



a product of the company Bozzio AG

Maintenance Manual

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BOZZIO

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Switzerland



Hauptsponsor



Schweizer
Paraplegiker
Stiftung

Sponsoren



STI
Stiftung für technologische Innovation
Fondation pour l'innovation technologique
Foundation for technological innovation



Berner Fachhochschule
Technik und Informatik

KTI/CTI
DE FONDACIUNEA DA INNOVAZIUN
L'AGENZIA PER LA PROMOZIONE DE L'INNOVAZIUN
L'AGENZIA PER LA PROMOZIONE DELL'INNOVAZIONE
THE INNOVATION PROMOTION AGENCY

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1 General

This document describes the maintenance of the joysteer® system **exclusively** for trained personnel, whereby all points need to be carried out as described.

2 Disclaimer

Bozzio AG refuses their product liability if one or more of the following facts are given:

- Driving the system by users who do not possess an appropriate driving licence
Exception: driving accompanied by an authorized driving instructor
- Driving with accompanying driving instructor without installation of an Instructor switch
- Installation/ maintenance/ repairs by companies not trained by Bozzio AG
- Installation/ maintenance/ repairs by personnel not trained by Bozzio AG
- Installation/ maintenance/ repairs not according to the manuals
- Installation/ maintenance/ repairs of components/ modules, which are not mentioned in the part list
- Installation/ maintenance/ repairs of any MMI (Man Machine Interface), which has not been released by Bozzio AG in written form
- Usage of parameter-sets which do not correspond to the “rules” of the Service manager
- Any modifications to the cable harness

Important:

- By opening the modules any warranty of the manufacturer is omitted
(Exception: EnergyAlarm module)

3 Owner- and vehicle details

Name:	
Street:	
ZIP/ Postal code/ City:	
Country:	
Telephone:	
Vehicle Type:	
VIN:	
Vehicle registration number:	
Date of Handover to owner:	

4 System details

joysteer 2.0	Serial number:
EnergieAlam module:	
Display module:	
Cable harness:	
SmartGas:	
Puls test box:	
Software version with first installation:	
Filename of Parameter set:	
Steering sensor module:	
Converter module 1:	
Converter module 2:	
Converter module 3:	
Converter module 4:	
Steering actuator module:	
Brake actuator module:	
MMI 1 (Name + S/N):	
MMI 2 (Name + S/N)	

3rd party products (if existing):	Module name and serial number:
Secondary controls:	
Digital gear shifter:	
Electric Park Brake:	

5 Interval and actions

Required Maintenance interval 1:

Every **12 months**, irrespective of the driven distance.

Actions:

- **System inspection:** refer to chapter 6 for further details
- **Parameter-set inspection:** check, if the parameter-set complies with the users capabilities. Refer to chapter 6.4 for further details

Required maintenance interval 2:

Every **24 month or at 70'000 kilometres, whichever comes first will apply.**

Actions:

- **System inspection:** refer to chapter 6 for further details
- **Parameter-set inspection:** check, if parameter-set complies with the users driving capabilities. Refer to chapter 6.4 for further details
- **Replace backup-battery.** Refer to the universal system manual for the battery classification

6 System inspection

Following steps need to be checked in the following order:

1. Customer and system information

- a. Has the customer encountered any errors or problems?
- b. Check and store the log with the service manager.
- c. Check if the parameters are o.k.
Test drive with the customer and improve the parameters if necessary.
- d. Check how many kilometres/miles have been driven since the last service, conventionally and with the joysteer® system. The running hours and mileage can be seen in the service manager.

2. Maintenance check

a. Man Machine Interface (MMI)

i. Friction

With the system off, check if the MMI has excessive friction or stick/slip effect.

The MMI should move smoothly.

ii. Stroke and end-stop

Check if the entire stroke can be reached and if the end-stops have not moved.

Note: The calibrated stroke can be different than the mechanical stroke.

iii. Play on moving parts

Check for excessive play on moving parts.

Check if all bolts and nuts are locked.

iv. MMI bracket

Check if the MMI is mounted securely to its bracket and that there is no chance that the MMI can come loose.

v. Connector X10

Check if the locking-clip of the connector X10 is fixed.

vi. Connector X51 through X54

Check if the pins of the connectors X51 through X54 are still in there housing properly. Do this for both sides of the adapter cable.

vii. Moveable cables

Check that the moving cables on the MMI are still intact.

Check for broken wires or worn isolation.

- b. Steering actuator
 - i. Friction

Check for excessive friction or stick slip effect. While driving conventionally with J-PAS, the steering wheel has to go back into the straight ahead position.
 - ii. Play on the mounting brackets

Check if the brackets are mounted securely and if there is no play or deformation.
 - iii. Position sensor housing

Check if the housing is fixed.
 - iv. Relays

Some steering actuators have external relays. If so, check if the relays are fixed well.
 - v. Connectors

Check if the locking clips of the connectors are fixed.
- c. Brake actuator
 - i. Friction

Check for excessive friction.
 - ii. Play on the mounting brackets

Check if the brackets are mounted securely and if there is no play or deformation.
 - iii. Locking pin

Check if the circlips of the locking pin, that connects the actuator to the pedal, are mounted properly.
 - iv. Relays

Check if the relays are fixed.
 - v. Connectors

Check if the locking clips of the connectors are fixed.
- d. Electronic modules
 - i. Vehicle mass

Check that all electronic modules are properly connected to the vehicle mass.
 - ii. Connectors

Check that the locking clips of all connectors are properly fixed.
- e. Pressure sensors
 - i. Leaks

Check if there are hydraulic leaks in the brake circuits.
 - ii. Wiring

Check if the wiring is not damaged by heat, moving parts or dirt in the engine compartment.

- iii. Connectors
 - Check if the locking clips of the connectors on the pressure sensors are fixed.
- f. Velocity signal
 - There are the following solutions available:
 - 1. proximity sensors
 - 2. magnet sensors
 - 3. CAN adapter
 - i. Adjustment (for **proximity sensors**)
 - Check if the distance between sensors and drive shaft is ok.
 - Check if the adjustment nuts are tight.
 - Check with the service manager if the velocity is read out correctly otherwise adjust with "velocity scale"
 - ii. Adjustment (for **magnet sensors**)
 - Check if the distance between sensors and magnets is ok.
 - Check if the adjustment nuts are tight.
 - Check if there are no missing magnets.
 - Also check for corrosion. A rusty magnet loses its magnetic behaviour.
 - Check with the service manager if the velocity is read out correctly otherwise adjust with "velocity scale"
 - iii. **CAN adapter**
 - Check that the wirings are O.K
 - Check with the service manager if the velocity is read out correctly otherwise adjust with "velocity scale"
- g. Back-up battery
 - i. Check that the batteries are properly fixed (board and backup)
 - ii. Check that the batteries terminals are fixed
 - iii. Check that the terminals are properly isolated
- h. Functionality
 - i. Turn the system on
 - Check that the LED's and buzzers are working and can be seen/ heard.
 - ii. Check that the display is readable
 - iii. After initialising, check the middle position of the steering actuator.
 - Do this by driving the car in a straight line at approximately 20 km/h. Use the service manager to check if the steering wheel angle is at zero degrees.
 - Note: A 5 degrees deviation is allowable.
 - iv. Use the service manager to read the log and the parameter-set and store it in a file.
 - Important:** Keep this in the folder on the network for this car.

- i. SW update
 - i. Check about the latest SW update with the producer /your distributor.
If available a SW update needs to be carried out.
Reload the initial parameter-set
- j. Check the installation
 - i. Are all bolts/screws tightened according to the specified torque?
 - ii. Are all bolts/screws sealed with Loctite 243?
 - iii. Are the modules put on vehicle mass?
 - iv. Is the backup battery connected correctly (including the ventilation) and fixed?

3. Functional test in the workshop

- a. Start the system and check the display module for error messages.
If there are any error messages refer to annex 2 of the Universal System Manual for troubleshooting.
- b. Continue with rebooting until there are no error messages left.
Also double check these with the service manager
- c. Functional test "initialisation" by positioning the MMI in the straight-ahead position
- d. Functional test "steering"; by rotating to the maximal left and right end position.
Check that the vehicle generates the full steering lock
- e. Functional test "brake" by operating the MMI
- f. Functional test "brake" by operating the OEM brake pedal
- g. Functional test "gas" by operating the MMI prior to operating the gas pedal
- h. Reboot system
- i. Functional test "gas" by operating the gas pedal prior to operating the MMI.
- j. Reboot system

4. Functional test by test driving

- a. It is required that the complete system is tested with several test drives with and without the end customer.

Ensure you do this in a closed off area with sufficient space.

The dynamic Force Feedback must be set in such a way, that the end customer always has enough force to reach the Force Feedback. This must be verified by setting the parameter “actuator torque limit” to zero and letting the end customer move the MMI to the left and right end stops. While doing that the MMI Output in the Service Manager must reach the value of the set “Force Feedback”.

If the end customer is not able to reach the end stops, then the parameter “Force feedback” must be reduced until the end customer is passing this test.

Once the test is passed, the parameter “actuator torque limit” must be set back to the initial value of 212.

- b. Set the Parameter “SAM Range” according to the indications in the Service Manager.
- c. Set the Parameter “SAM Dynamics” according to the indications in the Service Manager.
- d. Increase the values of the Sensor parameters (P Torque and Retraction) until the desired driving performance is given
- e. The system contains a dynamic Force Feedback which, in case of a failure, can fall away. The end user has to be sure to be able to control the car at any time, even when the Force Feedback is falling away.
Ensure you do this in a closed off area with sufficient space.
In order to do so, a test drive with a simulation has to be done. Use the service manager and set the parameter “Force Feedback” to a value of zero.
- f. Once the customer feels safe driving at low speed in closed off areas, the local high speed limit has to be tested too. This is to assure best driving performance and ability at high speed.

7 Confirmation of maintenance

Maintenance confirmation 1	Maintenance confirmation 2	Maintenance confirmation 3
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
Notes:	Notes:	Notes:
Date:	Date:	Date:
Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company

Maintenance confirmation 4	Maintenance confirmation 5	Maintenance confirmation 6
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
Notes:	Notes:	Notes:
Date:	Date:	Date:
Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company

Maintenance confirmation 7	Maintenance confirmation 8	Maintenance confirmation 9
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
Notes:	Notes:	Notes:
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Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company

Maintenance confirmation 10	Maintenance confirmation 11	Maintenance confirmation 12
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
Notes:	Notes:	Notes:
Date:	Date:	Date:
Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company

Maintenance confirmation 13	Maintenance confirmation 14	Maintenance confirmation 15
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
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Date:	Date:	Date:
Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company

Maintenance confirmation 16	Maintenance confirmation 17	Maintenance confirmation 18
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
Notes:	Notes:	Notes:
Date:	Date:	Date:
Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company

Maintenance confirmation 19	Maintenance confirmation 20	Maintenance confirmation 21
Details of performed work:	Details of performed work:	Details of performed work:
<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____	<input type="checkbox"/> System check <input type="checkbox"/> Parameter-set check <input type="checkbox"/> Driving test with end customer <input type="checkbox"/> Replacement of the backup-battery <input type="checkbox"/> Software update updated to version: _____
Notes:	Notes:	Notes:
Date:	Date:	Date:
Odometer:	Odometer:	Odometer:
Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company	Signature and stamp of the nominated car adaption company