

# **NAC**

## **SERVICE MANUAL**



Art. No: 20972-03

# **SILVA**

Edition No: 1

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## INTRODUCTION

This service manual will give you the basic information how to perform faultfinding and testing on the SILVA NX2 navigation system.

Silva have used a new double moulding technology and high precision assembling procedure with a new gluing robot, hereby reaching the IP68/IP66 standard for all instruments.

This means that the NX2 instruments are sealed and can not be opened.

When finding a fault in a NX2 Instrument it has to be replaced and returned to Silva according to the NX2 exchange system.

As faults and male function in the electronics of the NX2 System is very rare it is essential to start checking wiring and connections on board the boat.

Also the settings in Set up and calibration have to be checked before judging the instrument as faulty.

Faultfinding on instruments and transducers connected in a complete NX2 system, on board a vessel is well supported by signal sensors on all transducer inputs of the Server.

With our NX2 exchange system, it is possible to obtain effective service without much effort regarding time and tools.

In order to handle returns and warranty claims in a quick and safe way Silva Sweden ask you to complete a NX2 Return Form for every returned unit.

This service manual will be upgraded with complementary information when necessary and questions concerning service matters are always welcome to and answered by undersigned.

Sollentuna, 17 February 2003  
SILVA Sweden AB

Kjell Sahlberg  
Service Manager

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## 1. GENERAL INFORMATION

The Silva NX2 system is based round a central network manager, i.e. the Server, see § 2.3. All transducers are connected to the Server which transmits data on a Bus to all connected instruments.

In a limited system also the Wind Data, Compass Data and AUTOPILOT servo can be the network manager.

The communication is of bus type, which means that information is transmitted constantly and that each instrument reads the bus to collect data. The bus is RS 485. See § 2.

Silva NX2 can have a maximum of 32 communicating units, such as instruments, Autopilot etc.

The NX2 Speed instrument can also work stand-alone, in this case the Log transducer is connected direct to the instrument.

When upgrading with a Server the connection of the Log transducer should be moved to the Server.

Silva NX2 instrument series is build according to IP68/IP66 standard which means that the instruments are sealed and can not be opened.

Before starting a service procedure, check that the customer has all basic settings correct.

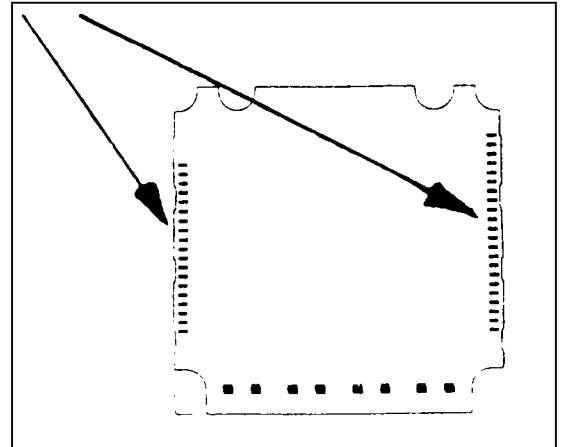
Remedy in a NX2 system with customer claim should always start with a thorough check according to the checkpoint list, see § 5.5 NX2 Faultfinding Guide.

In most instances, repair is effected by replacing the defective unit with SILVA NX2 exchange system. The Server and Wind, Compass and GPS transducers can be repaired.

The water moisture, which all marine equipment are exposed to, have been closely investigated. The following details will prevent moisture problem:

- Instrument front and window are produced as one pies in a new double moulding technology giving no possibility for water intrude of the front.
- Push buttons are made out of a new silicone material.
- The Instrument front and the back cover are integrated in a new gluing robot
- No mounting screws through the front eliminates water ingress of the instrument.
- The absence of an instrument gasket eliminates any possibility for water ingress of the front.
- A Gore-tex™ membrane, covers a venting hole in the back cover. This will give possibility for pressure balancing and air to circulate in a slow tempo, avoiding sudden changes with the risk of moisture in the instrument.

- The air volume inside the instrument is kept to a minimum. The contact points on the digital PCB are gold plated which will avoid oxide from developing with weak display segments as a result.

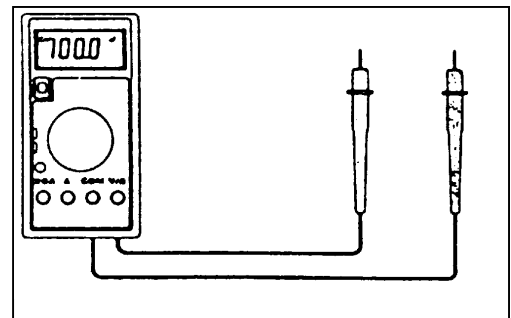


## Fault solving - NX2 Exchange System

The NEXUS NX2 System is adapted to an Exchange system of Instruments that easily can be replaced if a fault is detected according to §5: NX2 FAULTFINDING AND TESTS ON BOARD.

The national SILVA distributor keeps stock of NX2 Instruments to give the customer a fast, safe and quick service.

Equipment for trouble shooting on board  
§5: NX2 FAULTFINDING AND TESTS  
ON BOARD and Digital multi-meter.



## Repair of faulty Instruments

A faulty NX2 Instrument can only be repaired by Silva due to the high precision re-assembling procedure and the special routines in the gluing robot.

## Software Version

On every SILVA Instrument the software version is shown on the display during the starting up procedure.

Moreover the software version is marked on the Type label on the back cover.

## 1.1 RELATED NX2 DOCUMENTS, OPERATION MANUALS AND PRODUCT TYPE NUMBERS

### APPENDIX

- A. NEXUS Network Specification
- B. Full Duplex NEXUS specification version 1.07
- C. NEXUS NMEA 0183 Input/Output, version 1.1
- D. NEXUS Network Software Versions
- E. NMEA Standard 0183

GB = English, D = German, F = French, S = Swedish

User Manual Art. No.	NX2 Product & Product Art. No.	Language
22172-1	Server (22120-1)	GB
22172-2	Server (22120-1)	S
22172-3	Server (22120-1)	D
22172-4	Server (22120-1)	F
22133-1	Multi Control (22117-3)	GB
22133-2	Multi Control (22117-3)	S
22133-3	Multi Control (22117-3)	D
22133-4	Multi Control (22117-3)	F
22131-1	Speed Log (22117-1)	GB
22131-2	Speed Log (22117-1)	S
22131-3	Speed Log (22117-1)	D
22131-4	Speed Log (22117-1)	F
22137-1	Autopilot Inst., Servo, RAT (22117-7)	GB
22137-2	Autopilot Inst., Servo, RAT (22117-7)	S
22137-3	Autopilot Inst., Servo, RAT (22117-7)	D
22137-4	Autopilot Inst., Servo, RAT (22117-7)	F
22134-1	Wind Data (22117-4)	GB
22134-2	Wind Data (22117-4)	S
22134-3	Wind Data (22117-4)	D
22134-4	Wind Data (22117-4)	F
22135-1	Compass Data (22117-5)	GB
22135-2	Compass Data (22117-5)	S
22135-3	Compass Data (22117-5)	D
22135-4	Compass Data (22117-5)	F
22136-1	GPS Navigator (22117-6)	GB
22136-2	GPS Navigator (22117-6)	S
22136-3	GPS Navigator (22117-6)	D
22136-4	GPS Navigator (22117-6)	F
22002-12	GPS Antenna (21970)	GB, S
22002-34	GPS Antenna (21970)	D, F
22138-1	Instrument Analogue (2217-01 to 22117-13)	GB
22138-2	Instrument Analogue (2217-01 to 22117-13)	S
22138-3	Instrument Analogue (2217-01 to 22117-13)	D
22138-4	Instrument Analogue (2217-01 to 22117-13)	F
	Remote Control Instrument (21210-903)	GB
	Remote Control Instrument (21210-903)	S
	Remote Control Instrument (21210-903)	D
	Remote Control Instrument (21210-903)	F

	Multi XL (22308-1)	GB
	Multi XL (22308-1)	S
	Multi XL (22308-1)	D
	Multi XL (22308-1)	F

User Manual Art. No.	Product & Product Art. No.	Language
21646-1	Multi Center (21621)	GB
21646-2	Multi Center (21621)	S
21646-3	Multi Center (21621)	D
21646-4	Multi Center (21621)	F
67701-2	Pumpset PF-0.3 / S (21341+21341-24)	GB
	Pumpset PF-0.3 / S (21341+21341-24)	S
	Pumpset PF-0.3 / S (21341+21341-24)	D
	Pumpset PF-0.3 / S (21341+21341-24)	F
67703-1	Linear Drive AN-23 (21136)	GB
	Linear Drive AN-23 (21136)	S
	Linear Drive AN-23 (21136)	D
	Linear Drive AN-23 (21136)	F
67705-1	Linear Drive SP-20 (21136-2)	GB
	Linear Drive SP-20 (21136-2)	S
	Linear Drive SP-20 (21136-2)	D
	Linear Drive SP-20 (21136-2)	F
67704-1	Integrated Drive HP-40 (69991-12)	GB
	Integrated Drive HP-40 (69991-12)	S
	Integrated Drive HP-40 (69991-12)	D
	Integrated Drive HP-40 (69991-12)	F
	Connection Box NX2/Nexus Bus (21456)	GB
67705	Connection Box Wind/Compass Data (21453)	GB
67706	MTC box (21721)	GB
21730	Server Simulator (20592-2)	GB
	<b>Mounting instructions</b>	
20706-1	Log / Temp transducer (20707)	GB
20706-2	Log / Temp transducer (20707)	S
20706-3	Log / Temp transducer (20707)	D
20706-4	Log / Temp transducer (20707)	F
20728-1	Wind transducer (20721)	GB
20728-2	Wind transducer (20721)	S
20728-3	Wind transducer (20721)	D
20728-4	Wind transducer (20721)	F
20867-1	Compass transducer 45° (20860)	GB, S, D, F
21751	Compass transducer 35° (21731)	GB, S, D, F
20867-1	Compass transducer 35° (21731)	GB
20867-2	Compass transducer 35° (21731)	S
20867-3	Compass transducer 35° (21731)	D
20867-4	Compass transducer 35° (21731)	F
	<b>Other</b>	
20917	Warranty Card	GB
20919	Representative Marine EI.	

## 2. NX2/NEXUS NETWORK - BRIEF INTRODUCTION

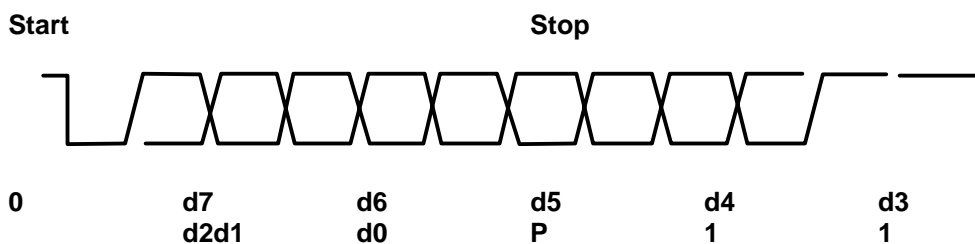
For full information see Appendix A

For practical understanding see § 6 Server

The NX2/NEXUS Network is a high performance, non collision Multi talker Multi receiver databus especially designed to be used for marine and navigational applications.

The most important features are the high update rate, fast response times, very low data latency (25 ms) and very high data security even at very long distances. Another important feature is that Data transfer efficiency will not degrade even when used in large and complex systems. It utilises the RS485 standard with up to 32 senders and/or receivers to form a Local Area Network.

Data is transmitted asynchronously with 1 start-bit, 8-data-bits, 1 parity-bit, two stop-bits in 9600 baud.



### 2.1 PROTOCOL

All data is exchanged in PACKETS. There are two main types of PACKETS: **Data-Packets** and **New-Sender-Packets**.

The **Data-Packet** consists of a "header byte" followed by 1, up to max. 24 bytes of data, ended with a checksum byte. The Data packets "header byte" is identified by having the **parity bit = 1 and bit d7 = 0**. The remaining 7 bits are identifying the **type of data** that will follow (0-127). The bytes that follows the "header byte" is the usable data. There is no length-field included, but the receiver will know by the pre-defined field length from the packet-ID (bit d6-d0 in the "header byte"). The last byte is the checksum, equals the XOR-summation of packet-ID and all data bytes.

The **New-Sender-Packet** consists of just one byte and has no checksum. When this packet have been sent, the receiving unit switches over to transmit mode, and the "old" sender switches over to receiver mode. The sending rights have been "handed-over" to the **New-Sender**.

**New-Sender-Packet format:**

d7	d6	d5	d4	d3	d2	d1	d0	P
1	Sender ID							1

N.B. the parity bit is not used for error detection, just to identify the "header byte" and "next sender ID" from the data.



## 2.2 NX2/NEXUS USER POLICY

The NX2/NEXUS network is open for new users/applications without the need of a license or license fee.

Silva Sweden AB will support PC applications under DOS and WINDOWS™ when using the PC-Interface FD, art. no 21248. The PC-interface will convert the NX2/NEXUS half-duplex data to Full-Duplex data suitable for WINDOWS™ applications.

The PC-interface comes with software and is supplied with a 9-pole D-sub connector cable for the RS232 PC port. The PC interface will be a very useful tool to control and monitor real time data, or when editing Waypoints to/from PC-file or to/from NX2 GPS or Server.

## 2.3 NX2/NEXUS PRODUCT TYPE WITH POSSIBLE CATEGORIES

### Product

There are basically 4 different Marine electronic product types, where some of the product types also include NMEA 0183 input & output.

- NEXUS Network-Manager
- NEXUS Network-Repeater (talk & listen)
- NEXUS Network-Repeater (listen only)
- *Standalone instruments with no NEXUS Network*

### Product Type

The most advanced type is the NEXUS Network-Manager, which is needed to establish and operate a NEXUS Network. The Server will automatically be the NEXUS Network-Manager when installed, but other units may be used as a NEXUS Network-Manager. See further details in the NEXUS Network specification, appendix A.

### Possible Category

Each category represents one or more core functions given from a transducer (i.e. wind- speed wind angle) or calculated by an instrument (GPS navigational data). Only one category may be activated as a category master even if multiple category instruments are available in the NEXUS Network.

**Example 1:** The Server may give away the Wind category to the Wind Data instrument on request from the configuration set-up. It is therefore very important to configure the Network so it corresponds to where the transducers or the "category's" are connected or used.

**Example 2:** Where two Wind Data instruments are installed, only one may be set-up to be the Wind category master, the other must be set to Repeater mode. Also, if the Server is missing, the Wind Data instrument with category Wind will become the NEXUS Network Manager. For further information, read the NEXUS Network specification, appendix A.

<b>Product</b>	<b>Product Type</b>	<b>Possible Category/Masters</b>
NX2 Server	<b>NEXUS Network-Manager</b> * NMEA 0183 input & output	Log & temp, Depth, Compass, Wind.
NX2 Wind Data and Compass Data instruments	<b>NEXUS Network-Manager</b> or NEXUS Network Repeater (talk & listen)	Wind and / or Log & temp Compass and / or Log & temp
NX2 GPS Antenna. New P/N 21970	NMEA 0183 output	None
Nexus GPS Antenna. Old P/N 21000	<b>NEXUS Network-Manager</b>	Position
GPS Compass XL1000/ XL300	<b>NEXUS Network-Manager</b> (limited)	Position
NX2 Autopilot Servo Unit	<b>NEXUS Network-Manager</b> (limited)	Autopilot, Compass
NX2 Multi Control, Speed Log and Autopilot instruments	NEXUS Network Repeater (talk & listen)	None
NX2 Multi XL instrument	NEXUS Network Repeater (talk & listen)	None
NX2 Multi Center	NEXUS Network Repeater (talk & listen) or NMEA 0183 input & output	Nav-Master incl. WP-bank or Nav-Repeater
NX2 Remote Control instrument	NEXUS Network Repeater (talk & listen)	None
NX2 GPS Navigator instrument	NEXUS Network Repeater (talk & listen) and NMEA 0183 input & output	Nav-Master incl. WP-bank or Nav-Repeater
All NX2 Analog instruments	Network Repeater (listen only)	None

\*) Can also be named "Master" or "Bus-Master" in some Silva Information material.

## **Stand alone products with no NX2/NEXUS Network!**

<i>NX2 standalone connected Speed Log instrument</i>	
<i>STAR Sea Data instrument</i>	<i>No network possibility</i>
<i>STAR Nav Repeater instrument</i>	<i>NMEA 0183 input</i>

## 2.4 NETWORK START UP AND INITIALISATION

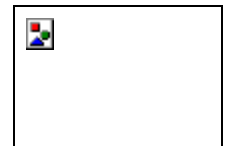
When the NX2 Network gets 12 V power on, the System will perform a Network initialisation and a system and instrument self test. The display on all digital instruments first show all segments, then the software version number and the Nexus Network ID number.



At first power on after installation you will be asked to press any KEY (PrESkey). This will give each instrument a logical ID number on the Nexus Network. This (PrESkey) can also come up when a change has been done in the system.



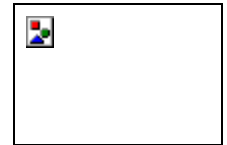
To initialise the instrument, press **SET** on all installed digital instruments, one at the time.



**Note: Always wait for the text "Init to be displayed, before you press on the next instrument!"**

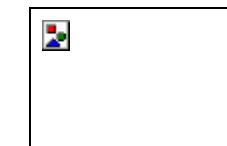


**OK"  
SET**

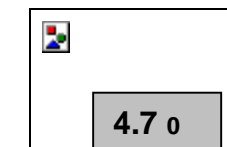


The Server automatically gives the first unit ID number 16, then 17 and so on. The order in which you press **SET** is the same order as the instruments will be given a logical ID number on the Nexus Network.

The example shows that the instrument version number is 2.0 and the given logical ID number is 16. The bottom line will write SILVA when the NX2 Multi Control is of version 3.7 or lower, the same as for Nexus Classic.

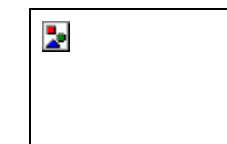


On NX2 Multi Control  $\geq 4.1$ , Multi XL  $\geq 1.4$  and Autopilot  $\geq 2.11$  Instruments the bottom line will show the Server ver. no: e.g. 4.7 and the last smaller digit the ID number of the Network Master/Manager e.g. 0=NX2 Server. Where 0=Server, 3=AP Servo, 8=Compass Data, 9=Wind Data,



Re-initialising the instrument

If two instruments by mistake have the same ID number, this can cause disturbance and block the information on the Nexus data bus.



To re-initialise the instrument, press **CLEAR** during the power up sequence when version and ID numbers are displayed.

The display self test is then re-started on all instruments and you will be asked to press KEY on each instrument as explained above.

**Note!** If you do not succeed to re-initialise, we suggest you disconnect all but one instrument with the same ID number, then repeat the above procedure.

## 2.41 Locking the network for unauthorised change of set up and calibration.

The Locking function gives the owner the possibility to prevent unauthorised users to enter the Set up, Calibration or to move and select sub functions for the whole NX2 System.

**To lock**, long (2 sec.) on “Set” to enter Set up mode.

Press “Set” and “Page” simultaneously .

Enter the code **324135** by + and – button and press Set to lock.

**To unlock**, press “Set” and “Page” simultaneously while “LOCKEd” is displayed when entering the Set up.

Then, enter the code **324135** by + and – button and press Set to unlock.

Note! To lock or unlock from the Wind Data or Compass Data “Set” has to be pressed after entering three digits 324 and then again after 135 as well.

Note! GPS Navigator Instrument can not be used to lock or unlock.

### 3. NX2/NEXUS NETWORK ERROR MESSAGE WITH CAUSE AND REMEDY

If an error message [Err #] is displayed on any instrument, an error has been detected by NX2/NEXUS Network.

The message can assist you to diagnose the cause and remedy the error.

To escape from an error message, press any push-button. If not possible to escape, reset power (turn off and on again), then make the remedy if suggested below.

**Note!** For errors marked with [\*], most probably the unit needs a rectification. Errors marked with [☒] is only relevant for old products, GPS Antenna 21000, and GPS Compass /XL1000.

No.	Message and cause	*	Remedy
01	Activated watchdog timeout. Stack error	*	Reset power.
02	NEXUS Network data frames are missing.		Check connections and set-up.
03	No data received within approx. 10 sec.		Check connections and power voltages.
04	EEPROM read error.	*	Reset power.
05	EEPROM write error.	*	Reset power.
06	RAM memory Read-error.	*	Reset power.
07	Autolog full in GPS Compass.		Clear Autolog memory.
08	Break reset.	*	Reset power.
09	EEPROM auto initalisation, or NMEA transmit fail. (NX2/NEXUS Server only).	*	Reset power.
10	Range error, depending on wrong input e.g. 17° 70' = too many minutes.		Correct input format.
11	Remote control calibration error. Command can not be executed .		Check connections and settings.
12	No response from navigator.		Check navigator connection and settings.
13	Waypoint not defined.		Define a waypoint.
14	Impossible command when used with an external NMEA navigator.		Use only possible command.
15	Impossible command when in autopilot mode.		Use only possible commands.
16	Auto-deviation is not possible. NMEA Compass selected?		Check for extreme magnetic field, upside down mounting of transducer or wrong transducer type setting. NMEA Compass?
17	Auto-deviation check failed.		1¼ turn not completed or extreme magnetic disturbance.
18	Auto-deviation. Function denied.		Function denied since compass is busy with the auto-deviation routine.
19	Auto-deviation failure.		Error larger than 1.5°. The boat probably hit a wave during the turn.
20	GPS to CPU communication error.	*☒	Reset power.
21	GPS aquisition failure (time out).	☒	Maximum allowed time for searching satellites. E.g. when try to navigate indoors. Check GPS antenna location.
22	CPU to GPS communication error.	*☒	Reset power.

No.	Message and cause	*	Remedy
23	DGPS (RTCM) data ignored.	☒	Change the DGPS (RTCM) setting.
24	GPS bad fix, no fix position (time expired at one-fix).	☒	Check GPS antenna location.
25	No autopilot response. Object is not connected.		Check wiring connections and fuse.
26	The unit is not allowed to power up because there is too high input voltage.	*	Check input voltage.
27	Extended object server busy or error.		Set one GPS Navigator instrument to master.
28	Route command error. The waypoint bank memory is full.		Clear waypoint bank for new space.
29	DGPS mode is interrupted.	☒	Check the DGPS receiver.
30-41	Reserved for NEXUS Autopilot Servo Unit.		See NEXUS Autopilot manual.
42	Bad transducer input / bad measurement.	*	Reset power.

Reserved for NEXUS Autopilot Servo Unit.			
30	General autopilot failure	*	Reset power.
31	Autopilot compass input failure in autopilot standalone connection.		Check compass connection at autopilot Servo Unit.
32	Autopilot compass input failure in autopilot NEXUS Network connection.		Check compass at NEXUS Server or at the Compass Data instrument
33	Received wind data input failure.		Check wind wire connection.
34	Autopilot calibration failure.		Check for air in the system and make APC routine again in calm water at crusing speed.
35	Navigation data not available in autopilot stand alone connection.		Check NMEA input connections and settings in the navigator.
36	Navigation data not available in autopilot NEXUS Network connection.		Check connections and navigator settings.
37	Autopilot Network re-initialisation.		Check connections, wire dimensions and Battery charge and quality.
38	Autopilot Rudder transmitter failure	*	Check Rudder transmitter, connection and wiring.
41	Failure to initialise EEPROM.	*	Reset power.

## **4 NX2 REPLACEMENT SYSTEM OF DEFECT TRANSDUCER AND INSTRUMENT**

The Silva NX2 System is designed and adapted to a replacement system of Transducer and Instruments, giving the customer fast and accurate service.

The NX2 replacement system handled by Authorised Service Agents, mean that the Service Agent stocks NX2 Transducer and Instruments for immediate replacement.

### **4.1 REPAIR BY FAULTFINDING AND REPLACEMENT OF DEFECT TRANSDUCER OR INSTRUMENT**

If faultfinding according to §5 leads to the conclusion that any unit is defect it should be replaced in accordance to SILVA NX2 replacement system if the unit is under warranty. Wind, Compass and GPS transducers can be repaired.

If the unit is outside the warranty period the customer should be offered a restored instrument.

### **4.2 RETURN OF FAULTY NX2 UNITS TO AGENT/SILVA**

The SILVA NX2 exchange system is a replacement system handled by Authorised Service Agents, mean that the Service Agent stocks NX2 Transducer and Instruments for immediate replacement, giving the customer fast and accurate service.

When returning NX2 Instruments to a Service Agent or Silva Sweden each unit should be followed by a NX2 Return Form, filled in as complete as possible to secure high quality on all NX2 products.

NX2 instruments followed by a complete Return Form will also pass the Silva administration fast with quick handling and return shipment without any delay.



## 5 NX2 FAULTFINDING AND TESTS ON BOARD

The Silva NX2 System can easily be tested on board a vessel. Always start by confirming that the “Maintenance and fault finding” in the Operation Manuals has been checked by the customer. Also be convinced that all system and calibration settings are not causing the problems.

### 5.1 BLANC DISPLAY - POWER TEST

Check connection terminal at the back of the Instrument: Green(+) to Screen(-) you should have 12 Volt (10-16 V), if not: **check wires, fuse and battery**. If the Instrument do not run the starting up procedure in spit of 12V OK power, it has to be replaced and sent to Silva for further tests.

### 5.2 NO OR WRONG VALUE ON NX2 INSTRUMENTS

All transducer inputs on the NX2 Server are equipped with signal sensors indicating incoming signals by blinking LED's.

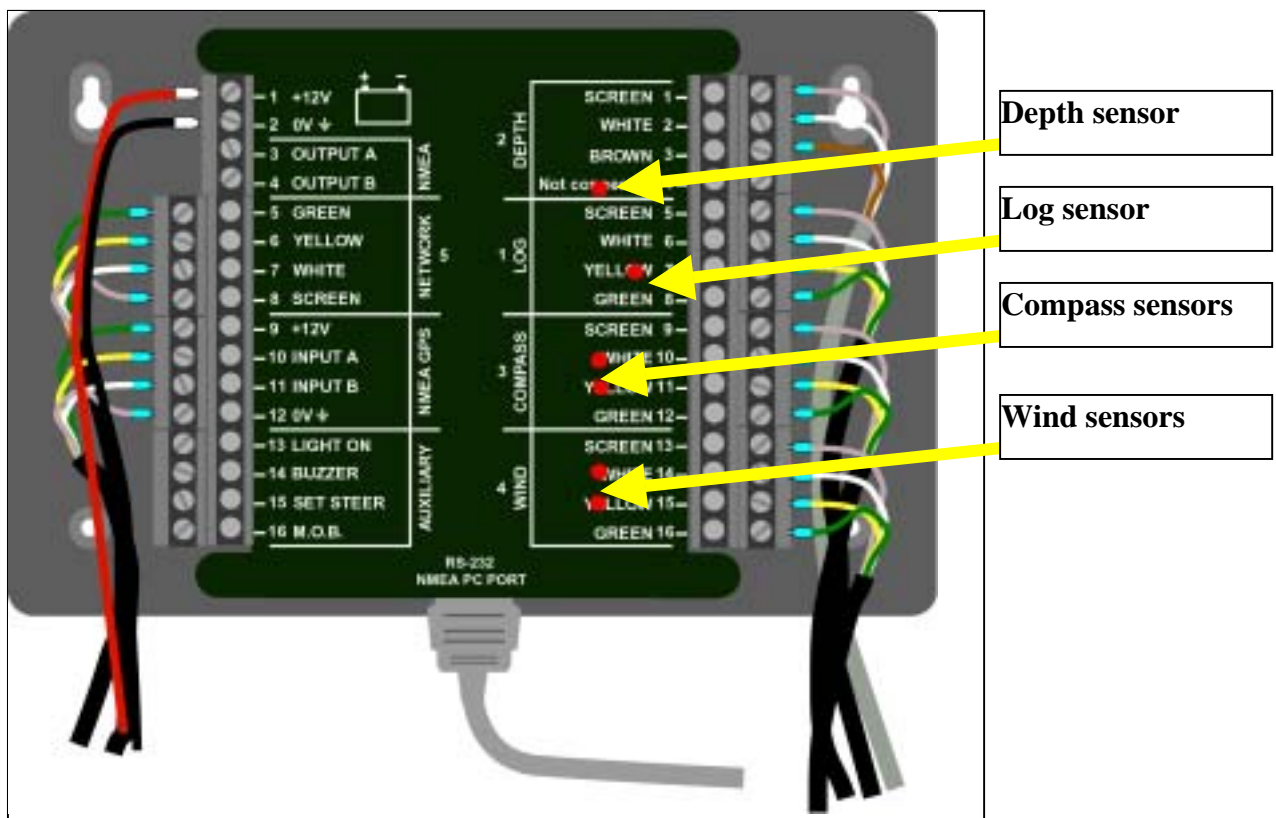
Log transducer will shift the LED on log input from on to off and vice versa for every half turn on the impeller.

Depth LED will blink on every received Echo.

Compass LED's will blink on each channel receiving signal, with constant frequency.

Wind LED's will blink on each channel receiving signal, with a frequency related to the actual wind speed.

If lack of signal indication on LED's, **check wires, connections and transducer**.



### 5.3 ERR 03 – BUS COMMUNICATION TEST

If the instrument shows Err 03 it means brake in the communication (time out is 10 sec.).

**Test 1:** Check connection and signal at the 4-pole jack plug the back of the Instrument: Between Yellow and White you should have ~4,3 Volt AC (varying). If ~4,3V OK do test 2. If only ~1,8 V AC, check Yellow to Screen and White to Screen, the one with 0 V is interrupted.

**Check connections, wires, lose ends, mix white-yellow etc.**

If no fault on the installation is found remove Yellow and White wires connected to term. 6 and 7 on the Server, do Test 1 on the Server output terminal 6 and 7.

If not ~4,3 Volt AC (varying) there is a fault in the Server.

If the Instrument does not start in spit of correct signal level, do test 2.

**Test 2:** If possible, check the same 4-pole jack plug with another working Digital NX2/Nexus instrument to see if there is a correct Bus-signal from the plug. If this Instrument works well there is **fault in the first instrument**, and it has to be replaced and sent to Silva for further tests.

## 5.4 ERR 02 – BUS COMMUNICATION TEST

If the instrument show Err 02 it means that there is "some" signal on the Bus but it is in-correct, disturbed or of wrong type, (e.g. NMEA). **Check connections, Set-up and that white-yellow wires isn't mixed.**

## 5.5 NO OR WRONG VALUE ON ANALOGUE INSTRUMENT

If an Analogue instrument connected to a working NX2 bus do not show relevant value: **Check Set-up, calibration, connections, wires, lose ends and that white-yellow wires isn't mixed.**

If customer have claim on other function, please check to confirm.

## 5.6 NX2 FAULTFINDING GUIDE

Multi Center can be used to find reason to system faults, see 5.8

Function	Display	Cause	Action	Set-up/ Remedy
Start	Blank Display	No Power	Check back of Instrument Green+12V, Screen 0 V. See §5.1	Wires, Fuse, Battery
	Err 03	No Bus signal	Check back of Instrument Yellow-White 4.3 V AC. See §5.3	If <b>no</b> signal to Instrument check wires, connections, Bus-signal out fr. Server
	Err 03	No Bus signal	Check back of Instrument Yellow-White 4.3 V AC. See §5.3	If signal to instrument, Fault is in Instrument. Replace
	Err 02	Fault or disturbance in Bus signal	Check system and that Yellow-White wire isn't reversed. See § 5.4	Correct wires. Remove spurious signal source
LCD segments missing	LCD segments missing		Check if all segments are present during Start up.	Fault in Instrument Replace
Speed/Depth/Wind/Compass	Wrong or No Speed/Depth/Wind or Compass	No signal from transducer?	Check signal indicators on server. see §5.2	If No signal check wires connections and transducer
Speed/Depth/Wind/Compass	Wrong or No Speed/Depth/Wind or Compass	Check settings per below check list.	Correct settings!	Correct settings!
Analogue Instrument value	Wrong or No value on Analogue Instru	Connections, wires, calibration, Set-up	Check accordingly, see § 5.5	If fault in Instrument Replace
Instrument Light	Not all turn ON.	Same ID-No on two Instruments	Make a Re-Initialisation so that every Instrument get its own ID-No.	
BTW	no values	No waypoint selected	Select way point	
Calibration	Not available/ Can't be changed	Same ID-No on two Instruments	Make a Re-Initialisation so that every Instrument get its own ID-No.	
Function	Display	Cause	Action	Set-up
Compass	no heading [- - ]	Wrong setting of COG: COG set to ON but no navigator connected	Set COG to OFF	C94
Compass	no values [- - ]	Nexus compass transducer	Set C75 to OFF	C75

		and C75 set to ON		
Compass	no values [ - - ]	NMEA compass transducer and C75 set to OFF	Set C75 to ON	C75
Compass	wrong COG-values	Incorrect setting of damping	Correct setting of damping	C72
Compass	wrong values	Incorrect setting of magnetic variation	Correct setting of magnetic variation	C33
Compass	wrong values	Auto deviation not performed	Run the Auto deviation	C34
Compass	wrong values	Auto deviation not successful	Check Auto deviation Run the Auto deviation	C34, C35
Compass	wrong values	Incorrect setting of compass transducer misalignment	Correct setting of compass transducer misalignment	C37
Compass	wrong values	Wrong selection of magnetic/true	Correct setting	C40
Compass	wrong values	Wrong mounting of the transducer	Check that transducer is not mounted upside down. Mount correct	
Compass	wrong values	Magnetic disturbance	Check that there are no ferruginous items close to the transducer.	
Compass	wrong values	Incorrect setting of damping	Correct setting of damping	Sub-function NAV-page
Compass	no values [ - - ] Compass Data	C71 incorrect set to [ON] (Compass Data)	Correct setting to [OFF]	C71 in Compass Data
Compass	Compass function not available in Multi Control	Incorrect setting of Page Auto C31	Set C31 to PAGE ATO or PAGE ON	C31
Depth	wrong values	Wrong units	Correct setting of units	C21
Depth	wrong values	Incorrect calibration of the depth transducer position	Correct calibration of the depth transducer position	C22
Depth	no values [ - - ]	Deep water outside the range of the transducer		
Depth	no values [ - - ]	Deep water and soft bottom		
Depth	no values [ - - ]	The boat is heeling heavily		
Depth	no values [ - - ]	In propeller stream, where air bubbles are created		
Depth	wrong values	In propeller stream, where air bubbles are created		
Depth	no values [ - - ]	Poor connection or reversed connectors at the amplifier box	Check connections	
Depth	no values [ - - ]	Internal mount: poor signal penetration due to thick hull	Use through hull fitting	
Depth	no values [ - - ]	Internal mount: air between transducer and hull	re-install the transducer	
Depth	wrong values	Going over shallow water, with uneven and high bottom vegetation		
Depth	wrong values	Heavy layers of salt or noticeable ranges of water temperature		
Depth	wrong values	Heavily agitated water containing particles of sand or some other contamination		
Depth	wrong values at anchor in harbour	Disturbances from other depth transducers		
Depth	wrong values (in harbour/at anchor)	Disturbances from chains or mooring equipment		
DTW	no values	No waypoint selected	Select waypoint	
MEM setting	Not possible. Err 02	Same ID-No on two Instruments	Make a Re-Initialisation so that every Instrument get its own ID-No.	
Multi Center	Loading Waypoint Please be patient	Same ID-No on two Instruments	Make a Re-Initialisation so that every Instrument get its own ID-No.	
	Display Blanc or Black	Contrast to low or to high	Contrast can be adjusted during start up. Push cursor button up or down.	
Multi Center		Err 03	Check connections i.e. on connector back of MCE	
Multi Center	Can not pass Warning text page		Check wires on MCE – wires with open ends have to be isolated.	
Multi Center	Course line poins only North.	Setting of Course Line not correct	Set Course Line to COG for GPS and HDC for Compass transducer.	
<b>Function</b>	<b>Display</b>	<b>Cause</b>	<b>Action</b>	<b>Set-up</b>
NMEA out	no values on NMEA-unit	Incorrect selection of NMEA out sentences	Select desired NMEA sentences	C77 to C93
NMEA out	wrong / no values	Poor NMEA-out connection	Check connections	
NMEA out	no values on NMEA-unit	No NMEA output	Check NMEA output, see §5.7	If no NMEA output replace Server
NMEA in	wrong / no values	Poor NMEA-in connection	Check connections	

NMEA in	No values	Wrong NMEA sentences transmitted	Check set-up in the transmitting unit	
Position	no values	Incorrect selection of position source	Correct selection of position source	Config Nexus / NMEA position in GPS Navigator
Position	wrong values	Incorrect setting of minutes/seconds, C38	Correct setting of C38	C38
Push button	No sound	Wrong setting of C71=OFF	Set to C71= ON	C71/Set C71 = ON
Push button	No sound		If correct setting of C71 Fault in Instrument	Fault in Instrument Replace
REM Remote Control	Two Instruments react on comands	Same ID-No on two Instruments	Make a Re-Initialisation so that every Instrument get its own ID-No.	
Speed	no speed [- - -]	Wrong setting of SOG, set to ON but no navigator connected	Set SOG to OFF	C95/ Set C95 = OFF (SOG)
Speed	Speed value is 0.00	Impeller is not rotating?	take up the transducer and turn the impeller. Log diode should blink and speed value on instrument.	Blinking diod indicate OK Log transducer.
Speed	no speed [0.00]	Impeller is not rotating	Clean the impeller	
Speed	no speed [0.00]	Impeller is not rotating, due to remaining antifouling inside the through hull fitting	Clean the through-hull fitting	
Speed	wrong values	Wrong units	Correct setting of units	C11
Speed	wrong values	Incorrect calibration value	Correct calibration	C12
Speed	wrong values	Incorrect setting of damping	Correct setting of damping	C13
Speed	wrong SOG-values	Incorrect setting of damping	Correct setting of damping	C72
Temperature	No Temp. (- - -)	Connections, wires, lose end	Correct connect. Check. White to ground	~1,8 V White to ground
Temperature	Wrong Temp. value	Incorrect calibration value	Correct calibration	C23, C24
Wind	no values [- - -]	Nexus wind transducer but C76 set to ON	Set C76 to OFF	C76
Wind	no values [- - -]	NMEA wind transducer and C76 set to OFF	Set C76 to ON	C76
Wind	wrong speed values	Wrong units	Correct setting of units	C53
Wind	wrong wind angle	Wrong selection of wind angle	Correct selection of wind angle	C52
Wind	wrong wind angle	Incorrect setting of mast top unit misalignment	Correct setting of mast top unit misalignment	C55
Wind	wrong wind angle	Incorrect setting of wind calibration values	Correct setting of wind calibration values	C56 to C63
Wind	wrong values	Poor cable connection	Check connections wind transducer / cable through deck connectors	
Wind	wrong values	Incorrect setting of damping	Correct setting of damping	C65
Wind	no values [- - -] Wind Data	C71 incorrect set to [ON] (Wind Data)	Correct setting to [OFF]	C71 Wind Data
Wind	Wind function not available in Multi Control	Incorrect setting of Page Auto C51	Set C51 to PAGE ATO or PAGE ON	C51

## 5.7 SERVER NMEA COMMUNICATION TEST

Connect the Server D-Sub to the PC via a PC-cable.

Chose Hyperterminal - Set up - Settings - Config.

- 4800 bps
- 8 bits
- No parity
- 1 Stop bit
- No XON/XOFF

The Server should send NMEA- sentences continuously. The following, C77 to C92 per below, is transmitted in default setting (see also User Manual 3.11.1)

0	(—)	No out signal
1	(APB)	Autopilot B
2	(BOD)	Bearing original destination
3	(BWC)	Bearing and distance to waypoint
4	(BWR)	Bearing and distance, dead reckoning
5	(C77) (DBT)	Depth measured from the transducers position
6	(DPT)	Depth
7	(C78) (GLL)	Geographic position
8	(GSA)	DOP and active satellites
9	(C79) (GSV)	Satellites in view
10	(C80) (HDM)	Magnetic heading
11	(C81,89) (HDT)	True heading
12	(MTW)	Water temperature
13	(C82) (MWD)	Wind direction and speed
14	(MWV)	Apparent wind speed and angle
15	(RMB)	Minimum navigation data
16	(RMC)	Minimum specific GPS- and TRANSIT-data
17		
18	(C83) (VDR)	Set and drift
19	(C84) (VHW)	Speed and course through the water
20	(VLW)	Distance travelled through the water
21	(C85) (VPW)	Speed relative to the wind
22	(C86) (VTG)	Distance made good and distance over ground.
23	(C87) (VWR)	Apparent wind speed and wind direction
24	(C88) (VWT)	True wind speed and direction
25	(C90) (WCV)	Waypoint closure velocity
26		
27	(C91) (XTE)	Cross track error
28	(C92) (ZDA)	Time and date
29	(ZTG) & (UTC)	Time to destination or waypoint.

If no NMEA is sent the test failed and the Server has to be returned to Silva for further tests

## 5.8 Using Multi Center to find reason for NX2 Network faults.

Connect a Multi Center to the NX2 BUS: Set Display to "Network"

All units and instruments on the NX2 Network will be shown. The categories and software versions for each unit is also displayed. Multi Center can only have category N. Following categories exist:

**[L]** = Log and water temperature.

**[D]** = Depth

**[C]** = Compass

**[W]** = Wind transducer.

**[P]** = Position

**[E]** = Engine data (RPM, oil temp etc.)

**[A]** = Autopilot

**[B]** = Battery

**[R]** = Roll and Pitch

**[N]** = Navigation master with active waypoint bank.

**Note:** All Nexus Speed and Depth instruments will be displayed as MULTI in the list since they share instrument Id.

Press ENTER for Network utilities.

This information is for trouble shooting and fault-finding. Select Network information and press ENTER and a list of the network is displayed.

This information may be acquired from a Nexus engineer when experience any NX2 Network problems.

## 5.9 RETURN OF FAULTY NX2 UNITS TO AGENT/SILVA

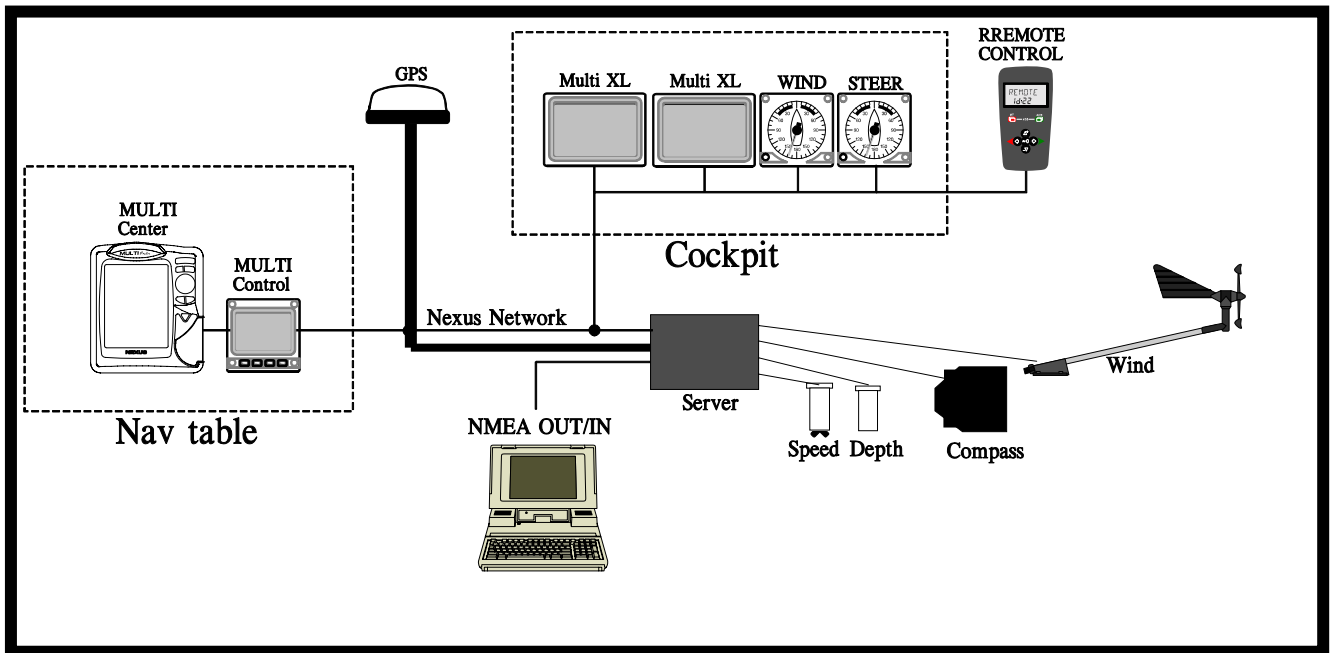
In most instances, repair is achieved by replacing the defective unit according to the SILVA NX2 exchange system. Wind, Compass and GPS transducers can be repaired.

The SILVA NX2 exchange system is a replacement system handled by Authorised Service Agents, this means that the Service Agent stocks NX2 Transducer and Instruments for immediate replacement, giving the customer fast and accurate service.

When returning NX2 Instruments to a Service Agent or Silva Sweden each unit should be followed by a NX2 Return Form, filled in as complete as possible to secure high quality on all NX2 products.

**NX2 instruments followed by a complete NX2 Return Form will also pass the Silva administration fast with quick handling and return shipment without any delay.**

## 6.0 NX2 SERVER



The Server is the "heart" of the NEXUS Navigation Network to which transducers for speed, depth, compass, wind and navigation are connected.

From the Server the single NEXUS cable transmits power and data to the instruments, which repeats the information sent from the Server or other NX2 transducers.

The NX2 Server also have communication possibility to other equipment via NMEA signal protocol.

The Nexus Network is designed with the industry standard RS 485 data bus, which allows you to connect up to 32 NX2 instrument units on the single Nexus Network cable, thereby allowing you the flexibility to easily develop your system. The Nexus Network is capable of carrying data 10 times faster than NMEA 0183.

### Network Manager - Principal of operation

Every NX2 Navigation Network need to have a Network Manager. A very typical Network Manager or "bus-master" is the Server, but even the Autopilot Servo, Wind Data / Compass Data instruments and GPS Navigator instrument can be a "bus-master".

A "bus-master" is responsible for initialisation of the network at start, e.g. call for known units and give them so called "next-sender" address. This is the identity (ID) for this instrument which (when receiving data) is given right to "talk" on the network. The instrument then can talk, or direct give away the right to talk by a new "next-sender" ID etc. The Network Manager also:

- Superintend the Network so if some unit disappears (gone out of order or is taken away) then the Network shall be re-initialised.

- If the bus-master is out of order , one of the other units that is able to be a bus-master, should become a new Network Manager (according to a special procedure).
- If a new unit is added, the bus-master shall take care and the unit will be taken into the "community" and given its own ID/identity.

The NX2 Server will NOT ask every instrument if they have something to say, only if they stop answering to "next-sender" packet.

Possible communication errors.

Error 03 is a local error message shown on instruments with LCD display when the instrument is unable to read Nexus data during approximate 10 sec. then it will display Err03.

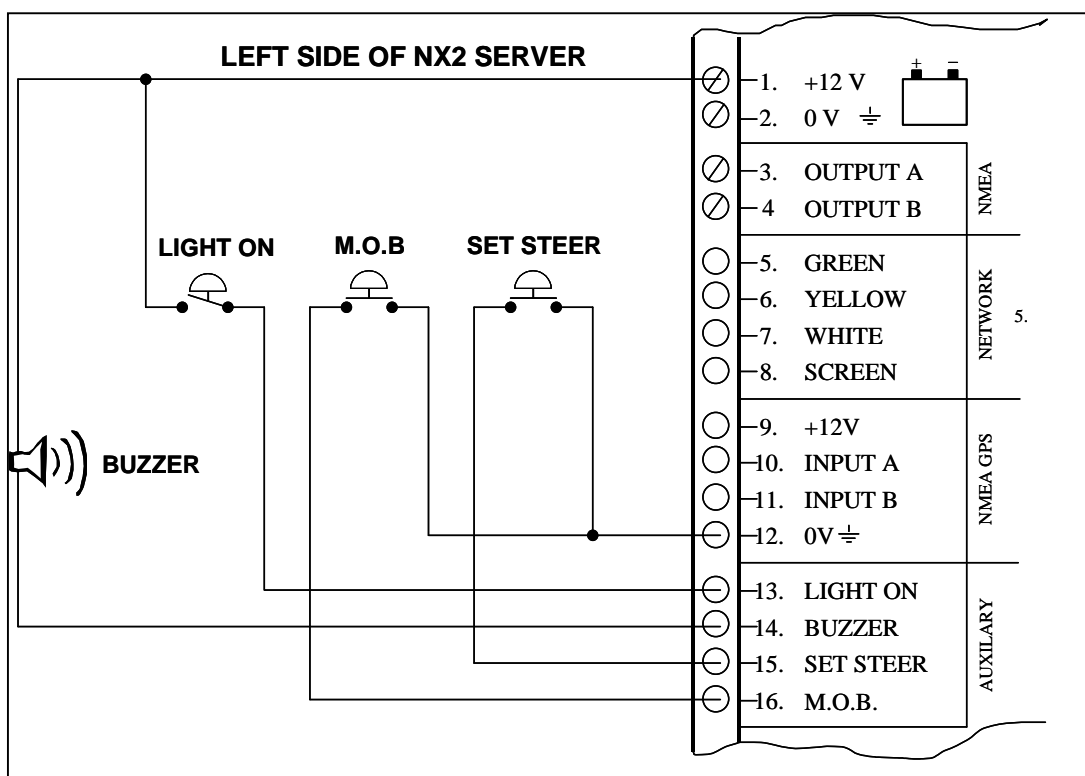
Example on Err03: Lose wire, or the white and yellow wire are mixed up.

Error 02 is more a hardware problem. It e.g. yellow and white wire are together and short circuit, or if electronics of Autopilot is bad installed with e.g. long thin wires.

An other typical Err02 error is a bad earthing or incorrect signals e.g. NMEA signals on the bus.

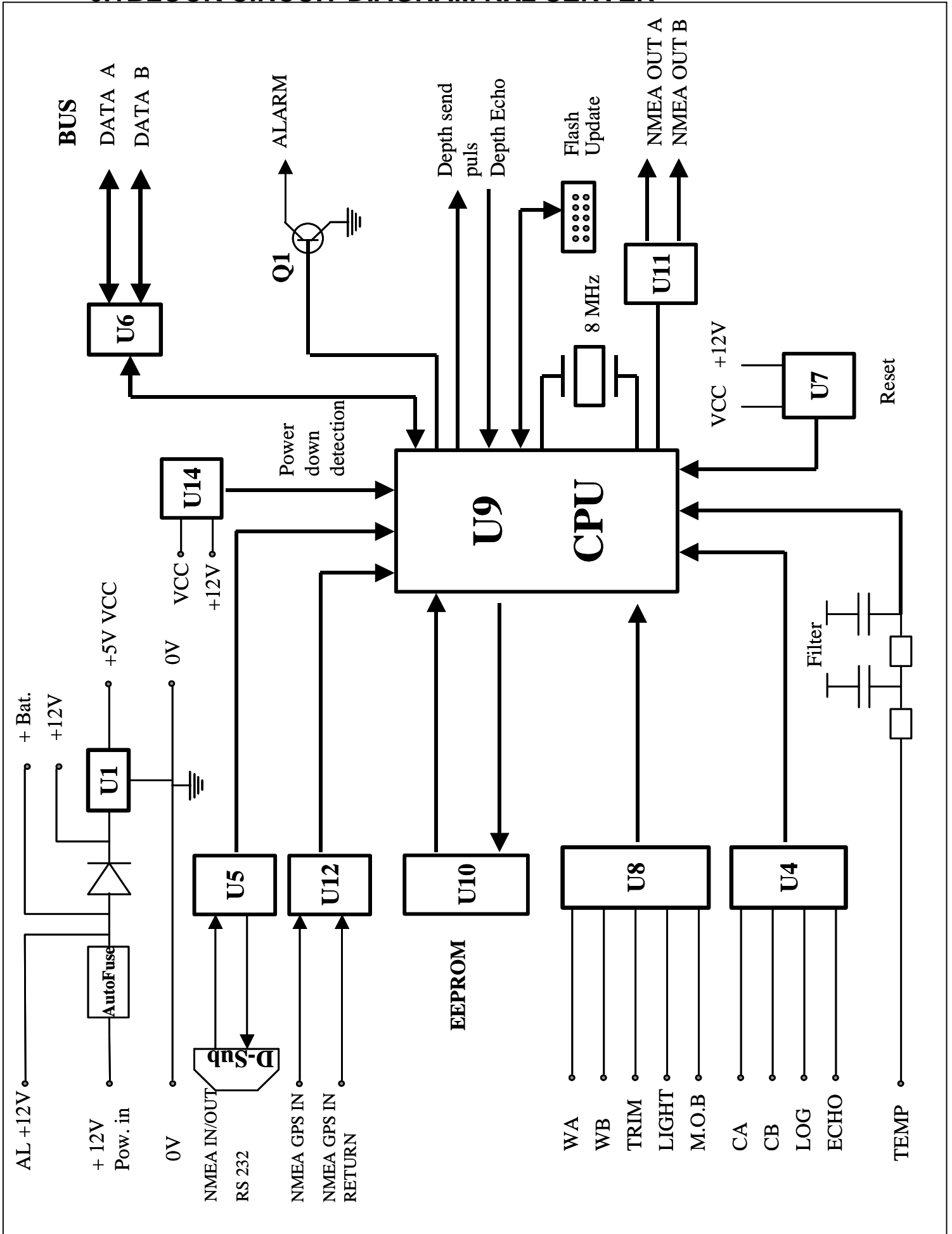
**NEXUS network - brief introduction see § 2. For full information see appendix A**

## How to connect Light, M.O.B and Steer push buttons:

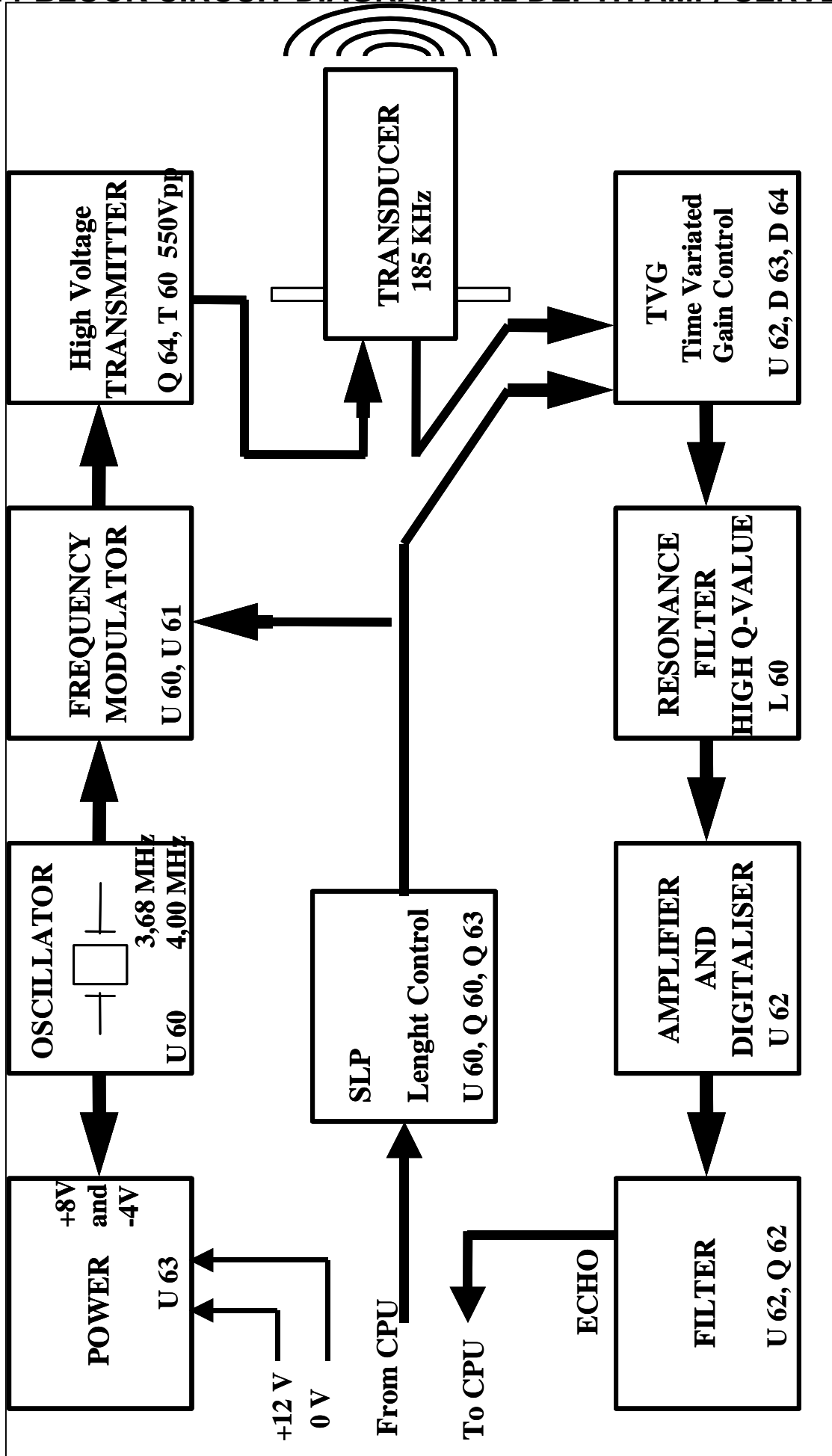




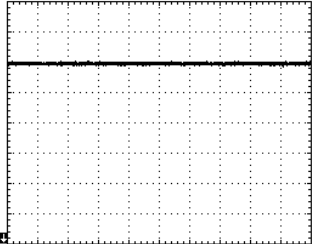
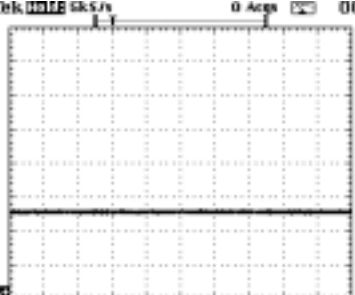
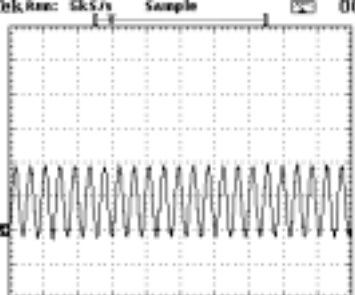
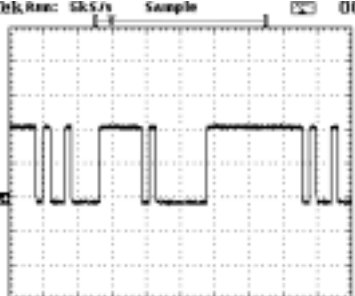
# 6.1 BLOCK CIRCUIT DIAGRAM NX2 SERVER

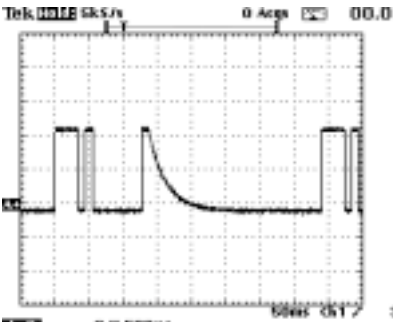
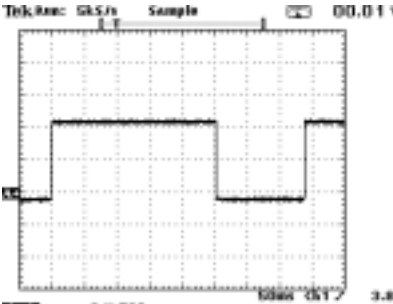
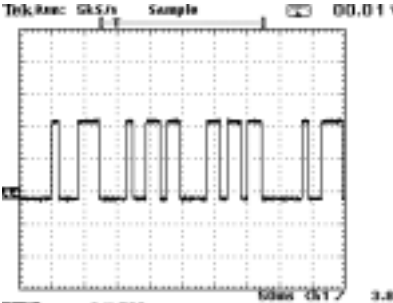
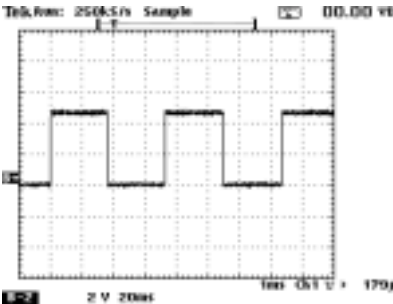


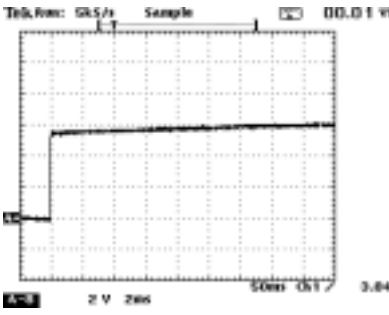
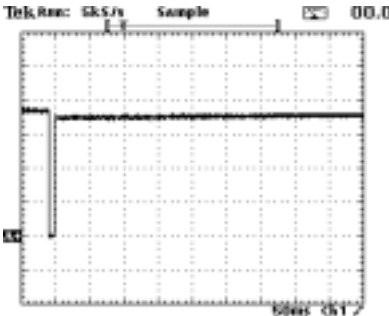
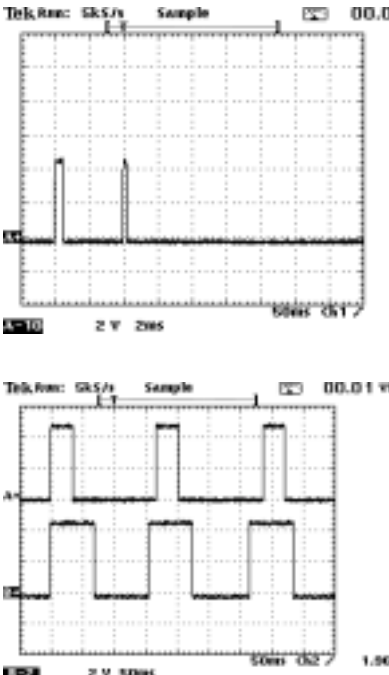
## 6.11 BLOCK CIRCUIT DIAGRAM NX2 DEPTH AMP/ SERVER

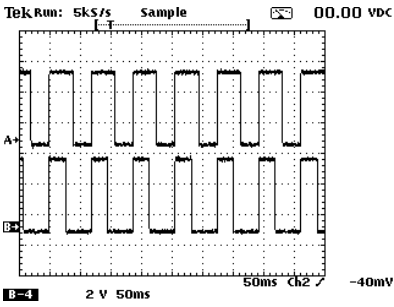
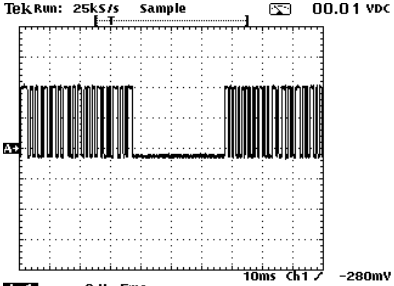
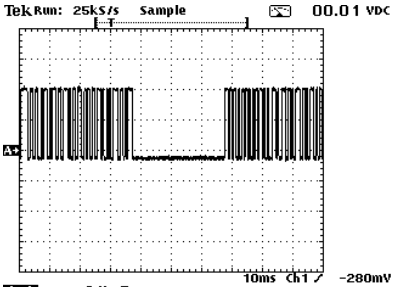
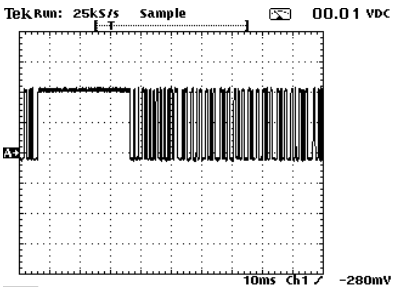


## 6.2 TROUBLE SHOOTING - TEST WAVE FORMS SERVER

Fault indication	Check signal at:	Possible reason if not Correct waveform	DMM test.	Oscilloscope Correct wave form
Err 02 or Err 03	TP 1 D1	Defect D1	+12 V	 <p>2 V 20ms</p>
Err 02 or Err 03	TP 2 U1 pin 1	Defect U1	+5 V	 <p>2 V 500µs</p>
Err 02 or Err 03	TP 3	CPU not running. Defect processor, U9	AC 2,2V	 <p>2 V 500µs</p>
Err 02 or Err 03	TP 4+5 U6 pin 6 U6 pin 7	No Bus signal out Defect U6	DC 0,6 - 0,8V	 <p>2 V 500µs</p>

Fault indication	Check signal at:	Possible reason if not Correct waveform	DMM test.	Oscilloscope Correct wave form
Err 02 or Err 03	TP 6 U 6 Pin 1	No Bus to U6 Defect processor U9		
Err 02 or Err 03	TP 7 U 6 Pin2+3	No Bus to U6. Defect processor U9		
Err 02 or Err 03	TP 8 U 6 Pin 4	No Bus to U6. Defect processor U9		
No Speed	TP 9 U8 pin 6	Deffect U8		

Fault indication	Check signal at:	Possible reason if not Correct waveform	DMM test.	Oscilloscope Correct wave form
No Depth	TP 10	Long SPL can indicate no echo. Deffect Depth Amp		
No Depth	TP10	Deffect Depth Amp. Short SPL can indicate OK echo.		
No Depth  No Wind value	TP11  TP WA TP WB  U4 Pin 4 = chan.A Pin 10 = chan.B	If no echo check Depth Amp.		

Fault indication	Check signal at:	Possible reason if not Correct waveform	DMM test.	Oscilloscope Correct wave form
No Compass value	TP CA TP CB  U8 Pin 4 = chan.A pin12 = chan.B			
No NMEA out signal on Term. 3	TP 12 NMEA out terminal 3 on J1A	If no NMEA signal on TP12 check TP13 if OK signal defect U11		
No NMEA out signal on D-sub pin 2	TP 14 NMEA out signal on D-sub pin 2	If no NMEA signal on TP14 check TP13 if OK signal defect U 5		
NMEA in test	Connect term.3 NMEA out to NMEA in term. 10 + 11 to ground and check at TP 15 Optocoupl. U12 pin 6.	If no NMEA signal on TP15, defect U 12, Q2, Q3 or D5.		

## 6.2 SERVER NMEA COMMUNICATION TEST

Connect the Server D-Sub to the PC via a PC-cable.  
Chose Hyperterminal - Set up - Settings - Config.

- 4800 bps
- 8 bits
- No parity
- 1 Stop bit
- No XON/XOFF

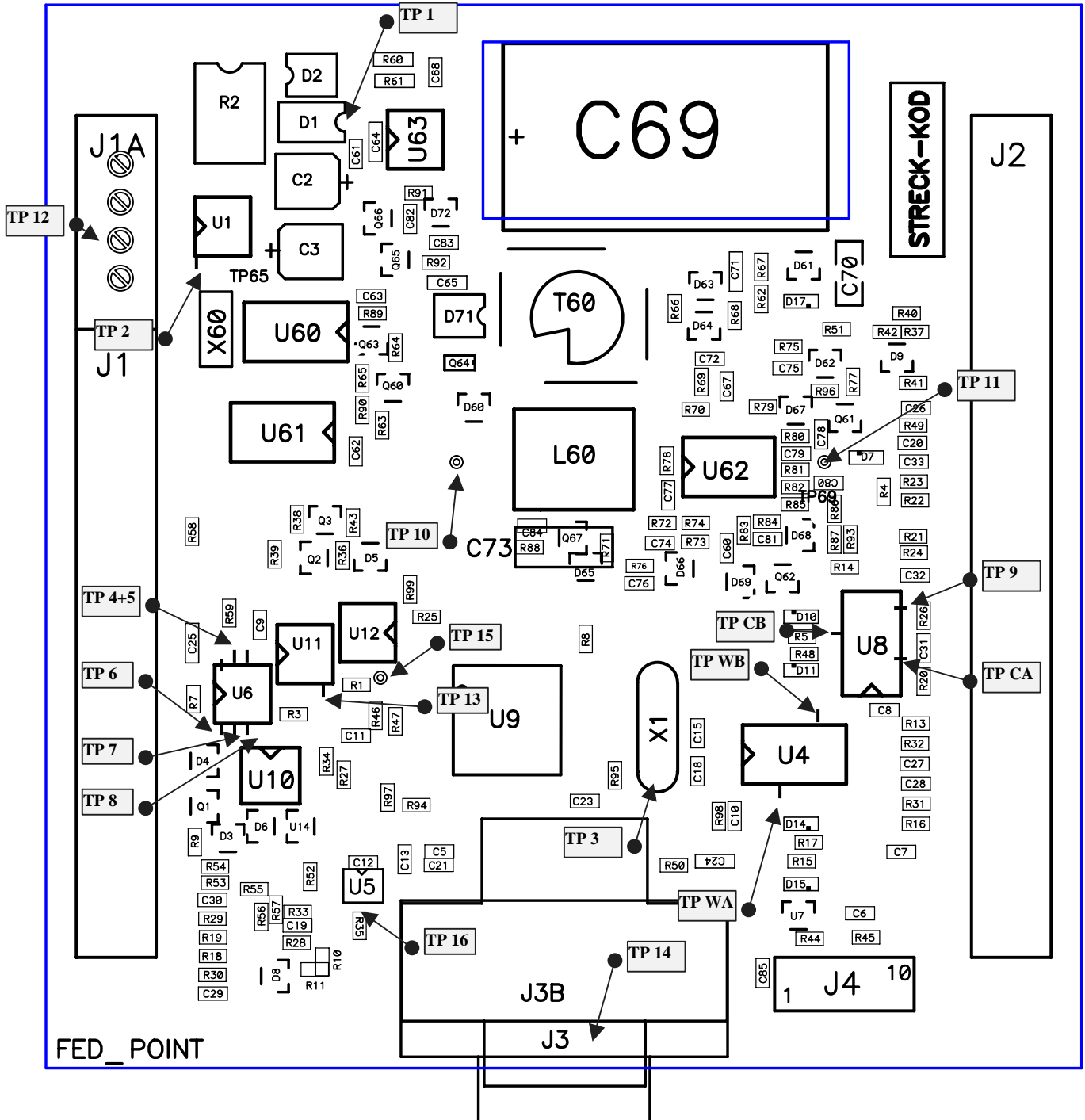
The Server should send NMEA- sentences continuously. The following, C77 to C92 per below, is transmitted in default setting (see also User Manual 3.11.1)

0	( — )	No out signal
1	(APB)	Autopilot B
2	(BOD)	Bearing original destination
3	(BWC)	Bearing and distance to waypoint
4	(BWR)	Bearing and distance, dead reckoning
5	(C77) (DBT)	Depth measured from the transducers position
6	(DPT)	Depth
7	(C78) (GLL)	Geographic position
8	(GSA)	DOP and active satellites
9	(C79) (GSV)	Satellites in view
10	(C80) (HDM)	Magnetic heading
11	(C81,89) (HDT)	True heading
12	(MTW)	Water temperature
13	(C82) (MWD)	Wind direction and speed
14	(MWV)	Apparent wind speed and angle
15	(RMB)	Minimum navigation data
16	(RMC)	Minimum specific GPS- and TRANSIT-data
17		
18	(C83) (VDR)	Set and drift
19	(C84) (VHW)	Speed and course through the water
20	(VLW)	Distance travelled through the water
21	(C85) (VPW)	Speed relative to the wind
22	(C86) (VTG)	Distance made good and distance over ground.
23	(C87) (VWR)	Apparent wind speed and wind direction
24	(C88) (VWT)	True wind speed and direction
25	(C90) (WCV)	Waypoint closure velocity
26		
27	(C91) (XTE)	Cross track error
28	(C92) (ZDA)	Time and date
29	(ZTG) & (UTC)	Time to destination or waypoint.

If no NMEA is sent the test failed and the Server has to be returned to Silva for further tests

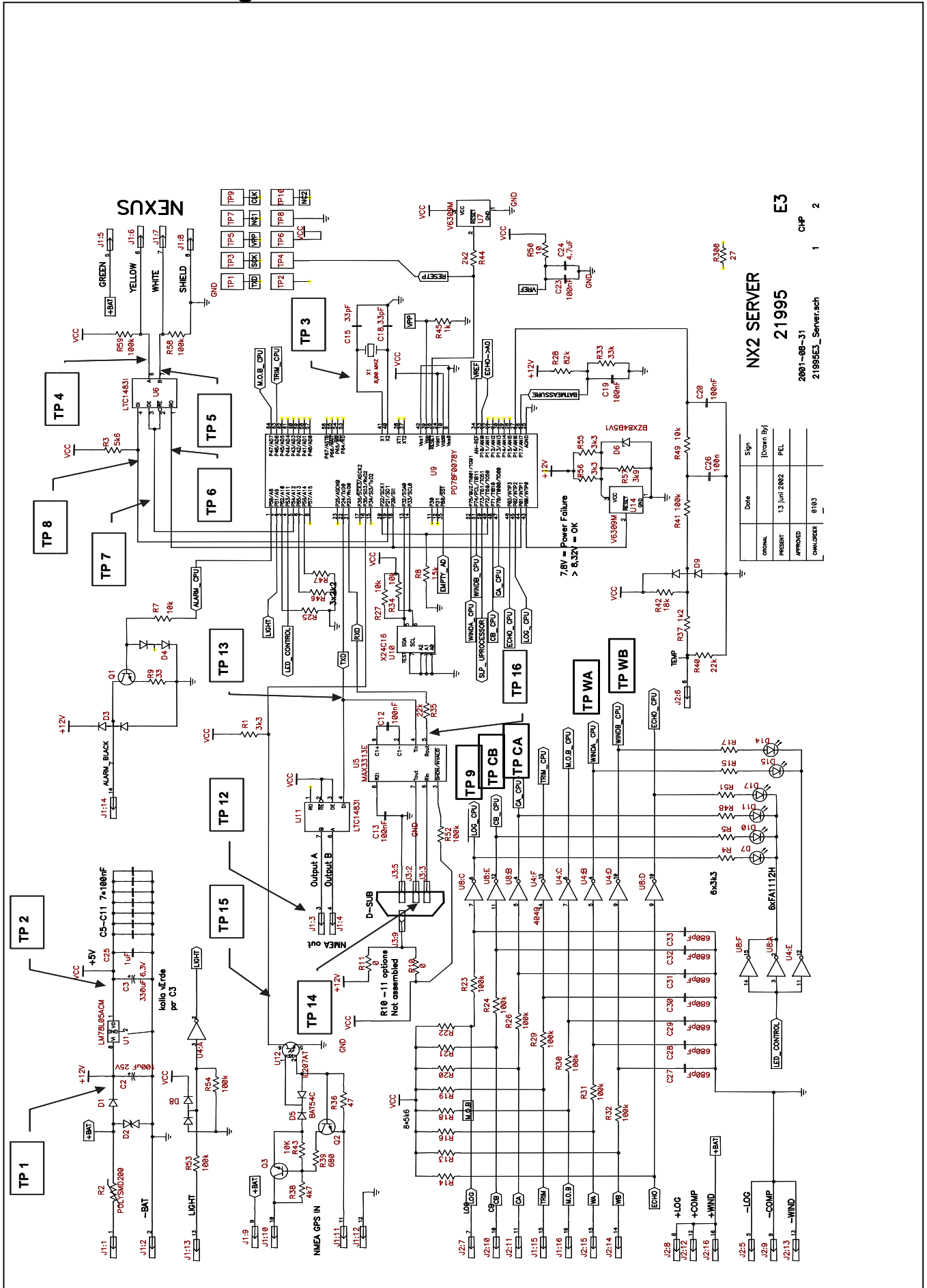
# 6.3 PCB Layout with Test points – NX2 Server

## NX2 SERVER 21997F





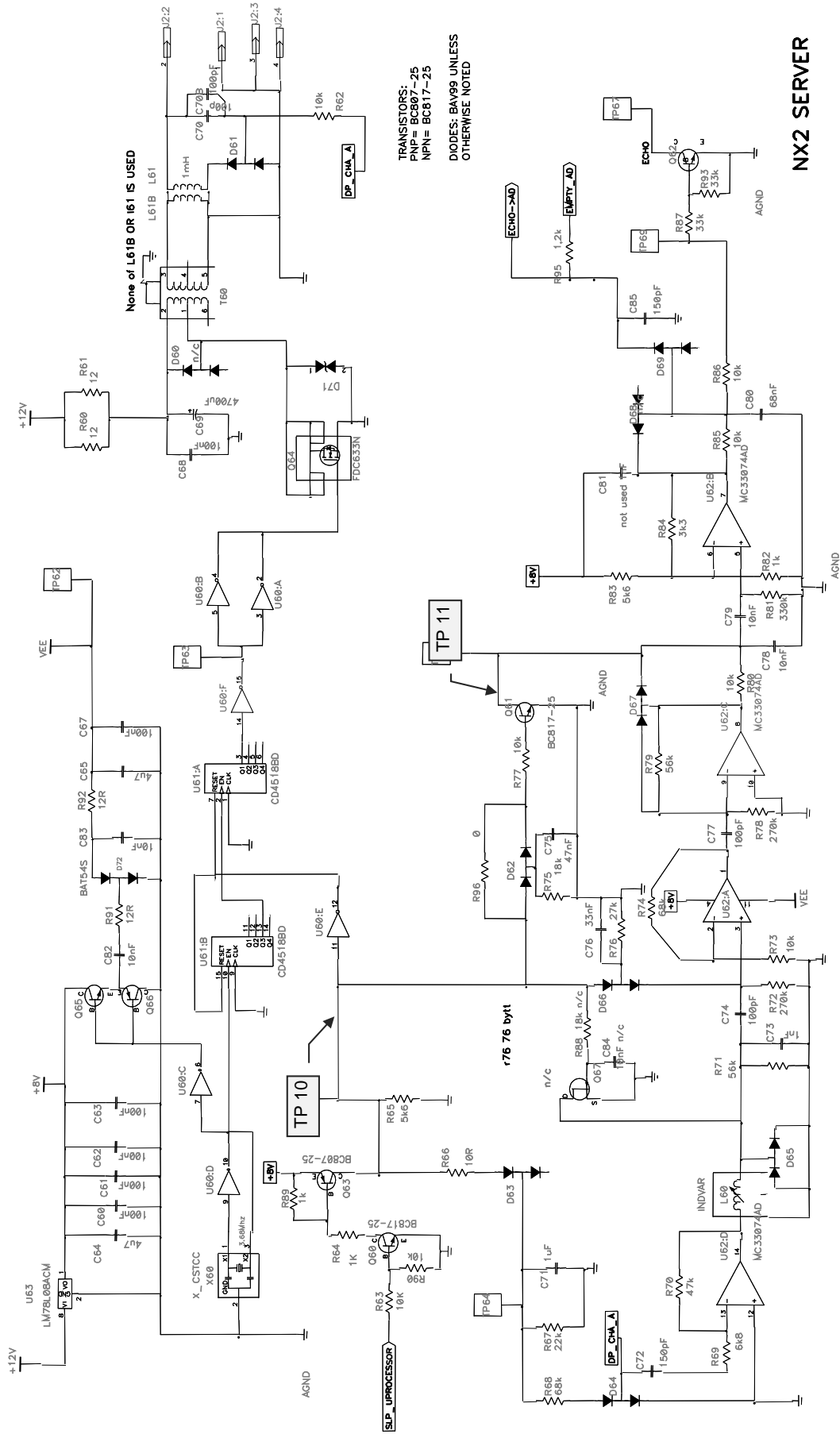
# 6.4 Circuit Diagram NX2 Server



**NX2 SERVER**  
2 1995

E3  
2001-08-31  
2 1995E3\_Server.sch  
1 2  
CHP

Date	Spn	Drawn By
13 Jun 2002		PEL
APPROVED		
01/03		



None of L61B OR i61 IS USED

TRANSISTORS:  
PNP = BC807-25  
NPN = BC817-25  
DIODES: BAV99 UNLESS  
OTHERWISE NOTED

### NX2 SERVER