuse

[1] Remove the scanner cover. (See <u>Removing the Scanner Cover on Page 25</u>.)

[2] Locate the fuse housing and open the fuse housing cup.

[3] Press and turn the fuse housing cup with the flat screwdriver to remove it.

[4] Remove the old fuse.

[5] Insert the new fuse.

[6] Replace the fuse housing cup.

[7] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[8] Install the scanner cover.

[9] Install the scanner cover screws.

[10] Switch ON the scanner.

Test Procedure

Perform this test procedure:

[1] Go to **Settings>Diagnostics>Erasing**.

[2] Activate erase lamps Group 1. Check that the current reading is between 2800 mA and 3600 mA. (See <u>Step b</u> on page <u>79</u>.)

Replacing the Erase Lamp Board

Tools Required

- Allen 2.5 mm wrench
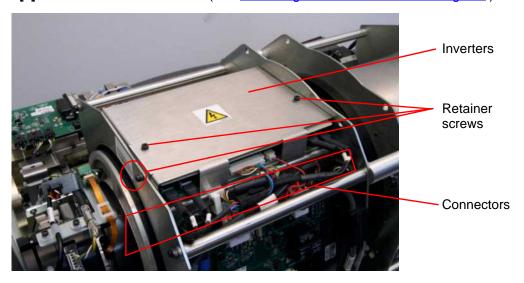
Removing the Erase Lamp Board

⚠ Caution

High Voltage! Do not proceed without disconnecting the scanner from the main power.

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See .)

Inverters

Retainer screws

Connectors

[3] Disconnect all the connectors from the erase lamp board.

[4] Remove the three 2.5 Allen screws from the erase lamp board and remove the board.

Installing the Erase Lamp Board

[1] Install the 3 retainer screws connecting the board to the drum.

[2] Connect the connectors. (Note that the connector numbers must be the same as the Con numbers.)

[3] Before installing the scanner cover:

    (a) Go to **Settings>Diagnostic>Erasing**.

    (b) Activate erase lamps Group 1

    (c) Check that the current reading is between 2800 mA and 3600 mA. (See .)

[4] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[5] Install the scanner cover.

[6] Install the scanner cover screws.

[7] Switch ON the scanner.

Replacing the Erase Lamps Inverter Board

Tools Required

• Allen 2.5 mm wrench
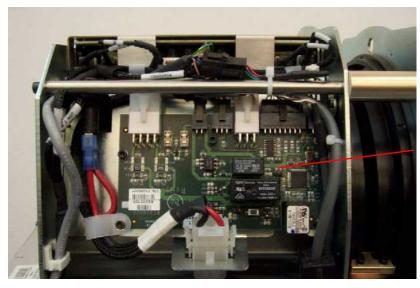
Removing the Erase Lamps Inverter Board

⚠️ **Caution**

High Voltage

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

Erase lamps board

[3] Disconnect the connectors from the erase lamps inverter board.

[4] Remove the 4 Allen screws from the erase lamps inverter board and remove the board.

Installing the Erase Lamps Inverter Board

[1] Install the 4 Allen screws into the erase lamps inverter board.

[2] Connect the connectors.

[3] Before installing the scanner cover:

    (a) Go to **Settings>Diagnostic>Erasing**.

    (b) Activate erase lamps Group 1.

    (c) Check that the current reading is between 2800 mA and 3600 mA. (See Step b on page 79.)

[4] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[5] Install the scanner cover.

[6] Install the scanner cover screws.

[7] Switch ON the scanner.

Replacing the Roof Assembly and Tray Assembly

Introduction

Remove the roof assembly:

- If it needs to be replaced.
- To replace the auto-loop solenoid assembly.
- To replace the LED indicator.
- To remove the tray assembly.

Remove the tray assembly:

- If it needs to be replaced.
- To replace the W0 sensor.
- To replace the barcode reader.
- To replace:
  - J512 - 15x30 adapter sensor
  - J513 - Cassette presence sensor
  - J514 - Cassette lock sensor
  - J510 - Cover sensor

Tools Required

- 1.5 mm Allen wrench
- 2.5 mm Allen wrench
- 3.0 mm Allen wrench
- 2.5 x 100 mm cable ties
- Wire cutters
- 7 mm socket wrench

Removing the Roof Assembly
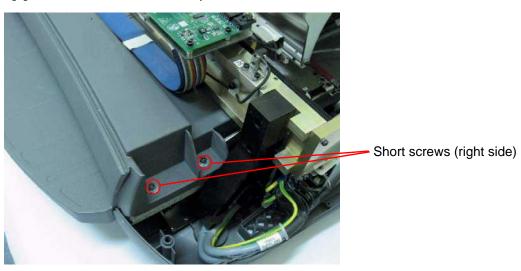
⚠ Laser Warning
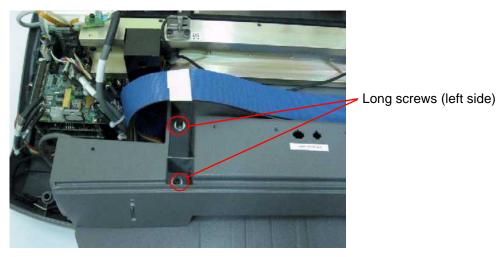
When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Remove the solenoid cable plastic ties and disconnect the solenoid connectors.

Short screws (right side)

Long screws (left side)
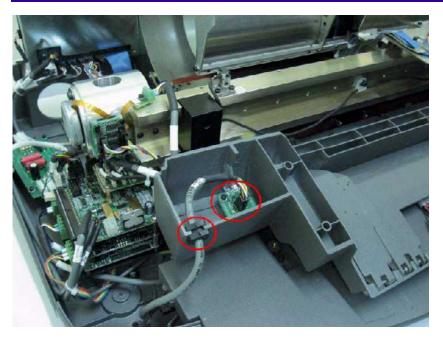
⚠ **Caution**

First remove all 4 screws. Then pull the roof assembly towards you before lifting it.

[4] Remove the four 3.0 mm screws connecting the roof assembly to the unit.

[5] Turn the roof assembly over.

[6] Remove the plastic clip of the LED display board cable.

[7] Disconnect the LED display board connector (CB 057011). The roof assembly is now disconnected.

Removing the Tray Assembly

> **Note**
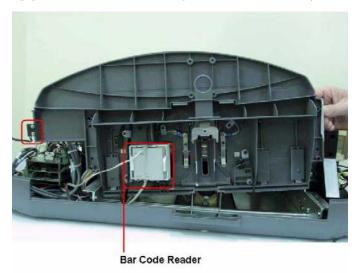
Before performing this procedure you must first remove the roof assembly. (See Removing the Roof Assembly on Page 83.)

[1] Remove the eight 4.0 mm tray assembly retainer screws using the 3.0 Allen wrench.

[2] Move the blue ribbon cable aside and carefully remove the tray from its position.

[3] Turn up the front end in order to remove the connectors. (See Step 7 on page 86.)

[4] Cut the cable ties under the drum.

[5] Disconnect from the connector panel:

- CB057045 from J514
- CB057044 from J512
- CB057056 from J513

[6] Disconnect CB057012 (barcode reader cable) from J6 on the controller board.

Bar Code Reader

[7] Disconnect the interlock sensor and the barcode reader (J6) from the underside of the tray assembly.

[8] Using a size 7 wrench, disconnect the ground wire nut between the tray assembly and the scanner bottom from the scanner bottom.

⚠ Important

To prevent damage guide the cables slowly and carefully underneath the drum.

[9] Carefully remove the tray assembly.

Installing the Tray Assembly and the Roof Assembly

[1] Connect the barcode reader and the interlock cover sensor to the underside of the tray assembly.

[2] Connect the ground cable.

[3] Guide the sensor cables under the drum.

[4] Connect J6, J512, J513, and J514 sensors to the controller board and connector board.

[5] Insert the tray assembly into its position. The flap under the assembly must fit in behind the body wall.

[6] Install the tray assembly screws.

[7] Connect the LED cable to the display board and install the roof assembly.

[8] Before installing the scanner cover, perform Step 1 and Step 2 in the test procedure.

[9] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[10] Install the scanner cover.

[11] Install the scanner cover screws.

[12] Switch ON the scanner.

[13] Perform Step 3 in the test procedures.

[14] Perform the cassette release mechanism adjustment procedure. (See Adjustment Procedure on Page 120.)

Test Procedure

⚠ Laser Warning

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in [Activating the Scanner Without the Cover (Laser Deactivated) on Page 26](#). If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Before installing the scanner cover, go to **Settings>Diagnostics>Motion**.

[2] Load/unload a screen a few times using the diagnostic controls and check to see that the indicator lights switch on and off according to the position of the screen. Ensure that:

    (a) There is no unusual noise during the process.

    (b) The screen is unloaded all the way into the cassette.

    (c) The screen is loaded/unloaded straight.

[3] After installing the scanner cover, load/unload a screen a few times using the diagnostic controls and check to see that the indicator lights switch on and off according to the position of the screen. Ensure that:

    (a) There is no unusual noise during the process.

    (b) The screen is unloaded all the way into the cassette.

    (c) The screen is loaded/unloaded straight.

Replacing the Right and Left Limit Sensors

Tools Required

- 2.0 mm Allen wrench
- 2.5 x 100 mm cable ties
- Wire cutters
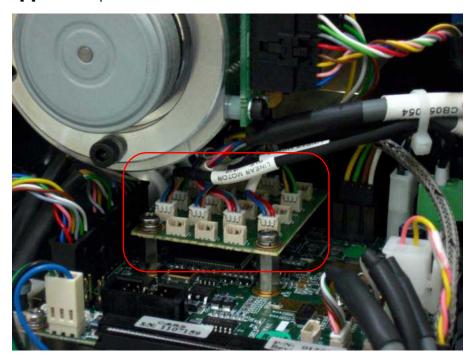
Removing the Right Limit Sensor
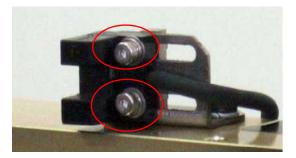
⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] If necessary, move the laser board to the left to expose the right limit sensor.

[4] Mark the position of the sensor on the bracket.

[5] Disconnect the right limit sensor cable from the sensor board.

[6] Remove the two 2.0 mm retaining screws from the sensor.

[7] Remove the sensor from the sensor bracket.

Installing the Right Limit Sensor

[1] Install the right limit sensor into the sensor board.

[2] Position the sensor on the sensor bracket according to the marking made during the removal procedure.

[3] Install the two 2.0 mm retaining screws.

Note

The sensor bracket head must be adjusted so the sensor screen is in the middle of the sensor bracket, with equal spacing between the two sides of the sensor screen and the bracket.

Laser Warning

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[4] Before replacing the scanner cover:

    (a) Go to **Settings>Diagnostics>Motion**.

    (b) In the **Linear Motor** section, click **<<** or **>>** to activate the linear motor.

    (c) The carrier begins to move, and should enter the sensor area causing the indicator light to illuminate.

[5] Install the scanner cover.

Removing the Left Limit Sensor

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Mark the position of the sensor on the bracket.

[4] Disconnect the left limit sensor cable from the sensor board.

[5] Remove the two 2.0 mm retaining screws from the sensor.

[6] Remove the sensor from the sensor bracket.

Installing the Left Limit Sensor

[1] Install the left limit sensor into the sensor board.

[2] Position the sensor on the sensor bracket according to the marking made during the removal procedure.

[3] Install the two 2.0 mm retaining screws.

> **Note**

The sensor bracket head must be adjusted so the sensor screen is in the middle of the sensor bracket, with equal spacing between the two sides of the sensor screen and the bracket.

Laser Warning

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[4] Before replacing the scanner cover:

    (a) Go to **Settings>Diagnostics>Motion**.

    (b) In the **Linear Motor** section, click **<<** or **>>** to activate the linear motor.

    (c) The carrier begins to move, and should enter the sensor area causing the indicator light to illuminate.

[5] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[6] Install the scanner cover.

[7] Install the scanner cover screws.

[8] Switch ON the scanner.

[9] Perform an origin calibration. (See Origin Calibration on Page 115.)

Replacing the LED Indicator

Tools Required

- 3.0 mm Allen wrench
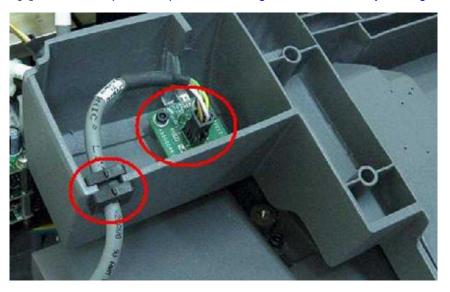
## Removing the LED Indicator

⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Perform Step 1 to Step 4 of Removing the Roof Assembly on Page 83.

[2] Turn the roof assembly over.

[3] Remove the plastic clip on the cable of the LED sensor.

[4] Disconnect the LED connector.

[5] Remove the 4 LED Indicator retainer screws using the 3 mm Allen wrench.

Installing the LED Indicator

[1] Install the 4 LED indicator retainer screws.

[2] Install the LED connector and the plastic clip holding it in place.

[3] Reassemble the roof assembly according to the procedure outlined in Installing the Tray Assembly and the Roof Assembly on Page 86.

LED Indicator Test Procedure

⚠ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Perform the Test Procedure outlined in the Replacing the Tray Assembly and the Roof Assembly Test Procedure on Page 87.

[2] While performing the test procedure, check that the LED indicator is functioning properly.

The LED indicator can appear orange or green, and the color can be blinking or steady.

LED	System Status
Orange	Powering up and Homing
Orange blinking	Error
Green	Ready for Scan
Green blinking	Scanning

Replacing the Cassette Status Sensors

Tools Required

- 2.5 x 100 mm cable ties
- 2.5 mm Allen wrench
- Wire cutters
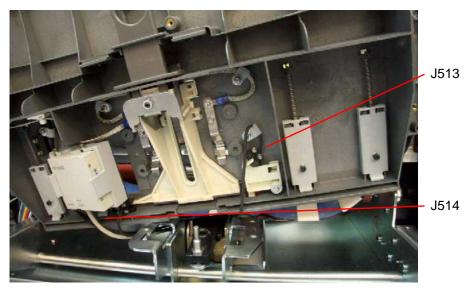
Removing the Cassette Status Sensors

⚠ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective eyewear at all times.

[1] Remove the roof assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

[2] Remove the tray assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

J513

J514

[3] Remove the sensor that needs to be replaced:
- Cassette in place sensor J513
- Cassette lock sensor J514

Installing the Cassette Status Sensors

[1] Install the sensor(s) that need to be replaced.

[2] Install the tray assembly.

[3] Install the roof assembly.

[4] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[5] Install the scanner cover.

[6] Install the scanner cover screws.

[7] Switch ON the scanner.

Cassette Status Sensors Test Procedure

⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Perform the Test Procedure outlined in Replacing the Tray Assembly and the Roof Assembly Test Procedure on Page 87.

[2] Both before and after installing the scanner cover, while performing the Test Procedure, load cassettes of all sizes and make sure that the cassette status sensors read them correctly.

Replacing the Cassette Fixation Lever Assembly

Tools Required
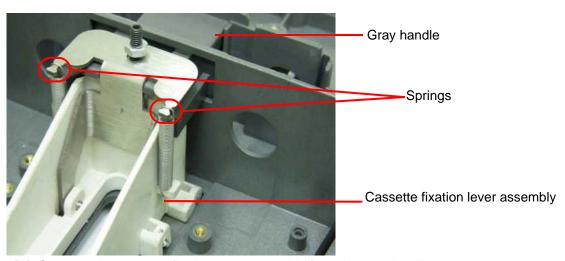
- Replacement cassette fixation lever assembly kit (SK00091)
- 4 Flat screwdrivers

Removing the Cassette Fixation Lever Assembly
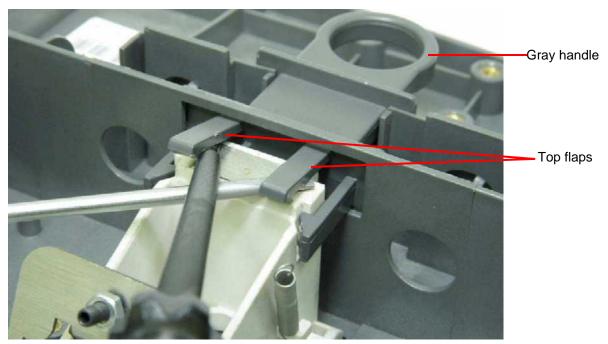
[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25).

[3] Remove the roof assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

[4] Remove the tray assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

[5] Remove the 2 Phillips screws located on top of the tray.

Gray handle

Springs

Cassette fixation lever assembly

[6] Separate the cassette fixation lever assembly from the gray handle:

    (a) Release the springs from the left and right side of the bracket.

    (b) Push down the bracket.

Gray handle

Top flaps
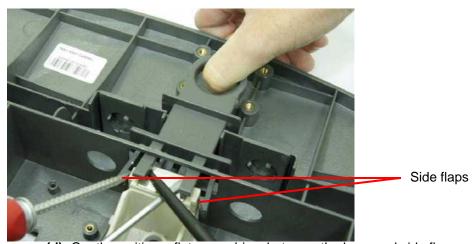
(c) Position a flat screwdriver underneath each top flap and slightly lift up the flaps.

⚠ **Important**
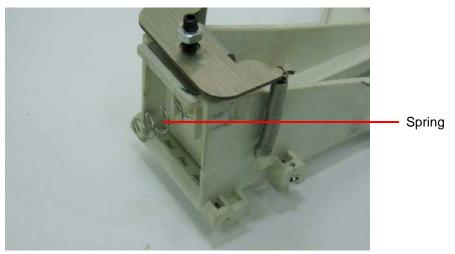
To avoid breaking the flaps, do not apply any force. If the handle breaks, use the new handle supplied in the replacement assembly kit.

Side flaps

(d) Gently position a flat screwdriver between the lever and side flaps and push the flaps out.
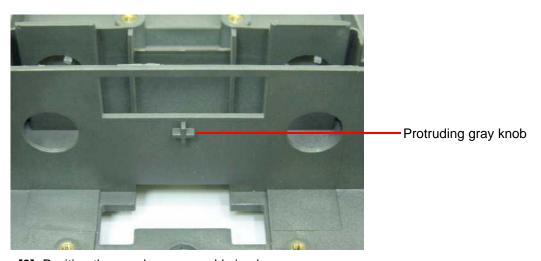
(e) Gently release the gray handle using your thumb.

Spring

[7] Remove the cassette lever fixation assembly.

[8] Remove the spring from the cassette lever fixation assembly.

Installing the Casette Fixation Lever Assembly

[1] Install the spring on the new cassette fixation lever assembly.

Protruding gray knob

[2] Position the new lever assembly in place.

▷ Note

The spring must encircle the protruding gray knob.

[3] Secure the lever assembly with its 2 Phillips screws located on the top of the tray.

[4] Turn the tray on its underside and push the gray handle into its position until you hear a click.

[5] Perform the cassette release mechanism adjustment procedure. (See Adjustment Procedure on Page 120).

Replacing the W0 Sensor

Tools Required

- 2.5 x 100 mm cable ties
- 2.5 mm Allen wrench
- Wire cutters
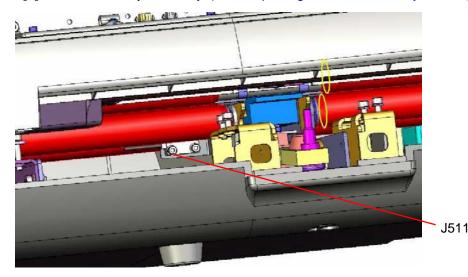
Removing the W0 Sensor

⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Remove the roof assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

[2] Remove the tray assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

J511

[3] Remove the W0 sensor (J511).

Installing the W0 Sensor
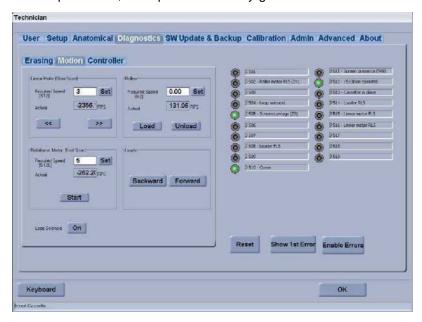
[1] Install the W0 sensor.

[2] Install the tray assembly.

[3] Install the roof assembly.

[4] Perform the test procedures in the following section.

W0 Sensor Test Procedure

⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in [Activating the Scanner Without the Cover (Laser Deactivated) on Page 26](). If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Go to **Settings>Diagnostics>Motion**.

[2] Load/unload a screen a few times using the diagnostic controls and check to see that the W0 Indicator lights up and switches off according to the position of the screen. Ensure that:

   (a) There is no unusual noise during the process.

   (b) The screen is unloaded **all the way** into the cassette.

   (c) The screen is loaded/unloaded straight.

Replacing the Z0 Sensor

Tools Required

- 2.5 x 100 mm cable ties
- 2.5 mm Allen wrench
- Wire cutters
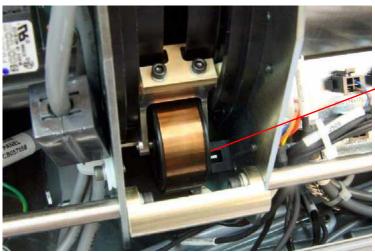
Removing the Z0 Sensor

⚠ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Disconnect the scanner from the main power.

[2] Remove the service panel and scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Disconnect the cable from the sensor board (J505).

Z0 sensor

[4] Remove the two 1.5 mm retaining screws from the sensor.

[5] Remove the sensor from the slide.

Installing the Z0 Sensor

[1] Position the Z0 sensor on the back of the drum.

[2] Loosely insert the two 1.5 mm retaining screws.

[3] Slide the sensor up or down till the screen is in the middle of the bracket.

[4] Connect the sensor connector.

[5] Before replacing the scanner cover, perform the test procedures in the section below.

[6] Check (in this order):

    a. The scanner is switched OFF.

    b. The safety interlock key is not in the interlock.

    c. The laser DIP switch is switched ON.

[7] Install the scanner cover.

[8] Install the scanner cover screws.

[9] Switch ON the scanner.

Z0 Sensor Test Procedure

⚠️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective safety glasses at all times.

[1] Go to **Settings>Diagnostics>Motion**.

[2] Load/unload a screen a few times using the diagnostic controls, and check to see that the Z0 Indicator lights up and switches off according to the position of the screen. Ensure that:

   (a) There is no unusual noise during the process.

   (b) The screen is unloaded **all the way** into the cassette.

   (c) The screen is loaded/unloaded straight.

[3] Move the screen guide up and down and check that the Z0 light in the **Diagnostics** screen turns on and off.
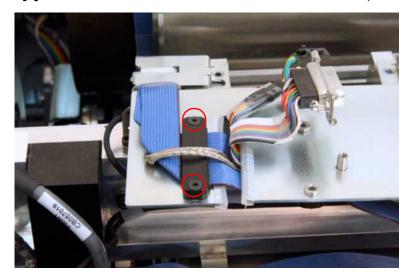
Installing the IGUS Energy Chain

Tools Required

- IGUS energy chain (female)
- IGUS energy chain (male)
- 2.5 mm Allen wrench
- 5 mm Allen wrench

Procedure
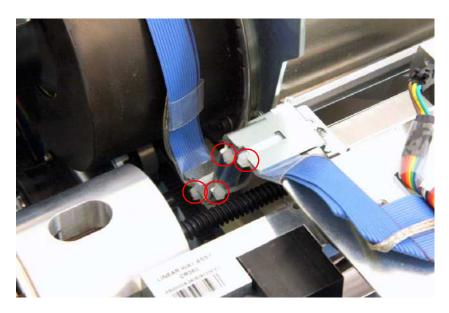
[1] Disconnect the scanner from the main power.

[2] Remove the service panel and scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Remove the laser board from the laser board bracket. (See Removing the Laser Board on Page 69.)
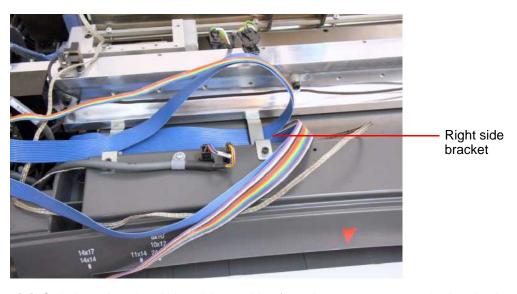
[4] Remove the 2 Allen screws securing the ribbon cable bracket.

[5] Remove the bracket.
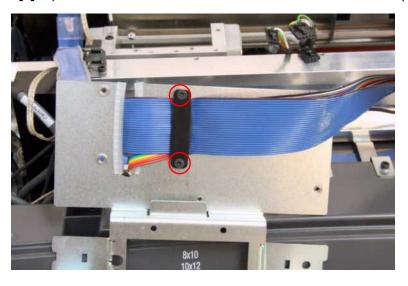
[6] Cut the 2 plastic cable ties on the right side of the laser board.

[7] Cut the 4 plastic cable ties on the left side of the laser board.

[8] Remove the white adhesive tape that binds the ribbon cables.

Right side bracket
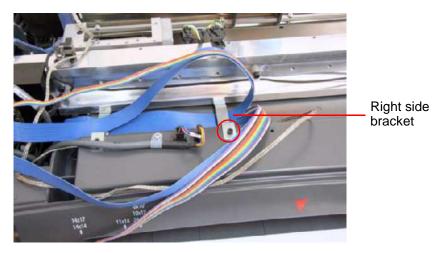
[9] Split the colored and blue ribbon cables from the connector up to the bracket located on the right side.
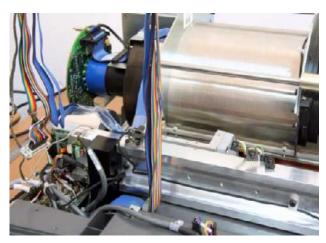
[10] Remove the 2 Allen screws.

[11] Remove the ribbon cable bracket.

[12] Clean the ribbon cable to remove glue and other dirt.

Right side
bracket

[13] Remove the ribbon cable bracket on the right side by unscrewing the Allen screw.

[14] Flatten the ribbon cables together, so they appear as one cable.
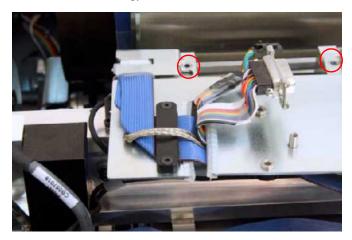
[15] Place the ribbon cables inside the U channel of the (female side) IGUS energy chain. The IGUS energy chain adjustment bracket is to the right.
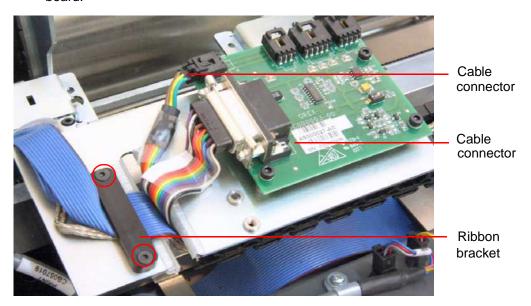
[16] Align the (male side) IGUS energy chain exactly over the female side (with the sensor board bracket to the left).
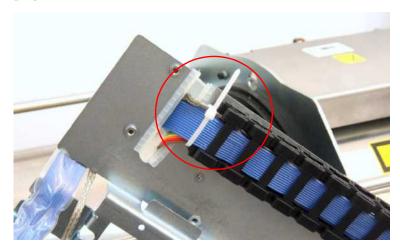
[17] Snap the IGUS energy chain together. Both male and female sides should be joined along the entire length of the IGUS energy chain.

[18] Position the new bracket connected to the end of the IGUS energy chain and secure it with the 4 Allen screws.

[19] Pull the ribbon cables, so there is enough slack for the end of the connector to reach the connector on the laser board.

Cable connector

Cable connector

Ribbon bracket

[20] Position the laser board and secure it with the 4 Allen screws.

[21] Connect the 2 connectors.

[22] Attach the ribbon bracket with the 2 Allen screws.

⬤ Note

After the ribbon cable is secured with the cable tie, you will not be able to slide the cables inside the IGUS energy chain for adjustment.
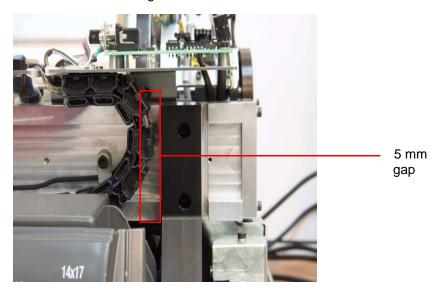
[23] Secure the ribbons with a plastic cable tie.

[24] Manually rotate the linear screw to move the optical head assembly to the right side of the scanner.

![Important icon] **Important**

Be careful not to entangle the three unconnected cables.

5 mm
gap

[25] Make sure there is a gap of at least 5 mm between the IGUS energy chain and the linear way stand when the optical head assembly is at the far right limit of travel.

![Important icon] **Important**

The IGUS energy chain must never touch the linear way stand.

[26] To adjust the gap between the IGUS energy chain and the linear way stand:

    (a) Loosen the 2 Allen screws holding the adjuster clamp to the roof.

    (b) Slide the roof so that the distance between the IGUS energy chain and the linear way stand is 5 mm when the optical head assembly is at the far right limit of travel.

    (c) Tighten the 2 Allen screws which hold the chain bracket to the roof.

Testing and Closing the Scanner Cover

[1] Check the following items:

- Cables are not entangled
- All cable ties are in place

[2] Insert the technician key in the Technician slot.

[3] Switch on the scanner.

Note

Wait two minutes for the initialization process to complete.

[4] Logon to KODAK QC software.

[5] Go to **Settings>Diagnostics**.

[6] Click to move the optical head assembly from side to side while checking that it runs smoothly without touching the linear way stand when on the right, or causing tension on the IGUS energy chain when on the left.

[7] Switch OFF the scanner.

[8] Remove the technician key.

[9] Install the scanner cover. (See Installing the Scanner Cover on Page 25.)

Replacing the Barcode Reader

Tools Required
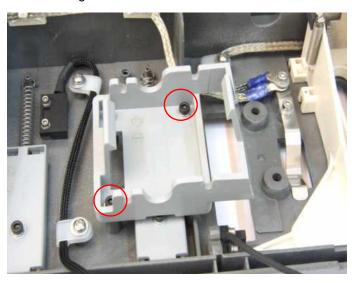
- Barcode reader kit (SK000087), which consists of:
  - Barcode reader housing bracket
  - Barcode reader with mirror bracket
  - 2.0 mm round head screw
  - 2.0 mm flat head screw
- 2.5 mm Allen wrench
- Phillips (cross-head) screwdriver
- Test target tool (Test Target Tool for Barcode Alignment Procedure on Page 213)

Removing the Barcode Reader
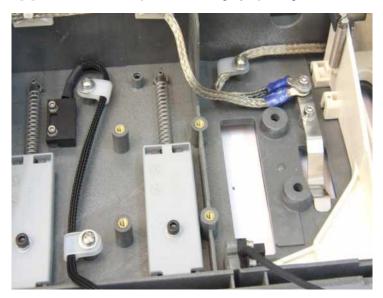
[1] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[2] Remove the roof assembly. (See Removing the Roof Assembly on Page 83.)

[3] Remove the tray assembly. (See Removing the Tray Assembly on Page 85.)

[4] Remove the barcode reader by opening the 4 Allen screws that attach the barcode reader to the old plastic housing.
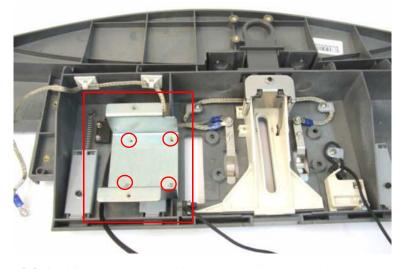
[5] Remove the old plastic housing by opening the 4 Allen screws connecting it to the tray assembly.
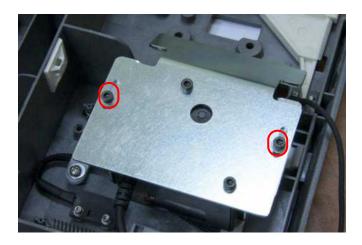
Installing the Barcode Reader

[1] Connect the barcode reader cable to J6 on the controller board.

[2] Position the new metal barcode reader housing bracket and secure it with the four 2 mm flathead Allen screws.

⚠️ **Caution**

Do not touch the surface of the mirror bracket.

The mirror bracket must be dust/dirt free before installation.
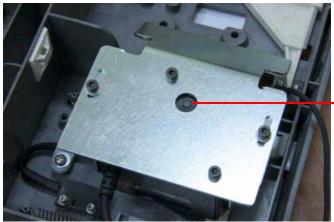
**[3]** Place the new barcode reader with the mirror bracket on the metal housing bracket and secure it with the 2 round head screws.
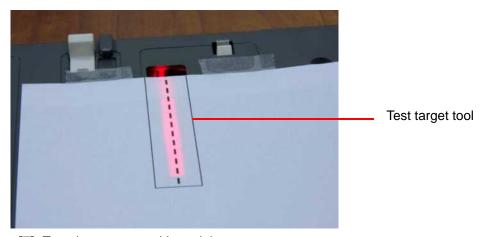
☀️ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Activating the Scanner Without the Cover (Laser Deactivated) on Page 26. If the laser must be activated during the service procedure, wear protective eyewear at all times.

[4] Check (in this order):

  a. The safety interlock key is not in the interlock.

  b. The laser DIP switch is switched ON.

[5] Switch ON the scanner.

[6] Push the button located on the barcode reader to manually operate the reader.

  A red light illuminates.

Test target tool

[7] Turn the tray assembly upright.

The barcode reader is facing downward.

[8] Align the test target tool directly over the open space of the barcode reader.

Note

If needed, use scotch tape to hold the sheet in place.

[9] Does the barcode beam align with the dotted line?

Yes	No
Proceed to Step 10.	Align the barcode reader by sliding the mirror bracket up or down. To slide the mirror bracket, loosen the two 3.0 mm screws located on the left and right side of the mirror bracket. Once aligned, tighten the screws and proceed to Step 10.

[10] Push the button located on the barcode reader to turn OFF the reader.

Important

Ensure that the barcode reader cable is secured and cannot be caught by any moving parts.

[11] Route the new barcode cable under the scanner drum.

[12] Install the tray assembly. (See Installing the Tray Assembly and the Roof Assembly on Page 86.)

[13] Install the roof assembly. (See Installing the Tray Assembly and the Roof Assembly on Page 86.)

[14] Install the scanner cover. (See Installing the Scanner Cover on Page 25.)

Section 4: Calibrations

Four parameters must be calibrated in the Point-of-Care CR 360: origin, offset, system gain tuning, and OCPC process. The unit is calibrated at the factory before it is shipped. Calibration is necessary after replacing or re-installing certain components, as detailed in the replacement procedures themselves.

Introduction

The Calibrations Tab

- A green check mark next to a date box indicates that the system is calibrated.
- The date box indicates the date that the calibration took place.
- A red X next to a de-activated date box indicates that the system is not calibrated.
- If a calibration procedure does not succeed, repeat the procedure.

Equipment Required
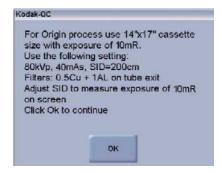
- Calibrated dosimeter
  - Dose range from <0.1 mR to >10 mR
  - Precision 5%
- Rectangular plates for X-ray filtration
  - 0.5 mm copper
  - 1.0 mm aluminum
- Lead sheet or lead apron (use the lead apron throughout the test to avoid backscatter)
- Calibration Results Report (see Calibration Results Report on Page 212)

Origin Calibration

The origin calibration determines the starting point of a scanning procedure (x,y coordinates).

Origin calibration must be performed after replacing the linear slide assembly, optical head assembly, or the linear limit (Origin) sensors.

[1] Make a 10 mR exposure of a 14 x 17 in. flat field.

- Settings: 80 kVp, 40 mAs, SID=200
- Filters: 0.5 mm Copper and 1.0 mm Aluminum on the tube exit

[2] Adjust the SID to measure an exposure of 10 mR on screen.

[3] In the **Setup** tab, check **16-bit Image**.

[4] Check **Set Origin** in **Calibration**.

[5] Insert the cassette into the scanner and click **OK**. The system performs the calibration automatically.

[6] At the message "Origin successfully found...Would you like to save the new result?", click **Yes**.
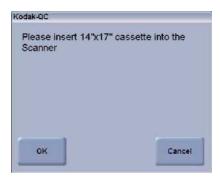
[7] Verify that a green check mark appears next to the **Set Origin** window.

[8] Record the results in the Calibration Report (typical results: x=0, y=530).

Offset Calibration
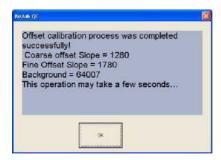
The offset calibration can be performed only if the Origin parameter is calibrated.

The offset calibration is required to set the zero level needed to convert output signals from Analog to Digital signals. This auto zero process determines the noise level before any image acquisition and provides the appropriate offset.

[1] In the **Setup** tab, check **16-bit Image**.

[2] In **Calibration**, check **Offset** and click **Start**.

[3] Click **OK** and insert an erased cassette into the scanner.

- The system performs an erasing procedure and reloads the cassette.
- The offset calibration is performed.

[4] Click **OK** to return to **Calibration**.

[5] Verify that **Set Offset** is marked with a green check mark.

[6] Record the results in the Calibration Report.

System Gain Tuning

Purpose

▷ **Note**

System gain tuning can be performed only if the Origin and Offset parameters are calibrated.
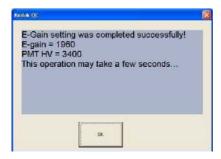
System gain tuning sets the internal electronic gain. The electronic gain is tuned using a 10mR exposure to obtain a target code value of 48,000 (16,000 counts). In log-space this is equivalent to an APV of 3,000. The PMT high-voltage is kept at fixed value and electronic gain is tuned slightly in the nominal value proximity. In this test a 12-bit raw image should be inspected (AR folder image).

System Gain Tuning Procedure

[1] In **Calibration**, select **Set E-Gain** and click **Start**.

[2] Make a 10 mR exposure of a 14 x 17 in. flat field according to the values presented in the screen message that appears.

- Settings: 80 kVp, 40 mAs, SID=200
- Filters: 0.5 mm copper and 1.0 mm aluminum on the tube exit

[3] Adjust the SID to measure exposure of 10 mR (±0.2 mR) on screen.

[4] Click **OK** to continue or **Cancel** to stop the process and return to the main window.

[5] Wait five minutes, then insert the cassette into the scanner and click **OK**. The screen scanning begins.

[6] Click **OK** to return to the **Calibration** window.

[7] Verify that **Set E-Gain** is marked with a green check mark.

[8] Record the results in the Calibration Report.

[9] Manually erase the cassette.

OCPC Process Calibration

Purpose

Every optical collector has its own unique profile (signature) along the scan line. During this process an algorithm is applied to compensate for this profile and to flatten the flat field.

In this test, a 12-bit raw image should be inspected (AR folder image).

OCPC Process Calibration Procedure

⚠ Important

Before you continue, be sure the cassette has been manually erased.

[1] In **Calibration**, check **14 x 17 HS**, and click **Start**.

[2] Make a 10 mR exposure of 14 x 17 in. cassette according to the values presented in the screen message that appears.

- Settings: 80 kVp, 40 mAs, SID=200
- Filters: 0.5 mm copper and 1.0 mm aluminum on the tube exit

[3] Adjust the SID to measure exposure of 10 mR (±0.2 mR) on screen.

[4] Click **OK** to continue or **Cancel** to stop the process and return to the main window.

[5] Insert the cassette into the scanner and click **OK**.

[6] Click **OK** and return to **Calibration**.

[7] Verify that **14 x 17 HS** is marked with a green check mark.

[8] Repeat the procedure on three types of cassettes:

- 14 x 17 HR

- 8 x 10 HR

- 10 x 12 HR

[9] Record the results in the Calibration Report.

> **Note**

When the system is ready for clinical use, verify that the 16-bit option in **Setup** is unchecked.

Section 5: Adjustments

Adjusting the Cassette Release Mechanism

Tools Required

- 2 mm long-shaft Allen wrench
- CR 360 Tool Kit (SK000098): contains Sub Kit 1 (SK000152)

Sub Kit 1
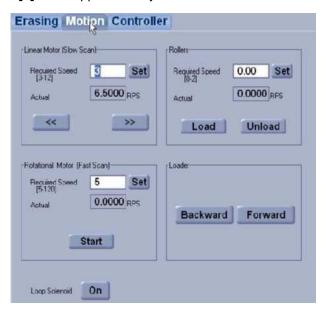
Part Name	Description	Picture
Cassette Eject POS Tool Kit (SK000152)	Aluminum ruler gauge	
	Aluminum T-piece slider gauge	
	Long 7 mm pipe socket wrench	

Adjustment Procedure

[1] Disconnect the scanner from the main power.

[2] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[3] Place the Tech plug in its position. (See Activating the Scanner Without the Cover (Laser Deactivated) on Page 26.)

[4] Remove the roof assembly. (See Removing the Roof Assembly on Page 83.)
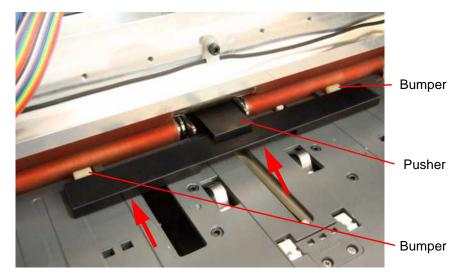
[5] Logon to KODAK QC software.

[6] Go to **Settings>Diagnostics**.

[7] Switch ON the scanner.

[8] Wait approximately two minutes for the initialization process to complete.
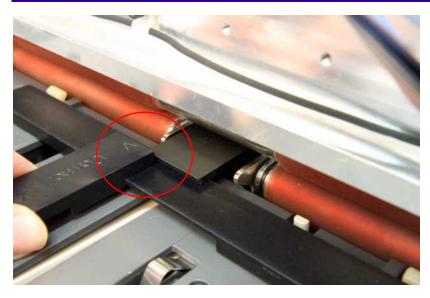
[9] Select **Motion**.

[10] Click **Backward**.

> **Note**
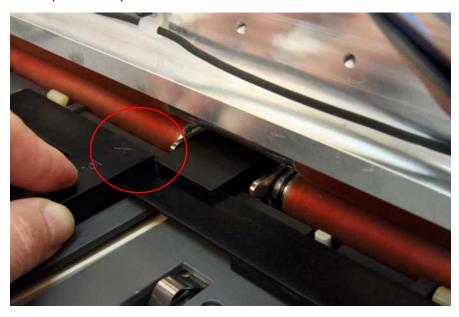
The loader pin and pusher move towards you.

Bumper

Pusher

Bumper

[11] Place the ruler gauge under the pusher and align it against the bumpers.

[12] Place the T-piece slider on the ruler gauge with the **V** closest to the ruler, and slide it along the ruler. Check that it passes the pusher.

[13] Reverse the T-piece slider, place it on the ruler with the **X** closest to the ruler, and slide it along the ruler. Check that it does not pass the pusher.

[14] Are the conditions in Step 12 and Step 13 met?

Yes	No
The test has passed. Remove the T-piece slider and ruler gauge and advance to Step 20.	The test has failed. Proceed to Step 15.

[15] Remove the T-piece slider and ruler gauge.

[16] Click **Forward**.

> **Note**
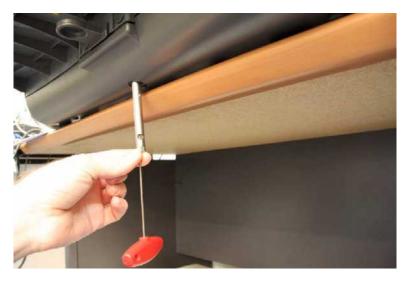
The loader pin and pusher move away from you.

[17] Remove the plastic tab on the underside of the unit and loosen the locking nut with a 7 mm long-shaft socket wrench.

> **Note**
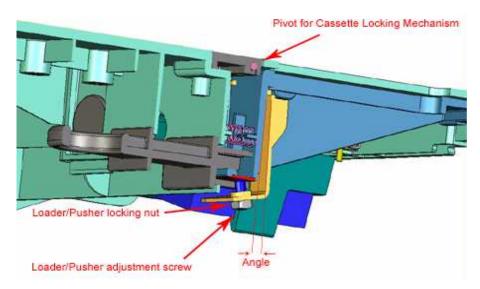
The greater the angle, the sooner the cassette is released.

[18] With a long-shaft 2 mm Allen wrench, adjust the positioning of the loader/pusher and close the locking nut.

- Turning the Allen screw clockwise (opening the screw) moves the pusher part away from the unit.
- Turning the Allen screw counterclockwise (closing the screw) moves the pusher part towards the machine (away from you).

▷ **Note**

Clockwise/counterclockwise are described from the perspective of viewing the long-shaft Allen wrench from the hand end and not from the head.

✳ **Important**

Make sure to close the locking nut before checking the alignment of the tray.

[19] Repeat Step 9 – Step 14.

[20] Replace the roof assembly. (See Installing the Tray Assembly and the Roof Assembly on Page 86.)

[21] Remove the Tech plug.

[22] Install the scanner cover. (See Installing the Scanner Cover on Page 25.)

Auto-loop Solenoid Test

Introduction

The following tests check that the auto-loop solenoid is functioning correctly. If one of the tests fails, stop testing and replace the roof assembly. (See Installing the Tray Assembly and the Roof Assembly on Page 86.)

 Caution

- If the fork is aligned too low, the screen may be grabbed by the fork and damaged.

- If the fork is aligned too high, the screen may not be fully inserted into the cassette.

Tools Required

- CR 360 Tool Kit (SK000098): contains Sub Kit 2 (SK000153, SK000154)

Sub Kit 2

Part Name	Description	Picture
SK Auto-loop Off gauge (SK000153)	Solenoid Off gauge	
SK Auto-loop On gauge (SK000154)	Solenoid On gauge	
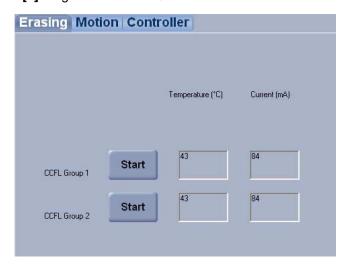
Solenoid Off Test (Go/No Go)

> **Note**
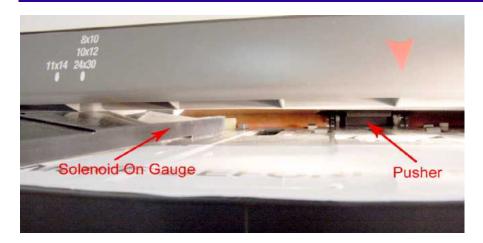
- The erase lamp turns off automatically when it gets too hot. To allow the lamp to cool down, click **Stop**. Click **Start** to turn the erase lamp on again.

- While the erase lamp is cooling, shine a strong lamp into the flap to continue work.

[1] Switch ON the scanner.

[2] Logon to KODAK QC software.
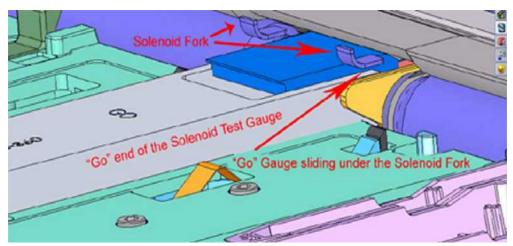
[3] Go to **Settings>Diagnostics>Erasing**.
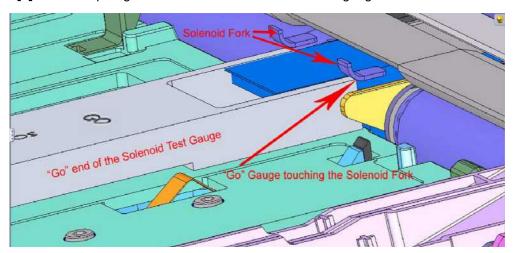
Note

The Solenoid On gauge is used to hold up the flap so that you can use the Solenoid Off gauge for the test.

[4] Slide the Solenoid On gauge under the side of the flap to allow access to the solenoid.

[5] Click either **Start** button. The erase lamp turns on.

[6] Slide the prongs of the **GO** end of the Solenoid Off gauge under the solenoid fork.

[7] Do the prongs slide under the fork of the solenoid without touching it?
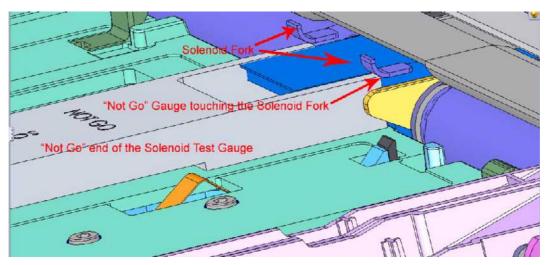
Yes	No
The test has passed.	The test has failed.

[8] Click **Start**. The erase lamp turns on.
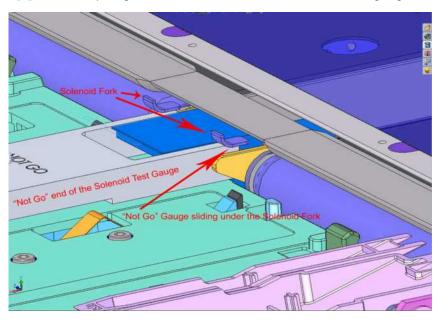
⚠️ Caution

Do not push or force the Solenoid Off gauge under the solenoid fork. This will damage the fork and alignment.

[9] Slide the prongs of the **NOT GO** end of the Solenoid Off gauge to the solenoid fork.

[10] Do the prongs of the **NOT GO** end of the Solenoid Off gauge touch the fork of the solenoid but not slide under it?

Yes	No
The test has passed.	The test has failed.
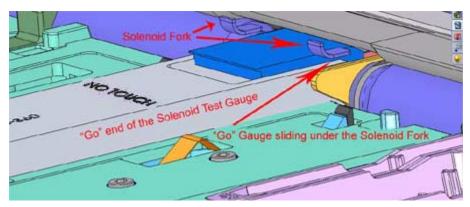
Solenoid On Test (Touch/No Touch)

[1] Select **Motion**.

> **Note**

The Solenoid Off gauge is used to hold up the flap so that you can use the Solenoid Off gauge for the test.

[2] Slide the Solenoid Off gauge under the side of the flap to allow access to the solenoid.

[3] Slide the prongs of the **No Touch** end of the Solenoid On gauge under the solenoid fork.

> **Note**

Shine a strong lamp into the flap, so that you can see the solenoid fork without waiting for the erase lamp to cool down. If you do not have a lamp, click **Erasing**>**Start** to turn the erase lamp on and off again as needed.

[4] Observe the gap between the Solenoid On gauge and the solenoid fork while performing <u>Step 5</u> and <u>Step 6</u>.

[5] In **Motion**, next to **Loop Solenoid,** click **On**. The solenoid pushes the fork down for about half a second.

[6] Does the solenoid fork touch the **NO TOUCH** end of the Solenoid On gauge?

Yes	No
The test has failed.	The test has passed.

[7] Click **OFF**.

[8] Slide the prongs of the **TOUCH** end of the Solenoid On gauge under the solenoid fork.

[9] In **Motion**, next to **Loop Solenoid**, click **On**. The solenoid pushes the fork down for about half a second.

[10] Does the solenoid fork touch the **TOUCH** end of the Solenoid On gauge?

Yes	No
The test has passed.	The test has failed.

[11] Click **Off.**

[12] Click **OK.**

Adjusting the Plate Pusher

Tools Required
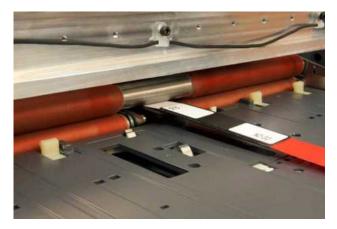
- Trolley Roller Gauge 0.3 mm and 0.4 mm (SK000024)
- 2.5 mm Allen wrench

Adjustment Procedure
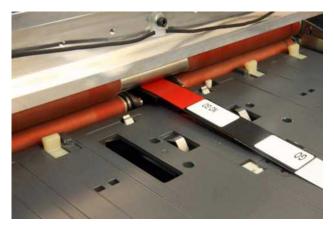
> **Note**

This adjustment can be performed either with the tray assembly assembled or removed.

[1] Go to **Settings>Diagnostics** and move the loader to its back position.

[2] Remove the scanner cover and remove the roof assembly. (See Replacing the Roof Assembly and Tray Assembly on Page 83.)

[3] Insert each end of the Trolley Roller Gauge between the pusher and the roller.

GO End (0.3mm)	NO GO End (0.4 mm)
If this end enters the gap easily, the **GO** end is adjusted. If it does **not**, the pusher height is incorrect. Proceed to Step 4.	If this end does **not** enter the gap, the **NO GO** end is adjusted. If it does, the pusher height is incorrect. Proceed to Step 4.

[4] If the pusher height is incorrect:

  (a) Remove the tray.

  (b) Loosen the motor frame retainer screws.

  (c) Adjust the frame position as necessary.

[5] Repeat Step 3 to verify the adjustment

Section 6: Preventive Maintenance

Cleaning the Rollers

Roller Cleaning Cycles

The roller-cleaning device enables you to clean the rollers that feed the storage phosphor screen from the cassette into the scanner. Clean the rollers periodically to remove dust and small particles.

Every 1,000 scanning cycles the following message appears.

If you do not clean the rollers, the message appears every 100 scanning cycles. Cleaning the rollers resets the roller cleaning counter.

⚠ Important

Not cleaning the rollers periodically will reduce the image quality.

Roller Cleaning Procedure
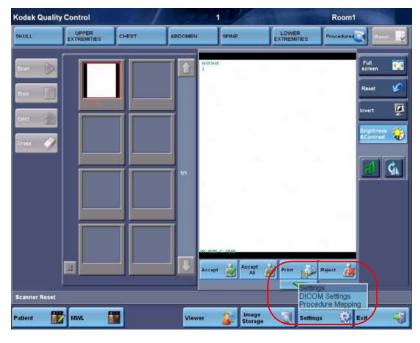
▷ Note
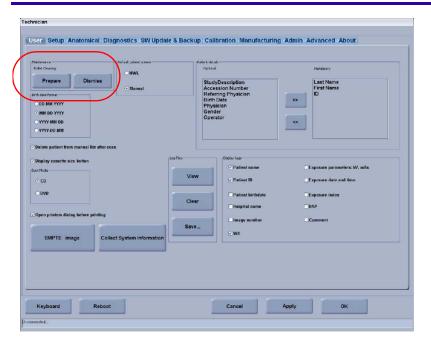
Perform the roller cleaning procedure three times.

The roller-cleaning device includes the following items:
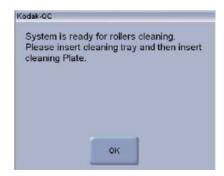
- Cleaning tray
- Cleaning plate with adhesive strips inside a protective envelope

[1] Remove any cassettes and screens from the scanner.

[2] Start the KODAK QC software.
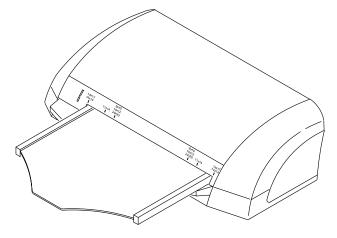
[3] Go to **Settings>User**.

[4] Click **Prepare**.
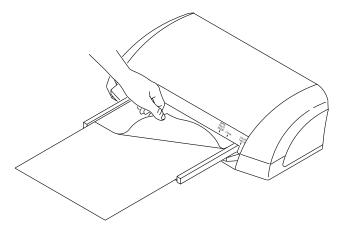
[5] Before you click **OK**, perform Step 6 – Step 8.
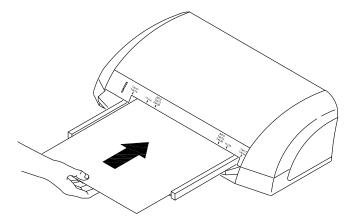
[6] Insert the cleaning tray into the unit tray. Make sure it locks into place.

[7] Place the cleaning plate on the tray. Make sure the cleaning plate is placed in the correct direction, as specified on the plate.

[8] Remove the protective paper from the cleaning plate to expose the adhesive.

[9] In the KODAK QC Software window, click **OK**.

[10] While holding onto the plate, push the plate gently into the scanner until the rollers start to pull it into the scanner. It should go in almost entirely, with approximately a quarter of the plate remaining outside.

[11] The system ejects the cleaning plate and the cleaning tray automatically.

Dismissing the Roller Cleaning Reminder

⚠ **Important**
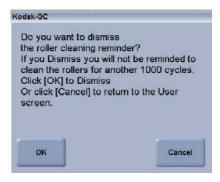
Not cleaning the rollers periodically will reduce the image quality.

[1] To prevent the roller cleaning reminder from appearing every 100 cycles, in **Maintenance**>**Roller Cleaning**, click **Dismiss**.

[2] Click **OK** to dismiss the message or **Cancel** to return to the User screen.

Cleaning the Phosphor Screens

Introduction

Failure to routinely clean the phosphor screens with a recommended solution may create the following results:

- The screen may not move smoothly from the cassette into the reader, causing an error message.
- The screen may not fully return to the cassette at the end of the cycle, preventing the cassette from latching. No error message appears.
- Artifacts could appear on radiographs.

Cleaning the Phosphor Screens

[1] Your system will issue a warning periodically reminding you to clean the phosphor screens.

[2] Refer to the *Screen and Cassette Cleaning Instructions* Sheet.

Cleaning the Scanner

⚠️ **Caution**

Do not use alcohol or alcohol-based products to clean any of the scanner components.

[1] Clean the outer surfaces only with water using a soft, lint-free cloth.

[2] Dampen the cloth, then wipe the outer surfaces lightly.

Section 7: Key Operator Settings

The advanced settings wrench is used to access advanced features of the QC and CR software. Available tabs depend on the user's designation. (See Admin Tab on Page 147.)

Accessing Advanced Settings

To enter **Advanced Settings**, go to **User>Settings**.

For an Operator-level user, a list box opens with three options: **Settings, Procedure Mapping**, and **Annotations Tool**.
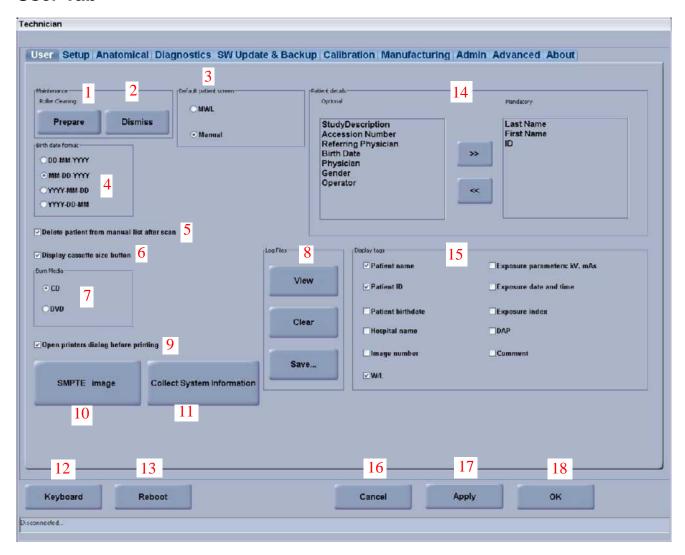
When the operator selects **Settings,** two tabs are provided: **About** and **User**.

For a Key Operator or a Full Service Operator, a list box opens with four options: **Settings**, **DICOM Settings**, **Procedure Mapping,** and **Annotations Tool**.

 When these personnel select **Settings**, available tabs depend on the user's designation.

User Tab
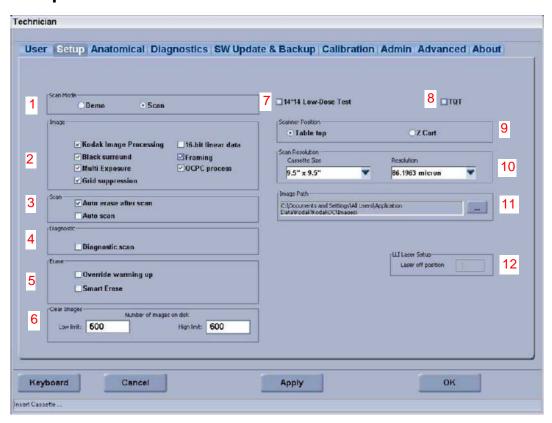
The User tab is accessible by all user levels. It contains parameters that may be set for local clinical preferences: birth date format, the default screen that opens when the interface is opened, patient detail field settings, and which display tags can be used. The roller cleaning procedure is also initiated in the User tab.

#	Component	Description
1	Prepare	Enables you to perform roller cleaning. (See Cleaning the Rollers on Page 130.)
2	Dismiss	Defers roller cleaning after receiving a message to perform the procedure. (See Cleaning the Rollers on Page 130.)
3	Default Patient Screen	Determines whether MWL or manual patient list will be the default display. MWL is usually the default. • MWL: Operator chooses from patient list. • Manual mode: Operator enters the patient details.
4	Birth Date format	Allows you to select the preferred format.
5	Delete patient from manual list after scan	When checked, the patient is automatically deleted from the Manual Patient list after scanning. If not selected, the operator must manually delete patient names from the Manual patient list periodically.
6	Display cassette size button	When checked the **Cassette Size** button will appear on the scan screen and the operator can select the cassette size. If not checked, the **Cassette Size** button will appear only if there is a problem with the barcode reader.

#	Component	Description
7	Burn Media	This option is for the burn CD/DVD from image storage. Choose between CD and DVD writing. For the DVD option, NERO software must be installed.
8	Log Files	View, Clear, and Save system log files. • View: opens the Log File drop-down list. • Clear: saves the present log file in the **Archive Log Files** directory and creates a new Log File list. • Save: retains existing log file and saves it to the selected file location. A Full Service operator can delete log files.
9	Open printers dialog before printing	When checked, allows the operator to choose different print options.
10	SMPTE image	Loads a grayscale SMPTE screen image for a screen quality check.
11	Collect System Information	Save system information for problem analysis.
12	Keyboard	Activates on-screen virtual keyboard.
13	Reboot	Switches the system OFF and ON.
14	Patient Details	Determines which fields will appear on manual patient selection screen. Mandatory Patient Details: • Have a red asterisk to the right of the field name. • Are displayed in red letters on the Manual Patient Entry. • Last Name, First Name, and ID are defaults and cannot be transferred from the mandatory list. • Other details may be set as mandatory. To transfer a patient detail between the mandatory and optional lists: • Select the patient detail. • Click **>>** or **<<** to move the detail to the opposite list.
15	Display tags	Select which tags (values) will appear on the image window after scan.
16	Cancel	Cancel all changes made on the screen.
17	Apply	Save all changes made on the screen.
18	OK	Closes the User tab; if unsaved changes were made, a pop-up will prompt the user to save or cancel the changes.

Setup Tab

The Setup tab is used to enable or disable certain applications. It can be accessed by both the Key Operator and the Full Service Operator.
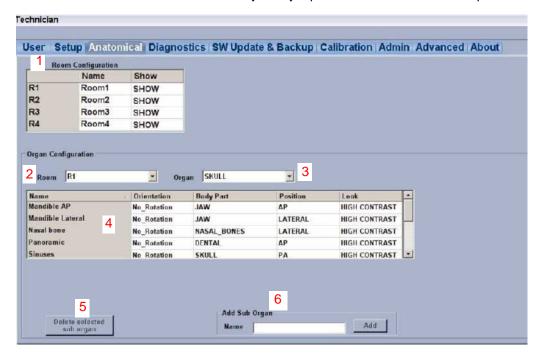
#	Component	Description
1	Scan Mode	Set **Scan Mode** to **Scan** for normal scanning of cassettes. Select **Demo** to simulate a scan that displays example images. No cassette is required in Demo mode. The images are located in **C:\Program Files\Kodak\KodakQC\CR 360\Demo Images** folder.
2	Image options	Sets image processing options for the scanned image.
		KODAK Image Processing is a mandatory image enhancement tool which includes six different looks. Looks are determined in the Anatomical tab.
		Black Surround activates automatic detection of the collimation regions and surrounds them with black borders. Default: checked.
		Multi Exposure on a single screen displays all sub-image fields and black-masks the collimation. Default: unchecked.
		Grid Suppression applies an algorithm to remove grids lines caused by using stationary grid. Grid Suppression algorithm requires 103 lp/mm. Default: checked.
		16-bit linear data saves the raw unprocessed images as a 16 bit image in **C:\Program Files\Kodak\KodakQC\Images\Linear Images**. Service use only.
		Framing removes the white screen overscan. Default: checked.
		OCPC process corrects for collector profile (uniformity). It can be activated if Framing is activated. Default: checked.

#	Component	Description
3	Scan options	**Auto erase after scan** erases the cassette after each scan. Default : checked. **Auto scan** initiates a scan automatically when scan prerequisites have been met. Default: unchecked. For Auto-scan to be performed, the following should be done: • Patient details entered • Cassette loaded • Body part and sub-part selected
4	Diagnostic	**Diagnostic scan** is used by Full Service Operators to evaluate the image data of a scan for troubleshooting scanner image quality problems. When selected the Scan Parameters screen appears in the scan window while the image is being scanned. Default: unchecked.
5	Erase	**Override warming up** can be used by Full Service operators when troubleshooting a scanner. Default: unchecked. **Smart Erase** sets the erase time according to the level of phosphor screen exposure. Default: checked.
6	Clear Images	**Low limit:** The number of images that will remain in the database after the deleting process that is initiated by number of images reaching the high limit value. The oldest images are always deleted. **High limit:** The maximum number of images to be stored in the hard drive.
7	14*14 Low-Dose Test	Not applicable.
8	TQT	To activate TQT (Total Quality Tool) image analyzing module. For details on this optional acquisition, see *KODAK Point-of-Care TQT Users' Guide*.
9	Scanner Position	Check according to scanner placement: on a table top or in a Z-cart at 60°. (This is normally defined during the Installation procedure.)
10	Scan Resolution	Select scan resolution for cassettes that can be given more than one option. Currently only large cassettes have more than one option.
11	Image Path	Set the file destination path. On the Point-of-Care CR 360, the system image store path default is **C:\Program Files\Kodak\KodakQC\Images**.
12	LLI Laser Setup	Not applicable.

Anatomical Tab

⬜▷ **Note**

The **Anatomical** tab can be accessed by a Key Operator and a Full Service Operator.

#	Component	Description
1	Room Configuration	Edit Room names, select Show/Hide rooms. At least one room must be in Show mode.
2	Room	Select Room from drop-down list.
3	Organ	Select Organ (Body Part). Related sub organs (view positions) appear in the main list.
4	Main list	Display Sub Organ list for selected Room and Organ.
5	Delete selected sub organ	Select a Sub Organ and click **Delete selected sub organ** button to delete it from the main list. A sub organ that is assigned to a procedure in the procedure mapping tool cannot be deleted.
6	Add Sub Organ	Enter a name and click **Add** to add to the main list.

Room Configuration: enables pre-defined configuration according to specific X-ray units in the location. **Rooms** represent a set of user-defined parameters that correspond to a specific X-ray unit—its name and the position names of the organ and sub-organ images acquired there.
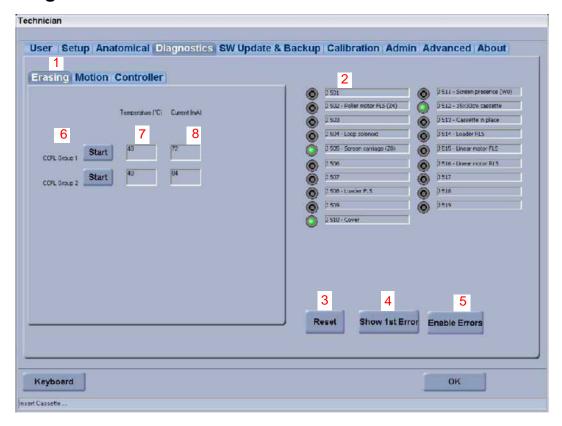
Organ Configuration: is limited to six organs. The body part is included in the DICOM header and to define image processing parameters.

Image Processing Look: For each body part name, a different image processing look can be selected.

Image Processing Look	Characteristics	Usage
High Contrast	System default setting	Suitable for all body parts
Wide Latitude	For images needing wide latitude	Abdomen, spine, chest
Extremity	High contrast, narrow latitude	Extremity imaging
Medium Contrast	Universal look, less contrast than High Contrast	Suitable for all body parts
Standard	Less contrast than Medium contrast. Soft or smooth look	Suitable for all body parts
Traditional	Contrast, latitude and sharpness remain fixed, like film. Brightness adjusted to correct for under- and over-exposure	Suitable for all body parts

There is no limitation for sub-organs (body parts). Sub organs are listed in alphabetical order.

Diagnostics Tab

The **Diagnostics** tab is used to check the electrical and mechanical components of the scanner.

The right side displays the sensor LEDs. Sensor LEDs light green when they are activated; otherwise they are unlit.

The left side has three sub-tabs:
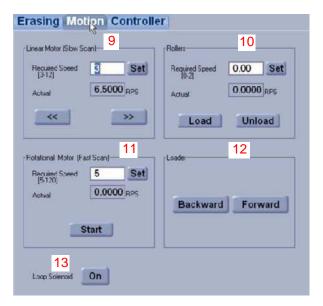
- **Erasing**
- **Motion**
- **Controller**
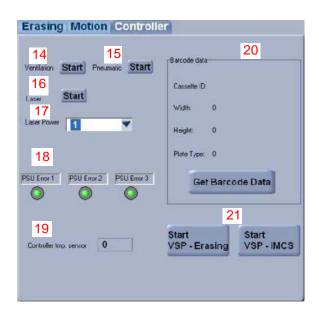
Sensor LED Names

#	Sensor LED Name	#	Sensor LED Name
J501	reserved	J511	W0 sensor
J502	Roller motor (Z4)	J512	15 x 30 cassette adapter sensor
J503	reserved	J513	Cassette presence sensor
J504	Loop solenoid sensor	J514	Cassette hold sensor
J505	Screen carriage (Z0)	J515	Left limit sensor
J506	reserved	J516	Right limit (Home) sensor
J507	reserved	J517	reserved
J508	Loader back position sensor	J518	reserved
J509	reserved	J519	reserved
J510	Cover sensor		

Erasing Tab

#	Component	Description
1	Function Tab	Choose the function type to be diagnosed.
2	Sensor LED indicators	View status of sensors in the system. When the green LED is on, the sensor is active; otherwise, it is not active.
3	Reset	Click to simulate unload and reset operations.
4	Show 1st Error	When activated, the first error message that comes from the firmware will appear.
5	Enable Errors	The error message mechanism is disabled when entering **Diagnostic** mode. Click to activate the error message mode. To deactivate the error message mode, exit and re-enter the **Diagnostic** screen.
6	Erase Lamps groups	Activates groups of erase lamps to diagnose the group's functioning. Use the **Start/Stop** button to activate/deactivate the lamps.
7	Temperature	Temperature display is activated only when erase lamps are not activated.
8	Current	Current values indicate the efficiency of the lamps.
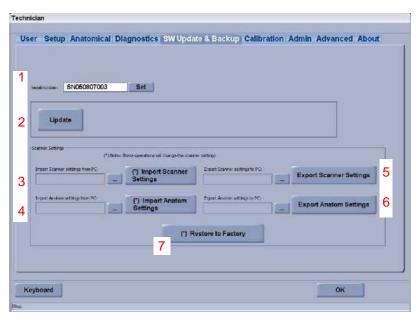
Motion Tab

#	Component	Description
9	Linear Motor (Slow Scan)	Activates the linear motor. Set the required speed and click **<<** and **>>** to choose the direction. Actual revolution speed appears in the **Actual** window.
10	Rollers	Activates the rollers motor. Set the required speed and use the **Load/Unload** buttons to choose the movement direction. Actual revolution speed appears in the **Actual** window.
11	Rotational Motor (Fast Scan)	Activates the rotational motor. Set the required speed and use the **Start/Stop** button to activate/deactivate the motor. Actual revolution speed appears in the **Actual** window.
12	Loader Motor	Click **Backward** and **Forward** to activate the loader motor.
13	Loop Solenoid	Click **On** to activate the loop solenoid mechanism for 1 second. Click **Off** to change the status of the button.

Controller Tab

#	Component	Description
14	Ventilation	Not active.
15	Pneumatic	Not active.
16	Laser	**Start/Stop** button activates the laser.
17	Laser Power	Set the strength of the laser power.
18	PSU Error LEDs	Not active.
19	Controller tmp. sensor	Displays the temperature in the vicinity of the controller board.
20	Get Barcode Data	Activates the barcode reader and displays the values read. Click **Get Barcode Data** when a cassette is inserted to acquire barcode data.
21	VSP activation buttons	Clicking the VSP buttons disconnect the scanner normal USB channel and open the USB Virtual Serial Port channel (VSP) to the IMCS board. (Driver installation required.) (See <u>Updating the Controller Files on Page 181</u>.)

SW Update & Backup Tab

⬕ **Note**

Back up the Scanner and Anatom settings when you first arrive at the site and as a final step before leaving the site.

The SW Update & Backup tab is used:

- To update the scanner's firmware, FPGA, and NIOS settings.
- To restore the Scanner and Anatom settings.
- To perform backups.

#	Component	Description
1	Serial Number	Displays the scanner serial number. Set Serial Number is a procedure available to Admin level users only.
2	Update	Opens the Update options dialog on the screen in order to update firmware, FPGA, and NIOS.
3	Import Scanner Settings	Enter the path to the Scanner settings file and click the button to import.
4	Import Anatom Settings	Enter the path to the Anatom settings file and click the button to import.
5	Export Scanner Settings	Enter a path and file name to create the Scanner settings file and click the button to export. Use to back up the scanner settings.
6	Export Anatom Settings	Enter a path and file name to create the Anatom settings file and click the button to export. Use to back up the Anatom settings.
7	Restore to Factory	⚠ **Important** This will erase all calibrations and system settings. Full calibration will be required. Click to restore the factory settings.
8	Updates dialog box	When you click **Update,** this dialog box appears. (See Step 1 on page 145.)

Backing Up (Export) Scanner and Anatom Settings

[1] Click **…** next to **Export Scanner Settings**. The **Save as** dialog box appears.

[2] Enter an appropriate file name such as **Scanner_Backup_Date**.

[3] Click **Save**.

[4] Click **Export Scanner Settings** to back up.

[5] Repeat Step 1 - Step 4 to back up Anatom settings.
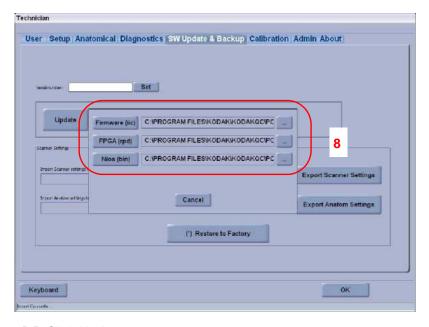
To Restore (Import) Scanner and Anatom settings:

[1] Click **…** next to **Import Scanner Settings**. The **Open** dialog box appears.

[2] Select the file that you previously created for receiving the export settings.

[3] Click **Open**.

[4] Click **Import Scanner Settings** to restore.

[5] Repeat Step 1 to Step 4 restore Anatom settings.

> **Note**

The **Restore to Factory** button restores the pre-defined Factory Scanner and Anatom values. This button should only be used when you suspect that the current setting and backup values are corrupt. **Restore to Factory** is used return the scanner to an operational state. After using **Restore to Factory** the four calibrations must be performed.

Updating Firmware, FPGA, and NIOS Settings

[1] Click **Update**.

[2] To update firmware from the default path, click **Firmware**.

To update firmware from another path, click **...** to the right of the firmware default path name, and enter the path details.

[3] When the update is complete a message appears in the left side of the task bar requesting that you restart the system.
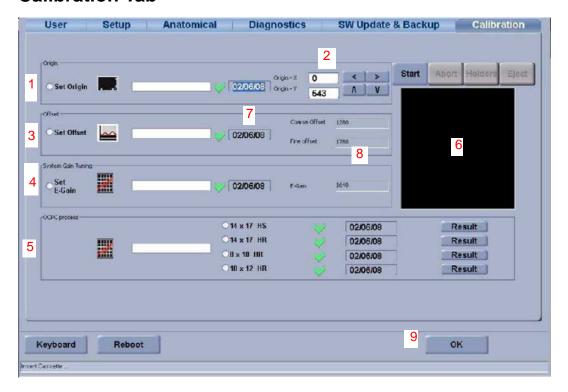
> ⚠ **Caution**

After FPGA installation, you must install NIOS. Do not switch off the system after FPGA without installing NIOS.

[4] Follow the same procedure to update FPGA and NIOS.

Calibration Tab
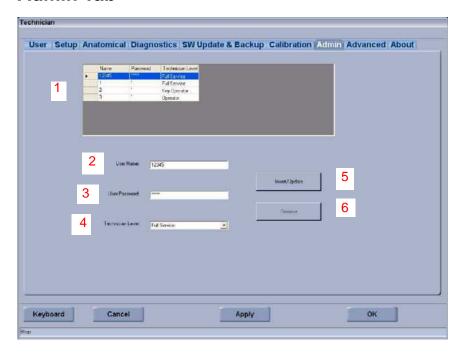
⬭▷ **Note**

The scanners are calibrated before leaving the assembly site. Do not perform calibrations unless you suspect the scanner has a problem or if an optical path component has been replaced. (See Calibrations on Page 114.)

#	Component	Description
1	Origin	Determines the X, Y values that will be used for the start of a scan.
2	Manual Origin Calibration	To perform manual calibration of the Origin parameters.
3	Offset	Determines the Offset value that will be used for each PM value.
4	System Gain Tuning	Sets the electronic Gain level to adjust the system response.
5	OCPC process	Compensates the optical collector profile so that non-uniformities in flat-field images will be minimized.
6	Calibration Preview	View scan progress during the calibration process.
7	Calibration Date	Date on which the calibration was performed.
8	Coarse offset / Fine offset	Displays the settings values that were found and will be used in normal operations.
9	OK	

*The green check mark indicates that a calibration has successfully been completed and the date to the right of the check mark indicates the date of the successful calibration.

Admin Tab

The Admin tab can be accessed by a Key Operator and a Full Service Operator in order to manage the list of registered users of the system and their access levels. There are three user access levels: Operator, Key Operator, and Full Service Operator.

Operator Level	User	Setup	Anatomical	Diagnostic	SW Update & Backup	Calibration	Admin	About
Operator	+							+
Key Operator	+	+	+		+		+	+
Full Service	+	+	+	+	+	+	+	+

#	Component	Description
1	User list	List of users registered in the system
2	User Name	Name of selected user or new user
3	User Password	Enter password of selected user or new user
4	Technician Level	Drop-down list of permissible user access levels
5	Insert/Update	Click to add or update user details
6	Remove	Click to remove the selected user from the system

To add a new user:
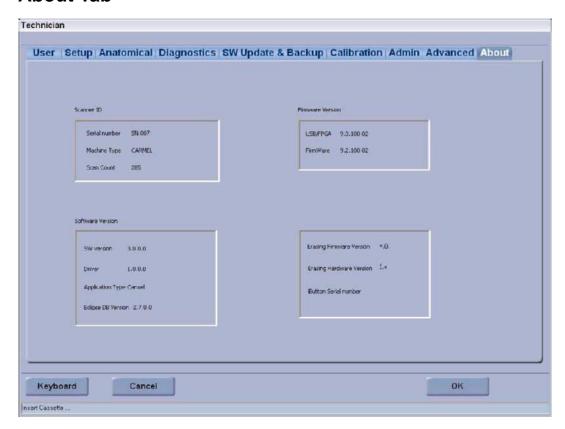
  [1] Enter **User Name**.

  [2] Enter **Password**.

  [3] Select **Level**.

  [4] Click **Insert/Update**.

  ⬭ **Note**

A Key Operator cannot remove himself (or the last operator) from the list.
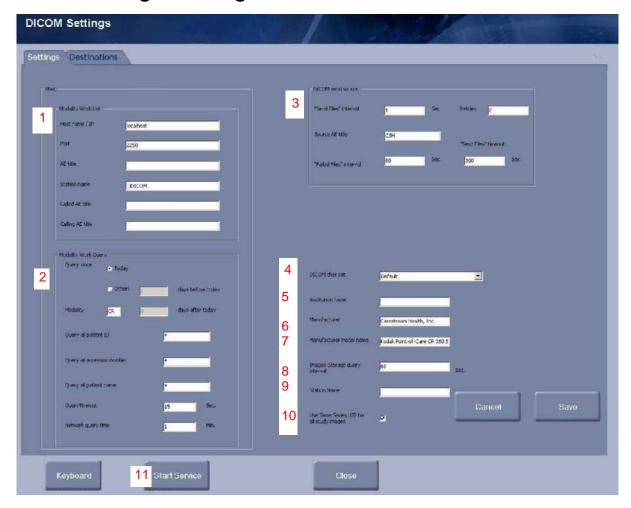
A Key Operator can add or remove an Operator or a Key Operator, but not a Full Service Operator.

About Tab

The About tab displays information about the unit and the software version installed. FPGA, firmware, and software version details are updated each time the particular software version is updated.

DICOM Settings—Settings Tab

To access DICOM Settings, go to **User>Settings** and select **DICOM Settings** from the list box.

The Settings tab is used for setting up the HIS/RIS connection for the modality work list.
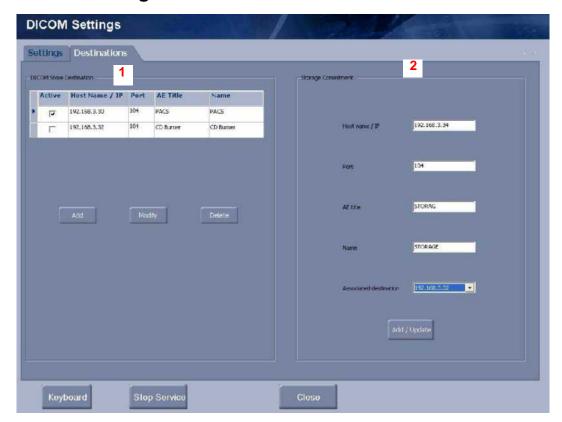
For the required parameters please consult your clinic/hospital System Administrator.

#	Component	Description
1	Modality Work List	Enter parameters for the HIS/RIS. Some parameters might not be mandatory, depending on the HIS/RIS definitions.
2	Modality Work Query	Enter parameters for the query from the HIS/RIS.
3	DICOM Send Source	**"Send Files" interval**—time interval for trying to send images to DICOM destination. **Retries**—number of retries for unsuccessful attempts. **Source AE title**—the local AE title. **"Failed files" interval**—time interval between retries. **"Send Files" timeout**
4	DICOM Char set	Lets you choose character sets within the software DICOM header. For example, ISO_IR 100 is used for Latin languages. Currently available options: GB18030, ISO_IR 100, \ISO 2022 IR 87, and ISO 2022 IR 13\ISO 2022 IR 87.
5	Institution Name	Enter the site name to appear in the image header and/or printed on the image.
6	Manufacturer	Enter the name of the manufacturer to appear on the image header and/or printed on the image. This value should be "Carestream Health, Inc."
7	Manufacturer model name	Enter the model name of the equipment to appear on the image header and/or printed on the image. This value should be "KODAK Point-of-Care CR 360".

#	Component	Description
8	Image Storage query interval	Enter the time interval, in seconds, how often the system will query the DICOM Storage device to upload Accepted images.
9	Station Name	Name of the station/site within the institution where the system is set up.
10	Use Same Series UID for all study images	
11	Start Service/Stop Service	Click **Stop Service** to stop the DICOMSendService. Changes to the DICOM devices cannot be saved until the service is stopped. After you click **Stop Service** and the service stops, the button changes to **Start Service**. Click **Save** to save changes to DICOM devices. Click **Start Service** to start DICOMSendServices again.

DICOM Settings—Destinations Tab
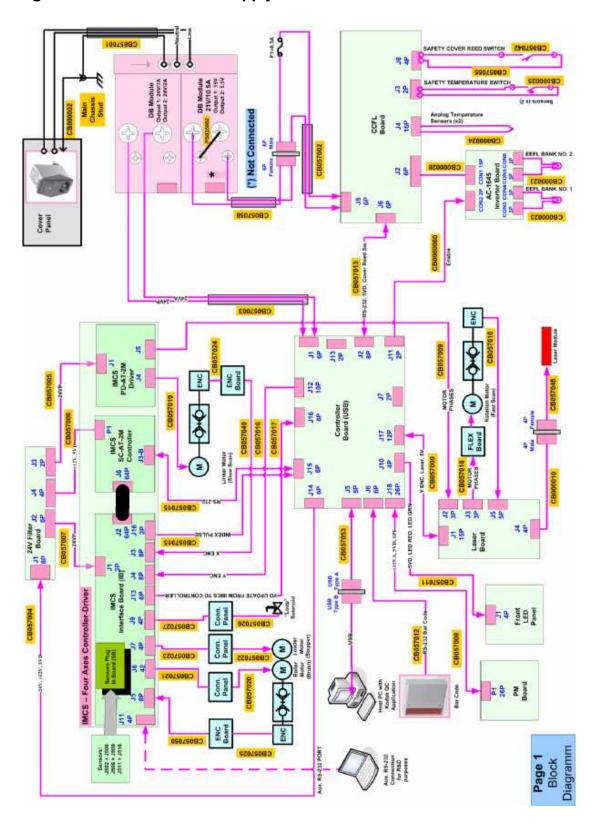
To access DICOM Settings, go to **User>Settings** and select **DICOM Settings** from the list box.

Destinations is used to set up and configure the system for sending images to DICOM destinations.
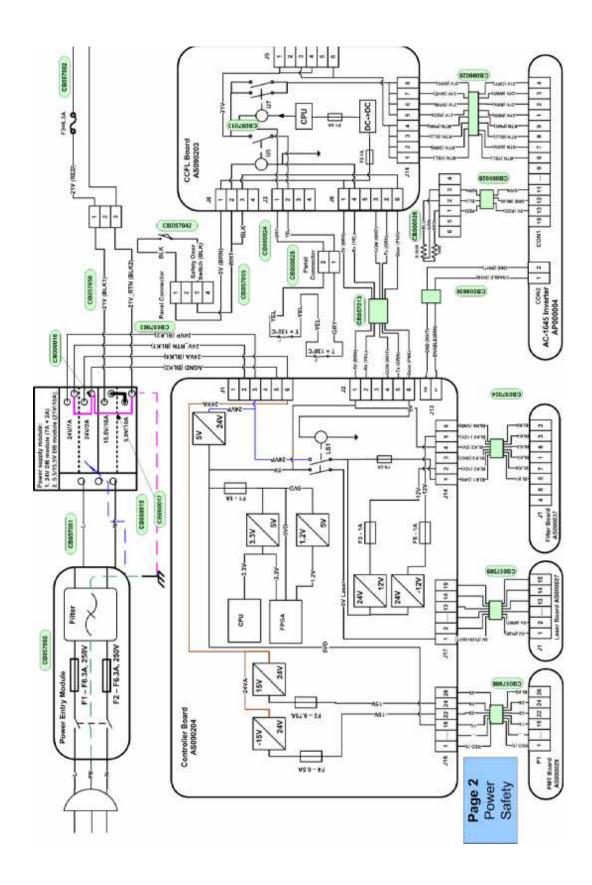
For the required parameters please consult your clinic/hospital System Administrator.
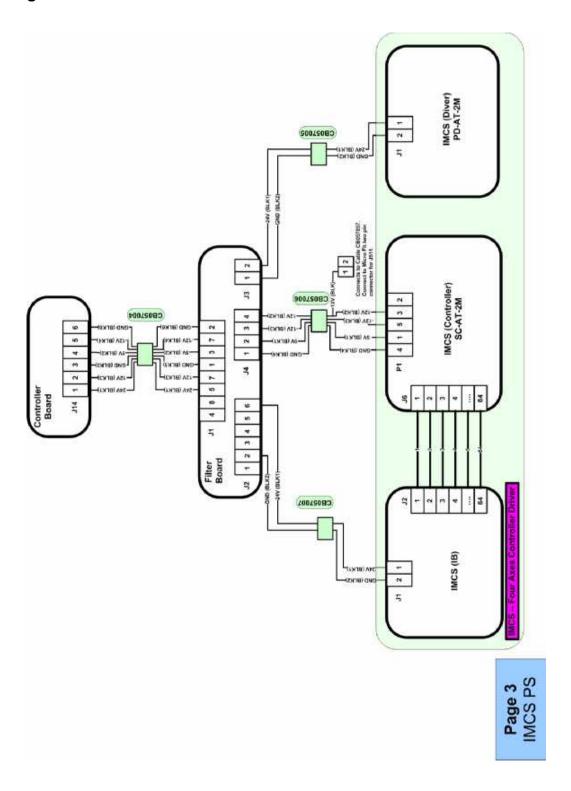
#	Component	Description
1	DICOM Store Destination	Add/modify/delete DICOM destinations. If **Active** is selected, the image(s) will automatically be sent to that location when **Accepted** is clicked in the **Viewer** screen. Non-active locations can be selected manually from the Archive application. For all destinations created, parameters must be set.
2	Storage Commitment	Used when the PACS destination for images has the capacity of sending a response back to the system when the image(s) have been successfully received and processed by the PACS.
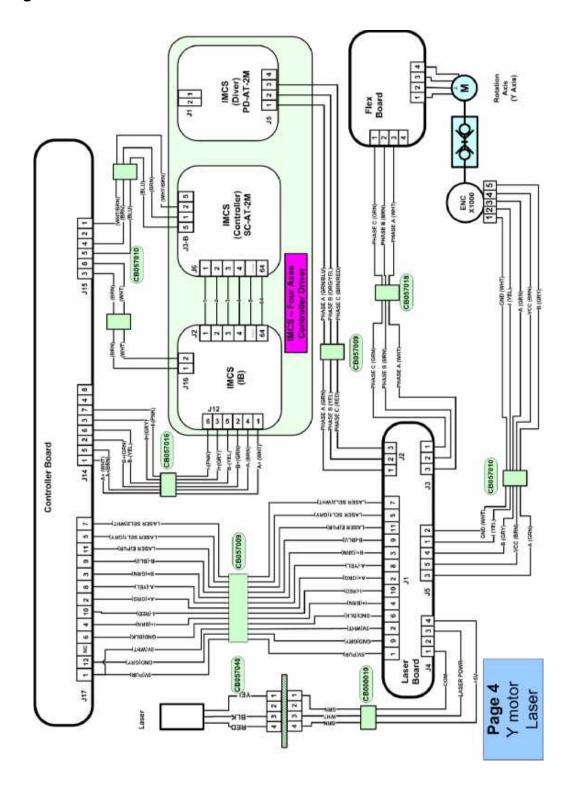
Section 8: Electrical Diagrams
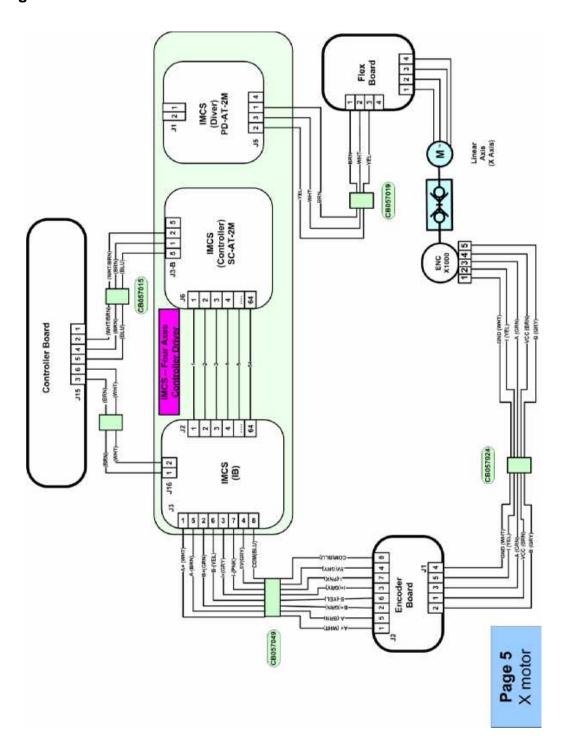
Block Diagram #1: Modular Power Supply

Page 1
Block Diagramm

Block Diagram #2

Block Diagram #3

Block Diagram #4

Block Diagram #5

Block Diagram #6

Controller Board — J18

Pin	Signal
24	PM_P15VDC
22	PM_N15VDC
16	GND
15	5VDC_O
14	GND
13	SPI_DIRECTION
12	BUSYN
11	GND
10	BUSYP
9	CNVN
8	GND
7	CNVP
6	I_CLKN
5	GND
4	I_CLKP
3	I_DATAN
2	GND
1	I_DATAP

CB057008

PM Board — P1

Pin	Signal
24	PM_P15VDC
22	PM_N15VDC
16	GND
15	5VDC_O
14	GND
13	SPI_DIRECTION
12	BUSYN
11	GND
10	BUSYP
9	CNVN
8	GND
7	CNVP
6	I_CLKN
5	GND
4	I_CLKP
3	I_DATAN
2	GND
1	I_DATAP

Page 6
PM Card

Block Diagram #7

Block Diagram # 8

Page 8
Sensors 1

Block Diagram #9

Section 9: Troubleshooting

⚠ **Laser Warning**

When a service operation is taking place with the cover removed, disconnect the laser according to the procedure in Replacing the Laser Board on Page 69. If the laser must be activated during the service procedure, wear protective laser safety glasses at all times.

Observable Conditions

Problem	Possible Cause	Solution
No power	No main power	Check the wall socket.
	UPS	Check that the UPS is turned on and functioning.
	Power cord	Check both ends of the power cord to ensure that they are firmly connected. Replace the power cord if necessary.
	Fuse	Check the fuse in the power input module. (See Replacing the Fuses on Page 30.)
	Power switch	Check the power switch with DVM. Replace the power switch if necessary. (See Replacing the Power Line Filter Module on Page 28.)
	Power supply	Using DVM check the power supply outputs and verify that they reach all boards. Replace the power supply module if necessary.
No communication with the computer (the "Scanner Disconnected" message appears when KODAK QC Software is launched)	USB cord	Check that the USB cord is firmly connected on both ends.
		Replace USB cord.
	USB driver is not installed or not functioning	Install the USB driver (see the Installation Manual).
	Problem with host computer	Connect the scanner to a different computer.
	Controller board malfunction	Replace the controller board. (See Replacing the Controller Board on Page 32.)
Scanner does not initialize or is stuck in initialization mode	Cassette was not correctly loaded to the scanner	Remove the cassette and insert it again.
	No screen inside the cassette	Verify that the cassette contains a screen.
	Optical head assembly is not moving to start position	Check functionality of limit sensors. (See Step 4 in Installing the Right Limit Sensor on Page 89 and Step 4 in Installing the Left Limit Sensor on Page 90.)
	Bad connection between the USB board and motion board	Check the connection. (See Step 3 on page 37.)
	Linear stepper motor is malfunctioning	Replace the loader assembly. (See Removing the Loader Stepper Assembly on Page 67.)
Scanner does not load screen from cassette ("screen … state fail" error message)	The screen did not come out of the cassette	Use the screen remover device to try to manually eject the screen from the cassette.
	Loader malfunction	Check the loader functionality. (See Test Procedure on Page 87.)
	Roller malfunction	Check the roller motor and rollers functionality. (See Test Procedure on Page 87.)

Problem	Possible Cause	Solution
White images	The scanner is improperly calibrated	Calibrate the scanner (see the Installation Manual).
	Laser malfunction	Check if the laser is functioning by performing a scan with the cover open to see if the laser light is visible. Replace optical head assembly if necessary. (See Installing the Optical Head Assembly on Page 46.)
	The PM module and board is not properly connected	Check the blue flex ribbon connectors on both Boards. (See Replacing the Photo Multiplier Assembly on Page 41.)
	Board malfunction	Replace the USB board. (See Installing the Controller Board on Page 34.)
	PM module malfunction	Replace the PM module. (See Replacing the Photo Multiplier Board on Page 39.)
	The screen was upside down in the cassette	Make sure that the screen is properly oriented in the cassette.
Black image	Erase lamps malfunction	Check that the erase lamps function. Replace the erase lamps or inverters if necessary. (See Replacing the Erase Lamps Assembly on Page 77.)
	Controller board malfunction	Replace the controller board. (See Replacing the Controller Board on Page 32.)
	PM module malfunction	Replace the PM module. (See Replacing the Photo Multiplier Board on Page 39.)
Other image problems	Dirty screen	Clean the screen and the rollers. (See Introduction on Page 134 and Cleaning the Rollers on Page 130.)
Scanner does not recognize screen size	Dirty or defective barcode sticker on the cassette	Clean or replace the sticker.
	Defective barcode reader	Replace the barcode reader. (See Replacing the Barcode Reader on Page 110.)

Section 10: Hardware Error Messages

Introduction

If a sequence of recommended actions apply to two or more error messages, the error numbers and texts appear on the same page and are followed by the scenario and recommended actions applicable to them.

If an error message appears, click **OK**. The message disappears and the software resets. Switch the scanner OFF and ON to perform a complete reset of the system. Perform a scan on an empty screen to see if the error repeats.

Instructions for using the SC Shell application appear in Updating the Controller Files on Page 181.

Hardware Error Message Index

Hardware Error Messages

Device Error #1: "Linear axis motor position error failure"

Device Error #2: "Linear axis motor encoder failure"

Device Error #4: "Linear motor peak over current failure"

Device Error #7: "Linear Homing cycle was not completed"

Device Error #10: "Linear motor commutation error"

Scenario

[1] During power up the linear motor failed in the commutation phase because of a disconnected limit switch.

[2] During power up the linear motor cable CB057019 is not connected properly.

[3] Encoder cable CB057049 is not connected properly.

[4] Encoder cable CB057024 is not connected properly.

[5] IMCS board assembly failure.

[6] Linear motor assembly failure.

Recommended Action by Field Engineer

[1] Remove the scanner cover and insert the technician key.

[2] Check that the coupling is tightly fastened and there is no slipping between the linear screw and the motor axis.

[3] Check the voltages of the IMCS board. See Block Diagram #3 on Page 154.

    If the voltages are incorrect check the fuses on the controller board.

[4] Connect the SC Shell application. (See Establishing Communication Between the Host Computer and the IMCS Board on Page 185.). Check in the X-axis section of the SC Shell application that the FLS and RLS check boxes are unchecked.

    (a) If both check boxes are checked, (right and left limit switches, FLS -515, RLS-516) verify proper routing of the sensor cables. If a cable is disconnected or the sensor is broken, the check box will be checked.

    (b) If one of the check boxes is checked, verify that the linear slide assembly position corresponds to the marked limit sensor. Manually move the screw to exit the limit sensor and verify if the check box is cleared.

    (c) Reboot the scanner.

[5] Click **Comm-X** in the **Custom** section. The linear motor performs commutation. Check that the status under the X-axis section indicates **last motion ended normally**.

[6] Encoder Test:

    (a) Draw a line on the linear motor.

    (b) Reset the position counter on the SC Shell by entering **XPS=0** in the field.

    (c) Click **Enter**. The counter resets to "0".

    (d) Manually turn the linear motor a full cycle and check that the position counter is about 4000 counts.

    (e) If the counter is not close to 4000 counts, check the linear axis encoder cables, CB057024 and CB057049.

    (f) Check the encoder and the encoder reader. (See Block Diagram #5 on Page 156.)

[7] Check that cable CB057019 and the linear motor flex cable are connected properly.

[8] Replace the linear motor.

[9] Replace the IMCS board.

Device Error #3: "Linear motor continuous over current"

Scenario

Linear movement is moving under high friction, causing the motor to work in continuous over-current.

Recommended Actions for Field Engineer

[1] Remove the scanner cover. (See <u>Removing the Scanner Cover on Page 25</u>.)

[2] Visually check the lead screw area and linear moving parts and remove mechanical objects.

[3] Measure the linear motor current using SC Shell. (See <u>Creating a Communication Terminal in the SC Shell Application on Page 187</u>.)

[4] Replace the linear lead screw.

Device Error #5: "Linear motor under voltage"

Device Error #21: "Rotation motor under voltage"

Scenario

In power up, the - 24 V power supply is lower than 23 V.

Recommended Actions for Field Engineer

[1] Check the cover interlock:

  (a) Check that the magnet on the cover is in place.

  (b) Check that the safety door switch on the scanner side CB057042 is in place.

  (c) Check CB057055 is connected to the magnet on one side and that the CCFL is in place.

[2] Check fuse F6 on the controller board - if the red LED is lit then the fuse is blown. Replace the fuse and power up again.

[3] Check 24 V on the controller board J14 pin 1.

[4] Check 24 V on IMCS 1B J1 connector. First check while the connector to IMCS is disconnected. If the voltage is acceptable, check while the connector to IMCS is connected.

[5] Check cable CB057004.

[6] Check cable CB057007.

Device Error #6: "Linear motor over voltage"

Device Error #22: "Rotation motor over voltage"

Device Error #38: "Roller motor over voltage"

Scenario

The 24 V supply to the IMCS board is too high above 24 V.

Recommended Actions for Field Engineer

[1] Check 24 V on the controller board J14 pin 1.

[2] Check 24 V on IMCS 1B J1 connector.

[3] Check the wire connections from the main power supply to the controller board CB057003.

Device Error #17: "Rotation motor position error failure"

Device Error #18: "Rotation motor encoder failure"

Device Error #19: "Rotation motor continuous over current"

Device Error #20: "Rotation motor peak over current"

Device Error #23: "Rotation motor commutation error"

Scenario

[1] During power-up—motor failure during commutation.

[2] During cassette load.

[3] During scan.

Recommended Actions for Field Engineer

[1] Remove the scanner cover.

[2] Check the voltages of the IMCS board. (See Block Diagram #3 on Page 154.)

   If the voltages are not correct, check the fuses on the controller board.

[3] Check the following cable connections. (See Block Diagram #4 on Page 155.)

   a. Rotation motor flex cable

   b. Encoder cable CB057010

   c. Laser board to controller board cable CB057009

   d. Controller board to IMCS board cable CB057016

   e. Laser board to motor flex board CB057018

Device Error #33: "Roller motor position error failure"

Device Error #34: "Roller motor encoder failure"

Scenario

[1] During power up while the roller motor is performing unload.

[2] During cassette load/unload.

Recommended Actions for Field Engineer

[1] Remove the scanner cover and insert the technician key.

[2] Check that the coupling is tight and that there is no slippage between the roller motor and the roller axis.

[3] Check the voltages of the IMCS board. (See Block Diagram #3 on Page 154.)

   If the voltages are not correct, check the fuses on the controller board.

[4] Encoder Test:

   (a) Draw a line on the roller motor coupling.

   (b) Reset the position counter on the SC Shell by entering **XPS=0** in the field.

   (c) Click **Enter**. The counter resets to "0".

   (d) Manually turn the roller motor axis a full cycle and check that the position count is about 2000 counts.

   (e) If the counter is not close to 2000 counts, check the roller axis encoder cables, CB057025 and CB057050.

   (f) Check the encoder and the encoder reader. (See Block Diagram #7 on Page 158.)

[5] Check cables CB057020 and CB057021 of the roller motor. (See Block Diagram #7 on Page 158.)

[6] Replace the roller motor assembly.

[7] Replace the IMCS board.

Device Error #40: "W0 sensor is in wrong state"

Scenario

During loading sequence W0 sensor is tested before the plate reaches it to verify correct operation of the sensor.

Recommended Actions for Field Engineer

[1] Check cables CB057057 and CB057043. (See Block Diagram # 8 on Page 159.)

[2] While there is no plate in the scanner, check in the **Diagnostic** screen that the J511 Screen Presence W0 indicator is off.

[3] Check the sensor mechanical position.

[4] Replace the sensor.

Device Error #41: "Loop sensor is in wrong state"

Scenario

After unloading a cassette, the auto-loop sensor remains in the wrong state (J504 = **1**).

Recommended Actions for Field Engineer

[1] Go to **Diagnostic>Motion** and click **Loop Solenoid**. If a clicking sound is not heard:

   (a) Check the cable CB057037, CB057027 and CB057026. (See <u>Block Diagram #9 on Page 160</u>.)

   (b) Replace the solenoid.

   (c) Replace the IMCS board.

[2] If you hear a clicking sound, check the J504 loop solenoid indicator. It should change its status from off to on and back to off.

Check mechanical adjustment of the auto-loop fork. Make sure that it blocks the sensor when moving manually.

[3] Adjust or replace the auto-loop assembly.

Device Error #39 "Plate carriage stuck"

Device Error #42: "Plate carriage stuck"

Scenario

[1] During erase, the plate carriage does not reach the Z0 sensor.

[2] During unload, the plate carriage does not reach the Z0 sensor.

Recommended Actions for Field Engineer

[1] Remove the scanner cover. (See Removing the Scanner Cover on Page 25.)

[2] Check the carriage position and release it if stuck.

[3] Check that the carriage flag closes the Z0 sensor when the carriage is in the lower position. When the sensor is closed the plate carriage (Z0) indicator light J505 on the **Diagnostic** screen lights.

[4] Manually move the plate carriage and check that the indicator light changes status when the sensor is covered and uncovered.

[5] Check the connector J505 on the sensor board.

[6] Check the J505 sensor and replace if broken.

Device Error #49: "Loader motor fault"

Device Error #55: "Loader homing cycle was not completed"

Scenario

[1] During power up the RLS J514 sensor is not activated correctly.

[2] During load/unload the loader motor does not work or its coupling is broken.

Recommended Actions for Field Engineer

[1] Remove the scanner cover and insert the technician key.

[2] Check the voltages of the IMCS board. (See Block Diagram #3 on Page 154.)

   If the voltages are not correct, check the fuses on the controller board.

[3] In **Diagnostic>Motion>Loader**, click **Backward** and **Forward**, and check loader response.

   Check loader cables CB057022 and CB057023.

[4] Manually move the **Eject** knob. Check for response in **Diagnostic** indicator J514.

   Check cables CB057045 and CB057054 (J514). (See Block Diagram # 8 on Page 159.)

[5] Check loader cables CB057022 and CB057023.

[6] Check the mechanical adjustment of the cassette eject mechanism.

[7] Check the coupling connecting between the loader motor and the loader axis.

[8] Replace the loader assembly.

[9] Replace the IMCS board.

Device Error #57: "Loader did not reach back sensor"

Scenario

During cassette load, the loader back flag did not reach the J508 sensor.

Recommended Actions for Field Engineer

[1] Remove the scanner cover and insert the technician key.

[2] Check the voltages of the IMCS board. (See Block Diagram #3 on Page 154.)

If voltages are not correct, check the fuses on the controller board.

[3] In **Diagnostic>Motion>Loader**, click **Backward** and **Forward**, and check loader response.

[4] Check loader cables CB057022 and CB057023.

[5] Check cables CB057040 and CB057054 (J508). (See Block Diagram # 8 on Page 159.)

[6] Check the mechanical adjustment of the cassette eject mechanism.

[7] Check the coupling connecting the loader motor to the loader axis.

[8] Replace the loader assembly.

[9] Replace the IMCS board.

Device Error #58: "Plate did not reach W0"

Scenario

During cassette load, the plate did not reach the W0 sensor.

The screen was not pulled out of the cassette, causing the error to appear.

Recommended Actions for Field Engineer

[1] Unload the cassette.

[2] Check that there is a plate (screen) in the cassette.

[3] Check that the cassette is operational and that the screen moves freely in and out of the cassette.

[4] Try to load a different cassette.

[5] Check cables CB057057 and CB057043. (See .)

Device Error #59: "Cassette release failure"

Scenario

After cassette unload, the J513 sensor still detects the cassette.

Recommended Actions for Field Engineer

[1] Check if the cassette is released and if the plate is fully loaded into the cassette. Check the mechanical adjustment of J513.

[2] Go to **Diagnostics** and check that J513 is responding.

[3] Check cables J513 CB057056 and CB057057.

[4] Check cables J514 CB057045 and CB057054. (See Block Diagram # 8 on Page 159.)

Device Error #69: "The cassette was released. Please re-enter the cassette"

Scenario

Before unloading or erasing the screen, the scanner checks if the cassette is locked in place. If the cassette is not locked, the error message appears.

Recommended Actions for Field Engineer

[1] Re-insert the cassette into the scanner. Wait for the unloading or erasing cycle to complete.

[2] Does the error message continue to appear?

Yes	No
1. Adjust the cassette release mechanism. See Adjusting the Cassette Release Mechanism on Page 120. 2. Remove the tray assembly and check sensors J513 and J514. See Replacing the Roof Assembly and Tray Assembly on Page 83.	Continue operating the scanner.

Device Error #70: "Communication error with IMCS"

Scenario

Appears during scanner operation.

Recommended Actions for Field Engineer

Check the connection of CB057015 between the controller board and the IMCS board.

Device Error #82: "CCFL power supply failure"

Scenario

Appears during the erasing cycle.

Recommended Actions for Field Engineer

[1] Remove the scanner cover and insert the technician key.

[2] Check the F1 fuse on CB057002. Check the cable connection.

[3] Check the 21 V power supply. (See Block Diagram #2 on Page 153.)

Device Error #92: "Erase lamps are not working"

Scenario

Appears right before the erasing cycle begins (while KODAK QC main screen shows **initialize erasing** status).

Recommended Actions for Field Engineer

[1] Remove the scanner cover and insert the technician key.

[2] Check the connections of CB000023 on the inverters assembly.

[3] Check CB000030 that leads from the controller board to the inverters.

[4] Replace the erase lamps assembly.

[5] Replace the erase lamp inverters assembly.

Section 11: Controller and IMCS Embedded Software Update

Updating the Controller Files
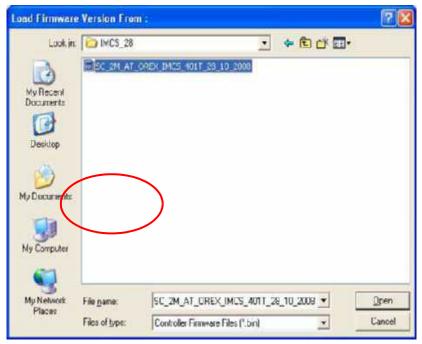
Firmware contains the USB interface: user command, USB mechanism, IMCS interface, and scanner's sequences. FPGA contains: pixels sequencer, digital PMT interface, PLL interface, and registers interface to the Firmware and inputs/outputs logics.

Updating Firmware and FPGA

⚠ Caution

You must update the Firmware and FPGA files together.

[1] Go to **Settings>SW Update & Backup**.

[2] Click **Update.**

[3] Select:

- Firmware (iic)

- FPGA (rpd)

[4] Click **Update Selected Options**.

> **Note**

The update process begins.

[5] Once the update process is completed, select **About**.

[6] Verify that the Firmware Versions are updated according to the latest Service Pack.

Updating the IMCS Embedded Files

[1] Select **Settings>About.**

[2] Verify that the files are updated as follows:

Controller	FPGA	9.3.1.25-01
	Firmware	9.2.1.31-05

[3] Are the controller files updated?

Yes	No
Proceed to Step Step 6.	1. Update the controller files. See Updating Firmware and FPGA on Page 181. 2. Proceed to Step Step 6.

[4] Verify that the files are updated as follows:

IMCS	Firmware	9.4.1.40-03

[5] Are the IMCS files updated?

Yes	No
Proceed to Step Step 6.	1. Update the IMCS files. See Downloading Firmware on Page 191. 2. Proceed to Step Step 6.

[6] Switch ON the scanner.

[7] Exit to the desktop.

> **Note**

Do not run the IMCS updating tool and the KODAK QC software at the same time.
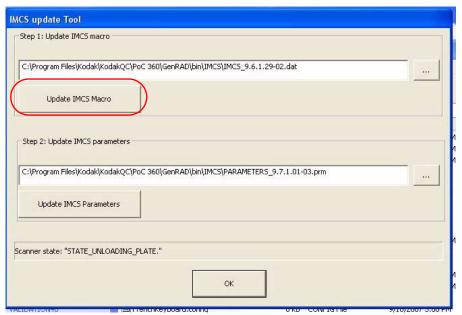
[8] Launch **IMCS updater.EXE** from the bin folder. For example, C:\Program Files\Kodak\KodakQC\PoC 360\GenRad\Bin.

> **Note**

The password is case-sensitive.

[9] Enter **imcs** in the **Password** field.

Wait until the message "STATE_NO_CASSETTE" appears at the bottom line of the tool and the IMCS tool is enabled.
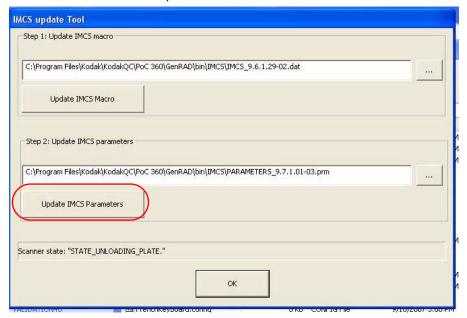
[10] Click **Update IMCS Macro**.

Wait for the message "Update success" or "Update failed" to appear.

[11] Manually reboot the scanner.

Wait until the IMCS update tool is enabled.

[12] Click **Update IMCS Parameters**.

Wait for the message "Update success" or "Update failed" to appear.

[13] Click **OK** and manually reboot the scanner**.**

[14] Start the KODAK QC software.

[15] Select **Settings>About.**

[16] Verify that the following updated versions appear:

Component		PoC 360
USB/FPGA		9.3.1.25-01
Firmware		*9.2.1.31-05
IMCS	Firmware	9.4.1.40-03
	Macro	*9.6.1.29-02

⬜ **Note**

The above versions are correct for Service Pack 5. Check with your Service Provider for the latest versions released.

* These versions have changed since the latest released version.

Using the SC Shell Application

Introduction

The SC Shell application is an external application used for control, diagnosis, and update of the IMCS board.

There are two ways to connect to the SC Shell application:

1. Virtual Serial Port (VSP)—a built-in option in the KODAK QC Diagnostic screen. This option uses the USB connection from the host computer to the scanner and requires USB driver installation.

2. Direct RS232 to RJ45 cable connected from a host PC to the RJ45 port on the IMCS board. This connection requires an external cable.
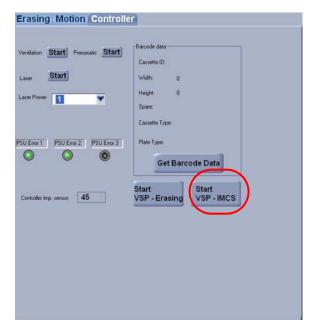
Installing the SC Shell Application

[1] Locate the file **CrsApplicationsSetup_Ver101.exe** at **KODAK QC ver 3.0.0.0 rev2\imcs**.

[2] Follow the SC Shell installation steps.

Establishing Communication Between the Host Computer and the IMCS Board

VSP Option
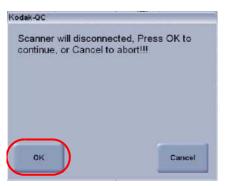
[1] While the scanner is connected to the PC and turned on, go to **KODAK QC Setup>Diagnostic>Controller**.

⮕ **Note**

Do not search for the driver on the Internet.

[2] Click **Start VSP - IMCS** and wait for the USB driver installation to begin.

[3] Click **OK.**

> **Note**

If the Found New Hardware Wizard appears, select **No, not this time**.

[4] Click **Next.**

[5] Choose **Specify location option** on the driver installation screen and locate the driver in the folder **KODAK QC CD:/VSP Driver**.

[6] If you receive a message that the driver is not registered with MICROSOFT, select **Continue anyway**.

[7] Click **Finish.**

[8] Exit to the desktop.

[9] Select **Start>Settings>Control Panel.**

[10] Click **Systems>Hardware>Device Manager.**

[11] Expand **Ports (COM & LPT).**

[12] Look for the new Communications Port COM number.

[13] Double-click **Communication Port (COM *X*)**.

> **Note**

Communications Port (COM *X*) Properties window opens.

[14] Verify that KEC appears in the Manufacturer line.

> **Note**
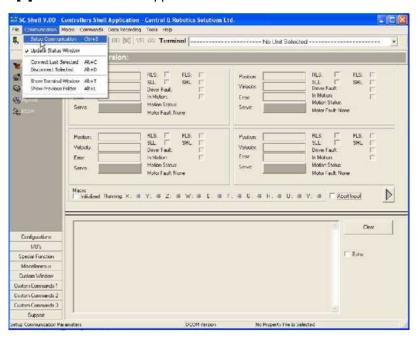
Use this selected COM number for all procedures requiring the SC Shell application.

Direct Cable Option

[1] Connect the cable to the serial port on the host computer.

[2] Connect the RJ45 connector to the IMCS board.

[3] Go to **Device Manager** and look in the ports (COM and LPT) for the serial communication COM number, usually COM 1.

Creating a Communication Terminal in the SC Shell Application

[1] Run the SC Shell application.
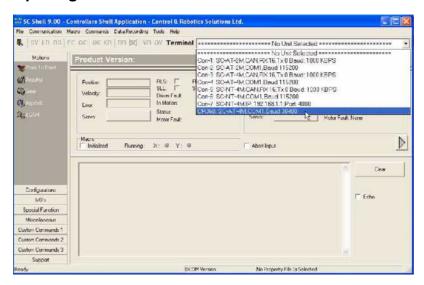
[2] Go to the **Communication** menu and select **Setup Communication**.
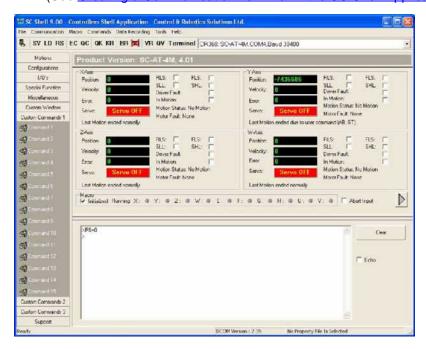
[3] Set the following options:

   (a) Type in the **Controller Name** (in our example **CR360**).

   (b) Select RS232 from the **Controller Communication Protocol** drop-down menu.

   (c) In the **RS232 Port:** drop-down menu, select the COM port that you found in the previous section.

   (d) Select **RS-232 Baud Rate** of **38400**.

[4] Click **Add**.

[5] Click **Exit.**

Opening the Communication Terminal in the SC Shell Application
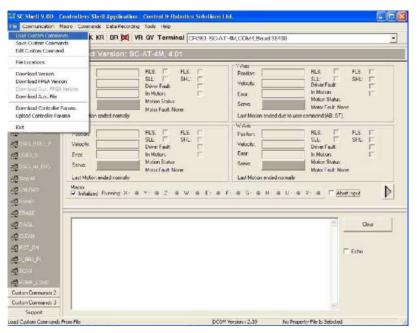
[1] Select the communication terminal created in Creating Communication Terminal in the SC Shell Application.
(See Creating a Communication Terminal in the SC Shell Application on Page 187.)

The communication screen appears.

Loading Custom Commands

[1] Open the communication terminal. (See <u>Opening the Communication Terminal in the SC Shell Application on Page 188</u>.)

[2] Run the SC Shell application.

[3] Click **File>Load Custom Commands**.
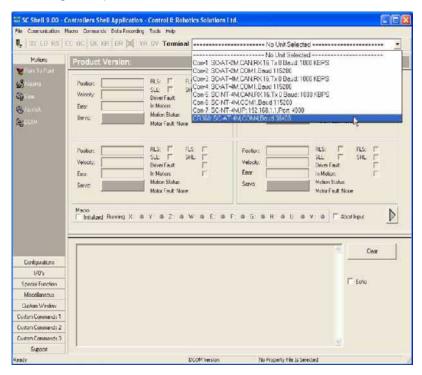
[4] Choose the **Custom commands** file from **KODAK QC ver 3.0.0.0 rev2\imcs**.

[5] Click **Open**.

[6] Click **SV** to save the custom commands.

Downloading Firmware

[1] Establish communication between the host computer and the IMCS board. (See Establishing Communication Between the Host Computer and the IMCS Board on Page 185.)

[2] Create a communication terminal. (See Creating a Communication Terminal in the SC Shell Application on Page 187.)

[3] Open the communication terminal. (See Opening the Communication Terminal in the SC Shell Application on Page 188.)

[4] Select **File>Download Version**.

> **Note**

The password is case-sensitive.
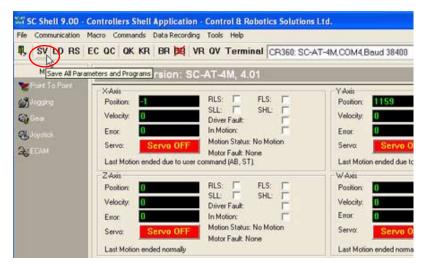
[5] Enter **CAR-5438** in the **Password** field.

[6] Browse to the folder **POC360\IMCS** (on the supplied CD) and select the **Bin** file.

[7] Click **Open**.

[8] At the message "New Firmware Version Download Succeded", click **OK**.

[9] Click **SV** after the firmware download is completed.

[10] Click **Yes** to save the parameters to FLASH memory.
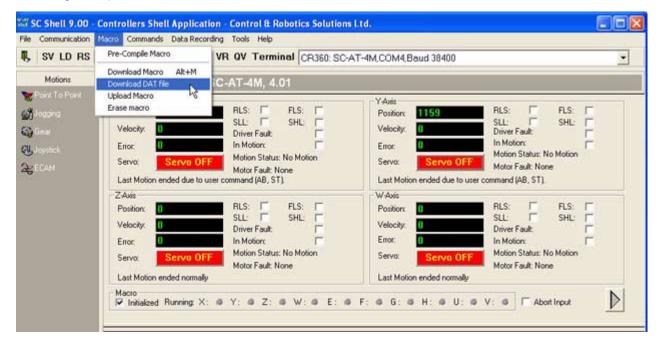
Verifying the Firmware Download

[1] Exit **Settings**.

[2] Close the program.

[3] Switch OFF the scanner.

[4] Switch ON the scanner.

[5] Logon to KODAK QC software.

[6] Go to **Settings**>**About**.

[7] Verify that the correct IMCS macro is reported.

	POC 360
IMCS Firmware	XXXXXXXX

Downloading Macros
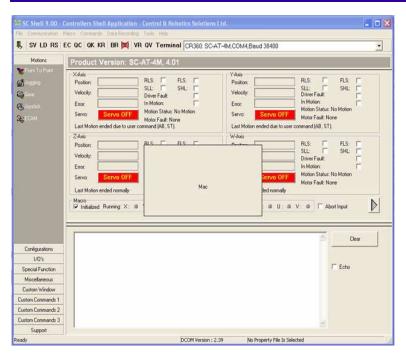
[1] Establish communication between the host computer and the IMCS board. (See Establishing Communication Between the Host Computer and the IMCS Board on Page 185.)

[2] Create a communication terminal. (See Creating a Communication Terminal in the SC Shell Application on Page 187.)

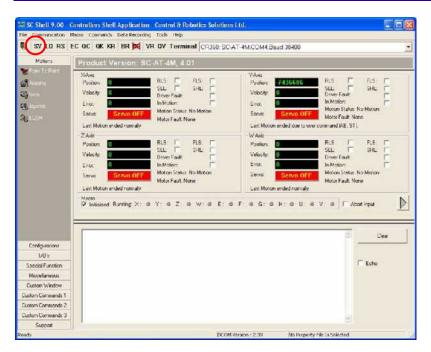**[3]** Open the communication terminal. (See Opening the Communication Terminal in the SC Shell Application on Page 188.)

[4] Select **Macro>Download DAT file**.

[5] Browse to the folder **POC360\IMCS** (on the supplied CD) and select the **IMCS.dat** file.

[6] Click **Open**.

[7] At the message "Macro Data File Download Succeded", click **OK**.

[8] Click **SV** after the macro download is completed.

[9] Click **Yes** to save parameters to FLASH Memory.
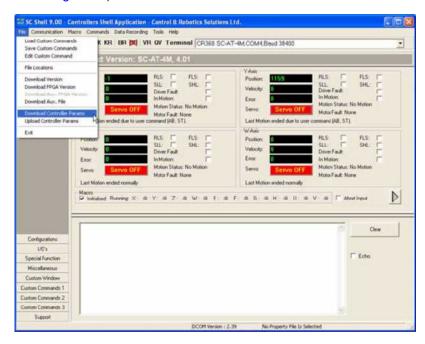
Verifying the Macro Download

[1] Exit **Settings**.

[2] Close the program.

[3] Switch OFF the scanner.

[4] Switch ON the scanner.

[5] Logon to KODAK QC software.

[6] Select **Settings**>**About**.

[7] Verify that the correct IMCS Macro is reported.
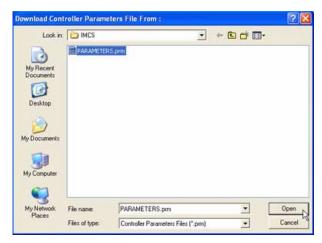
	POC 360
IMCS Macro	XXXXXXXX

Downloading Parameters
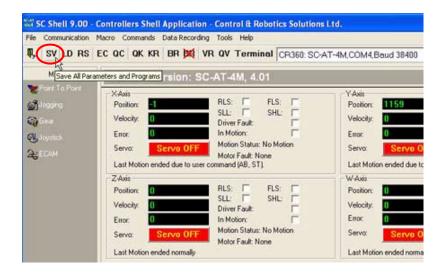
[1] Establish communication between the host computer and the IMCS board. (See <u>Establishing Communication Between the Host Computer and the IMCS Board on Page 185</u>.)

[2] Create a communication terminal. (See <u>Creating a Communication Terminal in the SC Shell Application on Page 187</u>.)

[3] Open the communication terminal. (See <u>Opening the Communication Terminal in the SC Shell Application on Page 188</u>.)
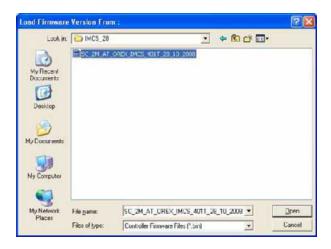

[4] Select **File>Download Controller Params**.

[5] Browse to the folder **POC360\IMCS** (on the supplied CD) and select the **PARAMETERS.prm** file.

[6] Click **Open**.

[7] At the message "Parameter File Download Operation OK!", click **OK**.

[8] Click **SV** after the parameters download is completed.

[9] Click **Yes** to save the parameters to FLASH Memory.

Verifying Parameters Download

[1] Open the communication terminal. (See <u>Opening the Communication Terminal in the SC Shell Application on Page 188</u>.)

[2] In the SC-Shell prompt window, type **XCL**.

[3] Click **Enter**.

> **Note**

The XCL value listed is an example. The numbers will vary.

[4] Verify that the XCL value is 2500.

[5] Type **XPL**.

[6] Click **Enter**.

> **Note**

The XPL value listed is an example. The numbers will vary.
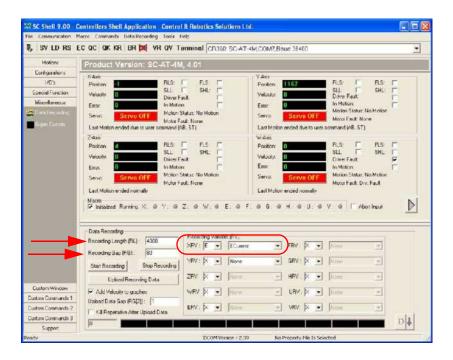
[7] Verify that the XPL value is 12000.

Measuring the Linear Motor Current

> **Note**
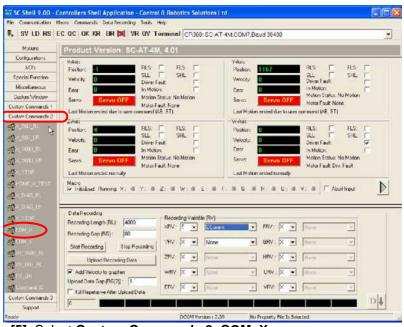
Verify that macro files are updated before performing this procedure.

[1] Connect to the SC Shell application using the direct cable option. (See <u>Direct Cable Option on Page 186</u>.)

[2] Open the SC Shell application.

[3] Select **Miscellaneous>Data Recording**.

[4] Enter the following parameters:

- Recording Length (RL) - 4000
- Recording Gap (RG) - 80
- XRV - E, ECurrent

[5] Select **Custom Commands 2>COM_X.**

> **Note**

Linear motor commutation performed.

[6] Select **COM_Y**.

> **Note**

Rotational motor commutation performed.

[7] Select **Home_X.**

> **Note**
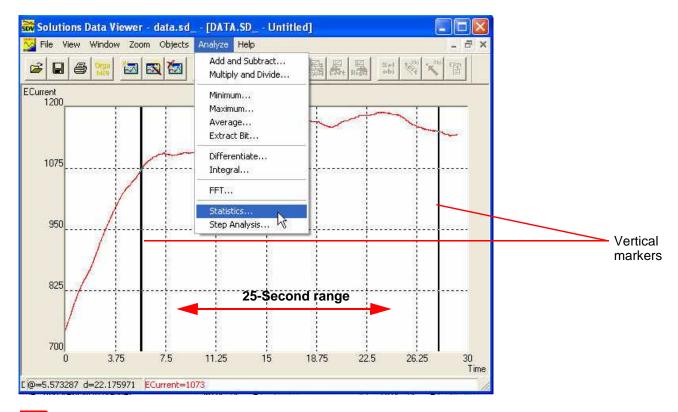
The optical head assembly returns to its home position.

[8] Select **X_86U_RL**.

> **Note**

The linear motor moves from right to left.

[9] Wait approximately 3 seconds until the linear motor reaches its desired speed. Click **Start Recording.**

Vertical markers

> **Note**
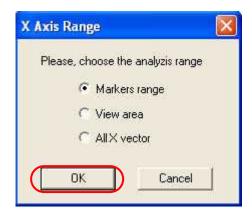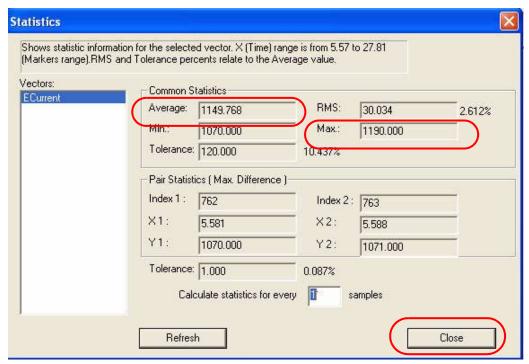
The linear motor current measurements are recorded.

Once the recording is complete, a graph appears displaying the current measurements.

[10] Move the vertical markers so that they cover a 25-second range. The selected range should include the maximum current measured and recorded.

[11] Select **Analyze>Statistics**.
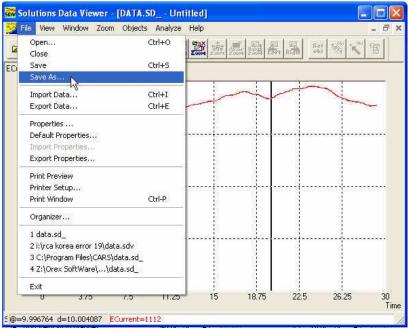
[12] Select **Markers range** and click **OK.**

[13] Record the following values in the DHR:

- Average
- Max

[14] Click **Close.**

[15] Select **File>Save As** and save the file under the name "86U_RL".

 Note

The file is saved with a .sdv extension.

[16] Perform Steps <u>Step 8</u>-<u>Step 15</u> for each command listed in the table below:

Command	Description	Note	Save File As
X_86U_LR	The linear motor moves from left to right.	-	"86U_LR.sdv"
X_160U_RL	The linear motor moves from right to left for 160 micron scanning.	The linear motor moves twice as fast for 160 micron scanning. Therefore, in Step 10, move the vertical markers so that they cover a 12.5-second range (as opposed to 25-second range).	"160U_RL.sdv"
X_160U_LR	The linear motor moves from left to right for 160 micron scanning.	The linear motor moves twice as fast for 160 micron scanning. Therefore, in Step 10, move the vertical markers so that they cover a 12.5-second range (as opposed to 25-second range).	"160U_LR.sdv"

[17] Disconnect the cable between the serial port and the host computer.

[18] Connect cable CB057015 to the IMCS board.

Section 12: Acceptance Test Procedure

Scope

This section describes the procedure used to test the performance of the Point-of-Care CR 360 once installation is completed. The procedure should be performed by a field engineer, and ensures that the system is functioning according to the manufacturer's design and specifications.

Tools Required

- Calibrated dosimeter
- SK0000170 - Image Quality toolkit:
  - Spatial resolution test pattern (Model 07 - 256)
  - 0.5 mm copper (Cu) plate for X-ray filtration
  - 1.0 mm aluminum (Al) plate for X-ray filtration
  - Step wedge phantom
  - Low contrast discs phantom

Important

Conducting the test without a dosimeter may reduce the accuracy of the test results.

Note

The complete set of tests takes approximately one hour to complete.
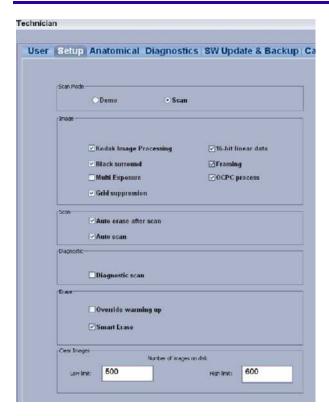
Preparing the Unit for Testing

[1] In the KODAK QC Software **Patient list** screen, enter a new patient:

    (a) Click **New**.

    (b) Fill in the three mandatory fields: **Last Name, First Name, Patient ID**.

    (c) Click **OK**.

Note

The patient's name appears in the patient list.

[2] Select the new patient.

[3] Click **Acquire**.

[4] Go to **Settings>Setup**.

[5] Verify that the following check boxes are selected:

- KODAK Image Processing
- Black surround
- Grid suppression
- 16-bit linear data
- Framing

[6] In the Scan screen click **SKULL** and select the **PATTERN** view position from the sub list.

[7] Complete all of the tests in this mode.

[8] Use the WIISE image viewer to analyze all images.

[9] Create an ATP folder and copy all test images from its original folder to the ATP folder. This allows easy reviewing and recording.

[10] Name each image according to the test it relates to for easier inspection.

Dark Noise

This procedure checks the noise level inherent in the system.

[1] Scan an erased 14 x 17 in. cassette.

[2] Open the 16-bit image using the WIISE viewer (linear folder).

[3] Verify that the entire screen is visible with overscan bands frame placed around it.

[4] Use the ROI tool to select a central area within the image (80%).

[5] Record the following parameters:

- The average pixel value (APV)
- The maximum pixel value (MaxPV)
- The average standard deviation (STD Dev)

[6] Record the results from Step 5 in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

System Response and Linearity

This procedure tests the following:

- System response and linearity.

- Exposure index. CR requires that the code value at each pixel accurately reflects the X-ray exposure at that location. For Point-of-Care 360 systems, the code values are calibrated to be linearly related to the X-ray exposure.

[1] Set the X-ray parameters:

- 80 kVp

- 40 mAs

- Large focal spot

- Position the X-ray tube as SID 180 cm (72 in.)

[2] Adjust the collimator to produce an X-ray field that fits a 14 x 17 in. cassette.

[3] Place the dosimeter centered in the X-ray field.

[4] Add 1 mm Al and 0.5 mm Cu filters to the tube exit with the copper closest to the tube.

[5] Measure the exposure level:

(a) Adjust the SID to measure exposure level of 10 ma (adjustment range ± 10 cm).

(b) If required, change mAs to reach 10 mR ± 0.1.

(c) If the dosimeter is not available, use the settings listed in Step 1.

[6] Remove the dosimeter and insert the cassette.

[7] Expose 14 x 17 in. screen to produce flat field.

[8] Wait 2 minutes between the exposure and the reading.

[9] Read the screen.

[10] Record the exposure index (EI) displayed in the preview window.

[11] Load the 12-bit raw image.

[12] Record the average pixel value (Avg).

[13] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)
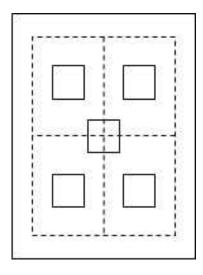
Uniformity and Artifacts

In CR and all other imaging, image artifacts can degrade diagnostic quality. The purpose of this test is to inspect the image uniformity using "flat-field" exposure and to perform visual inspection of artifacts. Uniform exposures provide a stringent test for many common image artifacts that can occur in CR systems.

For this test, use the flat-field image resulting from the 10 mR exposure from the System Response Linearity test. (See System Response and Linearity on Page 206.)

⬜▷ **Note**

When conducting the test without a dosimeter, first select ROI of 80% of the image and record the average pixel value (Avg). This value will be used as the reference point for the test results.

[1] Select 5 squares within 80% of the total image area using the ROI.

[2] Measure the average pixel value (Avg) in each of the five squares.

[3] Set the window width to 200.

[4] Select the automatic window level option. The window level should be approximately 3000.

[5] Visually examine the image for uniformity and artifacts.

[6] Examine the image for low-contrast dark or light bands or streaks running horizontally or vertically across the image.

⬜▷ **Note**
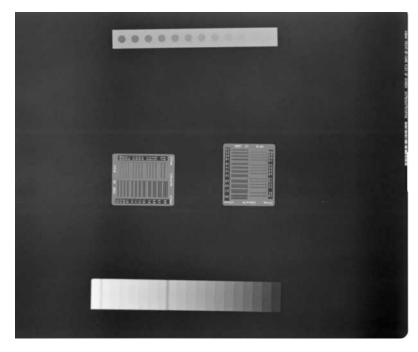
No artifacts should appear on the image.

[7] If any artifacts appear, measure and record the average pixel value along the artifacts (based on an extended rectangular ROI).

[8] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

[9] Compute the maximum deviation from the mean pixel value at each ROI with respect to the mean pixel value of the whole image.

[10] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

## Multiple Test Tools: Resolution Grid, Step Wedge, and Contrast Resolution

These procedures measure the spatial frequency resolution, exposure response, and contrast resolution of the system.

[1] Set the X-ray parameters:
- 80 kVp
- 40 mAs
- Large focal spot
- Position the X-ray tube as SID 180 cm (72 in.)

[2] Adjust the collimator to produce an X-ray field that fits a 14 x 17 in. cassette.

[3] Place the dosimeter centered in the X-ray field.

[4] Add 1 mm Al and 0.5 mm Cu filters to the tube exit with the copper closest to the tube.

[5] Measure the exposure level:

(a) Adjust the SID to measure exposure level of 10 mR (adjustment range ± 10 cm).

(b) If required, change mAs to reach 10 mR ± 0.1.

(c) If the dosimeter is not available, use the settings listed in Step 1.

[6] Place the following test tools on the 14 x 17 in. cassette:
- Grid
- Step wedge
- Low-contrast disc phantoms

[7] Expose the cassette using the X-ray settings listed in Step 1.

[8] Scan the cassette.

[9] Open the 12-bit raw image (Ar folder) using the WIISE viewer.

[10] Set the Viewer window magnification at 100%.

[11] Set the window width to 400.

[12] Select the automatic window level option. The window level should be approximately 3000.

Inspecting the Spatial Resolution

[1] Inspect the spatial resolution.

[2] Record the highest spatial frequency (line-pairs) showing visible modulation.

[3] Adjust the window width and level to maximize the visibility of the line-pair pattern.

[4] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

Inspecting the Low Contrast Resolution

[1] Inspect the circular contrast discs on the image.

[2] Record the number of circular discs that are visible on the image.

[3] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

Inspecting the Step Wedge

[1] Inspect the step wedge located on the image.

[2] Verify that all the steps are differentiable and not saturated.

[3] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

Erasure Efficiency

This procedure tests the plate for residual signals following a readout and erasure cycle.

[1] Set the X-ray parameters:

- 80 kVp
- 40 mAs
- Large focal spot
- Position the X-ray tube as SID 180 cm (72 in.)

[2] Add 1 mm Al and 0.5 mm Cu filters to the tube exit with the copper closest to the tube.

[3] Scan the cassette.

[4] Open the 12-bit raw image (Ar folder) using the WIISE viewer.

[5] Visually search the image for previous image marks.

[6] Is there evidence of ghost marks?

Yes	No
An ROI analysis is required in order to determine a pass/fail verdict.	The test is complete and there is no need to perform an ROI analysis.

[7] Calculate the number of ADC counts on peak-to-peak range (use line profile on X rows).

[8] Record the results in the Image Quality Results Reporting table. (See Image Quality Results Reporting on Page 210.)

Image Quality Results Reporting

<table>
<tr><td colspan="2" style="background:black"></td></tr>
<tr><td>Serial Number:</td><td>_____</td></tr>
<tr><td>Software Version:</td><td>_____</td></tr>
<tr><td>Date:</td><td>_____</td></tr>
<tr><td>Tested by:</td><td>_____</td></tr>
</table>

Dark Noise			
Parameter	**Actual**	**Requirements**	**Pass/Fail**
APV		63980 < APV < 64020	
MAX PV		MAX PV < 65534	
STD		PVSD < 3.5	

System Response and Linearity				
Parameter	**Actual**	**Requirements with Dosimeter**	**Requirements without Dosimeter**	**Pass/Fail**
APV at 10 mR		3000 ± 150		

Uniformity and Artifacts				
Parameter	**Actual**	**Requirements with Dosimeter**	**Requirements without Dosimeter**	**Pass/Fail**
APV image (80% of the image)		3000 ± 150		
APV TL		3000 ± 150		
APV TR		3000 ± 150		
APV BL		3000 ± 150		
APV BR		3000 ± 150		
APV Center		3000 ± 150		

Artifacts			
Parameter	**Actual**	**Requirements**	**Pass/Fail**
Artifacts and missing pixels		No artifacts or missing pixels	
Scratches		No scratches	
Line shifts		No line shifts	

Spatial Resolution			
Parameter	**Actual**	**Requirements**	**Pass/Fail**
14 x 17 (160 um)		> 2.5 LP/mm	

Low Contrast Resolution			
Parameter	**Actual**	**Requirements**	**Pass/Fail**
14 x 17 (160 um)		> 10	

Step Wedge			
Parameter	**Actual**	**Requirements**	**Pass/Fail**
14 x 17 (160 um)		Differentiable with no saturation	

Erasure Efficiency			
Parameter	**Actual**	**Requirements**	**Pass/Fail**
Image residual		No previous image marks	
APV difference		ADC count < 4	

Section 13: Appendix
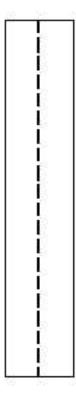
Calibration Results Report

Calibration Results Report

Scanner General Details

Machine Serial Number:	
Software version:	
Date:	
Tested by:	
Approved by:	

Calibration Test Results:

Parameter	Results		Requirement	Actual			Notes
1. Origin setting:	X	Y	For all cassette sizes – the 16-bit image should be viewed with white over-scan bands	14x17	12x10	8x10	
				Pass/Fail	Pass/Fail	Pass/Fail	
2. Offset Setting	Fine Offset	Coarse Offset	On 16-bit image empty screen: APV=64000 ± 50	14x17	12x10	8x10	
3. Gain setting	E-Gain		On 12-bit raw image: APV=3000± 50	14"x17	12x10	8x10	
4. OCPC Process			On 12-bit raw image: Non uniformity<300 counts	14x17 HR	10x12	8x10	
				14x17 HS			

Test Target Tool for Barcode Alignment Procedure

Section 14: Publication History

Publication Date	Publication No.	ECO No.	Changed Pages	File Name	Notes
JUL08	6H4869	C00388	- - -	6H4869_PoC360_ ServiceGuide.fm	New Publication
JUL09	6H4869-01	C00803	52-56, 189-196, 112-122, 96-102, 103-105, 67-73, 63-64, 176-188	6H4869-01_PoC_360_Servi ce Guide July_09.fm	• Linear Screw Replacement-Type B • Mini Acceptance Test Procedure • Cassette Release Mechanism Adjustment • IGUS Energy Chain Installation • Barcode Reader Replacement • Power Supply Replacement • Cassette Loader Replacement • Downloading and Verifying IMCS files
23DEC09	6H4869	---		6H4869.fm	Edited
17MAR10	6H4869	---	95-98, 110-113, 58-63, 177, 181-182, 199-204, 204	6H4869 updated.fm	• Replacing cassette fixation lever assembly • Replacing the barcode reader • Replacing the linear motor type B • Troubleshooting error # 69 • Controller and IMCS embedded software • Measuring the linear current • Acceptance test procedure

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