IBP

WHEEL BALANCER

SERVICE MANUAL

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

1.1 GENERAL

This Service Manual describes maintenance, checks and repairs operations of all wheel balancers under Hofmann, John Bean, Boxer and Snap On brands and is for use of qualified personnel only.
Keep this manual constantly updated, by adding Service Bulletins related to the balancers.

IMPORTANT!

The identification datas of each machine are printed on an adhesive label attached to the rear or the left side of the machines. The serial number is a sequence of figures standing for the manufacturing month and year the first four numbers, followed by the machine part number made of 7 numbers or alphanumeric and finally the progressive serial number of the machine manufactured with this specific part number.

1.2 TOOLS REQUIRED

To repair and/or check these balancers, the following standard tools are required:

Keys	**:** 6 mm to 19 mm
Allen keys	**:** 2.5 mm to 8 mm
	: 6 mm, with a length (or adapter) of at least 140 mm (ratchet advised)
Screw drivers	**:** Flat bed, 1 to 3
	: Phillips, 1 to 3
Multimeter	**:** AC, DC, A, Ohm, pF

User Calibration Weight (supplied with the unit)

Special tools that are required for specific tasks are:

Test Rotor : # EAA0277D12A / 0025406 / 6416946

Use this test rotor to perform a Factory Calibration, Service Code C115, C88, C122. This is required after:
- The replacement of a complete Vibratory System.
- Replacement of the piezo pick ups.
- The replacement of the scanner
- The replacement of the AWP or Motor driver boards.
- Replacement of the IBP box or main PCB board.
- A complete loss of the configuration data.
- Control of the balancers calibration.

Calibration ring: # 0025424 / 1668188 /

Use this ring on P variant machine only to perform the compensation of imbalance main shaft, Service Code C84.
This is required after:
- The replacement of a complete Vibratory system.
- A complete loss of the configuration data.
- The replacement or reparation of the power clamp device.
- After power clamp flange replacement.
- Replacement of piezo pick ups.

Calibration bar: # 0025408 / 6418020

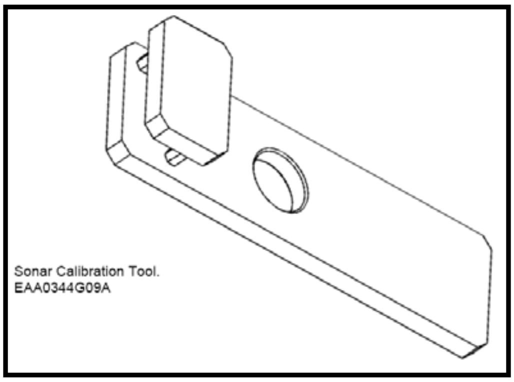
Use this bar to calibrate the Geodata only.
Service Code C80. This is required after:
- Geodata potentiometer/s replacement
- Geodata arm or arm components replacement.
- Calibration of Geodata

Geodata calibrator adapter # EAC0100G88A.
Use this adapter to calibrate the Geodata only on balancers **with Alloy Vibratory System.**
Service Code C80. This is required after:

- Geodata potentiometer/s replacement
- Geodata arm or arm components replacement.
- Calibration of Geodata
- IBP box replacement.
- Vibratory Assy replacement.

Sonar Calibration Tool # EAA0344G09A
This tool allows a high accuracy sonar sensor calibration.
Use this calibration tool to calibrate (C122) and check (C123) the sonar sensor. It is required after:

- Sonar sensor replacement
- AWP or Motor Driver board replacement
- Inner scanner replacement
- Controller or IBP board replacement
- Distance and/or diameter potentiometer/s replacement
- Vibratory assy replacement.
- Wheel guard replacement
- Wheel guard potentiometer replacement



Assy laser positioner # EAA0362G16A
This tool allows a high accuracy cameras calibration.
Use this tool to adjust and calibrate the Geodyna Optima 2 and BFH 2000 cameras with C122 and C123.
It is required after:

- Embedded PC replacement.
- HUB Board replacement.
- Camera replacement.
- Laser replacement.
- IBP box replacement.
- Geodata potentiometer/s replacement.
- Vibratory assy replacement.
- Power clamp optoencoder replacement

Fork tool 6,3 mm # EAM0092G36A for Front Transducer.

Use these tools on **ALLOY** vibratory system only to proper adjust the fastening mean of the front piezo pickup.

Fork tool 4,3mm # EAM0092G35A for Rear Transducer.

Use these tools on **ALLOY** vibratory system only to proper adjust the fastening mean of the rear piezo pickup.

Snap-on QDRIVER4NM

Use this torque wrench on **ALLOY** vibratory system only to proper tighten piezo pick ups screws.

Electronic inclinometer and spirit level

1.3 IMPORTANT SAFETY INSTRUCTIONS

The units are CE or UL approved, but whenever using this equipment basic safety precautions should always be followed, including the following:

1. **Read all instructions.**
2. **Do not operate equipment with a damaged power cord or if the equipment has been damaged until it has been examined by a qualified authorized service technician.**
3. **If an extension cord is used, a cord with a current rating equal to or more than that of the machine should be used. Cords rated for less current than the equipment may overheat. Care should be taken to arrange the cord so that it will not be tripped over or pulled.**
4. **Always unplug equipment from electrical outlet when not in use. Never use the cord to pull the plug from the outlet. Grasp plug and pull to disconnect.**
5. **To reduce the risk of fire, do not operate equipment in the vicinity of open containers of flammable liquids (gasoline).**

6. **Keep hair, loose fitting clothing, fingers and all parts of the body away from moving parts.**

7. **To reduce the risk of electric shock, do not use on wet surfaces or expose to rain.**

8. **Do not hammer on or hit any part of the control panel with weight pliers.**

9. **Do not allow unauthorized personnel to operate the equipment.**

10. **Use only as described in this manual. Use only manufacturer's recommended attachments.**

11. **Always securely tighten the wing nut before spinning the shaft.**

12. **ALWAYS WEAR SAFETY GLASSES. Everyday eyeglasses only have impact resistant lenses, they are NOT safety glasses.**

13. **Balancer is for indoor use only.**

1.4 ELECTRICAL SAFETY PRECAUTIONS

Make sure the balancer is unplugged before disconnecting any wires in preparation for replacing any boards, cables or other items within the unit.

CHAPTER 2
AC/DC POWER DISTRIBUTION

2.1 LOCKOUT AND/OR TAGOUT SYSTEM PROCEDURE

1. Notify all affected employees that a lockout or tagout system is going to be utilized and why. The authorized employee should know the electrical power the machine uses and it's hazards.

2. If the machine or equipment is running, shut it down by the normal stopping procedure (depress the stop button, open toggle switch, etc.)

3. Use appropriate devices to isolate the equipment from the power source(s). Stored energy (such as that in springs, elevated machine members, rotating flywheels, hydraulic systems, and air gas, steam or water pressure, etc.) must be dissipated or restrained by methods such as repositioning, blocking, bleeding down, etc.

4. Lockout and/or tagout the energy isolating devices with individual lock(s) or tag(s).

5. After ensuring that no personnel are exposed, and as a check on having disconnected the energy sources, operate the push button or other normal operating controls to make certain the equipment will not operate. ***CAUTION: RETURN OPERATING CONTROL(S) TO "NEUTRAL" OR "OFF" POSITION AFTER THE TEST [DE-ENERGIZED STATE].***

6. The equipment is now locked out or tagged out.

2.2 ELECTRICAL REQUIREMENTS

NOTE: ANY ELECTRICAL WIRING MUST BE PERFORMED BY LICENSED PERSONNEL.

ALL SERVICE MUST BE PERFORMED BY AN AUTHORIZED SERVICE TECHNICIAN.

Check on the plate of the machine that the electrical specifications of the power source are the same as that of the machine.

NOTE: THE IBP BALANCERS PERFORM A SELF-TEST ROUTINE ON START-UP. THERE IS A DELAY OF SEVERAL SECONDS BEFORE THE DISPLAY IS ACTIVATED.

NOTE: ANY ELECTRICAL OUTLET INSTALLATION MUST BE VERIFIED BY A LICENSED ELECTRICIAN BEFORE CONNECTING THE BALANCER.

NOTE: ENSURE THAT THE OUTLET HAS AN AUTOMATIC GROUND FAULT CIRCUIT BREAKER WITH A DIFFERENTIAL CIRCUIT SET AT 30 MA.

2.3 AC THEORY OF OPERATION

WARNING!

USE STANDARD ANT-STATIC PROCEDURES WHILE PERFORMING THESE INSTRUCTIONS

Always use the “One Hand Rule” when working with AC voltages by keeping one hand in your pocket or behind your back. Before removing wires from the Balancer, always verify that the unit is “OFF”. Turn off the Main Power Switch on the back and unplug the AC power cord from the AC outlet.

AC DISTRIBUTION

The balancesr requires 230VAC for proper operation. The 230 (+/-10%) AC voltage comes in through a switch and immediately is sent to the PCB. On CRT versions a splitter connector before the X41 pin 1, sends the Power Supply to a plug bolted in the back side of the balancers.

On touch less wheel balancers a splitter connector sends the Power Supply to the Camera processor Power Supplier board.

The primary voltage applies 230V, 50/60Hz AC to the BALANCER via the hot side (Black Wire) of the AC power cable. Different voltages - 100 VAC or 115 VAC - are implemented via a step-up transformer. The Main Power routes to one side of the “ON/OFF” Rear Panel Power Switch. The hot wire continues to one side of the Line Filter. The neutral side routes to the other side of the Line Filter. The earth ground directly connects to the BALANCER chassis, and the Line Filter. It is critical to have the proper input voltage in order for the balancer to operate correctly.

DRIVE MOTOR

The drive motor for the unit receives AC power VIA two relays mounted directly to the Power Supply section of the IBP one. To keep arcing at the relays to a minimum the relays are switched in synchronism. The switching times of the relays are determined individually and taken into consideration for optimum pull-in times. The motor also utilizes a capacitor to generate a sufficient amount of torque during clamping, on wheel clamp machines, acceleration and braking.

2.4 DC THEORY OF OPERATION

PROCESSOR BOARD

The operating voltage for the Main Processor is 5,24 VDC, generated by the integrated power supply section. These 5,24 volts are then supplied to the Optoencoder and the EPC on CRT balancers, except on Optima 2 and BFH 2000.

INCREMENTAL ENCODER BOARD MAIN SHAFT

The optoencoder receives 5,24 VDC from the Processor Board. This voltage can be measured on the Processor Board at X3 or X10, pin 6. Output directly goes to the Main Processor Board and on the touch less balancer it also passes through the Main Processor Board directly to the AWP, or Motor Driver ones or to the HUB.The optoencoder is built so there are no adjustments.The encoder disk consists of a reflective slotted sleeve which is mounted on the main shaft and cannot be replaced without replacing the vibratory system.

INCREMENTAL ENCODER BOARD POWER CLAMP (Power clamp version only)

The power clamp encoder board B9 is connected and supplied to the main shaft encoder board. It is fitted at 1 mm from a code strip fixed to the circumference of the big drive pulley, and it acquires the rotational travel direction of rotation and absolute angular position of the big pulley at the vibratory assembly with power clamp. The output signal passes trough the Incremental Encoder Board directly to Main Processor one

DISTANCE POTENTIOMETER

The distance potentiometer is a 10K pot. It is supplied at 3.3 VDC from the main processor. This input voltage can be measured at the Processor Board X6, pin 3. On the Optima 2 the distance potentiometer is a 10K 5 turns potentiometer. The output voltage is dependent upon the deflection of the gauge from the home position.

DIAMETER POTENTIOMETER

The diameter potentiometer is a 10K pot. It is supplied at 3.3 VDC from the main processor. This input voltage can be measured at the Processor Board X7, pin 3. The output voltage is dependent upon the rotation of the gauge from the home position.

WIDTH POTENTIOMETER
The width potentiometer is a 10K pot. It is supplied at 3.3 VDC from the main processor. This input voltage can be measured at the Processor Board X8, pin 3. The output voltage is dependent upon the rotation of the gauge from the home position.

TRANSDUCERS
The transducers are installed in a manner that it forms a virtual transducer on each end of the shaft. This configuration gives the balancer greater accuracy along with minimal amount of erroneous readings. Both measuring transducers are arranged in one plane. The transducers produce a charge output. The charge that is generated is sent back to the processor.

DISPLAY BOARD
The Display Board receives 5,24 VDC from the IBP box. This 5,24 volts can be checked at the harness of the display board X2 pin 6 or at the PCB X2, pin 6.

KEYPAD
The keypad allows operator input to the Main Processor Board. The output signal passes through theconnector X2 directly to the Main Processor section of the IBP. On touch less balancers, except Optima 2 and BFH 2000, it also passes through the Camera controller board.

GEODATA ARM
The Geodata switch receives 5,24 VDC from the IBP when the balancer is in the ALU-S mode. The voltage can be measures at the IBP at X13, pin 1 and 2.

AUTO STOP LOCK SWITCH
The auto lock switch receives 5,24 VDC from the IBP when the balancer is in the ALU-S mode. The voltage can be measures at the IBP at X13 pin 1and 2.

ELECTROMAGNETIC BRAKE
The PCB sends 150VDC to the Electromagnetic brake on the motor stopping the tire and wheel assembly at TDC for the outside weight location. The voltage can be measured at X13 on the IBP box, pins 7 and 8.

EMBEDDED PC (Standard monitor version only)
The balancer has an Embedded PC that controls the COM ports, the USB ports and the CRT. The PC has a 4Mb Compact Flash card that stores all screen shots for the balancer. The EPC interfaces with the Main balancer processor inside the EBox via COM1. The board is powered by 5,24 VDC via cable from the PCB at X9 or J9 on IBP.

AWP, MOTOR DRIVER AND HUB BOARDS POWER SUPPLIER BOARD
This Power Supplier Board is supplied at 230VAC by a splitter before X41 connector. On the first batch of touch less balancer the output was for the AWP board 9,35VDC and later it was changed to 12VDC one due to different type of AWP board.

AWP BOARD (Geo 6900p, 6900-2p, OPTIMA, b9850p, b9855p, b9855-2p, BFH 1000)
AWP board is the liaison of the Scanners and the Main PCB. It is supplied by the Power Supplier Board and supplies 9,35VDC or 12VDC to the scanners.

MOTOR DRIVER BOARD.
Motor Driver Board is the liaison of the Scanners and the Main PCB. It replaced the AWP board and is supplied by the Power Supplier Board and supplies 12VDC to the scanners.

A WEIGHT LASER BOARD.
A-Weight Laser Board is the liaison of the Laser pointer and the Main PCB and supplies 12VDC to the Laser pointer for its motion and its lighting.

SONAR SENSOR
The sonar sensor is supplied by the AWP or by the Motor Driver board. It si connected to the connector J6 of the Motor Driver board or J11 on the AWP board.

HUB BOARD (OPTIMA 2 AND BFH 2000)
HUB board is the liaison of the Rear Cameras and the Main EPC 0. It is supplied by the Power Supplier Board at 12VDC, J1, and transforms the 12VDC input in 5,24VDC output, J2, for the EPC 0.

EMBEDDED PC ON OPTIMA 2 AND BFH 2000
On Optima 2 and BFH 2000 5 EPC, including that one of the screen, acquire and stores data coming from the cameras through USB ports. The package of 4 EPCs are supplied at 12VDC from Power supplier Board, while the 5th one is used for the rear camera and User Interface is supplied at 5.24VDC from the HUB.

SCANNERS (Geo 6900p, 6900-2p, OPTIMA AND b9850p, b9855p, 9855-2p, BFH 1000)

In the first batch of machines, the scanners was supplied at 9,35 VDC (+/-15%) while later it is changed to 12VDC. They are connected to a specific Camera Controller board or Motor Driver Board supplied by a dedicated Power supply board.

CAMERAS (OPTIMA 2 AND BFH 2000)

Balancers are equipped by 5 cameras:

- Interna camera is connected to EPC 1 with USb cable.
- External camera is connected to EPC 2 with USb cable
- Rear left camera is connected to EPC 3 with USB cable.
- Rear Right camera is connected to EPC 4 with USb cable
- Rear camera is connected to HUB board with USB cable on J8

All are supplied at 12 VDC from the HUB board.

LASER POINTER

It is used to place the adhesive weights only. It is supplied at 12VDC.

SWITCH ETHERNET (OPTIMA 2 AND BFH 2000)

On Optima 2 and BFH 100 -2 the Switch Ethernet is the liaison of the EPCs 1, 2, 3 and 4 and the Main EPC 0. It supplied at 5VDC by the HUB board J21, pin1 and 3.

2.5 FUNCTIONAL DESCRIPTION

The wheel balancers are designed to compute static and dynamic imbalance of car, light truck, motorcycle and truck wheels.

Wheels are clamped to the shaft using precision centring adapters and retainers. The shaft rotates on precision bearings on the shaft support. The rotating shaft is perfectly balanced. The wheels clamped normally represent an imbalance, which creates centrifugal force and a dynamic momentum as it is spun on the balancer shaft. The wheel is spun by means of a motor or by hand.

The centrifugal forces created by any imbalance are detected by the two transducers located between the shaft support and the machine frame. These transducers contain small discs of special quartz which generate electric charge when compressed. The charge created is linearly proportional to the compression force. Centrifugal force vectors are generated by imbalances in the rotating wheel. This causes a signal to be generated by the transducers (which pick up only one component of the constrained forces) in the form of a periodic sine wave.
The signal is not perfectly sinusoidal, due to noises from the suspension system, which add to the signal generated by the imbalance of the wheel. To determine acutal imbalance the signal must be filtered.

To compute correct imbalance values, the parameters (diameter, width, and offset) of the wheel to be balanced must be entered. According to the level of the balancer these operations can be done in the following ways:

- **MANUALLY:**

  By pressing and releasing the rim data buttons and toggling the UP/DOWN arrow keys on the display panel or by rotating the tire and wheel assembly until the desired number is shown:

- **SEMI-AUTOMATICALLY:**

  By sliding the distance arm the distance and in some models the rim diameter, are entered automatically. The rim diameter and width may be entered manually by using the supplied rim width callipers and entering the measured value. This is done by pressing and releasing the rim width button and toggling the UP/DOWN arrow keys on the display panel or by rotating the tire and wheel assembly until the desired number is shown.

- **AUTOMATICALLY:**

  By sliding the 3 SAPE arms, the rim data are entered automatically by means of two or three mounted potentiometers.

- **DETECTOR OF DISTANCE:**

  By sliding the 2 SAPE arm, the rim offeste and diameter data are entered automatically and the rim width is entered by means of detector of distance or sonar device.

- **“IMAGING SYSTEM” :**

  Geo 6900p, 6900-2P,Optima, b9850p, b9855p, b9855-2p and BFH 1000 are based on distance measuring devices (range finders) based on the principle of LASER triangulation.

- **“LASER LIGHT OF LIGHT” SYSTEM:**

  Geodyna Optima 2 and BFH 2000 the *sheet-of-light* imaging system consists of a distance measuring device based on the principle of optical laser triangulation.

To find wheel imbalance, the transducers signal magnitude and encoder timing are both required.

A series of timing marks on the shaft that interrupt light transmitted between two optocouplers generate a DC Square wave each time a mark moves past an optocoupler. One additional mark offset from the encoders' metallic strip, interrupts a third optocoupler on the board, creating a zero-signal reset or home position.

The encoder detects 512 angular positions during each turn of the shaft, plus the home or reset position.

The frequency of the DC square wave generated by the encoder allows the balancer to compute shaft speed, wheel acceleration and weight location. The encoder and transducer signals are multiplexed by the CPU section of the IBP, to give weight amount and location readings.

The CPU section gathers the information generated from the encoder and transducer via a ribbon cable. This board is powered with 5,24 VDC received from the Power Supply section of the IBP.

Calculated imbalance values are then shown on the LED or LCD display panel or screen after a spin cycle.

2.6 INSTALLATION PRECAUTIONS (Floor Level)

All models of Wheel Balancers have to be placed on a well levelled floor (± 1º tolerance). If you have already verified the floor levelling, skip to the section "Wheel guard end stop adjustment" (for b9850P / b9855P, b9855-2p only), otherwise, you must proceed as explained below.

Remove the weights tray and check the levelling by mean of a spirit level or electronic inclinometer.

1. Put the level on the vibratory system (Fig.1). The value must be 0° ±1º.
2. Put the level vertically on the flange (Fig.2). The value must be in the range 90º± 1 °.

Figure 1

Figure 2

CHAPTER 3
BALANCER COMPONENTS

3.1 INTRODUCTION

The Snap on balancers are manufactured with the following main components:

- **DISPLAY ASSEMBLY**
- **IBP BOX**
- **DISPLAY BOARD**
- **EMBEEDED PC / MONITOR**
- **VIBRATORY ASSEMBLY**
- **BRAKING SYSTEM**
- **SAPE ARMS**
- **PROFILING**

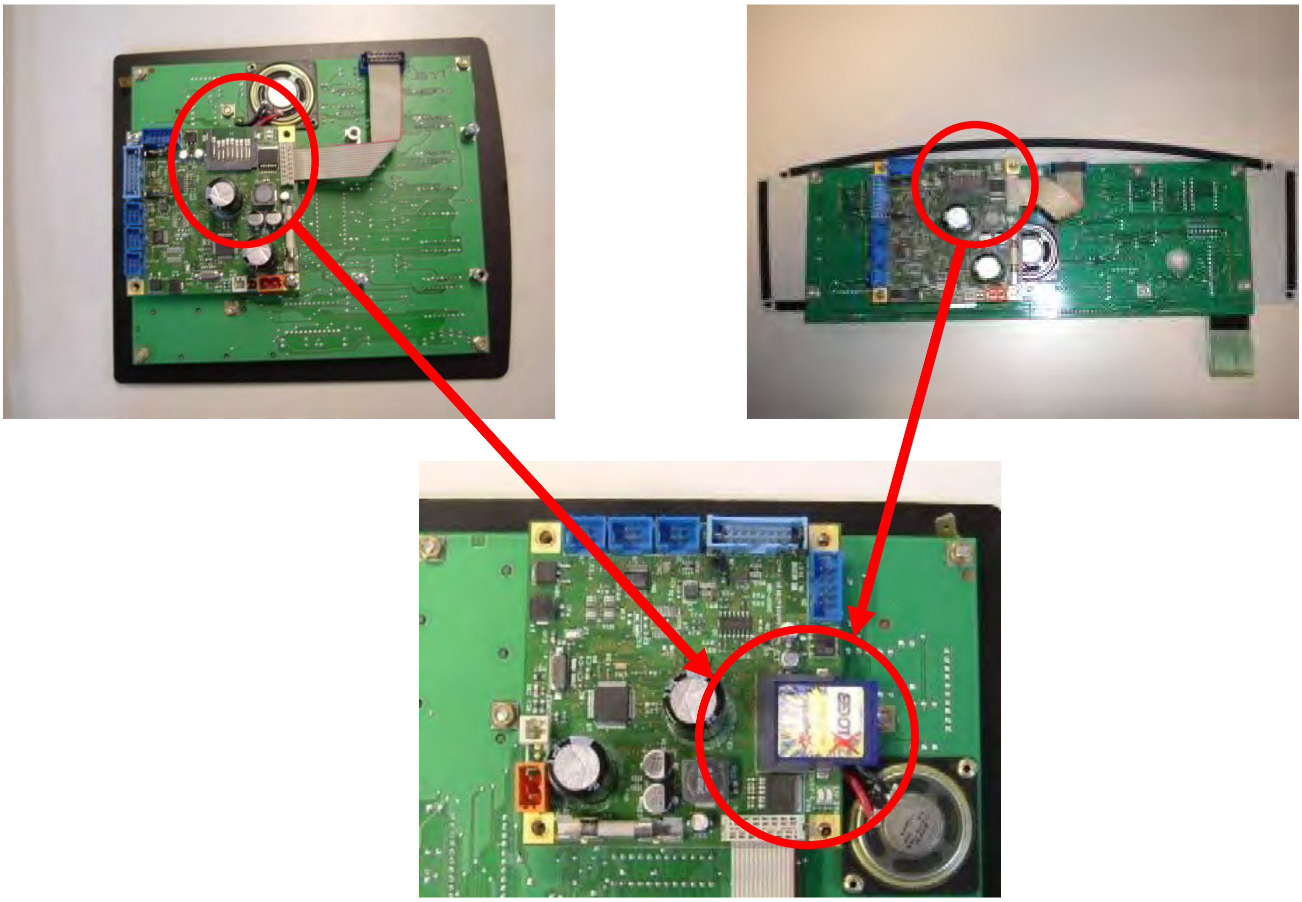
Each of these groups is composed by several other components that will be described in a deeper way in the following paragraphs.

3.2 DISPLAY ASSEMBLY OLD TYPE (Hand spin balancers only)

The IBP display assembly consists in a Controller Board integrated with the Power Supply one directly connected to the Display board through a flat cable. This new integrated board allows an easier software installation or update because it can be done via MMC/SD card. Software installation or update on all kind of balancers with new integrated board can be done with a unique MMC/SD card because the software downloading is automatically performed according to the type of keyboard installed on the balancer.
There is not any Hofmann and Boxer brand hand spin balancer equipped with this kind of integrated board.
Both assemblies are composed as follows:

- Display board.
- Integrated Controller board.

JOHN BEAN AND SNAP ON CONFIGURATION **OLD SNAP ON CONFIGURATION**



3.3 INTEGRATED PANEL ASSEMBLY - NEW TYPE

The Integrated display panel consists in a unique electronic board that intgrates Controller, Power Supply and Display. This integrated board allows an easier maintenance because it consist in a single board that includes more functions and easy software installation or update, since it can be done via MMC/SD card. Software installation or update on all kind of balancers with new integrated board can be done with a unique MMC/SD card because the software downloading is automatically performed according to the type of keyboard installed on the balancer.

JOHN BEAN AND SNAP ON CONFIGURATION

INTEGRATED LCD DISPLAY PANEL

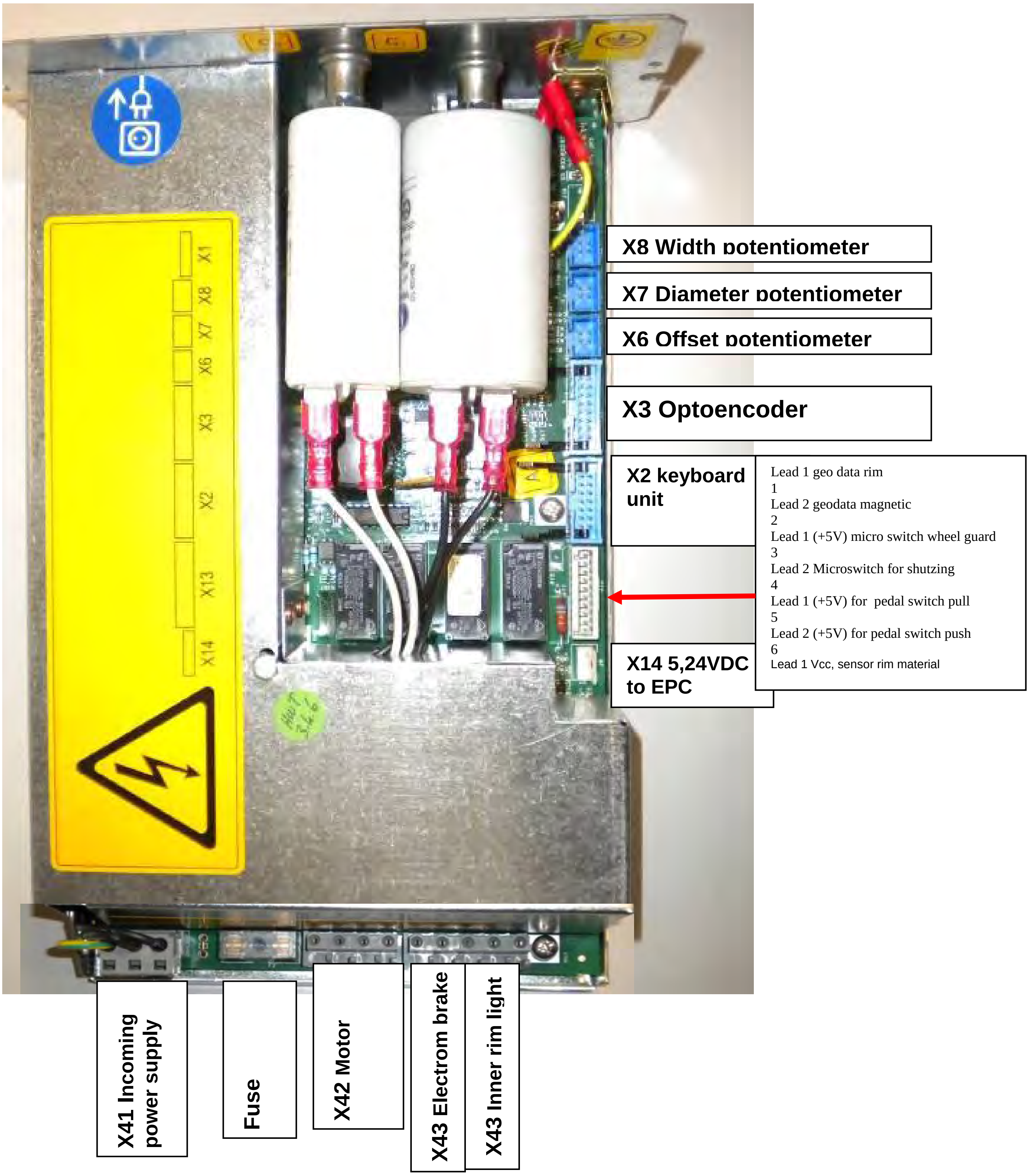
INTEGRATED LED DISPLAY CONFIGURATION

3.4 RETROFIT IBP BOX

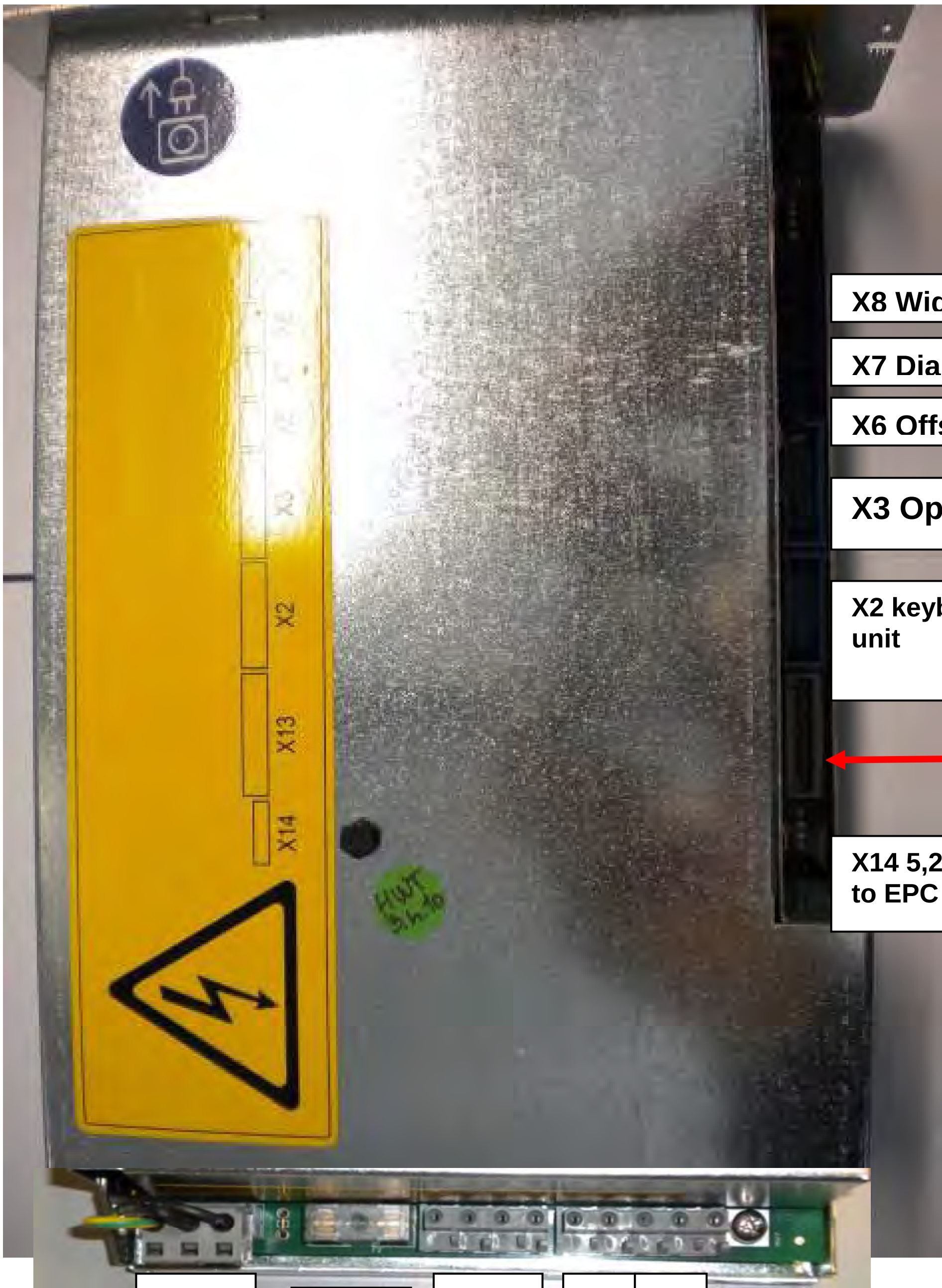
The IBP box consists in a Controller Board integrated with the Power Supply.This retrofit box has replaced the former one Y2k with Controller Board and- Power Supply one and allows an easier software installation because it can be done via MMC/SD card from the back of the box without remove the balancer weight tray and the cover of the Electronic box. The IBP box contains the following components:

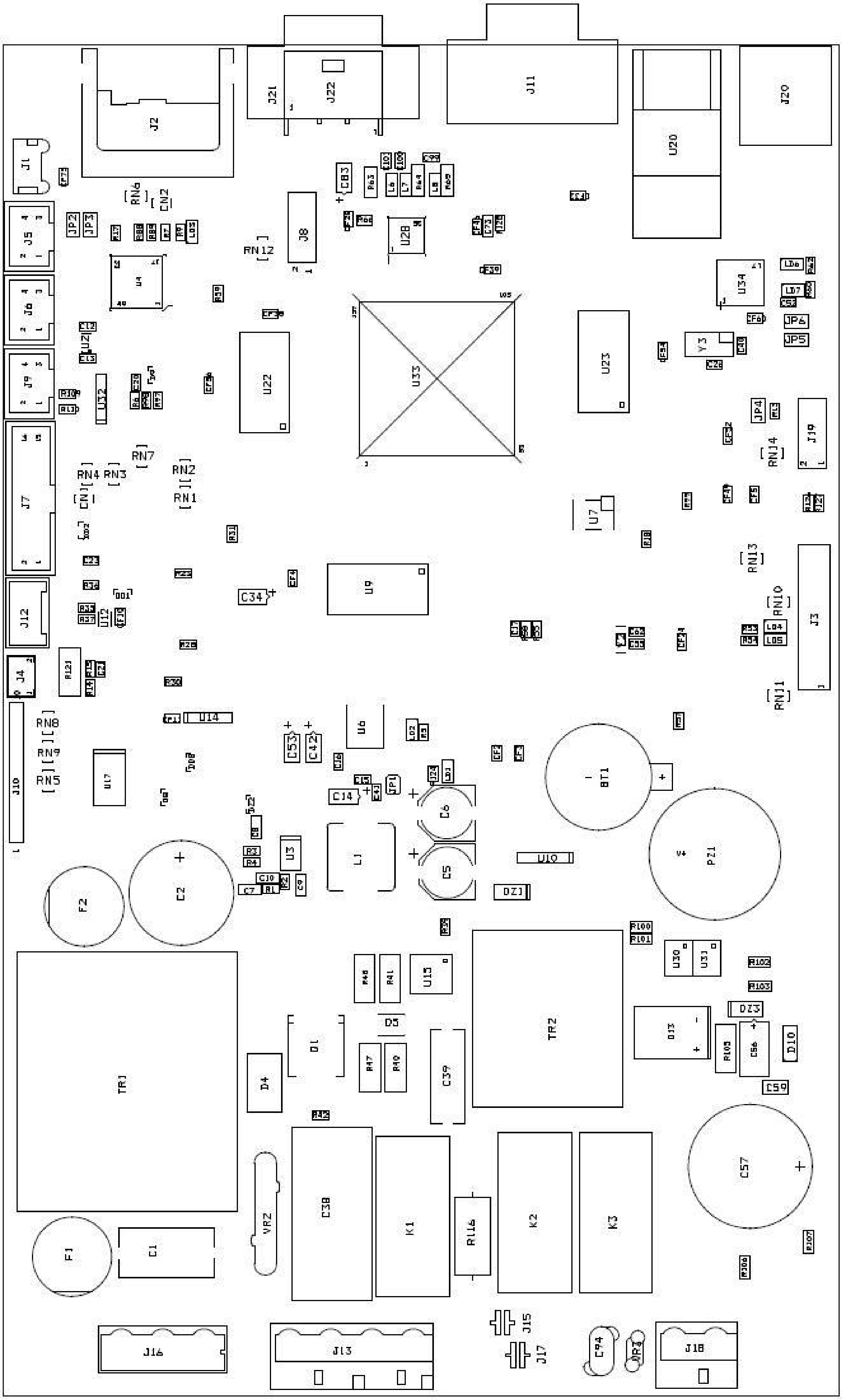
- Power Entry Module
- Controller board integrated with the Power Interface Board
- Motor Capacitors

  - **<u>OLD IBP BOX</u>**



- **NEW IBP BOX**


X8 Width potentiometer
X7 Diameter potentiometer
X6 Offset potentiometer
X3 Optoencoder
X2 keyboard unit
Lead 1 geo data rim
1
Lead 2 geodata magnetic
2
Lead 1 (+5V) micro switch wheel guard
3
Lead 2 Microswitch for shutzing
4
Lead 1 (+5V) for pedal switch pull
5
Lead 2 (+5V) for pedal switch push
6
Lead 1 Vcc, sensor rim material
X14 5,24VDC to EPC
X3
X2
X13
X14
X41 Incoming power supply
Fuse
X42 Motor
X43 Electromagnetic brake
X43 Inner rim light


J2
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C5
U10
DZ1
PZ1
F2
C2
U15
U30
U31
TR1
D5
D1
D4
C39
TR2
D13
DZ3
D10
C59
C38
K1
R116
K2
K3
C57
VR2
F1
C1
J15
J17
C94
J16
J13
J18

EAP0275G00A/B CONNECTORS LIST

J16 MAINS
1 PE
2 L
3 N

J13 MOTOR
1 FORWARD RUN WINDING
2 REVERSE RUN WINDING
3 COMMON OF WINDINGS
4 GND (PE)

J18 BRAKE (EAP0275G00A ONLY)
1 SOLENOID END 1
2 SOLENOID END 2

J11 VGA
(SEE VGA STANDARD)

J22 1ST SERIAL PORT RS232
1 GND
2 N.C.
3 TO PC-DTR
4 TO PC-RTS
5 TO PC-TX
6 TO PC-RX

J2 SD CARD SLOT
(SEE SD-SPI STANDARD)

J1 2ND SERIAL PORT (SONAR LINK)
1 TX
2 RX
3 +5V
4 GND

J5 RIM DISTANCE (OFFSET) POTENTIOMETER
1 GND
2 SIGNAL
3 VREF (3.3V)
4 N.C.

J6 RIM DIAMETER POTENTIOMETER
1 GND
2 SIGNAL
3 VREF (3.3V)
4 N.C.

J9 WIDTH POTENTIOMETER (N.U.)
1 GND
2 SIGNAL
3 VREF (3.3V)
4 N.C.

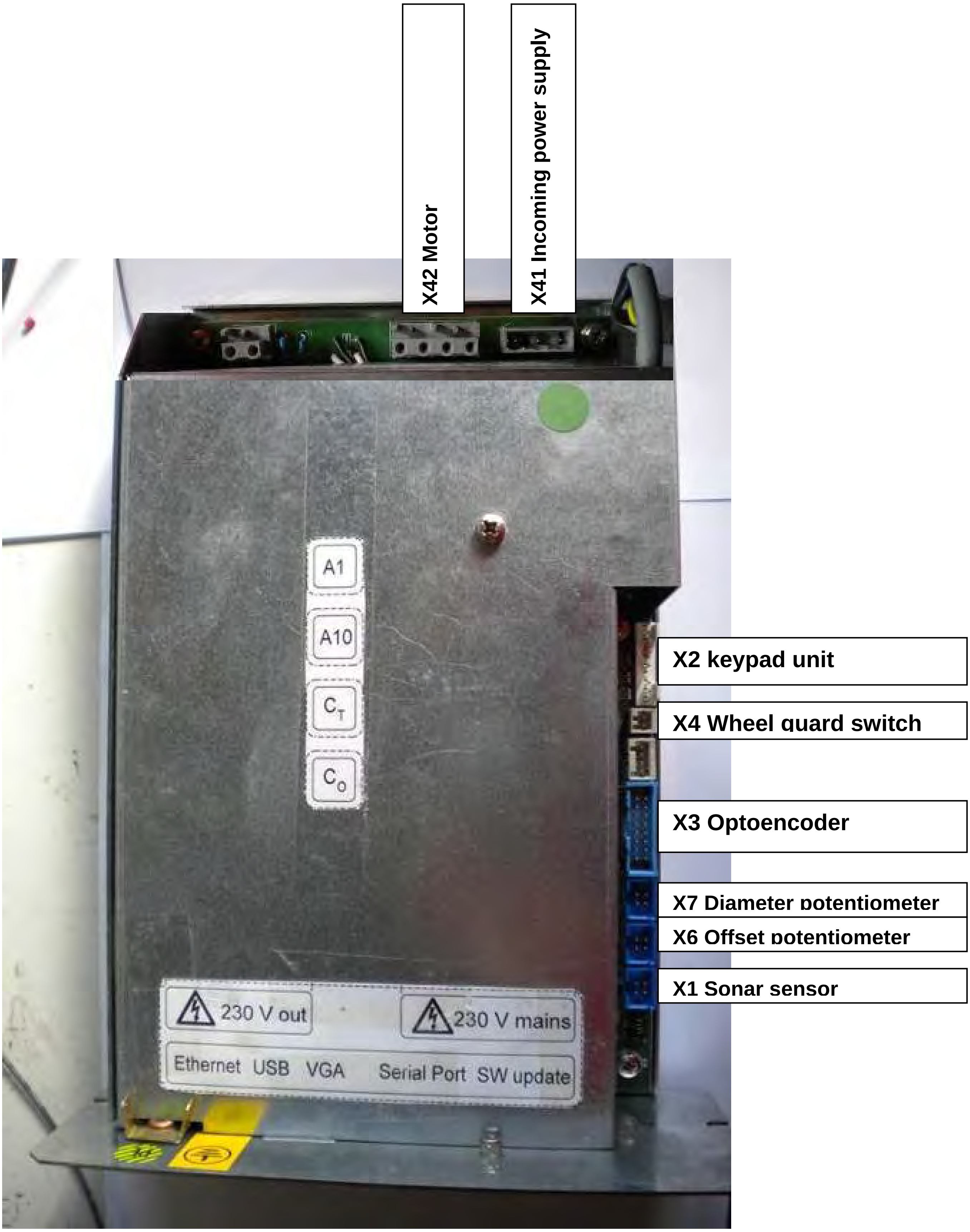
J7 ENCODER
1 CH_AUX1
2 CH_AUX2
3 I^2C SDA (DATA)
4 I^2C SCL (CLOCK)
5 OPTO EMITTER SUPPLY

6	+5V
7	CH_A
8	CH_REF
9	CH_B
10	GND
11	PIEZO R +
12	PIEZO R -
13	N.C.
14	GND
15	PIEZO L+
16	PIEZO L-

J12	**PEDAL SWITCHES INPUT** (EAP0275G00A ONLY)
1	+5V
2	PEDAL 1
3	+5V
4	PEDAL 2

J4	**WHEEL GUARD SWITCH INPUT**
1	SIGNAL
2	GND

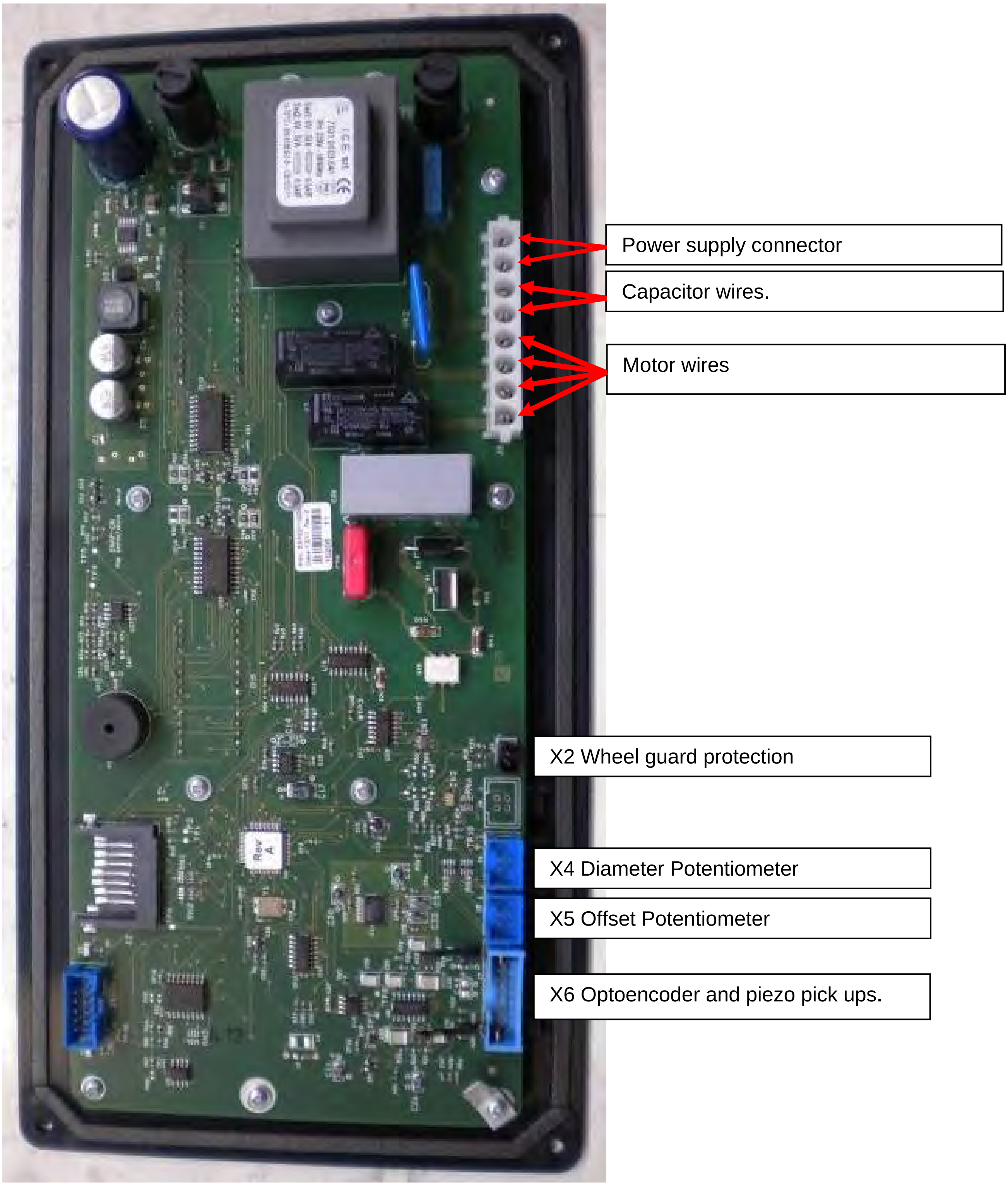
➢ IBP BOX WITH INTEGRATED USER INTERFACE (For screen balancer without EPC)

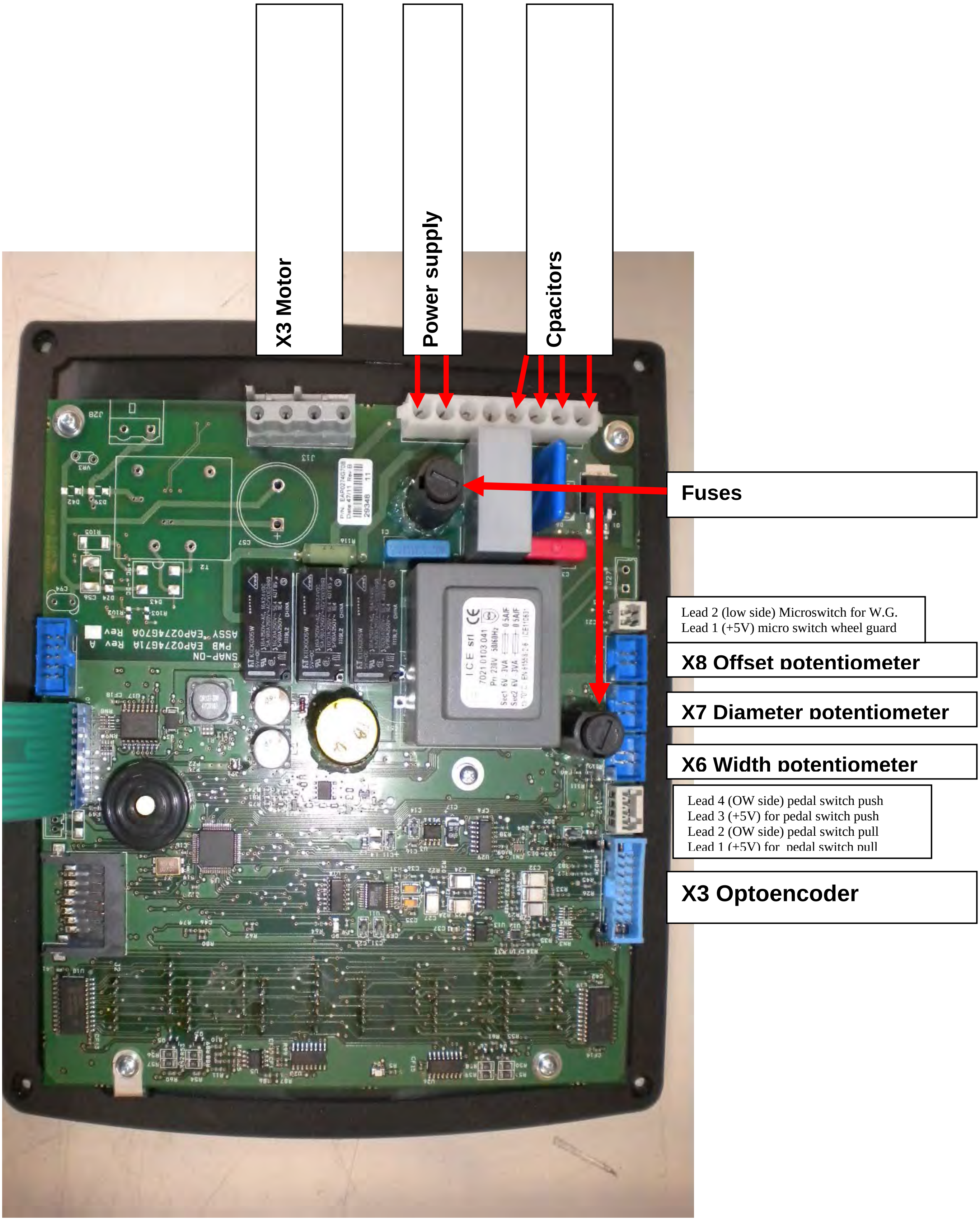


3.5 INTEGRATED INTERFACE BOARD

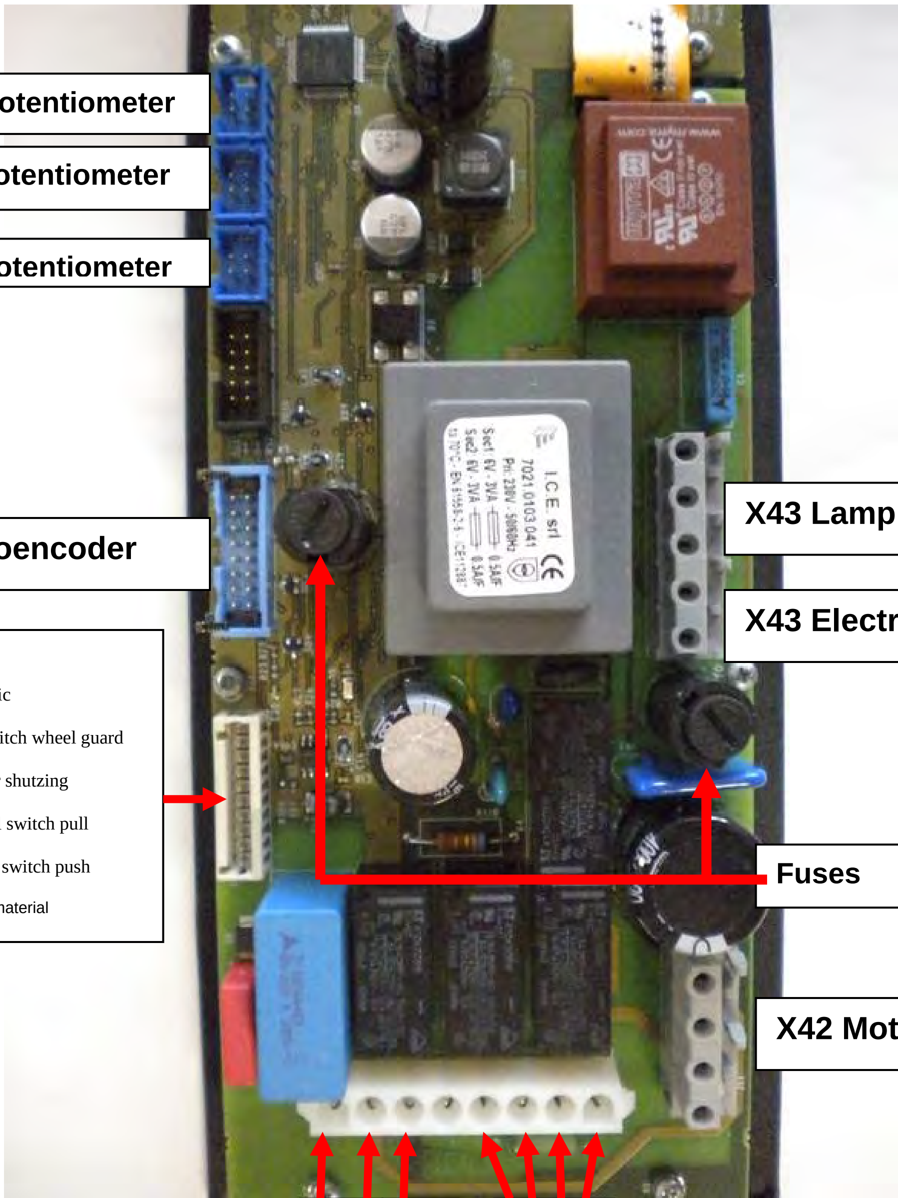
The interface board consist in a unique board that integrates Power supply, Controller and display for easy management and software installation. On this kind of Integrated board the 5 VDC is lower than the 5.24 VDC of the IBP box and it is not adjustable.

MOTOR DRIVEN INTEGRATED INTERFACE LEDs BOARD

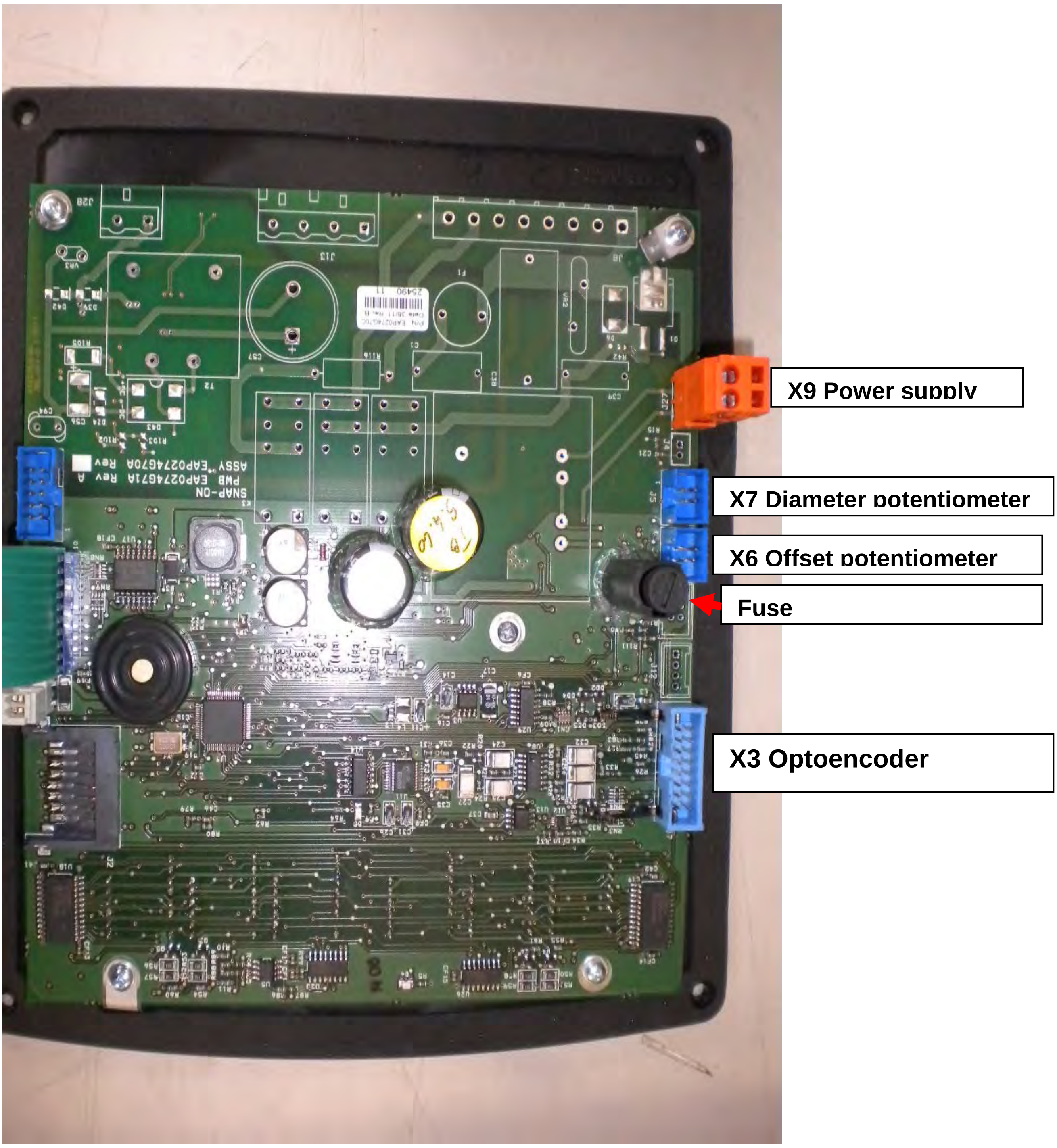



X3 Motor
Power supply
Cpacitors
Fuses
Lead 2 (low side) Microswitch for W.G.
Lead 1 (+5V) micro switch wheel guard
X8 Offset potentiometer
X7 Diameter potentiometer
X6 Width potentiometer
Lead 4 (OW side) pedal switch push
Lead 3 (+5V) for pedal switch push
Lead 2 (OW side) pedal switch pull
Lead 1 (+5V) for pedal switch pull
X3 Optoencoder

MOTOR DRIVEN INTEGRATED INTERFACE LCD BOARD



HAND SPIN INTEGRATED INTERFACE LEDs BOARD



3.6 POWER ENTRY MODULE (PEM)

On the former IBP box, the Power Entry Module (PEM) consisted in two separated units instead of one.

- One unit includes the switch only.
- One unit includes the the power supply inlet, suppresses noise and contains the fuses.

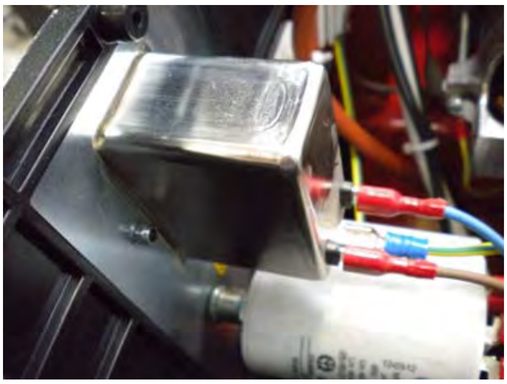
If a transformer is required, it has to be connected between the PEM and the Power Interface Board, Connector X41.

FORMER IBP BOX MODULE

PRESENT PEM MODULE

The present Power Entry Module (PEM) consists in a single unit includings switch, fuses, suppresses noise and power supply inlet

On the display balancers the module is applied to a steel bracket while on the video it is included into the IBP box.



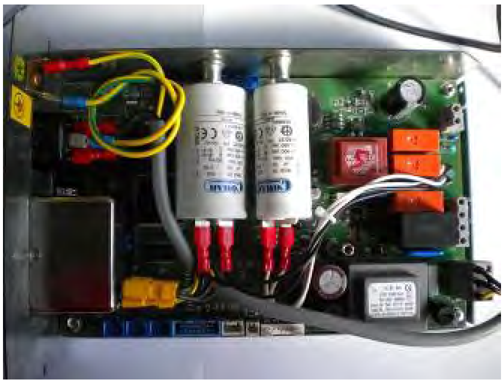
3.7 INTEGRATED POWER SUPPLY AND CONTROLLER BOARD

All wheel balancers are equipped with integrated power supply and controller board.
John Bean and Snap On brands digital display balancers are equipped with integrated interface controller-power supply and display board.

The PCB board does not include the socket for the Eprom because the software loading or updating is done with a MMC/SD card.
Until July 2012 the replacement of the board always required the software loading, balancer set up and calibration of the machine and it is mandatory to load the software with all connetcors plugged to the PCB board. Please refer to Service Bulletin 863, 864, 865 and 877 WB

INTEGRATED BOARD FOR IBP BOX

INTEGRATED BOARD FOR SCREEN BALANCERS WITHOUT EPC



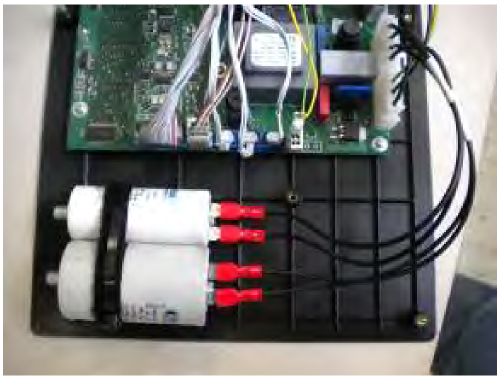
OLD INTEGRATED INTERFACE PCB BOARD HAND SPIN BALANCER

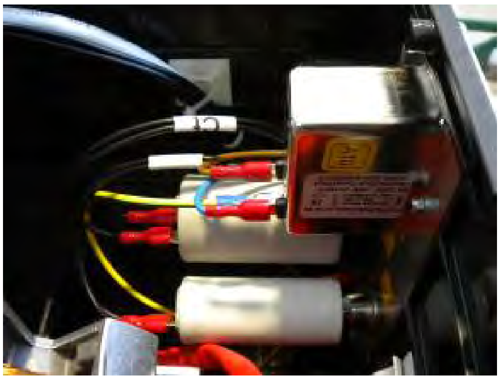
NEW INTEGRATED INTERFACE DISPLAY BOARD FOR JOHN BEAN AND SNAP ON HAND SPIN BALANCERS

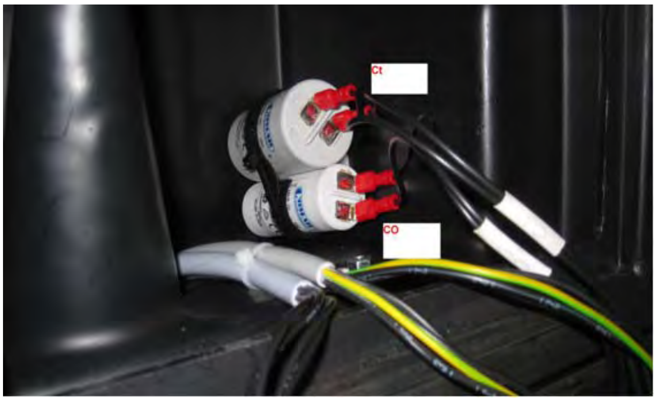
INTEGRATED INTERFACE LED DISPLAY PCBs

3.8 CAPACITORS

The car high speed balancers and the motor driven truck balancers are equipped by two capacitors. On car balancers they are of 10 and 20 uF while the truck ones are equipped by 5 and 25 uF capacitors. The function of both is to start up of the motor.
The capacitors are placed in different position according to the model of machine as shown below:







On the following range of balancers there is only one capacitor of 30uF.
HOFMANN: Geodyna 960, Geodyna 3900 – 3900S
JOHN BEAN: b9400, b9655 –b9655S
BOXER: S1280, S1750 – S1750S
SNAP ON: b2560

3.9 KEYPAD

The keypad is used to input data, change balancing program, ecc.. It connects directly to the display / screen to pcb via a ribbon cable. On Optima and BFH 1000 the ribbon cable goes trough the AWP board. The balancers are equipped with different key pad as follow:

- **LEDs AND LCD DISPLAY BALANCERS:**

On this kind of balancers the keypad are integrated with the display panel. The keypad can be of buttons type or of membrane type.

- **SCREEN BALANCERS:**

The screen balancers are equipped with different keypad according to their end level.
The keypad can be of buttons type and applied to the screen support with Velcro: now it includes a digital slider on the right side to change or confirm program without turn the balancing shaft.

Touch screen balancers only have the emergency stop button on the front panel.

The keypad of some balancers models is of adhesive type attached to the weight tray. It is directly connected to the IBP box.

3.10 OLD JOHN BEAN AND SNAP ON LED DISPLAY PCB

The Display PCB receives power directly from the power supply PCB. It passes 5,24VDC to power the tone generator and the LED display. It receives the information from the Main Processor Board via the power supply pcb. This information is passed back to the Main Processor routed through the Power Supply Board. On this kind of machines the display also includes the keypad

LED DISPLAYS PANELS

3.11 NEW JOHN BEAN AND SNAP ON LED DISPLAY PCB

The LED display PCB consists in an integrated board including Controller, Power Supply, LED Display and keypad.
It is directly supplied by the Power entry module and make all function of data processing, transforming the power supply in 5.0 VDC to power the tone generator and the LED display.

3.12 LCD DISPLAY PCB

The HWT panel has been added with some more features like vehicle type screen, Alu rim program screen, spokes number screen and rim data entry screen.
Also the buttons have now a different position.
This new panel work in conjunction with software 3.0 or higher only and for replacement on old machine it is also necessary to replace the keypad cable.

OLD LCD DISPLAY PANEL **PRESENT LCD DISPLAY PANEL**

3.13 LED INTEGRATED DISPLAY PCB

The Display is integrated into a unique board that includes the power supply and controller board. It is directly supplied by the Power enty module and transforms 5.0 VDC to power the tone generator and the LED display. It receives the information from the Main Processor sector. On this kind of machines the display also includes the keypad.

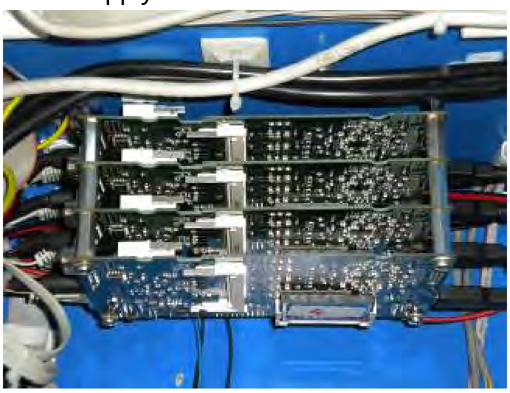
3.14 EMBEDDED PC

The Advantec PCM-3353F – SNAPE has all the power and features indicative of larger CPU control boards, but checks in at the standard PC/104 size of 96 mm x 90 mm.
It is a 586-level CPU module. It has 4Gb Flash memory, a 144-pin SODIMM socket which and accept up to 1Gb SDRAM, and support for up to two EIDE devices with BIOS auto-detect, PIO Mode 3 or Mode 4 transfer, Ultra DMA33 mode (ATA-4) up to 33 MB/sec. The PCM-3353F – SNAPE supports up to two FDDs plus one serial RS-232 port and one RS-232/422/485 port. There are four USB 2.0 compliant ports, one parallel port and a mini-DIN connector that supports a standard PS/2 keyboard and mouse. There is a Compact Flash(tm) socket that can act as an emulated hard drive as well. An 18-bit TFT LCD panel is supported with flat panel display resolution up to 1024 x 768 @ 18 bpp. Non-interlaced CRT monitor resolutions up to 1024 x 768 @ 24 bpp are also supported. Along with APM 1.1 power management, an infrared port and watchdog timer support, the PCM-3353 – SNAPE has all the features that make it a full-featured performer in any computer class.
The Embedded PC is equipped by 4GB Compact Flash card memory and supports a Linux software. It is used to send the images to the monitor and to print out on the Optima, Optima 2, BFH 1000 and BFH 2000.
It is supplied at 5,24 VDC by the IBP box on standard balancers and from the switching board on the touch less ones.
On Optima 2 and BFH 2000 it is supplied by the HUB board.

3.15 EMBEDDED PC CONFIGUARTION ON OPTIMA 2 AND BFH 2000

The machines are equipped by 4 EPCs Alix 3D2 assembled in a unique package inside of the cabinet on the Optima 2 and into the wheel guard support on the BFH 2000 having the following data.

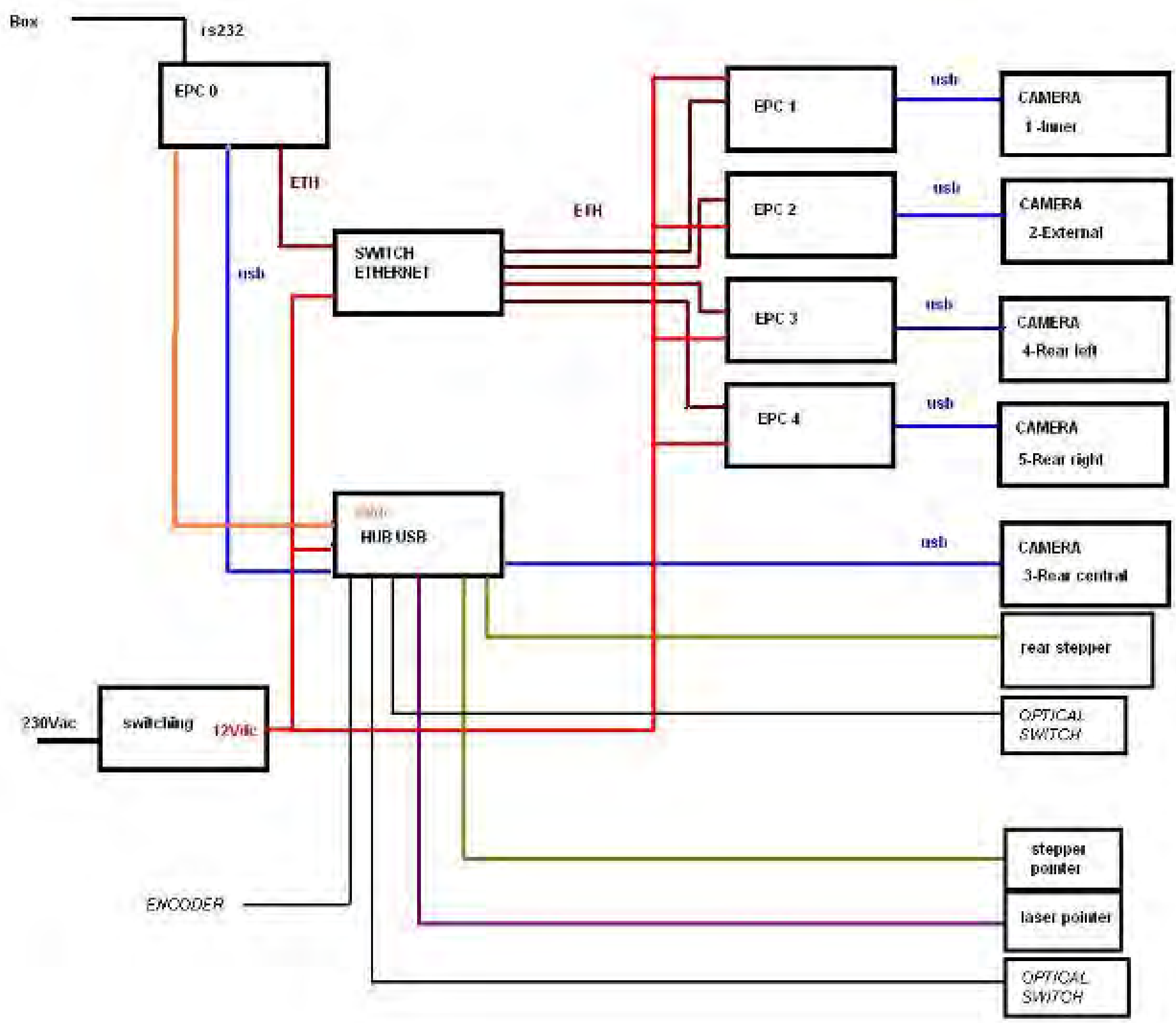
- 128MB of RAM
- USB ports: 2. Only 1 is used to connect the camera.
- NET ports: 1 used for a switch ethernet connection.
- Serial ports: 1 Not used.
- Power supply: 12VDC



They are supplied at 12 VDC by the power supplier board and communicate to the Main EPC trough the the Switch Ethernet.

Every EPC is equipped by 256 MB or more Compact Flash card memory and supports a Linux software. They are used to send the images to the main EPC.

The switch Ethernet is placed inside of the cabinet on the Optima 2 and into the wheel guard support on the BFH 2000



3.16 V.P.M. VIBRATORY ASSEMBLY – EXCEPT MID TIER BALANCERS

This range of balancers, is equipped with a V.P.M., ***V**irtual **P**lane **M**easurement,* Vibratory Assembly technology. Instead of using force measurement at widely apart positions, a compact set up is constructed . It is composed as following:
- The main shaft
- Two transducers
- Temperature sensor (then removed and included in the optoencoder)
- The optoelectronic unit
- The power clamp encoder (power clamp version only)
- The motor

The vibratory assembly is the central module of all wheel balancers.
It consists of the force guidance structure for directing the alternating unbalance forces via the transducers.
The main shaft is supported on ball bearings in the vibratory tube with the wheel adaptor at the right-hand end. The drive system is then propelling and stopping the main shaft.
The incremental encoder B8 is acquiring rotational travels, direction of rotation and absolute angular position of the main shaft.
The vibratory assembly is fastened and supported towards the ground by the cabinet, so that unbalance produces a minimum of vibration while the wheel is rotating.
To measure the unbalance, the wheel is clamped to the main shaft; the shaft is accelerated to measurement speed, with the electronic unit exploiting the signals of the incremental encoder and the unbalance transducers.
The vibratory assemblies utilise the ***V**irtual **P**lane **M**easurement* force guidance structure (patent pending). With this force guidance structure, inadvertently produced forces and the unbalance forces are directed horizontally via the transducers in an almost a one to one ratio, thus avoiding overload. Without the lever action of conventional vibratory assemblies, interfering vibrations and changes in transducer sensitivity caused by temperature changes, fatigue, overload, humidity, etc. have minimum effect thus achieving good long-term and repeatable measurement accuracy.
The unbalance transducers are located in close proximity inside the cabinet. Exposed to almost identical temperature, temperature variations have little effect on plane separation. The cabinet supports transducer B2, located in the rear. Transducer B3 at the front is clamped 7° diagonal between the vibratory tube and vibratory plate. Two leaf springs provide mechanical pre-stress to the transducers.

ATTENTION! Other machine parts must not obstruct the barely discernible movements of the vibratory assembly.
Does the bowden cable touch the cabinet immediately below the vibratory assembly, or the weight tray rests on the vibratory assembly, part of the alternating forces produced by unbalance are conveyed to the cabinet, side-stepping the transducers. That kind of force bypass can have considerable negative effect on measurement accuracy.
The advantages of this **V**irtual **P**lane **M**easurement construction are:
- Only horizontal forces are measured by the transducers
- Hardly no external based interference, as the transducers are close to each other and temperature compensated
- The (virtual) measurement planes are positioned outside the balancer cabinet, at least 1.5 meter to the left and at the shaft's flange.

3.17 TRANSDUCERS

Two transducers and the accompanying temperature sensor are used with all variants of the vibratory assemblies and they are installed in a manner that they form a virtual transducer on each end of the shaft. Both measuring transducers are arranged in one plane.

The **rear** transducer pick up alternating forces of the left-hand virtual measuring plane and is supported on the machine housing. The **front** measuring transducer is clamped between the vibratory tube and vibratory plate and converts the alternating forces of the right-hand virtual plane into a proportional electrical charge. Charge amplifiers on the processor board convert the transducer outputs to alternating voltages.

A transducer consists of a single piezo disc with contact plates; insulation discs and thrust spreading members at both sides of it. This sandwiched arrangement is encapsulated by a moulded case of black plastic. The slotted terminal strips of the two contact plates jut out of the plastic case, protected by collars. Connection to plug X3 is via the wire harness, by means of insulation displacement.

The wires from position 12 and 16 of connector X3 are marked with a small black bush and have to be connected to the transducer terminals marked with the embossed **+**. Wires 11 and 12 of X3 hook up transducer B3 located at the front, wires 15 and 16, connect transducer B2 at the rear of the vibratory assembly.

To make the insulation displacement connection to the transducer, proceed as follows:
a) To connect a transducer to an already used wire harness, cut off the wire ends at the notches.
b) Check the position of the terminal strips relative to the surrounding collar.
If the pointed ends of the terminal strip 0,6-mm below the edge of the collar, contact problems can arise.
c) Brake off the two small plugs, formed with the moulding process of the transducer case.
d) The insulated wire of the ribbon cable is put in the slot at the collar of the transducer, with the end protruding about 3-mm over the collar.
e) The plug, with the slot aligned to the wire, is placed upon the collar and then pushed into the collar, to be level with the edge.
The narrow slot in the terminal strip will cut the insulation and a gas-tight bond is formed between the tinned copper wire and the contact strip.
A capacitance meter across positions 11 and 12 respectively 15 and 16 of the unplugged connector X3 should read in the range of 1700 to 2100 pF. The resistance across the same positions and the insulation to the force spreading members should be more than 109 Ohms.
Service code C75 or a special high-resistance measurement instrument has to be used for the insulation test.
To obtain and keep good insulation, transducers, cable harness and connector X3 have to be kept clean. The collars should be positioned vertically below the transducers, to keep dust from the contacts (6-aclock position).

For disconnecting the wires, the two plugs have to be removed using a pointed device like a scriber. Insert the scriber in the slot of the collar just above the wire and lift off the plug. To pull out the wires, take hold of it at both sides of the collar to avoid warping of the terminals.
Keep the plugs with the transducer or as spare parts.
As the transducers take pressure forces only, they are clamped into the vibratory assembly under mechanical pre-load, which is greater than the maximum forces produced by unbalance.
The forces are conveyed via 8-mm balls to the thrust spreading members, so that lateral movement does not introduce forces on the piezo disc.

ATTENTION! With an already calibrated balancer, twisting the transducers can adversely effect plane separation.

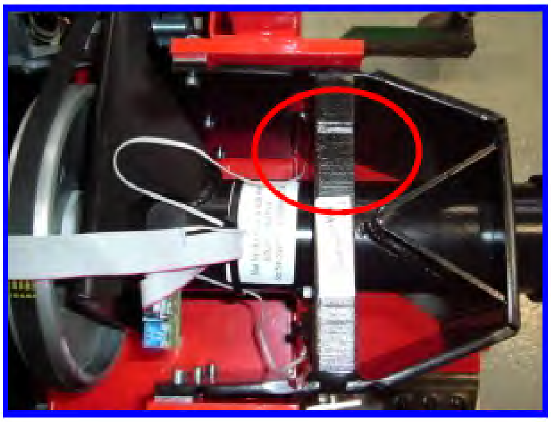
3.18 TEMPERATURE SENSOR

The system has a new force guidance structure. The forces at the measuring transducers have been reduced, thus achieving long-term stability and high measuring accuracy. Pre-tensioning of the transducers is achieved by two leaf springs. On the vibratory system the measuring transducers are very close together so that the difference in temperature has only a slight effect. The current vibratory sensor has a temperature sensor. The transducers can therefore be measured by **one** temperature sensor and taken into account in a fraction of a second. This temperature sensor effects the transducers and is set during calibration. The signal from temperature B1 is used to the compensate for temperature – dependant force to charge conversion of the unbalance transducers. The temperature sensor is attached to the vibratory plate by means of a Ushaped spring and to the Controller board via AWG 28 ribbon cable harness and connector X3. With a defective or disconnected sensor, the balancer will stay operational except for temperature correction of the unbalance amount reading. The actual temperature reading will be substitute by temperature value determined during calibration. Indication of current temperature and the voltage at connector X3 pin 13 is with service cod C57. If C57 is not available, use C75 / Channel Ad3 to get the dependant voltage. At 24° the voltage is about 1,3 VDC.
The signal from temperature sensor B1 is used to compensate for the temperature-dependant force to charge conversion of the unbalance transducers.

From end of 2008 the analogic temperature sensor has been replaced by a digital one incorporated into the optoencoder. The machines equipped with the new digital sensor can be recognized very easily because they do not have the sensor locked by a fasten on top of the vibratory assy
For more info see Service Bulletin 646 WB.

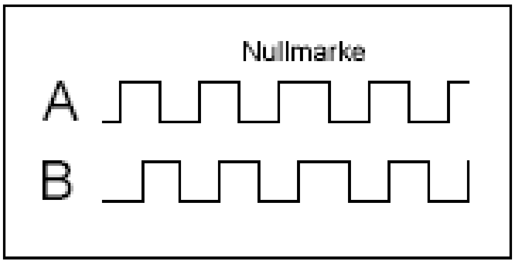
OLD SYSTEM WITH SENSOR

NEW SYSTEM WITHOUT SENSOR



3.19 INCREMENTAL ENCODERS

An incremental encoder picks up the rotational travel, direction of rotation, and absolute angular position of a rotating shaft.
One revolution is divided in increments (periods or intervals). The output signals A and B have about the shape and relationship shown. An intended irregularity (Nullmarke) is detected, with the main shaft rotating at constant speed. On detection of the irregularity, the position counter is set to zero thus providing absolute angular reference to the shaft.



3.20 ENCODER BOARD OF THE MAIN SHAFT

The incremental encoder B8 is located between the ball bearings inside the vibratory tube.
There are two types of incremental encoder: the metal ring encoder with the Printed Circuit Board (PCB) without lens (*see picture **X***) and the plastic polygonal ring with the Printed Circuit Board (PCB) with lens (*see picture **Y***).
_The metal encoder consists of a metal ring on a plastic black ring at the main shaft and the optoelectronic unit (without lens) fastened with a screw M4, length 6 mm to the slot in the vibratory tube.
The polygonal ring consists else of an annular polygon mirror at the main shaft and the optoelectronic unit (with lens) fastened with a screw M4, length 10 mm to the slot in the vibratory tube.

IMPORTANT: it is NOT possible to exchange the types of the encoder board! The metal ring encoder will function properly only wit the PCB without lens and the polygonal ring will function properly only with the PCB with lens! Due to the fact, that the optosensor on the PCB, the lens and the ring on the shaft, are single matched with each other, the disassembly of the lens from the PCB in order to create an encoder card for the metal ring encoder will not work well. Also the assembly of a lens on a PCB without lens will not assure a correct function of the encoder.

ATTENTION! To keep dust and light out of the tube, the opening for the Optoelectronic unit has to be covered with a piece of adhesive tape 30 by 50 mm (and if present with the plastic disk, *see picture **Z***). In the encoder IC on the Optoelectronic unit, behind a lens there is a red, in the direction of the main shaft, oblong Light Emitting Diode (LED). Behind a second lens, there are four light detectors on an integrated circuit.

The light of the LED is reflected back to the encoder by one of the 256 mirrors of the polygon or bars in the metal ring, focused by the lens on the four detectors. During rotation of the main shaft, the mirrors or bars will tilt and deflect the light across the detectors A, A`, B and B`. With further rotation in the same direction, the light will hit the next mirror or bar, and with a full revolution, it will be deflected 256 times across the detectors in the above given sequence.
The light detectors A and A` respectively B and B` are connected to one amplifier. The difference in brightness between the detector pairs determines the current state of the output channels A and B. To keep the signals A and B free from interference, an integrated circuit amplifies the signals.
An intended irregularity in the arrangement of the mirrors or bars is detected with the main shaft rotating at constant speed, serving as absolute reference. On detection of the reference, the position counter is set to zero thus providing absolute angular position of the main shaft.
Checking the incremental encoder is via service code C74.
The surface of the ring (as for the metal ring as well for the polygonal ring) has to be clean and shiny. If the ring is not clean, the machine can not working well.

IMPORTANT: *Before to impute an eventual malfunction of the machine to the whole vibratory system, try to clean the encoder ring. For this purpose, dependent on the kind of encoder is installed on your machine, follow the relevant cleaning procedures P1 or P2. Please note: Do not use any cleaning agent (no alcohol, etc.) to clean the plastic polygonal ring!*
If the metal ring encoder is installed on your machine and if the electronic unit fails to detect the zero reference and neither exchanging the Optoelectronic unit nor leaning the metal ring sleeve proofed successful, the following measure may help. Turn the main shaft until the solder joint of the code sleeve becomes visible. Wrap some soft cleaning paper round your forefinger and press the code sleeve slightly, so it will set in a different way.
The red LED of the reflective encoder IC does not light up immediately after power on, since voltage is applied under program control!
In the very infrequently case you will discover a defective polygon ring (or metal ring), the complete vibratory assembly has to be exchanged. The main shaft cannot be removed from the vibratory tube, as the ball bearings are glued-in. Anyway, before to impute an eventually malfunction to the ring (metal or polygonal) or to the PCB, clean the ring on the shaft carefully according to the relevant cleaning procedures P1 or P2!
Non-volatile memory at Optoelectronic unit Beside the EEPROM on the Controller board, there is a second non-volatile memory soldered to the Optoelectronic unit. Both EEPROMs should hold the same data: machine model, adjustment data, counts of counters, selected modes of operation and stored error-codes. Having two non-volatile memories becomes beneficial when the Controller board or the electronic box has to be replaced.
With service code C86, the contents of the EEPROM on the Optoelectronic unit can be copied to the EEPROM located on the Controller board, saving to set machine model number via C47 and to carry out calibration.
On power up self-test, the contents of the EEPROMs are compared. If differing but valid data is detected, C85 "Copy contents of the EEPROM on the Controller board to the Optoelectronic unit" is displayed.
Do not un-plug connector X3 or X10 with power connected. A difference in memory contents of the non-volatile memories may occur!

P1 Cleaning procedure metal encoder

Objective:
Give a step by step procedure to follow in case of dirty encoder.
Use only in case of check list failure (C54; C74)

Start

Remove the adesive tape

Clean with a clean humid soft cloth the metal surface where still be place the encoder card, please use alcohol, water, degreaser or glass cleaner.

Screw off the encoder card

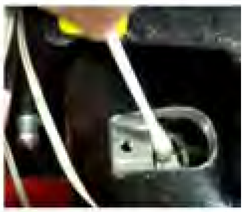
The machine has the metal ring encoder?

- No → Follow the procedure for polygonal encoder
- Yes ↓

Polygonal ring

Metal ring

Clean the metal ring with a humid cotton buds using alcohol or water or glass cleaner.



Screw on the encoder card

If present or available place the rubber protection above the encoder card

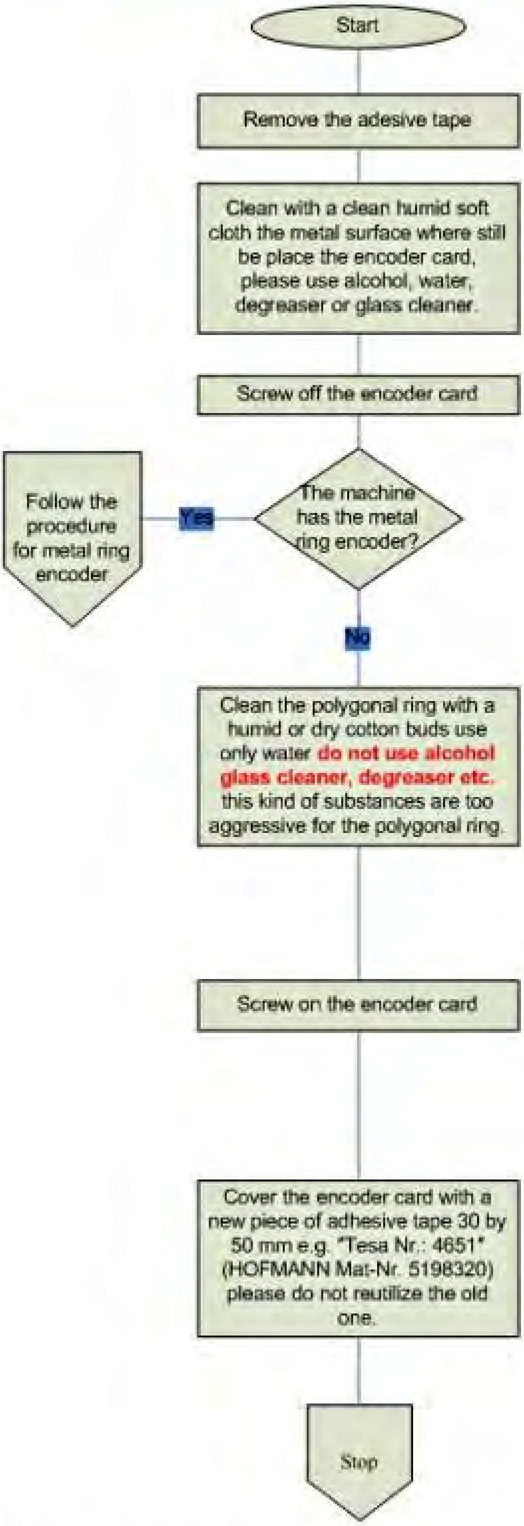
Cover the encoder card with a new piece of adhesive tape 30 by 50 mm e.g. "Tesa Nr.: 4651" (HOFMANN Mat-Nr. 5198320) please do not reutilize the old one.

Stop

Note: try to be as clean as possible, table, cloth, gloves, tools, etc.

P2 Cleaning procedure polygonal encoder

Objective:
Give a step by step procedure to follow in case of dirty encoder.
Use only in case of check list failure (C54: C74).



Polygonal ring

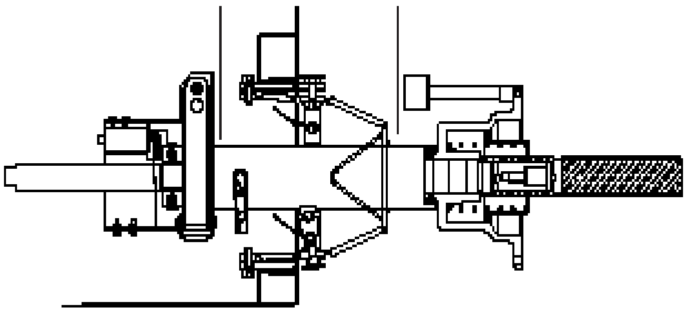
Metal ring

Note: try to be as clean as possible, table, cloth, gloves, tools, etc.

3.21 ENCODER BOARD OF THE POWER CLAMP

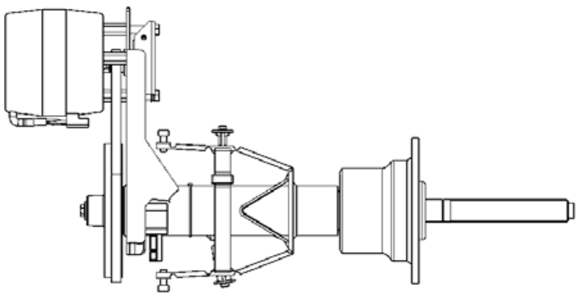
Incremental encoder B9 acquires the rotational travel, direction of rotation and the absolute angular position of the big pulley at the vibratory assembly with power-clamp. The travel of the tie-rod is derived by program from rotational travel of the pulley.
The pattern of a code strip, fixed to the circumference of the big pulley, is sensed optically by an encoder board positioned 1-mm above the pulley.
The adhesive code strip consists of a transparent foil with alternating black and white zones (32 increments) printed on.
CAUTION! The wider zone of the zero reference has to be positioned to the edge of the pulley.
The small encoder board carries four SMT reflective interrupters, some resistors, an integrated circuit (Hex-Schmitt-Trigger) and a 4-position ribbon cable with receptacle.
The reflective interrupters A and A` respectively B and B` are placed with a radial offset of half an increment, so the interrupters work in a push pull arrangement. The push pull mode of operation makes the encoder nsensitive to the light output of the infrared LEDs and the reflectance of the code strip. The lateral offset of the interrupters A to A` respectively B to B`is essential for the push pull operation for the zero reference as well. In this way the zero reference marking with its 25 to 75% mark to space ratio can be mapped complementary on the two tracks.
The analogue waveforms at the phototransistors of the interrupters are converted to sharp edge square-waves with low output impedance by the Schmitt-Trigger circuit.
The encoder board is fastened via a plate screwed to a corner bracket to the stator of the electromagnetic brake. The corner bracket and the plate serve also to keep the abrasion of the brake lining away from the encoder. To compensate for lateral work tolerance, the encoder board can be aligned to the code strip with the aid of the movable plate. The two standing back edges of the encoder board should be in line with the left-hand edge of the code strip.
Incremental encoder B9 can be checked with code C98.
CAUTION! Too much abrasion from the brake lining on the encoder board or code strip will degrade the function of the incremental encoder. Both parts should be cleaned with a soft cloth or brush occasionally.

3.22 HAND DRIVE SYSTEM

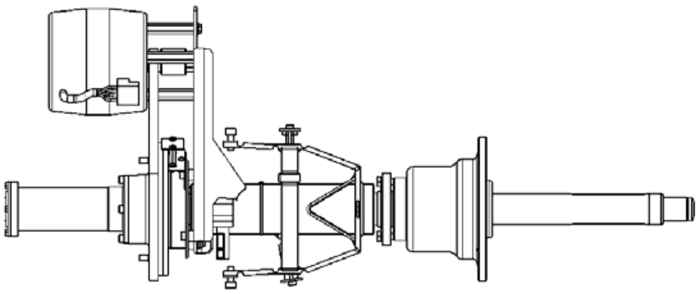


The operator, turning a crank, puts the main shaft with the clamped on wheel in rotation.
At reaching the minimum measurement speed of 100 RPM, an audible signal is given.
The flywheel mass of the wheel supported by low-friction ball bearings keeps the rotational speed during the ten revolutions of unbalance measurement almost constant.
The clamp nut is fitted with two turning handles, serving as a crank.
A main shaft with an extension to the left of the vibratory assembly is available for a left-hand crank (used with JEBEG *b9005*)
ATTENTION! For precise measurements and calibration, use the crank at the clamping nut.
Since the left-hand crank is some distance away from the vibratory assembly, turning the crank introduces strong forces by lever action, which does not decay completely before unbalance measurement begins.

3.23 MOTOR DRIVE SYSTEM



- **<u>Description</u>:** The primary functions of the motorised drive system are, to accelerate the main shaft with the wheel clamped to it up to measurement speed, keeping the speed constant during measurement and subsequently slow down to a dead stop. Acceleration and deceleration should be rapid but with controlled torque, avoiding slippage of the wheel on the adaptor.
  During unbalance measurement, no vibrations should be generated by the drive system.
  With some variants of the vibratory assembly, the



drive motor is used for breaking as well.
The mechanical parts of the Y2k drive system differ little from the previous HOFMANN design, the principle of operation is quite different, making the drive system suitable for high and low speed balancers.

The drive system consists of the motor fastened to a bracket, welded to the vibratory tubing. The small pulley at the motor, the big pulley at the left end of main shaft and the Multirib belt called multi-v belt as well. The screws fastening the motor to bracket are used for belt tensioning also.
The big pulley is seated on the tapered left end of the main shaft and fastened wit one central screw M8. For separating the big pulley, the central bore is furnished with a Thread M12.
After putting the big pulley back on the shaft, main shaft unbalance has to be compensated for using code C84.
With a single-phase squirrel cage motor with a nominal voltage of 230-volts AC and a maximum current of 4,5 A, the power requirements of the balancers can be easily met. It can be hooked up to 50 or 60 Hz line frequency via a plug to ordinary wall outlets.
The drive system will work in a range of 170 to 264 volts AC. With 110 line voltage, a stepup transformer should be fitted inside the cabinet.

- **Function:** Irrespective of line frequency, the drive system (patent applied for) accelerates to the preset speed within a range of 80 to 200 RPM. With low speed operation (100-RPM) selected, low torque is applied first. With the Speed still near zero after half a second, full motor torque will be applied. This is for preventing speed overshot with low flywheel mass as there might be no wheel guard fitted with a low speed balancer.

At reaching the pre-set speed, torque is cut back. The low torque is set to a rate, compensating the friction, for the most part, caused by the belt and by air drag of the wheel.
Torque reduction is accomplished by lowering the voltage supplied to the motor with an AC controller, located on the Power Interface board. Utilising semiconductor devices, this novel AC controller provides arc-less switching for a long service life.
Unbalance measurement is carried out with reduced torque at slightly in- or decreasing speed of the main shaft, hence avoiding pendulum oscillations in the motor.
Measurement speed can be held within set bounds to any length of time by varying the motor torque. Detecting the speed via the incremental encoder B8, speed control is implemented in software by varying the pulse-duty factor to the AC controller. Subsequently, the already reduced voltage supplied to the motor is varied by 5% (dual-mode control).
With more than 150 RPM of main shaft speed, the torque capacitor CT is switched off by relay K4 under program control. With increasing speed, the effect of CT on torque drops and reactive current increases.
Direction of rotation of the main shaft is appointed by the order of wires attached to connector X42. Connect motor wire marked 2 to the left-hand terminal 1, wire 3 to terminal 2 and wire 3 to terminal 3, the red/green wire to the right-hand terminal 4 of connector X42.
ATTENTION! There were IGBT failures within the drive system on the Power Interface board.
To improve reliability, remove the Surge Arrester F8 from Power Interface board.
CAUTION! There are two Surge Arresters on the Power Interface board. Do not remove the one with the red coloured body!
The Power Interface board equipped the four black heat sinks; the Surge Arrester is located between the heat sinks and the relays beside a 2k Ohm 2 Watt resistor.
The more recent Power Interface with one heat sink, the Surge Arrester marked F8 is located in front of the heat sink.
The Surge Arrester F8 has a cylindrical white ceramic body with red printing on it, metal discs on both ends with wires welded to in the middle of the discs.

3.24 BELT TENSION

With the drive system, belt tension is crucial as it has great influence on friction.
Friction can hinder extended measurement runs, e.g. service code C63. If friction uses up more energy than supplied to the motor during prolonged measurement, the speed will drop and measurement will be terminated. During a normal balancing cycle (10 revolutions) with a wheel clamped on, the effect of friction will hardly be noticed. Before the speed reduction becomes significant, unbalance data collection is

completed and the brake is turned on. Excess belt tension puts extra load on the ball bearings and can reduce measurement accuracy.
With the belt too slack, it will slip causing premature wear and in most cases, disturbing squeaking noises as well.
To check the belt tension use C code C111 on machines equipped with steel V.P.M. vibratory assembly only.

3.25 THE BRAKES

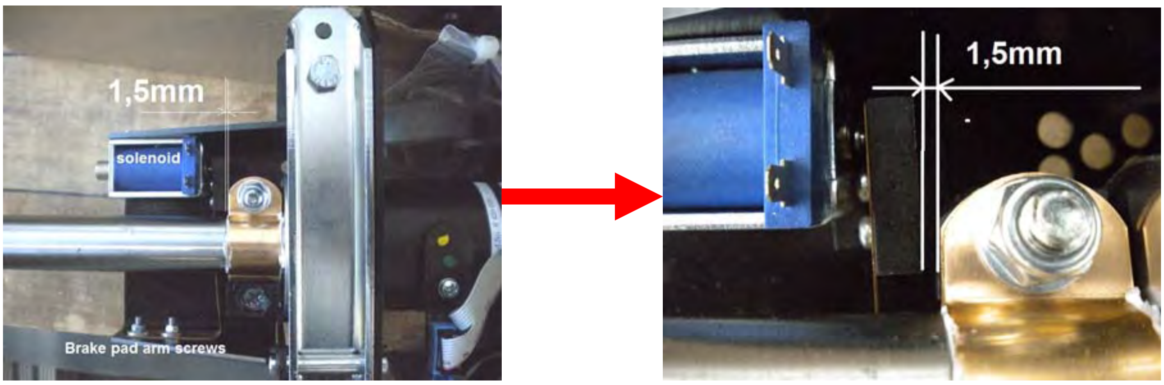
Within this balancing platform, there are a number of brakes of different design and for various applications. All brakes have controlled torque, to avoid slippage of the wheel on the adaptor, preserving counterweight positions.

- Brakes for decelerating the main shaft after completion of unbalance measurement.
- Shaft locks for blocking the rotation of the main shaft, actuated by the operator or under program control.
- Position brakes under program control for stopping of the slowly rotating main shaft, with one of the compensation locations at the top (12-o'clock) or other wanted position:

a) Braking at the compensation location of the left-hand plane after measurement.
b) Indexing to the compensation location of the right-hand plane with the aid of the drive motor.
c) Finding the next compensation location, with the operator slowly rotating the wheel.(so-called "sticky on top" function).

3.25.1 DECELERATING AND LOCKING THE SHAFT BAND BRAKE (Hand spin vibratory)

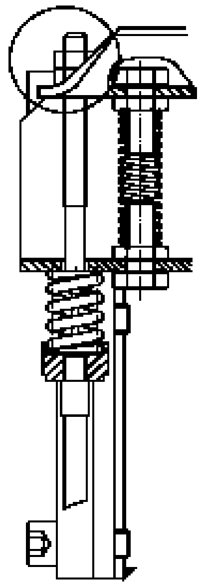
- **<u>Shaft deceleration</u>:** With the vibratory assembly used in the John Bean and Snap On balancers, decelerating the main shaft is initiated automatically.
  The shaft band brake and the accompanying solenoid are equivalent to that in the balco balancers.
  The band brake consists of two semi-circular band clamps of bronze, joint to a ring around the main shaft. To make the braking torque adjustable, a rubber washer is placed between the link plates at one of the screws. With the opposite screw, a steel washer is inserted. Different long screws M8x25 versus M8x20 compensate the weight difference of the washers.
  To set the braking torque, so that the test rotor accelerated to 100 RPM will stop after one revolution, the rubber washer is compressed by tightening the self-locking nut (13-mm width across flats).



ATTENTION! For optimum measurement precision during calibration or determining the distance-depending phase shift using code C72, deactivate the shaft band brake temporarily by pulling off one of the receptacles from solenoid.

- **<u>Shaft locking</u>:** The outside shoe brake is pedal operated and acts via Bowden cable and single lever on a disk fitted to the main shaft.
  A coil spring inserted between Bowden cable jacked and the support plate protects the Bowden cable from overload and restricts the braking torque, preventing the wheel to slip on the adaptor.
  The nuts (10-mm across the flats) at the end of the Bowden cable are adjusted for 0,1-mm clearance between brake pad and the brake disc.

  On HOFMANN *geodyna 935,* the mechanical foot operated brake is used for decelerating the main shaft after measurement and as the shaft lock.

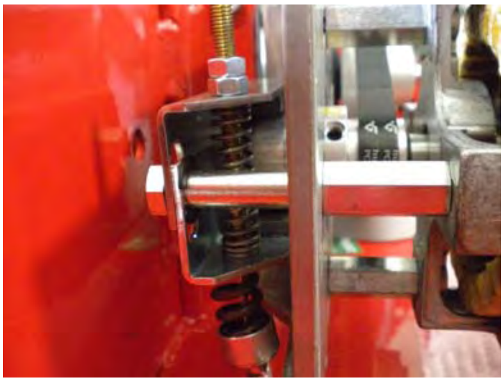


3.25.2 BRAKING BY REVERSING THE MOTOR TORQUE

For this economical and robust brake with well-controlled torque, just the relay K4 had to be added to the drive system.
After reaching standstill of the main shaft, motor voltage has to be switched off immediately.
With the semiconductor AC controller, this is accomplished easily.

3.25.3 THE SHAFT LOCK OF THE MOTOR DRIVE VIBRATORY ASSEMBLY

The mechanical brake is pedal operated and acts on the motor pulley. There is no electrical interlock. The motion of the pedal, conveyed via Bowden cable, pulls together the two brake levers with glued on brake pads. The front fastening screw of the motor serves as the lever pivot.



The locknuts (10-mm across the flats) at the end of the Bowden cable are adjusted for 1-mm travel before the levers, moved together by hand, hit the rear fastening screw of the motor.

3.25.4 THE ELECTROMAGNETIC BRAKE

The electromagnetic brake is used on power clamp balancers. Once the balancer reaches a low RPM the Main Processor looks for the outside weight position. Once this location is known the Processor sends a command to turn on the Electromagnetic brake. The PCB sends 150VDC to the Electromagnetic brake on the motor stopping the tire and wheel assembly at TDC for the outside weight location. Once the weight is applied the operator can then press the “START” button, this sends the command to the Main Processor which in turns sends a command to rotate the motor. The Main Processor then sends a command to engage the Electromagnetic brake stopping the tire and wheel assembly at TDC for the inside weight location.

- Big solenoid brake with a brake power of 30 Nm (Newton meters) acting on the main shaft. Used with the power-clamping device only.
- Small solenoid brake of three Nm braking torque, acting on the motor pulley is used as shaft-lock and position brake e.g. for the "sticky on top" function.

Different in size but identical in design, the brakes, designated Y2, comprise of a ring shaped stator with the winding behind the brake lining and the brake disc fastened axially movable to the hub by an annular leaf spring. Without power, there is no friction at all, since the brake disc is separated from the stator by an air gap. With current applied to the solenoid, the disc is pulled to the stator by magnetic force. With rotary motion of the hub, friction will develop between the brake disc and both the lining and the steel body of the stator (hybrid friction).
CAUTION! There is line voltage at the brake solenoids.

3.26 POWER CLAMPING DEVICE

- **Description:** The power-clamping device, moving the tie rod comprises of the following components:
  a) The axially bored main shaft with the tapered end, the MZV-*p* adaptor is fitted on and tightened axially
  by two hexagon screws (13 mm across the flats) to the to bayonet disc.
  b) The tie-rod with a spline shaft as part of it, so axial moveable in the bore of the main shaft. A short piece left-handed thread of 8-mm pitch is fitted spring loaded to the left-hand end of the tie-rod.
  c) The big pulley at the left-hand end of the main shaft supported by ball bearings.
  d) The clamping nut of 8-mm pitch is flange-mounted to the big pulley with the thread of the tie-rod engaged in it.
  e) The incremental encoder B9 to determine tie rod travel and angular position of the drive disc.
  f) Solenoid brake Y2. The stator is fastened to the welded part and the brake disc to the main shaft.
  g) The pedal unit with two micro-switches S4 and S5 for actuating clamping action and the main shaft lock.
  h) The Power Interface board providing the following functions:
  The high voltage brake driver with brake ammeter
  The AC controller for various motor torque
  The motor ammeter Inputs for polling the pedal micro switches and the proximity detector.

- **Function:** Once the clamping operation has been initiated, the solenoid brake Y2 is switched on and the motion of the brake disk is monitored via incremental encoder B9. The brake locks the main shaft. The motor M1 is switched on in the direction of rotation as during the measurement run. The multi-vee belt conveys the motor torque to the big pulley and clamping nut. As the tie rod cannot rotate inside the main shaft, the rotary motion of the clamping nut is converted into longitudinal motion of the tie rod and later pulled to the left (max. travel is 76-mm). Via the yoke with the two clamping jaws and the clamping sleeve, the motion is transferred to the clamping head pulling the wheel on the cone and against the adaptor flange. With the wheel pressed to the adaptor flange, longitudinal movement and the motor come to a stop. The stop of the motion is detected via encoder B9. The drive and shortly afterwards the brake are switched off.
  The pitch-to-diameter ratio of the clamping nut thread has been selected that self-locking occurs in the clamped state; i.e. the clamped state is retained.
  To carry out a measurement run, the motor M1 is switched on but with the main shaft is free to rotate. As the tie rod cannot be pulled any further to the left, the motor torque is transferred to the main shaft via the clamping nut, thus accelerating the wheel for the measurement run.

After measurement, the motor is switched off and the solenoid brake decelerates the main shaft.
To release clamping, the solenoid brake locks the main shaft again; the motor is switched on in the reverse direction of rotation. The tie rod moves back to the right-hand starting position, causing the clamping jaws to retract in the adaptor sleeve thus releasing the clamping sleeve. As with clamping, motion is monitored by the encoder. Motor and brake are switched of in succession.
Releasing a wheel from the power-clamping device in the event of a power failure Behind a 15-mm hole in the front of the cabinet closed by a black plastic cap, two pegs project axially out of the big pulley. Take off the cap an insert a rod or screwdriver of 7 to 14-mm width for a length of 130-mm. With the rod engaging in the pegs, rotation of the big pulley is hindered.
By turning the wheel in the direction of rotation of a measurement run (the top of the wheel to the rear) while inhibiting rotation of the pulley, clamping force will slacken. By further turning at the adaptor flange, the tie rod is moved to the right-hand limit position so that the clamping sleeve and the wheel can be removed. Finally, put back the black cap.

3.27 SAPE (SEMI-AUTOMATIC-PARAMETER-ENTRY)

SAPE stands for **S**emi **A**utomatic **P**arameter **E**ntry. This chapter describes the mechanical version, based on a round tube.
The balancer range is equipped by three different kind of sape arms according to range of model:

- **1D SAPE ARM**
- **2D SAPE ARM**
- **3D SAPE ARM**

Every time the machine powers on, the software automatically checks the SAPE system in its initialization procedure. The SAPE's must be in the HOME position during start up. If the SAPE is good the machine enters idle state as normal. If for example, the distance, diameter or width gauge fails , the machine displays an error message.
The potentiometers plug into the main processor at connection X6 (Distance) and X7 (Diameter) and X8 (Width). The potentiometers are supplied with 5,24VDC from the Processor Board. As the SAPE is pulled out and up towards the wheel the voltage(s) change. The distance from the balancer to the wheel is generated from the voltage output and the diameter of the wheel is generated from the amount of voltage output when the arm is moved up. Adjustment are made using the C80/C81and C82 service code, this procedure can be found later in this manual.

3.27.1 1D AND 2D SAPE ARM

These modules are positioned at the inside of the front and the back of the balancer.
The function of this module is to
- measure the offset of the rim reference point (1D-version),
- measure the diameter of the rim at the rim reference point (2D-extension)
- apply the stick-on weights at non-12 o'clock positions (Hidden Weight Modes).
Some versions have an applicator for easier weight application. Various versions are available for this type of SAPE, refer to the Spare Parts List.

3.27.2 3D SAPE ARM

The width gauge arm enables the right-hand correction plane to be measured and adhesive weights to be placed precisely under the bead seat.
The gauge system comprises an arm attached to the wheel guard which can be swivelled sideways and about the wheel guard arbor. A gauge finger with a weight holder for adhesive weights, similar to the guge head of the gauge rod, is fitted at the end and is guided parallel to the main shaft by a second arm. The lateral swivelling movement is transferred to the width potentiometer B6 via a toothed segment and toothed wheel. The wiring to the width potentiometer is routed through the wheel guard arbor, which is of tubular design.
When calibrating the gauge arm, the voltage at potentiometer B6 is apparently set to between 0.10 and 0.20 V. However, the voltage is actually between 4.2 and 4.4 V because the potentiometer for the width gauge arm is connected in exactly the same way as B4 and B5 for the gauge rod (clockwise rotation causes the voltage at the slider to increase), but it rotates in the opposite direction from the home position.

3.28 AUTO STOP BEEPER

In the ALU-S mode the operator is required to apply stick on weights in exact location on the inside of the wheel. Through normal operation the balancer receives input from the SAPE arm. The balancer enters

D1(inside weight) and D2 (outside weight) by means of the operator pulling the SAPE arm to the locations of where the weight will be applied. Once these parameters are known after cycling the tire and wheel through it's spin cycle the operator can then apply the correct amount of sticky weight to the weight applicator on the end of the SAPE arm and pull the SAPE arm towards the tire and wheel assembly. The operator is driven by the displays and the screen in the research of weight position and the Power Supply Board sends 5,20VDC to the beeper advising the operator about the correct position to apply the weight.

3.29 AUTO STOP LOCK SWITCH

In the ALU-S mode the operator is required to apply stick on weights in exact location on the inside of the wheel. Through normal operation the balancer receives input from the SAPE arm. The balancer enters D1 (inside weight) and D2 (outside weight) by means of the operator pulling the SAPE arm to the locations of where the weight will be applied. Once these parameters are known after cycling the tire and wheel through it's spin cycle the operator can then apply the correct amount of sticky weight to the weight applicator on the end of the SAPE arm and pull the SAPE arm towards the tire and wheel assembly. D1 and TDC determines when to auto lock the SAPE arm to apply the sticky weight. The Power Supply Board sends 5,24VDC to the auto lock switch engaging it to lock the SAPE arm. Once the weight is applied the outside sticky weight is applied to the weight applicator and the operator pulls the SAPE arm towards the tire and wheel assembly. D2 and TDC determines when to auto lock the SAPE arm and apply the sticky weight. The Power Supply Board sends 5,24VDC to the auto lock switch engaging it to lock the SAPE arm.

3.30 GEODATA 2 GAUGE ARM

The *geodata 2* gauge rod makes it feasible to measure the rim-to-machine distance, the diameter of the rim and a correction plane with diameter inside the rim disc. After unbalance measurement adhesive weights can be precisely positioned in the previously defined correction planes.

The gauge rod has been completely re-designed and the following features improved:

a) The extension range has been increased by 45 mm to 300 mm
b) The gauge head is flatter
c) Fitting of adhesive weights in the rim disc is easier by means of the automatic extension limitation
d) facility. With the wheel indexed to the correction position after the measurement run, further
e) extension of the gauge rod is locked as soon as it reaches the previously defined correction planes.
f) A protective cover prevents accidental release of the helical spring under the belt roller.
g) The belt roller has a metal bushing so that the collet cannot become loose.
h) A limit stop ensures that the gauge rod does not lie on the vibratory system when the housing cover is removed, and that its home position is detected.

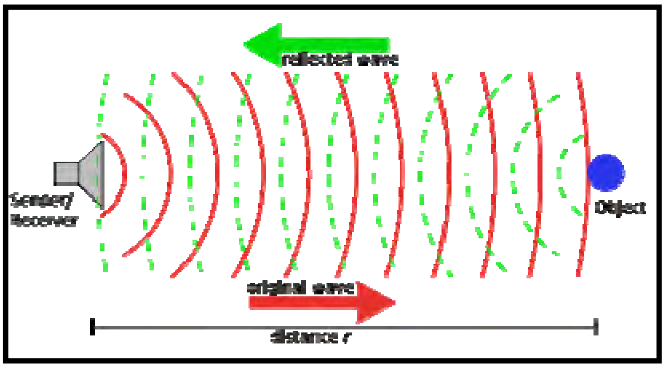
The extension of the gauge rod is transferred via a toothed belt and belt roller to the distance potentiometer B4. A helical spring under the belt roller, which is under 8-turn initial stress, keeps the belt taut.

CAUTION! When working on or near the helical spring safety goggles have to be worn.
The application angle of the gauge rod is transferred via a toothed segment and toothed wheel to the diameter potentiometer B5. The toothed segment and toothed wheel each have a raised marking. If the gauge rod has been lifted too far, causing the toothed segment to become disengaged from the toothed wheel, the relation between the toothed segment and toothed wheel can be checked and corrected according to the markings.
The extension and angle of the gauge rod do not directly correspond to the rim-to-machine distance and diameter. The effect due to the geometry of the gauge system is eliminated by calculations. Consequently, if one of the potentiometers becomes defective, the gauge rod cannot be used to measure the distance or the diameter separately.
The fully rotatable single-turn potentiometers B4 and B5 are of identical design. Therefore the connectors of the potentiometers have to be inserted on the processor board with care. The connector of the distance potentiometer is inserted on the left-hand 4-pin connector X6. The connector of the diameter potentiometer is inserted on the middle connector X7.
The extension limitation of the gauge rod is initiated by brief energisation of solenoid Y1; this moves a pivoted clamping piece towards the toothed belt. The clamping piece, which is serrated, is taken by the toothed belt and pushes the belt against the belt contact surface so that a clamping action is produced and inhibits the further extension of the gauge rod. When the gauge rod is retracted again, the lock is released because the toothed belt is pre-tensioned over the belt roller.
To prevent the clamping piece from engaging suddenly if the gauge rod is pushed back quickly into its home

position on the left, so that the gauge cannot be extended again, the teeth on the section of the toothed belt which is in front of the clamping piece in the home position are covered.
If a squeaking noise or excessive friction is noticed while drawing out the gauge rod, the square guide bar should be cleaned with special paper and the surface lubricated with soap, or better sprayed with silicone oil.

3.31 SONAR WHEEL DATA SYSTEM

The sonar sensor device is used on some ranges of balancers to read the rim width. The sonar is a detector of distance and detect a possible return echo generated by the presence of an object within the nominal flow.



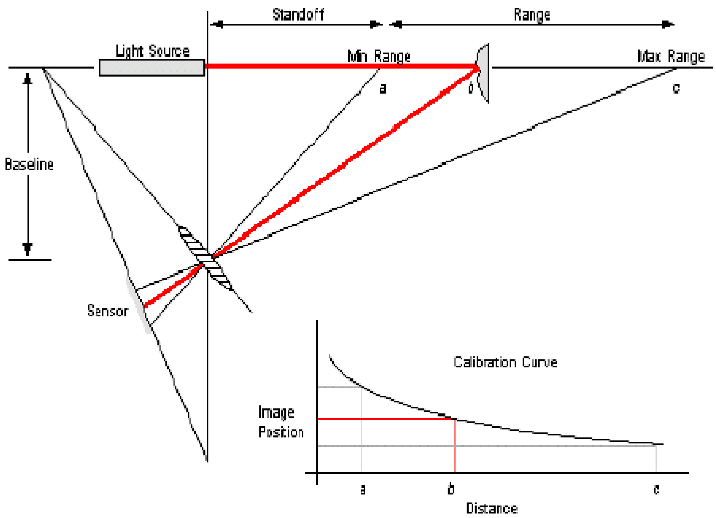
On the wheel balancer the sonar must work in conjunction with the inclination of the wheel guard, rim offset and diameter.
This because it must make a board of returned echo signals to be converted through a specific trigonometry recalculation, to the rim width.

3.32 IMAGING WHEEL DATA SYSTEM

The OPTIMA and BFH 1000 are wheel balancing machines equipped with three optical scanners. Two scanners capture images of the wheel rim profiles (inner and outer), so that the co-ordinates of positions for application of the balancing weights can be calculated automatically and without user inputs. The scanners are also used to obtain geometrical data about rim deformations, deviation of the rim edges from its axis of rotation (Rim Runout). The third scanner provides geometrical data about tire deformations, deviation of the tire from its axis of rotation (Tire Runout). Such data is used for advanced diagnosis of the wheel as well as to provide the user with indications on how to proceed in order to minimize the effects of such deformations.

3.32.1 LASER LIGHT OF LIGHT WHEEL DATA SYSTEM

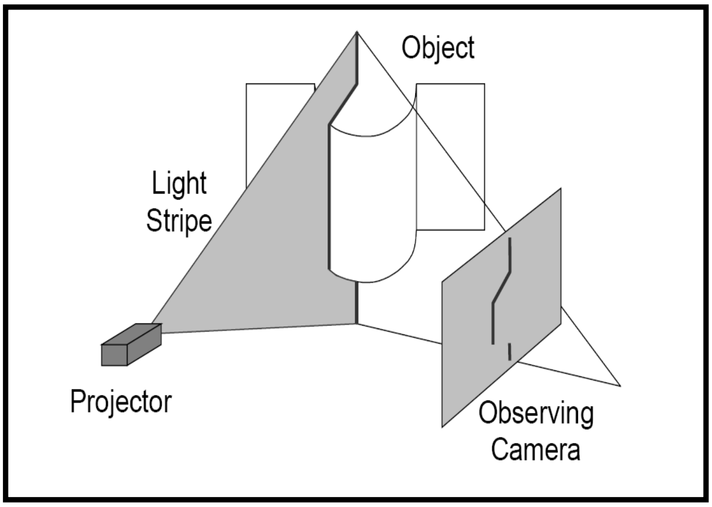
The OPTIMA-2 and BFH 2000 are wheel balancing machines equipped with 5 camera sensors. Two cameras capture images of the wheel rim profiles (inner and outer), so that the co-ordinates of positions for application of the balancing weights can be calculated automatically and without user inputs. The cameras are also used to obtain geometrical data about rim deformation, deviation of the rim edges from its axis of rotation (Rim Runout). The third scanner provides geometrical data about tire deformations, deviation of the tire from its axis of rotation (Tire Runout), tread depth indication, tread conicity, tire wear pattern The two lateral cameras are also used to obtain tire sidewall bulges and depression, rim and tire damaging. Such data is used for advanced diagnosis of the wheel as well as to provide the user with indications on how to proceed in order to minimize the effects of such deformations.



3.32.2 SCANNERS / LASERS

Optima and BFH 1000 are based on distance measuring devices (range finders) based on the principle of LASER triangulation. This device comprises a LASER source, a lens and a linear optical image sensor (a CCD – charge coupled device). The beam of coherent light emitted by the LASER source hits the object whose distance is to be measured. The beam of light is diffused (scattered) in a plurality of light rays from the surface of the object and the rays are concentrated by the lens in a spot on the sensitive surface of the linear optical image sensor. The position of the spot on the sensor is determined by a digital analysis of the electrical signal produced by the sensor.
The distance between the object and the LASER source may be calculated. In practice, a calibration procedure is performed and a polynomial Interpolation of a suitable degree is used. Specifically, the OPTIMA system implements cubic spline interpolation with shape preserving characteristics.
The complete process is as follows:
1. Laser power – exposure time settling. The system is able to set the optimum values of laser power and CCD exposure time according to the ambient light, amount of reflected light, and reflectivity of objects.
2. Background subtraction. Two successive readings are taken: in the first the laser source is off, in the second is on. Complete sensor readouts are kept in the computer’s memory. The difference of the acquired data provide an image of the CCD sensor without effects due to ambient light.
3. Detecting the position of the light peak on the linear optical image sensor.
4. Calculating the distance to the object by means of polynomial interpolation.

3.32.3 LASER LIGHT OF LIGHT SYSTEM

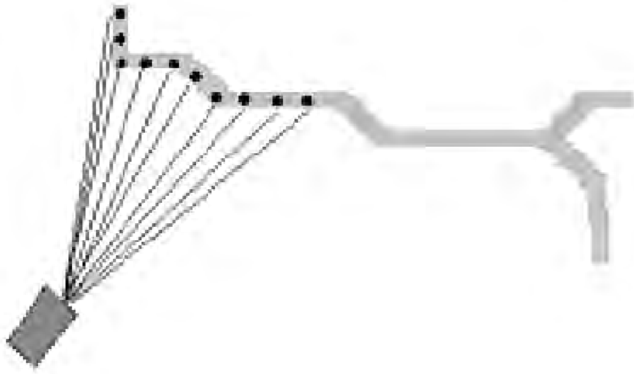


On Optima -2 and BFH 1000 -2 the *sheet-of-light* imaging system consists of a distance measuring device based on the principle of optical laser triangulation. This device comprises a laser source with an optical line generator, a lens and an area image sensor, CMOS on our machines.The beam of coherent light emitted by the laser source is shaped in a laser light by the optical line generator – typically a cylindrical lens. The light laser light – or *sheet of light* – hits the object whose distance is to be measured and intersects the object in a plurality of points.
For each point, the light is diffused – scattered – in a plurality of light rays from the surface of the object and the rays are concentrated by the lens in a curve on the sensitive surface of the area image sensor. The positions of the points in the curve on the sensor are determined by digital processing of the electrical signal produced by the sensor. The positions of the points in the curve on the sensor determine, after calibration, the positions of the correspondent points on the target.
The complete process is as follows:
1. Laser power – exposure time settling. The system is able to set the optimum values of laser power and CMOS exposure time according to the ambient light, amount of reflected light, and reflectivity of objects.
2. Background subtraction. Two successive readings are taken: in the first the laser source is off, in the second is on. Complete sensor readouts are kept in the computer’s memory. The difference of the acquired data provide an image of the CMOS camera without effects due to ambient light.
3. Detecting the position of the light peak on the linear optical image sensor.
4. Calculating the distance to the object by means of polynomial interpolation.

3.32.4 PROFILING

In the OPTIMA and BFH1000 system, the distance measuring devices (range finders) are rotated in a plurality of known positions by a stepper motor, so that they constitute optical scanners. The scanners, detecting the distances from a known position of a plurality of points on the object to be explored (the wheel rim) allows the spatial co-ordinates of each point detected to be obtained.
For each scanner, the complete process is as follows:
1. Measuring the distance to the point hit.
2. Saving the distance measured at point 1 and the position of the distance measuring device at point 1.

3. Moving the laser range finder to the next known position.
4. Repeating steps 1 – 4 until the scan is complete.
Based on these co-ordinates, it is possible to identify positions on the rim profile which are useful, and even in a certain sense optimum, for the application of balancing counterweights. The co-ordinates of these positions are calculated automatically and without contact.



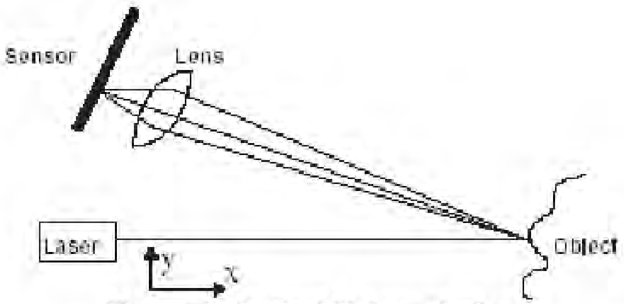


Figure 2. Optical Triangulation.

The complete weight position detection process is as follows:
1. Scan rim contour to determine typical rim parameters
2. Compare current rim pattern with a set of stored rim patterns
3. Select the best match stored rim pattern
4. Pick pre-established weight locations associated with the best match pre-established rim pattern
5. Calculate weight amount and display
6. Allow the user to modify suggested weight location by moving the laser pointer
7. “Learn” from experience

Rim Runout Measurement - Rim- Tire Matching / Optimization
It is known that the vibrations produced by a motor vehicle wheel as it turns are caused, by the following:
1. Uneven distribution of weights on the tire
2. Uneven distribution of weights on the rim
3. Geometrical deformation of the tire
4. Geometrical deformation of the rim
5. Uneven tire elasticity (variation in stiffness)
The OPTIMA system allows the identification of geometrical deformations in the rim, that is to say, deviationof the rim axis from its axis of rotation:

3.32.5 RADIAL AND LATERAL RUNOUT

The scanner devices are rotated to a known position so that the LASER beam hits the surface of the rim at a predetermined point. The rim is rotated about the wheel balancer shaft and a plurality of distance measurements are taken at known rim angles of rotation. The operation is repeated for at least one other known distance measuring device position. On the basis of the data gathered in this way, a calculation process defines the eccentricity (Radial Runout) and angle (Lateral Runout) of the rim axis relative to the axis of rotation. This data can be used to provide the user an indication of the quality of the rim examined.
It is also used to provide the user with indications on how to position the tire relative to the rim in order minimize the effects of such deformations.

In fact, the system allows the measurement of geometrical data relative to tire deformations, deviation of the tire axis from its axis of rotation. The distance measuring device is moved by rotation and translation to a known position so that the LASER beam hits the surface of the tire at a predetermined point. The wheel is rotated about the wheel balancer axis and a plurality of distance measurements are taken at known wheel angles of rotation. On the basis of the data gathered in this way, a calculation process defines the eccentricity – Radial Runout – of the wheel axis relative to the axis of rotation. A calculation process defines the eccentricity of the tire only, based on the measurements taken respectively on the rim and on the entire wheel by means of vector subtraction.

This data, together with the data about the imbalance and the data about the rim geometrical deformations, allows a complete wheel diagnosis and provides the user with more accurate indications. Moreover, a suitable optimization algorithm provides indications on how to position the tire relative to the rim in order to minimize the concurrent effects of such deformations in accordance with appropriate criteria. Typically, the tire is rotated with respect to the rim opposing the peak (maximum) of the tire radial runout with the minimum of the rim radial runout, thus minimizing the radial runout of the assembled wheel.

3.33 POWER SUPPLY BOARD (OPTIMA AND BFH 1000)

- **<u>Description:</u>** The Power Supply PCB receives 230VAC power from the Electronic box. This voltage can be measured using a Digital Volt Meter at J1 pins 1 and 2 on the Power Supply PCB. The AC power passes through onboard bridge rectifiers converting the power to 9,35 VDC which is used to power all of the (4) Scanner Motors.
  This 9,35 or 12 VDC can be measured at J2 pins 1,2 and 3. Pins 4,5 and 6 are ground connections. This voltage must be adjusted after the installation of the Power Supply PCB. Follow the procedure below to measure and adjust the output voltage to the scanner motors.
  The Power Supply Board receives 230VAC from splitter connector on the EBOX and it is turned on and off by the main switch.

  9,35VDC are used to supply AWP board and the scanners on **GEO OPTIMA AND BFH 1000.**

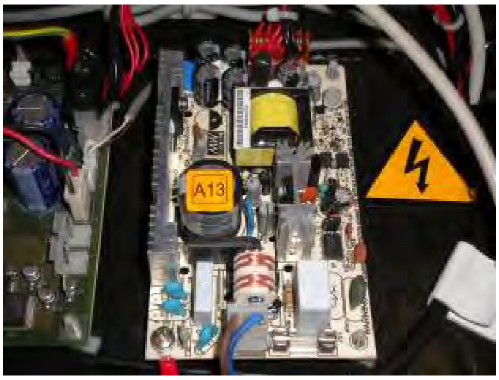
  12 VDC are used to supply :

  - Motor Driver Board and scanner **on GEO 6900P, B9855P AND B9855P.**
  - HUB board, Switch Ethernet, EPCs 1, 2, 3, 4 on **GEO OPTIMA 2, BFH 2000.**
- **<u>Function</u>:** The function of this module is to:
  - process the input power and distribute that to the relevant peripherals.
  - exchange input signals from and output signals to peripherals.
  Peripheral are the AWP board, Motor Driver Board, HUB board, Switch Ethernet, EPCs 1, 2, 3, 4

  A malfunction in this module can generate an error code that belongs to a component that is correct in itself.
- **<u>Revision identification</u>:** The described revision can be identified on the board itself, in between connector X2 and X13.
- **<u>Power up</u>:** On power up of this module following happens:

On the Geodyna Optima, Optima 2 and 6900p the power supplier board is placed behind the wheel guard,

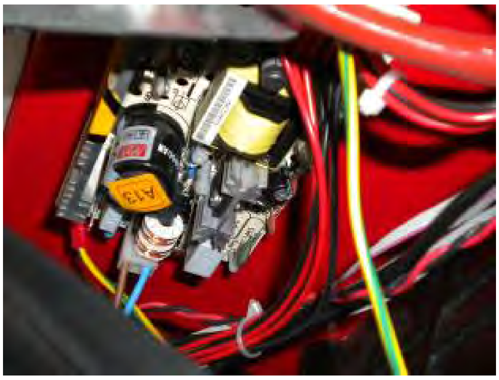
12VDC POWER SUPPLIER BOARD



9.35VDC POWER SUPPLIER BOARD

On the B9850P, B9855 2P, BFH 1000 and BFH 2000, the power supply board is placed into the cabinet.

12VDC POWER SUPPLIER BOARD
B9850P, B9855P AND BFH 2000



9.35VDC POWER SUPPLIER BOARD
BFH 1000

3.34 CAMERA PROCESSOR BOARD (6900p, Optima, b9850p, b9855p and BFH 1000)

The Camera Processor board is the liaison between the three Scanner / CCD assemblies and the Main Processor PCB inside the Ebox.
On the Geo 6900p and Optima the Camera Processor was located behind the wheel guard, while on the the B9850P, B9855P and BFH 1000 was placed inside of the cabinet.

J6/7/8/9	**Pin #**	**Direction**	**Name**	**Description**
	1	Digital Out	Q3	Stepper Motor Phase B
	2,5	Power Out	Un	Common Power Supply
	3	Digital Out	Q4	Stepper Motor Phase D
	4	Digital Out	Q2	Stepper Motor Phase C
	6	Digital Out	Q1	Stepper Motor Phase A

J10	**Pin #**	**Direction**	**Name**	**Description**
	1	Power Out	+5Vdc	Digital Power Supply (5V)
	2	Digital In	Zpos3	Motor 3 Zero Position
	3,4			dGnd Digital Ground

J11	**Pin #**	**Direction**	**Name**	**Description**
	1	Digital In	PH-A	Encoder Phase A
	2,4			dGnd Digital Ground
	3	Digital In	PH-B	Encoder Phase B

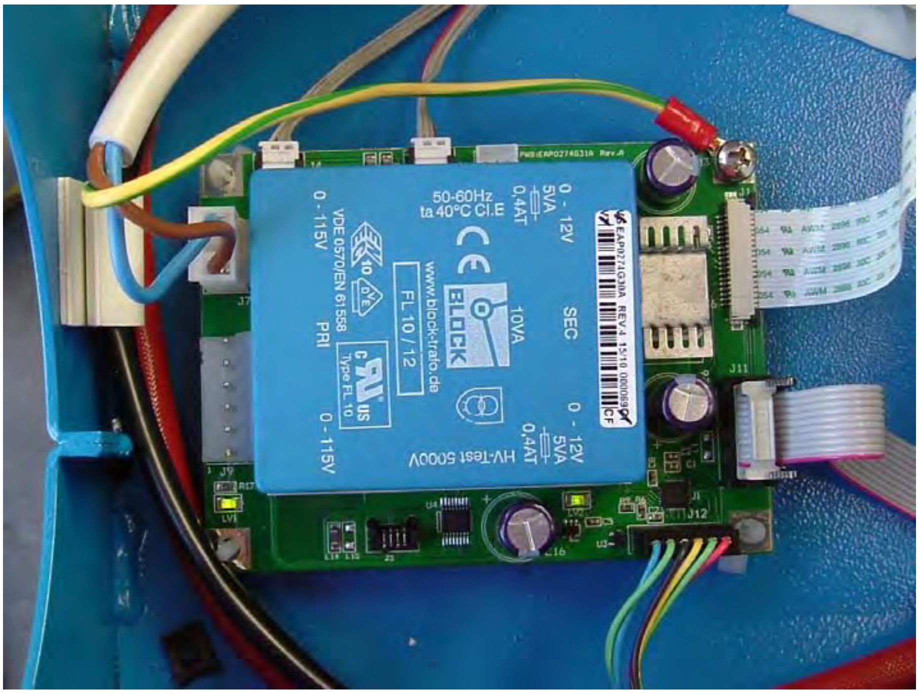
J12	**Pin #**	**Direction**	**Name**	**Description**
	1,2,4,6	Power In		External 5V power supply
	3,5,13,14			External Ground
	7,8,9,10		NC	Not Connected
	11	Digital In	IIC-SCif	External IIC Serial Clock
	12	Digital I/O	IIC-SDif	External IIC Serial Data

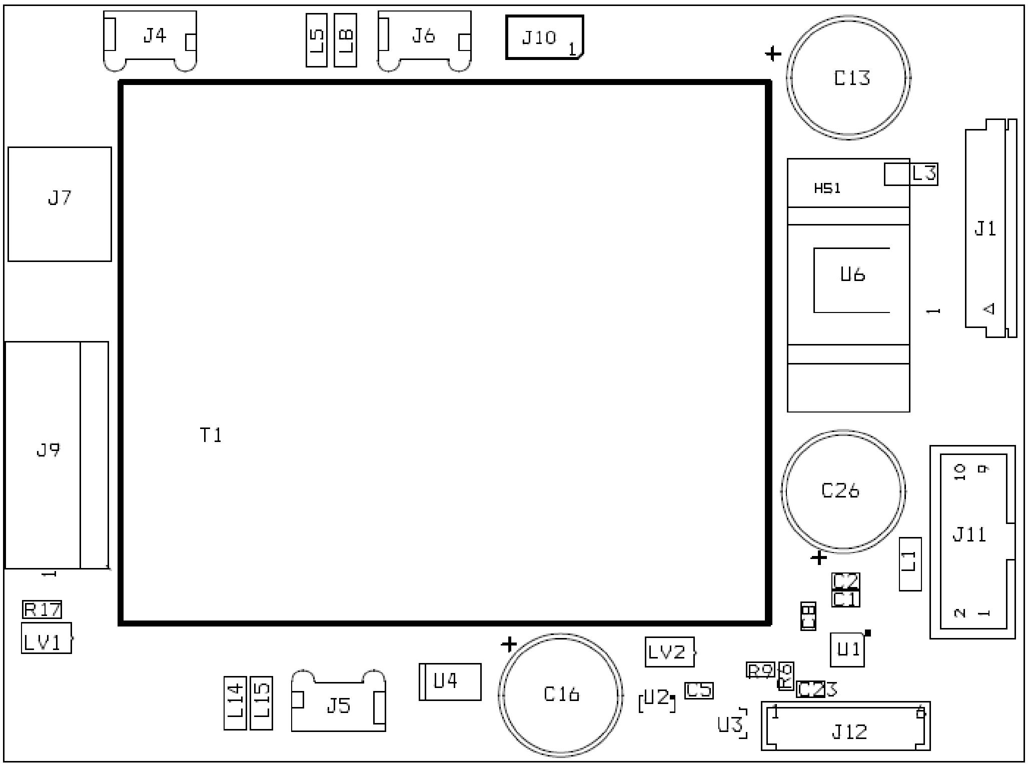
J13	**Pin #**	**Direction**	**Name**	**Description**
	1,2,3	Power In		External Motor Power Supply
	4,5,6			External Motor Ground

J14,15,16	**Pin #**	**Direction**	**Name**	**Description**
	1,18,20			Digital Ground
	2	Analog In	OSx	OS CCD signal
	3	Analog In	DOSx	DOS CCD signal
	4,12	Power Out	+5Vd	5V Digital Power Supply
	5	Digital Out	FRMstx	Frame Start Signal
	6	Out	LPx	Laser Pointer Switch
	7	Digital Out	RSTx	Reset signal
	8,10	Power Out	+3.3Vd	3.3V Digital power supply
	9	Digital In	AUXoutx	Auxialiary Digital out
	11	Digital In	CONVstx	Conversion start signal
	13	Digital I/O	SDA	IIC serial data
	14,16	Digital Out	E0/1	IIC EEPROM address configurati.
	15	Digital Out	SCL	IIC serial clock
	17	Digital In	Zposx	Scanner home position signal
	19	Digital Out	LASERx	Laser modulation signal

3.35 MOTOR DRIVER BOARD (6900 2p AND b9855p-2p)

The Motor Driver board is the liaison between the scanner, sonar and the IBP box.





Pin	J1 - EAP0274G50A		J1 - EAP0274G30A
1	out	3,3V reference	in
2	in	wheel guard potentiometer signal, analog	out
3	in	sonar signal, analog	out
4	in	motor current monitor, analog	out
5	in	12V monitor, analog	out
6	in	encoder Ch A	out
7	out	motor direction	in
8	out	motor step	in
9	out	motor enable	in
10		GND	
11	out	TX TTL	in
12	in	RX TTL	out
13	in	+5V	out
14	out	I2C SCL	in
15		GND	
16	bdir.	I2C SDA	bdir.
17		GND	
18	in	+5V	out

J4- EAP0274G30A

1	3,3V reference (output)
2	wheel guard potentiometer signal (input)
3	12V (output)
4	Gnd

J5- EAP0274G30A

1	TX Rs232
2	RX Rs232
3	5V (output)
4	Gnd

J6- EAP0274G30A

1	3,3V reference (output)
2	sonar signal (input)
3	12V (output)
4	Gnd

J7- EAP0274G30A **Mains Supply 230Vac**

J9- EAP0274G30A **(not used)**

1,2,3	12V (out)
4,5,6	Gnd

J10- EAP0274G30A **(not used)**

1	Auxiliary input
2	Gnd
3	5V (output)

J11- EAP0274G30A

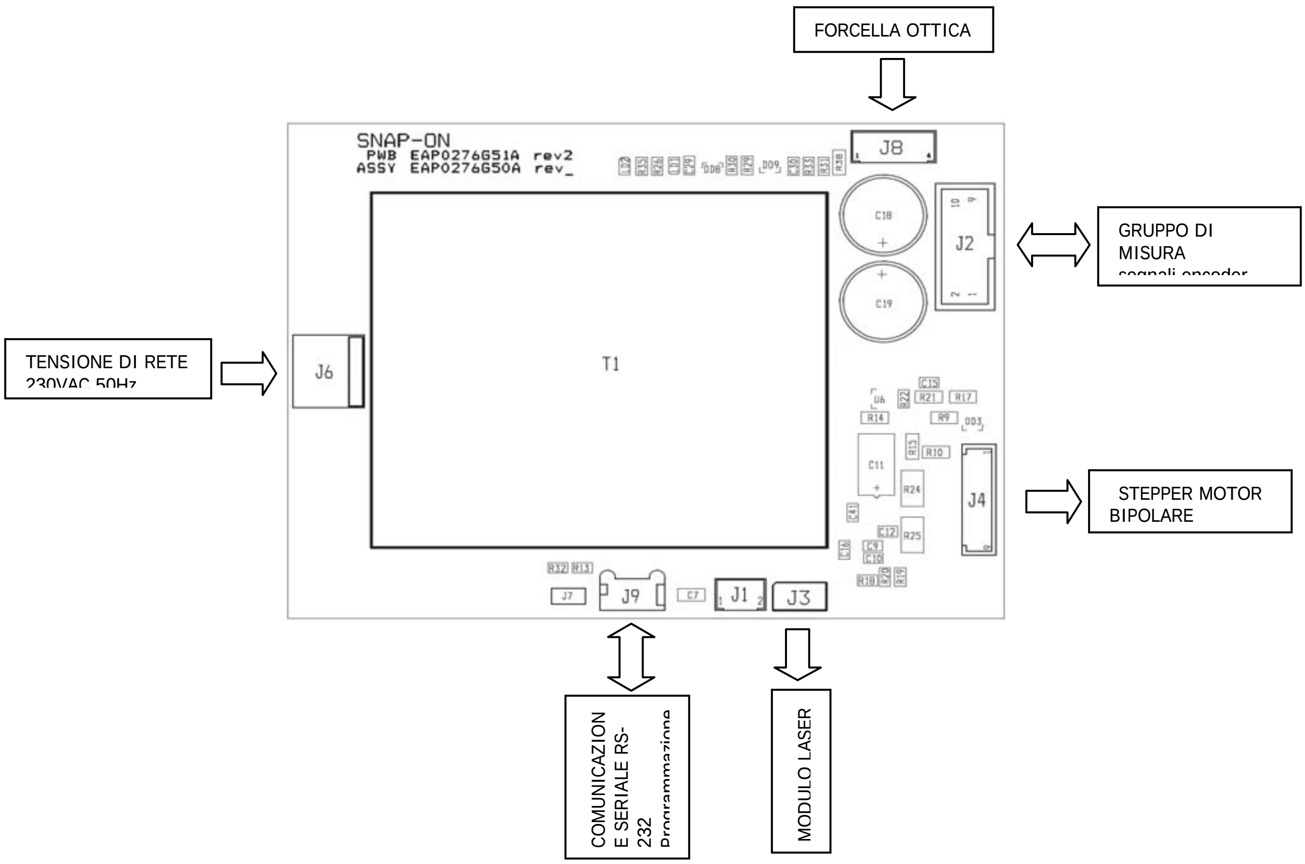
1,2,5,6,9	nc
3	I2C SDA
4	I2C SCL
7	Encoder CH A
8,10	Gnd

J12- EAP0274G30A

1	phase 1 A
2	nu
3	phase 1 B
4	phase 2 A
5	nu
6	phase 2 B

3.36 A-WEIGHT LASER BOARD (6900 2p AND b9855p-2p)

The A-Weight Laser Board is the liaison between the laser device and the IBP box.



Pin	J2 connector	
1-2-5-9	N.C.	
3	IIC-SDA	BIDIRECTIONAL
4	IIC-SCL	INPUT
6	+5VD	
7	ENCODER CH_A	INPUT
8-10	GND	

Pin	J4 connector	
1	PHASE 1A	OUTPUT
2-5	N.C.	
3	PHASE 1B	OUTPUT
4	PHASE 2A	OUTPUT
6	PHASE 2B	OUTPUT

Pin	J3 connector	
1	LASER SUPPLY	ON=5V OFF=0
2	GND	
3	N.C.	

Pin	J6 connector	
1	MAIN VOLTAGE	
2	MAIN VOLTAGE	

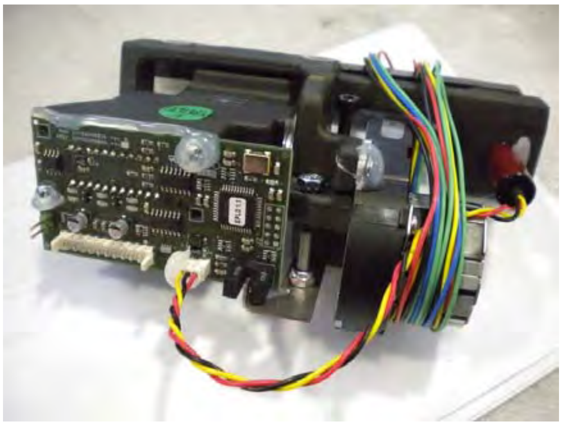
Pin	J8 connector	
1	OPTO-SWITCH SUPPLY	OUTPUT
2-4	GND	
3	OPTO-SWITCH SIGNAL	INTPUT

Pin	J9 connector	
1	TX RS-232	OUTPUT
2	RX RS-232	INPUT
3	N.C.	
4	GND	

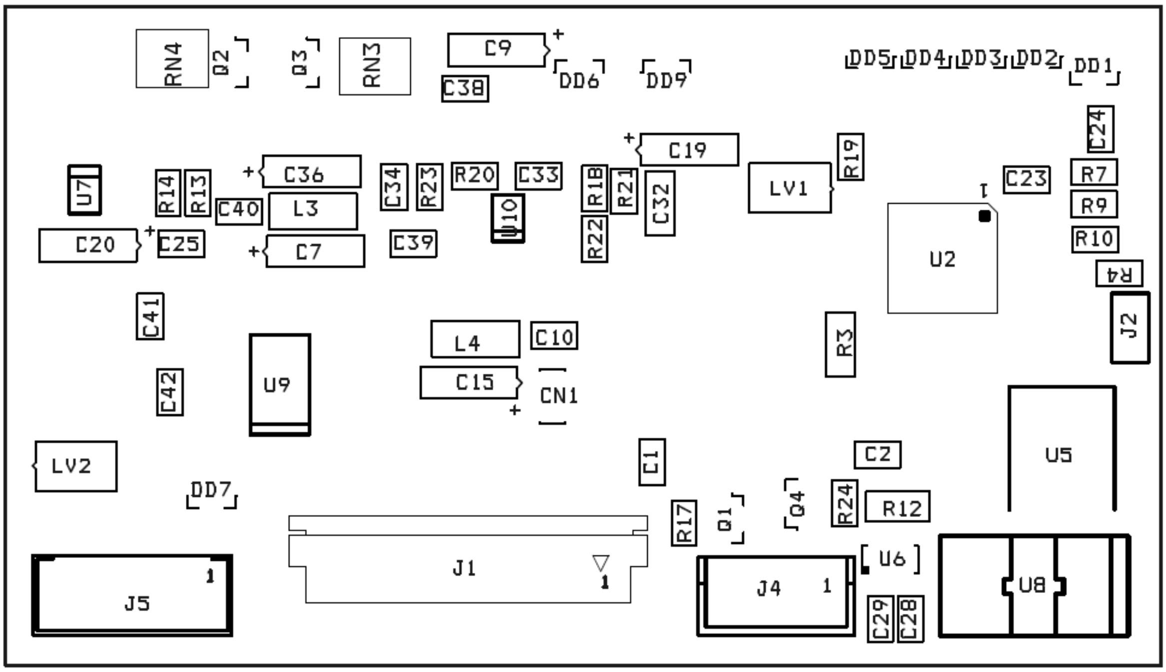
3.37 NEW CCD PROCESSOR BOARD (6900-2p AND b9855-2p)

Scanner is used to detect all information required by the IBP box about the rim to make measurement, weight placement run out, ecc. The board cannot be replaced separately from the scanner.

ALL EXCEPT b9855 2p AND 6900 2p



ONLY FOR b9855 2p AND 6900 2p



Pin	J1 - EAP0274G50A		J1 - EAP0274G30A
1	out	3,3V reference	in
2	in	wheel guard potentiometer signal, analog	out
3	in	sonar signal, analog	out
4	in	motor current monitor, analog	out
5	in	12V monitor, analog	out
6	in	encoder Ch A	out
7	out	motor direction	in
8	out	motor step	in
9	out	motor enable	in
10		GND	
11	out	TX TTL	in
12	in	RX TTL	out
13	in	+5V	out
14	out	I2C SCL	in
15		GND	
16	bdir.	I2C SDA	bdir.
17		GND	
18	in	+5V	out

J4- EAP0274G50A

1	Laser supply (5V on / 0V off)
2,4	Gnd
3	Pwm modulation (TTL)

J5- EAP0274G50A **Not used on wheel balancer**

1	I2C SDA
2	Gnd
3	I2C SCL
4	5V (input)

3.38 LASER POINTER ASSEMBLY

Laser pointer is used to place the weight on the rim. It takes the weight reference position following two different reference according to the machine models:

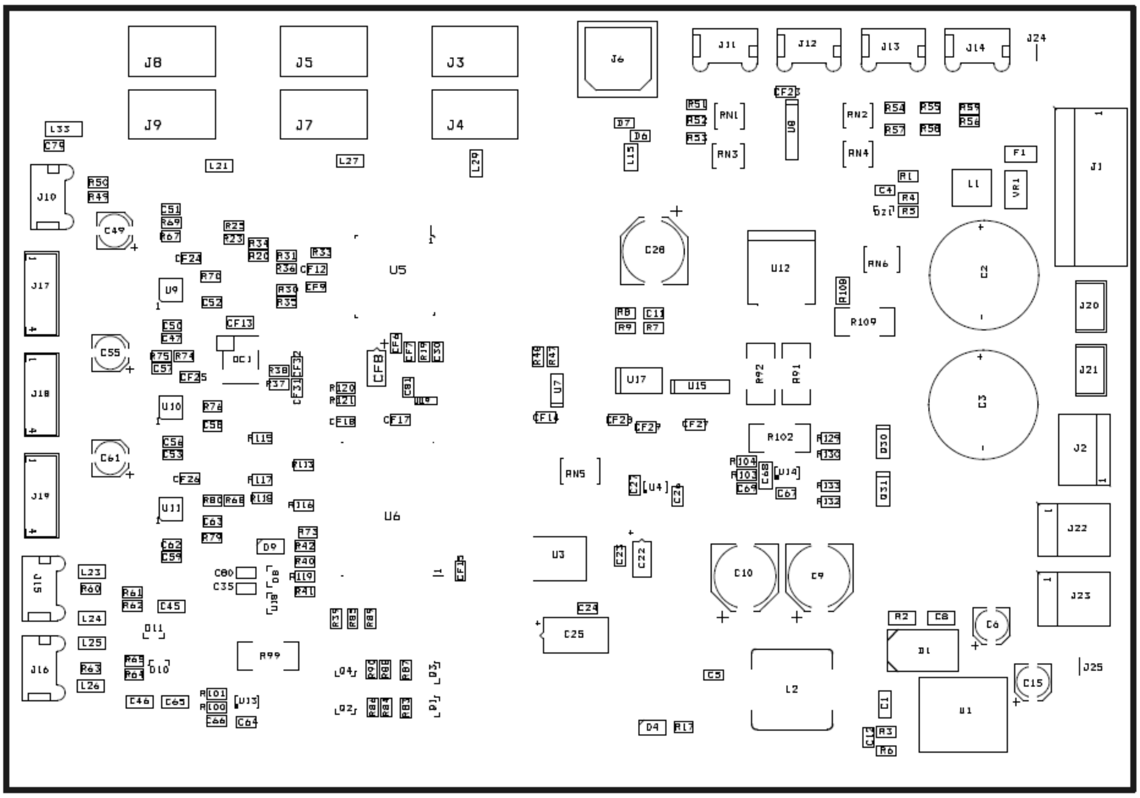
- On touchless balancers if follows the rim data entry stored in the IBP with the cameras or with scanners.
- On all other wheel balancers it follows the 2D sape rim data input.

ONLY FOR OPTIMA II AND BFH2000

FOR ALL OTHER MODELS

3.39 HUB BOARD (Optima 2 AND BFH 2000)

The HUB board is the liaison between the cameras and the Main Processor PCB inside the IBP box.
On the Optima 2 the HUB board is placed behind the wheel guard while in the BFH 2000 it is placed inside of the cabinet.



Main functions:

- Six ports Usb Hub
- Three stepper motor driver (two only are used)
- Encoder signals reading
- Three home position reading (two only are used)
- Two laser driver (one only is used)

J1 Board Power input
pins 1,2,3 +12V (in)
4,5,6 Gnd

J2 5.24V Power output (to Epc)
1,2 Gnd
3,4 +.245V (out)

J20 Auxiliary laser supply output (NOT USED)
1,3 +5V when laser on, 0 when off
2 Gnd

J21 Laser supply output
1,3 +5V when laser on, 0 when off
2 Gnd

J22 Auxiliary output (NOT USED)
J23 Auxiliary output (NOT USED)

J6 USB port B Connected to main EPC

J3 USB Port A

J4 USB Port A

J5 USB Port A

J7 USB Port A

J8 USB Port A Rear Camera

J9 USB Port A

J11 Encoder reading input
1 phase A
2 reference
3 phase B
4 Gnd

J12 Home position input (rear motor slotted optical switch)
1 +5V (out)
2 Signal input (5V when the motor is at home position, 0V otherwise)
3,4 Gnd

J13 Home position input (motorized laser pointer slotted optical switch)
1 +5V (out)
2 Signal input (5V when the motor is at home position, 0V otherwise)
3,4 Gnd

J14 Auxiliary input (NOT USED)
1 +5V (out)
2 Signal input (0V when slotted optoswitch is closed)
3,4 Gnd

J10 I2C bus (NOT USED)
1 5V out
2 I2c Scl (Clock)
3 I2c Sda (Data)
4 Gnd

J17 Bipolar stepper motor drive (rear motor)
1 phase 1 B
2 phase 1 A
3 phase 2 A
4 phase 2 B

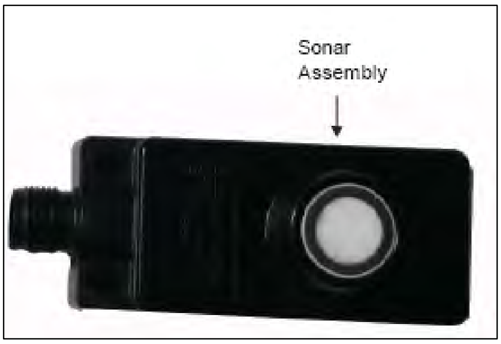
J18 Bipolar stepper motor drive (pointer motor)
1 phase 1 B

	2	phase 1 A
	3	phase 2 A
	4	phase 2 B
J19	**Auxiliary bipolar stepper motor (NOT USED)**	
	1	phase 1 B
	2	phase 1 A
	3	phase 2 A
	4	phase 2 B
J15	**Analog input 1**	**(NOT USED)**
	1	3.3V output voltage reference
	2	Signal input
	3	12V output
	4	Gnd
J16	**Analog input 2**	**(NOT USED)**
	1	3.3V Output voltage reference
	2	Signal input
	3	12V output
	4	Gnd
J24	Gnd	
J25	Gnd	

3.40 SONAR SENSOR

The Sonar Sensor is used to detect all information required by the AWP or by the Motor Driver Board about the rim to make rim width measurement.

The sonar of first generation was of analogic type working in conjunction with the wheel guard potentiometer.



The present sonar is of digital type and it is equipped by an electronic inclinometer to avoid the using of the wheel guard potentiometer.
The Sonar Sensor, old and new, are not reparable and can be replaced separately from the scanner.

CHAPTER 4
SERVICE

4.1 INTRODUCTION

This chapter will describe how to check and replace the components of the balancers described in Chapter 2 in the same order.

⚠ WARNING!

DANGEROUS HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT

NOTE: BEFORE OPENING THE MACHINE FOR SERVICE, DISCONNECT ELECTRICAL SUPPLY LINE AND USE THE LOCKOUT / TAGOUT PROCEDURE.

4.2 POWER SUPPLY CABLE: CHECK AND REPLACEMENT

✂ **:** Voltmeter.
⌛ **:** 30’
ⓘ **:** Turning the machine on, the display or the screen does not show anything.
Turning the machine on, the balancer makes the self test but the screen does not show anything.
Turning the balancer on it showsC10800
SB **:** 418 WB

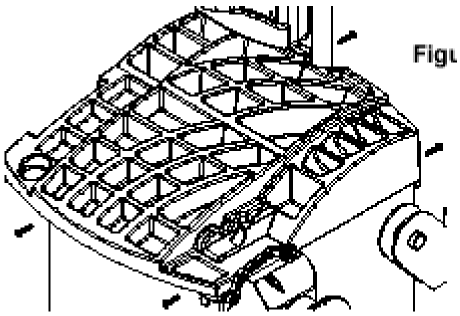
- Go to C oced C55 to check the power supply.
- Disconnect the power supply from the balancer or from the screen.
- Using a VOM, check for an output voltage at the end of the power plug 230VAC +/- 10%VAC VPI

If there is not 230VAC output voltage the cable must be replaced.

4.3 TO ACCESS THE INSIDE OF THE MACHINE

✂ **:** Big and Medium Philip screwdriver, 5mm allen key.
⌛ **:** 30’
ⓘ **:**
SB **:** 944 WB

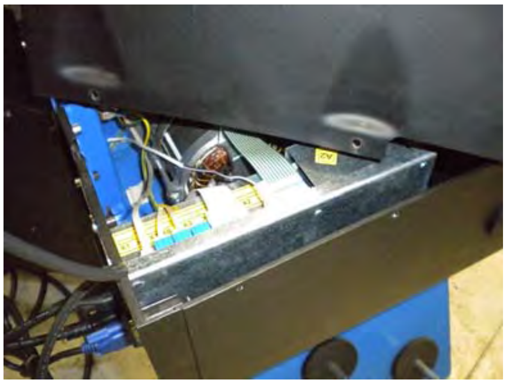
- Disconnect the power supply from the balancer.
- Remove the screws from the front and rear or in the sides of the weight tray.



- Standing at the front of the machine, rotate the SAPE arm to it’s full most outward position.
- Lift and remove the weight tray. Avoid breaking or damaging wire harnesses. Harnesses may be held in place with various retainer clips.

- On balancers with adhesive key pad lift the weight tray and place it on the balancer cabinet to disconnect the keypad flat cable.



- On “L” cabinet the weight tray can be lifted without move the Geodata arm.

NOTE: WHEN INSTALLING THE WEIGHT TRAY, BE CAREFUL TO DO NOT CRUSH CAMERA OR OTHER WIRES.

4.4 TO ACCESS TO THE IBP BOX

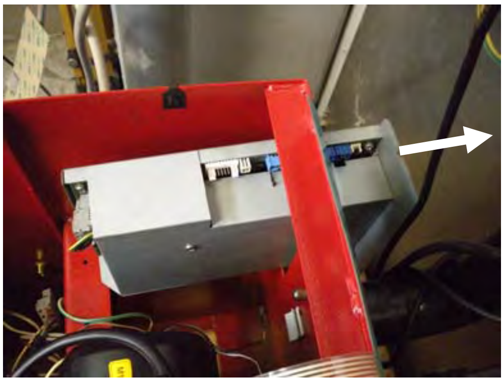
✂ **:** Big and Medium Philip screwdriver.
⌛ **:** 30’
ⓘ **:**
SB **:** None

The IBP box is mounted in the same way of the Y2k one and it can be removed as follows according to the cabinet style:

“S” AND “M” STYLE CABINETS

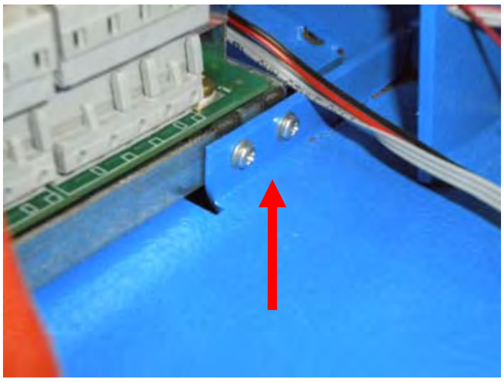
- Disconnect the power supply cable, and the serial one on the screen balancers, from the rear of the machine.
- Remove the weight tray.

- Un-plug each of the harnesses from the power supply box marking each harness to ensure correct installation.
- From the rear of the machine remove the two screws holding the IBP box.
- Gently pull the box out from the back.



"L" STYLE CABINET

- Disconnect the power cable, and the serial one on the screen balancers,from the rear of the machine.
- Remove the weight tray.
- Unplug each of the harnesses from the power supply box marking each harness to ensure correct installation.
- From the rear of the machine remove the two screws holding the IBP box.
- Gently pull out the box out from the top.



4.5 TO ACCESS TO THE INTEGRATED DISPLAY BOARD

On machines equipped by Integrated Display Board bolted to front panel, the acces is allowed as follows:

- Disconnect the power supply from the machine.
- Remove the screw securing the panel to weight tray or to the display panel assembly.
- Gently lift the panel paying special attention to the wiring harness that are connected.
- Un-plug each of the harnesses from the power supply box marking each harness to ensure correct installation.

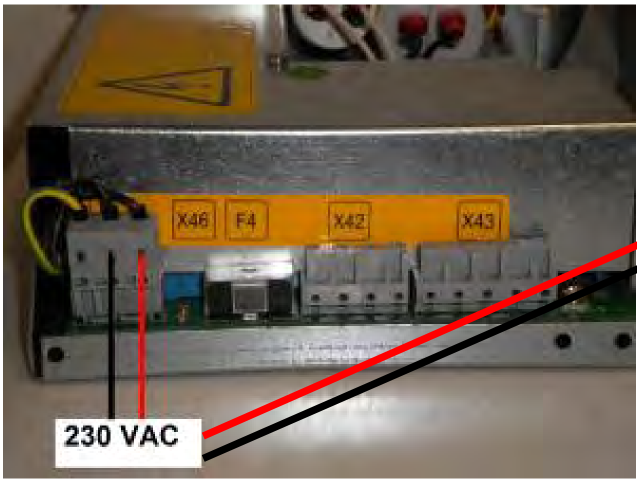
4.6 CHECK POWER TO POWER SUPPLY BOX AND INTEGRATED BOARD

✂ **:** Big and Medium Philip screwdriver.
⌛ **:** 30'
ⓘ **:**
SB **:** None

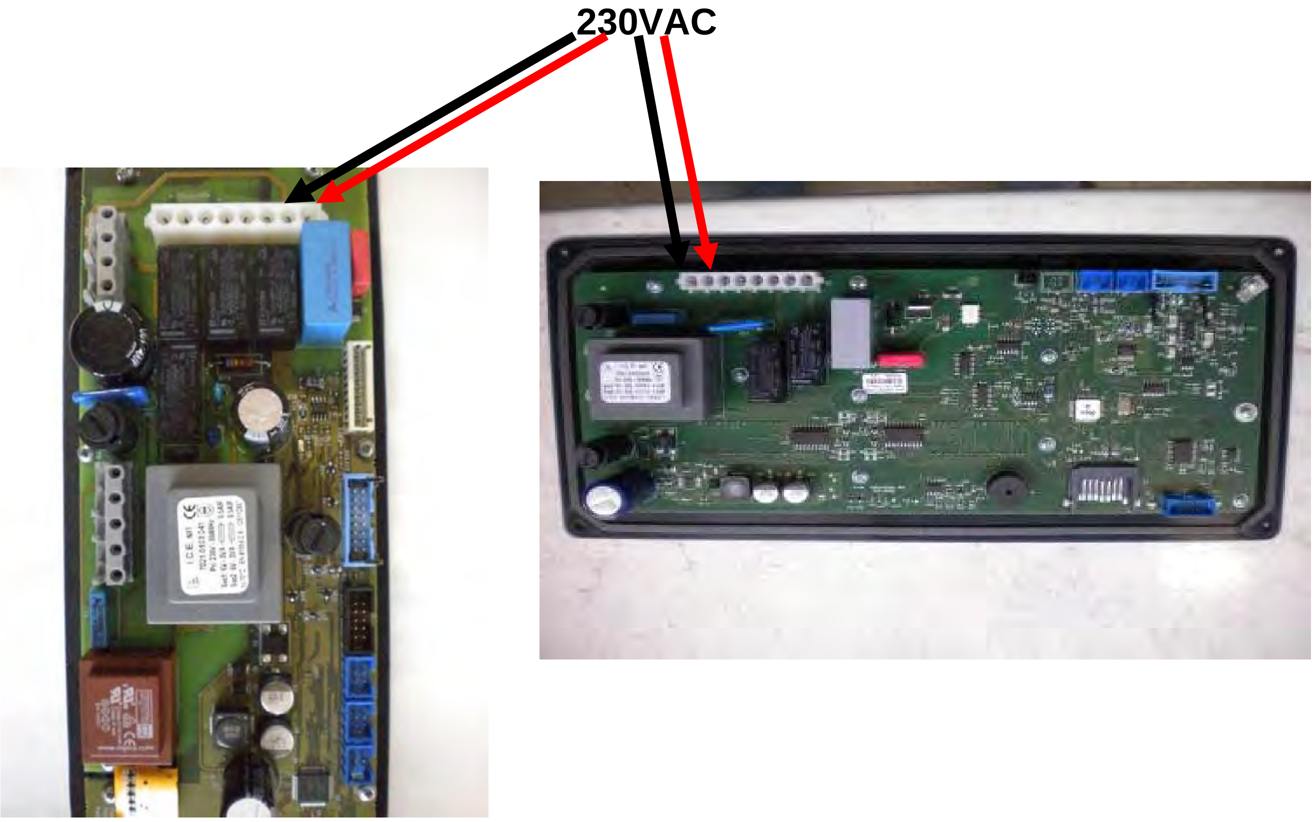
• Remove the weight tray.
• Using a VOM check for 230VAC at the power supply board, X41 pins 2 and 3 all balancers.

⚠ WARNING!
DANGEROUS HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT

IBP BOX | **INTEGRATED BOARD**



INTEGRATED BOARD



4.7 CHECK AND REPLACEMENT OF THE MAIN SWITCH

✂ **:** Multimeter, medium flat and Philip screwdriver.
⌛ **:** 1h
ⓘ **:** Defective power entry module may cause the following malfunctions:

1. Turning the machine on, the main switch of the shop shuts off.
2. Turning the machine on, the machine does not show anything.

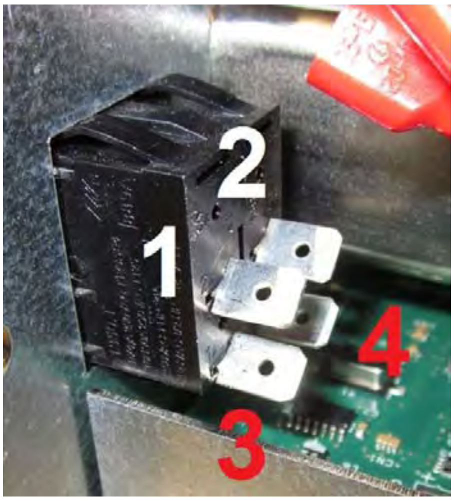
SB **:** None

TO CHECK THE SWITCH:

- Turn off the balancer.
- Disconnect the power supply from the machine.
- Remove the weight on other balancer to access to the IBP.
- Remove the IBP box from the machine and remove its cover to access to the switch.

- Disconnect the wires from the switch.
- Take the multimeter and select it in Ohm.
- Turn switch to ‘0’ (off).
- Check that there is no continuity (W = infinity) between any two terminals 1, 2, 3 and 4.

- Turn switch to '1' (on).
- Check that there is continuity between terminals 1-2 and terminals 3-4 (W = 0 ~ 0.2) and discontinuity between terminals 1-3 and 1-4, as well as 2-3 and 2-4.



TO REPLACE THE SWITCH:

- Take the small flat screwdriver and push the switch clips and at the same time push off the switch.

- Take the new switch and clips it in.
- Connect the wires to the switch.
- Mount the IBP box to the machine .
- Connect all wires to the box.
- Turn on the balancer and check if it works fine.
- Install the weight tray.

4.8 CHECK AND REPLACEMENT OF THE POWER ENTRY MODULE

✂ **:** Multimeter, medium flat and Philip screwdriver, 5,5mm end type key.
⌛ **:** 30’
ⓘ **:** Defective power entry module may cause the following malfunctions:
1. Turning the machine on, the main switch of the shop shuts off.
2. Turning the machine on the 6.3A fuses of the module blow up.
3. Turning the machine on, the machine does not show anything.

SB **:** SB 564WB

Before starting with any power entry module replacement, make sure about that the fuses are fine or not.

TO CHECK THE POWER ENTRY MODULE
- Disconnect the power supply from the machine.
- Access to the IBP box or to the Integrated board according to the machine model ☞4.4 and 4.5
- Disconnect the connector X41 from the IBP box or the Integrated board.
- Make sure that the switch is “OFF” position.
- Take a multimeter and select it Ohm.
- Position the multimeter terminals on Phase-Neutral, Phase-Ground and Neutral-Ground.

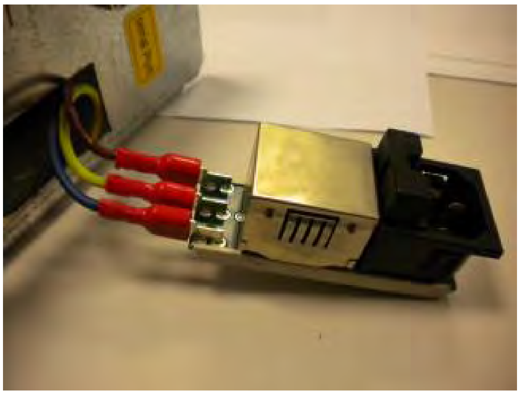


- If the multimeter will emits a beep in one or more positions, the module is in short circuit and must be replaced.
- If the multimeter will not emits any beep, the module is fine and the problem is caused by IBP or Integrated board.

TO REPLACE THE OLD POWER ENTRY MODULE

- Turn the balancer off.
- Disconnect the power supply from the machine.
- Take a small flat screwdriver to push the upper and the lower module tabs


- Push out by a finger the defective module and once out remove the wires.



- Ensure the On/Off switch will be situated closest to the top of the IBP Box, after inserting the IBP Box correctly into the balancer.
- Connect the leads to the PEM, while leading the cables through the rectangular hole of the IBP Box.
- Insert the PEM through the rectangular hole of the IBP Box. Snap it into place.
- Connect the green/yellow lead to the central earth bracket, next to the Protected Earth sticker.
- Connect the other 2 leads to Connector X41.
- Ensure the green/yellow lead from Connector X41 is also fitted onto the central earth bracket.
- Ensure all screws and spacers are (re)fitted.
- Close and mount the IBP Box.

TO REPLACE THE NEW POWER ENTRY MODULE

- Turn the balancer off.

- Disconnect the power supply from the machine.
- Access to the IBP box or to the Power Entry Module according to the machine model ☞3.7 and 4.4
- Disconnect the Power Entry Module from the main switch or from the Integrated board.

- Take a small flat or Philip screwdriver and 5,5mm end type key to dismount the module.

- Take the new module and secure it to the bracket.
- Plug in the new module to the main switch.
- Plug in the machine to power supply.
- Turn the machine on and check if the machine works fine.

No calibration is required at the end of this operation.

4.9 CHECK AND REPLACEMENT OF THE POWER ENTRY MODULE 6.3A FUSES

✂ **:** Multimeter, small flat screwdriver.
⌛ **:** 30'
ⓘ **:** Defective fuses may cause the following malfunctions:
1. Turning the machine on, the machine does not show anything.

SB **:**848 WB

TO CHECK AND REPLACE THE FUSES

- Turn the balancer off.
- Unplug the power supply cable.
- Remove the fuses holder from the power entry module
- Remove the fuses from the holder.

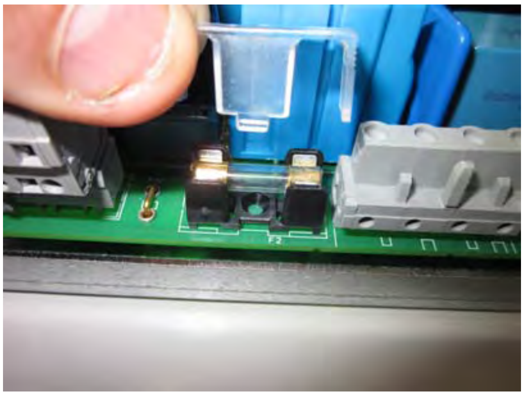
- Take the Voltmeter and select it in Ohm.
- Make sure that there is continuity among the two ends.
- If there is not the continuity, replace the fuse or the fuses with new ones of the same Amps and same voltage.
- Insert the new fuses in the holder and install them on the entry power module.

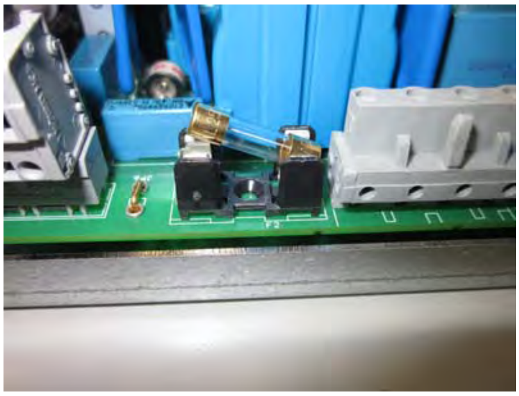
4.10 CHECK AND REPLACEMENT OF THE IBP BOX F2 FUSE

✂ : Multimeter, big and medium Philip screwdriver.
⌛ : 30’
ⓘ : Defective fuses may cause the following malfunctions:
Turning the machine on, the machine does not show anything.
SB : 848 WB

TO CHECK AND REPLACE THE FUSES

- Turn the balancer off.
- Unplug the power supply cable from the balancer.
- Remove the weight tray ☞4.3.
- Remove the fuse holder plastic cover.
- Lift the fuse with the screwdriver to remove it easily from its holder.





- Take the Voltmeter and select it in Ohm.
- Make sure that there is continuity among the two ends.
- If there is not the continuity, replace the fuse or the fuses with new ones of the same Amps and same voltage.
- Insert the new fuses in the holder and install the plastic cover.
- Turn on the balancer and check if it works fine.
- Turn off the balancer.
- Mount the weight tray.
- Turn on the balancer and check again if it is still working fine.

4.11 CHECK AND REPLACEMENT OF THE INTEGRATED PANEL F2 FUSE

✂ : Multimeter, medium flat and philip screwdriver.
⌛ : 30’
ⓘ : Defective fuses may cause the following malfunctions:
Turning the machine on, the machine does not show anything.

TO CHECK AND REPLACE THE FUSES

- Turn the balancer off.
- Unplug the power supply cable from the balancer.
- Remove the Integrated Display Panel from the weight tray ☞4.5.
- Take the medium flat screwdriver and push downward and then turn the fuse holder.
- Then release to allow the exit of the fuse

- Take the Voltmeter and select it in Ohm.
- Make sure that there is continuity among the two ends.
- If there is not the continuity, replace the fuse or the fuses with new ones of the same Amps and same voltage.
- Insert the new fuses in the holder and install the plastic cover.
- Fix the Integrated Display Panel to the weight tray.
- Turn on the balancer and check if it works fine.

4.12 CHECK AND ADJUSTEMENT OF THE POWER SUPPLIER VOLTAGE

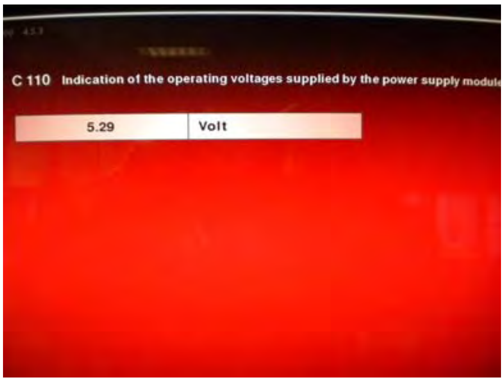
✂ **:** Multimeter, Medium flat and philip screwdriver, tweaker.
⌛ **:** 30’
ⓘ **:** Incorrect power supply may cause the following malfunctions:

1. After turning the machine on, the machine shows error C10810
2. After turning the machine on, the machine shows error C10811
3. Turning the machine on, the machine does not show anything.

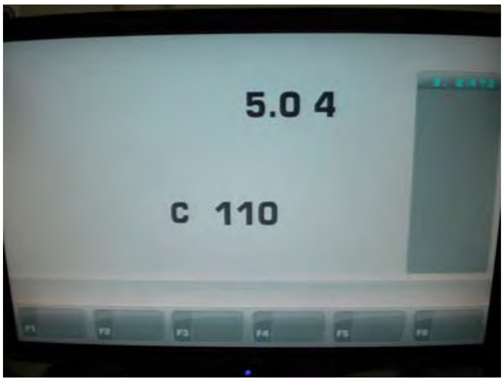
TO CHECK THE POWER SUPPLY

Power up the unit and access the ***“Service Menu”***.

- Enter the **“C-110”** mode.
- Make sure that the voltage shown by the screen is 5.24VDC ± .25



IMPORTANT! On machine equipped with new integrated panel and screen wheel balancers **<u>without EPC</u>**, the power supply is 5.00 VDC ± .25.
On these machines the power supply value is **<u>not adjustable.</u>**



- In case the screen or the display do not show anything, remove the weight tray.

- Disconnect the connector X14 of the IBP box.
- Turn on the balancer.

⚠ WARNING!

DANGEROUS HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT

- Place the multimeter terminals on the two external terminals on the connector X14 of the IBP box

TO ADJUST THE VOLTAGE

- Turn the balance off.
- Remove the IBP box cover.
- Turn the balancer on.

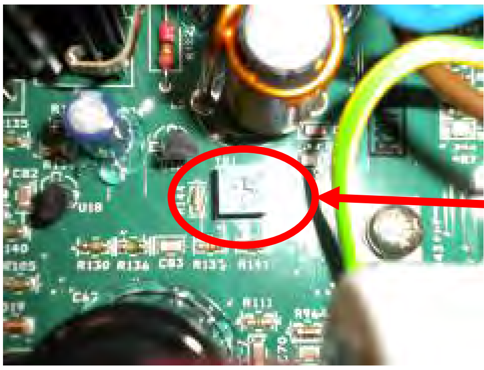
⚠ WARNING!

DANGEROUS HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT

- Using a tweaker tool, rotate the trimmer to adjust the voltage up to +5.24VDC on screen or multimeter display

IMPORTANT! The trimmer is very sensitive and therefore it must be rotated slowly to avoid dangerous jumping of power supply.

IBP BOX



- Escape C code C110.
- Turn the balancer off and turn it on again.
- Make sure that the display will not show the error anymore.
- Turn the balancer off.
- Install the cover on the IBP box.
- Mount the weight tray again.

4.13 CHECK AND REPLACEMENT IBP BOARD ON HAND SPIN BALANCERS

✂ **:** Multimeter, Medium flat and philip screwdriver, calibration rotor
⌛ **:** 1h
ⓘ **:** Defective board may cause the following malfunctions:

1. Turning the machine on, the display does not show anything.
2. After turning the machine on, the machine shows error with module 22
3. After the balancing cycle the machine show error with module 42.
4. After the balancing cycle the machine show error with module 81.
5. After the balancing cycle the machine show error with module C10.
6. After turning the machine on, the balancer emits the beep sequence **S P1**.
7. After the balancing cycle the machine emit the beep sequence **S S P1**.
8. After the balancing cycle the machine emit the beep sequence **S**.
9. The balancer shows wrong balancing values.
10. The balancer chases weight.

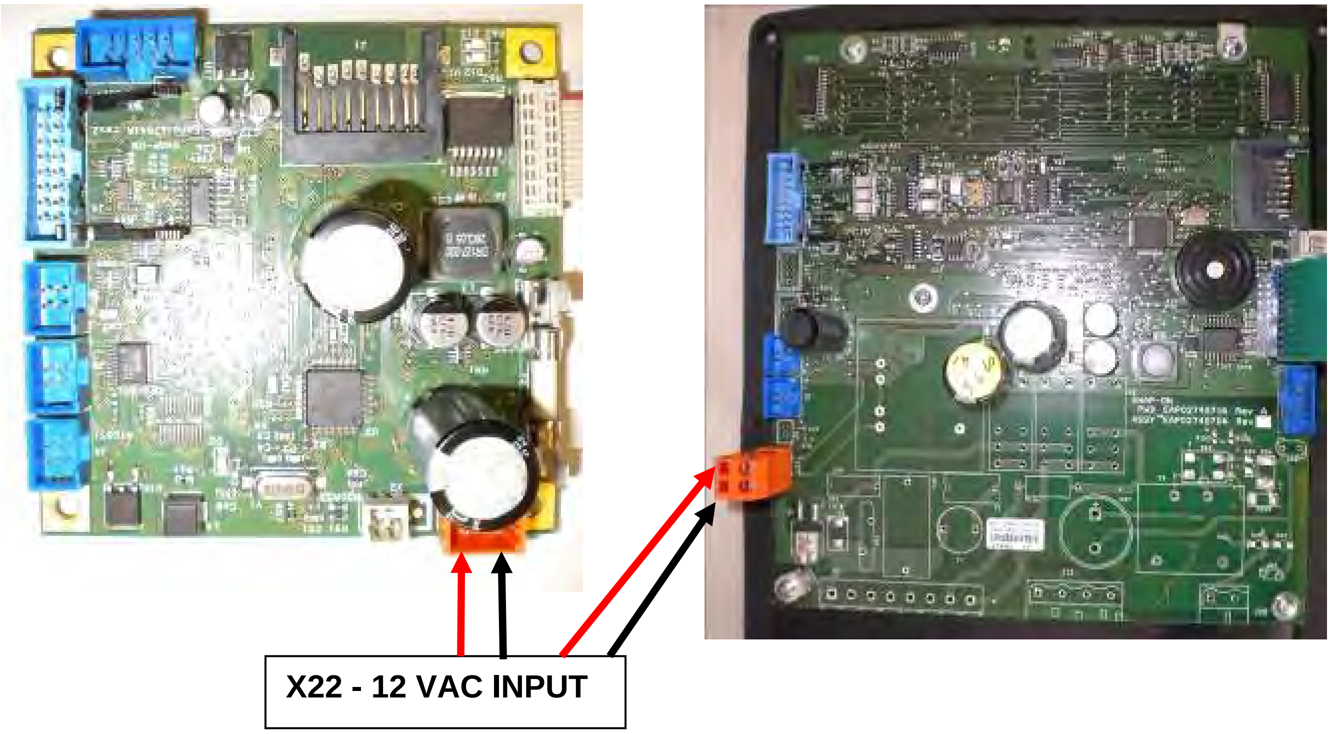
SB **:** 629 WB, 634 WB, 778 WB

TO CHECK THE IBP AND INTEGRATED BOARD

If you suspect any troubles in or originating from this module, perform checks in the following order:

- Check for system messages. After that:
- Check all connectors and cables for damage
- Check the on-board fuses F1
- Turn the machine on.
- Check the power input / outputs

OLD TYPE **NEW INTEGRATED TYPE**



- Check the signals to and from the component that is also involved in this trouble shooting search.
- Check the component that is also involved in this trouble shooting search.
- Check the signal flow from connector to connector. Some signals run straight from connector to connector.

E.g. connector X1, pin 16 goes straight to connector X2, pin 8.

TO REPLACE THE IBP BOARD

- Remove the plug-in transformer from the power outlet

- Remove the low voltage output plug of the transformer from the power inlet socket to prevent someone from applying power accidentally.
- If the IBP Board on a handspin balancer is found at the rear of the digital display board: remove the Digital Display Board.
- If the IBP Board on a handspin balancer is found at a separate chassis that can be retrieved from the rear of the balancer:
  - remove the digital display board and/or weight tray in order to free all wiring
  - remove the screws gently pull out the chassis.
- Remove all connectors
- Remove the 4 screws and rings and gently remove the IBP board.
- If the 4 original srews and rings are in the nuts, remove them first.
- If the power supply is replaced by the integrated one, remove also the microcontroller one 4.10.
- Gently position the board over the nuts.
- Enter and apply the original screws and rings.
- Reapply all wiring.
  Ensure the green/yellow earth cable(s) is/are applied to the cabinet earth bracket.
- Check if the module is back in its original state: screws, rings, wiring, etc. All items removed should be reapplied.
- Re-install the weight tray.
- Position the Digital Display Board on its velcro seating or insert the chassis.
- Reapply the low voltage output plug of the transformer into the power inlet socket
- Reapply the plug-in transformer into the power outlet.
- Turn the machine on.
- Perform C86 to download all calibration stored in optoencoder Eprom.
- Check if the unit functions correctly.

TO REPLACE THE INTEGRATED BOARD

- Remove the plug-in transformer from the power outlet.
- Remove the 4 screws that secure the panel to the weight tray.
- Disconnect all wirings from the board.
- Remove the screws that secure the board to the panel.
- Install the new board on the panel.
- Connect all wires to the board.
- Install the panel assembly on the weight tray.
- Plug in balancer.
- Turn on the balancer.
- Perform C86 to download all calibration stored in optoencoder Eprom.
- Check if the unit functions correctly.

4.14 CHECK AND REPLACEMENT OF THE IBP BOX (MOTOR DRIVEN BALANCERS)

✂ **:** Multimeter, 5,5 and 7mm tube type key, Medium flat and philip screwdriver, tweaker, calibration rotor, assy laser positioner, touch less calibration tool, electronic or spirit inclinometer

⌛ **:** 1h

ⓘ **:** Defective board may cause the following malfunctions:

1. Turning the machine on, the display does not show anything.
2. After turning the machine on, the machine shows error with module 22
3. After the balancing cycle the machine show error with module 42.
4. After the balancing cycle the machine show error with module 49.
5. After the balancing cycle the machine show error with module 81.
6. After the balancing cycle the machine show error with module C10.
7. After turning the machine on, the balancer emits the beep sequence **S P1**.
8. After the balancing cycle the machine emit the beep sequence **S S P1**.
9. After the balancing cycle the machine emit the beep sequence **S**.
10. The balancer shows wrong balancing values.
11. The balancer chases weight.

SB **:** 456WB, 589 WB, 679 WB, 671 WB, 778 WB

TO CHECK THE POWER SUPPLY SECTION:

If you suspect any troubles in or originating from Power Interface Board, perform checks in the following order:

- Check for system messages. After that:
- Turn the balancer off and remove the weight tray.

- Check the fuses from the entry power module .
- Check the on-board fuses F6 (see connector X2, pin 4) resets automatically. This fuse protects the PIB
- Check all connectors and cables for damage
  - Each connector Xxx has its own protection, except for connector X12.
  - The +5 V output of connector X14 is protected by F7.
  - The +5 V output lines of connector X2 protected by F6.
  - The complete power supply is protected by F4
  - The complete motor control unit is protected by F3
  - Do check if both (big) motor capacitors in the IBP Box are connected properly.
- Check if bridge (X46) is in position
- Check LED H2 (green, on PIB):
  If it lights up, the +5 V supply voltage is OK.
  If not:
  - check mains plug, mains switch, mains fuses (F1 and F2)
  - check connector X41 (wiring and placement).
  - check the electrical connection between connector X41 and the PEM
  - check fuse F4 on the PIB

If the mains on connector X41 is 150 - 264 V~, then a short circuit or overload condition on the +5 V output may be present. To locate the possible cause of the condition:
- disconnect connectors X12, X13, X14 and X1 one by one. If the LED H2 lights up, check the connector and wiring to the module and check the module.

If LED H2 is still off, then:
- remove the soldered bridge R213 (next to X12) from the PIB. If the LED lights up, the PIB itself created a short circuit or overload condition. Replace the PIB.

Note: R213 (next to connector X12) is a soldered bridge, positioned between the Vcc generator and the internal users (users on the PCB) of Vcc.

- Check LED H1 (red, on Controller Board).
  If it lights continuously:
  - the motor control unit is not working properly
  - the program is not properly loaded or executed.
  Normally, LED H1 is switched off by the software during the power up sequence.
  - check if the unit is standby: rotate the shaft and check if the rotation direction indicators on the display react:
  - if not: switch off the unit, wait 20 seconds, switch on again to reload the software. Rotate the shaft again and check the rotation direction indicators.
  - if switching off and on the unit did not solve the problem, replace the PIB
- Check the signals to and from the component that is also involved in this trouble shooting search (if relevant)
- Check the component that is also involved in this trouble shooting search (if relevant)
- Check the signal flow from connector to connector. Some signals run straight from connector to connector.
  E.g. connector X14, pin 1 goes straight to connector X1, pin 11.

TO CHECK THE CONTROLLER SECTION:
- Check for system messages and perform the steps. After that:
- Check all connectors and cables for damage
- Check the power input
  Try to download the correct program by means of a SD card or through the serial interface.
- Check the signals to and from the component that is also involved in this trouble shooting search (if relevant)
- Check the component that is also involved in this trouble shooting search (if relevant)
- Check the signal flow from connector to connector. Some signals run straight from connector to connector.
- E.g. connector X1, pin 40 goes straight to connector X3, pin 3.

TO REPLACE THE IBP BOX / IBP INTEGRATED BOARD
- Disconnect power supply from the machine
- Disconnect the integrated panel from the weight tray.
- Remove the weight tray
- Remove the IBP Box.
- Disconnect all connectors.
- Mount the new IBP.

- Reapply all wiring.
- Ensure the green/yellow earth cable is applied on the central earth bracket.
- Do check if the module and IBP Box are back in their original state: screws, rings, wiring, etc. All items removed should be reapplied.
- Close and insert the IBP Box into the balancer
- Re-install the weight tray
- Reapply mains cable.
- Turn on The balancer.
- Perform the C code C86
- Check if the machine works fine.

4.15 CHECK OF VIBRATORY SYSTEM

✂ **:** Calibration rotor, electronic or spirit inclinometer
⌛ **:** 1h
ⓘ **:** Both bearings are bonded into place in the main shaft. In between the two positions the polygon ring is positioned.
It is not possible to replace the bearings or the polygon ring. Should any problems arise in that area, the only solution is replacing the complete main shaft.
To check the vibratory it is necessary to perform the service codes C59,C63, C64, C66, C71, C69, C71, C72, C74, C75, C103, C104 by using the test rotor.

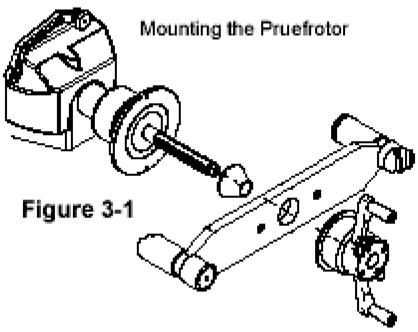


Figure 3-1

4.15.1 REPLACEMENT OF STEEL VPM VIBRATORY SYSTEM

✂ **:** 2,5, 5 and 6mm allen key, 17mm end key , Medium and big philip screwdriver all special tools, except the fork tools, from par.1.2 according to the model.
⌛ **:** 1,5h
ⓘ **:** Defective vibratory assembly may cause the following malfunctions:
1. After the balancing cycle the machine show error with module 29.
2. After the balancing cycle the machine show error 001-021.
3. After the balancing cycle the machine show error 001-022.
4. The balancer shows wrong balancing values.
5. The balancer chases weight.
6. The shaft shows excessive play.

SB **:** 525 WB, 555 WB, 611 WB, 646 WB

- Remove the flange or the balancing shaft from the balancer.
- Turn the machine off.
- Disconnect the power supply from the the machine.
- Remove the display panel.
- Remove the weight tray.
- Remove the camera (optima II and BFH 2000)
- Remove the laser from Vibratory assembly (optima II and BFH 2000)
- Remove the scanner from Vibratory assembly (Geo 6900 – 6900 2p, Optima, b9850p, b9855p, b9855 2p and BFH 1000).
- Disconnect the mechanical brake from the vibratory system, depending the model.
- Disconnect the flat cable of the opto-encoder, transducers and temperature sensor, if available, from connector X3 of the Controller Board or X2 of display board.
- Disconnect the motor cable (motor driven balancers).
- Remove the electromagnetic brake cable (electromagnetic brake balancers)
- Remove the rear transducer.
- Remove the three plastic plug from the cabinet to access to the hex vibratory assembly bolts.
- Using 1/4” drive 6mm hex head remove the six hex bolts to the vibratory. Pay special attention of spacer placement.
- Lift up on the vibratory member and remove. Be careful not to damage wiring, boards, etc.
- Lift and set vibratory member into the balancer housing. Be careful not to damage wiring, boards, etc.
- Insert spacers.

IMPORTANT! MAKE SURE THAT SPACERS ARE FORCED TO GO IN PLACE.

- Apply Loctite® to the hex bolts.

- With the aid of a helper start the two lower hex bolts.
- Install the 4 remaining hex bolts and make sure that the vibratory assy is properly levelled.

- Tighten firmly all the screws to 35Nm.
- Install the flat cable of the opto-encoder, transducers and temperature sensor, if still available.
- Plug in all connectors.
- Install the rear transducer.
- Install mechanical brake and follow mechanical brake installation.
- Install and adjust the camera (optima II and BFH 2000).
- Install laser (optima II and BFH 2000)
- Install the scanner to Vibratory assembly (Geo 6900 – 6900 2p, Optima, b9850p, b9855p, b9855 2p and BFH 1000).
- Install weight tray.
- Install control panel assmebly.
- Connect power and follow all calibration procedures C85 .
- Adjust the camera (optima II and BFH 2000) with C123.
- Accordingly to the model perform the calibration C122, C90 and test the unit.

4.15.2 REPLACEMENT OF THE ALLOY VIBRATORY SYSTEM

✂ **:** 2,5, 5 and 6mm allen key, 17mm end key , Medium and big philip screwdriver all special tools from par.1.2 according to the model.

⌛ **:** 1,5h

ⓘ **:** Defective vibratory assembly may cause the following malfunctions:

1. After the balancing cycle the machine show error with module 29.
2. After the balancing cycle the machine show error 001-021.
3. After the balancing cycle the machine show error 001-022.
4. The balancer shows wrong balancing values.
5. The balancer chases weight.
6. The shaft shows excessive play.

SB **:** 525 WB, 555 WB, 611 WB, 646 WB, 887 WB, 935, 1003 WB

- Remove the flange or the balancing shaft from the balancer.
- Turn the machine off.
- Disconnect the power supply from the the machine.
- Remove the display panel.
- Remove the weight tray.
- Remove the camera if available.
- Remove the laser if available.
- Remove the scanner or the laser pointer from Vibratory assembly if available.
- Disconnect the mechanical brake from the vibratory system, depending the model.
- Disconnect the flat cable of the opto-encoder, transducers and temperature sensor, if available, from connector X3 of the Controller Board or X2 of display board.
- Disconnect the motor cable (motor driven balancers).
- Remove the electromagnetic brake cable (electromagnetic brake balancers)

- Remove the rear transducer .
- Remove the three plastic plug from the cabinet to access to the hex vibratory assembly bolts.
- Using 1/4” drive 6mm hex head remove the six hex bolts to the vibratory. Pay special attention of spacer placement.
- Lift up on the vibratory member and remove. Be careful not to damage wiring, boards, etc.
- Lift and set vibratory member into the balancer housing. Be careful not to damage wiring, boards, etc.
- Insert spacers.
- With the aid of a helper start the two lower hex bolts.

- Install the 4 remaining hex bolts tighten to 25Nm and make sure that the vibratory assy is properly levelled.

- Install the rear transducer following 4.16
- Install all the cables.
- Install and adjust the camera with C123 if available.
- Install laser if available
- Install the scanner to Vibratory assembly if available.
- Install weight tray.
- Install control panel assmebly.
- Connect power supply and follow all calibration procedures C85 .
- Accordingly to the model perform the calibration C122, C90 and test the unit.
- Perform C115, C84, C88 and C90.

4.16 CHECK AND REPLACEMENT OF TRANSDUCERS ON STEEL VPM

✂ **:** 2,5, 5 and 6mm allen key, 17mm end key , Medium and big philip screwdriver, Scissors, Calibration rotor, dynamometric key.

⌛ **:** 1h each one

ⓘ **:** Defective piezo transducer may cause the following malfunctions:

1. The balancer shows error C10410.
2. The balancer shows error C10420.
3. The balancer shows error C10430.
4. The balancer shows error codes with module28
5. The balancer shows wrong balancing values.
6. The balancer chases weight.

SB **:** 965 WB

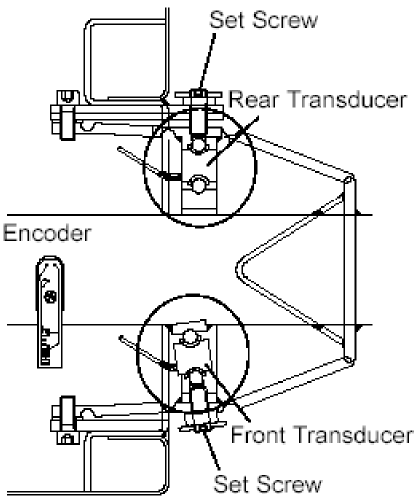
TO CHECK THE PIEZO TRANSDUCERS:

- Check with C64

- Check with C66
- Check with C104.
- Check with C103.
- Select the C75 and source AdE 2. "AdE 2" is read out for one second, then the voltage difference between the outputs of the unbalance signal amplifiers N4A and N4B is indicated. AdE 2 is the channel indicating the signal of transducer B3 located in the front. Normally, the readings are fluctuating around ± 0.005x volts.
- Standing in front of the balancer, push at the end of the main shaft repeatedly by hand and observe the readings.
  (Pushing at the flange will put inadequate force on the front transducer, since this plane is the pivot axis of the force guidance structure.)
  If there is no effect on the readings, the transducer is not connected properly.
  If the two wires are connected in the order intended, there is a minus sign as long you press. Pushing by hand, readings of 0.5xxx volts are easily obtained.
- In order to assess the relevant insulation resistance; do not touch the machine, just read theindicated voltage. With the transducer in the humid for several days, the insulation resistance can decline to less than 500 Meg Ohms. Insulation resistance of 500 Meg Ohms will produce 0.14 volts at the input of the analogue to digital converter.
- Press the minus key to select channel "AdE 1", transducer B2 in there is connected to, and repeat steps 3 and 4.

TO REPLACE THE PIEZO TRANSDUCERS:

- The transducers are held in place with setscrews and jam nuts.
- Disconnect the power from the rear of the machine.
- Remove the weight tray.
- Using a 2.5mm hex key remove the preload plate.
- Using a 17mm wrench loosen the jam nut.
- Using a 5mm hex key, back the set screw off by turning counter/clockwise.
  Do not lose the ball bearings on each end of the tranducers. These allow the transducer to center easily on the vibratory member.
- If the transducer is being replaced , the lead “+” is already signed on the wire with a black band. Cut the two wires at the transducer.



The transducer attached to wires 11 and 12 of connector X3 is placed in the front; that one attached to wires 15 and 16 is placed in the rear of the vibratory assembly.
To fit and mechanically pre-load a transducer, carry out the following steps:

- Insert the wires into the transducers: the cables with black band must be fitted on the positive lead.
- The two setscrews M10x1x29 with ball sockets (inverse cones) should be screwed into the vibratory plate of 20-mm thickness and the rigid support plate welded to the cabinet.
- Put some stiff grease in the recesses at both ends of the transducer.

Put balls of 8-mm Ø in the recesses.

- Insert the transducer in the jog of the vibratory plate with one of the balls contacting the indentation opposite the setscrew. Tighten the setscrew until the transducer is centred.
- Screw on the locknut M10x1 (17-mm across the flats), but do not tie up yet. At the rigid support plate, a nut M10x1 of 5-mm thickness, at the front with the slightly slant screw; a nut of 8-mm is used.

- Adjust the M10x1 screw, so that the transducer is held firmly but can be twisted easily using two fingers. Fasten the locknut. To prevent the setscrew to turn, hold it with the hexagon wrench 5-mm inserted.
- Put the steel leaf spring on the setscrew M10, with the counterpunch visible. Fasten it using two countersunk head screws M4.
  Drive in the screws M4, so that the leaf spring is in equal distance at both ends but not bend in the middle.
- While twisting the transducer with two fingers back and forth, fasten the screws M4 that an effect on slewability is felt.
- Align the leaf spring to be in parallel to the vibratory plate.
  The screws M4 have to be in the middle of the bores behind the leaf springs.
  Whatsoever, neither the screws M4 nor the leaf springs should touch the vibratory or support plate.
- Turn the transducer, so that the collar, protecting the cable connection, is pointing downwards (six a clock position).
- Pre-stress the transducer by turning both screws M4 by one revolution. Do so by turning the upper screw half a revolution, the lower a full and the upper a further half of a revolution.
- For the second transducer, repeat the steps.

The transducers replacement require the calibration with service codes C115, C84, C88 and C90.

4.17 CHECK AND REPLACEMENT OF TRANSDUCERS ON ALLOY VPM

✂ **:** 2,5, 5 and 6mm allen key, 17mm end key , Medium and big philip screwdriver, Scissors, Calibration rotor, Fork tools, dynamometric key.
⌛ **:** 1h each one
ⓘ **:** Defective piezo transducer may cause the following malfunctions:

1. The balancer shows error C10410.
2. The balancer shows error C10420.
3. The balancer shows error C10430.
4. The balancer shows error codes with module28
5. The balancer shows wrong balancing values.
6. The balancer chases weight.

SB **:** 887 WB, 935 WB 965 WB, 1003 WB

TO CHECK THE PIEZO TRANSDUCERS:

- Check following 4.16.

TO REPLACE THE PIEZO TRANSDUCERS:

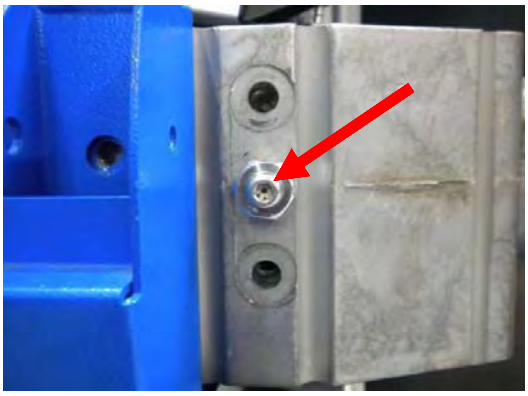
- Disconnect the power from the rear of the machine.
- Remove the weight tray.
- Using a 2.5mm hex key remove the preloading plate.

- Using a 17mm wrench loosen the jam nut.
- Using a 5mm hex key, back the set screw off by turning counter/clockwise. Do not lose the ball bearings on each end of the tranducers. These allow the transducer to center easily on the vibratory member.

- If the transducer is being replaced , the lead "+" is already signed on the wire with a black band. Cut the two wires at the transducer.
- The transducer attached to wires 11 and 12 of connector X3 is placed in the front; that one attached to wires 15 and 16 is placed in the rear of the vibratory assembly.

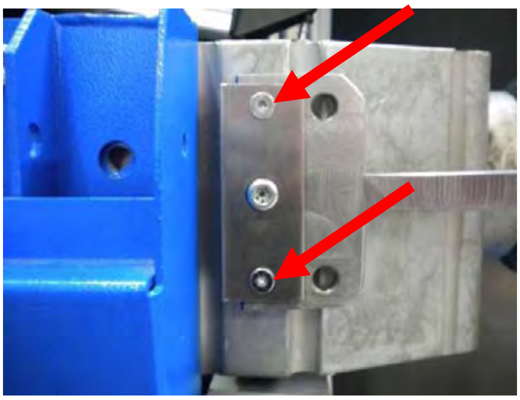
To fit and mechanically pre-load a transducer, carry out the following steps:

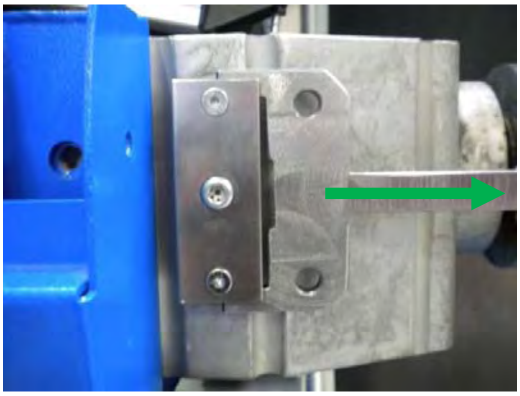
- Insert the wires into the transducers: the cables with black band must be fitted on the positive lead.
- The two setscrews M10x1x29 with ball sockets (inverse cones) should be screwed into the vibratory plate of 20-mm thickness and the rigid support plate welded to the cabinet.
- Put some stiff grease in the recesses at both ends of the transducer.
  Put balls of 8-mm Ø in the recesses.
- Insert the transducer in the jog of the vibratory plate with one of the balls contacting the indentation opposite the setscrew. Tighten the setscrew until the transducer is centred.
- Route the piezo transducers with leads downward to avoid any possible condensation concentration inside of the leads them selves.
- Screw on the locknut M10x1 (17-mm across the flats), but do not tie up yet.
- Tighten the M10x1setscrews at 0,4Nm shown by red arrow.
- Fasten the locknut. To prevent the setscrew to turn, hold it with the hexagon wrench 5-mm inserted.



TO ADJUST THE FRONT TRANSDUCER

- Use Fork tool EAM0092G36A 6,3mm thick
- Put the steel leaf spring on the setscrew M10, with the counterpunch visible. Fasten it using two countersunk head screws M4.
  Drive in the screws M4, so that the leaf spring is in equal distance at both ends but not bend in the middle.
- Put the **6,3 mm fork** spacer, between the spring plate and the vibratory system, then tighten thescrews (red arrows) at **0.4 Nm**, then remove the spacer.





Remark: The tightening torque is necessary to ensure the correct preload to the spring plate.

TO ADJUST THE REAR TRANSDUCER

- Use Fork tool EAM0092G35A 4,3mm thick
- Tighten the the M10x1setscrew at 0,5 Nm.

- Put the steel leaf spring on the setscrew M10, with the counterpunch visible. Fasten it using two countersunk head screws M4.
  Drive in the screws M4, so that the leaf spring is in equal distance at both ends but not bend in the middle.
- Put the **4,3 mm** spacer, between the spring plate and the cabinet. then tighten the screws (red arrows) at **0.6 Nm**, then remove the spacer.

Remark: The tightening force is necessary to ensure the preload of the spring plate.

- Turn on the machine.
- It is required to perform the following calibration steps: , C123, C122 C115, C84, C88 and C90 where required.
- Check if the machine works fine.
- Turn off the balancer.
- Mount the spring plates protection, where available.
- Mount the weight tray.

4.18 CHECK AND REPLACEMENT OF TEMPERATURE SENSOR

✂ **:** Medium and big philip screwdriver.
⌛ **:** 1h
ⓘ **:** Defective temperature sensor may cause the following malfunctions:
1. The balancer shows Error codes with module 27.

SB **:** 646WB

TO CHECK THE TEMPERATURE SENSOR

The temperature sensor is placed above of the rear transducer

- Select service code C57 and verify indication of current temperature and the voltage at connector X3 pin 13.
- If service code C57 is not available, use service code C75. Select "Ad3" to get the temperature dependant voltage. At 24 °C there are about 1.3 volts.

TEMPERATURE SENSOR REPLACEMENT

- Gently pull up the clip
- Hold the temperature sensor behind the hole in the clip, with the rounded side pointing outward.
- Stick the lip behind the 2 cm bridge and pull the clip open.
- Gently lower the clip and close it.
- Check that the flat side of the temperature sensor make proper contact with the steel bridge.

The temperature sensor replacement require the calibration with service codes C115, C84, C88 C90.

4.19 CHECK AND REPLACEMENT OF OPTOENCODER BOARD OF THE MAIN SHAFT

✂ **:** Medium and big philip screwdriver.
⌛ **:** 1h
ⓘ **:** Defective optoencoder board may cause the following malfunctions:
1. The balancer shows error codes with module 29.
2. The balancer shows error codes with module C10.
3. The balancer shows Error codes with module 27.
4. Machine shows E300
5. The wheel balancer shows 001021-0010022

SB **:** SB 525WB, 552WB, 596WB, 600WB, 611WB, 670WB, 669WB, 686WB, 850WB, 711WB, 880WB

TO CHECK THE OPTOENCODER BOARD

- Turn on the balancer.
- Check the encoder with service code C74, C54, C75

REPLACEMENT OF THE OPTOENCODER BOARD

- Turn the machine off.
- Disconnect power supply.
- Remove the weight tray.
- Disconnect the 10 Pin ribbon cable from the encoder PCB.
- Remove all dirt from the region where the Opto-electronic Encoder is positioned, preferably with a moisturized cloth.
- Remove the phillip screw holding the encoder PCB to the shaft tube.

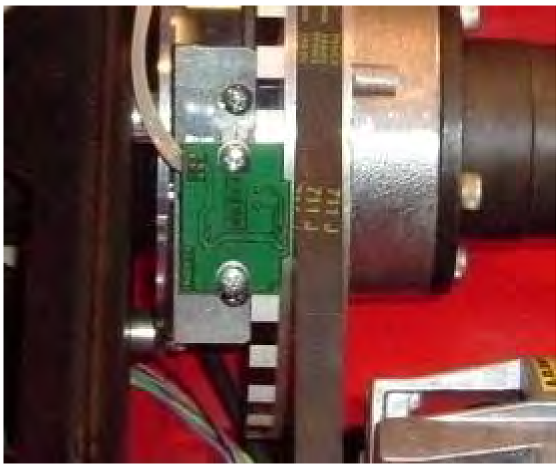
- Clean the encoder board lens
- Clean the polygon ring

NOTE: BE CAREFUL NOT TO LET FOREIGN DEBRIS FALL INSIDE THE TUBE.

IMPORTANT! THE NEW AND THE OLD OPTOENCODER ARE NOT INTECHANGEABLE EACH OYHER

- Install the encoder board.
- Apply again the plastic protection immediately.
- Connect Connector X10 (and if present X3) onto the Opto-electronic Encoder.
- Mount the weight tray.
- Perform service code C85.

4.20 CHECK AND REPLACEMENT OF ENCODER BOARD FOR POWER CLAMP



✂ **:** Medium and big philip screwdriver, 5mm allen key.
⌛ **:** 1h
ⓘ **:** Defective optoencoder board may cause the following malfunctions:

1. The balancer shows error codes with module 4A.
2. The balancer shows error codes with module 2A.
3. The balancer shows error codes with module 49.
4. The balancer shows error codes with module E14.

SB **:** SB 881WB

TO CHECK THE POWER CLAMP ENCODER BOARD

- Check the encoder with service code C98.
- Verify if the board sensors are at 1mm above the pulley
- Verify if the encoder sensor read the wider strip zone.
- Make sure that the cable and connection are fine
- Make sure that the optoencoder is well tightened.

TO REPLACE OF THE POWER CLAMP ENCODER BOARD.

- Disconnect power supply.
- Remove weight tray.
- Disconnect the 4 Pin ribbon cable from the optoencoder PCB.
- Remove the phillip screws holding the encoder board to the bracket.
- Install the new encoder board. It must be positioned at 1-mm above the pulley and have to read the small and wider strip zones.
- Connect the 4 pin ribbon cable to the encoder PCB.
- Turn on the machine.
- Perform C code C84.
- Check if the machine works fine.
- Mount the weight tray.

4.20.1 CHECK AND REPLACEMENT OF ENCODER BOARD FOR POWER CLAMP ON OPTIMA 2 AND BFH 2000

✂ **:** Medium and big philip screwdriver, 5 and 6mm allen key, Assy laser positioner.
⌛ **:** 2h
ⓘ **:** Defective optoencoder board may cause the following malfunctions:

1. The balancer shows error codes with module 4A.
2. The balancer shows error codes with module 2A.
3. The balancer shows error codes with module 49.
4. The balancer shows error codes with module E14.

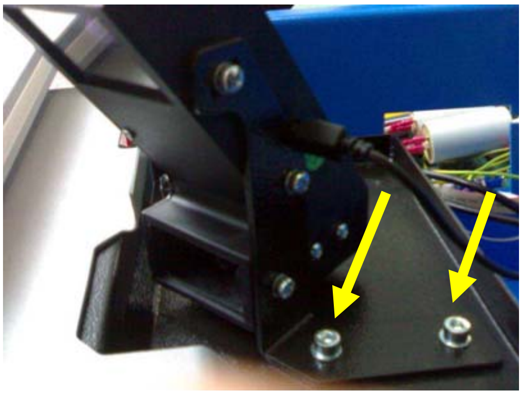
TO CHECK THE POWER CLAMP ENCODER BOARD

- See 4.22

TO REPLACE OF THE POWER CLAMP ENCODER BOARD

- Disconnect power supply.
- Remove weight tray.
- Remove the VPM plastic cover on Hofmann only

- Remove the screws that secure the camera to the balancer cabinet to access to the Optoencoder board.



- Disconnect the 4 Pin ribbon cable from the encoder PCB.
- Remove the phillip screws holding the encoder board to the bracket.
- Install the new encoder board. It must be positioned at 1-mm above the pulley and have to read the small and wider strip zones.
- Connect the 4 pin ribbon cable to the encoder PCB
- Secure again camera support to the cabinet
- Mount the VPM plastic cover.
- Mount the weight tray.
- Perform service code C123 to adjust the camera, C84 and C122.

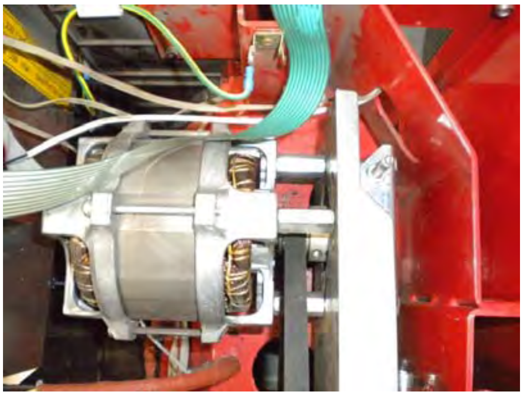
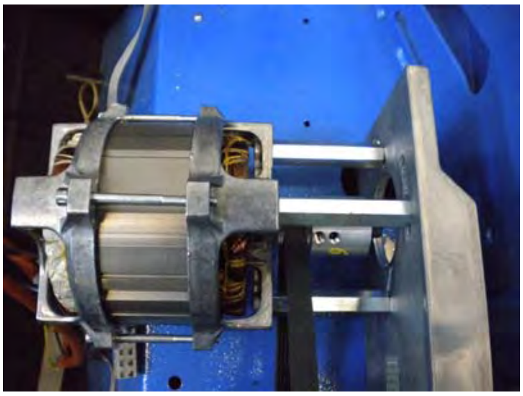
4.21 CHECK AND REPLACEMENT OF THE MOTOR

✂ **:** Medium and big philip screwdriver, 5 and 6mm allen key, 10 and 13mm end key.
⌛ **:** 1h
ⓘ **:** Defective motor may cause the following malfunctions:

1. The balancer is noisy.
2. The balancer shows E22.
3. The balancer shows error codes with module 49.
4. The balancer shows E23
5. The balancer shows E24
6. The balancer shows E25
7. The balancer shows E26

TO CHECK THE MOTOR

- Check for system messages with service code C28
- Turn off the balancer.
- Remove the weight tray.
- Check all connectors and cables for damage.
- Turn on the balancer.
- Check the power input with C55
- Check the belt tension with C110 on stell VPM only
- Turn off the balancer
- Disconnect power.
- Disconnect the power supply
- Disconnect motor wiring harness from the PCB.
- Remove the belt from the pulley.
- Plug the motor directly to power supply and turn it on to verify if it works.

TO REPLACE THE MOTOR

- Unplug the motor
- Remove the bolts securing the motor to the vibratory system.


- Remove the setscrew securing the motor pulley to the motor.
- Remove the pulley from the motor.

- Reverse procedure for installation.
- Using a pry bar, pry against the motor spacers to tighten belt.
- Turn on the balancer and check the belt tension with service code C111 on stell VPM only.
- Mount the weight tray
- Turn on the balancer.
- Check if the balancer works fine.

4.22 CHECK AND REPLACEMENT OF THE BELT

✂ **:** Medium and big philip screwdriver, 5 and 6mm allen key, 10 and 13mm end key.
⌛ **:** 1h
ⓘ **:** Defective belt may cause the following malfunctions:

1. The balancer shows E22.
2. The balancer shows E23
3. The balancer shows E24
4. The balancer shows E25
5. The balancer shows E26

TO CHECK THE BELT

- To check the belt perform the service code C111 on steel VPM only
- Check if the belt is worn out or damaged.

TO REPLACE THE BELT

- Remove or loosen the motor following 4.23.
- Remove from or position the belt over the main shaft pully.
- Proceed with the installation, mount the motor and adjust the tension of the belt.
- Connect the power to the machine
- Turn on the machine
- Check the belt tension with service code C111
- Mount the weight tray
- Mount the display panel, when available.

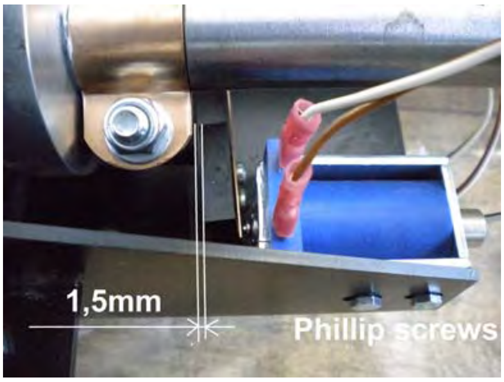
4.23 REPLACEMENT OF BRAKE SOLENOID

✂ **:** Medium and big philip screwdriver, 5 and 6mm allen key, 10 and 13mm end key.
⌛ **:** 1h
ⓘ **:** Defective solenoid brake may cause the following malfunctions:

1. Balancer does not brake the wheel.

TO REPLACE AND ADJUST THE BRAKE SOLENOID

Disconnect the power from the rear of the machine.



- Remove the Display panel
- Remove the weight tray.
- Disconnect wiring harness from the brake solenoid.
- Remove the two #2 phillip screws.
- Loosen the two phillip screws holding the brake pad and arm and move towards the brake band.
  The gap between the brake pad and brake band is 1/16”.
  Tighten the two screws holding the brake arm.
- Loosen the two phillip screws holding the brake solenoid in place.
- Slide the brake solenoid towards the brake pad until the solenoid plunger makes contact with the back of the brake pad, maintaining the 1/16 between the brake pad and the brake band.
- Tighten the two screws holding the solenoid and test the brake.
- Mount the weight tray
- Mount the display panel

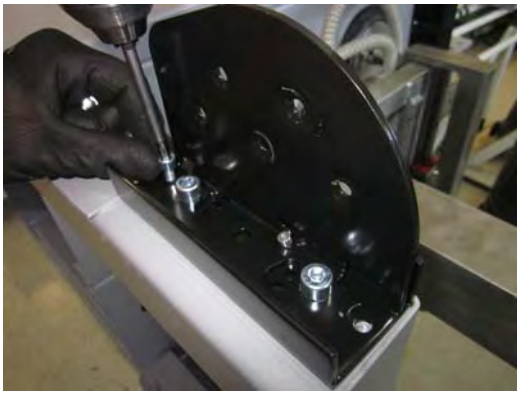
4.24 REPLACEMENT OF MECHANICAL BRAKE BOWDEN CABLE

✀ : Medium and big philip screwdriver, 5 and6mm allen key, 10 and 13mm end key.
⌛ : 1,5h
ⓘ : Defective mechanical brake cable may cause the following malfunctions:
1. Balancer does not hold the wheel in position.
2. The brake pads touch the motor pulley during the balancing cycle.

BS : 602WB

- Disconnect the power supply from the rear of the machine.
- Remove the Display panel, when available.
- Remove the weight tray.
- Disconnect the brake cable from the vibratory member.

- Make note of the location of the springs and washers.
- Lift the machine.
- Remove the two 5mm bolts holding the pedal to the frame.



- Pull out the pedal assy with the Bowden cable from the cabinet.
- Dismount the screws to separate the pedal from the pedal bracket.

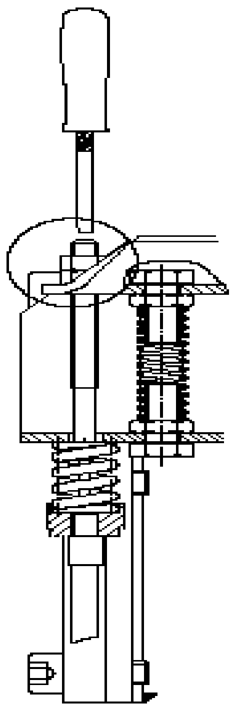
- Pull out the Bowden cable from the pedal


- Install the new Bowden cable on the pedal.
- Mount the pedal to the bracket.
- Pull in the Bowden cable through the protective flex tubing inside of the cabinet.


- Tighten the pedal assy to the cabinet.
- Install the nus on the Bowden brake cable without lock them
- Mount a standard 15” tire and wheel assembly.
- Using your foot apply pressure to the foot pedal assembly.
  Using a 10mm wrench hold the nut located at the top of the cable.
- Using a flatblade screwdriver turn the cable counterclockwise to apply tension to the brake or clockwise to loosen the brake.
- The cable is properly adjusted when the tire and wheel assembly has a little resistance.
- Lock firmly with the counter nut.
- Mount the weight tray
- Mount the display panel

4.25 REPLACEMENT OF SHAFT BRAKE BAND

✂ **:** Medium and big philip screwdriver, 5 and 6mm allen key, 10 end key.
⌛ **:** 1,5h
ⓘ **:** Defective mechanical brake cable may cause the following malfunctions:
1. Balancer does not hold the wheel in position.
2. The brake pads touch the motor pulley during the balancing cycle.



- Disconnect power.
- Remove Main PCB.
- Remove weight tray.
- Using a 1/2" socket remove the two self locking nuts and flat washers.
- Remove both brake bands.
- Apply a small amount of white lithium grease between the shaft and band before installing.
- Using a 15" tire and wheel tighten bands to where the tire and wheel assembly will stop after 1 1/2 to 2 revolutions after the brake kicks in.

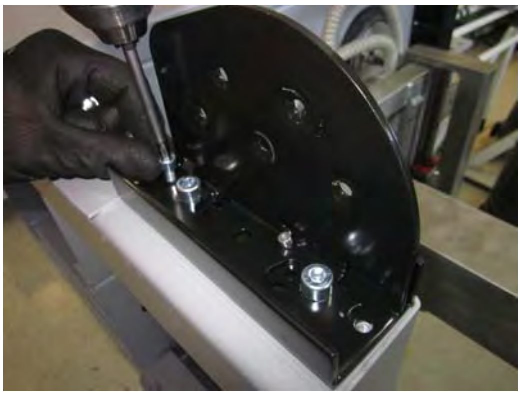
4.26 CHECK AND REPLACEMENT OF ELECTRIC BRAKE/CLAMPING PEDAL SWITCH

✂ **:** Medium and big philip screwdriver, 5 and 6mm allen key, 10 end key.
⌛ **:** 2h
ⓘ **:** Defective mechanical brake cable may cause the following malfunctions:
1. Machine does not clamp or unclamp.
2. Balancer show E89 turning it on.

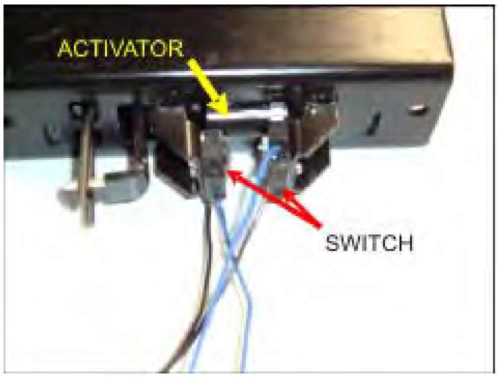
SB **:** 585WB

TO CHECK THE SWITCH

- Turn on the balancer and check the switches with service code C56.
- Remove the two screws securing the brake pedal assembly.
- Remove the weight tray.
- Remove the cover from the electronic box.
- Rotate either the microswitch activator or the micro switch on the brake pedal assembly until the circuit is open.
- Make sure that the circuit closes when the brake pedal is depressed or pressed.



TO REPLACE THE SWITCH



- Lift the balancer from the floor.
- Remove the defective switch from the pedal.
- Remove the weight tray.
- Release the switches wires inside of the cabinet.
- Cut the wires of the defective switch and connect them to those ones of the new switch.
- Pull out the new wires through the cabinet
- Remove the wires of the defective switch from the connector X2
- Install the new switche wires to the connector X2.
- Fit l the new switch on the pedal bracket.
- Fit the pedal assy to the balancer.
- Turn on the machine and check if the brake and the power clamp switches work fine.If the functions are reversed, reverse the wires on the connector X2.
- Mount the pedal assy.
- Mount the weight tray.

4.26.1 CHECK AND REPLACEMENT OF ELECTRIC BRAKE/CLAMPING PEDAL SWITCH ON GEODYNA 6900-2P AND B8955 – 2P

✂ **:** Medium and big philip screwdriver, 3, 5 and 6mm allen key, 10mm end key.
⌛ **:** 2h
ⓘ **:** Defective mechanical brake cable may cause the following malfunctions:

1. Machine does not clamp or unclamp.
2. Balancer show E89 turning it on.

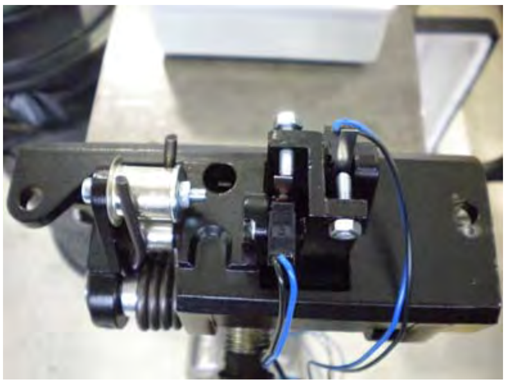
SB **:**

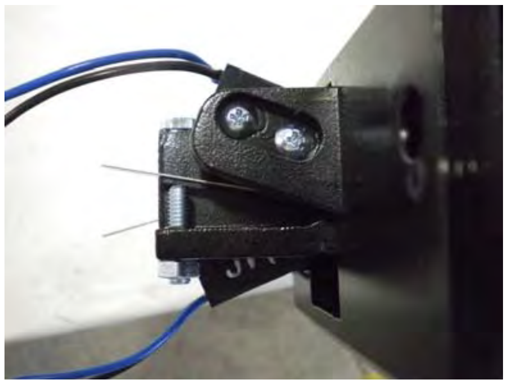
TO CHECK THE SWITCH

- Refer to 4.26 to check the switch.

TO ADJUST AND REPLACE THE SWITCH

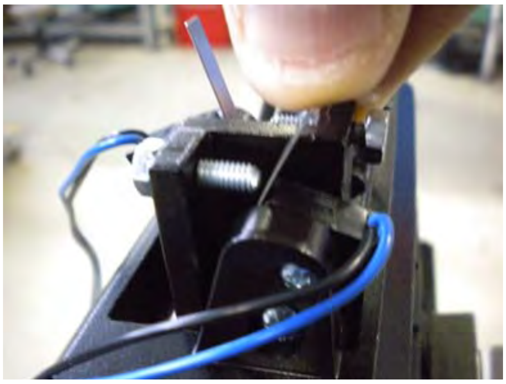
- Lift the balancer from the floor.
- Remove the defective switch from the pedal.



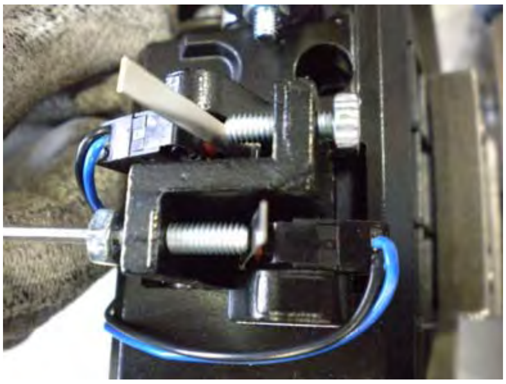


- Remove the weight tray.
- Release the switches wires inside of the cabinet.
- Cut the wires of the defective switch and connect them to those ones of the new switch.
- Pull out the new wires through the cabinet
- Remove the wires of the defective switch from the connector X2
- Install the new switche wires to the connector X2.
- Fit l the new switch on the pedal bracket.

➢ Check the adjustment of the switch by pressing the pedal until end of stroke: when the pedal is at the end of its stroke the micro switch must be engaged and still has to show some more stroke



➢ Unlock the 4mm set screw and adjust it until to have reached the correct adjustment.



➢ Fit the pedal assy to the balancer.
➢ Turn on the machine and check if the brake and the power clamp switches work fine.If the functions are reversed, reverse the wires on the connector X2.
➢ Mount the pedal assy.
➢ Mount the weight tray.

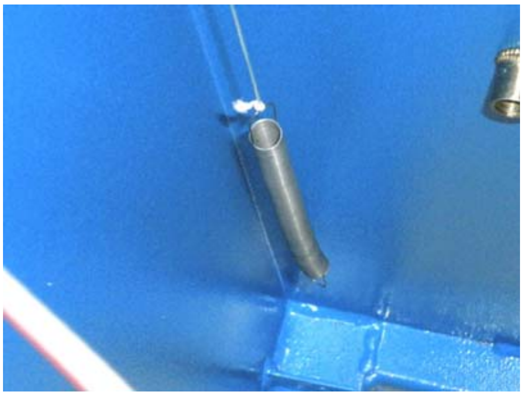
4.27 CHECK AND REPLACEMENT OF 1D SAPE / POTENTIOMETER

✂ **:** Medium and big philip screwdriver, 13 and 14mm end key.
⌛ **:** 1,5h
ⓘ **:** Defective potentiometer may cause the following malfunctions:
1. Machine shows error with module 44.
2. Balancer show E92 turning it on.

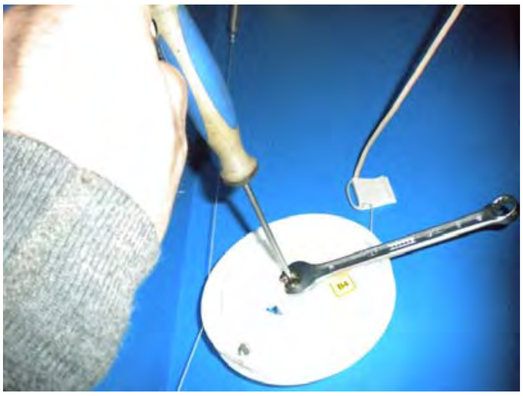
SB **:** 944WB, 735WB, 678WB

TO CHECK THE POTENTIOMETER
➢ Check with service code C75, C80 and C92

TO REPLACE THE POTENTIOMETER BOLTED TO THE CABINET
➢ Disconnect the power from the rear of the machine.
➢ Remove the Display panel.
➢ Remove the weight tray.
➢ Disconnect the 1D SAPE return spring from the lower base assembly.



- Remove the 10mm nut holding the SAPE wheel to the frame.
- Remove the 13mm nut holding the potentiometer to the frame.

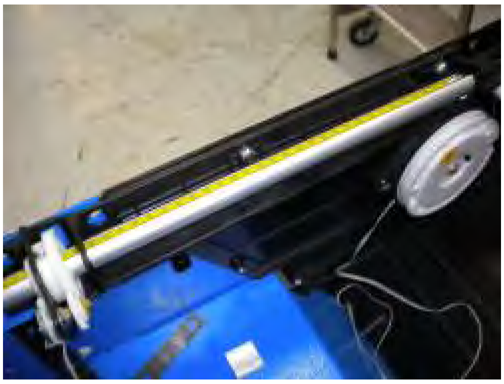


- Disconnect the defective potentiometer from the PCB board.
- Install 10K potentiometer onto bracket and tighten 13mm nut.
- Make sure to place the antirotational pin in the hole on the bracket.

- Install SAPE Wheel onto potentiometer shaft and hand tighten 10mm nut.
- Attach SAPE thread to return spring.
- Hook return spring to the lower base of the cabinet.
- Route SAPE thread over guide roller.
- Manually turn SAPE wheel counterclockwise and hold it into position.
- Loop SAPE thread around SAPE wheel and release the SAPE wheel.
  Test SAPE assembly by pulling on the SAPE arm to it's full out position several times. Make sure there is no binding.
- Plug in the balancer.
- Turn on the machine.
- Run C80, C81 and C90 for SAPE calibration.

TO REPLACE THE POTENTIOMETER BOLTED TO THE SAPE FRAME

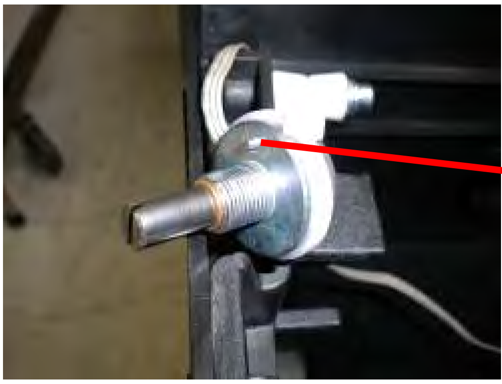
- Disconnect the power from the rear of the machine.
- Remove the Display panel.
- Remove the weight tray.
- Remove the 10mm nut holding the SAPE wheel to the frame.



- Remove the plastic wheel carefully in order to avoid the uncoil of the return spring.

- Remove the 13mm nut holding the potentiometer to the frame.
- Remove the conical bushing.

- Install 10K potentiometer onto bracket and tighten 13mm nut.
- Make sure to insert the antirotational pin into the hole on the rakcket.



- Insert the return spring into the plastic wheel slot.
- Install SAPE Wheel onto potentiometer shaft and hand tighten 10mm nut.
- Rotate counter clockwise to load the spring.

- Loop SAPE belt through the “auto lock” mechanism and attach the SAPE belt to the distance rod.
- Test SAPE assembly by pulling on the SAPE arm to it’s full out position several times. Make sure their is no binding.
- With the SAPE arm in the HOME position select service code C80.
- Hold the SAPE wheel firmly, using a flat blade screwdriver adjust the potentiometer referring to the paragraph of C code C80, C81 and C90.

4.28 CHECK AND REPLACEMENT OF DISTANCE POTENTIOMETER WITH LOCK DEVICE

✂ **:** Medium and big philip screwdriver, 13 and 14mm end key, 3mm allen key.
⌛ **:** 1,5h
ⓘ **:** Defective potentiometer may cause the following malfunctions:

1. Machine shows error with module 44.
2. Machine shows error with module 41.

3. Balancer show E92 turning it on.

TO CHECK THE POTENTIOMETER

- Check with service code C75, C80 and C92

TO REPLACE THE POTENTIOMETER

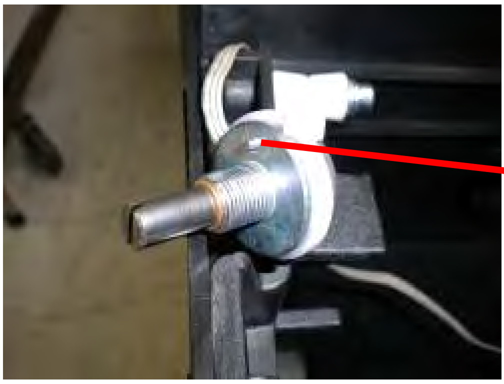
- Remove the Disconnect the power from the rear of the machine.
- Remove the weight tray.
- Disconnect the 1D SAPE belt from the distance rod.
- Remove the 10mm nut holding the SAPE wheel to the frame.

NOTE: DO NOT LET THE RETURN SPRING UNCOIL.

- Remove the 10mm nut holding the SAPE wheel to the frame.

- Remove the plastic wheel carefully in order to avoid the uncoil of the return spring.
- Remove the conical bushing.
- Remove the 13mm nut holding the potentiometer to the frame.

- Install 10K potentiometer onto bracket and tighten 13mm nut.
- Make sure to insert the antirotational pin into the hole on the rakcket.



- Install SAPE Wheel onto potentiometer shaft and hand tighten 10mm nut.
- Rotate counter clockwise to load the spring.

- Attach SAPE belt to the guide roller.
- Route SAPE belt over guide roller.
- Loop SAPE belt through the "auto lock" mechanism and attach the SAPE belt to the distance rod.
- Test SAPE assembly by pulling on the SAPE arm to it's full out position several times. Make sure their is no binding.
- Run service code C80, C81 and C90 for SAPE calibration.

TO REPLACE THE 10 TURNS DISTANCE POTENTIOMETER ON OPTIMA 2

- Disconnect the power from the rear of the machine.
- Remove the weight tray.
- Disconnect the 1D SAPE belt from the distance rod.
- Remove the 10mm nut holding the SAPE wheel to the frame.

NOTE: DO NOT LET THE RETURN SPRING UNCOIL.

- Extract the toothed SAPE wheel from the potentiometer by using gently a small screwdriver.

- Remove the 13mm nut holding the potentiometer to the frame..

- Install 10K 10 turns potentiometer onto bracket and tighten 13mm nut.
- Make sure about the correct direction of the potenziometer. An incorrect position will causa the breakage of the potentiometer.

- Install SAPE Wheel onto potentiometer shaft and hand tighten 10mm nut.
- Attach SAPE belt to the guide roller.
- Test SAPE assembly by pulling on the SAPE arm to it's full out position several times. Make sure their is no binding.
- With the SAPE arm in the HOME position select service code C80.
- Hold the SAPE wheel firmly, using a flat blade screwdriver adjust the potentiometer referring to the paragraph of C code C80
- Run service code C80, C81 and C90 for SAPE calibration.

4.29 CHECK AND REPLACEMENT OF DIAMETER SAPE POTENTIOMETER

✂ **:** Medium and big philip screwdriver, 13 and 14mm end key, 3mm allen key.
⌛ **:** 1h
ⓘ **:** Defective potentiometer may cause the following malfunctions:

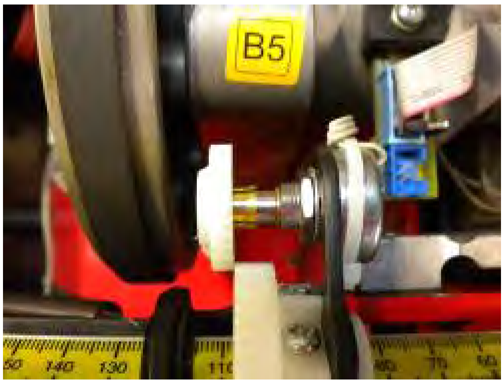
1. Machine shows error with module 44.
2. Machine shows error with module 41.
3. Balancer show E92 turning it on.

TO CHECK THE POTENTIOMER

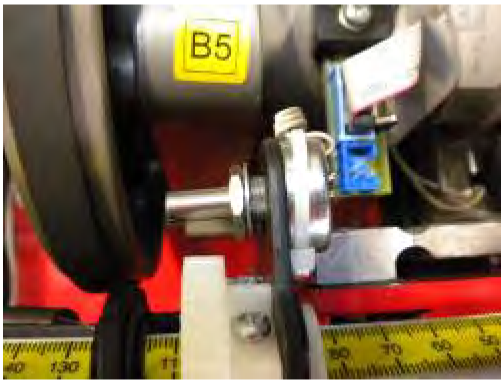
- Check with service code C75, C80 and C92

TO REPLACE THE POTENTIOMETER

- Disconnect the power from the rear of the machine.
- Remove the Display panel, when available.
- Remove the weight tray.
- Disconnect the 2D SAPE harness from X7 connector of the Processor Board.
- Remove the 10mm nut holding the SAPE wheel to the mounting bracket and slide the cog wheel off of the potetiometer shaft.
- Remove the conical bushing.



- Remove the 13mm nut holding the potentiometer to the frame.



- Install potentiometer onto bracket and tighten 13mm nut.
- Install cog wheel onto potentiometer shaft and hand tighten 10mm nut.

- Attach SAPE harness to Processor Board.
- Mount the display, when available

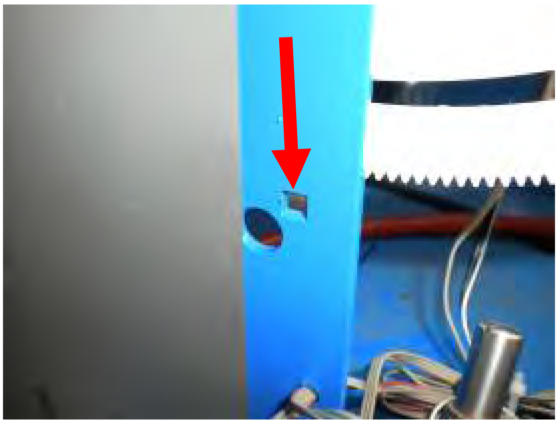
- Turn on the machine
- Run service code C80, C81 and C90 for SAPE calibration.
- Mount the weight tray.
- Check if the machine works fine.

TO REPLACE THE DIAMETER POTENTIOMETER ON M2 CABINET BALANCERS

- Unplug the machine from power supply.
- Remove the Display panel, when available.
- Remove the weight tray.
- Disconnect the 2D SAPE harness from from X7 connector of the Main Processor Board.
- Remove the 10mm nut holding the SAPE wheel to the mounting bracket and slide the cog wheel off of the potetiometer shaft.

- Remove the 13mm nut holding the potentiometer to the frame.

- Install 5K potentiometer onto bracket and tighten 13mm nut. Make sure to insert the potentiometer antitwist pin through the squared hole of the cabinet.



- Install cog wheel onto potentiometer shaft and hand tighten 10mm nut.

- Attach SAPE harness to X7 connector of Processor Board.
- Mount the display, when available
- Turn on the machine
- Run service code C80, C81 and C90 for SAPE calibration.
- Mount the weight tray.
- Check if the machine works fine

4.30 CHECK AND REPLACEMENT OF WIDTH POTENTIOMETER

✂ **:** Medium and big philip screwdriver, 13 and 14mm end key.
⌛ **:** 1h
ⓘ **:** Defective potentiometer may cause the following malfunctions:
1. Machine shows error with module 44.
2. Machine shows error with module 41.
3. Balancer show E3 turning it on.

TO CHECK THE POTENTIOMER
- Check with service code C75, C82

TO REPLACE THE POTENTIOMETER
- Disconnect the power from the rear of the machine.
- Remove the weight tray.
- Disconnect the 3D SAPE wire from the PCB box and gently pull the wire through the hood tube.
- Remove the three screws holding the top cover on the SAPE arm. Remove the three screws holding the bottom cover on the SAPE arm.
- Remove the 10mm nut holding the gear to the potentiometer.
- Remove the 13mm nut holding the potentiometer.
- Reverse procedure for installation.
- The potentiometer comes equipped with a standoff, insert the standoff into the hole in the housing.
- Reconnect all wiring.

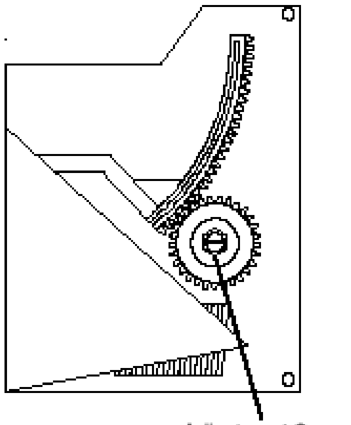


Figure 3-36

- With the Width SAPE arm in the home position program **C82**.
- Losen the 10mm nut and hold the gear.
  Using a flatblade screwdriver turn the potentiometer to a voltage reading of 4.35 ± .05VDC or greater than 0.15 when the tip of the SAPE is touching the backing collar.
- Run service code C82 and C90 for SAPE calibration.

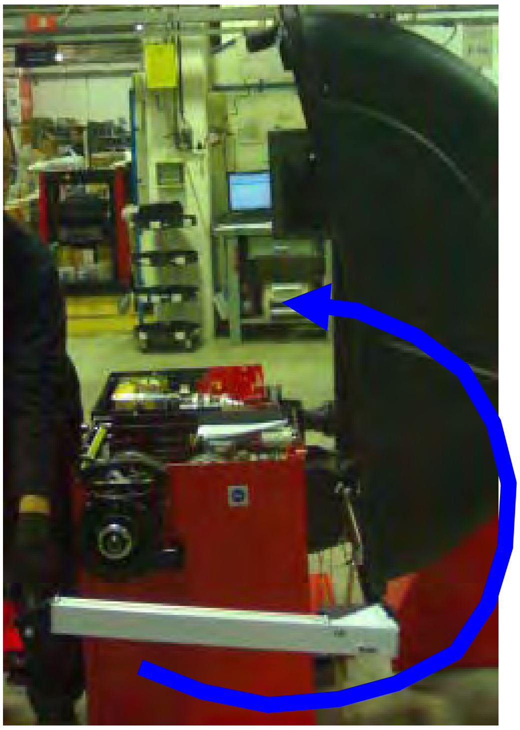
4.30.1 REPLACEMENT OF THE 3D SAPE ARM ON M2 CABINET.

✂ **:** Medium and big philip screwdriver, 10mm end key.
⌛ **:** 2h
ⓘ **:** Defective 3D sape may cause the following malfunctions:
1. Balancer show E3 turning it on.
2. Incorrect wheel width

- Unplug the power supply from the machine.
- Disconnect the potentiometer from the cable in the back of the machine.

- Remove the 4 screws to get the arm out.
- Remove the calliper finger from the sape arm.
- Mount the new 3D sape arm in horizontal position on its housing and lock the screws firmly.
- Turn 270° the 3D sape arm counter clockwise to load the spring.



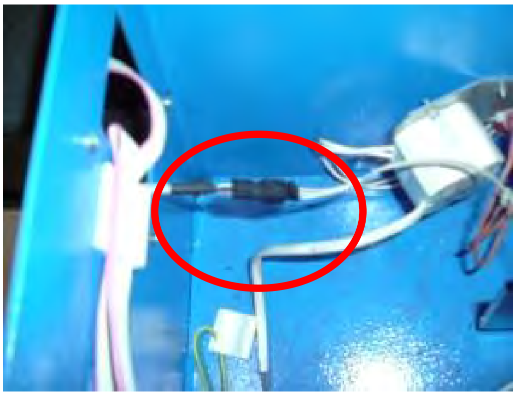
- Mount the calliper finger again to the sape arm.
- Connect the potentiometer to the cable in the back of the machine.
- Calibrate with C82 and C90.

4.30.2 REPLACEMENT OF THE 3D SAPE ARM ON L2 CABINET

✂ **:** Medium and big philip screwdriver, 10mm end key.
⌛ **:** 2h
ⓘ **:** Defective 3D sape may cause the following malfunctions:

1. Balancer show E3 turning it on.
2. Incorrect wheel width

- Unplug the power supply from the machine.
- Remove the weight tray.
- Remove the rear protection steel sheet.
- Disconnect the potentiometer from the cable inside of the machine.



➢ Remove the 6 screws, 4 on top and 2 more in the bottom, from the 3D sape arm holder

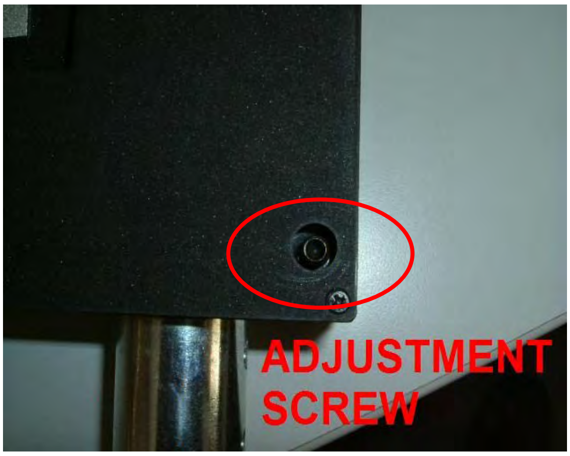
WHEN THE ARM HOLDER IS FREE HOLD IT FIRMLY TO AVOID ANY FAST ROTATION DUE TO THE SPRING PRELOADING.

- ➢ Remove the holder from the sap arm.
- ➢ Take the new arm and bolt it to the holder firmly.

- ➢ Make a complete turn of the arm hold to preload
- ➢ the spring.
- ➢ Insert the potentiometer wire through the wheel
- ➢ guard support and bolt on it the sape arm.
- ➢ Plug the potentiometer.
- ➢ Install the rear protection steel sheet.

4.30.3 TO ADJUST THE 3D SAPE ARM SYNCHRONIZATION ON BOTH VERSION

✂ **:** 4 mm allen key.
⌛ : 30’
ⓘ : Defective 3D sape adjustment may cause the following malfunctions:
1. Arm does not return in home position.



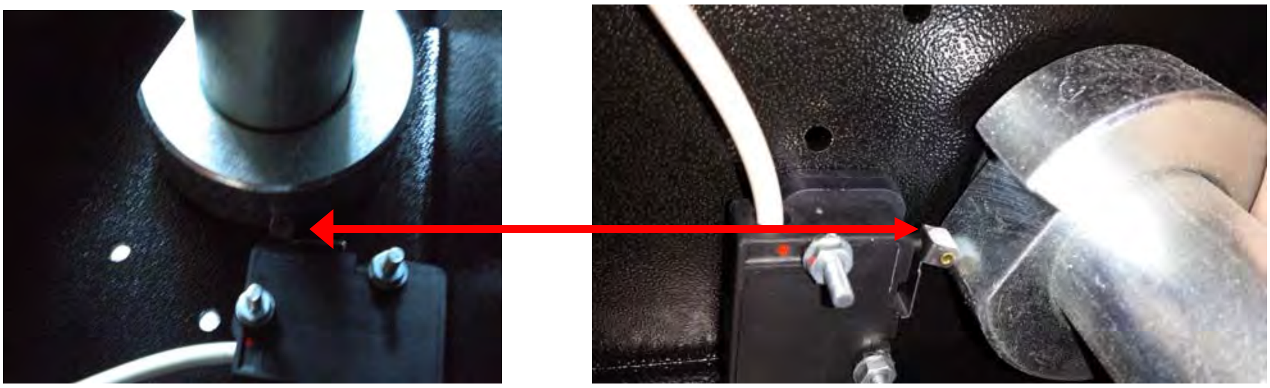
- Mount the proof rotor to the balancer.
- Take the proof rotor width with the 3D sape and release the arm in order to allow to it to return at home position itself without the help of the operator hands.
- In case it raises too fast turn unless return to home position, turn the adjustment screw counter clockwise to reduce the spring preloading.
- In case it raises to slow, turn the adjustment screw clock wise to increase the spring preloading.
- At the end of the adjustment calibrate with C82 and save with C90 where necessary.

4.31 CHECK AND REPLACEMENT OF HOOD SWITCH / CAM / SPRING

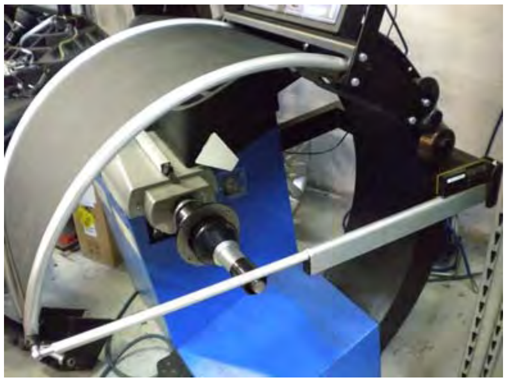
✂ **:** Medium and big philip screwdriver, 5mm end key, electronic inclinometer.
⌛ **:** 1h
ⓘ **:** Defective hood switch may cause the following malfunctions:
1. Lowering the wheel guard the wheel does not start.
2. The balancer shows E2

TO CHECK THE SWITCH
- Check with service code C56.

TO REPLACE THE SWITCH
- Disconnect the power supply from the back of the machine.
- Remove the weight tray.
- Disconnect the Hood Switch from the PCB and remove the wiring from the connector.
- Remove the cover plate from the wheel guard box.
- Remove the two (2) screws holding the switch to the wheel guard box.
- Install the new switch and route the wiring harness through the access hole.
- Install the wiring into the connector.
- Reverse procedure for installation.



- Select C code C56 and make sure that the switch is working properly.
- Check the proper inclination of the wheel guard when the value change from 0 to 1as follows: it must be not less than 2° and not higher than 5° on all standard wheel balancers, including the Geo 6900p and 6900 2p.



On b9850p, b9855p and b9855 2p, the switch must close the circuit when the wheel guard has an angle among 10° to 13°.

On the machine with sonar sensor (Geo 3900S, 4550S, 4650S, b9655p, BFH 600, BFH 500, Boxer S1750S), the switch must close the circuit when the wheel guard has an angle among 15° to 12°.

TO REPLACE THE SWITCH ON OPTIMA II

- Disconnect the power supply from the back of the machine.
- Remove the weight tray.
- Disconnect the Hood Switch from the IBP Board and remove the wires from the connector.
- Remove the rear sheet cover plate from the wheel guard box.
- Remove the plastic protection.
- Remove the defective switch and install the new one.
- Close the wheel guard and make sure to hear the click of the switch activation.
- Route the switch cable through the wheel guard box to the IBP board.
- Connect the wires to the connector and plug it to IBP box.
- Plug the power supply to the machine again and turn the balancer on.
- Select C code C56 and make sure that the switch is working properly. Check also that the value will change to 1 with an inclination of the wheel guard among 12° and 15°.
- Make sure that the switch lever is working without hit the switch body.
- If the switch will not work of if its lever is hitting the body, adjust the wheel guard stroke by modifying the adjustment of the rear absorber.
- Take the 18mm end key and unlock the counter nut.
- Turn the screw clockwise to reduce the switch stroke
- Turn the screw counter clockwise to increase the switch stroke.
- Take the electronic inclinometer and make sure that the wheel guard inclination is 10°.
- At the end of the adjustment mount the plastic protection.
- Mount the weight tray and check again with C code C56.

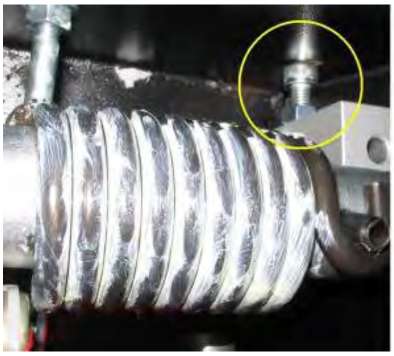
4.32 WHEEL GARD ADJUSTMENT (b9850p/ b9855p / b9855-2p)

✂ **:** Medium and big philip screwdriver, 5, 13mm end key, 6mm allen key
⌛ **:** 1h
ⓘ **:** Defective hood switch may cause the following malfunctions:

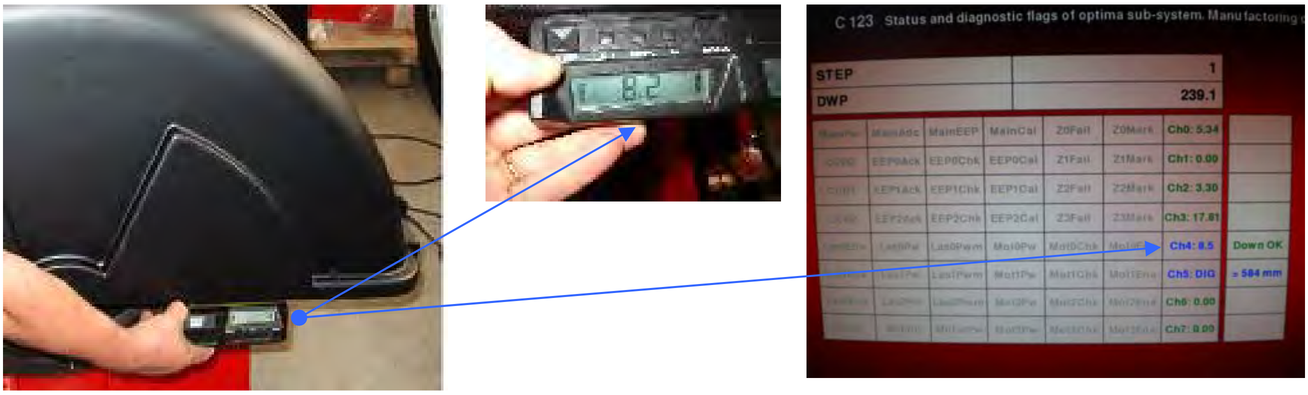
1. Lowering the wheel guard the wheel does not start.
2. The balancer shows E2
3. Machine shows H33
4. Machine shows H35
5. Machine take wrong rim data.

End-Stop positions adjustment

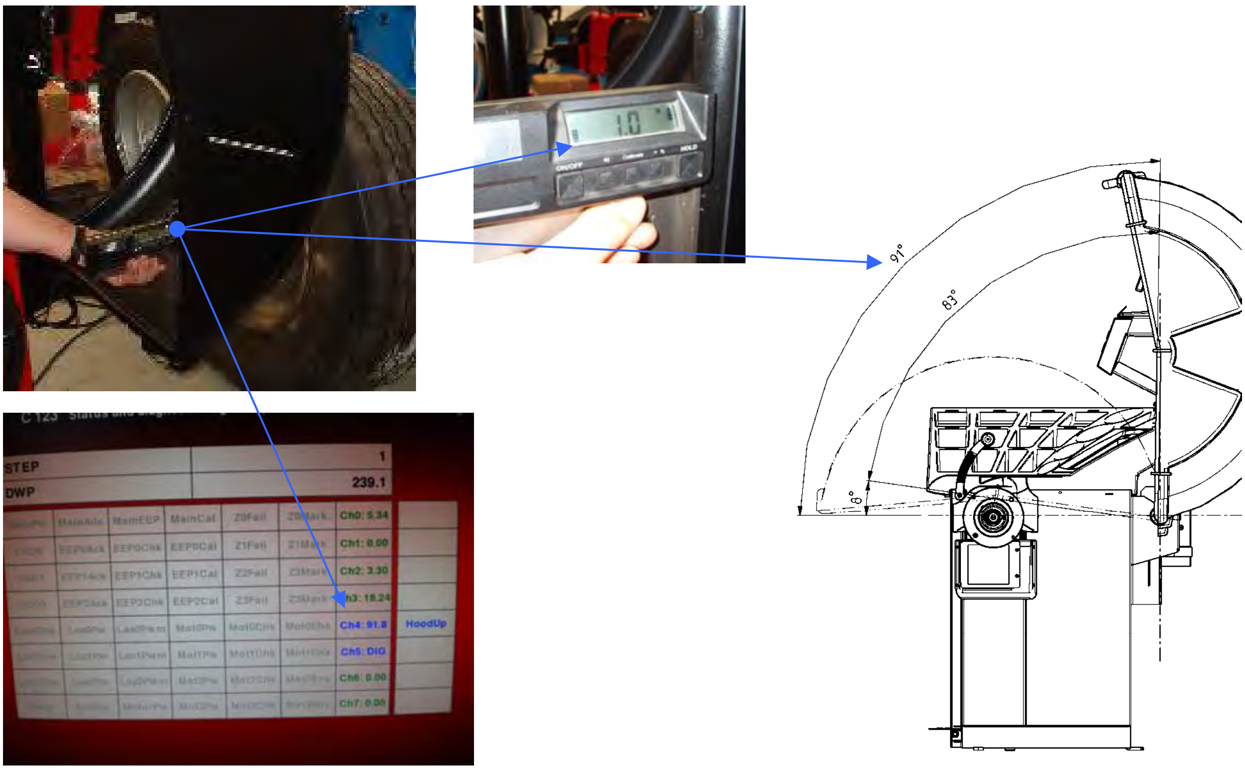
In order to calibrate the wheel guard you must operate on the screws shown below.
Referring to the wheel guard pipe angular position, adjust the end-stop positions to the following values.



- With the wheel guard completely lowered, the pipe should form an angle of 8º ± 1º with respect to the horizontal plane.In C123 Ch4 should show an angle of 8º ± 1º. The screen should show “HOOD DOWN”

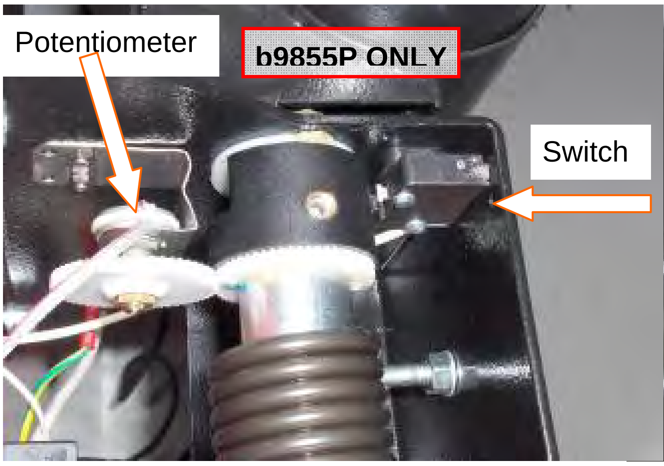


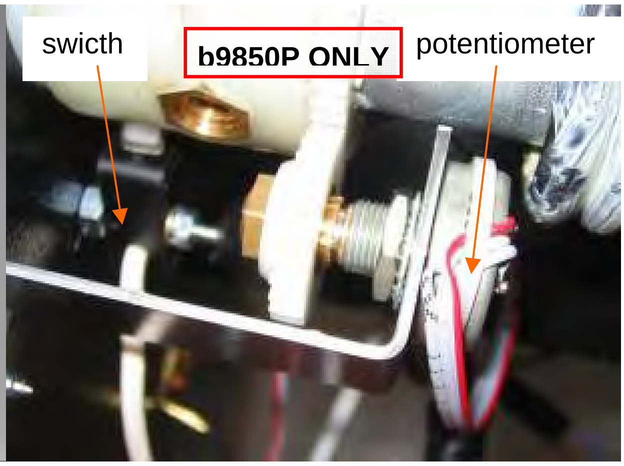
- With the wheel guard completely opened, the pipe should form an angle of 1° ± 1º with respect to the vertical plane (91° ± 1º with respect the horizontal one). In C123 Ch4 should show an angle of 91°± 1º. The screen should show “HOOD UP”.



Micro-switch wheel guard adjustment

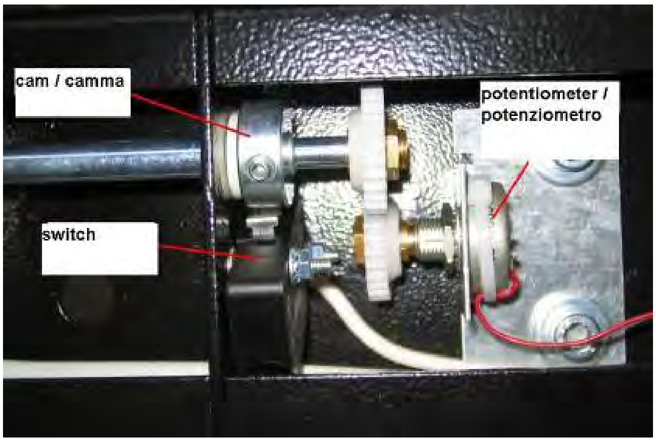
Regulate cam position, which acts on the micro-switch shown below, so that this one will close when the covering is almost totally closed. Check by using **C56** procedure. On the screen will appear 100 when the switch is closed.



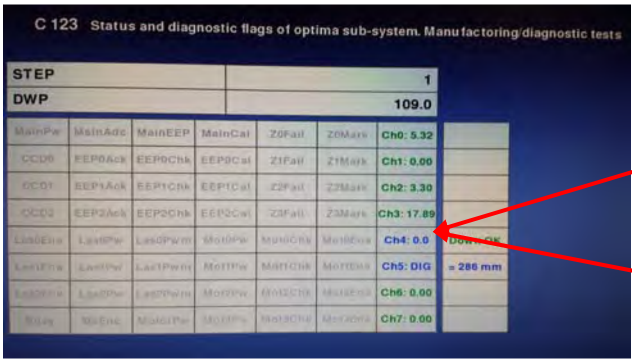


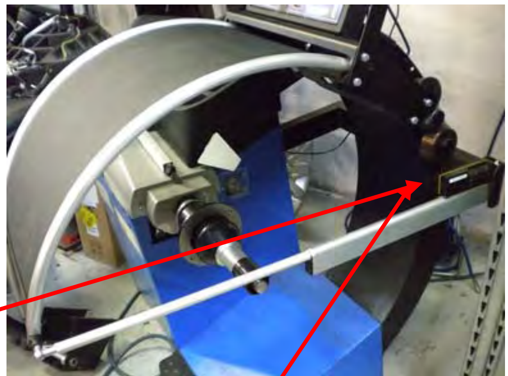
4.33 WHEEL GARD ADJUSTMENT (geodyna 6900p only)

Regulate cam position, which acts on the micro-switch, so that this one will close when the covering is almost totally closed. Check by using **C56** procedure. On the screen will appear 100 when the switch is closed.

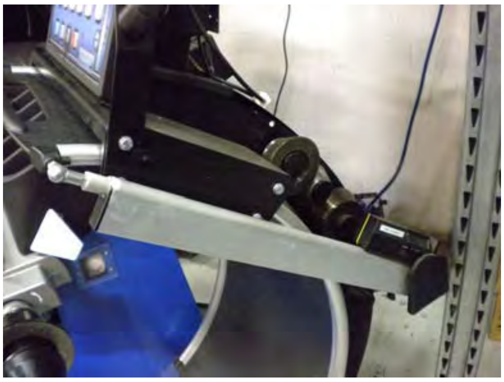


- With the wheel guard completely closed, the pipe should be at 0º ± 1º with respect to the horizontal plane. In C123 Ch4 should show an angle of 0º ± 1º. The screen should show “HOOD DOWN”.





- With the wheel guard completely opened, the pipe should form an angle of 1° ± 1º with respect to the
vertical plane (91° ± 1º with respect the horizontal one). In C123 Ch4 should show an angle of 35°± 1º. The screen should show “HOOD UP”.

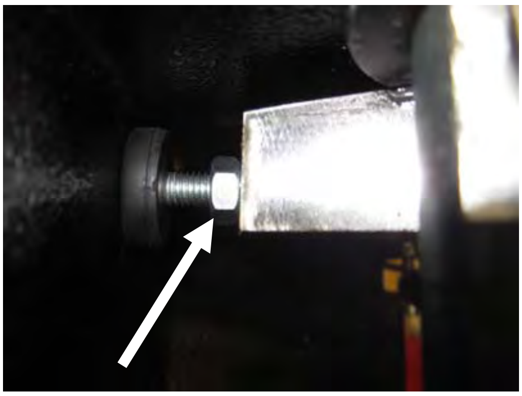


4.34 WHEEL GARD ADJUSTMENT (Geo 3900S, B9655S, S1750S)

To calibrate the wheel guard, lower completely the wheel guard and measure the inclination with an electronic inclinometer.

The inclination must be 15° +/- 1°

If necessary correct the inclination adjusting the bumper inside of the wheel guard pipe assembly.

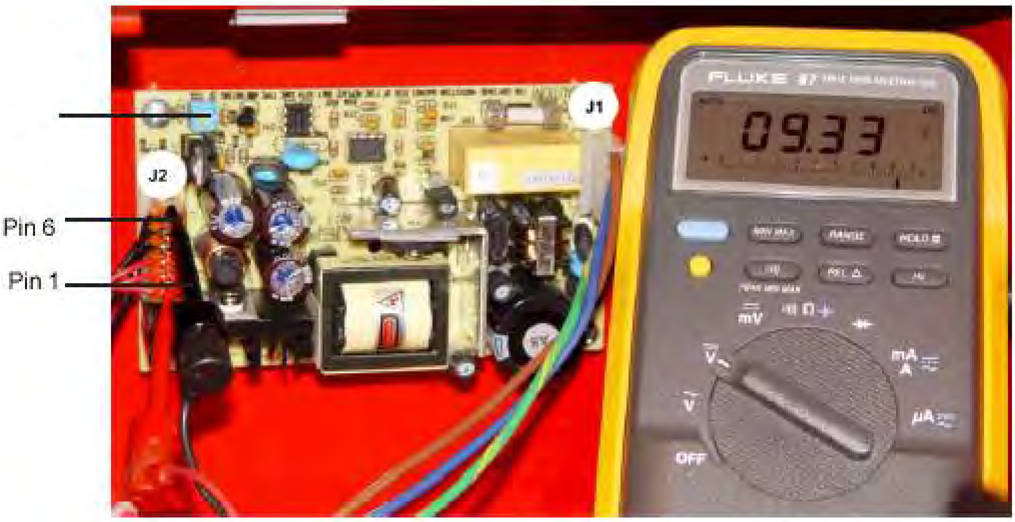


4.35 CHECK AND REPLACEMENT OF POWER SUPPLY PCB (All Touch Less models)

✂ **:** Medium and big philip screwdriver, 5mm end key.
⌛ **:** 1h
ⓘ **:** Defective power supply board may cause the following malfunctions:
1. Turning the machine on it works in manual mode only.
2. Turning the machine on several error 36X are displayed.

TO CHECK THE POWER SUPPLY BOARD

- The Power Supply PCB receives 230VAC power from the Electronic box.
- Turn off the balancer.
- Remove the weight tray or the rear cover of the wheel guard.
- Turn on the balancer.
- Take Digital Volt Meter and place the terminals at J1 pins 1 and 2 on the Power Supply PCB to check if there 230VAC.
- The AC power passes through onboard bridge rectifiers converting the power to 9 or 12VDC which is used to power all of the Scanner or camera Motors.
- This 9 or 12 VDC can be measured at J2 pins 1,2 and 3. Pins 4,5 and 6 are ground connections. This voltage must be adjusted after the installation of the Power Supply PCB. Follow the procedure below to measure and adjust the output voltage to the scanner motors.
- Check also in C123 in Ch3
- Remove the weight tray
- Place the positive lead of the Digital Volt Meter on Pin 1 (Red wire) and the negative lead of the Digital Volt Meter on Pin 6 (Black wire).
- Use a small pocket screwdriver and adjust the pot to obtain a voltage reading between 9 - 9.5 / 12-12,5 VDC.



TO REPLACE THE POWER SUPPLY BOARD

- Turn off the balancer.
- Disconnect the connectors from the power supply board.
- Remove the screws that secure the board to the cabinet.
- Install the new power supply board.
- Plug all cable to the board.
- Turn the balancer on and check if it works fine.

4.36 SCANNER / LASER / CCD

The OPTIMA is equipped with 3 Scanner assemblies. Each of these assemblies are installed and calibrated as complete assemblies. A role call is performed with each one on boot up. There are no serviceable components on these assemblies with the exception of the manufactures mechanical adjustments.
Each scanner assembly has a zero stop that has no adjustment. The rear scanner assembly and the

outside scanner assembly are identical and can be swapped. However, the inside scanner assembly has a different mounting bracket and cannot be interchanged with the other two assemblies. For troubleshooting purposes the units can be swapped at board level. Should any of these assemblies require replacement the balancer will flag an E360 error code and force a scanner calibration.

4.36.1 CHECK AND REPLACEMENT OF SCANNER, LASER, CCD

Should any of the scanner assemblies require replacement it will be necessary to make some mechanical adjustment before calibrating the unit (C83, 84, 88 and 122) and returning it to service. These adjustments should run parallel with the C123. **The ribbon cable that feeds the CCD must have some slack at the scanner assembly**. This can be tested by manually pressing on the scanner assemblies. A small amount of play is necessary and they should return to the home postion.

4.36.2 REPLACEMENT OF INNER SCANNER

✂ **:** Medium and big philip screwdriver, 5mm end key.
⌛ **:** 1,5h
ⓘ **:** Defective inner scanner may cause the following malfunctions:

1. Turning the machine on several error 36X are displayed.
2. At the of the balancing cycle the balancer shows all wheel data in red and it only select clip on weight modo.
3. The scanner does not work at all.
4. The balancer read incorrect offset and diameter data.
5. Balancer chases weight.

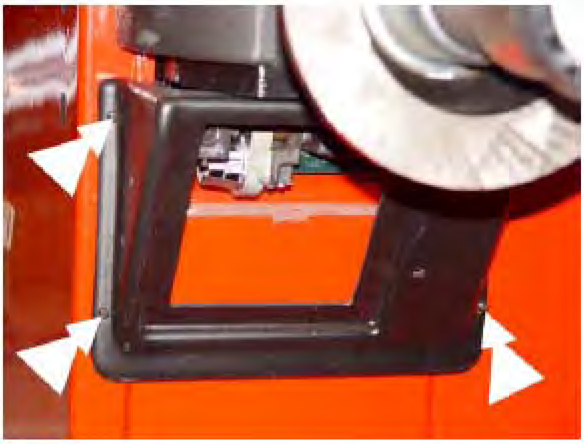
TO CHECK THE INNER SCANNER

- Go in C123 and check the data reported.
- Enable step 1 of C123 to check the laser working.
- Check if the laser is aligned with the cabinet.
- Check if the scanner touch the glass of the shield

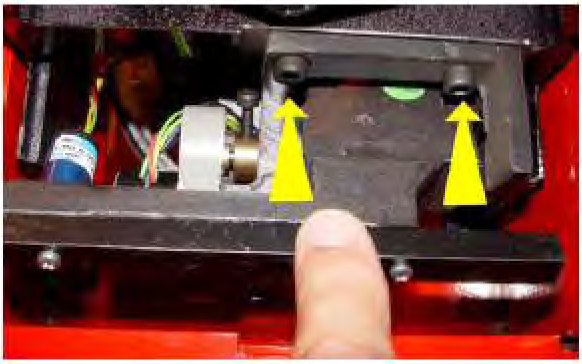
TO REPLACE THE INNER SCANNER

1. Power down the unit.

2. Remove the 4 phillip screws that secure the shield.



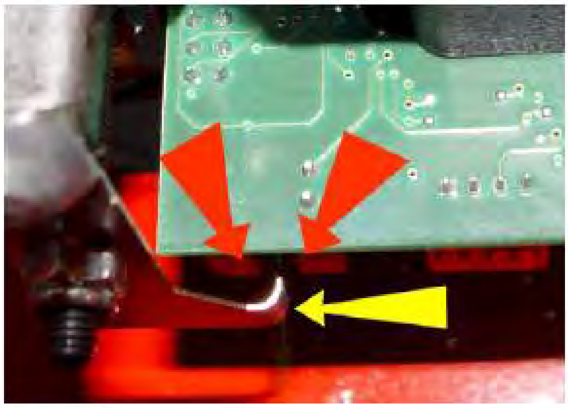
3. It may be necessary to manually swing the scanner assembly downward to access the bolts that secure the assembly to the vibratory.



4. Remove the two Socket Head Cap Screw that secure the assembly to the vibratory.
DO NOT DROP THE SCANNER ASSEMBLY.

5. Disconnect all cables and reverse this procedures for installation.

6. It may be necessary to adjust the “Home Reference Opto” tab for the laser to fall in the correct home position as shown in C123 step 1.



7. Manually adjust the tab (yellow arrow) upward or downward with help of the adjustment nut.
Making sure that the tab does not interfere with the opto switch (red arrows).
After each adjustment it will be necessary to reboot the unit and check the step 1 of C123.

NOTE: AFTER ANY CHANGES AND OR ADJUSTMENTS TO EACH OF THE 3 SCANNERS THE BALANCER MUST BE CALIBRATED WITH C122 AND C90. FAILURE TO CALIBRATE THE BALANCER WILL YIELD ERRORS.

4.36.3 OUTER SCANNER INSTALLATION

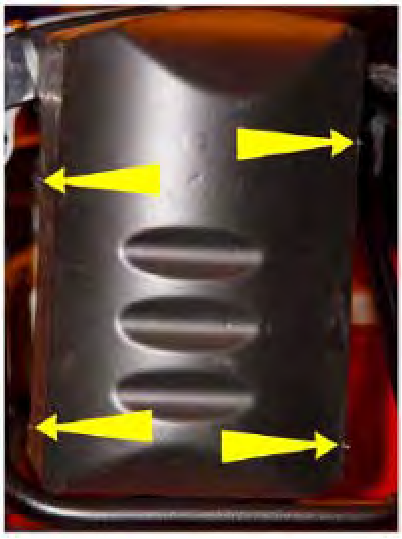
✂ **:** Medium and big philip screwdriver, 5mm end key.
⌛ **:** 1,5h
ⓘ **:** Defective outer scanner may cause the following malfunctions:

1. Turning the machine on several error 36X are displayed.
2. At the of the balancing cycle the balancer shows rim width data in red and it only select clip on weight mode.
3. The scanner does not work at all.
4. The balancer read incorrect rim width data.
5. Balancer chases weight.
6. Balancer reads incorrect rim type

TO CHECK THE OUTER SCANNER

- Go in C123 and check the data reported.
- Enable step 2 of C123 to check the laser working.
- Check if the laser is aligned in the middle of the balancing shaft.
- Check if the scanner touch the glass of the shield
- Check if the height of the scanner from the floor is corret.
- Check if the laser line is straight.

TO REPLACE THE OUTER SCANNER



1. Power down the unit.

2. Remove the 4 phillip screws that secure the shield.

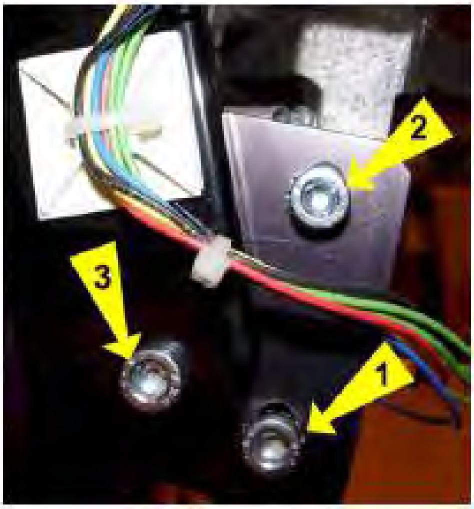
3. Disconnect all cable assemblies and reverse the procedure for installation.

NOTE: IF A CABLE IS REPLACED AND A ZIP TIE IS CUT OR SILICON ADHESIVE BOND IS BROKEN IT IS VERY IMPORTANT TO REINSTALL THESE SECURING FEATURES.

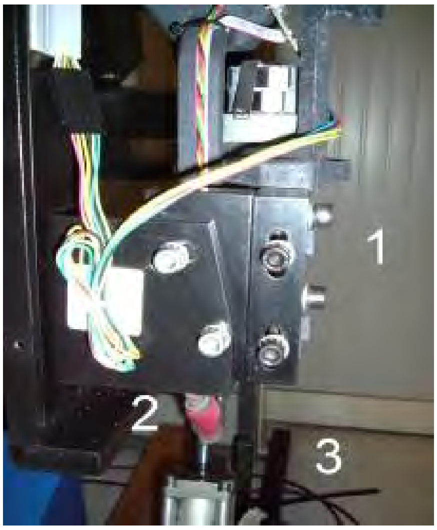
4. Firmly hold the scanner assembly and remove the 2 Socket Head Cap Screw (1and 2) that secure the scanner assembly to the hood frame.

5. Measure the distance from the ground to the center of the shaft and record this distance. Measure distance between the ground and the center of the adjustment screw signed (3). If the measurements are different the hood must be adjusted to match the two measurements.

OLD TYPE



NEW TYPE



4.36.4 HOOD ADJUSTMENT

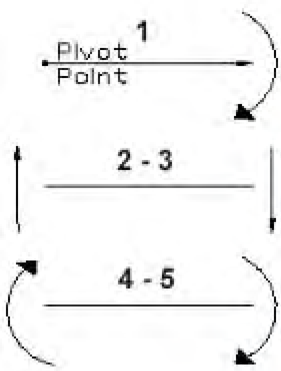
1. Loosen the Hex screw on the back side of the hood block. Loosen the jam nut (yellow). Using an 18mm wrench turn the adjustment screw (red) until while monitoring the height between the ground and the screw mentioned in step 5.

2. Mount a Pruefrotor on the balancer shaft and secure. Program the balancer for step 2 of C123.

OLD TYPE SCANNER

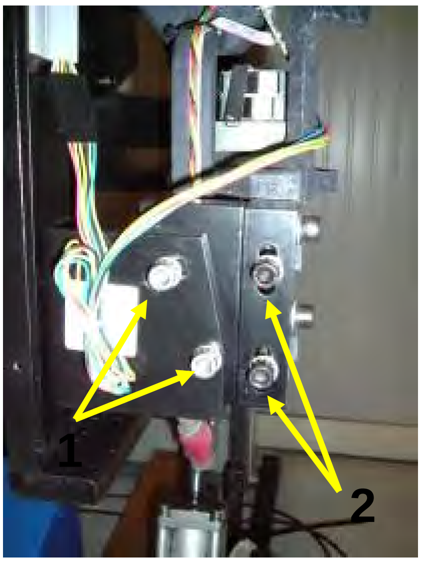
Verify that the laser light moves horizontally from left to right. The illustrations below show the direction that the laser line moves using the 5 adjustments screws. Each directionof movement can and will effect the other adjustments.

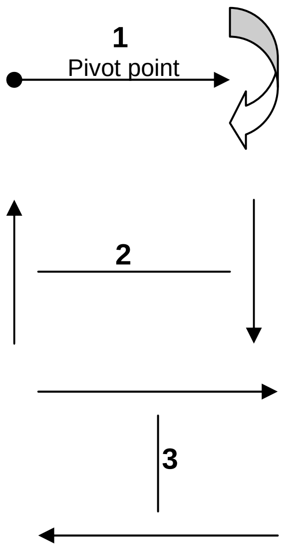
In most cases the number (1) adjustment screw is the only needed movement. Secure all screws.

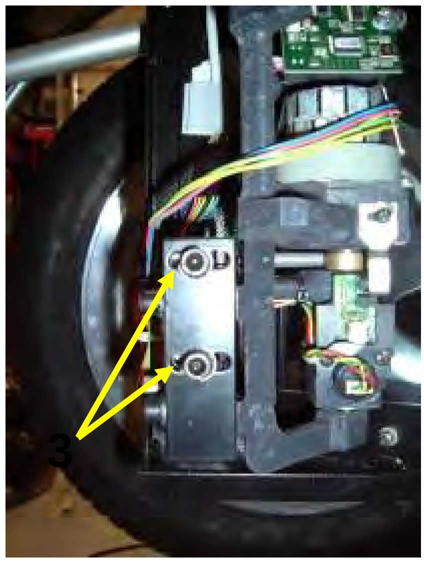


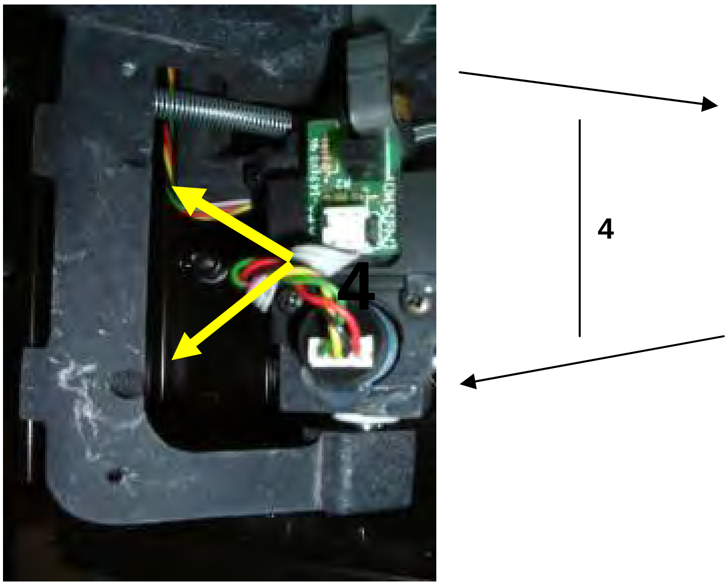
NEW TYPE SCANNER

Verify that the laser light moves horizontally from left to right. The illustrations below show the direction that the laser line moves using the 8 adjustments screws. Each direction of movement can and will effect the other adjustments.









8. If the number 1 adjustment screw does not bring the laser within specification it may be necessary to adjust all 5 adjustment screws. Before doing so it is recommended to level the scanner in two locations before any adjustments are made. Doing so will bring the scanner very close to specs and only a small amount of adjustment will be necessary. Level the scanner in the two locations indicated.

9. It may be necessay to adjust the zero stop of the laser. With the Pruefrotor mounted look at the stop point of the left side of the horizontal scan. The end of travel should be should hit the left side of the power clamp or just inside the power clamp.

10. ADJUSTMENT OF THE ZERO REFERENCE OF THE OUTSIDE SCANNER.

OLD TYPE SCANNER: Power down the unit. Remove the cover from the outside scanner. Slightly bend the zero reference tab left or right. The unit will need to be recycled each time an adjustment is made.

NEW TYPE SCANNER: Power down the unit. Remove the cover from the outside scanner and check again the adjustment of the point 7 (4.28.2). The unit will need to be recycled each time an adjustment is made.

NOTE: AFTER ANY CHANGES AND OR ADJUSTMENTS TO EACH OF THE 3 SCANNERS THE BALANCER MUST BE CALIBRATED WITH C122 AND C90. FAILURE TO CALIBRATE THE BALANCER WILL YIELD ERRORS.

4.36.5 REPLACEMENT OF REAR SCANNER

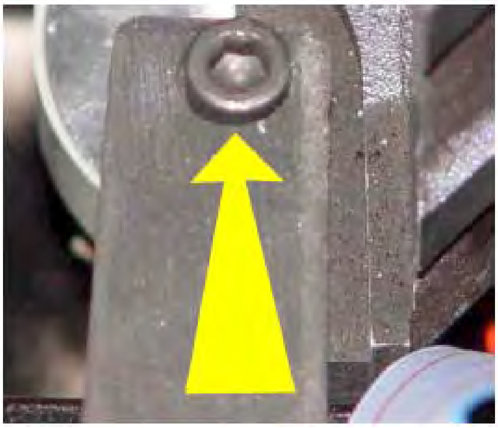
✂ **:** Medium and big philip screwdriver, 5mm end key.
⧗ **:** 2h
ⓘ **:** Defective rear scanner may cause the following malfunctions:
1. Turning the machine on several error 36X are displayed.
2. At the of the balancing cycle the balancer doe not show wheel run out.

TO CHECK THE OUTER SCANNER

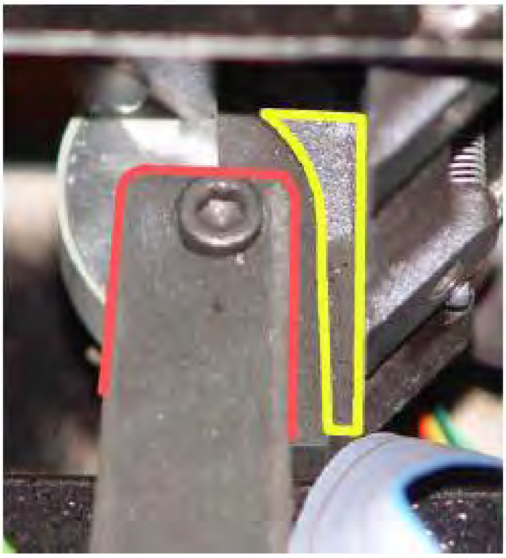
- Go in C123 and check the status.
- Enable step 3 of C123 to check the laser working.
- Check if the laser is aligned in the middle of the balancing shaft.
- Check if the scanner touch the glass of the shield
- Check if the laser line is straight.

OLD TYPE SCANNER

1. Remove the rear cover from the Slide Car.
2. Remove the philip screws from the scanner box.
3. Remove the front glass from the scanner box.
4. Remove the (1) Hex screw securing the scanner assembly and disconnect all wires.

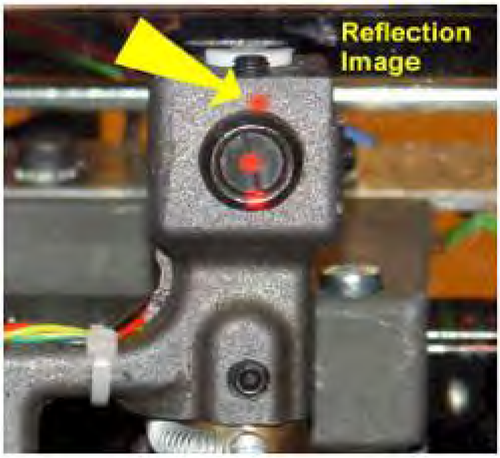


5. Special attention must be spent when installing the rear scanner assembly. The scanner bracket and the mounting bracket must be aligned parallel with each other.



6. Program step 4 of C123.

7. Look at the reflection of the laser back on the scanner. The reflection should come close to being on top of the original light source.

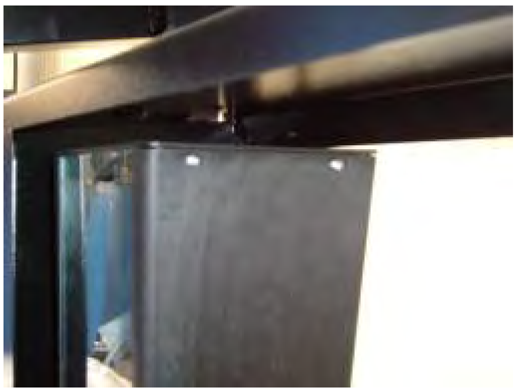


8. If the reflection is not close to being on top of the original light source power down the unit and remove the protection glass. Locate the opto switch and the zero reference tab. Bend the zero reference tab slighty and retest using step 4 of C123. The balancer must be rebooted each time an adjustment is made.

9. Install the protection glass onto the scanner box assembly.

NEW TYPE SCANNER

1. Remove the rear cover from the Slide Car.
2. Remove the 4 philip screws from top of the scanner box.

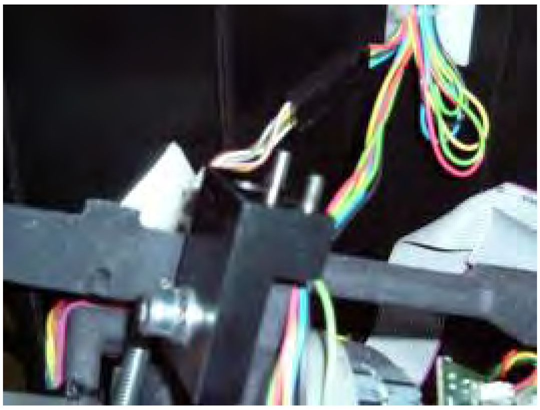


3. Remove with a screwdriver the top cover and the front glass:

PAY ATTENTION TO THE GLASS WHEN REMOVING THE TOP COVER BECAUSE IT MAY FALL AS SOON AS THE COVER WILL BE REMOVED.

4. Loosen the rear screw to remove the scanner assy.

5. Remove the support with the two reference roll pins from the old scanner and install it on the new one.
Mount the rear the new scanner on the sliding carriage.



6. Program step 4 of C123.

7. Install the protection glass and the top cover onto the scanner box assembly.

NOTE: AFTER ANY CHANGES AND OR ADJUSTMENTS TO EACH OF THE 3 SCANNERS THE BALANCER MUST BE CALIBRATED WITH C122 AND C90.
FAILURE TO CALIBRATE THE BALANCER WILL YIELD ERRORS.

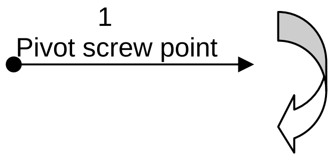
4.36.6 NEW REAR SCANNER CARRIAGE ALIGNEMENT ADJUSTMENT

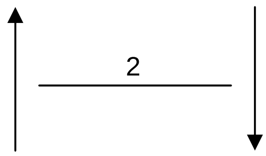
The scanner must move horizontally on its carriage from left to the right and the new rear scanner carriage allows some more adjustment compared to the old one as follows:

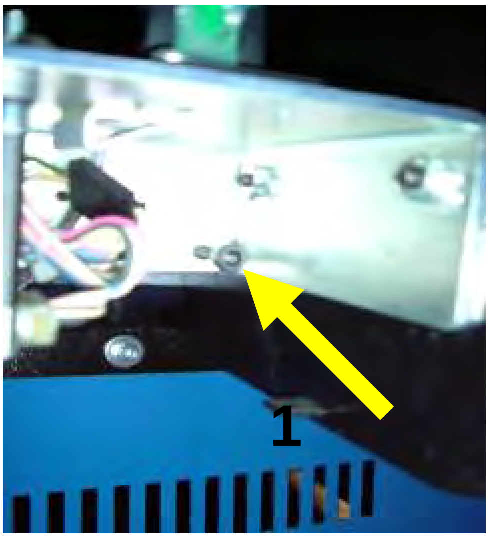
1. Loosen the lateral screws, two each side, shown by the arrows.

2. Make the adjustement following the the below illustrations
They shown the direction that the laser line moves using the 2 adjustments screws. Each direction of movement can and will effect the other adjustments.
3. Program step 4 of C123.

4. Look at the reflection of the laser back on the balancing shaft. The laser spot should come close to being on top of the original light source.







NOTE: AFTER ANY CHANGES AND OR ADJUSTMENTSTO EACH OF THE 3 SCANNERS THE BALANCER MUST BE CALIBRATED WITH C122 AND C90. FAILURE TO CALIBRATE THE BALANCER WILL YIELD ERRORS.

4.36.7 REAR SCANNER DRIVE BELT

The belt that drives the rear scanner inside the housing is a one piece cog belt. Over time the belt may be come hard and brittle and require replacement.

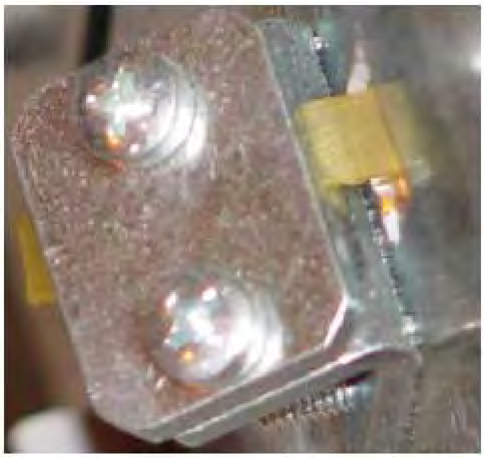
OLD TYPE

The belt will come as a single belt that needs to simply be cut. The rear scanner assembly moves across the back of the balancer using a drive motor mentioned earlier. The drive motor has a cog gear mounted that drives the scanner assembly.

1. Loosen the two Phillips sheet metal screws and remove the broken or damaged drive belt.

2. Remove the rear cover of the rear drive assembly.

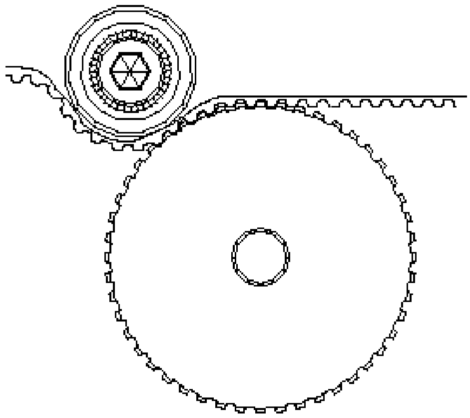
3. Using a pair of scissors cut the new drive belt and install the one end of the belt with the cog side facing down.



4. Feed the belt through the drive assembly. It may be necessary to loosen the motor to feed the belt through. Once the belt is installed lift up on the drive motor, this will tighten the belt and not allow it to slip off the gear drive.

5. Tighten each end that secures the belt. DO NOT OVER TIGHTEN THE SCREWS SECURING THE BELT, THIS MAY CUT THROUGH THE BELT.

6. Snip the remaining excess and retest the rear drive.

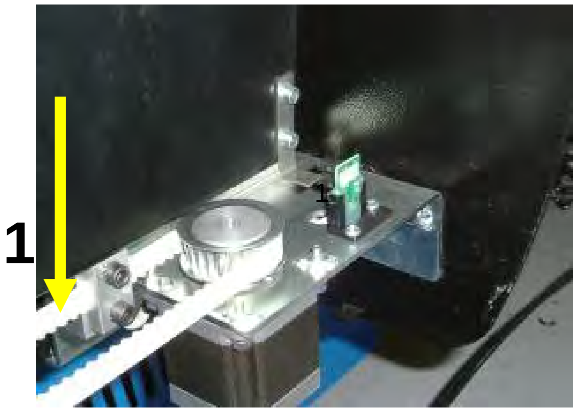


NEW TYPE

The belt will come as a single toothed belt. The rear scanner assembly moves across the back of the balancer driven by the belt installed on a drive motor and on a driven pulley system.

The replacement of the belt is very easy as follows.

1. Remove the screws (1) of the metal sheet that hold the rear scanner to the belt.



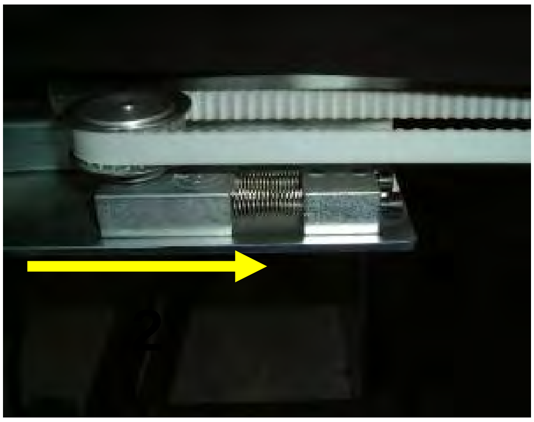
2. Push the mobile pulley support as shown by the arrow and remove the bad belt.

3. Install the new belt on the pulleys and make the belt tension will be automatically made again.

4. Lock firmly the scanner to the belt with the metal sheet

5. Retest the rear scanner.

6. Remount the rear cover.



4.37 CAMERA / LASER

The OPTIMA 2 and The BFH 2000 are equipped with 5 Cameras assemblies and 1 laser assembly. Each of these assemblies are installed and calibrated as complete assemblies. A role call is performed with each one on boot up. There are no serviceable components on these assemblies with the exception of the manufactures mechanical adjustments.
The laser and the rear camera assemblies have a zero stop that has no adjustment. All cameras assembly are identical and can be swapped. For troubleshooting purposes the units can be swapped at board level. Should any of these assemblies require replacement the balancer will flag an error code and force a camera calibration.

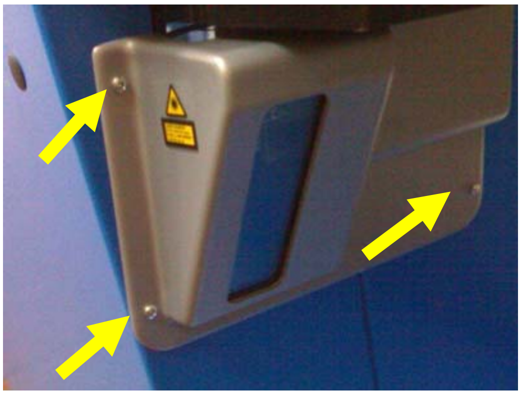
4.37.1 CHECK AND REPLACEMENT OF CAMERA, LASER

Should any of the camera assemblies require replacement it will be necessary to make some mechanical adjustment before calibrating the unit (C115, 84, 88 and 122) and returning it to service. The laser spot must run parallel to the cabinet with the C123. **The ribbon cable that feeds the Laser must have some slack at the laser assembly**. This can be tested with C123. A small amount of play is necessary and they should return to the home postion

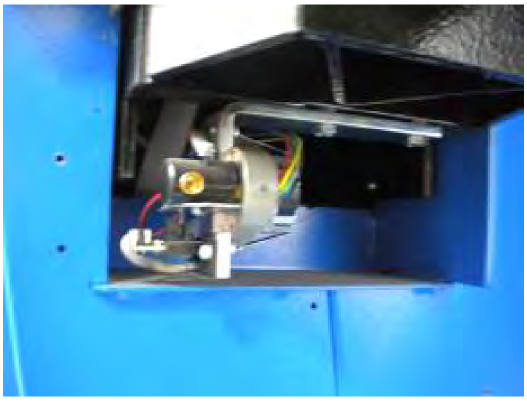
4.37.2 REPLACEMENT OF LASER POINTER ON OPTIMA 2 AND BFH 2000

✂ **:** Medium and big philip screwdriver, 5mm allen key, assy laser positioner.
⌛ **:** 1h
ⓘ **:** Defective laser pointer may cause the following malfunctions:
1. Turning the machine on several error 36X are displayed.
2. The laser does not work at all.

1. Power down the unit.
2. Remove the laser pointer protection.
3. Remove the cover behing the wheel guard (Optima 2 Only).
4. Disconnect the ribbon cable from J21 of the HUB board.
5. Disconnect the laser stepper motor cable from J18 of the HUB board.
6. Remove the 4 phillip screws that secure the shield.



7. Remove the two Hex Head Screws that secure the assembly to the vibratory.
DO NOT DROP THE LASER ASSEMBLY.

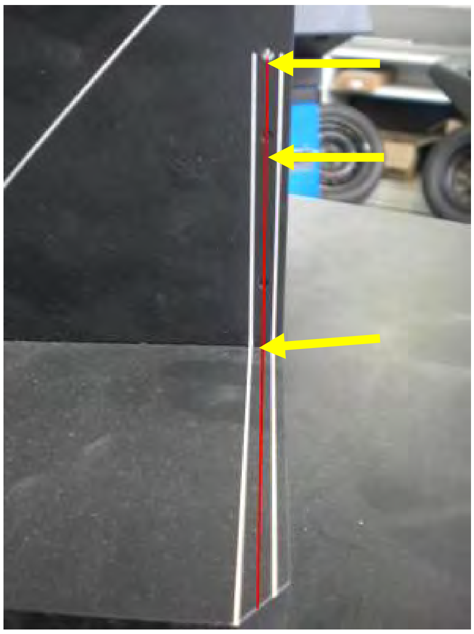


8. Install the new laser and tight the screws firmly.
9. Connect the ribbon cable to J21 of the HUB board.
10 Mount the laser shield.
11. Connect the laser stepper motor cable to J18 of the HUB board.
12. Turn the balancer on.
13. Mount the Assy Laser Positioner on the balancer with the laser reference toward the laser.

14. Select C code C123.
15. Level the Assy Laser Positioner and press the brake to lock it in position.

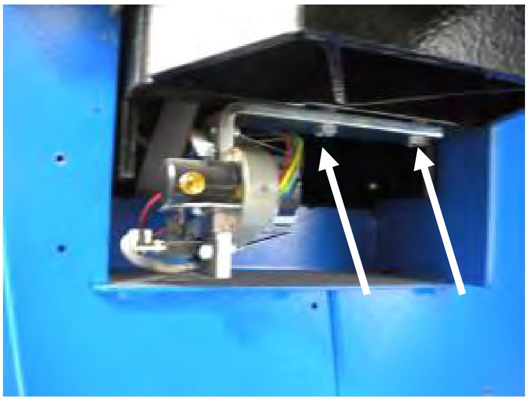
16. Enter “STEP 1” to turn on and move the laser.
17. Make sure that **the ribbon cable that feeds the Laser must have some slack at the laser assembly**.

18.Make sure that the laser beam is running within the reference lines of Assy Laser Positioner and, more important, make sure that the laser beam will cross the three notches shown by the arrows

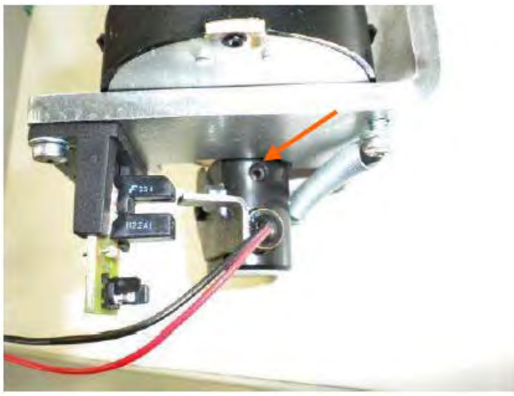


19. Make sure that when the laser stops, its spot will shoot into the Assy Laser Positioner top notch.

20. If not, loose a little the securing screws, to adjust the laser pointer.
Make sure that the beam remains between the two lines for all the stroke.



21. If the laser beam is still not parallel, loose the setscrew to proper adjust it.
Make sure that the beam remains between the two lines for all the stroke.



22. If the laser beam will nor match with the Assy Laser Positioner top notch, slightly bend the home position tab until to find the correct position.
23. Exit C123.
24 Remove the Assy laser positioner.
25. Turn off the balancer
26. Mount the laser pointer protection.
27. Check if the balancer works fine again.

4.37.3 REPLACEMENT OF THE INTERNAL CAMERA ON OPTIMA 2 AND BFH 2000

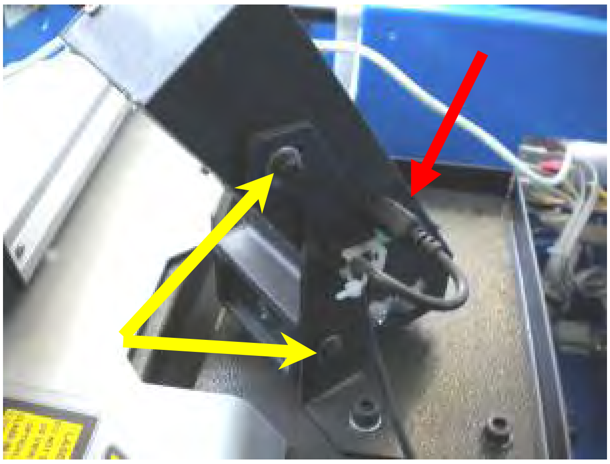
✂ **:** Medium and big philip screwdriver, 5mm allen key, assy laser positioner.
⌛ **:** 1h
ⓘ **:** Defective inner camera may cause the following malfunctions:

1. Turning the machine on several error 36X are displayed.
2. The balancer shows all rim data in red.
3. The balancer chases weight
4. The balancer takes rim offset and diameter incorrect..

1. Power down the unit.
2. Remove the 3 philip screws that secure the weight tray and remove it.

3. Unplug the USB cable, red arrow.

4. Remove the two philip screws, yellow arrows, that secure the camera without remove the holder.



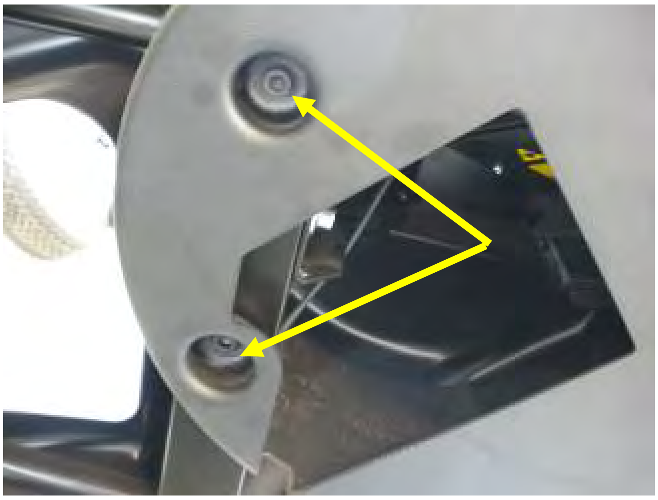
5. Install a new camera and plug the usb cable.
6. Mount the weight tray.
7. Turn on the balancer.
8. Change the operating mode of the balancer from “PROFILING” to “MANUAL”.
9. Perfor a couple of balancing spins.
9. Make the camera adjustment with C code C123.
10. Perform the camera calibration with C code C122.
11. Save with C90.
12. Change the operating mode of the balancer from “MANUAL” to “PROFILING”.
13. Check if the balancer works fine again.

4.37.4 REPLACEMENT OF THE EXTERNAL CAMERA ON OPTIMA 2 AND BFH 2000

✂ **:** Medium and big philip screwdriver, 5mm allen key, assy laser positioner.
⌛ **:** 1h
ⓘ **:** Defective external camera may cause the following malfunctions:
1. Turning the machine on several error 36X are displayed.
2. The balancer shows rim width data in red.
3. The balancer chases weight
4. The balancer takes rim width incorrect.

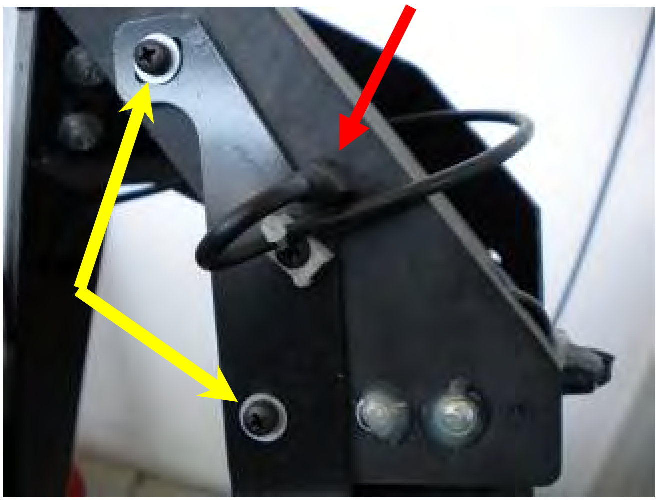
1. Power down the unit.
2. Remove the screws that secure the shield and remove the shield to access to the camera.

OPTIMA 2 SHIELD **BFH 2000 SHIELD**



3. Unplug the USB cable, red arrow.

4. Remove the two philip screws, yellow arrows, that secure the camera without remove the holder.



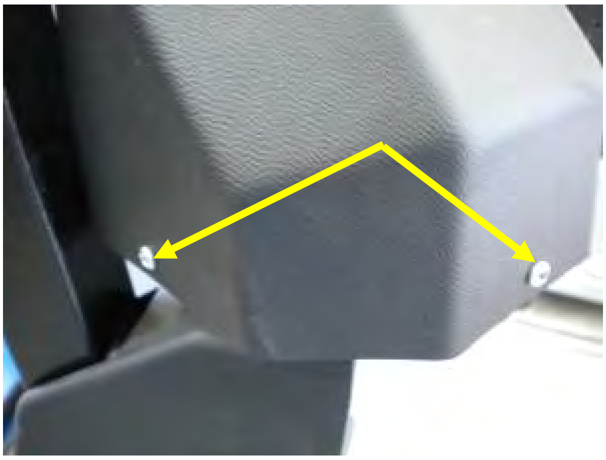
5. Install a new camera and plug the usb cable.
6. Turn on the balancer.
7. Change the operating mode of the balancer from “PROFILING” to “MANUAL”.
8. Perfor a couple of balancing spins.
8. Make the camera adjustment with C code C123.
9. Perform the camera calibration with C code C122.
10. Save with C90.
11. Change the operating mode of the balancer from “MANUAL” to “PROFILING”.
12. Install the shield again.
13. Check if the balancer works fine again.

4.37.5 REPLACEMENT OF REAR RIGHT AND LEFT CAMERAS ON OPTIMA 2 / BFH 2000

✂ **:** Medium and big philip screwdriver, 5mm allen key, assy laser positioner.
⌛ **:** 1h Each one
ⓘ **:** Defective rear camera may cause the following malfunctions:

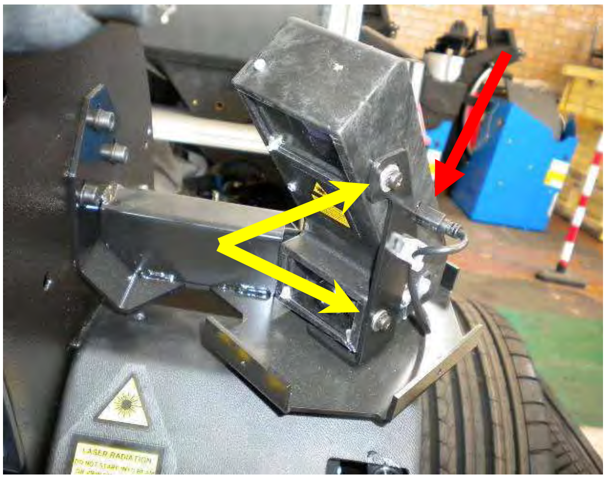
1. Turning the machine on several error 36X are displayed.
2. The balncer does not make the wheel radial run out.

1. Power down the unit.
2. Remove the screws that secure the shield and remove the shield to access to the camera.



3. Unplug the USB cable, red arrow.

4. Remove the two philip screws, yellow arrows, that secure the camera without remove the holder.



5. Install a new camera and plug the usb cable.
6. Turn on the balancer.
7. Change the operating mode of the balancer from “PROFILING” to “MANUAL”.
8. Perfor a couple of balancing spins.
8. Make the camera adjustment with C code C123.
9. Perform the camera calibration with C code C122.
10. Save with C90.
11. Change the operating mode of the balancer from “MANUAL” to “PROFILING”.
12. Install the shield again.
13. Check if the balancer works fine again.

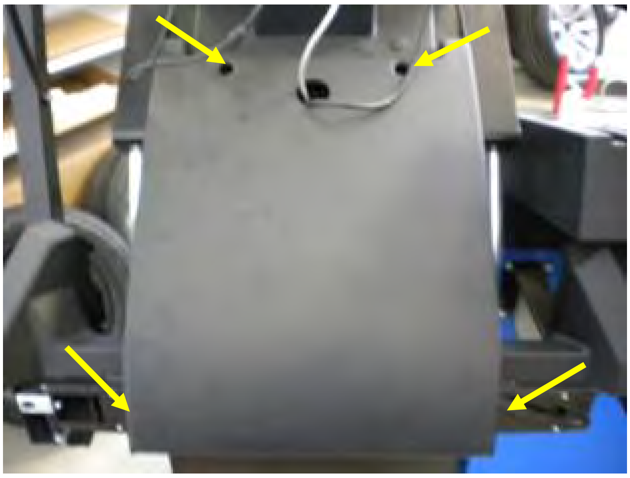
4.37.6 REPLACEMENT OF THE REAR CAMERA ON OPTIMA 2 AND BFH 2000

✂ **:** Medium and big philip screwdriver, 5mm allen key, assy laser positioner.
⌛ **:** 1,5h
ⓘ **:** Defective rear camera may cause the following malfunctions:

1. Turning the machine on several error 36X are displayed.
2. The balncer does not make the wheel radial run out.

1. Power down the unit.
2. Remove the screws that secure the rear cover and remove it to access to the camera.

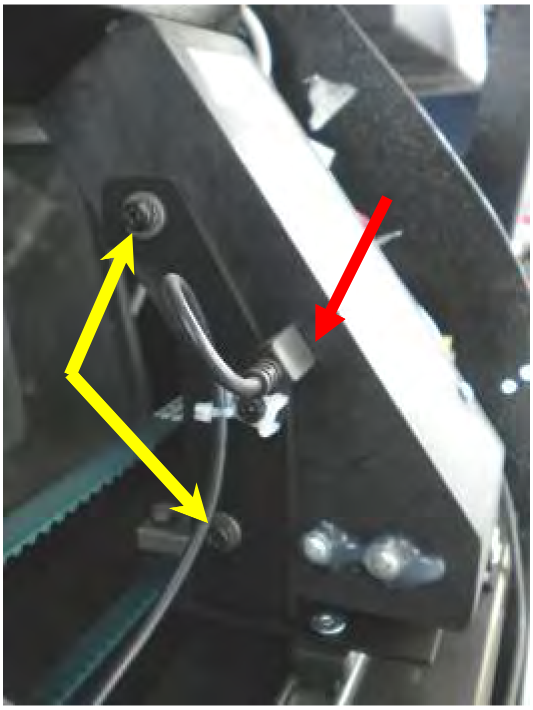
OPTIMA 2 COVER



BFH 2000 COVER

3. Unplug the USB cable, red arrow.

4. Remove the two philip screws, yellow arrows, that secure the camera without remove the holder.



5. Install a new camera and plug the usb cable.
6. Turn on the balancer.
7. Change the operating mode of the balancer from “PROFILING” to “MANUAL”.
8. Perform a couple of balancing spins.
8. Make the camera adjustment with C code C123.
9. Perform the camera calibration with C code C122.
10. Save with C90.
11. Change the operating mode of the balancer from “MANUAL” to “PROFILING”.
12. Install the cover again.
13. Check if the balancer works fine again.

4.37.7 REAR CAMERA DRIVE BELT REPLACEMENT

✂ **:** Medium and big philip screwdriver, 4 and 5mm allen key, 10mm end key, assy laser positioner.
⌛ **:** 1,5h
ⓘ **:** Defective rear camera carriage may cause the following malfunctions:
1. Turning the machine on several error 36X are displayed.
2. The balancer does not make the wheel radial run out.
3. Rear scanner does not move.

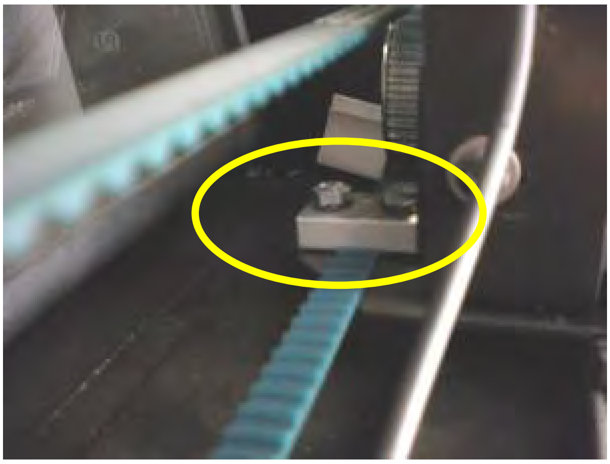
The belt will come as a single toothed belt. The rear camera assembly moves across the back of the balancer driven by the belt installed on a drive motor and on a driven pulley system.
The replacement of the belt is very easy as follows.

1. Remove the screws that secure the rear cover and remove it to access to the rear camera (see 4.30.6)

2. Lose the screws shown by the yellow arrows to release the bad belt.

3. Lose the two hex head screws and remove the broken or damaged drive belt.

4. Install the new belt on the pulleys and tight the screws firmly.



5. Complete the belt tension by sliding the driven pulley and then lock firmly the two set screws.
6. Retest the camera with C123.
7. Remount the rear cover.

4.38 SONAR SENSOR: CHECK AND REPLACEMENT

✂ **:** Medium and big philip screwdriver, 4 and 5mm allen key, 10mm end key, Touch less sensor calibration tool .
⌛ **:** 1,5h
ⓘ **:** Defective sonar may cause the following malfunctions:
1. The balancer shows H33 lowering the wheel guard.
2. The balancer shows incorrect rim with data.
3. The balancer chases weight.

TO CHECK THE SONAR ON TOUCHLESS BALANCERS

- Install the wheel on the balancer.
- Lower the wheel guard.
- Check with C123 the sonar status.

TO REPLACE THE OLD SONAR ON B9850P / B9855P

- Turn off the balancer.
- Remove the screws that secure the sonar protection.
- Disconnect the sonar cable.
- Remove the two bolts tha secure the sonar assembly to the wheel guard tube.

- Install the new sonar.
- Connect the cable.
- Install the protection.
- Perform the calibration C122
- Check if the machine works fine again

TO REPLACE THE NEW SONAR ON B9855 – 2P

- Turn off the balancer.
- Remove the screws that secure the sonar to remove the sonar from the wheel guard.

- Remove the screw that secure the sonar board cover to access to the inner board.
- Disconnect the sonar cable.

- Install the new board.
- Install the cover.
- Fit the sonar to the wheel guard.
- Perform C123 to make sure that sonar is working.
- Calibrate with C122.
- Check if the machine works fine.

TO REPLACE THE OLD AND NEW SONAR ON Geo 6900P / Geo 6900-2P

- Turn off the balancer.
- Remove the rear protection to extend the sonar cable.
- Remove the screw that secure the sonar protection.
- Disconnect the sonar cable.

- Disconnect the sonar cable.

- Remove the bolt that connect the wheel guard to the sonar arm to remove the sonar sensor.

- Mount the new sonar.
- Connect the cable.
- Secure it to the arm.
- Pull the sonar cable into the box behind the machine and mount the cover.
- Fix the sonar arm to wheel guard.
- Check if the wheel guard will open and close properly.

- Check if the sonar works fine in C123.
- Calibrate the sonar with C122.

TO CHECK THE SONAR ON Geo 3900S, B9655S, S1750S.

- Perform C82. If the value will not be stable afer hqaving reapited the step 2 3 times, the sonar is defective.

TO REPLACE THE SONAR ON Geo 3900S, B9655S, S1750S.

- Turn off the balancer.
- Remove the screws that secure the sonar protection.

- Remove the sonar board cover.
- Disconnect the sonar cable.

- Mount the new sonar.
- Connect the cable.
- Install the cover.
- Fix the sonar to wheel guard.
- Calibrate with C82
- Check if the machine works fine.

4.39 LASER POINTER (EXCEPT OPTIMA 2 AND BFH 2000): CHECK AND REPLACEMENT

✂ **:** Medium and big philip screwdriver, 5mm allen key.
⌛ **:** 1h
ⓘ **:** Defective laser pointer may cause the following malfunctions:

1. Turning the machine on several error 36X are displayed.
2. The laser does not work at all.
3. Lase shoot the dot in one point only.

TO CHECK THE LASER POINTER

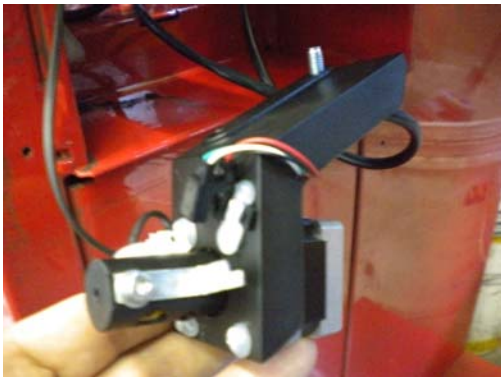
- Check if the cable and connector are fine.
- Check with C122.

TO REPLACE THE LASER POINTER

- Turn off the balancer.
- Remove the laser plastic cover.
- Remove the weight tray of the balancer.

- Disconnect the laser cables from the A weight laser board.
- remove the two screws that secure the laser assembly to the VPM.

- Remove gently the laser assy from the machine.



CHAPTER 5
TROUBLE SHOOTING

5.1 INTRODUCTION

This chapter represents a kind of trouble-shooting guide, which describes the different typologies of error, all system messages available and the possible causes of malfunction.
In particular the following are described:

- **Error Codes:** an error code appears automatically on the screen when an error occurs; these codes are subdivided into **H**-code, **E**-codes and **K**-codes.
  - **H - codes:** These are hints codes and they do not lock the machines.
  - **E - codes:** These are user interface codes and the machine does not work if the code is not solved. On CRT balancers the "Help" shows the meaning of each E code.
  - **K – codes:** These are kernel codes.
- **Beep codes:** beeps are generated automatically if errors are found during the Power-Up procedure.
- **Service Codes:** the service codes are shown on the display as a number (which indicates the selected service code) preceded by the "C" letter. With Service Codes the following is possible:
  - Changing the settings of the unit;
  - Displaying measured values;
  - Adjusting the unit and modules.

5.2 SERVICE

Some notes about the operations of the wheel balancer:
All measured angular positions are related to the mass to balance the wheel; they are <u>not</u> the positions of the imbalance mass itself.

If the balancer is in service mode, some of the normal behaviour is changed:

- Some error codes will be written into the error record in normal operation mode.
  This is disabled in service mode, errors will not be recorded.
- The number of revolution for a measurement run in service mode is set to
  - 20 turns (GS, JBEG models)
  - two times of the C6 setting but minimum 20 turns (CRT, HNA, HWT models)

5.3 TO UPDATE /FLASH THE NEW SOFTWARE

TO UPDATE THE KERNEL SOFTWARE ON THE IBP BALANCER

On all display and Video without EPC wheel balancers, the software update must be performed by using the SD card.

TO UPDATE THE KERNEL SOFTWARE ON THE DISPLAY WHEEL BALANCERS

On the digital wheel balancer the downloading of the correct software is made according to the type of keypad installed on the balancer.

The software recognize the keypad installed on the balancer and it will only download into the box the version of software compatible with the keypad installed on the machine.

1. Make sure that all cables and connectors are properly connected to the Box.
2. Turn the balancer off and remove the protection from the softwear port.

3. Insert the Memory card (MMC/SD card) in the slot, wait 10 seconds and turn the machine on: the machine will emit a three beeps to indicate that the MMC/SD card has been recognized.

The downloading or flashing of the new software will now begin. It can take up to 2 minutes in case of touchless units.

The machine will emit one beep at the end of the update of the Camera Board software, if present: keep waiting!

TO UPDATE THE KERNEL SOFTWARE ON VIDEO BALANCERS WITHOUT THE EPC.

Also on Geo 3900S, Geo3700, B9655S, B9600 and S1750S, BB5200 the software update must be performed by using the SD card, but the procedure is a little bit different as follows:

1. Make sure that all cables and connectors are properly connected to the Box.
2. Turn the balancer off and remove the protection from the softwear port.

3. Insert the Memory card (MMC/SD card) in the slot, wait 10 seconds and turn the machine on: the machine will emit a three beeps to indicate that the MMC/SD card has been recognized and the monitor is black.

4. The machine will not emit any beep for at least 1 minute.

5. Then the machine will emIt a beep every 15/20 second for about 8 minutes.

Once the down loading is completed, the machine will start beeping constantly and will not stop till you switch off. The beeping means the down loading is completed.

IMPORTANT! PLEASE DO NOT TURN OFF THE BALANCER BEFORE IT WILL START TO BEEP CONSTANTLY BECAUSE THE SOFTWARE UPDATE PROCESS WILL BE INTERRUPTED AND, TURNING IT ON, THE DISPLAY WILL NOT SHOW ANYTHING.

6. Now switch “Off” the balancer and remove the MMC/SD card and install the protection again. Wait 10 seconds. Switch “On” the machine and use C47 to select what type of machine/model it is. On the HWT LCD balancers select model with the fine botton pressed and rotating the shaft. On the John Bean, Snap On and Boxer display balancers, use the plus and minus keys.

TO UPDATE INTEGRATED IBP BOARD DIGITAL BALANCER

1. Make sure that all cables and connectors are properly connected to thye board.
2. Turn the balancer off and remove the protection from the softwear port.
3. Remove the front panel.

2. Insert the Memory card (MMC/SD card) in the slot, wait 10 seconds and turn the machine on: the machine will emit a three beeps to indicate that the MMC/SD card has been recognized.

The downloading or flashing of the new software will now begin. It can take up to 2 minutes in case of touchless units.

The machine will emit one beep at the end of the update of the Camera Board software, if present: keep waiting!

3. Once the down loading is completed the Machine will start Beeping constantly and will not stop till you switch off. The beeping means the down loading is completed.

IMPORTANT! PLEASE DO NOT TURN OFF THE BALANCER BEFORE IT WILL START TO BEEP CONSTANTLY BECAUSE THE SOFTWARE UPDATE PROCESS WILL BE INTERRUPTED AND, TURNING IT ON, THE DISPLAY WILL NOT SHOW ANYTHING.

4. Now switch “Off” the balancer and remove the MMC/SD card and install the protection again. Wait 10 seconds. Switch “On” the machine and use C47 to select what type of machine/model it is. Select model with the plus (+) and minus (-) keys.

TO UPDATE U.I., KERNEL AND AWP SOFTWARE ON SCREEN BALANCER

1. Switch off the unit and Remove the Flash card from the Embedded Pc at the rear of the unit and replace it with new version of flash card.

2. Turn the balancer on: the screen will show H948 and H949 if the Kernel and, on touchless machines, the AWP software are different compared to those ones available on the machine.
3. Perform the C code C48 and C49 to update the Kernel and, on touchless machines, the AWP software. The procedure is supported by English text and a loading bar.

IMPORTANT! PLEASE DO NOT TURN OFF THE BALANCER BEFORE THE END OF THE OPERATION BECAUSE THE SOFTWARE UPDATE PROCESS WILL BE INTERRUPTED AND, TURNING IT ON, THE SCREEN WILL ONLY SHOW “PLEASE WAIT”.

5.4 IN THE FIELD REPROGRAMMING OF BALANCER

1. Update the software following par.5.3.
2. The normal startup procedure will be performed.
3. Perform service codes in the following order;

- **C47** - Select machine model: after the selection, the machine will make three audible beeps followed by the automatic turning off and on again.
- **C80** - Calibration of inner SAPE gauge arm
- **C81** - Measurement of flange to zero plane distance
- **C82** - Calibration of outer gauge arm and outer sonar calibration
- **C83** - Basic calibration of vibratory system **with wheel**
- **C84** - Measurement of residual main shaft unbalance
- **C88** - Adjustment of 12 h position
- **C115** Basic calibration of vibratory system **with calibration rotor**
- **C122** - Scanner, cameras or sonar calibration on touchless hardware.
- **C90** - Saving calibration data

The machine is now ready for use.

5.5 RECOMMENDED SERVICE STEPS

In case of an error it is recommended to perform some service code to check the system. The following are some common service codes for this job.

- **C28** - Indicate the content of the error record
- **C54** - Some more testing for the incremental encoder of the main shaft (CRT/HWT/HNA models)
- **C55** - Check lines Voltage (only for CRT/HWT/HNA models)
- **C56** - Check the pedal switches. The switches and the Function-Code to lock the power clamp should be checked if the power clamp does not work (only for CRT/HWT /HNA models)
- **C63** - Continuous measurements for test of valid results.
- **C67** - Indicate the phase stability/shift of the vibratory system
- **C71** Display angular deviation of the vibratory system as measured with C code 115.
- **C72** - Measure the angular deviation of the vibratory system
- **C74** - Check the incremental encoder of the main shaft
- **C75** - Check Voltages of SAPE potentiometers (AD8, AD9, AD10) or perform STEP 1 of C80 and C82

- **C80** - Check Voltages for left SAPE
  ATTENTION! This is a calibration function; interrupt this function after the test in STEP 1 with the STOP or ESC key
- **C82** - Check Voltages for right SAPE
  ATTENTION! This is a calibration function; interrupt this function after the test in STEP 1 with the STOP or ESC key
- **C92** - Test of off-set and diameter potentiometers
- **C98** - Check the incremental encoder of the power clamp (only for CRT/HWT/HNA models)
- **C103** - Test of transpindance and unbalance signal amplifiers.
- **C104** - Test of piezo transducers.
- **C110** - Check VCC Voltage (only for CRT/HWT/HNA and JBEG models)
- **C111** - Check belt tension (only for steel VPM)
- **C123** - STATUS and DIAGNOSTIC flags of Optima Optima 2, BFH 1000 and 200

5.6 SELFTEST DURING STARTUP CRT / HWT / HNA

A series of tests is accomplished after the machine has been turned on. If a test is not successful:

- A series of audible signals is given
- An error code is read out.

On HNA/HWT or CRT models, a three-tone signal is given once, if the machine is operative.
In case there is a functional error it must be acknowledged by pressing the STOP or ESC key and there is no three-tone signal.

1. Communication between microcontroller and embedded PC	**Blue screen**

Affected models : CRT models

Service Codes : No service code available

Communication between micro-controller and embedded PC is not OK (check serial cables).
This can also indicate a bad connection to the keyboard.

2. Check home position of left SAPE	**E3**

Affected models : Models with 1D-, 2D-SAPE or geodata

Service Codes : C80 (& C81) to calibrate SAPE
C92 to check distance and diameter of actual calibration

Inner SAPE gauge arm not in home position.

Re-place SAPE gauge arm in home position and press STOP or ESC key to continue.

3. Check home position of right SAPE	**E4**

Affected models : Models with 3D-P-SAPE

Service Codes : C82 to calibrate SAPE

Outer SAPE gauge arm not in home position.
Re-place SAPE gauge arm in home position and press STOP or ESC key to continue.

4. Power clamp service interval expired	**E85**

Affected models : Models with power clamp

Service Codes : All codes available for the model

5. Check keyboard	E 89

Affected models : All models

Service Codes : No service code available

One of the keys F1 to F6, HELP, ESC, START supplies a key code.
The machine will proceed with the next step only if the trouble is remedied.

6. Check pedal switches	E 89

Affected models : Models with power clamp or electromagnetic brake

Service Codes : C56 to check the pedal switches.
C75, AdC16 to check voltage to external switches

Models with solenoid brake only and power clamp:
One or, if available, both pedal switches are actuated. The user can now remedy the trouble. Press STOP or ESC key to check the pedal switch once again and to delete the error code reading. If the trouble cannot be remedied, the pedal is made inoperative.

7. Disable left SAPE	E92

Affected models : Models with 1D-, 2D-SAPE or geodata

Service Codes : C80 (& C81) to calibrate SAPE
C92 to check distance and diameter of actual calibration

During the second attempt the inner SAPE gauge arm was again not re-placed to home position. Inner and outer SAPE gauge arms are turned off. Wait for 5 seconds, or press STOP or ESC key to continue.

8. Disable right SAPE	E93

Affected models : Models with 3D-P-SAPE

Service Codes : C82 to calibrate SAPE

During the second attempt the outer SAPE gauge arm was again not re-placed to home position. Outer SAPE gauge arms are turned off. Wait for 5 seconds, or press STOP or ESC key to continue.

9. Check content of permanent memories	E 145

Affected models : All models

Service Codes : C85, C86 to copy content of permanent memory

Contents of both permanent memories are different, but both contain valid data.

If the trouble signalled by the error code is not remedied (using service codes C85 or C86), the machine will remain in service code mode.

10. Check availability of keyboard	E 300

Affected models : CRT models

Service Codes : No service code available

The microcontroller was not able to detect a keyboard.
Check cabling between microcontroller and keyboard.

11. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 Calibration	E 360

Affected models : Models with optima hardware

Service Codes : C123

The optima hardware requires wheel profiler position calibration.

When the camera controller board is replaced on the machine, the SW detected that calibration data are missing.

Calibration procedure C122 is required to calibrate the actual position of the laser scanners with respect to the balancer reference plane,

12. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 Hardware	E 361

Affected models : Models with optima hardware

Service Codes : C123

Wheel profiler is not present or is not responding during self test.

The balancer controller board was not able to communicate with the camera controller board during start-up self test.

Possible causes:

- The camera controller board is missing or dead.
- The flat cable connecting the balancer controller board and the camera controller board is unplugged, damaged or missing,

13. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 Hardware	E 362

Affected models : Models with optima hardware

Service Codes : C123

Main camera board self test fail.

Balancing is not possible since wheel data cannot be scanned.

Problem during power up. Switch power off and on again. Should the problem not go away please call service.

14. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner scanner	E 363

Affected models : Models with optima hardware

Service Codes : C123

Left side scanner self test fail or CCD not calibrated or zero mark not detected.

Balancing is not possible since wheel data cannot be scanned.

Problem during power up. Switch power off and on again. Should the problem not go away please call service.

15. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer scanner	E 364

Affected models : Models with optima hardware

Service Codes : C123

Right side scanner self test fail or CCD not calibrated or zero mark not detected.

Balancing is not possible since wheel data cannot be scanned.

Problem during power up. Switch power off and on again. Should the problem not go away please call service.

16. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear scanner	E 365

Affected models : Models with optima hardware

Service Codes : C123

Rear scanner self test fail or CCD not calibrated or zero mark not detected.

Wheel data can be scanned, balancing is possible. Run out measurement of the wheel is not possible.

Problem during power up. Verify if the scanner is on its rail. Switch power off and on again. Should the problem not go away please call service.

17. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 main camera board memory	**E 366**

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- there is a fault in the camera controller board

Corrective actions:

- check the camera controller board

18. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 motor power supply	**E 367**

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the cable connecting the camera controller board and the motor power supply board is unplugged, damaged or missing
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- the cable connecting the mains supply and the motor power supply board is unplugged, damaged or missing

Corrective actions:

- check all items above

19. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 main camera board A/D converter	**E 368**

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- there is a fault in the camera controller board

Corrective actions:

- check the camera controller board

20. Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 main shaft encoder zero mark	**E 369**

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- there is a fault in the camera controller board
- there is a fault in the encoder
- the cable connecting the camera controller board and the encoder board is unplugged, missing or damaged

Corrective actions:

- check the camera controller board
- check the encoder
- check the connections

21.1 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner CCD signals	E 370

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the inner scanner CCD board is unplugged, missing or damaged
- there is a fault in the inner scanner CCD board
- there is a fault in the camera controller board
- the supply voltage is configured too high on the power interface board

Corrective actions:

- check all items above
- switch power off and on again; should the problem not go away please call service

21.2 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner scanner memory	E 371

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the inner scanner CCD board is unplugged, missing or damaged
- there is a fault in the inner scanner CCD board
- there is a fault in the camera controller board

Corrective actions:

- check the connections
- check the inner scanner CCD board
- check the camera controller board
- switch power off and on again; should the problem not go away please call service

21.3 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner scanner memory	E 372

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:
- the flat cable connecting the camera controller board and the inner scanner CCD board is partially unplugged or damaged
- there is a fault in the inner scanner CCD board

Corrective actions:
- check the connections
- check the inner scanner CCD board
- switch power off and on again; should the problem not go away please call service

21.4 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner scanner calibration	E 373

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:
- the inner scanner has not been factory calibrated

Corrective actions:
- please call service and replace the inner scanner

21.5 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner motor power supply	E 374

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:
- the cable connecting the camera controller board and the inner scanner motor is unplugged, damaged or missing
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- the cable connecting the mains supply and the motor power supply board is unplugged, damaged or missing
- there is a fault in the inner scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:
- check all items above

21.6 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner scanner zero mark	E 375

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the inner scanner CCD board is unplugged, missing or damaged
- there is a fault in the inner scanner CCD board
- the inner scanner is locked
- the inner scanner zero mark is missing, bent, locked or damaged
- the cable connecting the camera controller board and the inner scanner motor is unplugged, damaged or missing
- there is a fault in the motor power supply board
- there is a fault in the inner scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

21.7 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner motor missing steps	E 376

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the inner scanner movement is not smooth or it is striking the frame
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- there is a fault in the inner scanner motor
- there is a fault in the camera controller board motor drivers
- the cable connecting the camera controller board and the inner scanner motor is partially unplugged or damaged

Corrective actions:

- check all items above

21.8 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner laser power supply	E 377

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the inner scanner CCD board is unplugged, missing or damaged
- the cable of the laser module of the inner scanner is damaged or there is a fault in the laser module itself
- there is a fault in the camera controller board laser drivers

Corrective actions:

- check all items above

21.9 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 inner laser modulation	E 378

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the inner scanner CCD board is unplugged, missing or damaged
- the cable of the laser module of the inner scanner is damaged or there is a fault in the laser module itself
- there is a fault in the camera controller board laser drivers

Corrective actions:

- check all items above

22.1 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer CCD signals	E 380

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the outer scanner CCD board is unplugged, missing or damaged
- there is a fault in the outer scanner CCD board
- there is a fault in the camera controller board
- the supply voltage is configured too high on the power interface board

Corrective actions:

- check all items above
- switch power off and on again; should the problem not go away please call service

22.2 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer scanner memory	E 381

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the outer scanner CCD board is unplugged, missing or damaged
- there is a fault in the outer scanner CCD board
- there is a fault in the camera controller board

Corrective actions:

- check the connections
- check the outer scanner CCD board
- check the camera controller board
- switch power off and on again; should the problem not go away please call service

22.3 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer scanner memory	E 382

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the outer scanner CCD board is partially unplugged or damaged
- there is a fault in the outer scanner CCD board

Corrective actions:

- check the connections
- check the outer scanner CCD board
- switch power off and on again; should the problem not go away please call service

22.4 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer scanner calibration	E 383

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the outer scanner has not been factory calibrated

Corrective actions:

- please call service and replace the outer scanner

22.5 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer motor power supply	E 384

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the cable connecting the camera controller board and the outer scanner motor is unplugged, damaged or missing
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- the cable connecting the mains supply and the motor power supply board is unplugged, damaged or missing
- there is a fault in the outer scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

22.6 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer scanner zero mark	E 385

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the outer scanner CCD board is unplugged, missing or damaged
- there is a fault in the outer scanner CCD board
- the outer scanner is locked
- the outer scanner zero mark is missing, bent, locked or damaged
- the cable connecting the camera controller board and the outer scanner motor is unplugged, damaged or missing
- there is a fault in the motor power supply board
- there is a fault in the outer scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

22.7 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer motor missing steps	E 386

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the outer scanner movement is not smooth or it is striking the frame
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- there is a fault in the outer scanner motor
- there is a fault in the camera controller board motor drivers
- the cable connecting the camera controller board and the outer scanner motor is partially unplugged or damaged

Corrective actions:

- check all items above

22.8 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer laser power supply	E 387

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the outer scanner CCD board is unplugged, missing or damaged
- the cable of the laser module of the outer scanner is damaged or there is a fault in the laser module itself
- there is a fault in the camera controller board laser drivers

Corrective actions:

- check all items above

22.9 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 outer laser modulation	E 388

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the outer scanner CCD board is unplugged, missing or damaged
- the cable of the laser module of the outer scanner is damaged or there is a fault in the laser module itself
- there is a fault in the camera controller board laser drivers

Corrective actions:

- check all items above

23.1 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear CCD signals	E 390

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear scanner CCD board is unplugged, missing or damaged
- there is a fault in the rear scanner CCD board
- there is a fault in the camera controller board
- the supply voltage is configured too high on the power interface board

Corrective actions:

- check all items above
- switch power off and on again; should the problem not go away please call service

23.2 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear scanner memory	E 391

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear scanner CCD board is unplugged, missing or damaged
- there is a fault in the rear scanner CCD board
- there is a fault in the camera controller board

Corrective actions:

- check the connections
- check the rear scanner CCD board
- check the camera controller board
- switch power off and on again; should the problem not go away please call service

23.3 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear scanner memory	E 392

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear scanner CCD board is partially unplugged or damaged
- there is a fault in the rear scanner CCD board

Corrective actions:

- check the connections
- check the rear scanner CCD board
- switch power off and on again; should the problem not go away please call service

23.4 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear scanner calibration	E 393

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the rear scanner has not been factory calibrated

Corrective actions:

- please call service and replace the rear scanner

23.5 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear motor power supply	E 394

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the cable connecting the camera controller board and the rear scanner motor is unplugged, damaged or missing
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- the cable connecting the mains supply and the motor power supply board is unplugged, damaged or missing
- there is a fault in the rear scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

23.6 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear scanner zero mark	E 395

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear scanner CCD board is unplugged, missing or damaged
- there is a fault in the rear scanner CCD board
- the rear scanner is locked
- the rear scanner zero mark is missing, bent, locked or damaged
- the cable connecting the camera controller board and the rear scanner motor is unplugged, damaged or missing
- there is a fault in the motor power supply board
- there is a fault in the rear scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

23.7 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear motor missing steps	E 396

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the rear scanner movement is not smooth or it is striking the frame
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- there is a fault in the rear scanner motor
- there is a fault in the camera controller board motor drivers
- the cable connecting the camera controller board and the rear scanner motor is partially unplugged or damaged

Corrective actions:

- check all items above

23.8 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear laser power supply	E 397

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear scanner CCD board is unplugged, missing or damaged
- the cable of the laser module of the rear scanner is damaged or there is a fault in the laser module itself
- there is a fault in the camera controller board laser drivers

Corrective actions:

- check all items above

23.9 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear laser modulation	E 398

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear scanner CCD board is unplugged, missing or damaged
- the cable of the laser module of the rear scanner is damaged or there is a fault in the laser module itself
- there is a fault in the camera controller board laser drivers

Corrective actions:

- check all items above

24.1 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear shift motor power supply	E 404

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the cable connecting the camera controller board and the rear shift scanner motor is unplugged, damaged or missing
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- the cable connecting the mains supply and the motor power supply board is unplugged, damaged or missing
- there is a fault in the rear shift scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

24.2 Check OPTIMA OPTIMA 2 BFH 1000 BFH 2000 rear shift	E 405

scanner zero mark	

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the flat cable connecting the camera controller board and the rear shift scanner CCD board is unplugged, missing or damaged
- there is a fault in the rear shift scanner CCD board
- the rear shift scanner is locked
- the rear shift scanner zero mark is missing, bent, locked or damaged
- the cable connecting the camera controller board and the rear shift scanner motor is unplugged, damaged or missing
- there is a fault in the motor power supply board
- there is a fault in the rear shift scanner motor
- there is a fault in the camera controller board motor drivers

Corrective actions:

- check all items above

24.3 Check OPTIMA rear shift motor missing steps	E 406

Affected models : Models with optima hardware

Service Codes : C123

Possible causes:

- the rear shift scanner movement is not smooth or it is striking the frame
- the motor power supply is not configured properly
- there is a fault in the motor power supply board
- there is a fault in the rear shift scanner motor
- there is a fault in the camera controller board motor drivers
- the cable connecting the camera controller board and the rear shift scanner motor is partially unplugged or damaged

Corrective actions:

- check all items above

25. Check model information	E 900

Affected models : All models

Service Codes : C47 to set model

The stored machine model is not known.

If the trouble signalled by the error code is not remedied (using service codes C47), the machine will remain in service code mode.

26. Check calibration	E901

Affected models : All models

Service Codes : C80, C81, C82, C83, C84, C88, C90

Machine was not calibrated. For calibration the following calibration codes will have to be carried out in the sequence as given below:

C80 – Calibration of inner SAPE gauge arm
C81 – Measurement of flange to zero plane distance
C82 – Calibration of outer gauge arm
C83 – Basic calibration of vibratory system
C84 – Measurement of residual main shaft unbalance
C88 – Adjustment of 12 h position
C90 – Saving calibration data

27. Hardware test disturbed	H 82

Affected models : All models

Service Codes : All codes available for the model

A self test was disturbed (e.g. wheel was rotated during the transducer test)
The code is read out for 3 seconds, then measurement is repeated (10 times maximum), or aborted using the STOP or ESC key.

5.7 SELFTEST DURING STARTUP JBEG AND BOXER DIGITAL BALANCERS

If any problems are detected a sequence of beeps are generated to describe the problem.
When the UI initialises the display board identifier is checked. If the correct display board is not connected a 1 second beep is generated and the machine halts.

If the display board is correct, the contents of the two non-volatile memory chips (one on the microcontroller board and one on the opto-encoder board) are compared. If they are different (due to a component change for example) “C85” is diplayed. The user can use the plus and minus keys to select either C85 or C86. Pressing return causes the selected function to be executed and the machine to reset. C85 and C86 are used to synchronise the two flash chips.

If the machine repeatedly fails to initialise and generates a sequence of audible beeps with no display leds lit there is a low-level machine fault detected (kernel initialisation failed).
On initialisation where the flash chips are in agreement and the kernel has successfully initialised, the entire display is lit for a lamp test. The display board speaker sounds also. The lamp test ends and the current software release number is displayed in the right display panel.
At this point a machine self-test is performed. If any problems are identified during this self test an error message is displayed for a number of seconds. Errors which can be generated are the following:

1. SAPE arm not at home position	E11

Affected models : All models

Service Codes : C80 to calibrate inner SAPE

SAPE arm not at home position.
Re-place SAPE gauge arm in home position and press STOP or ESC key to continue.

2. 3D SAPE arm not at home position	E13

Affected models : Models with 3D-P-SAPE

Service Codes : C82 to calibrate 3D SAPE

Outer SAPE gauge arm not in home position.
Re-place SAPE gauge arm in home position and press STOP or ESC key to continue.

3. Error encountered during self test	E82

Affected models : All models

Service Codes : All codes available

Machine self test failed.

5.8 “H” ERROR CODES ON CRT / HWT / HNA / JBEG / BOXER BALANCERS

H	Internal code (C28)	C Code	Description
H0			Wheel running conditions cannot be improved by optimisation
H1			Further optimisation not recommended but feasible
H2			Weight minimisation is recommended, optimisation can achieve no further improvement
H20			The correction plane cannot be re-located using the gauge arm
H21			Indexing position does not match correction plane
H22	492215	C98	Unclamping of power clamp device is disabled
H23			Unclamp denied until results are OK
H26			The gauge arm was pulled out too quickly (normal operation, ASS calibration)
H28			NEW:The gauge arm was pulled out too slowly (ASS calibration)
H32			PlaneSeparationTooSmall
H33			Wheel guard lowered too fast
H80	810510		No provision was made for readjustment
H82			Self test disturbed during execution
H90	492203	C74, C111	- acceleration during start or stop too slow - measuring speed not reached
H91	492204	C74, C111	Speed too low during measuring run
H92			Sape1Defective
H93			Sape2Defective
H100			NetworkOrderMessage
H948			BK2 (camera board) firmware version is not aligned with the currently running UI version (older or newer then requested)
H949			AWP (electronic box) firmware version is not aligned with the currently running UI version (older or newer then requested)

5.9 “E” ERROR CODES ON CRT / HWT / HNA

E	Internal code (C28)	C Code	Description
E1			Rim dimensions entered incorrectly
E2		C56	Wheel guard is not closed
E3		C80	Gauge arm not in home position
E4		C82	Outer gauge arm not in home position
E5			Range of electrical unbalance compensation exceeded (residual adapter unbalance)
E6	812560, 812561,	C83,C84	Calibration weight not attached to flange

E	Internal code (C28)	C Code	Description
	812565, 812566	C88, C90	
E7			No balancing mode for this wheel type
E8			Valve position was not entered
E9			Optimisation was carried out incorrectly
E10		C56	Wheelguard is not open, wheel may not be clamped/ unclamped
E12	Not available to date		Pedal is operated, measuring run not possible
E13	Not available to date		The clearance of the solenoid brake is too wide.
E14			The power clamping device is not clamped
E15			Corrective terms for readjustment are out of range
E16	812570, 812571	C83,C84, C88, C90	Calibration weight attached erroneously to flange
E17	492207	C74	Wheel slipped on adapter
E28	492205	C74	Wrong direction of rotation (hand spin)
E29			Speed too high (hand spin ?)
E30			Run-out measurement failed
E31			Rim only mounted during geometric matching when rim and tyre expected.
E32			The user selected to proceed with a bare rim measurement but the machine actually detects that a complete wheel is on the machine. Mount a bare rim.
E40			Printing error or printer not connected
E41			USB Pen Drive Not Inserted or Installation Process in Act
E42			Cannot Access Prediction Usage File
E50		C125	An attempt to access the weights usage database has failed.
E83		C102	Vibration of the machine disturbed the unbalance measurement
E85			Power clamp service interval expired
E88	492208	C74	The rotating speed of the main shaft exceeds the safety limit
E89			Key contact or pedal switch closed
E92	441350, 441351 441360, 441361	C92,C80	The inner gauge arm for distance and rim diameter is defective
E93	441370, 441371	C82	The outer gauge arm for rim width is defective
E101	C30E01		ASA: Status of an activated order has changed due to network manager or shop management software activities.
E141	000169	C74	Check sum of EEPROM 1 is wrong
E144	00016D	C74	Check sums of both EEPROMs are wrong
E145	000168	C74	Contents of the EEPROMs are different
E300			The microcontroller was not able to detect a keyboard. Check cabling between microcontroller and keyboard.
E301			Missing Comunication with Kernel
E341	00016A	C74	Check sum of EEPROM 2 is wrong
E360		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** hardware wheel profiler position calibration required.

E	Internal code (C28)	C Code	Description
E361		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** wheel profiler is not present or is not responding during self test
E362		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** main camera board power on self test failure
E363		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** left side scanner self test fail or CCD not calibrated or zero mark not detected
E364		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** right side scanner self test fail or CCD not calibrated or zero mark not detected
E365		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear scanner self test fail or CCD not calibrated or zero mark not detected
E366		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** main camera board memory self test failure
E367		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** motor power supply missing or out of range
E368		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** main camera board A/D converter failure
E369		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** main shaft encoder zero mark detection failure or missing cable
E370		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner CCD signals failure
E371		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner scanner memory not responding
E372		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner scanner memory not valid
E373		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner scanner not calibrated
E374		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner motor current sink or power supply failure
E375		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner scanner zero mark not detected
E376		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner motor missing steps
E377		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner laser current sink or power supply failure
E378		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** inner laser modulation failure
E380		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer CCD signals failure
E381		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer scanner memory not responding
E382		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer scanner memory not valid
E383		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer scanner not calibrated
E384		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer motor

E	Internal code (C28)	C Code	Description
			current sink or power supply failure
E385		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer scanner zero mark not detected
E386		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer motor missing steps
E387		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer laser current sink or power supply failure
E388		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** outer laser modulation failure
E390		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear CCD signals failure
E391		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear scanner memory not responding
E392		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear scanner memory not valid
E393		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear scanner not calibrated
E394		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear motor current sink or power supply failure
E395		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear scanner zero mark not detected
E396		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear motor missing steps
E397		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear laser current sink or power supply failure
E398		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear laser modulation failure
E400			OPTIMA BFH 1000 pull index user calibration failure
E404		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear shift motor current sink or power supply failure
E405		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear shift scanner zero mark not detected
E406		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** rear shift motor missing steps
E407		C123	**OPTIMA / OPTIMA 2 / BFH 1000** / **BFH 2000** AWP Not Ready
E500		C122	Laser Kit Failure
E502			LK_MotorPowerSupplyFault
E503			LaserPowerSupplyFault
E504			MarkDetectionFault
E623	620530	C66	Virtual dimensions wrong
E812		C72	The drive pulley was not readjusted by 180º relative to the main shaft
E824			Power Clamp Drive Open Locked
E825			Power Clamp Drive Closed Locked.
E900		C47	No model selected or model storing incorrect

E	Internal code (C28)	C Code	Description
E901			Machine not calibrated
E990			Internal error (message server : message buffer overflow(1) Machine halts.
E991			Internal error (message buffer overflow(2).Machine halts.
E992			Internal error (synchronous receive time-out). Machine halts

5.10 E" ERROR CODES ON JBEG / BOXER DIGITAL BALANCERS

E	Internal code (C28)	C Code	Description	JBEG	BOXER
E01			Rim diameter is out of range		x
E06	812560, 812561 812565, 812566	C83,C84 C88, C90	100g calibration weight is too low, during calibration		x
E09		C56	Wheel guard is not open, wheel may not be clamped / unclamped	x	
E10			SAPE removed during wheel spin	x	x
E11			SAPE arm not at home position	x	x
E12			Rim diameter is below limit	x	x
E13			3D SAPE arm not at home position	x	x
E14			The power clamping device is not clamped	x	x
E16	812570, 812571	C83,C84, C88, C90	Calibration tool weight is too high, during calibration		x
E21			Power clamp locked: cannot unclamp	x	
E22	492202	C60 C110	Speedup timeout	x	x
E23	492203	C60 C110	Speed not reached	x	x
E24	492204	C60 C110	Speed low	x	x
E25			Wheel spun in wrong direction (hand spin)	x	x
E26	492206	C60, C74 C110	No acceleration	x	x
E27	492107	C60, C74 C110	Slip detected	x	x
E28	492208	C60	Speedlimit reached	x	x
E29			START button pressed with wheel guard raised		x
E41			USB Pen Drive Not Inserted or Installation Process in Act		
E42			Cannot Access Prediction Usage File		
E50	XXX-510		Factory calibration was not completed	x	x
E51	810511		Calibration failed	x	x
E52	810512		Calibration weight on opposite side or not attached	x	x
E53	810560, 810561	C83, C84 C88, C90	Calibration tool weight is too low, during calibration	x	x
E54	810565, 810566	C83, C84 C88, C90	100g calibration weight is too low, during calibration	x	

E	Internal code (C28)	C Code	Description	JBEG	BOXER
E55	810570, 810571	C83, C84 C88, C90	0g calibration weight is too high, during calibration	x	
E60			No data from data conditioning module	x	x
E82			Measuring disturbed during self-test procedure	x	x
E89			Key contact jammed or pedal switch closed	x	x
E92	441350, 441351 441360, 441361	C92,C80	Inner gauge arm for distance and rim diameter - defective	x	x
E93	441370, 441371	C82	Outer gauge arm for rim width - defective	x	x
E141	000169	C74	Check sum of EEPROM 1 is wrong	x	x
E144	00016D	C74	Check sums of both EEPROMs are wrong	x	x
E145	000168	C74	The Contents of EEPROM are valid but different	x	x
E341	00016A	C74	Check sum of EEPROM 2 is wrong	x	x
E500		C122	Laser Kit Failure	x	
E502			LK_MotorPowerSupplyFault	x	
E503			LaserPowerSupplyFault	x	
E504			MarkDetectionFault	x	
E623	620530	C66	Virtual dimensions wrong	x	
E812		C72	The drive pulley was not readjusted by 180º relative to the main shaft	x	
E824			Power Clamp Drive Open Locked	x	
E825			Power Clamp Drive Closed Locked.	x	
E900		C47	No model selected or model storing incorrect	x	x
E901		C83,C115	Machine not calibrated	x	x
E1000			Main battery needs a charging cycle.	x	x

5.11 ERROR CODES ON IBP BOX

Specific Kernel Error Code for IBP BOX (from Kernel Version 2.0)

IBP error		Equivalent Y2K error	Hofmann User error
001-001	BK_ERROR_PO_NOTFOUND	internal	-
001-002	BK_ERROR_PO_READING	internal	-
001-003	BK_ERROR_PO_WRITING	new	-
001-004	BK_ERROR_PO_EEP1_RD	internal	-
001-005	BK_ERROR_PO_EEP2_RD	internal	-
001-006	BK_ERROR_PO_EEP1_WR	new	-
001-007	BK_ERROR_PO_EEP2_WR	new	-
001-010	BK_ERROR_KBD_DISPLAY	internal	-
001-011	BK_ERROR_KBD_VOLTAGE	46x-xxx	-
001-012	BK_ERROR_KBD_READING	46x-xxx	-
001-020	BK_ERROR_DC_OVERRUN	xxx-401	E83
001-021	BK_ERROR_IEM_ZERO_MISMATCH	290-703	-
001-022	BK_ERROR_IEP_ZERO_MISMATCH	2A0-703	-

001-030	BK_ERROR_POWER_FAIL	xxx-900	-
001-031	BK_ERROR_TEMP_SENSOR	xxx-58x	-
001-032	BK_ERROR_VCC_ABOVE_LIMIT	xxx-811	-
001-033	BK_ERROR_VCC_BELOW_LIMIT	xxx-810	-
001-034	BK_ERROR_VDISP_ABOVE_LIMIT	xxx-821	-
001-035	BK_ERROR_VDISP_BELOW_LIMIT	xxx-820	-
001-036	BK_ERROR_LINE_ABOVE_LIMIT	xxx-801	-
001-037	BK_ERROR_LINE_BELOW_LIMIT	xxx-800	-
001-038	BK_ERROR_OPTO_SHORT_HIGH_CUR	xxx-708	-
001-039	BK_ERROR_OPTO_OPEN_LOW_CUR	xxx-707	-
001-040	BK_ERROR_SAPE_1D_LOW_VOLT	xxx-350	E92
001-041	BK_ERROR_SAPE_1D_HIGH_VOLT	xxx-351	E92
001-042	BK_ERROR_SAPE_2D_LOW_VOLT	xxx-360	E92
001-043	BK_ERROR_SAPE_2D_HIGH_VOLT	xxx-361	E92
001-044	BK_ERROR_SAPE_3D_LOW_VOLT	xxx-370	E93
001-045	BK_ERROR_SAPE_3D_HIGH_VOLT	xxx-371	E93
001-046	BK_ERROR_SAPE_1D_INVALID_CAL	new	E92
001-047	BK_ERROR_SAPE_2D_INVALID_CAL	new	E92
001-048	BK_ERROR_SAPE_3D_INVALID_CAL	new	E93
001-050	BK_ERROR_SIDE_CAL_BAL	xxx-512	E16
001-051	BK_ERROR_SIDE_CAL_USER	xxx-512	E16
001-052	BK_ERROR_NO_CAL_USER	xxx-510	H80
001-053	BK_ERROR_FAIL_CAL_USER	xxx-511	E15
001-054	BK_ERROR_VIRT_DIM_OUTOFRANGE	xxx-530	E623
001-055	BK_ERROR_C1_100G_LOW	xxx-565	E6
001-056	BK_ERROR_C2_100G_LOW	xxx-566	E6
001-057	BK_ERROR_C1_0G_HIGH	xxx-570	E16
001-058	BK_ERROR_C2_0G_HIGH	xxx-571	E16
001-059	BK_ERROR_C1_USERCALTOOL_LOW	xxx-560	E6
001-060	BK_ERROR_C2_USERCALTOOL_LOW	xxx-561	E6
001-061	BK_ERROR_CAL_WEIGHT NOT AT 12 O'CLOCK IN STEP2 C115		-
IBP error		**Equivalent Y2K error**	**Hofmann User error**
001-070	BK_ERROR_SPOKE_SAME_POS	internal	-
001-071	BK_ERROR_UG_NOT_BET_SPOKES	internal	-
001-072	BK_ERROR_ANG_SPOKES_TOOHIGH	internal	-
001-073	BK_ERROR_ANG_SPOKES_FAIL	internal	-
001-080	BK_ERROR_SPINUP_TIMEOUT	490-202	H90
001-081	BK_ERROR_NO_ACCELERATION	490-206	H90
001-082	BK_ERROR_SPEED_LOW	490-204	H91
001-083	BK_ERROR_SPEED_HIGH	490-208	E88
001-084	BK_ERROR_REVERSE_TURN	490-205	E28
001-085	BK_ERROR_SLIP_DETECTED	490-207	E17
001-090	BK_ERROR_STUCK_CLAMP	490-210	-
001-091	BK_ERROR_STUCK_UNCLAMP	490-211	-
001-092	BK_ERROR_CLAMP_MAXDISP	490-212	E14
001-093	BK_ERROR_CLAMP_TIMEOUT	490-216	E14
001-094	BK_ERROR_CLAMP_LOCKED	490-215	H22
001-095	BK_ERROR_CLAMP_SLIP	490-214	-
001-096	BK_ERROR_CLAMP_FALLBACK	490-213	-

001-100	BK_ERROR_WATCHDOG	new	-

5.12 "K" CODES (KERNEL CODES)

5.12.1 STRUCTURE OF AN ERROR CODE

A complete error code consists of 6 hexadecimal digits.

Digit 6	Digit 5	Digit 4	Digit 3	Digit 2	Digit 1
Module ID		**Priority ID**	**Error code**		
Left Display			Right Display		

The module ID is a 2-digit hexadecimal value and indicates the software module which detected the error.
The priority ID represents the kind of error (message only, critical error).
The error code itself determines the kind of the fault.

5.12.2 PRIORITY ID

Prior. ID	Description
0	Critical error (will be recorded in user mode)
1	Warning message
2	For information only
3	All of above, but will not be recorded in the error record (persistent objects p30 to p39)

5.12.3 ERROR ID

The table lists the error codes and gives the most common errors that may come up.
Note: (1) These diagnostic codes are composed three parts.
(2) They are also used in digital balancers.
(3) X means low priority.
(4) The module ID is the most important part in diagnostic code. It shows where the problem occurs.
(5) Use proper C functions (or P, or F functions in some digital balancers) to locate the problems.

Module 22: I^2C Bus

Codes	**22X180** **22X181** **22X182** **22X183** **22X184** **22X185** **22X186** **22X187** **22X188** **22X189** **22X18A** **22X18C**

	22X18D **22X18E** **22X18F** **22X190** **22X191** **22X192** **22X193**
Description	I^2C bus communication failed.
Explanation	The integrated internal communication (I^2C) bus is used for communication between the microprocessor and other devices, like EEPROMs, key board and display. If the microprocessor is brain, the I^2C bus is the nerve system. If this is failed, the machine stops its work.
Action	The I^2C bus system includes the traces on the PCB boards and the cables connecting the boards together. First check the plugs, connectors and cables. These are most possible having the problem. If can not find any problem, consider to change the boards. May there is trace or soldering failure on the boards, or some chip(s) is out of order.
Associate C Functions	C74

Module 23: RS 232 Serial Communication

Codes	**23X140** **23X141** **23X142** **23X143** **23X144** **23X145** **23X146** **23X147** **23X148** **23X149** **23X14A** **23X14C**
Description	RS 232 serial communication failed.
Explanation	The RS 232 serial cable provides the communication between microprocessor control board and imbedded PC. Bad connection and fail of microprocessor and embedded PC could cause these diagnostic codes.
Action	Check the plugs of serial cable first. These plugs are small and relatively easy loose if someone intentionally pull the cable. Second, check the cable. Is it damaged or not. Finally consider change the control board and embedded PC.
Associate C Functions	None

Module 27: Temperature Measurement

Codes	**27X402** **27X580** **27X581** **27X585**

	27X586 **27XF04**
Description	Temperature measurement failed.
Explanation	In order to make precise measurement, the temperature compensation is applied to calculation of unbalances. If the temperature sensor does not work, these diagnostic codes will appear.
Action	Use C74 to check if the software can read from the temperature sensor. If not, check the cable and connection to the temperature sensor. Or replace the temperature sensor.
Associate C Functions	C57

Module 28: Piezoelectric Transduers

Codes	**Rear Transducer:** **28X410** **28X411** **28X412** **28X415** **28X416** **28X418** **28X419** **Front Transducer:** **28X420** **28X421** **28X422** **28X425** **28X426** **28X428** **28X429** **Both Transducers:** **28X403** **28X430** **28X431** **28X432** **28X435** **28X436** **28X438** **28X439**
Description	The transducer(s) has (have) some problems.
Explanation	The piezoelectric transducer is the key part of the balancer. It is a pressure sensor. It transfers the pressure change to electric voltage change. The unbalance of the wheel assembly produces the vibration when it is spinning. The vibration introduces pressure change on the piezoelectric transducer. The transducer transfers these pressure change to electric signals and then these signals are processed by microprocessor to calculate out and locate the unbalances of the wheel. There are two transducers on every balancer located on both side of spin shaft. One is in front of shaft, the other is on rear of shaft. The transducers are preloaded certain pressures. These pressures are very important for the quality of signals. The problem of the transducer could be (1) There is no signal output from transducer if the piezoelectric crystals are broken. (2) The preloaded pressure is too high or too low. The signal produced by piezoelectric crystals have serious distortion. That means the quality of the signal is bad. (3) The cable and connection is bad, the signal can not reach the microprocessor board. (4) The output of transducer is good, but A/D converter does not work. (5) The output of transducer is good, but the signal amplifiers are bad. (6) The output of transducer is good, but the microprocessor board is bad. So the controller can not see the transducer.
Action	Use C64 to check transducer sensitivity. Use C75 to check the A/D supply voltage. Use C103 to test of the unbalance signal amplifiers. Use C104 test the RC time constant of the unbalance transducers.

	Check the cables. Or replace the transducer. Consider the control board failure.
Associate C Functions	C67, C72, C75, C103, C104

Module 29: Main Spin Shaft Optical Encoder

Codes	**29X701** **29X702** **29X703** **29X705** **29X706** **29X707** **29X708** **29X710**
Description	Reading problem on main shaft encoder.
Explanation	The main shaft encoder consists of two parts. One is a encoder ring that is attached on the shaft and spin with the shaft. The other is an optical sensor. It reads the reflect light from the encoder ring. Then the electric pulses are transferred through the cable to the microprocessor control board.
Action	Use C54 or C74 to check the encoder counter output. Check the plugs, connectors and cable. Encoder ring may loose. Replace the optical encoder board. (a small board on the main shaft)
Associate C Functions	C54, C74

Module 2A: Belt Disc Optical Encoder

Codes	**2AX701** **2AX702** **2AX703** **2AX705** **2AX706** **2AX707** **2AX708** **2AX710**
Description	Reading problem on the power clamp encoder.
Explanation	Like the main shaft encoder, the power clamp encoder is consist of two parts. One the encoder strip that is attached on the belt disc. The other is an optical circuit that is used to read the encoder. The electric signal generated by the optical circuit is transferred to microprocessor control board by the cable.
Action	Use C98 to check the output of the encoder. Check the plugs, connectors and cable. The cable is thin and connectors are small. They easy to be damaged. Check and adjust the relative position of the encoder and belt disc. If the position is not right, there is no output from the encoder reading circuitry. May the optical circuit is bad. Replace the circuit.
Associate C Functions	C98

Module 30: Supervisor

Codes	**30X300**
Description	Over current of the motor
Explanation	Motor is bad or motor is stuck. Large current passes to motor. May cause fire.
Action	Is the motor stuck. Motor is bad and replace the motor
Codes	**30X800** Line voltage below limit 170 VAC **30X801** Line voltage above limit 265 VAC **30X804** Line voltage much too high, larger than 275 VAC **30X810** VCC below limit 5.10 VDC **30X811** VCC above limit 5.35 VDC (Y2K) or 5.4 VDC (IBP) **30X820** Keyboard/display voltage below limit 5.00 VDC **30X821** Keyboard/display voltage above limit 5.35 VDC **30X830** External voltage (pedal) below limit 4.5 VDC **30X831** External voltage (pedal) above limit 5.35 VDC **30X900** Power fail detected.
Description	Power supply problem. The voltages are beyond limits.
Explanation	The microprocessor monitors the voltages on all circuitry. Once the voltages are out of proper range, these diagnostic codes are generated.
Action	Use C55 and C110 to check the voltages. If something is wrong, check the power line voltage. In most case, power line drops too much causes low voltage. Is there big machinery use the same power line with the balancer? Avoid this.Check the cable, plugs and connectors.If VCC is low, adjust it. (see service manual to find how to adjust)
Associate C Functions	C55, C110

Module 41: Auto Stop System (ASS)

Codes	**41XF07** **41XF0F** **41XF12** **41X380** **41X381** **41X382** **41X383**
Description	Auto stop system does not lock the distance gage arm.
Explanation	The auto stop system is used in ALU-S balancing mode. It is used to locate the position of tape weights. When the distance gage arm reaches the position the tape weight should be attached, the gage arm will automatically locked up. Sometime, the electro magnetic system failed, these diagnostic codes are generated.
Action	Check the electromagnetic system. The cable and connection. The big cap 6800uf/25V on the power interface board which is used to power the solenoid brake.
Associate C Functions	C80

Module 42: Data Condition

Codes	**42XF18** Can't get data from external AD converter. **42X400** During measuring run data conditioning can't get proper speed information. **42X402** During measuring run data: Temperature information invalid, 20° used instead.
Description	Software can not get enough data to calculate the unbalances.
Explanation	In order to calculate the unbalances the software has to know (1) the data transferred from piezoelectric transducers. (2) the spin speed of the wheel, that is the speed of shaft. If one of them is missing, the data condition is wrong. - a malfunction of the incremental encoder. - a malfunction of the main board.
Action	Based on the explanation of the diagnostic codes, it is very clear that 1. check the transducer signals if the code is 42XF18. (See module 28) 2. check the main shaft encode if the code is 42X400. (See module 29) Check C74 and C54. Check C75 if ADE1 and ADE2 displays valid results.
Associate C Functions	C54, C74, C75

Module 44: SAPE Devices

Codes	**(1) BFH AWP Problem** **44XF0F** Bad parameter **44XF09** AWP already in use but bad parameter **44XF18** No answer from AWP **44XF12** AWP problem **(2) Convention SAPE Problem** **44X350** 1st Pot : Voltage below range 0.05 V (0.037 V for IBP) - AD value: 0..10 **44X351** 1st Pot : Voltage above range 4.45 V (3.26 V for IBP) - AD value: 1014..1024 **44X360** 2nd Pot : Voltage below range 0.05 V (0.037 V for IBP) - AD value: 0..10 **44X361** 2nd Pot : Voltage above range 4.45 V (3.26 V for IBP) - AD value: 1014..1024 **44X370** 3rd Pot : Voltage below range 0.05 V (0.037 V for IBP) - AD value: 0..10 **44X371** 3rd Pot : Voltage above range 4.45 V (3.26 V for IBP) - AD value: 1014..1024
Description	One or more SAPE device do not work.
Explanation	There are two kinds of parameter enter devices. One is AWP, Auto Wheel Parameter, which is used in BFH balancer. The wheel parameters are detected by laser and camera scan system. The other is convention SAPE, Semi-Automatic Parameter Entry. This device uses the outputs of potentiometers to measure the wheel size.
Action	Check the plugs and connectors, cables or replace the potentiometers.

Module 45: Display Board

Codes	45X120
Description	The digital display board has some problem.
Explanation	This diagnostic code occurs in digital balancer only
Action	Check the plugs, connectors and cable wiring from power interface board to the display board. May have to replace the display board.
Associate C Functions	C75

Module 46: Key Board

Codes	**46X100** **46X101** **46X102** **46X180** **46X181** **46X182** **46X183** **46X184** **46X185** **46X186** **46X187** **46X188** **46X189** **46X18A** **46X18B** **46X18C** **46X18D** **46X18E** **46X18F**
Description	All these diagnostic codes occur when the communication has some problem with keyboard. That includes hardware not found, I^2C communication failure and so on.
Explanation	The microprocessor has to find the keyboard and communicate with it while balancer is working. If something is wrong with that, one or some of these diagnostic codes will be generated by balancing kernel software.
Action	Check the plugs, connectors and cable wiring from power interface board to the key board. May have to replace the key board if you can not find anything wrong in wiring system.
Associate C Functions	C45

Module 49: Motor & Brake

Codes	**49XF09** Internal diagnostic command is not valid in actual mode of operation **49XF20** Access denied. The clamp device if it is not available **49X201** Brake does not work **49X202** Motor can not speed up **49X203** Motor can not reach the required speed **49X204** Motor speed down during measurement **49X205** Motor reverses **49X206** No acceleration during speed up or braking detected **49X207** Slip detected (speed up to fast) **49X208** Speed limit exceeded **49X300** Motor over-current detected by hardware**.**
Description	The descriptions are followed diagnostic codes above.
Explanation	The work conditions of motor and power clamp are monitored by the microprocessor. If something is wrong like described above, the different diagnostic codes will be generated by software. The motor driving system includes motor, belt, shaft encoder.
Action	Check the plugs, connectors and cables concern the motor and encoder. Check the tension of belt. Check the position reading of encoder by C74. Check the motor is good or bad. May need to replace the main shaft encoder, motor or adjust the tension of belt.
Associate C Functions	C54, C60, C74, C75, C111

Module 4A: Power Clamp

Codes	4AX210 Clamping device got stuck in clamped position 4AX211 Clamping device got stuck in unclamped position 4AX212 Displacement limit exceeded during (un)clamping 4AX213 Belt disc rotates backward after clamping 4AX214 Main shaft rotates during clamping 4AX215 Clamp device is locked 4AX215 Clamp device is locked 4AX216 Time limit for clamping process exceeded
Description	The descriptions are followed diagnostic codes above.
Explanation	The working status is monitored by microprocessor. If it works abnormal, one or some of diagnostic codes occur.
Action	Check the power clamp device. In most case, these are mechanical problems or improper operation.
Associate C Functions	C98

Module 81: Command Language

This part is a large chunk of the diagnostic codes. The command language is used inside software and can not be seen by the operator. Some electronic and mechanical failures can introduce grammar conflict in command language, then the diagnostic codes started with 81 are generated by software.

Codes	81XF0F
Description	The kernel software though the parameters gathered by AWP or SAPE are not reasonable values, they are bad.
Explanation	The unbalance calculation is base on the output of transducers AND the parameters of the wheel assembly. If the value(s) of parameter(s) is not in certain range, the software is unable to calculate out the unbalances. This diagnostic code occurs.
Action	AWP or SAPE malfunction that causes incorrect wheel parameters. Check the AWP and SAPE system
Associate C Functions	C80, C81, C82

Codes	81XF17
Description	Not running (still not initialized)
Explanation	This diagnostic can occur after a measuring run, if the incremental encoder of the power clamp is not able to detect the reference mark (810F17).
Action	Check main shaft and power clamp encoders. May need replacement.
Associate C Functions	C54, C74, C98

Codes	**81X160** **81X161** **81X162** **81X163** **81X164** **81X165** **81X166** **81X167** **81X168** **81X169** **81X16A** **81X16B** **81X16C** **81X16D**
Description	Communication with EEPROM through I2C bus is failed.
Explanation	When the microprocessor wants to calculate the unbalances, it needs a lot of data that stored in EEPROM. If the communication with EEPROM failed, it can not do

	calculation.
Action	Check the plugs, connectors and cables between microprocessor control board and main shaft encoder board. May need to change encoder board or microprocessor board.
Associate C Functions	C74

Codes	**81X510** Calibration slug is missing **81X511** The mass of calibration slug is wrong **81X512** The calibration slug is put on wrong side.
Description	The user calibration fail.
Explanation	The user calibration uses calibration slug to calibrate the balancer. The calibration slug should be properly used in different steps. If it is not properly used, or the mass of calibration slug is not right, or it is put wrong side, one of these code will be generated.
Action	Follow the user manual to repeat user calibration procedure. Reload software, maybe the software collapses. Check the output of transducers.
Associate C Functions	C14, C64

Codes	**81X560** c1 value too low, if a user calibration tool assumed **81X561** c2 value too low, if a user calibration tool assumed **81X565** c1 value too low, if a 100g weight and calibration rotor assumed **81X566** c2 value too low, if a 100g weight and calibration rotor assumed **81X570** c1 value too high, if a calibration rotor only assumed **81X571** c2 value too high, if a calibration rotor only assumed
Description	The vectors c1 and c2 generated by transducers are no correct in factory calibration procedure.
Explanation	In factory calibration procedure, a very precise and accurate instrument called proof rotor and 100 gram calibration weigh are used. These calibration tools make the transducers produce certain outputs, we call them as vector c1 and c2. If something is wrong, for example, the tools are used improperly, or the transducer work improperly, the vectors c1 and c2 will out of their range. If the software detected the c1 and c2 are not right, these diagnostic codes will be generated.
Action	Followed instruction on the manual repeat the factory calibration carefully. Make sure every step is right. If still can not pass the calibration and got diagnostic code, it will be the transducer problem. Use C64 to check the outputs of transducers. In most case should re-torque the transducers. Or transducer(s) is bad, need replace the transducer(s).
Associate C Functions	C64, C83

Module “C” :Hardware test error

There is an error occurred during the hardware test. The four hyphens replace the digits 0 to 9 and the letters A to F which all characterize an error/defect. The following test will be performed:

1. Power supply voltage (235V)
2. 5V line
3. Incremental encoder (Current of optoelectronic LED)
4. Transducer signal available
5. Auto Stop System (Voltage for relay)
6. Power clamp encoder board

K Code	**C10 F02** **C10 F07** **C10 F08**
Description	Unsuccessful self-test on power up
Explanation	A software command was invalid or the hardware is set up wrong for the model
Action	Restart the balancer . If these codes persist, Go to C47 to and reset brand and model.

K Code	**C10 800**
Description	AC power supply is below 170V, (25% below 230V)
Explanation	The BFH balancer is powered by 230VAC. In order to operate correctly and precisely, the balancer must be supplied the proper mains voltage. The microprocessor constantly monitors the mains power supply line. If the power line drops below 170V, C10 800 is displayed to alert the operator to check mains power line voltage.
Action	Go to function C55 to check the power line voltage. The balancer must be on a dedicated 230 Volt Main. Avoid use of long extension cords or share the power source with large electric machinery. If the mains power line is OK, check the mains power connections inside the unit.

K Code	**C10 801** **C10 804**
Description	AC power supply is above 265V, (15% above 230V)
Explanation	In order to operate correctly and precisely, the balancer must be supplied the proper mains voltage. The microprocessor constantly monitors the mains power supply line. Because voltages above 265VAC can damage the product, the C10 801 diagnostic code is displayed to warn operator to check power line voltage.
Action	Go to function C55 to check the power line voltage. The balancer must be on a dedicated 230 Volt Main. If the mains power line is OK, check the mains power connections inside the unit.

K Code	**C10 810**
Description	VCC below 5.10V
Explanation	The 5 VDC source is used to power electronics circuits. If it is too low, the electronics will fail to properly operate.
Action	Use function C110 to check the DC voltage. Adjust DC voltage if needed. (follow the adjust procedure described in service manual) Check the connectors, plugs and wires.

K Code	**C10 811**
Description	VCC above 5.35V (Y2K) or 5.4V (IBP)
Explanation	The 5 VDC source is used to power electronics circuits. If it is too high, the electronics will fail to properly operate or could be damaged.
Action	Use function C110 to check the DC voltage. Adjust DC voltage if needed. (follow the adjust procedure described in service manual) Check the connectors, plugs and wires.

K Code	**C10 410** **C10 420** **C10 430**
Description	C10 410: No signal output from transducer 1 (behind main shaft) C10 420: No signal output from transducer 2 (front of main shaft) C10 430: No signal output from both transducers
Explanation	The pressure transducers are key parts of the balancer. There are two transducers in one balancer. They are pre-loaded and connected to the microprocessor control board. When the shaft spin with the wheel assembly, the imbalance produces vibration on these transducers. The transducers convert the pressure change to electrical signals and pass these signals to the microprocessor for imbalance calculations. If the microprocessor can not get these signals, the balancer does not work.
Action	Check the cable and connectors from transducers to microprocessor control board. Re-torque the transducers. Go to C103, C104: Maybe a transducer is bad and can not output signal.

K Code	**C10 705** **C10 706** **C10 707** **C10 708**
Description	C10705: Opto electronic, voltage on shunt resistor is less 2.50 V, too low. C10706:Opto electronic, voltage on shunt resistor is above 4.30 V, too high. C10707:Opto electronic, the current through LED less 16 mA, too low. C10708:Opto electronic, the current through LED above 20 mA, too high.
Explanation	The opto-electronic circuit is mainly used to obtain the encoder signal from the encoder ring attached on main shaft. The Microprocessor continuously monitors the encoder. If a problem occurs on the encoder circuit, one of these diagnostic codes will be displayed.
Action	Check the cable and connector on the encoder board. Go to C74, C75. Clean the encoder band. If the balancer will spin, balance a wheel and stop, the encoder is ok.

K Code	**C10 380** **C10 381** **C10 382** **C10 383**
Description	C10380: 4.50 V ASS : Voltage magnet below limit - off state. C10381: 1.00 V ASS : Operating Voltage magnet below limit - on state. C10382: 2.00 V ASS : Operating voltage magnet above limit - on state. C10383: 0.5 s ASS : Operating Voltage magnet recharging time above limit
Explanation	Affected models : Models with auto stop system. If the voltage is below or above a limit or the recharging time is above a limit the error code is displayed.
Action	Service Codes: C75, Adc21 to check voltage on capacitor of the auto stop system.

5.13 EEP CODES

The beeps codes are made to recognize the malfunction of the machine in case of display or screen problem.

5.13.1 ABBREVIATIONS

Beeps		
*	Frequency	: 2000 Hz
	Duration	: 100 ms
	Pause	: 100 ms (Pause after beep, total length = 200 ms)
S	Frequency	: 1600 Hz
	Duration	: 200 ms
	Pause	: 400 ms
L	Frequency	: 1600 Hz
	Duration	: 500 ms
	Pause	: 400 ms
nS or nL	**n** repeats of **S** or **L**	
Pause		
Pn	Duration	: n seconds

5.13.2 BEEP SEQUENCES

A beep sequence consists of a
- - A - : Prefix beep
- - B - : Beeps which indicates the initialisation step
- - C - : Beeps which indicates the module/object
- - D - : Pause between the cycle

5.13.3 –A- PREFIX BEEP

Each beep will be indicated by a prefix beep

- **P0.5**

5.13.4 -B- BEEPS OF THE INITIALISATION STEP

Beep sequence	Description	ID MODULE
S P1	**Error during basic initialisation:**	
	I2C bus (Keyboard, keyboard cable)	22
	Message server	83
	Command language	81
S S P1	**Error during PO (persistent objects) based initialisation:**	
	Encoder board of main shaft	29
	External AD converter	25
	Internal AD converter	26
	Temperature sensor measurement	27
	Data conditioning	42
S S S P1	**Extensions, based on Pos:**	
	Keyboard/display, SAPE, brake, motor	44, 45, 46, 47, 48
	Drive system	49

5.13.5 -C- BEEPS OF THE MODULE/OBJECT

Beep sequence	Description	ID MODULE
S	**Initialisation of the I2C bus fails.**	22
	SDA or SCL level is wrong	
S S S S	**Initialisation of keyboard device driver (including STOP, wheel guard, pedal)**	44, 45, 46, 47, 48
	Resource not available (timer)	
L L	**Persistent object not available**	29
	Persistent object not available	
L L S	**External AD converter**	25
	Persistent object not available	
L L S S	**Internal AD converter**	26
L L S S S	**Temperature measurement**	27
	Persistent object not available	
	Resource not available (timer)	
L L 4S	**Incremental encoder of power clamp**	2A
	Persistent object not available	
L L 5S	**Data conditioning**	42
	Persistent object not available	
3L	**Extensions: keyboard/display, SAPE, brake, motor**	44, 45, 46, 47, 48
	Persistent object not available	
	Resource not available (timer)	
3L S	**Extensions: Drive system**	49
	Persistent object not available	
	Resource not available (timer)	

5.13.6 -D- PAUSE BETWEEN THE CYCLES

P3 : 3 seconds pause

Example:

* * P0.5	S P1	5S	P3		* * P0.5
2 init beeps with half a second pause after	One short beep and a one second pause	5 short beeps	3 seconds pause		NEXT cycle ...

- Error during initialisation of the persistent objects. e.g. the opto-electronic board is not connected.

5.13.7 TROUBLE SHOUTING OR MULFUNCTION WITHOUT ERROR CODES

1. **PROBLEM DESCRITPION:**
   Turning on the balancer the display or the screen do not show anything.
   ACTIONS

- Check the output from the plug of the wall.
- Check if the power cord is fine.
- Check if power entry module fuses are fine.
- Check if F3 and F4 fuses of the Y2k box are fine.
- Check if F2 fuse of the IBP box is fine.
- Check if the power entry module is fine.
- Check the cable display.

- Replace the display.
- Check the 5.24 VDC output from the connector X12 or X14 of motor controller board of the Y2k box and from the connector X14 of the IBP box.
- Check the 5.24 VDC power supply cable.
- Check the 230 Volts output power supply from connector X41 of Y2k or IBP box.
- Check if the 230 Volts out cable from connector X41 is fine.
- Check the monitor power supply cable is well plugged to the balancer and to the screen.
- Replace the monitor.
- Replace the EPC.
- Replace the Y2k or the IBP box

2. TURNING THE BALANCER ON THE SCREEN SHOWS "PLEASE WAIT"

- Check if the serial cable is plugged and well tightened to the Y2k or IBP box.
- Check if the serial cable is fine.
- Replace the Y2k or IBP box.
- Replace the EPC.

3. PRESSING THE WHEEL CLAMPING PEDAL THE CLAMPING DEVICE DOES NOT CLAMP

- Check if pedal micro switches are fine.
- Check if the pedal micro switche are well tightened.
- Check if the pedal microswitches are well adjusted.
- Check if the pedal microswitches wires are well tightened to the connector X13.
- Check the +5VDC output from connector X13 of the Y2k or IBP box.
- Replace the Y2k or IBP box.

4. LOWERING THE WHEEL GUARD THE WHEEL DOES NOT START

- Check if the wheel guard micro switch is fine.
- Check if wheel guard micro switch is well adjusted.
- Check if the wheel guard micro switch is well tightened to the connector.
- Check the +5VDC output from connector X13 of the Y2k or IBP box.
- Replace the Y2k or IBP box.

5. AT THE END OF THE BALANCING SPIN ALL THE WHEEL DATA ARE SHOWN IN RED AND THE BALANCER ALWAYS SELECTS THE CLIPS TYPE WEIGHT.

- Go to C123 and activate step 1. Make sure that inner scanner laser is not shutting off at any time of the swinging.
- Check if the flat cable is properly plugged to the inner scanner CCD board and to the AWP board.
- Check if the inner scanner flat cable is well plugged to its connectors.
- Check if the inner scanner flat cable is well is correctly routed (SB 618 WB)
- Check if AWP board and the inner scanner CCD board connectors are fine.
- Check if the wires of the inner scanner laser are fine and well plugged.

6. ON TOUCH LESS BALANCERS AT THE END OF THE BALANCING SPIN THE RIM WIDTH IS SHOWN IN RED AND THE BALANCER ALWAYS SELECTS THE CLIPS TYPE WEIGHT.

- Go to C123 and activate step 2. Make sure that lateral scanner laser is not shutting off at any time of the swinging.
- Check if the flat cable is properly plugged to the lateral scanner CCD board and to the AWP board.
- Check if the lateral scanner flat cable is well plugged to its connectors.
- Check if AWP board and the lateral scanner CCD board connectors are fine.
- Check if the wires of the lateral scanner laser are fine and well plugged.

7. ON GEO 6900P, B9850P AND 9855P, AT THE END OF THE BALANCING SPIN THE RIM WIDTH IS SHOWN IN RED AND THE BALANCER ALWAYS SELECTS THE CLIPS TYPE WEIGHT.

- Check if the sonar sensor is properly connected to the AWP or to motor driver board.
- Check if the cable is fine.
- Check if the connectors are fine.
- Check if the sonar is reading correctly.

CHAPTER 6
SERVICE CODES

6.1 INTRODUCTION

The service codes are used to:

- Calibrate module
- Change setting.
- Show and check measured values of screen of certain signals, system information.

6.2 TABLE OF SERVICE CODES

The service codes are not the same for all balancers. The box below indicates all service codes available for every balancer brand and the number behind the letter indicates the revision since this code is available.
as following:

- **U** : C code is available for the user
- **S** : C code is available for service operator
- **NA** : C code will be discontinued

C	Description	CRT,HNA, HWT	BOXER	JBEG
0	Set to default profile and settings	U/S	U/S	U/S
1	Resolution of unbalance readings	U		
2	Suppression of minor unbalance readings (0=off(default), 1=on)	U		
3	Measurement units of unbalance readings (0=grams(default), 1=ounces)	U		
4	Compensation of adaptor unbalance	U	U/S	U
5	Automatic braking when wheel guard is opened ATTENTION : SAFETY REQUIREMENTS	U		
6	Number of revolutions for measurement	U		
7	Volume of audible signals	U	U	U
8	Threshold value for suppression of minor unbalance readings in units selected with C3	U	U	U
9	Weight Miser function	U	U	U
10	**Save user settings**	U		
11	Position brake after measuring run	U	U	U
12	Indication of total numbers of measurement runs -> Type of counters depends on brand !	U	U	U
13	Starting measurement run by closing the wheel guard	U		
14	User calibration	U	U	U
15	GS: Enable motor tap for weight positioning on top		S	
17	RCL (recalling) of a profile	U		
18	STO (storing) of a profile	U		
19	Weight Miser Cumulated Counter	U	U	U
20	Weight Miser Temporary Counter	U	U	U
21	Indication of the program version number (= p52)	U	U	U
22	Lock power clamp in clamped position	U		
25	Non-volatile wheel data	NA		
26	Change pedal functionality (down= brake, up=(un)clamp or opposite)	U		
27	Set time for screensaver or disable screensaver.	CRT 2.2		
28	Display the last 10 error codes	U/S	U/S	U/S
29	Disable/enable AutoStopSystem	NA		
43	Reset counters	S	S	S
45	Set various parameters used by measurement runs	S	S (IBP)	S (IBP)
46	Selecting the private brand	NA		
47	Select machine model	S	S	S
48	Download of application to FLASH memory. (Needs special software version) Refer to chapter 5.4 for details how to program the balancer.	(S)		
50	Indication of voltage on distance analogue input	NA		

C	Description	CRT,HNA, HWT	BOXER	JBEG
51	Indication of voltage on diameter analogue input	NA		
52	Indication of voltage on width analogue input	NA		
53	Display test - Only balancers with digital display	S		
54	Checking the incremental encoder on the main shaft	S		
55	Indication the line voltage	S		
56	Indication of the circuit state of the wheel guard switch	S		
57	Indication of temperature	S		
58	Indication of balancing calculation values			
59	Indication of the residual unbalance compensated for using code C84	S		
60	Motor : Indication of RPM of main shaft Hand-spin : Measure amount of measuring turns (C84 simulation)	S		S
61	Indication of correction values for user calibration	S		
62	Indication of angular position [0,360) of unbalance weight.			
63	Continuous measurement (with statistics)	S	S	S
64	Indication of the transducer sensitivity as measured with C code 83	S		
65	Indication of phase differences and phase shifts			
66	Display calibration values as measured with C code 83 (virtual dimensions)	S	S	S
67	Display phase stability of the vibratory system as measured with C code 83	S	S	S
68	Indication of time to reach measurement speed during last measurement run			
69	Successive measurement runs with pauses and statistics	S 2.2	S	S
70	Test light for inner rim.	NA		
71	Display angular deviation of the vibratory system as measured with C code 83	S		S
72	Measurement of angular deviation	S	S	S
73	Indication of delay of solenoid brake			
74	Indication of position counter and basic incremental encoder test	S	S	S
75	Display values from AD converter	S	S	S
76	Indication of the voltages used by the 2 step motor control	S	S	S 4.19
78	Restarting the program with self test			
80	Calibration of the inner SAPE gauge arm and the AutoStopSystem	S	S	S
81	Measuring the adaptor flange and the zero plane.	S	S	S
82	Calibration of the outer SAPE.	S	S	S
83	Calibration of the unbalance measurement with wheel/test rotor.	S	S	S
84	Compensation of unbalance of main shaft	S	S	S
85	Copy content of serial EEPROM (EEP) from micro-controller EEP to incremental encoder EEP.	S	S	S
86	Copy content of serial EEPROM (EEP) from incremental encoder EEP to micro-controller EEP.	S	S	S
88	Calibration of the 12 o'clock position for fitting position of weights	S	S	S
90	**Saving the adjustments data in the PO's (CRT, HNA, HWT only)**	S		
92	Display of actual distance and diameter of inner SAPE/geodata	S		
93	Indication of line frequency.			
95	Test of serial line (RS-232-E).			
96	Indication of motor current.			
97	Conditioning of the solenoid brake	S		
98	Display of angular position of power clamp pulley, incremental encoder test (see C74).	S		
99	Disabling the plane separation calculator.			
100	Indication of the unbalance data in Cartesian coordinates.			
101	Indication of the vibrations picked up by the unbalance transducers as an effective value.			
102	Performing a measuring run and indication of harmonic contents of the unbalance signals	S		
103	Test of the transimpedance and unbalance signal amplifiers	S 2.3		
104	Test the RC time constant of the unbalance transducers	S 2.2		
105	Set the parameters for the HUMSR feature with an EMB	S 2.6		
106	Test watch-dog timer.			
107	Indication of the difference of the angular momentum of the motor			

C	Description	CRT,HNA, HWT	BOXER	JBEG
	between forward and reverse rotation.			
108	Test and measurement of the relay delays.			
109	Save service/user mode for next power-on.			
110	Indication of the operating voltages supplied by the power supply module.	**S**		**S 4.21**
111	Belt tension: Measure first harmonic of the belt.	**S 2.2**	**S 0.24**	**S**
115	Calibration of the unbalance measurement with test rotor only	**S**		**S**
120	Enable / disable the laser pointer (OPTIMA machines)	**Optima Optima 2 BFH1000 BFH2000**		
121	Set the geometric matching bead seat recommendation threshold (OPTIMA machines)	**Optima Optima 2 BFH1000 BFH2000**		
122	Position calibration of the OPTIMA hardware.	**Optima Optima 2 BFH1000 BFH2000**		
123	Display of the STATUS and DIAGNOSTIC flags of the OPTIMA sub-system and perform manufacturing/diagnostic tests.	**Optima Optima 2 BFH1000 BFH2000**		
124	Set the position of driver’s seat (left or right)	**Optima Optima 2 BFH1000 BFH2000**		
126	OPTIMA: enable / disable Accurate Profiling	**6900p 6900 -2p Optima Optima 2 b9850p b9855p b9855-2p BFH1000 BFH2000**		

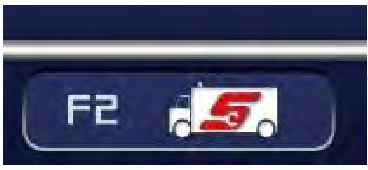
6.3 ENTERING C CODES AND OPTIONS

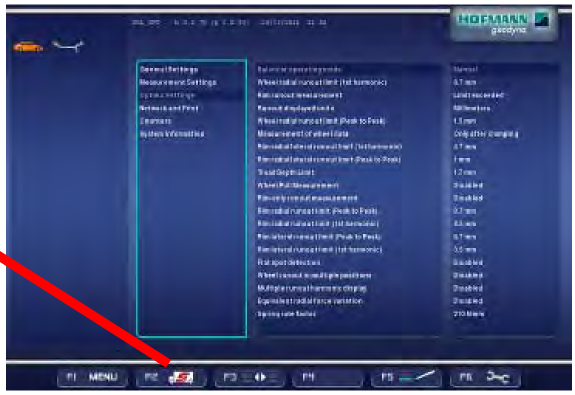
6.3.1 VIDEO BALANCERS WITH G.U.I. FROM 4.3.9.2 TO 4.4.9

- **C codes**

1. From the main screen open the F1 MENU, then select the voice “SETTINGS”.

2 Press three times F4 button and Service button will appear on F2.





3 Press the appearing button "Service" to go to the service code menu.
4 Turn the wheel or scroll with a finger the digital touch cursor to choose a service code.

5 Press F1 or OK to confirm the choice.

- **Options** Turn the wheel or scroll with a finger the digital touch cursor and choose an option of a C code.
Exceptions are C12, C21, C54, C61, C63, C64, C66, C72, C74, C98, as these codes either switch over to an alternative reading, or operation with wheel is no longer possible (C54, C63).

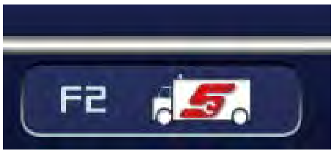
- **Acknowledge** Press ENTER key (F1) to acknowledge the option chosen.
- **Abort** Press STOP or ESC or F5 key to abort a C code.
- **Special function** Press the Optimisation key (F3) to activate extra functionality on some C codes (e.g. C28, C74, C75).
- **Measuring run** The START symbol invites the user to start a measuring run.

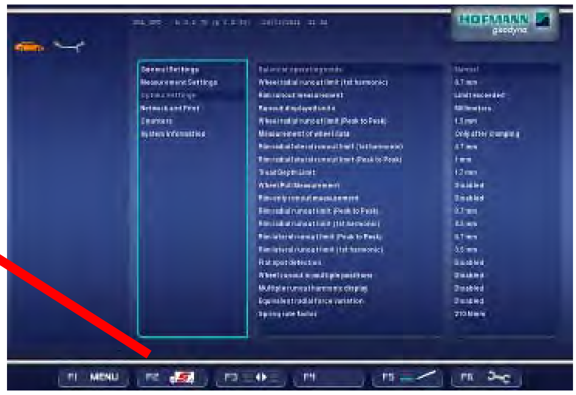
6.3.2 VIDEO BALANCERS WITH G.U.I. FROM 4.5.0

- **C code**

1. From the main screen open the F6 MENU, then select the voice “SETTINGS”.

2. Press three times F4 button and Service button will appear on F2.





3. Press the appearing button "Service" to go to the service code menu.
4. Turn the wheel or scroll with a finger the digital touch cursor to choose a service code.

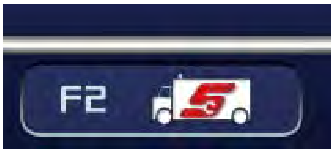
5. Press F1 or OK to confirm the choice.

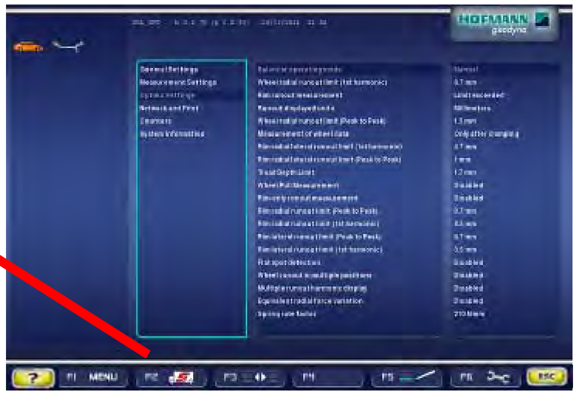
6.3.3 TOUCH SCREEN CRT BALANCERS WITH G.U.I. FROM 4.5.0

- **C code**

1. From the main screen open the F6 MENU, then select the voice “SETTINGS”.

2. Press three times F4 button and Service button will appear on F2.





3. Press the appearing button "Service" to go to the service code menu.
4. Turn the wheel to choose a service code.

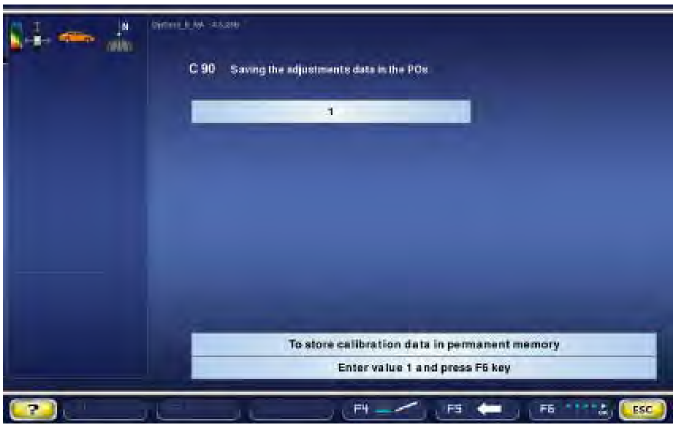
5. Press F1 or OK to confirm the choice.

Some Service Code (C90, C120, C123 …) require the selection of the step (action) to be executed.

Do this you pressing the right button (e.g F4)

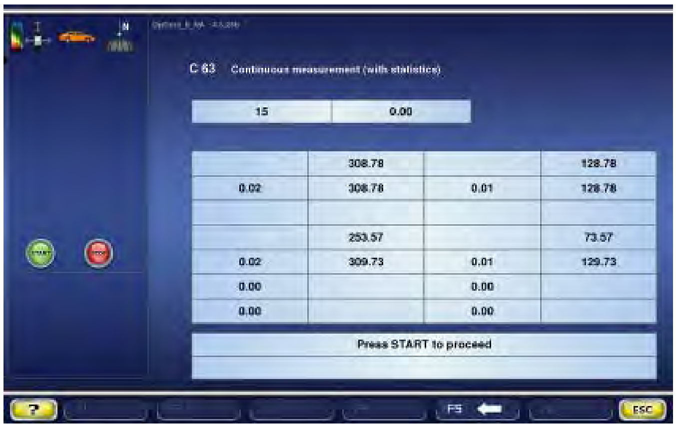
Then rotate the wheel to change the value

If the F4 button is press twice the rotation of the wheel is ignored



When a service code require Start and Stop buttons the appropriate icons are displayed on the screen

If the F4 button is press twice the rotation of the wheel is ignored



6.3.4 SCREEN BALANCERS WITH G.U.I UP TO 3.8.6

- **C code** In the function screen press the function selection button (F6) three times, then press the appearing button "Service" to go to the service code menu. Press "C-Code" key (menu key) and turn wheel to choose a service code.
- **Options** Press CODE key (F1) and turn wheel to choose an option of a C code. Exceptions are C12, C21, C54, C61, C63, C64, C66, C72, C74, C98, as these codes either switch over to an alternative reading, or operation with wheel is no longer possible (C54, C63).
- **Acknowledge** Press ENTER key to acknowledge the option chosen.

- **Abort** Press STOP or ESC key to abort a C code.
- **Special function** Press the Optimisation key (F3) to activate extra functionality on some C codes (e.g. C28, C74, C75).
- **Measuring run** The START symbol invites the user to start a measuring run.

6.3.5 SCREEN BALANCERS WITHOUT EPC

- **C code** In the function screen press the button (F5) three times.


Then press the appearing button "Service", button F1, to go to the service code menu.

- **Options** Press "Arrow left or right" key or turn the wheel to choose a service code.

- **Acknowledge** Press OK key to acknowledge the option chosen.
- **Abort** Press STOP or ESC key to abort a C code.
- **Special function** Press the Optimisation key (F4) to activate extra functionality on some C codes (e.g. C28, C74, C75).
- **Measuring run** The START symbol invites the user to start a measuring run.

6.3.6 BOXER DIGITAL BALANCER

- **C code** The service menu is accessed by holding down the "FINE" and "CAL" keys for 7 seconds and restarting the machine. At the first the "DIS 115" will be displayed and machine waits for input of rim data. Use "+ -" key for input of rim data. On machines with automatic sape the user can also use sape to input rim data. If no input is made, a default setting will be used (offset = 115 mm, rim width = 6.50 inch and rim diameter = 15 inch) .Press F key service code (C4) will be displayed and machine is now in state service code. Use "+ -" key to change service code. To select a service code press F key again.
- **Options** Press +/- keys to choose an option of a C code.
- **Acknowledge** Press F key to acknowledge the option chosen.
- **Abort** The service menu can be exited by pressing the "FINE" key. The display is cleared and a beep is generated.
- **Special function** not available
- **Measuring run** The START symbol invites the user to start a measuring run.

6.3.7 HWT DIGITAL BALANCER

- **User C code** Press C key and turn wheel to choose a **user** C code.
- **Service C code** Press C and weight placement keys and turn wheel to choose a **service** code.
- **Options** Press precision /FINE key and turn wheel to choose an option of a C code. Exceptions are C12, C21, C54, C61, C63, C64, C66, C72, C74, C98, as these codes either switch over to an alternative reading, or operation with wheel is no longer possible (C54, C63).
- **Acknowledge** Press C key to acknowledge the option chosen.
- **Abort** Press STOP or ESC key to abort a C code.
- **Special function** Various activities are accessible through the Optimisation key for various C codes (e.g. C28, C74, C75). Press the Optimisation key to activate the special function.
- **Measuring run** The START symbol invites the user to start a measuring run.

6.3.8 JBEG DIGITAL BALANCER

- **C code** The service menu is accessed by holding down the plus and minus keys for 7 seconds when the machine is idle. Note: The service menu is for service personnel only. Not for customers. The last service code used since power on is displayed. The service codes available can be accessed by using the plus and minus keys and selecting the desired code by pressing the return key.
- **Options** Press +/- keys to choose an option of a C code.
- **Acknowledge** Press Return key to acknowledge the option chosen.
- **Abort** The service menu can be exited by pressing the plus and minus keys together. The display is cleared and a beep is generated.
- **Special function** Not available.
- **Measuring run** Indicator not available.

6.3.9 TRUCK DIGITAL BALANCER

- **C code** The service menu is accessed by holding down the c-code and weight-placement keys. The user c-code menu is accessed by pressing the F-key and afterwards the c-code key.
  Note: The service menu is for service personnel only. Not for customers. The last

service code used since power on is displayed.
The service codes or c-codes available can be accessed by using the plus and minus keys and selecting the desired code by pressing the c-code key.

- **Options** Press +/- keys or precision /FINE key to choose an option of a C code.
- **Acknowledge** Press C key to acknowledge the option chosen.
- **Abort** Press STOP key to abort a C code.
- **Special function** Various activities are accessible through the Optimisation key for various C codes (e.g. C28, C74, C75). Press the Optimisation key to activate the special function.
- **Measuring run** Indicator not available.

6.3.10 GEO 960-b9400-S1280-b2560 DIGITAL BALANCER

- **C code** The service menu is accessed by holding down the c-code and weight-placement keys. The user c-code menu is accessed by pressing the F-key and afterwards the c-code key.
  Note: The service menu is for service personnel only. Not for customers. The last service code used since power on is displayed.
  The service codes or c-codes available can be accessed by using the plus and minus keys and selecting the desired code by pressing the c-code key.
- **Options** Press +/- keys or precision /FINE key to choose an option of a C code.
- **Acknowledge** Press C key to acknowledge the option chosen.
- **Abort** Press STOP key to abort a C code.
- **Special function** Various activities are accessible through the Optimisation key for various C codes (e.g. C28, C74, C75). Press the Optimisation key to activate the special function.
- **Measuring run** Indicator not available.

6.4 SAVING SETTINGS FOR MODES OF OPERATION AND CALIBRATION DATA

BOXER AND JBEG BALANCERS:
These balancers save modes of operation and calibration data are stored automatically into permanent memory.

HNA, HWT, TRUCK, MID RANGE AND CRT BALANCERS:

C10 : Save modes of operation (user settings)
C90 : save calibration data

Consequently C10 is available only for user C codes and C90 only for service C codes.

SYSTEM RESET:
The balancer is always reset after C47, C85, C86 have been carried out.

6.5 USER C CODE REFERENCE

C0 Load configuration from default profile

Options

0 : No action
1 : Set default values

Special function: None

Description: Pressing the Acknowledgment key resets the user settings to values defined under factory setting profile (default values). The chosen mode of operation can be transferred to the permanent memory The following modes of operation are activated simultaneously by pressing the Acknowledgment key.

Function	Status/value		Code
Unbalance display	dynamic		
Wheel dimensions	distance = 115mm (SAPE) = 165mm (geodata) diameter= 6.5", width = 14"		
Wheel type	car in inches	Type 1	
Weight placement	normal	nor.	
Resolution of unbalance readings	low	0	C1
Suppression of minor unbalance readings	on	1	C2
Measurement units of the unbalance readings	according to the model HWT: gram, HNA: ounces	HWT: 0 HNA: 1	C3
Compensation of adaptor unbalance	off	0	C4
Automatic braking on lifting the wheel guard	on	1	C5
Number of revolutions for measurement	5 - 25	10	C6
Volume of audible signal	0 - 100	50	C7
Threshold for unbalance suppression in grams/ounces according to C3	3.5 -20 g 0.12 - 0.71 oz	3.5 g 0.12 oz	C8
Position brake and indexing (R2.2 or higher)	on	1	C11
Start of measurement by closing wheel guard	off	0	C13
Actuation direction of pedal for clamping/releasing	lifting	0	C26
Time for screensaver (R2.2 or higher)	disabled	0	C27

Comments

C1 Resolution of unbalance readings

Options

0 : Low resolution
1 : High resolution

Special function: None

Description

Wheel type	Resolution of unbalance readings low	high	Suppression of minor readings
1, 2, 3, 6 (car)	5 grams	1 grams	threshold value x 1
4, 5 (light truck)	10 grams	2 grams	threshold value x 2
1, 2, 3, 6 (car)	0.25 ounces	0.05 ounces	threshold value x 1
4, 5 (light truck)	0.5 ounces	0.1 ounces	threshold value x 2

The selected mode of operation can be transferred to the permanent memory.

Comments: The asterisk “*“ marks the factory-adjusted default.

C2 Suppression of minor unbalance readings

Options:
0 : Suppression off
1 * : Suppression on

Special function: None

Description: In order to signal to the operator that the required balance quality for a correction plane has been reached, the unbalance below the threshold set using C8 will be read out as zero. In some cases this suppression may not be useful and can, therefore, be switched off temporarily using the precision/FINE key, or permanently using code C2.
The chosen mode of operation can be transferred to the permanent memory.

Comments: The asterisk “*“ marks the factory-adjusted default.

C3 Measurement units of unbalance readings

Options:
0 * : Readings in gram
1 ** : Readings in ounce

Special function: None

Description: The state defines the measurement unit of the unbalance readings (gram/ounce) active after power-on and execution of C0.
The chosen mode of operation can be transferred to the permanent memory.

Comments: The asterisk
“*“ marks the factory-adjusted default for HWT models,
"**" marks the default for the HNA models
0 * : Readings in gram
1 ** : Readings in ounce

C4 Compensation of adaptor unbalance

Options: None

Special function: None

Description: Set code C4, close the wheel guard and start an extended measuring run by pressing the START key. After the measuring run state switches automatically to 1, the adaptor symbol comes up and the mode is quit.
Resetting the state to 0 cancels compensation of adaptor unbalance.
Compensation is also cancelled by calibration, readjustment by the operator, an optimisation run or by turning off the machine.

Comments:

C5 Automatic braking when the wheel guard is opened

Options
0 : No braking when wheel guard is lifted
1 * : Braking when wheel guard is lifted

Special function: None

Description: With status = 0, there is no braking action when the wheel guard is raised; but the drive is switched off, so that lateral and radial run-out of the wheel can be observed. Safety goggles should be worn when doing so. If the wheel guard is raised before the measurement run has been completed and if the mode of operation «Starting a measurement run by closing the wheel guard» is set, the measurement run will be re-started on closing the wheel guard again. After completion of the unbalance measurement and observation of run-out, the rotation of the main shaft can be decelerated by pressing the STOP key.

The selected mode of operation can be transferred to the permanent memory.

Comments: The asterisk "*“ marks the factory-adjusted default.

C6 Number of revolutions for measurement

Options:
5 to 25 : Number of revolutions per measuring run
10 revs/run: Factory-adjusted value

Special function: None

Description
WARNING! Reducing the number of measurement revolutions will reduce the accuracy of measurement.
Measurement accuracy can be evaluated using test mode C63.
The chosen mode of operation can be transferred to the permanent memory.

Comments:

C7 Volume of audible signals

Options

0 to 100	: Volume (0 : low, 100 high)
50	: Factory-adjusted value

Special function: None

Description: The volume is not changed before the Acknowledgment key is pressed for quitting the mode.
The chosen mode of operation can be transferred to the permanent memory.

Comments: Not adjustable on John Bean b9005 and Snap On b2055.

C8 Threshold value for suppression of minor unbalance readings in units selected with C3

Options

3.5 - 20g	(0.12 - 0.71oz)	: Threshold value
3.5g	(0.12oz)	: Factory-adjusted value

Special function: None

Description: To set a new value use the option selection. Finally press the Acknowledgment key to acknowledge the entered value or press the Abort key to retain the former one.
To keep balance quality independent of weight placement, the *OK* indication is only visible if the unbalance readings for the **normal** balancing mode (balance clips on rim flanges) and the static unbalance are lower than the thresholds set via C8. Therefore the rim width must be known for a correct assessment of the balance quality (and for recommendation of optimisation).
If *OK* is displayed the unbalance readings will always be 0, irrespective of the selected balancing mode. If the precision/FINE key is now pressed to disable the suppression of minor unbalance readings temporarily, this

may result in unbalance readings that are higher than the threshold in other than the normal balancing mode. This is due to the fact that larger balance weights are usually required for adjacent correction planes and small diameters in the rim disc.
The threshold value can be transferred to the permanent memory.

Comments: The unit of measurement is chosen according to the one set with C3:

C3: gram -> C8 unit of measurement is also gram.
C3: ounce -> C8 unit of measurement is also ounce.
C9 is omitted.

C9 Weight Miser function

Options

Step 1 :	Weight Miser status (0 = disabled, default value; 1 = enabled) When step 1 is set to 0, other steps are not available
Step 2 :	Static threshold (5 – 10g, step 1g; 0.20 – 0.35oz, step 0.05oz; 5g default value)
Step 3 :	Dynamic threshold (10 – 30g, step 1g; 0.35 – 1.05oz, step 0.05oz; 10g default value)
Step 4 :	Clip weights money factor (1 – 999money/kg, step 1money/kg; same for money/lb; 20money/kg default value)
Step 5 :	Stick weights money factor (1 – 999money/kg, step 1money/kg; same for money/lb; 20money/kg default value)
Step 6 :	0 = default value; 1 = reset the temporary counters (shown by C20)

Special function: None

Description: Weight Miser is a feature wich allows to achieve wheel balancing using less (smaller) balancing weights. It must be very clear that the feature works assuming that some residual imbalance can be left on the wheel.
When the WM feature is enabled, it will provide:

- reduced amount of required weight, depending on the programmed thresholds (steps 2 and 3);
- **single weight** capability, whenever possible: if it is possible to reduce both static and dynamic imbalance below the given thresholds (steps 2 and 3) using a single weight, then a single weight will be recommended; if not, standard two-weight *Weight Miser* balancing will be proposed; depending on the type of imbalance present on the wheel, the single weight will be placed either to the left or to the right: this is determined by the unit SW and is not selectable by the operator;
- **auto static** mode, whenever possible: the unit determines if the dynamic imbalance is below the given fixed threshold (step 3); if this is the case, the unit automatically switches to the static balancing mode.

The weights and money saved are collected in C19 (cumulated counters) and C20 (temporary counters).

Comments: The unit of measurement is chosen according to the one set with C3.
GS and JBEG save changed values automatically into permanent memory.
HWT and HNA save changed values with C10.

When in the *Weight Miser* mode, the *Weight Miser* calculations above will be applied before displaying the imbalance values. The imbalance values shall also be rounded and the standard suppression threshold will be applied.

When in the *Weight Miser* mode, the fine button is available. When the fine button is pressed, the unit displays the original imbalance values, without *Weight Miser* correction, rounding and thresholds.

C10 Saving the user settings in the POs (permanent memory)

Options

0 *	:	No storage
1	:	Data is stored in the permanent memory

Special function: None

Description: Set code C10 to save user settings in the permanent memory. To do so, use the option selection to set 1. Acknowledge by pressing the Acknowledgment key.
All data so far temporary is stored in the permanent memory. This is acknowledged by a three-tone signal.
The following modes of operation will be stored by pressing the Acknowledgment key:

Function:

Function	Values	Code
Resolution of unbalance readings	low, high	C1
Suppression of minor unbalance readings	off, on	C2
Measurement units of the unbalance readings	gram, ounces	C3
Automatic braking on lifting the wheel guard	off, on	C5
Number of revolutions for measurement	5 - 25	C6
Volume of audible signal	0 - 100	C7
Threshold for unbalance suppression in grams/ounces according to C3	3.5 -20 g 0.12 - 0.71 oz	C8
Weight Miser preferences	off, on; 5 – 10g (0.20 – 0.35oz); 10 – 30g (0.35 – 1.05oz); 1 – 999money/kg (1 – 999money/lb); 1 – 999money/kg (1 – 999money/lb);	C9
Position brake and indexing (R2.2 or higher)	off, left right	C11
Start of measurement by closing wheel guard	off, on	C13
Static mode	off, on	C17
Unclamping of power clamp locked	off, on	C22
Actuation direction of pedal for clamping/releasing	lifting, pressing	C26
Time for screensaver (R2.2 or higher)	disabled, enabled	C27
Network protocol	none, ASA	---
Unclamping of wheel only if it is balanced (R3.2 or higher)	off, on	---

C11 Position brake after measuring run

Options

0 : No position brake after measuring run
1* : Position brake after measuring run for left plane
2** : Position brake after measuring run for right plane

Special function: None

Description: The position brake stops the main shaft in or near the correction position by initiating a braking pulse.
The position brake will be active after setting the **on** state and after a measurement run has been carried out with an unbalance display for the correction plane exceeding the threshold value.

Option = 1: After the measurement run the wheel is braked for the **left-hand** correction plane. If the unbalance in the left-hand correction plane is smaller than the threshold, the wheel will be braked for the right-hand correction plane.
Indexing of the wheel for the right-hand correction plane is initiated by pressing the START key while the wheel guard is open.

Option = 2: After the measurement run the wheel is braked for the **right-hand** correction plane. If the unbalance in the right-hand correction plane is smaller than the threshold, the wheel will be braked for the left-hand correction plane.
Indexing of the wheel for the left-hand correction plane is initiated by pressing the START key while the wheel guard is open.

With *p*-variants and manual indexing of the wheel with open wheel guard, a braking pulse will be initiated shortly before reaching one of the correction positions.
The selected mode of operation can be transferred to the permanent memory.

Comments: This feature is not available on: Geo 960, Geo 3900, Geo 3900S, b9400, b9655, b9655S, S1280, S1750, S1750S, b2560.
This feature is available in HWT R2.2 or higher
The asterisk "*" marks the factory-adjusted default for HWT and JBEG models.
Two asterisk "**" mark the factory-adjusted default for GS models.

C12 Recall counter - Only balancers with digital display

Options

1. SCREEN - none -
2. GS
1 : Total counter for all spins
2 : Counter for spins with OK
3 : Counter for spins with optimisation / minimisation
4 : Counter for spins in service mode
5 : Counter for spins since last calibration

3. HNA, HWT
(Only press the Option key, do not turn the wheel)
1 : Total number of measuring runs
2 : Number of measuring runs where balance quality was considered OK
3 : Number of optimisations or minimisations
4 : Number of measuring runs in service mode
5 : Number of measuring runs since the last calibration
6 : Total number of clamping operations (p models only)

4. JOHN BEAN
1 : Total spins counter.
2 : Resetable spin counter.
3 : User spins since last calibration counter.
4 : Service spins since last calibration.

Special function: None

Description: Various counter readings.

The SCREEN balancer has three lines in the menu "Modes of operation" to read out:
1. Total number of spins / spins with OK
2. Number of optimisation runs / clamping cycles
3. Number of measuring runs since last calibration / service

Comments: This mode has been adjusted to usual sequences of operation.

C13 Starting measurement run by closing the wheel guard

Options

0 : No start of measurement by closing the wheel guard
1* : Start of measurement by closing the wheel guard

Special function: None

Description: The chosen mode of operation can be transferred to the permanent memory.

Comments: The asterisk „*" marks the factory-adjusted default.

C14 User calibration

Options : None

Special function: None

Description: Re-calibration serves to compensate for sensitivity losses of the transducers.
Mount adaptor **without** calibration weight, wheel, clamping nut, centring cone and spacer ring on the main shaft.
With **p-variants,** attach the spacer ring, two small centring cones and clamping sleeve without the clamping head to the adaptor sleeve, and initiate the clamping operation. Set code C14.
With the **m-variant** mount the motorcycle wheel adaptor on the main shaft. Insert and tighten two driver bolts opposite to each other in the diameter range D3.

The following is displayed: 1. and the symbol of the START key.

Press the START key to start the first extended measuring run (twice as long as regular measuring run). (Instantaneous compensation of residual unbalance.)

The following is displayed after the run: 2. and the symbol of the START key.
Insert the calibration weight in the adaptor flange and press the START key to initiate the second extended measuring run.
With the **m-variant** insert and tighten a third driver bolt in the diameter range D1.

There is no third step as with the previous machine generations. Readjustment is completed after the measuring run of step 2 and the corrective factors determined are saved automatically.
Remove calibration weight and place in storage location.

Comments:

C17 Loading rim data from profile

Options: 1 to 4 (or 9) : Choosing the profile number

Special function: None

Description: A profile (1 – X) can be chosen by using the option selection.
The maximum number of profiles depends on the machine model (9 maximum).
Press the C key to load a stored wheel profile. This replaces the previously valid settings.
The following information is available (if applicable):
- Nominal wheel dimensions
- Values measured with the SAPE gauge arm
- Weight positions
- Wheel type
- Positions for relocation

Also see code C18.

Comments
New C code
The number of available profiles depends from the model.

C18 Saving rim data in profile

Options: 1 to 4 (or 9) : Choosing the profile number

Special function: None

Description: A profile (1 – X) can be chosen by using the option selection.
The maximum number of profiles depends on the machine model (9 maximum).

Press the C key to save a wheel profile.
The following information is available (if applicable):
- Nominal wheel dimensions
- Values measured with the SAPE gauge arm
- Weight positions
- Wheel type
- Positions for relocation
Also see code C17

Comments: The number of available profiles depends from the model.

C19 Weight Miser cumulated counters

Options
1. SCREEN - none -
2. HWT, HNA, GS, JOHN BEAN
1 : Weights saving (kg) : difference between original weight (weight necessary to balance the wheel, if WM is disabled) and WM weight
2 : Money saving (money) : calculated multiplying weights saving with money factor
3 : Weight Miser spins
4 : Weights saving (%)
5 : Money saving (%)
6 : Weight Miser spins (%)

Special function: None

Description: Various counters readings.

Comments: Performing C43 is the only way to reset these values.

C20 Weight Miser temporary counters

Options:
1. SCREEN - none -
2. HWT, HNA, GS, JBEG
1 : Weights saving (kg) : difference between original weight (weight necessary to balance the wheel, if WM is disabled) and WM weight
2 : Money saving (money) : calculated multiplying weights saving with money factor
3 : Weight Miser spins
4 : Weights saving (%)
5 : Money saving (%)
6 : Weight Miser spins (%)

Special function: None

Description: Various counters readings.

Comments: Execute step 6 of C9 to reset these values (or the C43).

C21 Indication of the program version & model number

Options: Indication of model designation

Special function: None

Description: Indication of program version number.
Press Option key to read out the model designation.
From IBP / Kernel Ver. 2.0: Press Optimization key to read out the Kernel Version of present Software.

Comments:

C22 Unclamping of power clamp locked

Options

0 * : Unclamping of power clamp device enabled
1 : Unclamping of power clamp device locked.

Special function: None

Description: The power clamp device is locked in clamped position.

Comments: The asterisk „*“ marks the factory-adjusted default.

C26 Change pedal functionality

Options

0 * : Lift pedal to clamp/unclamp
1 : Depress pedal to clamp/unclamp

Special function: None

Description: Actuation of the power clamping device can be set to the preference of the operator. Locking the main shaft is by moving the pedal in the opposite direction.
The chosen mode of operation can be transferred to the permanent memory.

Comments: The asterisk „*“ marks the factory-adjusted default.

C27 Disable or set time for screensaver (SCREEN only)

Options

0 to 60 : Time to enable screensaver in 5 minute steps. Zero "0" disables the screensaver.
0 : Factory-adjusted value (Screensaver disabled)

Special function: None

Description: The time is not changed before the Acknowledgment key is pressed for quitting the mode.
The chosen mode of operation can be transferred to the permanent memory.

Comments: This feature is available in HWT-CRT R2.2 or higher

6.6 SERVICE C CODES REFERENCE

C28 Display & clear error record

Options.

In step 1: Select one of the 10 malfunction code messages

In step 2: (Only Screen)
0 : Do not clear the error memory
1 : Clear the error memory.

Special function

In step 1 :
1. SCREEN : none
2. GS : none
3. HNA/HWT : display of memory location and number of incidents
4. JOHN BEAN : none

Description: The last 10 different malfunction codes are written into the error memory so that they can be called up and reported by the operator of the wheel balancer e.g. for remote diagnosis of malfunctions. The most recent malfunction code is written into memory location 1 and the previous error codes are shifted to the higher memory locations.
Display of internal error code (6 digits).
Use the option selection to proceed to the next error message (reading Err1 -Err10). If no error occurred, "---" is read out.

SCREEN: The reading comes up in a single line on the monitor:

Err1 -10	Error no.	Number of incidents	

Clearing the entire error memory (step 2):
Press the Acknowledgment key to proceed to step 2.
Use the option selection to choose “1” and acknowledge with the Acknowledgment key.

Comments:

C43 Reset counters

Options.

0 : No reset of counters
1 : Reset of counters.

Special function: None

Description: During first setting into operation in the factory the following counters and memories can be reset simultaneously using this code:

- Total number of measuring runs
- Number of measuring runs where balance quality was considered OK
- Number of optimisations and minimisations
- Number of measuring runs in service mode
- Number of measuring runs since the last calibration

The error memory which can be called up using C28 will not be reset. To this end please use C28.

Comments:

C45 Special Measuring Parameters

Options: None

Special function: None

Description: This C code define the start mode and automatically the necessary number of revolution for measurement.

The Special function can be read out one below the other:
In step **1**: The balancing time is reduce automatically in case the machine is able to measure it in the firsts revolutions of the spin.
0 : Disactivate the Adaptive Measuring Cycle
1 : Enable the Adaptive Measuring Cycle

In step **2**: Alternative algoritm to measure the 1st Harmonic of the unbalance.Faster then the previousi Fourier.
0 : Disactivate the Goertzel algorithm
1 : Enable the Goertzel algorithm

In step **3**: To reduce the acceleration of the spin avoiding excessive acceleration. Good for small wheels. Enable to default on 3900, 9400, 1280
0 : Disactivate the Soft Start Function
1 : Enable the Soft Start Function

In step **4**: Time among the reaching the balancing speed and the starting of the unbalance measurement. Measurement delay after spin up can be controlled, by chosen the preferred value. Default value is:
Motorized Wheel Balancer Machine - 0,8
Truck Wheel Balancer Machine - 1,5
Hand-Spin Wheel Balancer Machines - 2,5

Comments: This feature is available from BK Rev.2.0 or higher.
The selected mode of operation disappear when machine is turned off. To transfer the selection to the permanent memory perform a C90 code.

C47 Select machine model

Options: None

Special function: None

Description: Rotate the flange or scroll the digital slider to choice the balancer model.
Confirm the balancer model by pressing Acknowledgment key.

Comments: No further action is required.

C48 Download BK2 firmware to IBP board (SCREEN only, IBP only)

Options:
0 : No action
1 : Start firmware download to AWP board

Special function: None

Description: The download operation is started by pressing the Acknowledgment key when the value is “1”. Make sure the machine is not shut down during download operations.
Once download has been completed, the machine has an automatic reboot.

Comment: No further action is required.

C49 Download AWP firmware to AWP board

Options
0 : No action
1 : Start firmware download to AWP board
2 : Start firmware download to Motor Driver board.

Special function: None

Description: The download operation is started by pressing the Acknowledgment key when the value is “1”if the machine is equipped by AWP board or “2” if it is equipped by the Motor Driver board. .
Make sure the machine is not shut down during download operations.
Once download has been completed, the machine has an automatic reboot.
Comments: No further action is required.

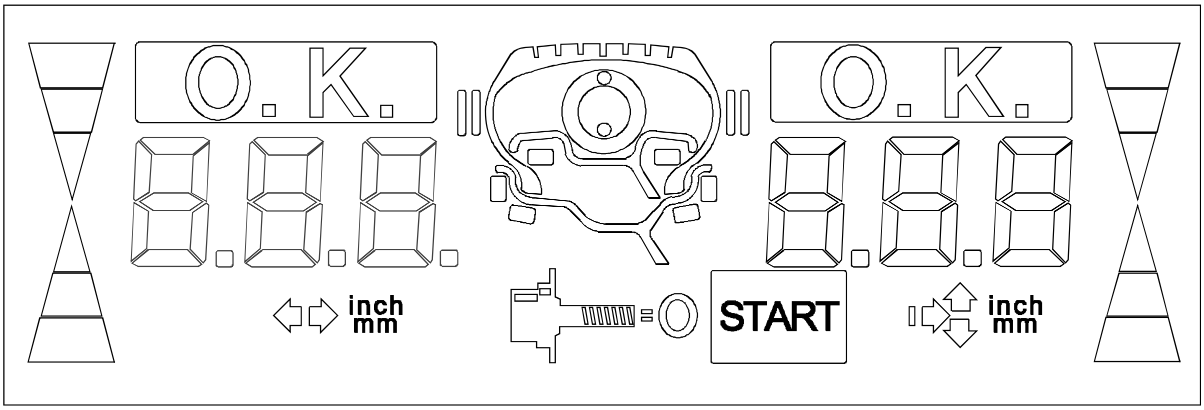
C53 Display test - Only balancers with digital display

Options : None

Special function : None

Description: Only machines with LC display:
All 80 segments of the LC display come up.

Comments



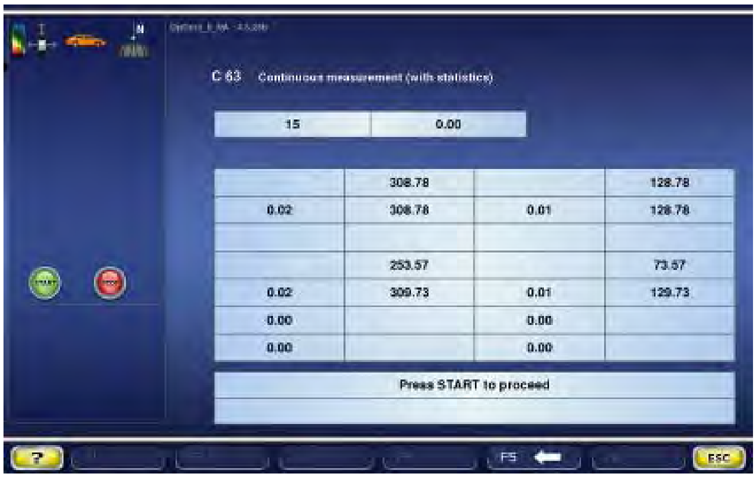
C54 Checking the incremental encoder on the main shaft

Options
Digital: Go to next step

Special function
Digital: Switch between average and min/max value.

Touch screen:
Start and Stop button are displayed
On the screen

Press the **Start** button to start the spin and press it **again** to stop the acceleration of the tire.



Display of measured data/measurement statistics for the incremental encoder/code bar

So that the opto-electronic unit and the code bar can be checked, the main shaft must rotate with constant speed. As proper performance of the opto-electronic unit is not ensured during execution of C54, speed and direction of rotation cannot be supervised.
So after the START key is pressed to call up the function, the motor is turned on and operated under full voltage and with the starting capacitor turned on until the START key is released. This should be done when the final speed is reached.
Once the START key is released the starting capacitor is turned off and motor voltage is reduced so that speed can be easily maintained.
If no signal is identified in one or both channels, no reading is given for the relative channel and for the phase shift.

Step	Description	min value [%]	average value [%]	max value [%]
1	A bar :	min	Avg From 40 to 60	max
2	B bar :	min	avg	max
3	A gap :	min	Avg From 40 to 60	max
4	B gap :	min	avg	max
5	A to B phase shift :	min	avg	max
6	N gap channel A :		biggest neighbour	N gap
			[%] of average gap around [-8...+8] of reference mark	
7	N gap channel A :	<=108	From 160 to 220	
8.1	Number of increments	Number of invalid measurements	256 or ---	256 or ---

The values for 1-6 are read out in per-cent of the average bar/gap in the average cycle time.

Channel B is not measured
The values for 7 are read out in per-cent of the average gap width in the interval [-8 .. +8] around zero reference.
The values for 8 are counts and in case of malfunction additional error codes.
With digital machines the minimum and maximum values are read out upon operation of the Special function key, the Option key is used to proceed to the next value.

Comments: On screen models all values are read out simultaneously.
Step 8 is available in truck wheel balancers R2.6 or higher.

From IBP / Kernel Ver. 2.0: the value 0 appears on channel B at steps 2, 4, and 5 of the program.

More detailed information about step 8 :

Cases of indication with digital display in step 8:

LH display	RH display	Increment count channel A	Increment count channel B	Malfunction
8.	---	Not analyzed	Not analyzed	No
8.	256	256	256	No
8.-	256	256	256	Yes
8.-A	256	256	Not analyzed	Yes
8.-A	XXX	XXX	Not analyzed	Yes
8.-A	XXX	XXX	256	Yes
8.-A	XXX	XXX	YYY	Yes
8.-B	256	Not analyzed	256	Yes
8.-B	YYY	Not analyzed	YYY	Yes
8.-B	YYY	256	YYY	Yes

Table legend: "XXX", "YYY": Number different from 256; 0 has the special meaning: 2nd zero mark was not detected, but should have been.
"Not analyzed": Due to the limited range of memory, increment data of only 1.5 revolutions is stored. The probability that two zero marks fall inside the 1.5 revolutions range, is 50 %. With only one zero mark detected inside the range, the data recorded cannot be analyzed.

LH display group

Reading	Meaning
8.__	Step 8 of Test function C54 active
__-_	Divergence between channel A and channel B
___A	RH display is count of channel A
___B	RH display is count of channel B

Display while optimization button is pressed : While the optimisation button is kept depressed, the LH display will show the number of measurements differing from 256. The RH display shows the total number of valid measurements.
If the total number exceeds 999, further measurements have no effect on the sums.

C55 Indication of the line voltage

Options: None

Special function: None

Description: Indication of line voltage

Comments: Please refer to chapter 05.12.3 ERROR ID (800, 801, 804) for the limits.

C56 Indication of the circuit state of the wheel guard switch

Options None

Special function: None

Description: The wheel guard switch is assigned to the hundreds digit, the micro-switch actuated by depressing the pedal to the tens digit and the micro-switch actuated by lifting the pedal to the units digit. This test function can be used to determine the angle at which the wheel guard switch trips.

0 : off (released)
1 : on (activated)

0/1	0/0	0/0
Switch wheel guard	Depress pedal	Switch

Comments: After exit C56, turn off and on again the balancer to able the foot controls.

C57 Indication of the temperature

Options: None

Special function: None

Description: Indication of temperature in centigrade (°C)

Comments: Please refer to chapter 05.12.3 ERROR ID (580, 581, 585, 586) for the limits.

C59 Indication of the residual unbalance of main shaft compensated for using C84

Options: None

Special function: None

Description: Indication of the residual unbalance of the main shaft compensated for using C84

Comments:

C60 Indication of RPM of main shaft (Motorised models only)

Options: None

Special function: None

Description: Once this code is called up "---" is read out in the right display.
As soon as measured data is available, the current speed is read out.

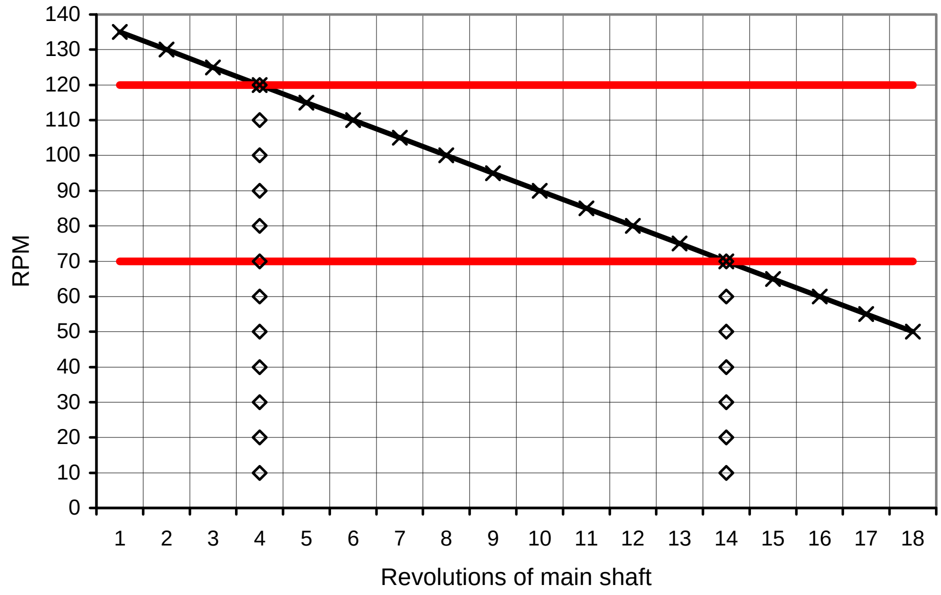
Comments: Motorised wheel balancers only.

C60 Indication of RPM of main shaft (Hand-spin models only)

Options: None

Special function: None

Description: Once this code is called up "1." is read out in the right display.
Spin up the main shaft to start the measure. If the speed is higher than 120 RPM the measure starts and the display shows “---”.
When the speed drops below 70 RPM the measure ends and the display shows the amount of measuring runs performed during the slow down.
The measuring run can be repeated until ESC key is pressed to exit or C-Code key is pressed to go to the next step.
This service function is for simulating a C84 measuring run. This means the operator starts a measuring run like for a C84 (only main shaft & flange) and gets the amount of measuring turns displayed afterwards. The wait time after acceleration is as for the C84 (1 second) and the speed range for the measurement is from 120 RPM down to 70 RPM.
In the example below the result is "10", because the machine was able to perform 10 measuring turns between 120 and 70 RPM.



Press C-Code key to enter in Step 2.
The measure performed in this Step calculates the amount of time elapsed in the slow down of the main shaft, from 200 RPM to stand still.
Once C-Code key is pressed “2.” is read out in the right hand display.
Spin up the main shaft to start the measure. If the speed is higher than 200 RPM the machine emits a beep and the display shows “---”.
The measure starts when the speed slows down to 200 RPM.
The display shows in the left hand side the actual speed of the shaft (expressed in RPM) and in the right hand side it shows the time elapsed since the measuring run is started (expressed in seconds).
After the counter shows 12 seconds (12 seconds from the measure starting) a beep is emitted.
When the shaft slows down to stand still the measure ends and the display shows the time elapsed.
The measuring run can be repeated until ESC key is pressed to exit.

Comments: Hand-spin wheel balancers only.

C61 Indication of the correction factors for user calibration

Options.
Digital machine : Press the Option key to switch over between the factors of the two transducers.
SCREEN machine : None

Special function: None

Description: Indication of the correction factors for user calibration.
The correction factors determined during user calibration are read out in form of 6 digits.

SCREEN: The correction factors determined during user calibration for the rear and front transducer are read out in form of 6 digits.
1. Field : Rear transducer
2. Field : Front transducer

HWT/HNA:
Press the Option key to switch between left and right transducer. The relative measuring plane is signalled through the direction indicator.

Comments:

C63 Continuous measurements - balancers with digital display

Options:
(Only press Option key without turning the wheel)
1. Amount of unbalance of both correction planes
2. Amount of unbalance plus angular location in degrees for left-hand correction plane
3. Amount of unbalance plus angular location in degrees for right-hand correction plane.
   (The relative correction plane is signalled through the direction indicator).

Special function:
1. Number of measurements carried out during the test with code C63.
2. The mean of unbalance plus angular location in degrees.
3. The mean of vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.
4. The maximum vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.

Description:
Mount an unbalanced wheel on the shaft.

Set code C63 and press the START key to carry out continuous measurements.

Minor unbalance readings are not suppressed, but read out in high resolution. For readings in gram the amount of unbalance is read out in floating point format.
After the first measuring run the Option key can be pressed to switch over readings (see options). The original reading is restored the third time the Option key is pressed.
The following values can be read out successively by pressing the Special function key:
1. Number of measurements carried out during the test with code C63.
2. The mean of unbalance plus angular location in degrees of the measurements carried out so far, whereby the plane is signalled by the direction indicator (inner side).
3. The mean of unbalance plus angular location in degrees of the measurements carried out so far, whereby the plane is signalled by the direction indicator (outer side).
4. The mean of vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.
5. The maximum vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.

After pressing the Special function key a fifth time the number of measurements carried out so far will be shown again.
By pressing the Option key the standard display of values is selected again.

Comments: The options and the special functions are still available after braking the measuring run with the STOP key. The angular position of the unbalance will be indicated. The C-Code will be exited by pressing the STOP key a second time.

C63 Continuous measurements - balancers with screen

Options: None.

Special function:
1. Number of measurements carried out during the test with code C63.
2. The mean of unbalance plus angular location in degrees.
3. The mean of vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.

The maximum vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.

Description:
Mount an unbalanced wheel on the shaft.

Set code C63 and press the START key to carry out continuous measurements.

Minor unbalance readings are not suppressed, but read out in high resolution. For readings in gram the amount of unbalance is read out in floating point format.

Until V2.2:

After the first measuring run the amounts of unbalance plus angular locations in degrees of both correction planes are read out in a single line on the screen as follows:

1. Field: Amount of left-hand correction plane
2. Field: Angular location of left-hand correction plane
3. Field: Amount of right-hand correction plane
4. Field: Angular location of right-hand correction plane

The Special function key can be pressed to proceed to display of statistical evaluations so that the following data is read out one below the other:

1. Number of measurements carried out during the test with code C63.
2. The mean of unbalance plus angular location in degrees.
3. The mean of vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.
4. The maximum vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.

Press the Option key again to return to standard display

V2.3 and later:

After the first measuring run the amounts of unbalance plus angular locations in degrees of both correction planes are read out in a single line on the screen as follows:

- First line:
  1. Field: Number of measurements carried out during the test with code C63
  2. Field: angular position of the main shaft (only available after Stop)
- Second line intentionally left free
- Third line: angular distance to the angular location(only available after Stop)
  2. Field: Angular location of left-hand correction plane
  4. Field: Angular location of right-hand correction plane
- Fourth line:
  1. Field: Amount of left-hand correction plane
  2. Field: Angular location of left-hand correction plane
  3. Field: Amount of right-hand correction plane
  4. Field: Angular location of right-hand correction plane
- Fifth line intentionally left free
- Sixth line: angular distance to the mean angular location (only available after Stop)
  2. Field: Angular location of left-hand correction plane
  4. Field: Angular location of right-hand correction plane
- Seventh line: The mean of unbalance plus angular location in degrees
  1. Field: Amount of left-hand correction plane
  2. Field: Angular location of left-hand correction plane
  3. Field: Amount of right-hand correction plane
  4. Field: Angular location of right-hand correction plane
- Eighth line: The mean of vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9
  1. Field: Amount of left-hand correction plane
  3. Field: Amount of right-hand correction plane
- Ninth line: The maximum vectorial deviation of the measured mean of unbalance after the number of measurements exceeded 9.
  1. Field: Amount of left-hand correction plane
  3. Field: Amount of right-hand correction plane.

Comments: The options and the special functions are still available after braking the measuring run with the STOP key. The angular position of the unbalance will be displayed above the unbalance values. The C-Code will be exited by pressing the STOP key a second time.
The options and the special functions are no longer available with V2.3.

C64 Indication of the transducer sensitivity as measured with code C115

Options:
Digital machine : Switching over between the two virtual distances of the transducers
SCREEN machine : None

Special function: None.

Description: The readings refer to amplification factors which were determined during the latest calibration of unbalance measurement using code C83 or C115. The higher the sensitivity of the transducer, the lower is the amplification factor. Press the Option key to switch over between rear and front transducer.

On Digital balancers the amplification factor of the rear transducer is indicated first.

On car balancers the amplification factors must be as follows:
Rear transducer: 595-950
Front transducer: 25-135

On truck wheel balancers the amplification factors must be as follows:
Rear transducer: 740-1000
Front transducer: 45-115

Comments: The shown values are those calculated in the latest calibration performed, not those saved from the latest C90.

C66 Display calibration values as measured with C code 115 (virtual dimensions)

Options.
Digital machine : Switching over between the two virtual distances of the transducers
SCREEN machine : None

Special function: None.

Description: Values for both transducers in mm.
Reference mark is the zero reference of SAPE (SAPE in home position for 1D and 2D SAPE)

Values for both transducers in mm.
Reference mark is the zero reference of SAPE (SAPE in home position for 1D and 2D SAPE, right-hand edge of machine cabinet for geodata)

CABINET S2 AND M2
On Digital balancers the virtual distance of the rear transducer is indicated first.
Reading with CRT machine:
1. Field : Rear transducer: 212 - 226
2. Field : Front transducer: -1500 to -10000

B9855p – S1250
On Digital balancers the virtual distance of the rear transducer is indicated first.
Reading with CRT machine:
1. Field : Rear transducer: 216 - 230
2. Field : Front transducer: -1500 to -10000

Geo 6300p, 6800p, 6900, Optima:
On Digital balancers the virtual distance of the rear transducer is indicated first.
Reading with CRT machine:
1. Field : Rear transducer: 226 - 272
2. Field : Front transducer: -1500 to -10000

TRUCK BALANCERS
On Digital balancers the virtual distance of the rear transducer is indicated first.
Reading with CRT machine:
1. Field : Rear transducer: 280 - 295
2. Field : Front transducer: 2400

Comments: The shown values are those calculated in the latest calibration performed, not those saved from the latest C90.

C67 Display phase stability of the RPI system as measured with C code 115

Options:

Digital machine : Switching over between
- the distance-dependant phase shift of the rear transducer and
- the phase shift between the rear and front transducers

SCREEN machine : None.

Special function: None.

Description: On Digital balancers the distance-dependant phase shift of the rear transducer is indicated first.

Reading with screen balancers:
1. Field : distance-dependant phase shift of rear transducer
2. Field : phase shift between rear and front transducers.

Comments: The shown values are those calculated in the latest calibration performed, not those saved from the latest C90.

C69 Successive measuring runs with pauses

Options.

In step 1:
0 to 50 : First pause, which simulates the weight application (init value = 50 seconds).

In step 2:
0 to 170 : Second pause, which simulates the (un)clamping of the wheel (init value = 170 seconds)

In step 3: Only models with power clamp
0 : Do not unclamp/clamp the wheel
1 : Unclamp/Clamp the wheel after the second pause.

Special function: please refer to the service function C63

Description:
Mount an unbalanced wheel on the shaft.
Displayed values and usage of this service function is the same as service code 63, with the except of the pauses and the unclamp/clamp cycle.

Comments: This feature is available in HWT R2.2 or higher.

C71 Display angular deviation of RPI system as measured with C code 115

Options.

Digital machine : Switching over between rear and front transducers
SCREEN machine : None.

Special function: None.

Description: Values for both transducers.

On Digital balancers the value for the rear transducer is indicated first.

The value of the left display must be from 177 to 182 and from 178 to 182 on the right one.

Reading on screen machine must be:
1. Field : Rear transducer 178-182
2. Field : Front transducer 358-002Reading with screen machine:

Comments: The shown values are those calculated in the latest calibration performed, not those saved from the latest C90.

C72 Measurement of angular deviation

Options.
Digital machine : Switching over between rear and front transducers
SCREEN machine : None.

Special function: None.

Description
1. Remove wheel or test rotor and centring cone from the adaptor.
   With p variants fit the spacer bushing, the medium centring cone and the clamping sleeve without clamping head onto the bushing and carry out clamping operation.
   Set code C72.
2. Press START key in order to initiate temporary compensation of unbalance.
3. Insert the user calibration weight into the adaptor flange so that it extends to the left and press the START key.
4. Insert the user calibration weight into the adaptor flange so that it extends to the right and press the START key.
   After three measuring runs the angle for the rear transducer is read out.

The step numbers are indicated on the left display:
angle = arg(2^{nd} measuring run – 1^{st} measuring run) - arg(3^{rd} measuring run – 1^{st} measuring run)

Display on screen balancers:
1. Field : Rear transducer
2. Field : Front transducer

If C90 is performed, the shown values are saved in two new persistent objects:
p541 : Rear transducer
p542 : Front transducer.

Comments: values saved in two new persistent objects.

C74 Display of angular position of main shaft, incremental encoder test

Options:
Digital machine : Switching over between position reading and reading of incremental encoder flags, and vice versa
SCREEN machine : None.

Special function: Reset of incremental encoder flags

Description: Once this code is called up, the angular position and incremental encoder status register are display continuously.
On digital machines the angular position is displayed in initially. Pressing the Option key toggles the right-hand display between angular location and status register.
On CRT machines the angular location is read out at the right-hand side and the status register at the left-hand side simultaneously.
For a short test turn the main shaft at least 2 turns in both directions, the status register then must show **23F**. For detailed status information see below.

Angular position:
As long as the incremental encoder has not jet synchronized with the zero reference, the angular location reading is "- - -".
After synchronization the angular position is display as a value in a range between 0 and 511.

Status register:
The status register is read out in form of a three-digit hexadecimal code XYZ:
X signals the status of the incremental encoder:

0	not initialised (only in case of an software malfunction)
1	not synchronised
2	synchronised

YZ covers the 8 flags er, ev, sr, sv, ba, ab, b, a

a	A channel signal available
b	B channel signal available
ab	phase sequence channel A before B identified (reverse rotation)
ba	phase sequence channel B before A identified (foreward rotation)
sv	zero reference identified in forward rotation
sr	zero reference identified in backward rotation
ev	synchronising error in forward rotation
er	synchronising error in backward rotation

Pressing the Special Function key will reset the YZ part of the reading to 00, the X part will not be reset.

Characteristic values of the status register (YZ part)

-00	after switching power on (main shaft not moved at all), or after pressing the Special function key
-07	after 2 turns backward → A- and B channel signals are OK, but there is no synchronisation in backward direction
-0b	after 2 turns forward → A and B channel signals are OK, but there is no synchronisation in forward direction
-1b	after 2 turns forward backward → A and B channel signals are OK, synchronisation in forward rotation is OK as well.
-1F	after 2 turns in each direction → A and B channel signals are OK, but synchronisation was made in forward direction **only**
-27	after 2 turns backward → A and B channel signals are OK, synchronisation in backward direction is OK as well
-2F	after 2 turns in each direction → A and B channel signals are OK, but synchronisation was made in backward direction **only**
23F	**Incremental encoder was rotated by more than 2 turns in each direction and performs properly.**
>-40	Synchronisation error in forward direction
>-80	Synchronisation error in backward direction.

Comments: If this test fails (no 23F) please check

- the cabling of the opto electronic – micro-controller
- the connectors of the cable
- clean the incremental encoder sleeve

C75 Display values from AD converter

Options: Choosing the AD channel

Special function

Digital machine : Display of original channel number and of the multiplexed channel
SCREEN machine : None.

Description: Display: Display of voltage in Volts

AD input	Channel	Description	
AdC 0	0.0	Free	
AdC 1	1.0	fLED-CW	LED current control
AdC 2	2.0	Free	
AdC 3	3.0	fBAL-TMP	Temperature of transducer (analog version if present)
AdC 4	4.0	Free	
AdC 5	5.0	Free	
AdC 6	6.0	Free	
AdC 7	7.0	fBAT	Supply voltage control (handspin)
AdC 8	8.0	fPOt-WHO	Width potentiometer
AdC 9	9.0	fPOT-OFS	Distance/extraction potentiometer
AdC 10	10.0	fPOT-DIA	Diameter/angle potentiometer

AdC 11	11.0	Free	
AdC 12	12.0	VCC-W	½ voltage of +5V supply
AdC 13	13.0	fLINE-V	Mains voltage control
AdC 14	14.0	Free	
AdC 15	15.0	Free	
AdC 16	5.0	VDisp	Supply voltage of display board (=VCC-W)
AdC 17	6.0	Free	
AdC 18	5.1	Free	
AdC 19	6.1	Free	
AdC 20	5.2	VDisp*	Supply voltage of display board (=VCC-W)
AdC 21	6.2	VAssStat*	Voltage on capacitor of AutoStopSystem
AdC 22	5.3	Free	
AdC 23	6.3		
AdE 1	AE1		External AD converter (rear transducer)
AdE 2	AE2		External AD converter (front transducer)

* via multiplexer on the power interface

Free: 0.0V will be displayed

Reading with SCREEN machine: 1. Field 2. Field 3. Field
AD input Channel Voltage.

Comments: Voltage Range is: 0.0 - 3.3V for ELECTRONIC BOX

C80 Calibration of the inner SAPE gauge arm and the AutoStopSystem

Options: None.

Special function: None.

Description:

1D SAPE CALIBRATION:

Step 1: Move gauge arm to calibration position 1 and adjust extraction potentiometer mechanically. Press acknowledge key to confirm step 1.

Gauge arm fully returned to home position. The reading for **distance sape** must be: 3.10 – 3.15V	

Step 2: Move gauge arm to calibration position 2. Press acknowledge key to confirm step 2.

Gauge arm extended to max extension. This depends on the model.	

Comments: Save the calibration data in the the permanent memory using code C90

2D SAPE CALIBRATION:

Step 1: Move gauge arm to calibration position 1 and adjust the distance potentiometers mechanically
On display balancers the voltage of the distance potentiometer is indicated in the right 3-dig display.

Gauge arm fully returned to home position. The reading for **distance sape** must be: 3.10 – 3.15V	

Place the gauge arm to the flange edge and adjust the diameter potentiometers mechanically.
On display balancers the voltage of the diameter potentiometer is indicated in the left 3-digit display.

Place the arm to flange edge. The reading must be: 2.60 – 2.63V	

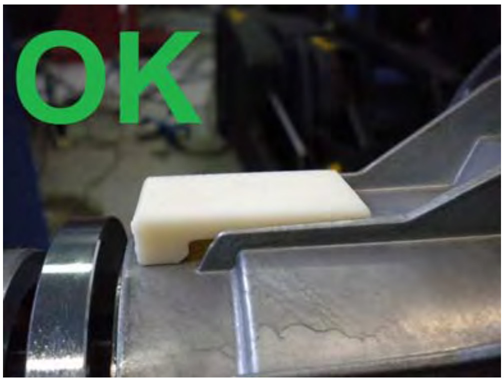
Move gauge arm to calibration position 1 and adjust extraction potentiometer mechanically. Press acknowledge key to confirm step 1.

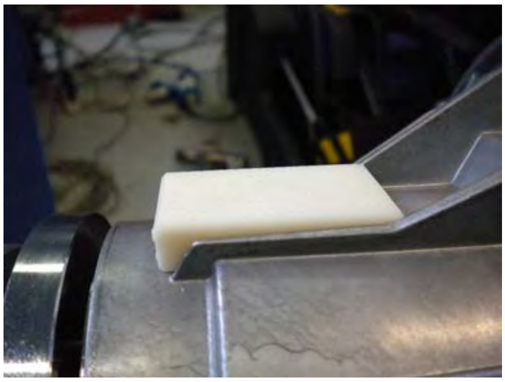
Gauge arm fully returned to home position.	

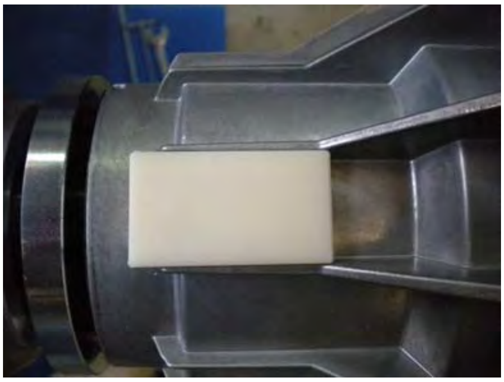
Step 2: Move gauge arm to calibration position max extension: Press acknowledge key to confirm step 2.

Gauge arm extended to max extension. This depends on the model.	

Step 3: Place the spacer in between the reinforcements of the flange.







Move gauge head to calibration position 4. Press acknowledge key to confirm step 3.

Position 1 of calibration template, or head of calibration weight	 

Step 4: Move gauge head to calibration position 4. Press acknowledge key to confirm step 4.

Position 2 of calibration template, or tip (screw) of calibration weight	 

Note: For BK 2.x or higher, ASS Calibration is **NOT PRESENT**. Calibration is completed at Step 4.

GEODATA ARM CALIBRATION ON STEEL VIBRATORY ASSEMBLY:

Step 1: Move gauge arm to calibration position 1 and adjust **diameter** potentiometer mechanically:
On screen balancers the voltage of the diameter potentiometer is indicated in the left 3-digit display. The voltage of the distance potentiometer is indicated in the right 3-digit.
On display balancers the voltage of the diameter potentiometer is indicated in the right 3-digit display. The voltage of the distance potentiometer is indicated in the left 3-digit.
Re-place gauge arm in home position (if necessary fit the weight box).
Press acknowledge key to confirm step 1.

Halfcone tip under gauge head applied to calibration groove in vibratory system. The **diameter** reading must be: • 0.10 – 0.14V	
Gauge arm fully returned to home position. The **distance** reading must be: • 0.10 – 0.14V	

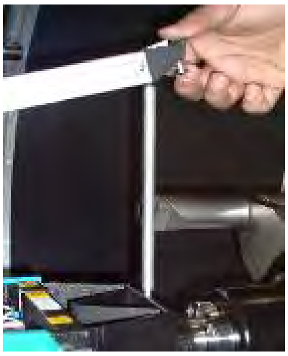
Step 2: Move gauge arm to calibration position 2. Press acknowledge key to confirm step 2.

Gauge arm extended to 300mm. The reading must be: • 3.11 – 3.15V	

Step 3: Move gauge head to calibration position 3 (notch in vibratory system).
Press acknowledge key to confirm step 3.

Reference notch in vibratory system	

Step 4: Move gauge head to calibration position 4 (with calibration bar).
Press acknowledge key to confirm step 4.

Reference notch in vibratory system.	

From software 3.0.60 end of calibration

GEODATA ARM CALIBRATION ON ALUMINIUM VIBRATORY ASSEMBLY

Step 1: Place the adapter on vibratory assembly.

Move gauge arm to calibration position 1 and adjust **diameter** potentiometers mechanically:
On screen balancers the voltage of the diameter potentiometer is indicated in the left 3-digit display. The voltage of the distance potentiometer is indicated in the right 3-digit.
On display balancers the voltage of the diameter potentiometer is indicated in the right 3-digit display. The voltage of the distance potentiometer is indicated in the left 3-digit.
Re-place gauge arm in home position (if necessary fit the weight box).
Press acknowledge key to confirm step 1.

Halfcone tip under gauge head placed on calibration notch of the thermo format adapter. The **diameter** reading must be 0.10 – 0.14V on the right display	

Gauge arm fully returned to home position. The **distance** reading must be: • 0.10 – 0.14V	

Step 2: Move gauge arm to calibration position 2. Press acknowledge key to confirm step 2.

Gauge arm extended to 300mm. The reading must be: The reading must be 3.11V - 3.15V	

Step 3: Move gauge head to calibration position 3 (notch in plastic adapter). Press acknowledge key to confirm step 3.

Halfcone tip under gauge head placed on calibration notch of the thermo format adapter	

Step 4: Move gauge head to calibration position 4 (with calibration bar). Press acknowledge key to confirm and quit the calibration.

Use the calibration bar.	

Comments: The calibration data can be saved in the permanent memory using C90 code

C81 Measuring the adaptor flange and the zero plane

Options: None

Special function: None

Description:
To keep the machine operative and to allow width measurement in case the gauge arm is defective, the distance SAPE will be calibrated relative to the clamping surface of the adaptor on the condition that the gauge arm has already been calibrated. Having applied the gauge arm to the outer edge of the adaptor flange, press the Acknowledgment key to acknowledge the input. No further inputs are necessary.

Comments: Save the calibration data in the the permanent memory using code C90.

C82 Calibration of the outer SAPE

Options : None

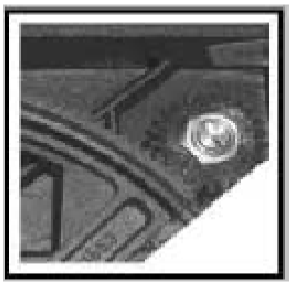
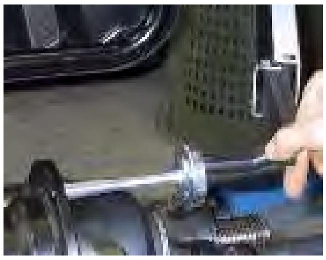
Special function: None

Description: When the outer gauge arm is calibrated the inner gauge arm must already have been calibrated and the position of the adaptor flange and zero plane must already have been measured.
There is a raised mark on the toothed wheel of the outer gauge arm which should point towards the first tooth of the toothed segment when the gauge arm is in its home position.

Step 1: Move gauge arm to calibration position 1 and adjust the potentiometer mechanically such that the voltage indicated below is read out.
Press acknowledge key to confirm step 1.
Step 2: Move gauge arm to calibration position 2. Press acknowledge key to confirm step 2.
Step 3: Move gauge arm in calibration position 3. Press acknowledge key to confirm step 3.

Calibration positions
Position 1: Home position
Position 2: Clamping surface of adaptor
Position 3: Head of calibration weight, fitted to adaptor flange from the right.

Comments: The calibration data can be saved in the permanent memory using code C90.

Step/Position 1	Step/Position 2	Step/Position 3
		

Readout Voltage Range in home position: 3.14 – 3.17V for IBP

C82 Calibration of the outer SONAR

Options : None

Special function: None

Description: Before performing the C82, it is mandatory to perform C80 and C81.

1. Mount the calibration rotor with the bracket downward at 6 o'clock.
2. The calibration tool must oriented at 12 o'clock.
3. Position the wings of the nut horizontally in order to avoid any interference with the sonar.

4. Press "OK" to begin the C82.

Step 1
The screen shows the value (distance among sonar to calibration tool) stored in the PO from the last C82.
Press “OK” button.

Step 2
Lower the wheel guard.

Then the sonar will try to acquire 3 valid measurement emitting one beep every second: when acquired the screen will show the green arrows.

Take a meter and make sure that distance shown in the screen will be comparable with the one done manually.

Reapeat the acquiring procedure 3 times to make sure that the value acquired will be stable.

Press “OK” to confirm the value.

Comments: Perform C90 to store the calibration

C83 Calibration of the unbalance measurement with wheel/test rotor.

Options: None

Special function: None

Description: With the calibration of the unbalance measurement the following are determined:
- the sensitivity of the transducers,
- the phase difference of the transducer signals,
- the comparative data for readjustment by the operator and temperature compensation
- the phase shift of the unbalance signal amplifiers and
- the angular deviation

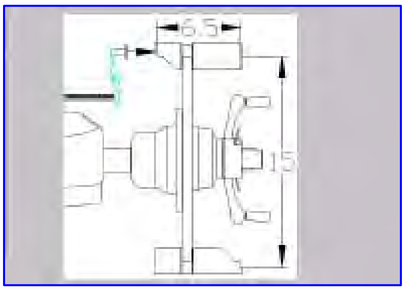
After the 1st step, that is the measuring run, a beep signal is heard.
After acknowledgement/setting of weight size in step 2 a beep signal is heard (in addition to the beep made by the key).

In step 6 the ambient transducer temperature will be read out for 1 second.

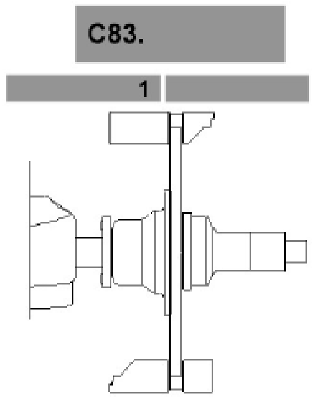
Comments: Save the calibration data in the the permanent memory using code C90.

NOTE: THIS TEST REQUIRES THE USE OF PRUEFROTOR *ALL TESTS MUST BE DONE WITH THE BALANCER IN THE MANUAL MODE. AFTER ALL TEST ARE DONE THE BALANCER MUST BE SWITCHED BACKINTO THE PREFERRED OPERATING MODE. ALSO CHECK THE VCC VOLTAGE "C110" AND ADJUST IF NECESSARY BEFORE ANY CALIBRATION IS DONE.*

Mount the calibration tool on the balancer shaft . Set the calibration tool data.



Step 1: Press the "***START***" button to begin the measuring run.

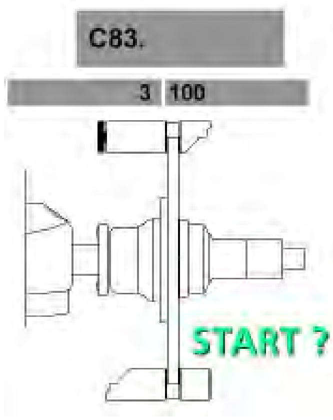


Step 2: If a Pruefrotor is used, screw the 100 gram weight on the left side of the Pruefrotor. If the value displayed is not "100" in step 2 press and hold the "***ENTER VALUE***" key (F4) and rotate the shaft until the custom weight is displayed.

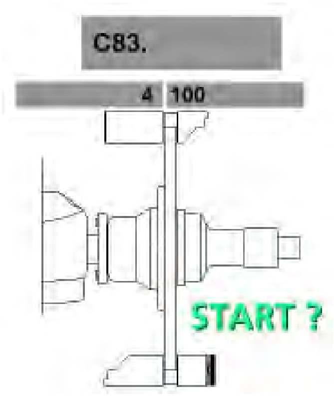
ROTATE THE CALIBRATION TOOL WITH 100GR AT 12 O'CLOCK.

Press the "***ENTER***" key (F6) to enter the value of the test weight.

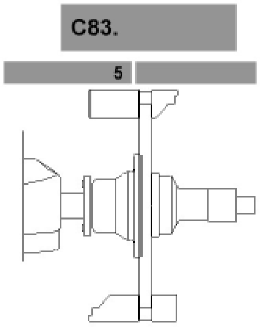
Step 3: Press the "***START***" button to begin the measuring run.



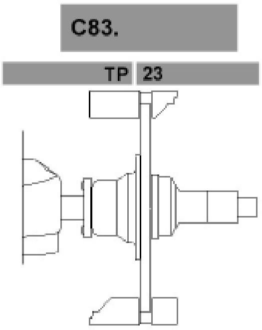
Step 4: Remove the 100 gram calibration weight and insert it into the right hand plane of the Pruefrotor. Press the "***START***" key to begin the measuring run.



Step 5:. Step Number 5 has not been programmed. Press the "***ENTER***" key (**F6**) to advance to the



Step 6: The ambient transducer temperature is displayed for 1 second.



Step 7: Remove the 100 gram weight, lower the hood and press the "***START***" button to begin a measuring run.

Step 8:. Insert the calibration weight that is supplied with the balancer on the left side of the backing plate.
Press the "***START***" button to begin a measuring run.

Step 9: Store the new factors using C90.

Step 10: Must complete C84 after this function

CALIBRATION COMPLETE

Comments: Save the calibration data in the the permanent memory using code C90.

C84 Compensation of unbalance of main shaft

Options: None

Special function: None

Description:

Compensating for residual unbalance left in the main shaft

To save balancing of the main shaft by drilling out material or by adding balance weights, the residual unbalance of the main shaft is determined and compensated for (subtracted) in all subsequent measurement runs.
To compensate for the residual unbalance of the main shaft on a machine without power clamping device carry out the following steps:

Compensating for residual unbalance left in the main shaft

1. Remove wheel adaptor from main shaft.
2. Activate adjustment function C84
3. Close the wheel guard and start the measurement run by pressing the START key.

CALIBRATION COMPLETE

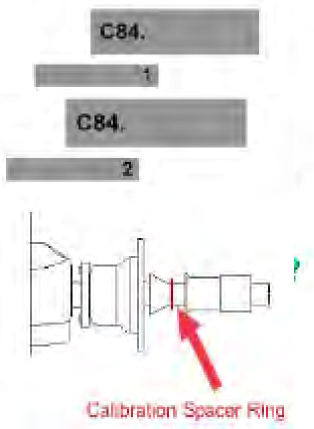
The residual unbalance of the main shaft is determined in an extended measuring run.

Comments: Save the calibration data in the the permanent memory using code C90.

Compensating for the residual unbalance of the main shaft and drive pulley on a "p" models

Since the angular position of the drive pulley relative to the main shaft is random in the clamped state, the residual unbalances of main shaft and drive pulley have to be determined and stored separately.
To separate the residual unbalances, two measuring runs have to be performed. Between these measurement runs, the drive pulley has to be adjusted by approx. 180 degrees relative to the main shaft. To accomplish adjustment of the drive pulley by 180 degrees, the tie rod must be displaced by another 4 mm in the clamping operation prior to the second measuring run.

Compensating for the residual unbalance of the main shaft and drive pulley on a "p" model



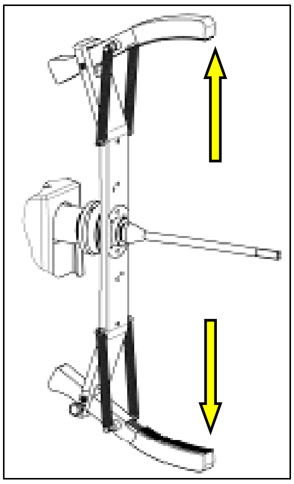
1. Remove wheel adaptor from main shaft.
2. Install the big and small cones on the shaft and lock
3. Close the wheel guard and start the measurement run by pressing the START key
4. Unclock the cones and insert the calibration ring between the cones. Lock the cones again
5. Close the wheel guard and start the measurement run by pressing the START key

CALIBRATION COMPLETE

Save with C90

Calibration of residual unbalance of main shaft and drive pulley on a geodyna motorcycles hand spin

The functions become accessible by simultaneously pressing and holding the C and the balancing mode keys and by rotating the motorcycle adaptor.
The following reading appears for one second:
C84
Then the following reading appears:
1
Start
Remove the Test Rotor and the calibration weight if present, and move the motorcycle adaptor's **arms** to the **open position**, as shown in Figure1**:**



- Figure 1: Adaptor's Arms opening position -

Press the START key to start a measuring run.
Then the following reading appears:
C - -
Calibration is completed and must be stored by entering C90.

C85 Copy content of serial EEPROM (EEP) micro-controller EEP → incremental encoder EEP

Options:

0 : No action
1 : Copy from controller board EEP to opto EEP.

Special function: None

Description: To make sure the content is not overwritten by mistake, first set display from 0 to 1 by using the option selection.

Then the copying operation is started by pressing the Acknowledgment key.
Once copying has been completed, the machine is started again automatically.

Comments:

C86 Copy content of serial EEPROM (EEP) micro-controller EEP ← incremental encoder EEP

Options:
0 : No action
1 : Copy from opto EEP to controller board EEP.

Special function: None.

Description: To make sure the content is not overwritten by mistake, first set display from 0 to 1 by using the option selection.

Then the copying operation is started by pressing the Acknowledgment key.
Once copying has been completed, the machine is started again automatically.

Comments: See C85

C88 Calibration of 12 o'clock position for fitting position of weights

Options: None

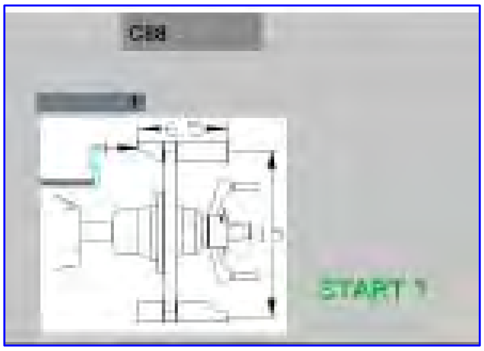
Special function: None

Description: With this calibration code it is possible to compensate for the individual angular deviation of a machine. During the basic calibration in the factory this code will only be carried out if there is a clearly noticeable angular deviation, and not as a general procedure. Since the angle of the static unbalance is used for this purpose, the service technician can select the correction plane in which he can best and most accurately assess the vertical position above the main shaft.
One possibility is to attach the weight to the left-hand correction plane and to use the gauge arm as reference point, in which case it is first necessary to make sure that the gauge arm is aligned parallel to and vertically above the main shaft.
The second possibility is to attach the weight in the right-hand rim flange and to turn the weight in step 3 so that it is exactly vertical below the main shaft. In this position a plumb line can be used as the reference point.

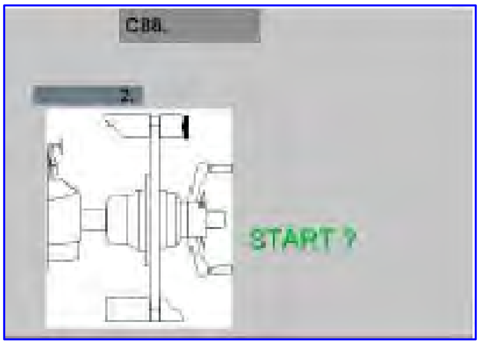
Possible angle correction is read out in +/- 5 degrees (used to be called increments)
If the angular deviation is more than +/- 5 degrees the reading will be "---".

Mount the Pruefrotor on the balancer shaft and enter in the parameters of the Pruefrotor using the balance screen.

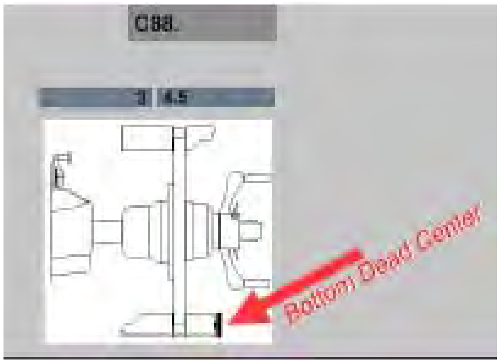
Step 1: Press the "**START**" button to begin the measurement run.



Step 2: Attach the 100 gram weight to outside of the Pruefrotor and press the "START" button.



Move the shaft to locate the 100 gram weight at "***BOTTOM DEAD CENTER***" position.Use a spirit level or electronic inclinometer to find the correct position. Press the "***ENTER***" key (F6) to save the data.



CALIBRATION COMPLETE

Comments: Save the calibration data in the the permanent memory using code C90.

C90 Saving the adjustments data in the PO's

Options:

0 : No storage
1 : Data is saved in the permanent memory.

Special function: None.

Description: The calibration data determined with C80, C81,C88 and C115 can be transferred to the permanent memory using code C90.
To this end use the option selection and set "1". Then acknowledge with the Acknowledgment key.
The data which used to be temporary to this moment is now transferred and saved in the permanent memory.
Saving is acknowledged by a series of audible signals.

Comments:

C92 Display of actual distance and diameter of inner SAPE

Options: None

Special function: None

Description: Display on digital and SCREEN machines:

1. Field / left display : diameter (408-410)
2. Field / right display : distance (From machine to calibration rotor edge).

Comments:

C97 Conditioning of the solenoid brake

Options: None

Special function: None

Description: Conditioning of the solenoid brake (p-variants only)
WARNING! With this test function the main shaft still rotates when the wheel guard is open.
Enter code C97 and then press the START key to run the motor with brake activated in order to remove contamination such as fingerprints from the brake lining, thus improving the braking effect of a new solenoid brake. As this function causes the brake to heat up quickly, it is deactivated automatically after one minute. The motor speed is held constant by controlling the brake current.

Comments: Brake current is not read out.

C98 Display of angular position of power clamp pulley, incremental encoder test

Options :
Digital machine : Switching over from position reading to incremental encoder flags and vice versa
SCREEN machine : None

Special function: Resetting incremental register flags.

Description: Once this code is called up, the reading is "---"
Only after the incremental encoder has identified zero reference, the angular location is read out in a range between 0 and 63.
Use of the C code and meaning of the flags are identical with C code C74 (incremental encoder of main shaft).

Comments: Only for power clamp models.
If this test fails (no 23F) please check

- the cabling of the opto electronic – micro-controller and
- the cabling opto electronic power clamp - opto electronic main shaft
- the connectors of the cables
- clean the incremental encoder tape

C102 Performing a measuring run and indication of harmonic contents of the unbalance signals

Options:

Digital machine : 1 : Non-linear harmonic distortion coefficient
2 : Percentage of 2nd harmonics relative to fundamental harmonic wave
3 : Percentage of 3rd harmonics relative to fundamental harmonic wave
4 : Percentage of 4th harmonics relative to fundamental harmonic wave
5 : Percentage of 5th harmonics relative to fundamental harmonic wave

SCREEN machine : None

Special function: None.

Description: Start measuring run by setting C102 and pressing the START key.

Digital machine:
Once the measuring run is completed, the non-linear harmonic distortion coefficient (tHd) is read out.
Use the option selection to read out successively the 2nd, 3rd, 4th and 5th harmonics of the latest measuring run as a percentage of the amount of unbalance (1st harmonics).

SCREEN machine:
Once the measuring run is completed, the following values are read out one below the other:

tHd : Non-linear harmonic distortion coefficient
HAr2 : Percentage of 2nd harmonics relative to fundamental harmonic wave
HAr3 : Percentage of 3rd harmonics relative to fundamental harmonic wave
HAr4 : Percentage of 4th harmonics relative to fundamental harmonic wave
HAr5 : Percentage of 5th harmonics relative to fundamental harmonic wave

There are two columns of readings, one referring to the rear transducer, the other to the front transducer.

Comments:

C103 Test of transimpedance and unbalance signal amplifiers

Options:

Digital machine: By pressing the Option key the following values are shown in the display. While keep the Option key pressed the number of the value is shown in the left display:

1. Channel 1 Offset (DC analog signal)
2. Channel 1 1st harmonic wave
3. Channel 1 2nd harmonic
4. Channel 1 3rd hrmonic
5. Channel 1 4th harmonic
6. Channel 1 1st harmonic wave phase
7. Channel 2 Offset (DC analog signal)
8. Channel 2 1st harmonic wave
9. Channel 2 2nd harmonic.
10. Channel 2 3rd hrmonic
11. Channel 2 4th harmonic
12. Channel 2 1st harmonic wave phase

Screen machines: Screen models indicates all values in one screen. All values for channel 1 (1…6) on the left and for channel 2 (7…12) on the right.

Geo3900-3900S-4650 – John Bean b9655–b9655S-BFH600 and Boxer S1750-1750S only: by pressing the check key (F3) the screen will show channels in the same order as shown in the list below. Pressing "OK" key, the screen will show the value of the channel selected.

0. Channel 1 Offset (DC analog signal)
1. Channel 1 1st harmonic wave
2. Channel 1 2nd harmonic
3. Channel 1 3rd harmonic
4. Channel 1 4th harmonic
5. Channel 1 1st harmonic wave phase

6. Channel 2	Offset (DC analog signal)
7. Channel 2	1st harmonic wave
8. Channel 2	2nd harmonic.
9. Channel 2	3rd harmonic.
10. Channel 2	4th harmonic.
11. Channel 2	1st harmonic wave phase

VPM BALANCERS VALUES

All values displayed in channel 1 are related to the rear piezo-electric pick-up and those in channel 2 are related to the front one.

	Offset	1^{ST}	2^{ND}	3^{rd}	4^{th}	Phase
CHANNEL 1	**0.00-0.10**	**0.10-0.25**	**0.00-0.02**	**0.03-0.08**	**0.00-0.01**	**-10°/+10°**
CHANNEL 2	**0.00-0.10**	**0.10-0.25**	**0.00-0.02**	**0.03-0.08**	**0.00-0.01**	**-10°/+10°**

Special function: All values displayed in channel 1 are related to the rear piezo-electric pick-up and those in channel 2 are related to the front one**.**

Description: Test of transimpedance and unbalance signal amplifiers. This test will take 12 seconds.

C104 Test the RC time constant of the unbalance transducers

Options: None

Special function: None

Description: Indication of the unbalance transducer RC time constants.
A "1" in the left and the right display will be indicated, if both transducers are OK.
Otherwise an error code will be displayed.

Comments:

C105 Set the parameters for the HUMSR feature with an EMB

Options:

Digital machine : 1 : Maximum activation time for EMB [min]
2 : EMB force for passenger car vehicle type in percent of maximum force (0 = EMB disabled for this vehicletype) [%]
3 : EMB force for light truck vehicle type in percent of maximum force (0 = EMB disabled for this vehicletype) [%]
4 : EMB force for truck vehicle type in percent of maximum force (0 = EMB disabled for this vehicletype) [%]

SCREEN machine : None

Special function: None

Description: In general, the EMB is activated during normal operation with the following exceptions :
- during a measuring run
- during a C-code or service code procedure
- during an optimisation/minimisation/pro-match procedure
- if the maximum activation time has elapsed.

if the EMB force for the current vehicletype is set to zero.

Comments: This feature is available in truck wheel balancers R2.6 or higher.
The changed values are saved to permanent memory by acknowledging the changed values for every step.

C110 Indication of the operating voltages supplied by the power supply module

Options: None.

Special function: None.

Description: Indication of the operating voltage,5.0 VDC, supplied by the power supply module for the controller board

Comments: Please refer to chapter 05.12.3 ERROR ID (810, 811) for the limits.

C111 Belt tension: Measure first harmonic of the belt

Options: FOR STEEL VPM ONLY

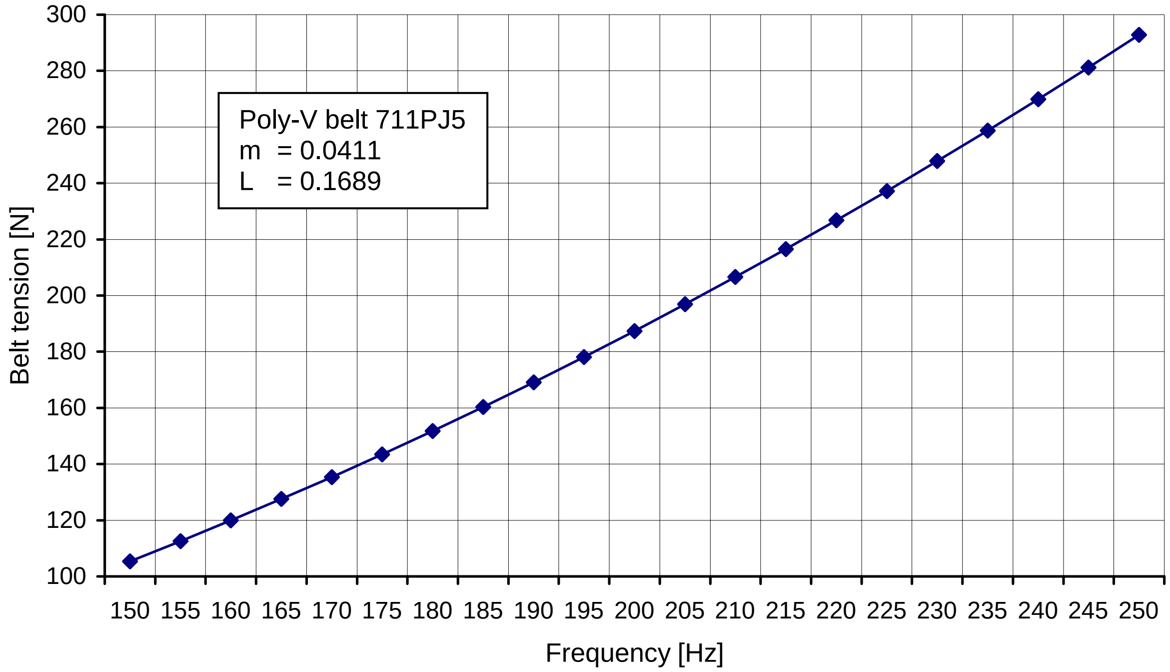
Special function: None.

Description: Once this code is called up, the reading is a running " - ".
After beating on the belt a beep indicates the start of the measurement. After 3 sec. a second beep indicates the end of the measurement and the frequency is displayed. If the harmonic analysis doesn't find any significant frequency, "Err" is displayed until the next measurement is started.
The test should be repeated with different forces during picking the belt and with different sections of the belt (rotating the main shaft).

The frequency is displayed in a range from 100 Hz up to 300 Hz.

The begin of a new measurement will be detected automatically.

Comments: This feature is available in HWT R2.2 or higher
Only for belt driven balancer.
The diagram shows the relation between frequency and belt tension for a y2k vibratory system and a Poly-V belt 711PJ5



C115 Calibration of the unbalance measurement with test rotor.

Options: None.

Special function: None.

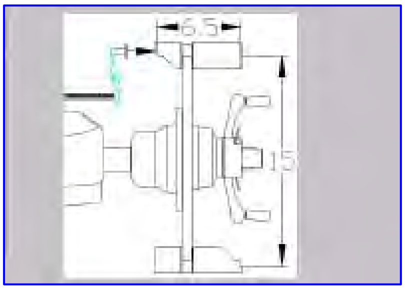
Description: With the calibration of the unbalance measurement the following are determined:
- the sensitivity of the transducers,
- the phase difference of the transducer signals,
- the comparative data for readjustment by the operator and temperature compensation
- the phase shift of the unbalance signal amplifiers and
- the angular deviation

After the 1st step, that is the measuring run, a beep signal is heard.
After acknowledgement/setting of weight size in step 2 a beep signal is heard (in addition to the beep made by the key).

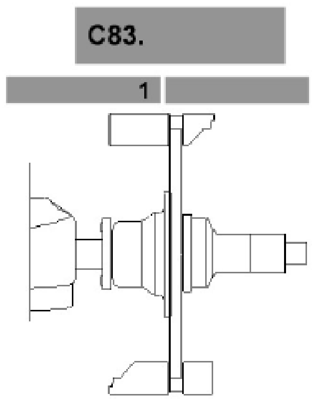
In step 6 the ambient transducer temperature will be read out for 1 second.

NOTE: THIS TEST REQUIRES THE USE OF PRUEFROTOR *ALL TESTS MUST BE DONE WITH THE BALANCER IN THE MANUAL MODE. AFTER ALL TEST ARE DONE THE BALANCER MUST BE SWITCHED BACKINTO THE PREFERRED OPERATING MODE. ALSO CHECK THE VCC VOLTAGE "C110" AND ADJUST IF NECESSARY BEFORE ANY CALIBRATION IS DONE.*

Mount the calibration tool on the balancer shaft . Set the calibration tool data.



Step 1: Press the "***START***" button to begin the measuring run.

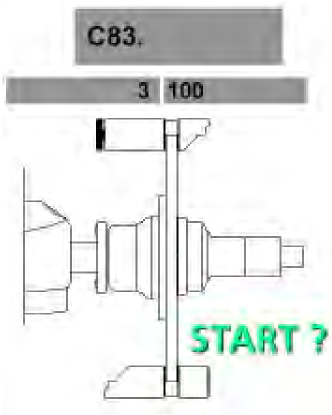


Step 2: If a Pruefrotor is used, screw the 100 gram weight on the left side of the Pruefrotor. If the value displayed is not "100" in step 2 press and hold the "***ENTER VALUE***" key (F4) and rotate the shaft until the custom weight is displayed.

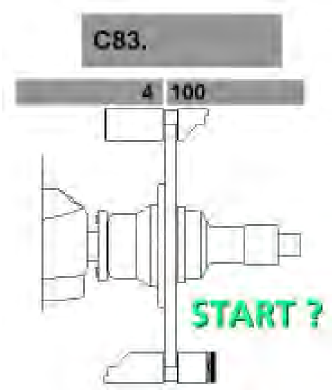
ROTATE THE CALIBRATION TOOL WITH 100GR AT 12 O'CLOCK.

Press the "***ENTER***" key (F6) to enter the value of the test weight.

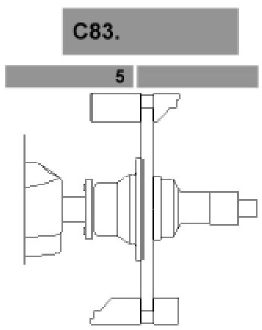
Step 3: Press the “***START***” button to begin the measuring run.



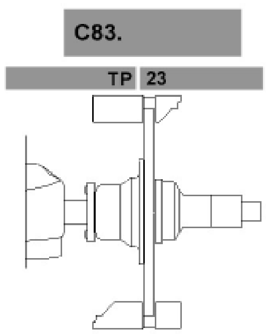
Step 4: Remove the 100 gram calibration weight and insert it into the right hand plane of the Pruefrotor. Press the “***START***” key to begin the measuring run.



Step 5:. Step Number 5 has not been programmed. Press the “***ENTER***” key (**F6**) to advance to the

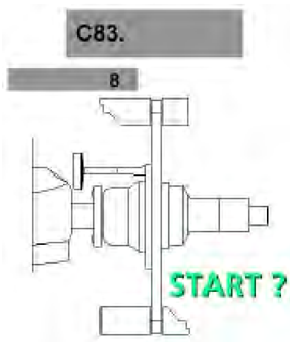


Step 6: The ambient transducer temperature is displayed for 1 second.



Step 7: Remove the 100 gram weight, lower the hood and press the "***START***" button to begin a measuring run.

Step 8:. Insert the calibration weight that is supplied with the balancer on the left side of the backing plate.
Press the "***START***" button to begin a measuring run.



Step 9: Store the new factors using C90.

Step 10: Must complete C84 after this function

CALIBRATION COMPLETE

Comments: Save the calibration data in the the permanent memory using code C90.

C120 Enable / disable the laser pointer

Options: None

Special function: None

Description: On selection the current status is displayed (0 / 1).
Select 0: Disable laser pointer.
Select 1: Enable laser pointer.

Comments: The setting can be stored to persistent memory by performing code C90.

C121 OPTIMA: Set the geometric matching bead seat recommendation threshold

Options: None

Special function: None

Description: On selection the current value is displayed (0 – 500%)
This value represents the level by which any of the geometric matching limits must be exceeded by before geometric matching with bead seat measurement is recommended.
The matching limits are;

- Equivalent static unbalance @ 100kmph / 60mph.
- Total wheel radial run-out.

Comments: The setting can be stored to persistent memory by performing code C90.

C122 OPTIMA: Position calibration of the OPTIMA hardware

Options: None

Special function: None

Description: Preconditions:

- Wheel balancer and SAPE must be already calibrated.
- AWP Diagnostic Flags must be in an acceptable state; See Appendix “AWP Flags for C122 / C123”.
- The calibration rotor must be clamped.
- The balancer must be in the manual mode before continuing this procedure.
- At least two revolutions of the shaft should be made so that the shaft Encoder can locate home reference. This must be done using the balancing mode.

Before the Scanner assemblies can accurately obtain the data needed to balance the wheel and tire assembly they must be calibrated. The calibration information is stored on the CCD / Scanner PCB. This information is stored through C90 procedure after completing the calibration. It is recommended that a check of scanner adjustments be made using the C123 procedure before calibrating the scanner assemblies.

1. Set Optima operating mode to 0: “manual”;
2. Clamp the calibration rotor;
3. Set rim dimensions using the geodata gauge arm (the default values are 165, 6.5, 15);
4. Enter service code C122 : The following screen-shot is displayed:

Figure 1: C122 screen-shot

Under the “Diag” writing, 56 flags are displayed: 16 diagnostic flags + 32 status flags + 8 analog input flags; the meaning of all these flags is explained in the Appendix “AWP Flags for C122 / C123”.
In the first line the actual step number is displayed while in the second line appears the angular position of the shaft and the “H12” writing.

5. Check if all the flags are OK (grey or blue color), except for the MainCal flag, which may be red-lighted if calibration is required. Any different situation means that an error occurred;
6. Line 2 displays “H12”: set the rotor vertical with the inner edge to the lower side (see figure 2). Use of a level doing this, is extremely recommended;
7. Press F6 (enter);
8. procedure starts. When scan is complete, a beep is emitted: if an error occurred, “ERROR” appears on line 2; else if 100 seconds pass without results, “Timeout” is displayed. Press F6 to retry;

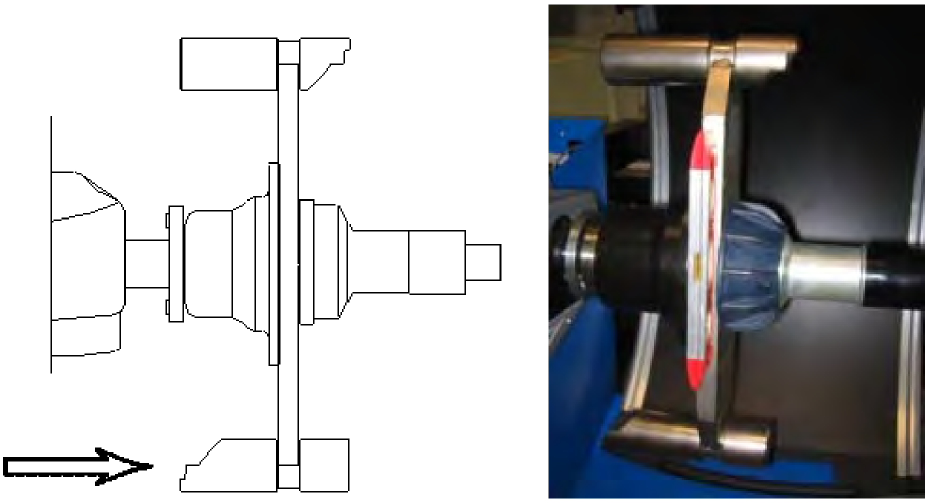


Figure 2: Setting the rotor vertical

9. Slowly rotate the rotor + 20 degrees (see figure 3). When “LOCK” appears on line 2, hold the position for few seconds so that the SW automatically brakes the rotor, “CAL” appears on line 2 and the scan.

Figure 3

10. If the scanner calibration ends successfully the procedure jumps to step 3: close the wheel guard;

11. Slowly rotate the rotor + 70 degrees: horizontal, with external edge to the rear side (see figure 4);

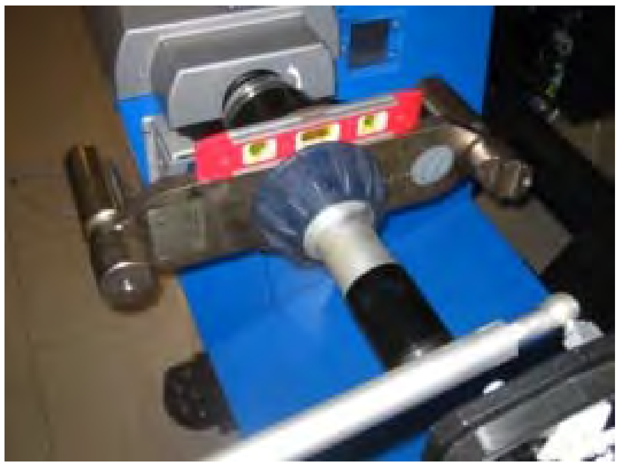


Figure 4: Setting the rotor horizontal

12. When “LOCK” appears on line 2, hold the position for few seconds so that the SW automatically breaks the rotor, “CAL” appears on line 2 and the scan procedure starts. When scan is complete, a beep is emitted: if an error occurred, “ERROR” appears on line 2; else if 100 seconds pass without results, “Timeout” is displayed. Press F6 to retry;
13. If the scanner calibration ends successfully the procedure jumps tostep 4; at this point it is possible to proceed with calibration in two different ways: if a new “T” calibration tool is available and the software versions are UI 2.9 (or higher) and AWP 0.71 (or higher) you can go on with the following calibration step 13 (“T tool” procedure); otherwise it is necessary to perform the standard procedure, so that jump to calibration step 13b (Standard procedure);

“T tool” procedure

14. Unclamp the calibration rotor and clamp the new “T” calibration tool, with the reference hole directed towards outside (see figure 5; set it vertical (it automatically reaches the position, if not use a level) and press F6 to confirm;

Reference hole

Figure 5: “T” calibration tool

15. Close the wheel guard and slowly rotate the “T” tool -85 degrees by hand (see figure 6): when “LOCK” appears on line 2, hold the position for few seconds so that the SW automatically brakes the tool, “CAL” appears on line 2 and the new calibration procedure of rear scanner (inclusive of the pull machine calibration) starts. When scan is complete, a beep is emitted but the brake does not release the tool (the tool tends to fall and swing: it could hit the operator);

Figure 6: “T” calibration tool with flat edge towards the rear scanner

16. Wait until the procedure ends and then press F6 (enter) to release the tool and exit C122 procedure;
17. Perform procedure C90 to store calibration.

Standard procedure

13.b Slowly rotate the rotor + 5 degrees (see figure 7). When “LOCK” appears on line 2, hold the position for few seconds so that the SW automatically brakes the rotor, “CAL” appears on line 2 and the scan procedure starts. When scan is complete, a beep is emitted: if an error occurred, “ERROR” appears on line 2; else if 100 seconds pass without results, “Timeout” is displayed. Press F6 to retry;

Figure 7

14.b If the scanner calibration ends succesfully the procedure jumps to step 5;
15.b “END” appears on line 2 and all diagnostic flags should be grey;
16.b Press F1 or F6 or STOP or ESC to exit C122;
17.b Perform procedure C90 to store calibration.

Comments: Save the calibration in permanent memory with C90.

C122 b9850P / b9855P / 6900p: Scanner and Sonar calibration

Options: C122 Procedure must be done after the C123

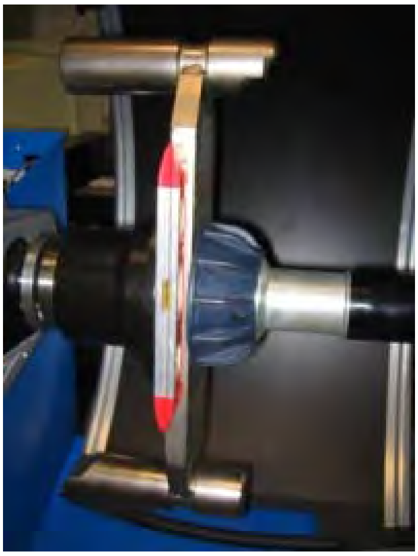
Special function: None

Description: Preconditions:

1. Set operating mode to 0: “manual mode”;
2. Clamp the calibration rotor p/n **EAA0277D12A**;
3. Enter the calibration rotor dimensions correctly.
4. Make a spin of the calibration rotor.
5. Enter service code C122 : The following screen-shot is displayed. Under the “Diag” writing, 56 flags are displayed: 16 diagnostic flags + 32 status flags + 8 analog input flags; the meaning of all these flags is explained in the Appendix Appendix “AWP Flags for C122 / C123”.
   In the first line the actual step number is displayed while in the second line appears the angular position of the shaft;
6. Check that all the diagnostic and status flags are ok (they must be blue or grey), except for the “MainCal” flag, that can be red to indicate that it’s necessary a scanner calibration. If other flags are red it means that an error has been happened;

Figure 1 - screen-shot of C122

Step 1: Position the rotor in vertical position with the segmented top down left . For this operation is extremely recommended the using of a spirit level. Press F6 (enter).



Fgure 2 - Rotor Vertical Positioning

Step 2: Rotate slowly the rotor of + 20°. When the indication “LOCK” is displayed on the second line, hold the rotor in position for a few seconds so that the SW will block automatically the shaft. “CAL” is displayed on the second line to indicate the starting of inner scanning calibration. A “beep” will be emitted as soon as the scansion will be completed: if an error will occur, ERROR message will appear on the second line; otherwise, if 100 seconds pass without anything happens, the writing Timeout will appear. Press F6 and try again.

Rotor 20°

Step 3: Unclamp the calibration rotor and clamp the rotor for sonar calibration (p/n EAA0344G09A). Low the wheel guard. Rotate the rotor until put the arm in front of the sonar sensor (Figure 3). On the screen, read the value (mm) of the distance that the sonar sensor measures. See Figure 1, the pointed out field is the value read by the sonar.

Fgure 3

Putting the rotor in the right way, you should read a value which is between 284-304 mm(264-314 for geo6900p). With a ruler take the measure of the actual distance between the sonar and the rotor arm. Check that both measures are the same. Press Enter, if the calibration is OK, the writing CAL will appear, followed by END to indicate that the procedure is ended.
Rotate the rotor of 180° to place the counterweight surface in front of the sonar as in Figure 4. You should verify that the value read by the sensor is 50 mm (+/- 1mm) less than the previous one.
Raise the wheel guard covering completely, check that in the Ch4 field there is the writing “HoodUp”. Close completely the wheel guard covering and check that in the Ch4 field there is now the writing “DownOK”. If appears the writing “Hs” it means that the closing has done too quickly, if so, open and close less quickly.

Press Enter and store in Eeprom the calibration values with C90.

Fgure 4

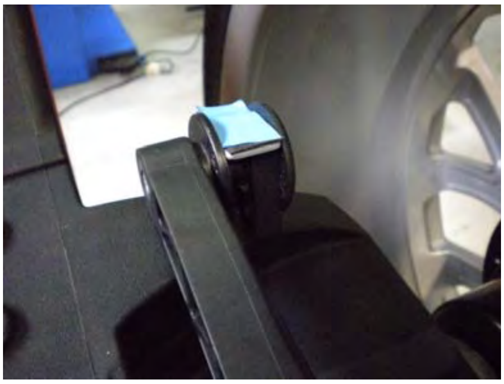
C122 Laser pointer calibration (except Optima II and BFH 2000)

Options: C122 Procedure must be done after the C80 and C81

Special function: None

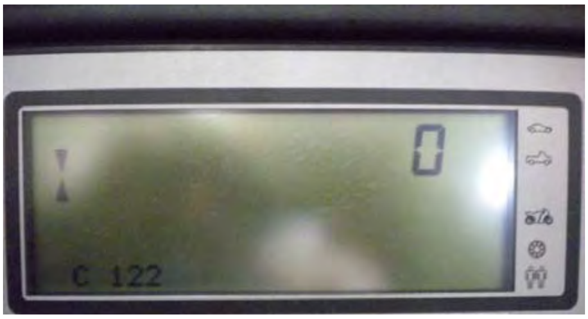
Description: Preconditions:

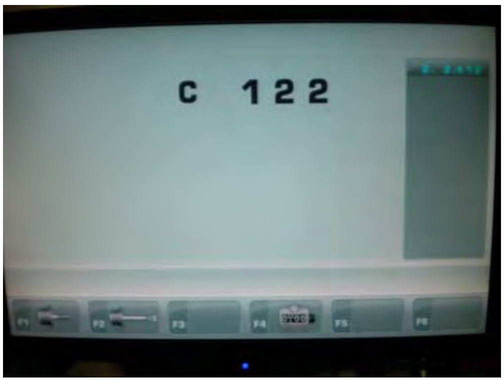
1. Clamp an Alloy wheel;
2. Set ALU 2P Programs
3. Place the stick weight on the gauge arm.

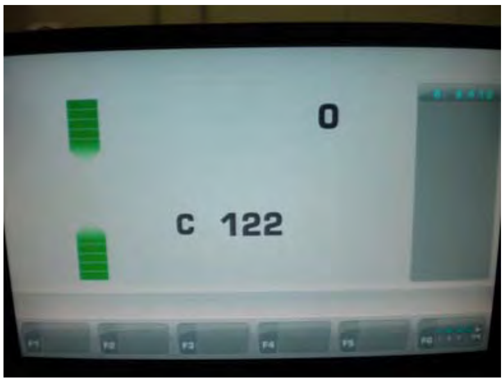


4. Set rim dimensions using the gauge arm.

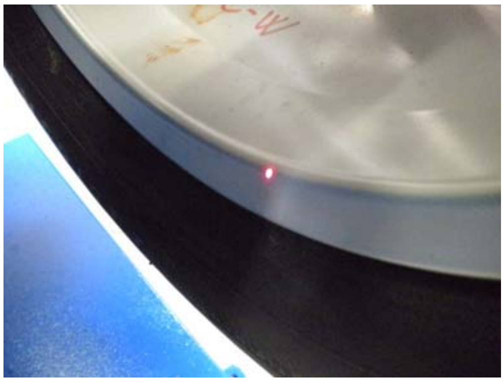
5. Enter service code C122 : The following screen-shots are displayed according to the machine model:







The laser pointer will shot the dot to the inner rim edge.

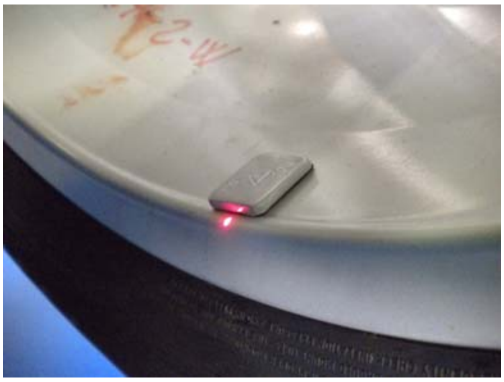


6. Place an adhesive weight on the rim and press the following button, according to machine model, to adjust the laser dot to the correct position.
IMPORTANT! The laser dot must be adjusted in front of the weight









7. Once the laser dot is adjusted to the correc place press the button “OK” or “g/oz” or “ENTER”, according to machine model, to store the outer laser position.

8. Then the laser dot will move to the outer plane.

9. Repeat the same procedure as described above in point 6, to adjust the laser dot position.
10. Once the laser dot is adjusted to the correct place press the button “OK” or “g/oz” or “ENTER”, according to machine model, to store the outer laser position.
11. Press the confirmation/return button to store the calculated correction and exit the service code.

Comments: Perform C90 to permanently store the two calculated corrections (models Geodyna 4550 and 4550p have the auto-save function).

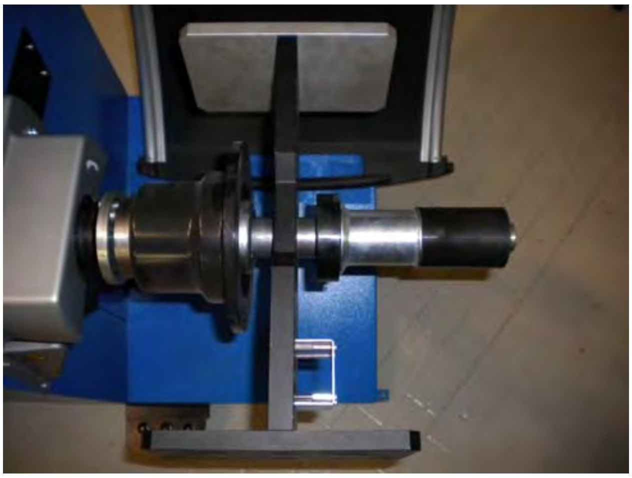
C122 OPTIMA 2 and BFH 2000: Camera calibration

Options:

Special function: None

Description: Preconditions:

- Wheel balancer and SAPE must be already calibrated.
- The balancer must be in the manual mode before continuing this procedure.
- At least two revolutions of the shaft should be made so that the shaft Encoder can locate home reference. This must be done using the manual balancing mode.
- HUB Diagnostic Flags must be in an acceptable state; See Appendix “HUB Flags for C122 / C123”.
- The assy laser positioner must be clamped **without** cone and **with** plastic spacer mounted on the clamping nut.



- Press F1 button (enter) or OK to start the calibration

STEP 1:

Under the “Diag” writing, 56 flags are displayed: 16 diagnostic flags + 32 status flags + 8 analog input flags; the meaning of all these flags is explained in the Appendix “HUB Flags for C122 / C123”.

- In the first line the actual step number is displayed.
- In the second line appears the angular position of the shaft.
- In the right upper side, over the picture, the operation status is shown.
- Check if all the flags are OK (grey or blue color), except for the MainCal flag, which may be red-lighted if calibration is required. Any different situation means that an error occurred;
- Place the assy laser positioner with the white plate backward to 9 o’clock.

- Using a spirit level or an inclinometer, set the assy laser positioner in horizontal position at 0° degrees and press F6 or “OK” button on the keyboard

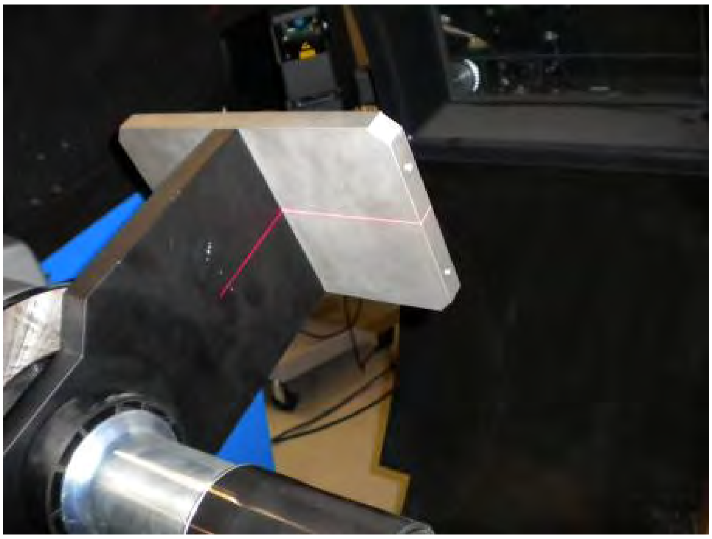
STEP 2: INNER CAMERA

- Slowly rotate the assy laser positioner watching the screen upper right side. When the 0° degrees value is reached, hold the position for few seconds so that the SW automatically brakes the assy laser positioner in position displaying “LOCK” on the screen and then “CAL” will be displayed on the screen meaning the scanning procedure is starting.

- When scan is completed, a beep is emitted and the software will move automatically to step 3: if an error occurred, “ERROR” appears on line 2; else if 100 seconds pass without results, “Timeout” is displayed. Press F6 to retry;

STEP 3: EXTERNAL CAMERA

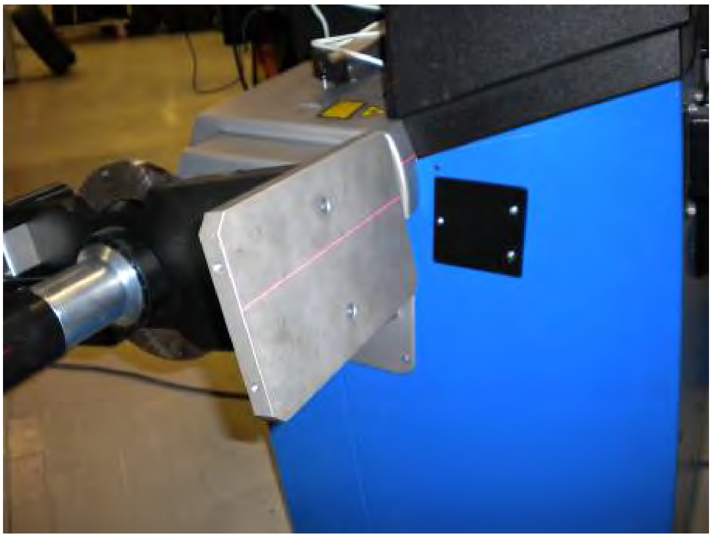
- Close the hood and slowly rotate the assy laser positioner watching the screen upper right side. When the 0° degrees value is reached, hold the position for few seconds so that the SW automatically will brake the assy laser positioner in position displaying on the screen “LOCK” followed after a while by “CAL”, meaning that the scanning procedure is starting.



- When scan is completed, a beep is emitted and the software will move automatically to step 4: if an error occurred, “ERROR” appears on line 2; else if 100 seconds pass without results, “Timeout” is displayed. Press F6 to retry;

STEP 4: REAR CAMERA

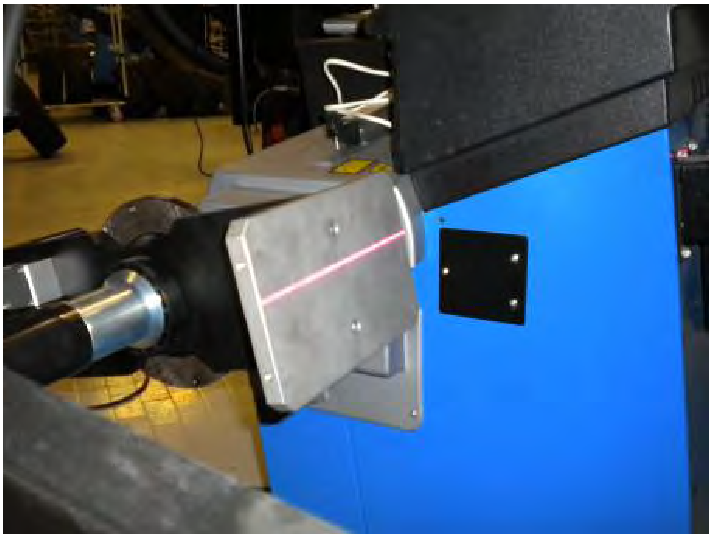
- Keep the hood closed and slowly rotate the assy laser positioner watching the screen upper right side. When the 0° degrees value is reached, hold the position for few seconds so that the SW automatically will brake the assy laser positioner in position displaying on the screen “LOCK” followed after a while by “CAL”, meaning that the scanning procedure is starting.



- When scan is completed, a beep is emitted and the software will move automatically to step 5: if an error occurred, “ERROR” appears on line 2; else if 100 seconds pass without results, “Timeout” is displayed. Press F6 to retry;

STEP 5 AND 6: LATERAL REAR LEFT AND RIGT CAMERA

- The calibration in Step 5 (lateral rear left camera) and in Step 6 (lateral rear right camera) will be performed automatically after Step 4 because the assy laser positioner is already positioned.



STEP 7: END OF CAMERA CALIBRATION

Comments: Perform C90 to permanently store the calibration in permanent memory.

C123 OPTIMA: Display of the status and diagnostic flags of the OPTIMA sub-system and perform manufacturing/diagnostic tests

Options: None

Special function: None

Description: If the OPTIMA balancer fails any part of the C122 camera calibration it may be necessary to adjust one or more of the cameras.

1. Clamp the calibration rotor;
2. When C123 procedure is selected, the following screenshot is displayed:

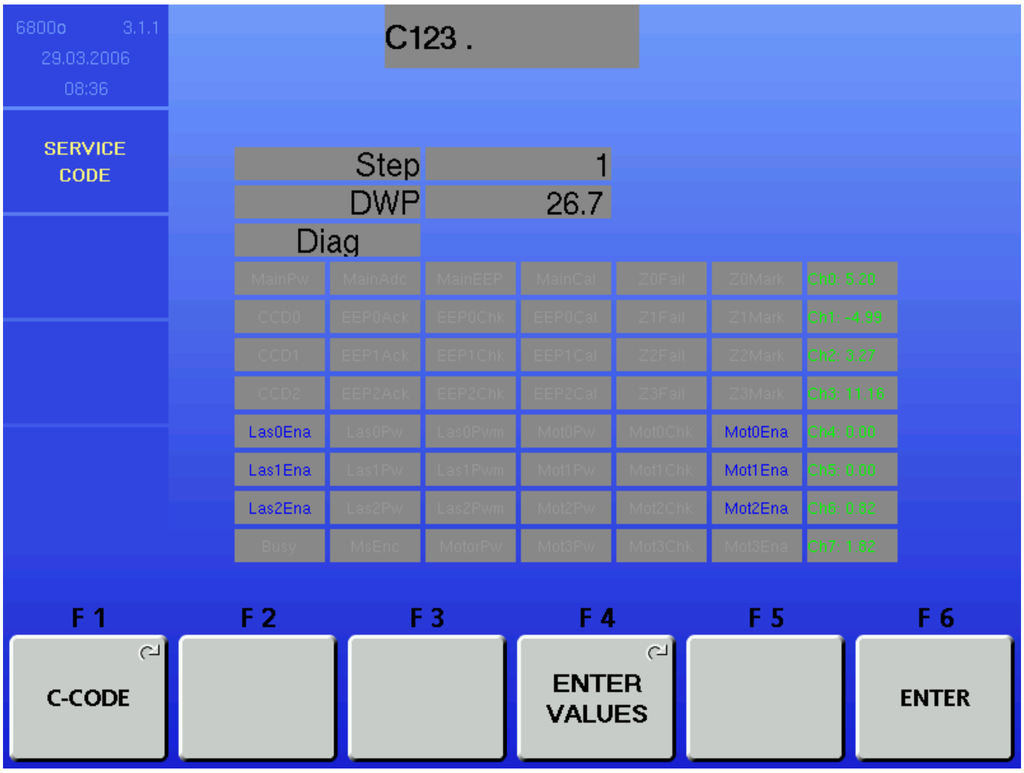


Figure 8: C123 screen-shot

Under the “Diag” writing, 56 flags are displayed: 16 diagnostic flags + 32 status flags + 8 analog input flags; the meaning of all these flags is explained in the Appendix “AWP Flags for C122 / C123”.
In the first line the actual step number is displayed while in the second line appears the angular position of the shaft;

3. In the first line of the screen the step number 1 is already selected. Press F6 (ENTER) to confirm the test step number and start the test;
4. The inner scanner begins to move continuously between two fixed position. Check if the inner scanner assembly and the laser pointing works correctly (see figure 9);

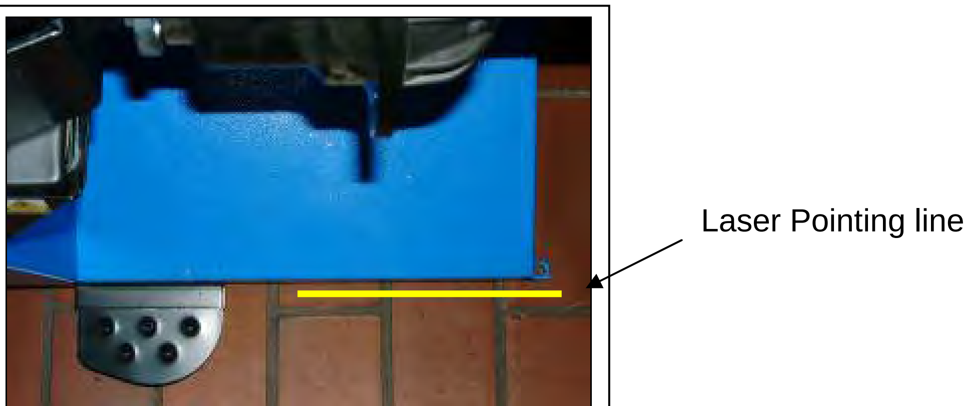


Figure 9

5. Press F6 to stop the test;
6. Close the wheel guard;
7. Use F4 and turn the main shaft to select test step number 2;

8. Move the rotor in horizontal position (use a level) and press the pedal down to lock the main shaft;
9. Press F6 to start the test: the outer scanner begins to move continuously between two fixed positions;
10. Adjust the outer scanner assembling so that the outer laser point both the center of the main shaft and the hole in the outer side of the rotor (see figure 10 below). Besides the starting point of the laser pointing must lay about 30 mm on the left of the center of the main shaft;

Figure 10: Outer scanner adjustment

11. Press the pedal down to release the main shaft and press F6 to stop the test;
12. Use F4 and turn the main shaft to select test step number 3;
13. Turn the rotor approximately +5 degrees referring to the horizontal plane (use the DWP indication on the second line of the screen as reference) and press the pedal down to lock the main shaft;
14. Press F6 to start the test: the rear scanner box leaves its home position and the rear scanner begins to move continuously between two fixed positions. Check if the laser pointing reaches the edges of the calibration tool and if the rear scanner assembly works correctly (see figure 11);

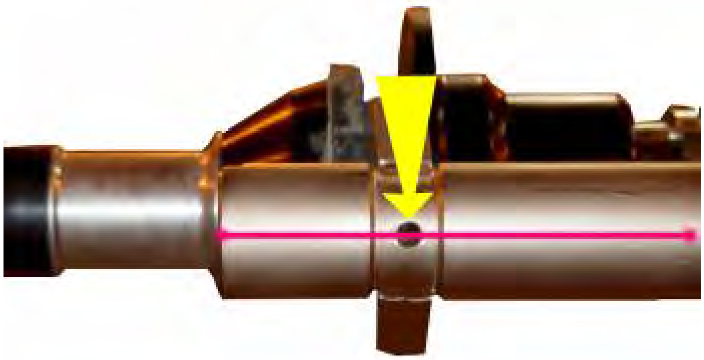


Figure 11

15. Press F6 to stop the test;
16. Press the pedal down to unlock the main shaft and unclamp the calibration rotor;
17. Use F4 and turn the main shaft to select test step number 4 and press F6 to start the test;
18. The rear scanner box begins to move continuously between two fixed positions. It is possible to adjust the rear scanner assembling so that the laser – while moving - keeps laying on the centreline of the slot on the side of the main shaft (see figure 12). This can be done by turning the hex socket head screw in the rear of the sliding head (see figure 13 on the next page) with a 4mm hex allen key;

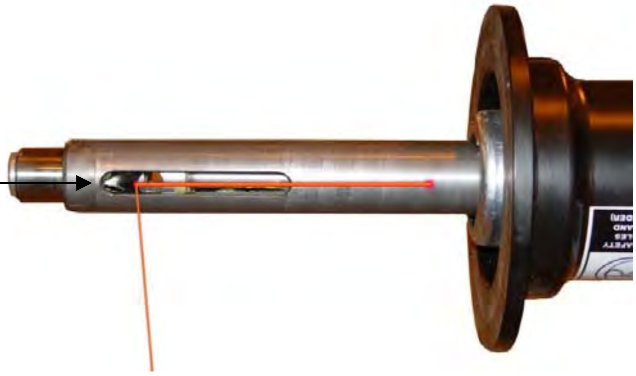


Figure 12: Reference hole on the main shaft

19. Press F6 to stop the test;
20. Press ESC or STOP to exit the procedure.

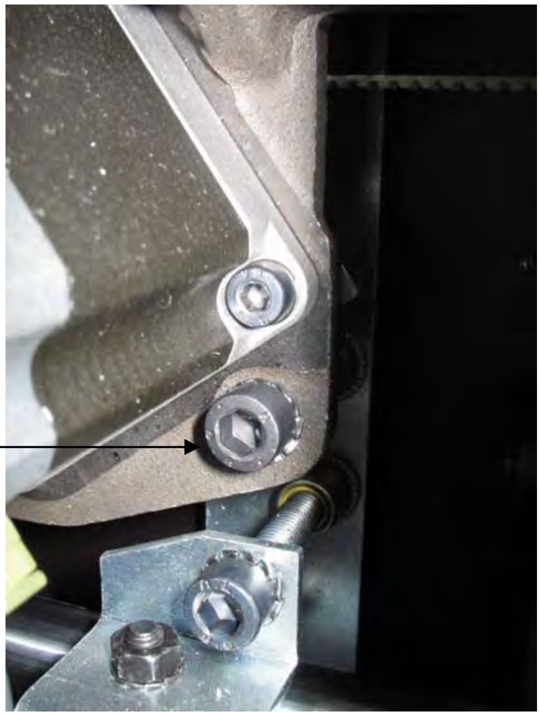


Figure 13: Regulation screw for the rear scanner assembly

Comments: Save the calibration in permanent memory with C90.

C123 OPTIMA 2 and BFH 2000 Display of the status and diagnostic flags of the OPTIMA sub-system and perform manufacturing/diagnostic tests

Options: None

Special function: None

Description: If the OPTIMA 2 and BFH 2000 balancers fail any part of the C122 camera calibration it may be necessary to adjust one or more of the cameras.

- Press F1 button to enter C123

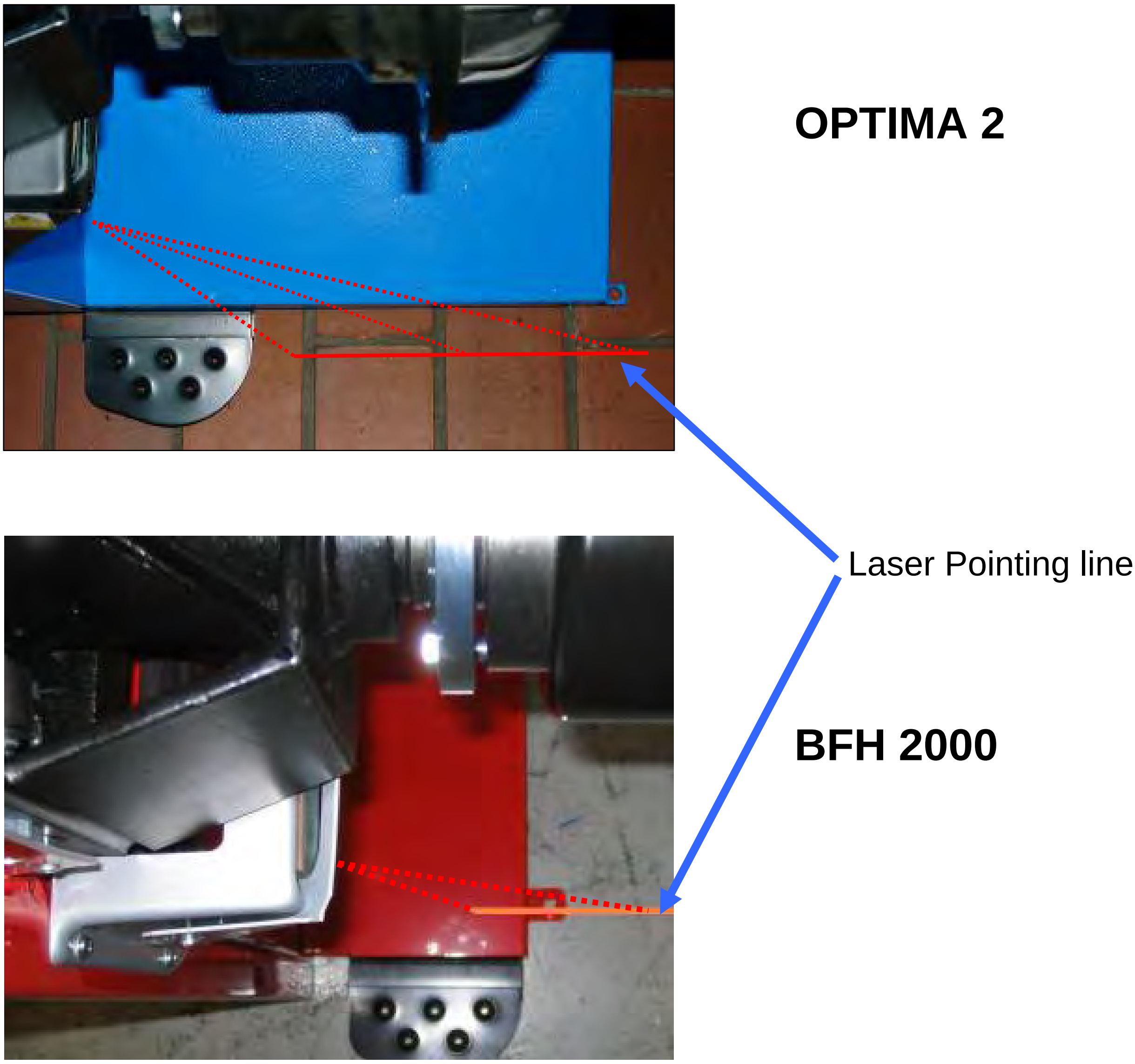
STEP 1: INNER CAMERA AND LASER

- When C123 procedure is selected, the following screenshot is displayed
- Under the “Diag” writing, 56 flags are displayed: 16 diagnostic flags + 32 status flags + 8 analog input flags; the meaning of all these flags is explained in the Appendix “HUB Flags for C122 / C123”.
- In the first line of the screen the step number 1 is already selected.

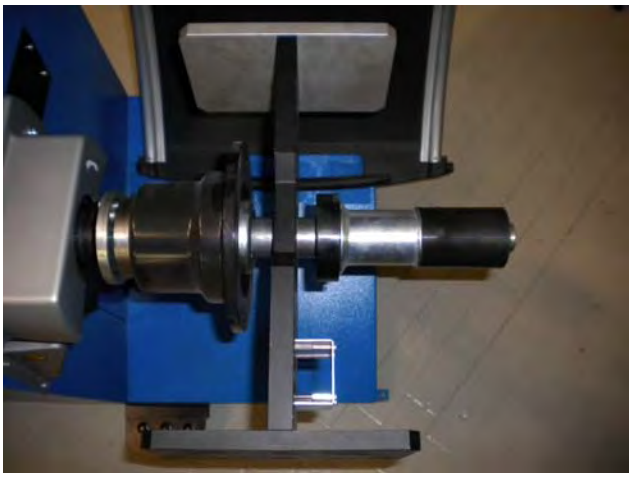
- Press F6 (ENTER) button or “OK” on the keyboard to confirm the test step number and start the test.
- The camera will to turn on to allow to watch the image on screen.

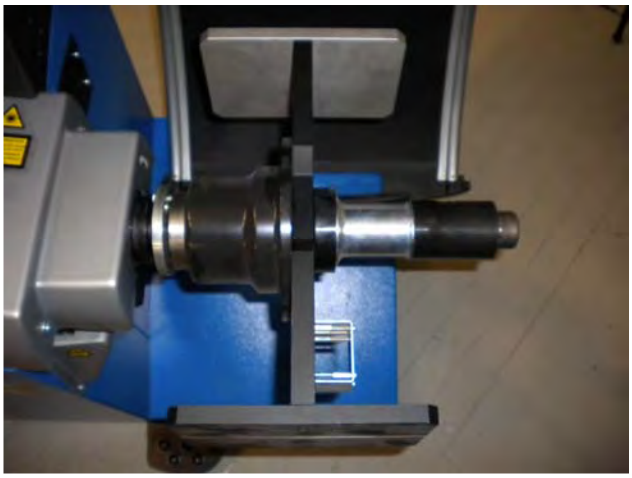
- Inner laser begins to move continuously between two fixed position. Make sure that its spot is moving parallel to the cabinet

- If the laser moves parallel continue with step 3. If not exit C123 and check the laser following paragraph 4.30.2



- Clamp the assy laser positioner **without** cone and **with** plastic spacer mounted on the quick nut.

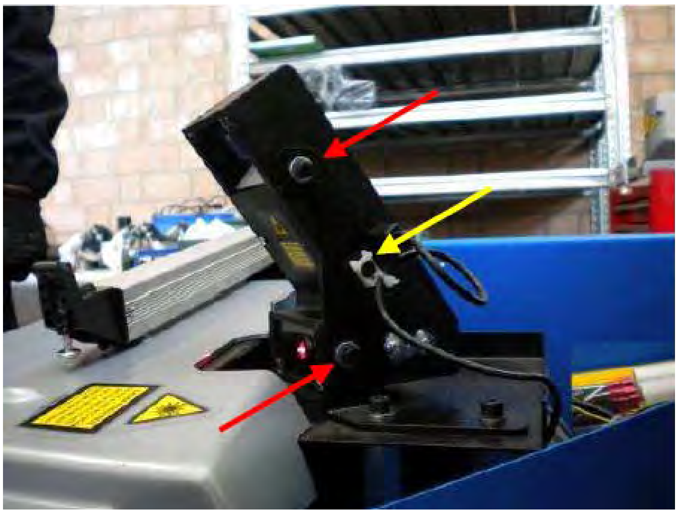




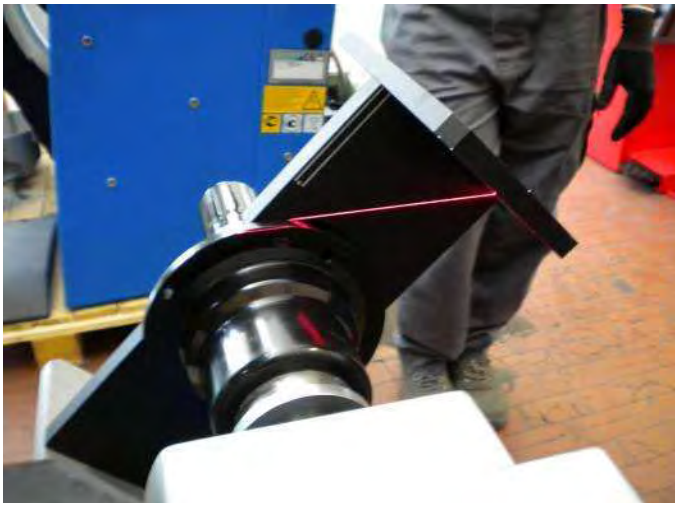
- Place the assy laser positioner with the white plate backward to 9 o'clock.
- Place an electronic inclinometer on the laser positioner and rotate it at 45°.
- Press the pedal to brake and freeze the position. If necessary press again the pedal to unlock.

- Make sure that the laser light of light is perfectly superimposed to the line marked on the positioner.

- To adjust the strip of light position loose a little the central screw (fulcrum) and loose the other screws (red arrows) to adjust the camera slope.



- When the laser light of light is perfectly superimposed to the line marked on the positioner, lock firmly the three adjustment screws.
- Press the pedal to unlock the positioner
- Press F6 to exit Step 1

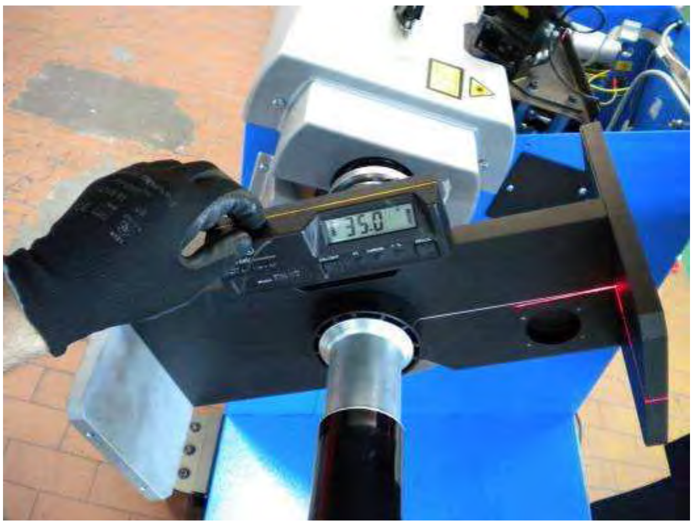


- Press and hold F4 button and rotate the positioner to select step 2.

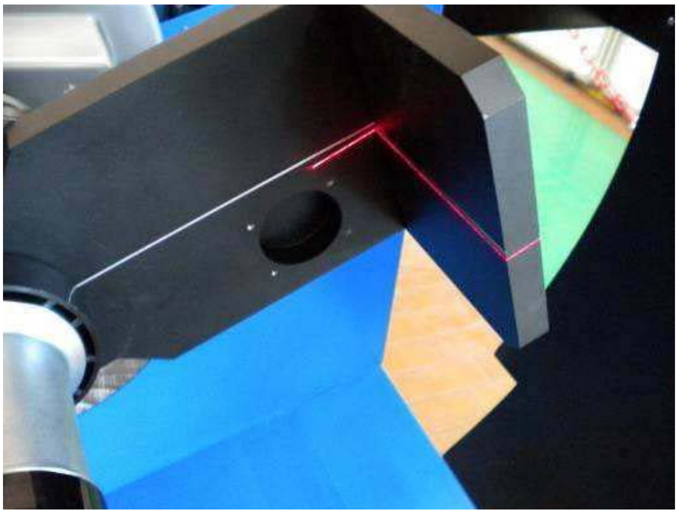
STEP 2: EXTERNAL CAMERA

- Press F6 (ENTER) button or “OK” on the keyboard to confirm the test step number.
- Camera will turn on to watch the image on scree and test can start..

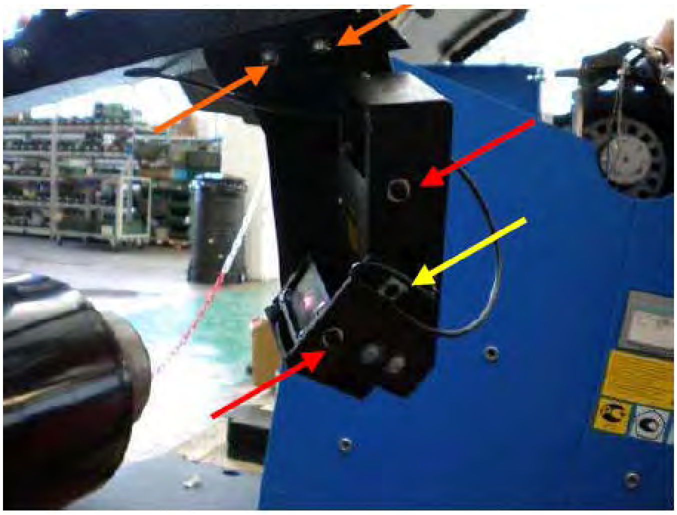
- Place the assy laser positioner with the white plate at 9 o’clock.
- Place an electronic inclinometer on the laser positioner and rotate it at 35°on Optima II and 30°on BFH 2000.
- Press the pedal to brake and freeze the position. If necessary press again the pedal to unlock.



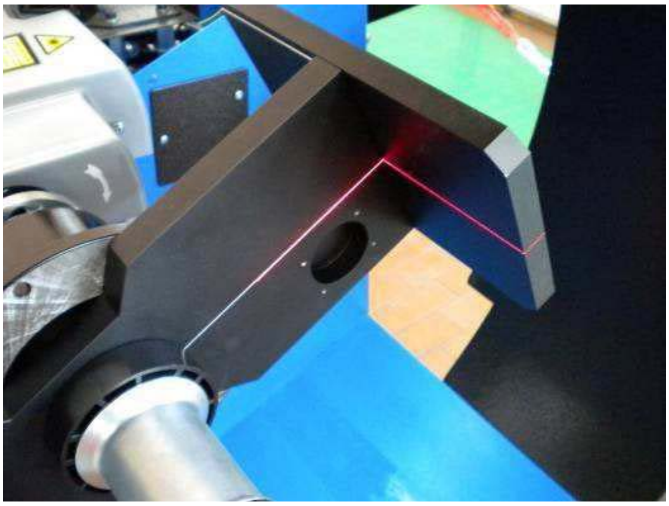
- Make sure that the laser light of light is perfectly superimposed to the line marked on the positioner.



- To adjust the strip of light position loose a little the central screw (fulcrum) and loose the other screws (red arrows) to adjust the camera slope.
- Besides for this camera, there are more adjustments, using the upper screws (orange arrows).



- When the laser light of light is perfectly superimposed to the line marked on the positioner, lock firmly the adjustment screws.
- Press the pedal to unlock the positioner
- Press F6 to exit Step 2



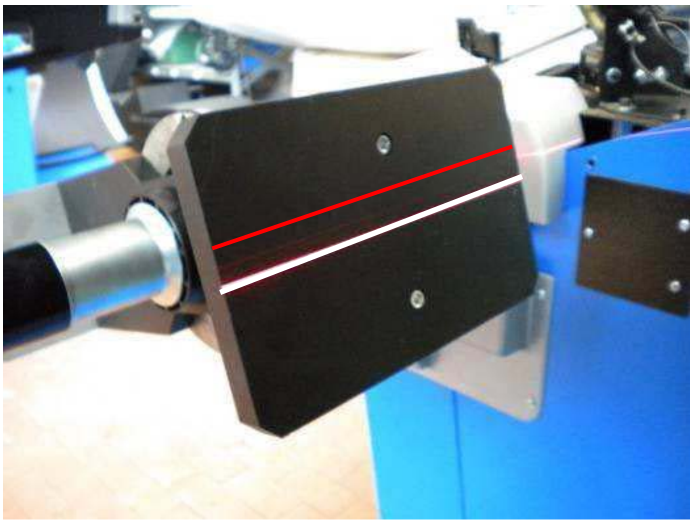
- Press and hold F4 button and rotate the positioner to select step 3.

STEP 3: REAR CAMERA

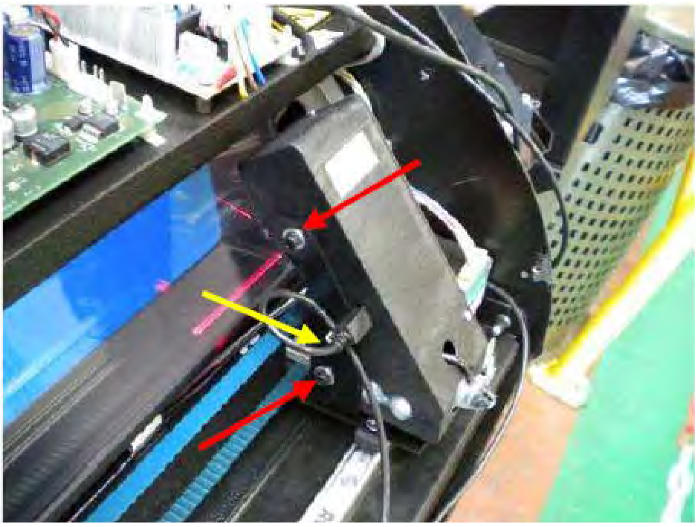
- Press F6 (ENTER) button or "OK" on the keyboard to confirm the test step number.
- Camera will turn on to watch the image on screen and test can start.

- Place the assy laser positioner with the white plate forward to 6 o'clock.
- Place an electronic inclinometer on the laser positioner and rotate it at 16.5°on Optima II and 15° on BFH 2000.
- Press the pedal to brake and freeze the position. If necessary press again the pedal to unlock.

- Make sure that the laser light of light is perfectly superimposed to the line marked on the positioner.

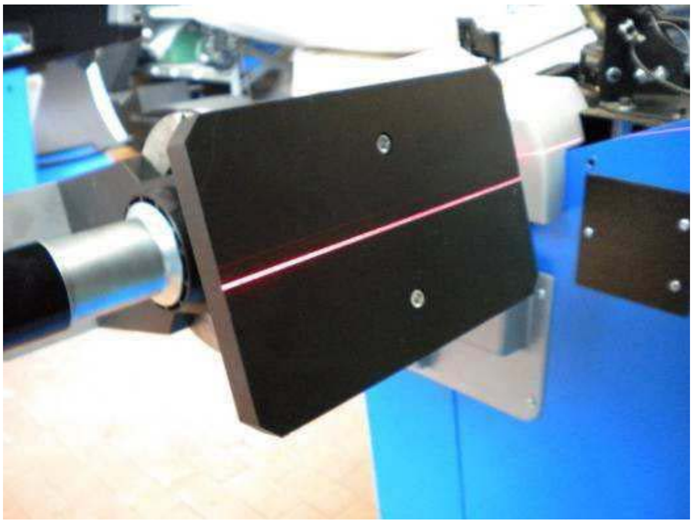


- Loose a little the central screw (fulcrum) and loose the other screws (red arrows) to adjust the camera slope.



- If necessary adjust the camera carriage slope using the screw pointed the orange arrow.

- When the laser light of light is perfectly superimposed to the line marked on the positioner, lock firmly the three adjustment screws.
- Press the pedal to unlock the positioner
- Press F6 to exit Step 3



- Press and hold F4 button and rotate the positioner to select step 4.

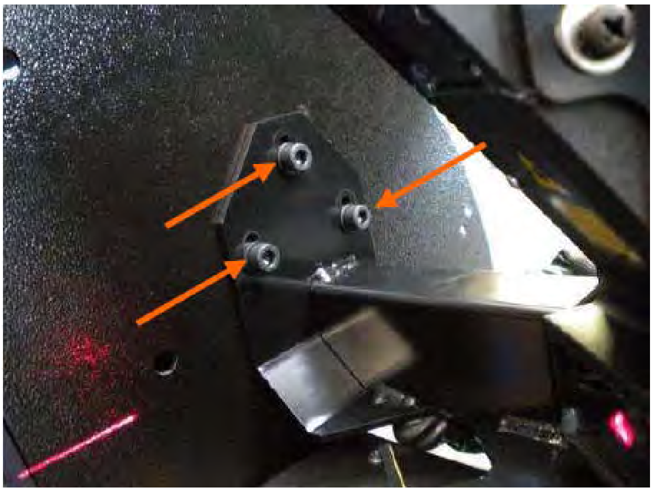
STEP 4: REAR LATERAL LEFT CAMERA

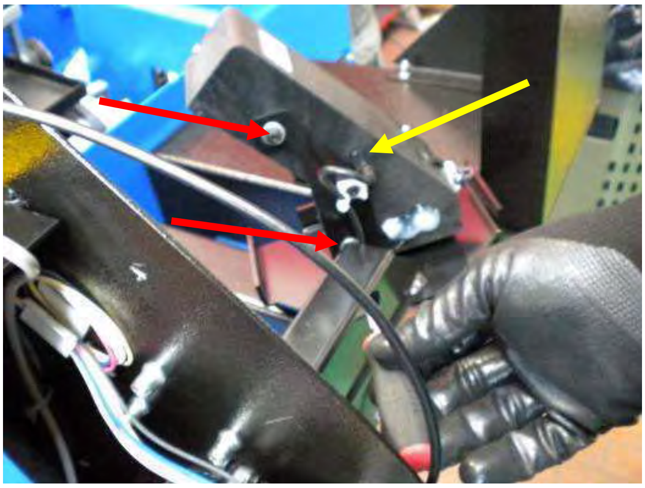
- Press F6 (ENTER) button or “OK” on the keyboard to confirm the test step number.
- Camera will turn on to watch the image on screen and test can start.

- Place the assy laser positioner with the white plate forward to 6 o’clock.
- Place an electronic inclinometer on the laser positioner and rotate it at 16.5°on optima II and 15° on BFH2000.
- Press the pedal to brake and freeze the position. If necessary press again the pedal to unlock.

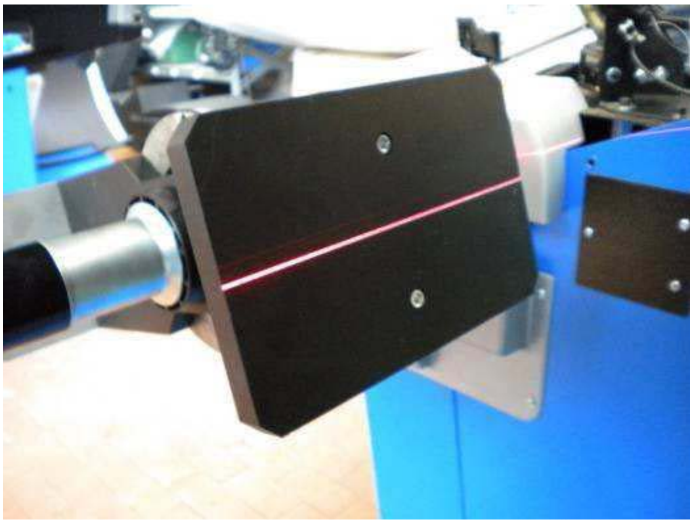
- Make sure that the laser light of light is perfectly superimposed to the line marked on the positioner.

- Adjust the support arm about in the middle of the three slots (orange arrows) and then loose a little the central screw (fulcrum) and loose the other screws (red arrows) to adjust the camera slope.





- When the laser light of light is perfectly superimposed to the line marked on the positioner, lock firmly the three adjustment screws.
- Press the pedal to unlock the positioner
- Press F6 to exit Step 4



- Press and hold F4 button and rotate the positioner to select step 5.

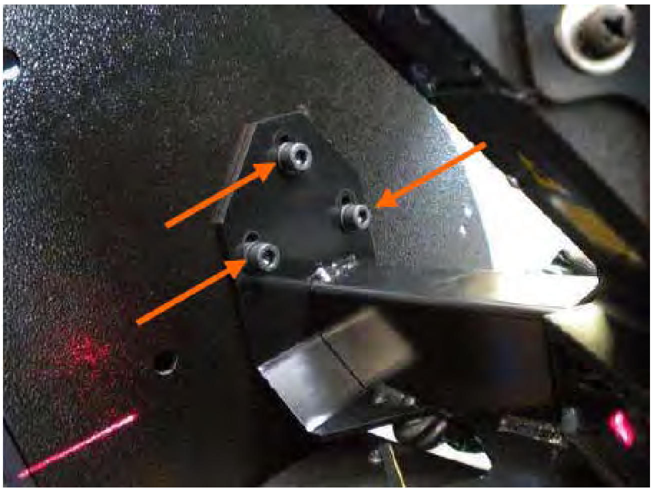
STEP 5: REAR LATERAL RIGHT CAMERA

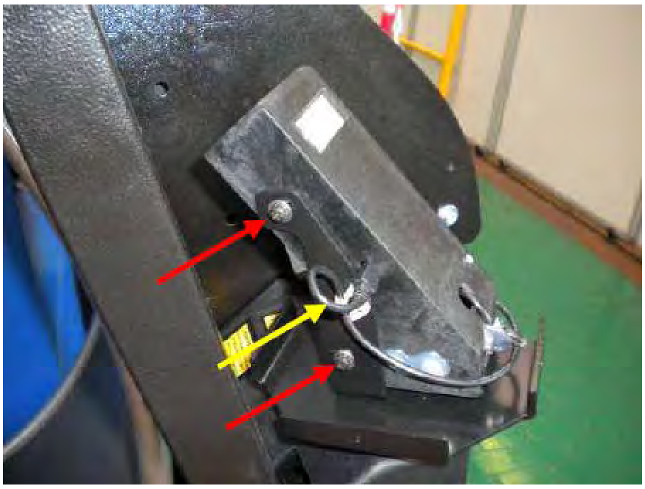
- Press F6 (ENTER) button or “OK” on the keyboard to confirm the test step number.
- Camera will turn on to watch the image on screen and test can start.

- Place the assy laser positioner with the white plate forward to 6 o'clock.
- Place an electronic inclinometer on the laser positioner and rotate it at 16.5°on Optima II and 15° on BFH2000.
- Press the pedal to brake and freeze the position. If necessary press again the pedal to unlock.

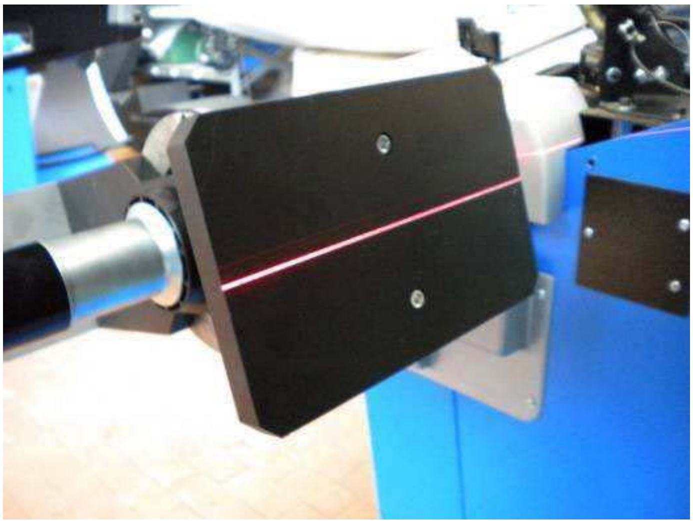
- Make sure that the laser light of light is perfectly superimposed to the line marked on the positioner.

- Adjust the support arm about in the middle of the three slots (orange arrows) and then loose a little the central screw (fulcrum) and loose the other screws (red arrows) to adjust the camera slope.





- When the laser light of light is perfectly superimposed to the line marked on the positioner, lock firmly the three adjustment screws.
- Press the pedal to unlock the positioner
- Press F6 to exit Step 5

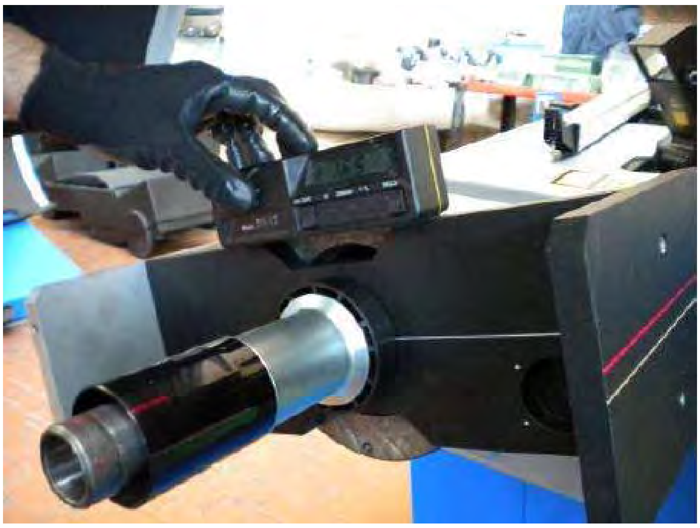


- Press and hold F4 button and rotate the positioner to select step 6.

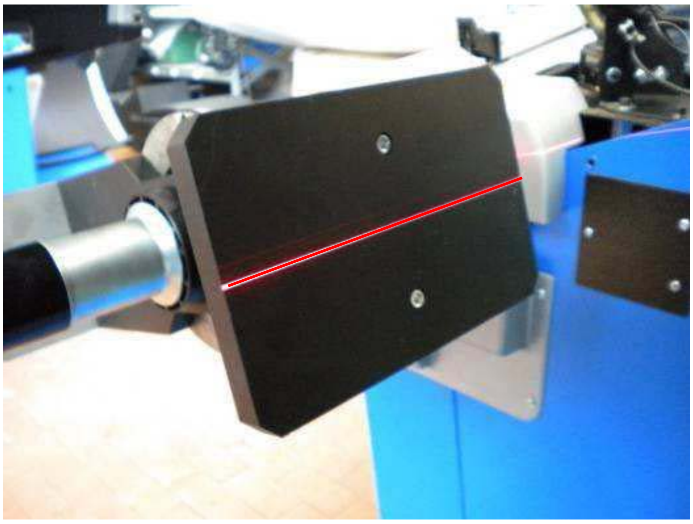
STEP 6: REAR CAMERAS STRIPS OF LIGHT COMPLANARITY.

- Press F6 (ENTER) button or “OK” on the keyboard to confirm the test step number.
- Camera will turn on to watch the image on screen and test can start.

- Place the assy laser positioner with the white plate forward to 6 o’clock.
- Place an electronic inclinometer on the laser positioner and rotate it at 16.5° on optima II and 15° on BFH2000.
- Press the pedal to brake and freeze the position. If necessary press again the pedal to unlock.

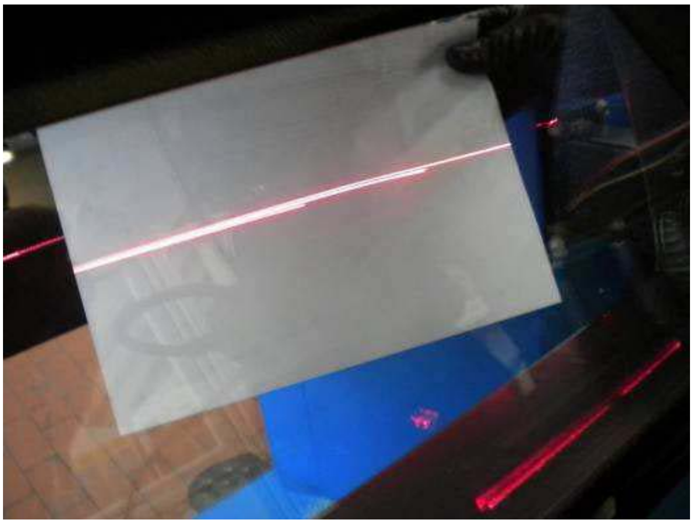


- Make sure that the three strips are coplanar each other and superimposed to the line marked on the positioner

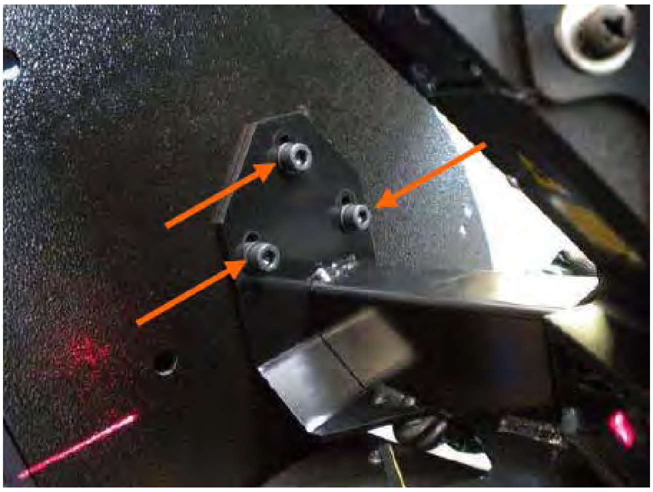


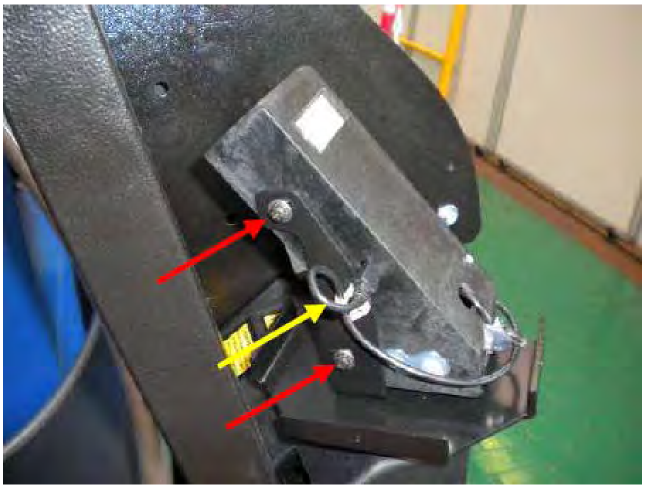
IMPORTANT!

- To make sure about the strips coplanarity, a sheet of paper is needed. Hold in your hand the paper sheet and place it in between cameras and camera positioner.
- Move the paper sheet forward and backward Compared to the cameras and make sure the laser strips do not change alignment, like in the picture.

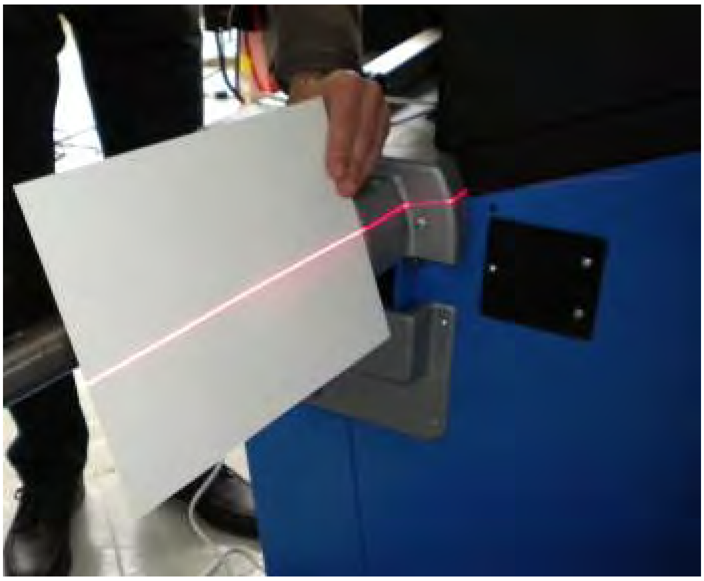


- To align properly the three planes, it is necessary to repeat the step 5 Rear Lateral Cameras. First adjusting the support arm up / down (orange arrows)
- Then loose a little bit the central screw (fulcrum) and the other screws (red arrows) to adjust the camera slope.





- The final result has to be the projection of a unique line that does not have to change near as well as far to the cameras.



- Press the pedal to unlock the positioner
- Press F6 to exit Step 6
- Unclamp the laser positioner

- Press and hold F4 button and rotate the shaft to select step 7.

<u>STEP 7: LASER AND REAR CAMERA MOTORS CONTROL</u>.

- Press F6 (ENTER) button or “OK” on the keyboard to confirm the test step number.
- Use this step to make sure about the regular functioning of the laser and rear camera motors.

- Press F6 to exit Step 7.

Press ESC button to exit C codes.

Comments: Save the adjustment in permament memory with C90.

<u>C123 All b9855P / b9850P / 6900p: Display of the status and diagnostic flags and execution of manufacturing/diagnostic tests</u>

Options: None

Special function: None

Description: None

1. Once selected the procedure C123, the screen-shot of Figure is displayed.

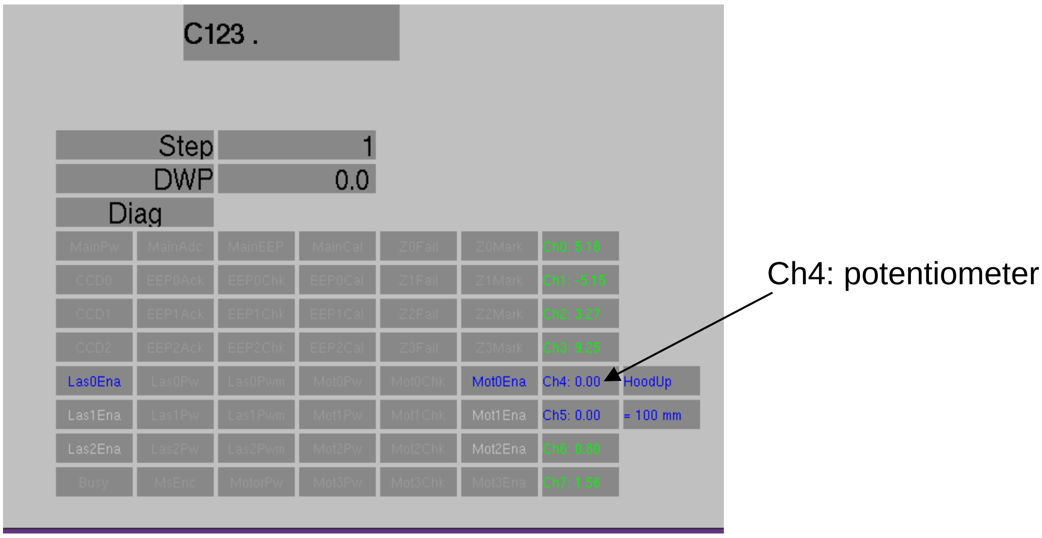


Figure 1 - C123 screen-shot

Under the “Diag” writing, 56 flags are displayed: 16 diagnostic flags + 32 status flags + 8 analog input flags; the meaning of all these flags is explained in the Appendix. In the first line the actual step number is displayed while in the second line appears the angular position of the shaft;

2. Calibration of the analogic potentiometer connected to the wheel guard.

Close totally the wheel guard. Read on the screen the analog value of the potentiometer in the Ch4 field.

FOR JOHN BEAN b9855P b9850P:

The value must be within the range 2.0V - 2.5V (0.5V – 1.8V for b9850P). Open completely the wheel guard, the value you read now should be about 1V below (2V above for b9850P) to the previous one. If not, you must proceed to the calibration as follow. In order to regulate the potentiometer position, act on the its springy holder and shift it until the gear can move freely. Turn the gear by hand until the correct value will appear on the screen. Release the holder.

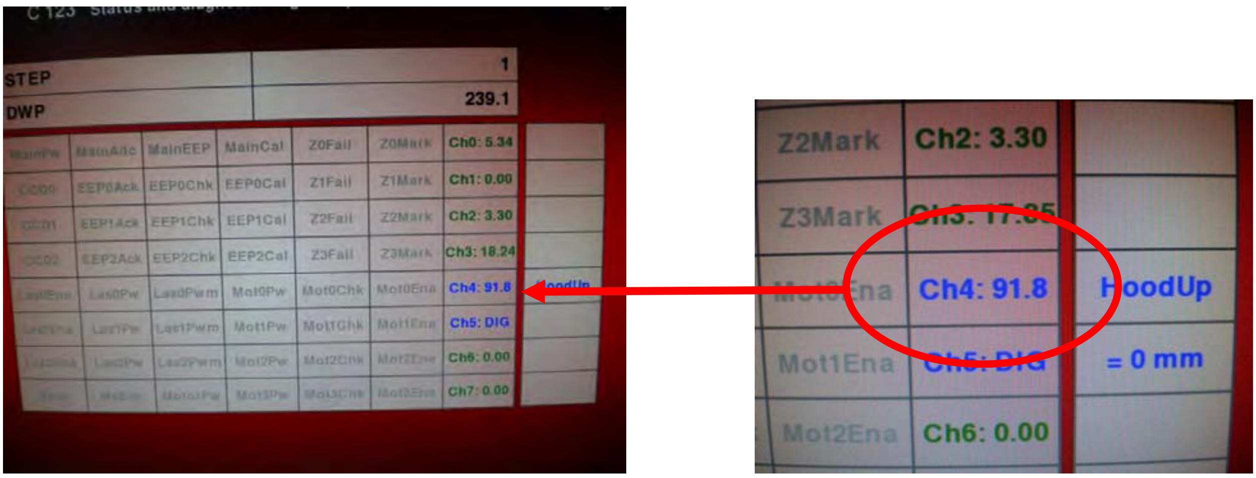
FOR GEODYNA 6900P:

The value must be less than 3.5V and greater than 1.5V. Open completely the wheel guard, the value you read now should be about 0.45V below to the last one. If not, you must proceed to the calibration as follow. In order to regulate the potentiometer position use a wrench of 10 and untighten the fastening screw of the gear connected to the shaft of the wheel guard arm. Turn by hand the gear until the correct value will appear on the screen. Tighten the nut.

3. Digital Sonar without the potentiometer connected to the wheel guard.

Digital Sonar without the potentiometer does not require any voltage of reference. It only requires a correct wheel guard inclination.

In Ch4 are only displayed numbers the represent the inclination in degrees and in Ch5 it is only displayed “DIG” to represent that the machine is using a Digital Sonar.



4. Check the scanner movement

Press Enter (F6) and proceed with step n.1. The inner scanner begins to move continuously between two fixed position. Check if the inner scanner assembly and the laser pointing work correctly; the scanner point must travel perpendicular to the cabinet right side as shown in Figure 2 / 2a.

5. Press F6 to stop the test;

Figure 2 - (b9855P / b9850P)

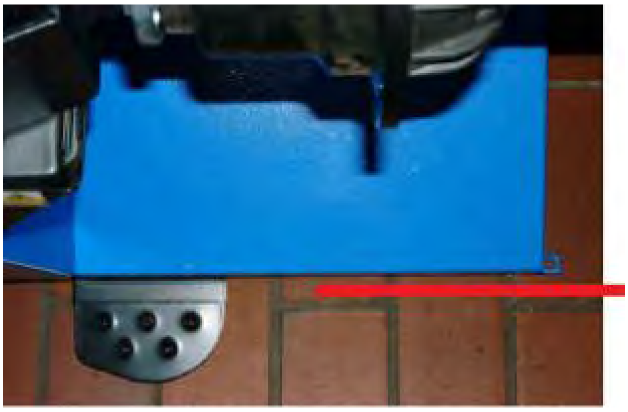


Figure 2a - (6900p)

Scanner Movement Control Line

Comments:

C123 Laser pointer balancer except all Optima – BFH – b9850p – 98552p Geo 6900p: Display of the status and execution of diagnostic tests

Options: None

Special function: None

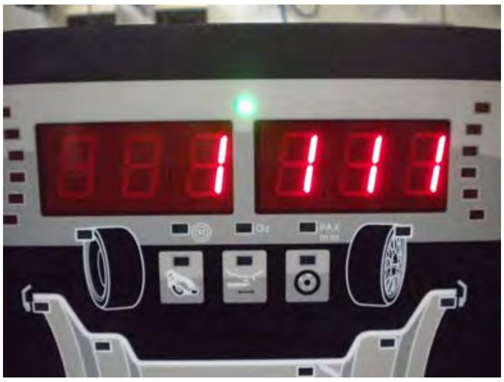
Description: A numeric sequence of 4 numbers that have the following meaning is displayed.
0 : off (fail)
1 : on (ok)

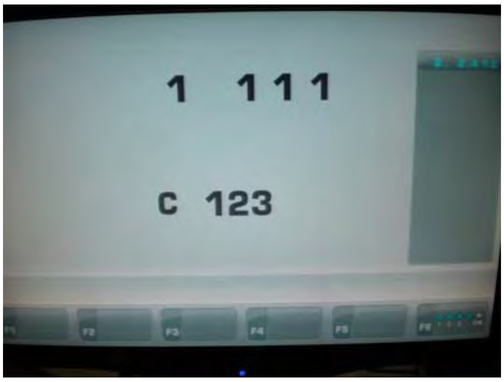
Display	0/1	0/1	0/1	0/1
	Main Board power	Motor Strem	Laser stream	Zero mark

Screen

Main Board Power Supply, status	0/1
Motor Stream, status	0/1
Laser Stream, status	0/1
Zero Mark Detection, status	0/1

Once selected C123, the following screens are displayed according to the balancer model:





Comments:

Appendix : AWP/HUB Flags for C122 / C123 Optima – BFH 1000

On-screen display:

In service procedure C122/C123 diagnostic information should be displayed as following:

MainPw (0)	MainAdc (36)	MainEEP (4)	MainCal (8)	Z0Fail (12)	Z0Mark (28)	Ch0 : X.XX
CCD0 (1)	EEP0Ack (33)	EEP0Chk (5)	EEP0Cal (9)	Z1Fail (13)	Z1Mark (29)	Ch1 : X.XX
CCD1 (2)	EEP1Ack (34)	EEP1Chk (6)	EEP1Cal (10)	Z2Fail (14)	Z2Mark (30)	Ch2 : X.XX
CCD2 (3)	EEP2Ack (35)	EEP2Chk (7)	EEP2Cal (11)	Z3Fail (15)	Z3Mark (31)	Ch3 : X.XX
Las0Ena (45)	Las0Pw (37)	Las0Pwm (41)	Mot0Pw (20)	Mot0Chk (16)	Mot0Ena (24)	Ch4 : X.XX
Las1Ena (46)	Las1Pw (38)	Las1Pwm (42)	Mot1Pw (21)	Mot1Chk (17)	Mot1Ena (25)	Ch5 : X.XX
Las2Ena (47)	Las2Pw (39)	Las2Pwm (43)	Mot2Pw (22)	Mot2Chk (18)	Mot2Ena (26)	Ch6 : X.XX
Busy (44)	MsEnc (40)	MotorPw (32)	Mot3Pw (23)	Mot3Chk (19)	Mot3Ena (27)	Ch7 : X.XX

For diagnostics bits, 0 (failure) is displayed in **RED**, 1 (ok) is **GRAY**.

For status bits, 0 (disable) is displayed in **GRAY**, 1 (enable) is **BLUE**.

For analog values, normal data is **GREEN**, out of range is **RED**.

Diagnostic flags:

Bit	Shown label	Meaning	Notes
0	MainPw	Analog/logic power supply	
1	CCD0	Inner CCD signals	
2	CCD1	Outer CCD signals	4
3	CCD2	Rear CCD signals	2 - 4
4	MainEEP	Main board EEPROM memory valid	
5	EEP0Chk	Inner EEPROM memory valid	
6	EEP1Chk	Outer EEPROM memory valid	4
7	EEP2Chk	Rear EEPROM memory valid	2 - 4
8	MainCal	Cameras calibration (E360,C122)	
9	EEP0Cal	Inner scanner factory calibration	
10	EEP1Cal	Outer scanner factory calibration	
11	EEP2Cal	Rear scanner factory calibration	2 - 4
12	Z0Fail	Inner motor home mark detection	
13	Z1Fail	Outer motor home mark detection	4
14	Z2Fail	Rear motor home mark detection	2 - 4
15	Z3Fail	Rear shift motor home mark detection	2 - 4
16	Mot0Chk	Inner motor missing steps	
17	Mot1Chk	Outer motor missing steps	4
18	Mot2Chk	Rear motor missing steps	2 - 4
19	Mot3Chk	Rear shift motor missing steps	2 - 4
20	Mot0Pw	Inner motor current sink / power check	1
21	Mot1Pw	Outer motor current sink / power check	1 - 4
22	Mot2Pw	Rear motor current sink / power check	1 - 2 - 4
23	Mot3Pw	Rear shift motor current sink / power check	1 - 2 - 4
32	MotorPw	External motor power supply	1
33	EEP0Ack	Inner EEPROM memory ACK	
34	EEP1Ack	Outer EEPROM memory ACK	4
35	EEP2Ack	Rear EEPROM memory ACK	2 - 4
36	MainAdc	Camera board A/D converter check	
37	Las0Pw	Inner laser current sink / power check	1
38	Las1Pw	Outer laser current sink / power check	1 - 4
39	Las2Pw	Rear laser current sink / power check	1 – 2 - 4
40	MsEnc	Shaft encoder zero mark detection	3 - 4
41	Las0Pwm	Inner laser modulation	1
42	Las1Pwm	Outer laser modulation	1 - 4
43	Las2Pwm	Rear laser modulation	1 – 2 - 4

Notes:

1. Available only on new camera boards (EAP0204G50B), default to 1 on former boards.
2. Obviously fails on BFH800 (this have not rear scanner and rear shift scanner)
3. Valid after runout measurement only.
4. NOT Valid for b9855P / b9850P and 6900p.

Every failure about a diagnostics bit produces an error code.

Status flags:

Bit	Shown label	Meaning
24	Mot0Ena	Inner motor power enable
25	Mot1Ena	Outer motor power enable
26	Mot2Ena	Rear motor power enable
27	Mot3Ena	Rear shift motor power enable
28	Z0Mark	Inner motor home mark
29	Z1Mark	Outer motor home mark
30	Z2Mark	Rear motor home mark
31	Z3Mark	Rear shift motor home mark
44	Busy	Firmware ready/busy status
45	Las0Ena	Inner laser power enable
46	Las1Ena	Outer laser power enable
47	Las2Ena	Rear laser power enable

Analog inputs:

Eight A/D converter channels are sampled and shown on screen display.

Ch	Analog Input on Camera Processor Board	Valid range
0	5.00 V power supply	4.80 V ; 5.60 V
1	-5.00 V analog power supply	-5.60 V ; -4.80 V
2	3.30 V logic power supply	3.00 V ; 3.60 V
3	9.00 V external motor power supply	8.00 V ; 12.00 V
4	AUX 0 external input	0 V ; 4.096 V
5	AUX 1 external input	0 V ; 4.096 V
6	Laser current sink	0 V ; 4.096 V
7	Motor current sink	0 V ; 4.096 V

Notes:

Inputs 6 and 7 are available only on new camera boards (EAP0204G50B) and scale factors for power supply voltages are consistent on new boards also.

Appendix : AWP/HUB Flags for C122 / C123 Optima II– BFH 2000

On-screen display:

In service procedure C122/C123 diagnostic information should be displayed as following:

Busy (0)	Z0Fail (8)	ETH1 (16)	ETH2 (17)	ETH3 (18)	ETH4 (19)	ETH5 (20)	Ch0 : 5.19
USB (1)	Z3Fail (9)	USB1 (21)	USB2 (22)	USB3 (23)	USB4 (24)	USB5 (25)	Ch1 : 0.00
MainPw (2)	Z0Mark (10)	USBHs1 (26)	USBHs2 (27)	USBHs3 (28)	USBHs4 (29)	USBHs5 (30)	Ch2 : 3.30
MotorPw (3)	Z3Mark (11)	CMOS1 (31)	CMOS2 (32)	CMOS3 (33)	CMOS4 (34)	CMOS5 (35)	Ch3 : 12.60
MainEEP (4)	M0Enab (12)	EEP1 (36)	EEP2 (37)	EEP3 (37)	EEP4 (39)	EEP5 (40)	Ch4 : 0.00
MainCal (5)	M3Enab (13)	CAL1 (41)	CAL2 (42)	CAL3 (43)	CAL4 (44)	CAL5 (45)	Ch5 : 0.00
MsEnc (6)	M0PwChk (14)	LasChk1 (46)	LasChk2 (47)	LasChk3 (48)	LasChk4 (49)	LasChk5 (50)	Ch6 : 0.00
LasP1 (7)	M3PwChk (15)	LasEna1 (51)	LasEna2 (52)	LasEna3 (53)	LasEna4 (54)	LasEna5 (55)	Ch7 : 0.00

Bit	Shown label	Meaning	Notes
0	Busy	Status of SOL	
1	USB	Communication HUB - cameras	
2	Main Pw	Analog/logic power supply on the HUB	5VDC
3	MotorPw	External motor power supply	12VDC
4	MainEEP	Main board EEPROM memory valid	
5	MainCal	Cameras calibration (E360,C122	
6	MsEnc	Shaft encoder zero mark detection	
7	LasP1	Laser pointer	
8	Z0Fail	Inner laser motor home mark detection	
9	Z3Fail	Rear shift motor home mark detection	
10	Z0Mark	Inner laser motor home mark	
11	Z3Mark	Rear shift motor home mark	
12	M0Ena	Inner laser motor power enable	
13	M3Ena	Rear shift motor power enable	
14	M0PwChk	Inner motor current sink / power check	
15	M3PwChk	Rear shift motor current sink / power check	
16, 17, 18, 19, 20	ETHx	Ethernet communication HUB to EPC	
21, 22, 23, 24, 25	USBx	USB Communication Camera to EPC	
26, 27, 28, 29, 30	USBHsx	High speed communication quality	
31, 32, 33, 34, 35	CMOSx	Camera image sensor	
36, 37, 38, 39,40	EEPx	Calibration memory in the camera	
41, 42, 43, 44, 45	CALx	Factory camera calibration	
46, 47, 48, 49, 50	LasChkx	Diagnostic power supply on camera module	
51, 52, 53, 54, 55	LasEnax	Status laser ON-OFF	

C124 OPTIMA: Driver Seat Side selection

Options: None

Special function: None

Description: On selection the current status is displayed (0 / 1).
Select 0: Driver Side to Left (Default selection)
Select 1: Driver Side to Right

Comments: The setting can be stored to persistent memory by performing code C90. This feature is available on OPTIMA CRT models only.

C127 OPTIMA/BFH2000: enable / disable Store data in USB stick

Options: None

Special function: None

Description: This service code will enable/disable the presence of the option inside F6 menu that can allows to copy all the content of the temp folder from the embedded pc to an USB Stick (debug/service use only).

On selection the current status is displayed (0 / 1).

Select 0: Option disabled (Default selection)
Select 1: Option enabled

Comments: Use USB stick with led to understand when the download is completed.The setting can be stored to persistent memory by performing code C90.

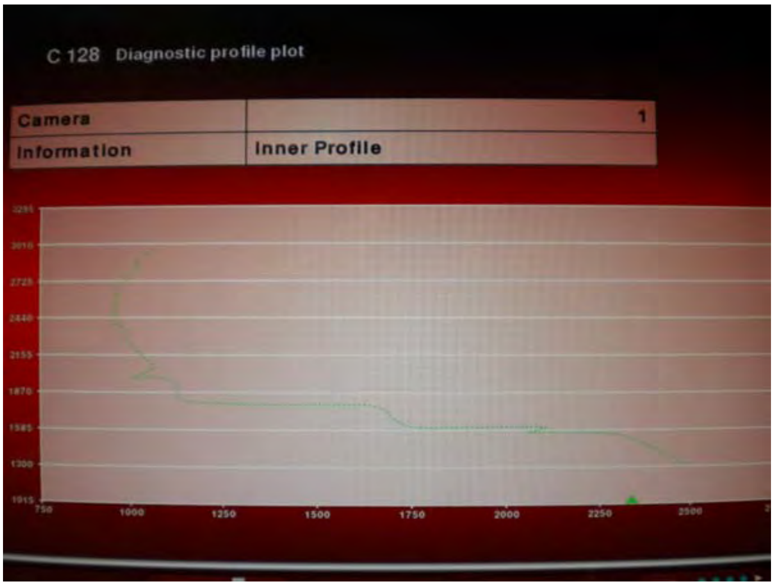
C128 OPTIMA BFH2000: Diagnostic profile plot

Options: None

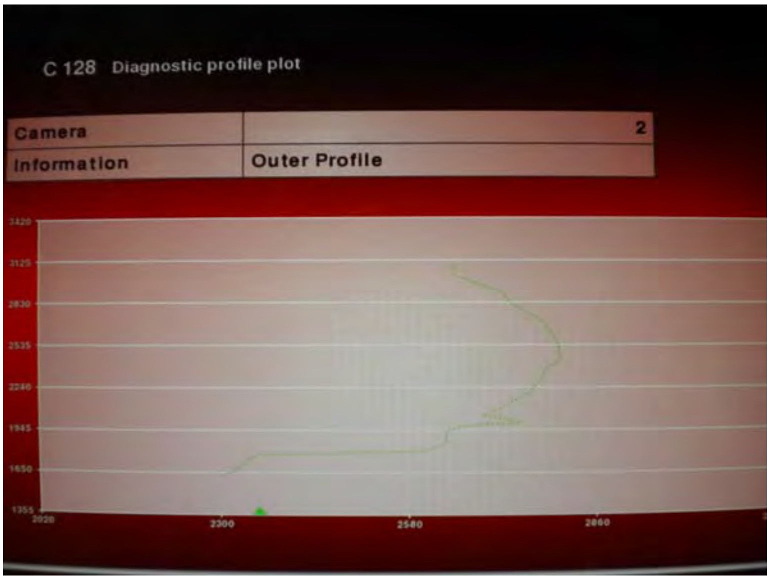
Special function: None

Description: This C code allows to display every plot stored the EPCs and compare each others to check the alignment of the cameras.
Press F4 to move from camears and F6 to confirm.

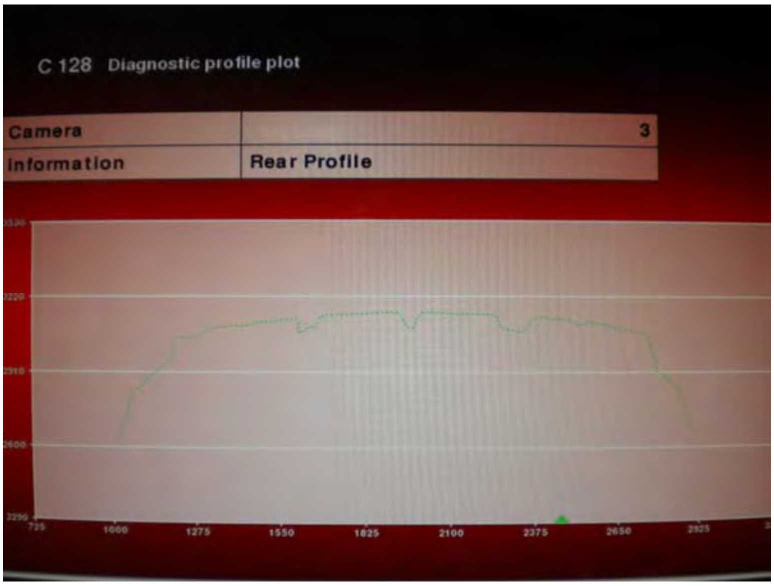
Camera 1: Inner Profile.



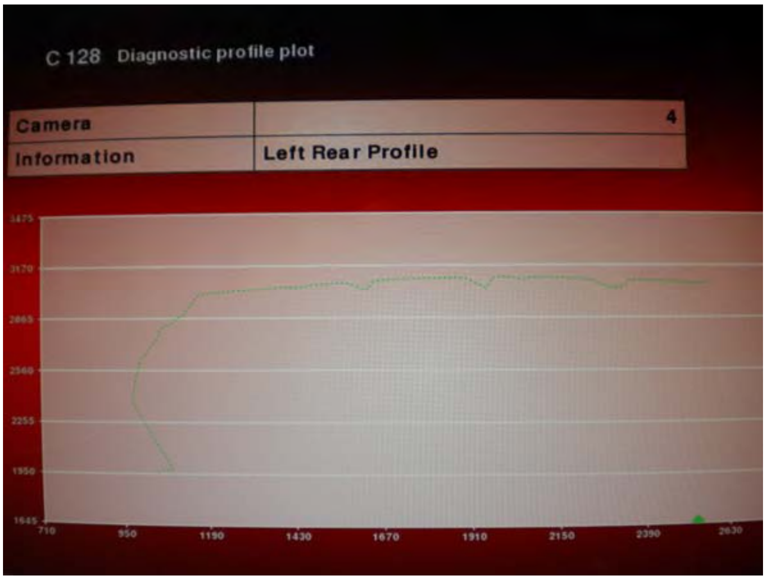
Camera 2: Outer Profile



Camera 3: Rear Profile

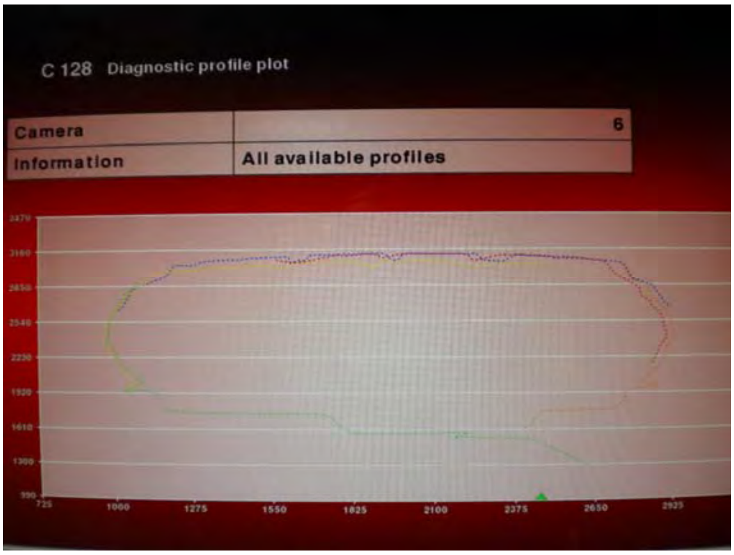


Camera 4:Left Rear Profile



Camera 5 Right Rear Profile

All Available Profiles



Comments: From software 4.5.3

C130 Enable / Disable Touch Screen

Options: None

Special function: None

Description: On selection the current status is displayed (0 / 1).
Select 0: Standard Screen
Select 1: Touch screen

First Step

Second Step

Third Step

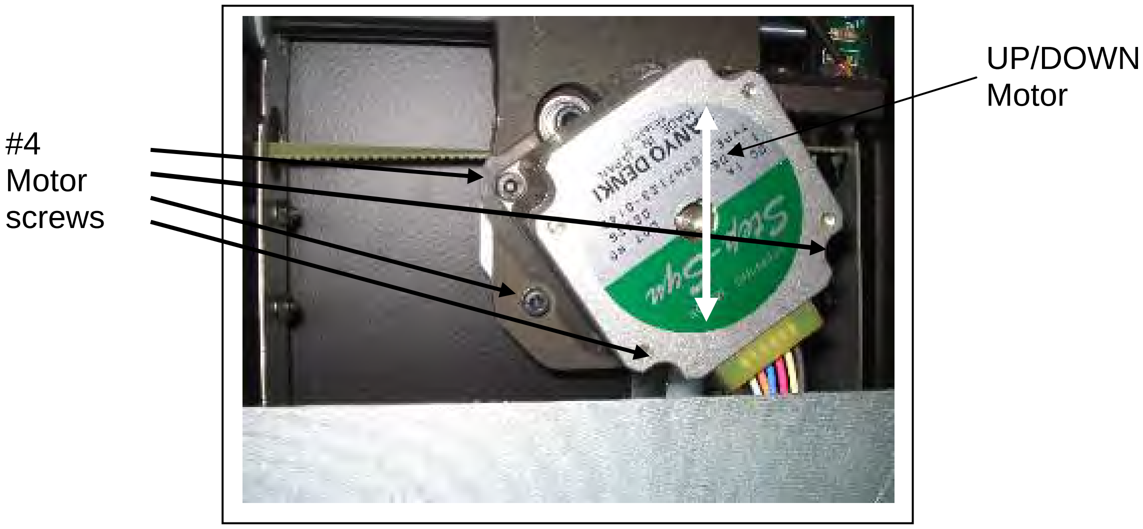
At the end of the calibration process the machine will reboot itself.

Comments: The setting can be stored to persistent memory by performing code C90. This feature is available on OPTIMA CRT models only.

6.7 ADJUSTMENT OF THE GEAR ON THE OPTIMA REAR SLIDING MECHANISM

This shall be done by manufacturing when the head is mounted or whenever the coupling toothed belt – gear is being need service (eg.: motor replacement, belt replacement, fix to reduce noise of the mechanism,…)

1. Loose the 4 screws which hold the motor with a 2,5mm hex allen key (see figure below);
2. Check the motor can be adjusted up-down (slots are provided in the basement);
3. Pull the motor to the top to fit the gear teeth in the belt. When this is done, tighten two or more of the 4 loosen screws;
4. Check that the head can not slip on the belt: keep the gear still with your fingers and try to gently move the complete scanning head left-right. If the gear keep tight on the belt, the adjustment is correct. If the gear slips, then you have to loose the screws again and pull the motor more to the top. Then try again if the gear does not slip on the belt.



NOTE: excessive noise of the rear head during movement can be due to too tight mate of the gear against the belt: we recommend then to move the motor slightly down, to decrease the pressure of the gear on the belt.

UPDATING GUIDE:

REVISION F March 2014

REVISION E February 2014

REVISION D December 2013

Chapter 5.10 “E” Error codes on JBEG and BOXER balancers: Updated text.	Pag.	150
Chapter 6.3.5 Screen balancers without EPC: Updated text and pictures	Pag.	175
Chapter C7: Volume of audible signals : updated text.	Pag.	182
Chapter C11 Position brake after measuring run: updated text.	Pag.	185
Chapter C13 Starting measurement run by closing the wheel guard: updated text.	Pag.	187
Chapter C47 Select machine model: updated text	Pag.	193
Chapter C71 Display angular deviation of the vibratory system as measured with C code 115: updated text.	Pag.	206
Chapter C80: Calibration of the inner SAPE gauge arm and the AutoStopSystem: updated text.	Pag.	210
Chapter C92: Display of actual distance and diameter of inner SAPE/geodata: updated text.	Pag.	232
Chapter C103 Test of transimpedance and unbalance signal amplifiers: updated text.	Pag.	235
Chapter C122: Laser pointer calibration (except Optima II and BFH 2000): New	Pag.	253
Chapter C123:All b9850, b9855, b9855-2p, Geo 6900p and Geo 6900-2p: display of status and diagnostic flags and execution of manufacturing/diagnostic tests: updated text and pictures.	Pag.	280
Chapter C123: Laser pointer balancers except all Optima, BFH, b9850p, b9855 2p, Geo 6900p: Display of the status and execution of diagnostic tests: New	Pag.	281
Chapter C128 OPTIMA BFH2000: Diagnostic profile plot: New	Pag.	288
Chapter 6.6: C47 (Updated)	Pag.	205
Chapter 6.6: C80 (Updated)	Pag.	225
Update parts of chapter		
Chapter 3.5: Pag. 21	Updated	

REVISION C March 2013

Update parts of chapter
ALL CHAPTERS HAVE BEEN UPDATED.

REVISION B July 2012

Update parts of chapter	
Chapter 6.6: Pag. 184 - C48	Deleted
Chapter 6.6: Pag. 200 – C75	Updated
Chapter 6.6: Pag. 201 – C76	Deleted
Chapter 6.6: Pag. 227 – C103	Updated

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