



FU Tiller

Type 105-105 NG020, NG021, NG022

- 1 Description
- 2 Technical Data
- 3 First Putting into Operation

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Spare parts catalogues

Dimensional Drawing 105-105.HP005

Circuit diagram 105-105.HP037

Circuit diagram 105-105.HP039 (sheets 1 and 2)

Wiring diagram 105-105.HP044



This equipment includes electromechanical devices such as relays, switches or potentiometers. Electromechanical devices are subject to wear and tear depending on operation cycles and environmental conditions.



Caution!
Use only original RAYTHEON Anschütz spare parts

FU TILLER

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1 Description

The tiller – set into control desks or steering stands – serves as follow-up steering element on bridges (**FOLLOW UP**).

The standard scale division is $\pm 35^\circ$, the deflection angle of the knob is $\pm 60^\circ$. In the mechanical zero position the knob is slightly engaged. The scale is illuminated; the brightness is regulated automatically.

When the follow-up (FU) steering control is selected via the steering mode selector switch, the illumination of the scale is switched on.

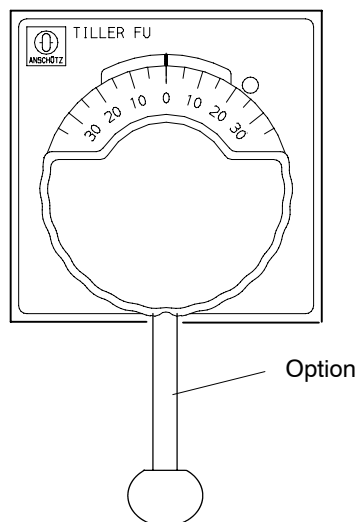
Depending on the application, single-, twin- or fourfold potentiometers are used.

Optionally, a handle can be attached to the knob for use as a lever.

For a rudder angle change to starboard (STBD) the knob must be turned clockwise; if a lever is used, this must be turned toward STDB.

The steering control effect corresponds to that of a handwheel.

There is an override switch integrated in this tiller, it is switched by turning the tiller more than 1° . By this the autopilot mode is interrupted and the steering control is performed via this tiller.

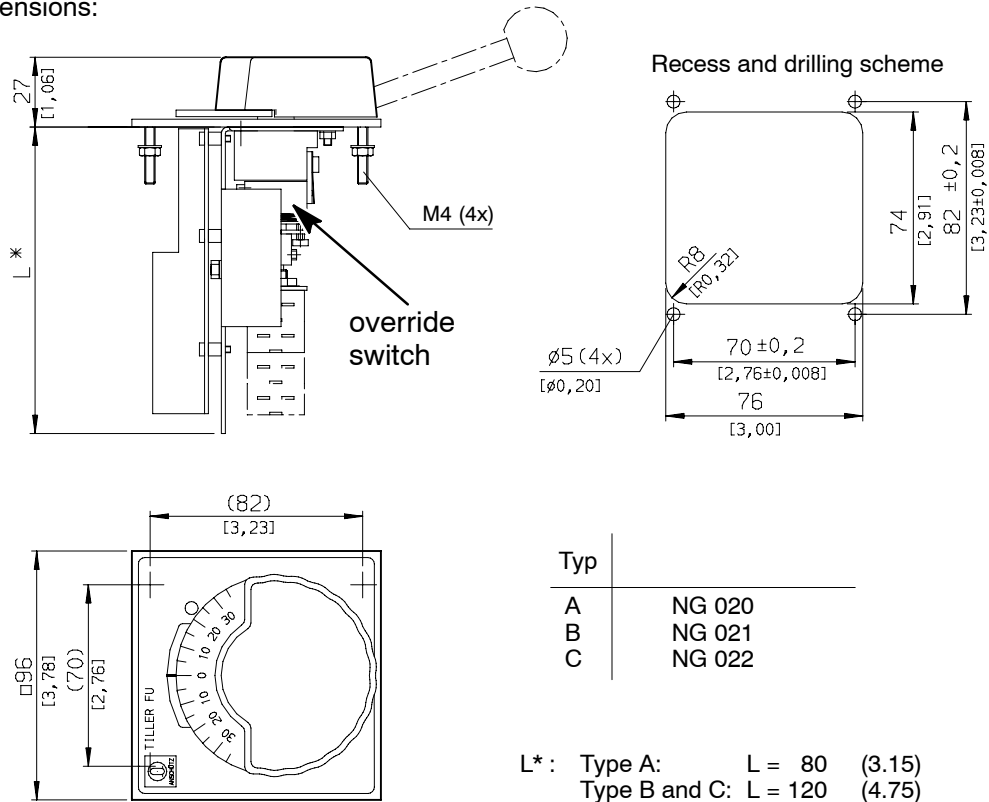


FU TILLER

2

Technical Data

Dimensions:



Weight:	approx. 1 kg
Scale range, standard:	±35°
other scales:	±45°, ±60°, ±90°
Supply voltage:	24 V _{DC}
Steering potentiometer:	20 kΩ
Number of potentiometers, Type A:	1
Type B:	2
Type C:	4
max. wire cross section:	1.5 mm ²
Type of enclosure:	IP 23 EN 60529 after installation
Ambient temperature (operation):	-25 °C to +55 °C

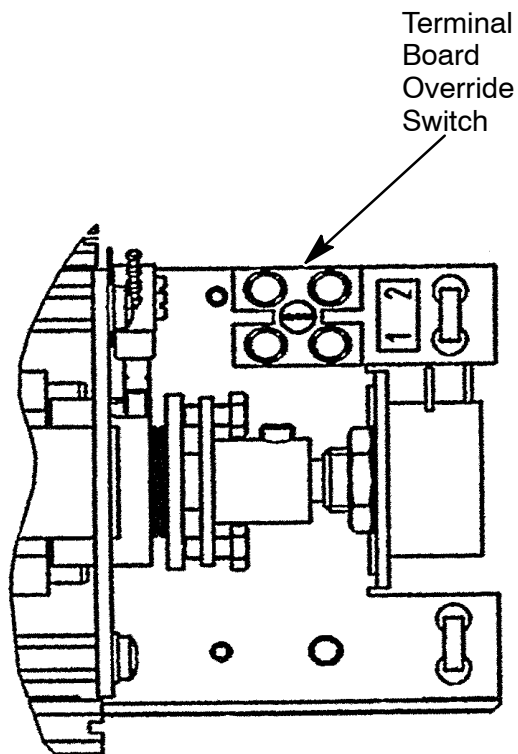
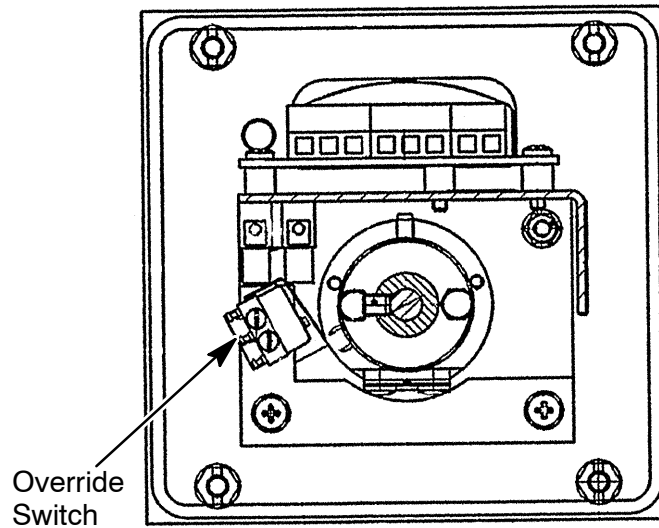
Zero adjustment, setting of the slope and the symmetry via subordinate trim potentiometer.

3

Override switch

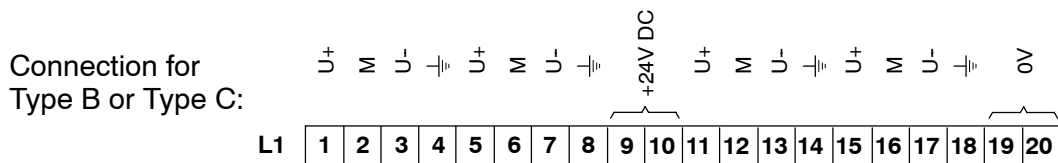
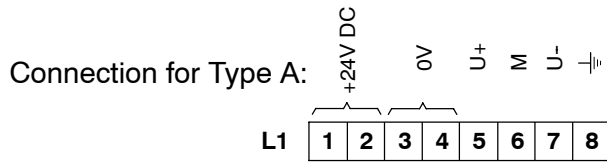
for location see below mentioned drawing,

for connection see below mentioned drawing and connection diagram 105-105.HP044.



FU TILLER

4 First Putting into Operation



Adjustment:

Brightness of background:

Adjust brightness of background with potentiometer R2; be sure to adjust during night operation (when the bridge is dark)!

Offset / Zero:

Set tiller to 0°; move zero-potentiometer until 0° is shown on the rudder position indicator as well.

Gain:

Set tiller to 20° (PORT or STBD); move gain-potentiometer until 20° (PORT or STBD) is also shown on the rudder position indicator.

Symmetry:

Adjust tiller to max PORT (for example: 35°) and after that to max. STBD.

If there is a difference between both rudder position indicators, then adjust the difference with the potentiometer "SYM".

Check ZERO and GAIN adjustments again.

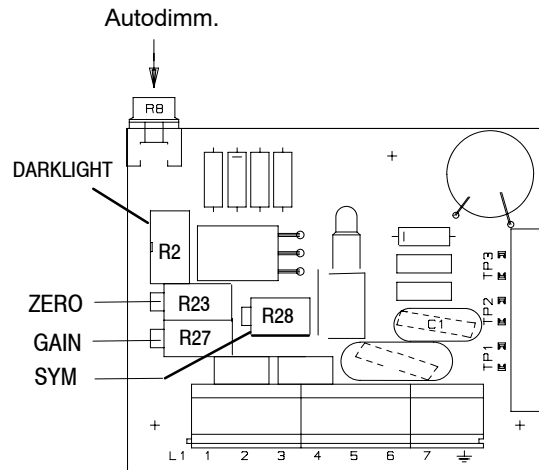
If necessary repeat the a.m. procedure in total.

see appended drawings: 105-105 HP037 (for type A)
105 -105 HP039, sheets 1 and 2 (for type B or C)
105-105 HP044 (for connecting override switch)

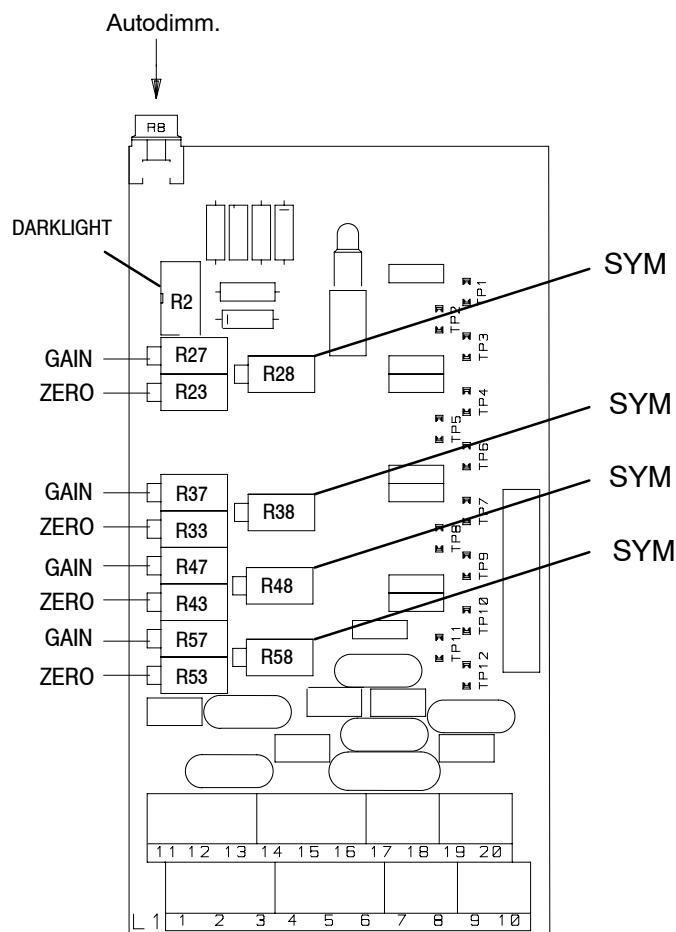
FU TILLER

Position of the potentiometers on the PCB:

for Type A:

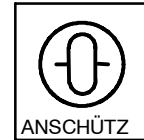


for Type B and C:

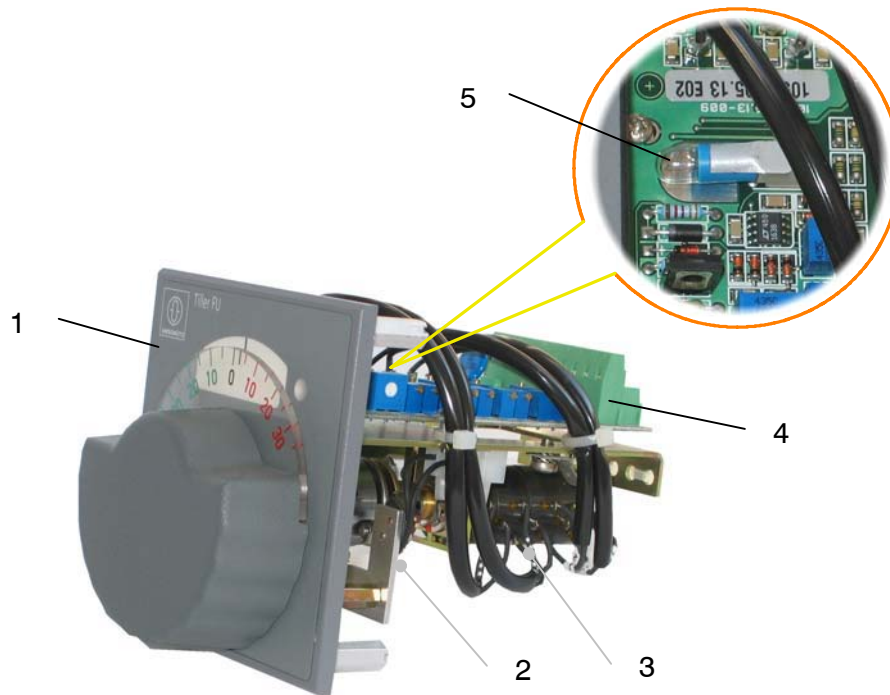


Tiller FU

Type 105-105.NG020 E00, NG021 E00, NG022 E00



Ersatzteilkatalog
SPARE PARTS
CATALOGUE



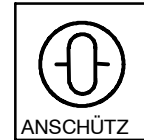
Pos.	Lager-Nr. Stock-No.	Benennung	Designation	Zeichnungs-Nr. Part-No.	Stck. in Qty. in			Herst.-Code MFRC	Versorgungs-Nr. NSN
					NG020 E00	NG021 E00	NG022 E00		
1 ¹		Tiller FU	Tiller FU	105-105.NG020 E00					
		Tiller FU	Tiller FU	105-105.NG021 E00					
		Tiller FU	Tiller FU	105-105.NG022 E00					
2	1720728	Mikroschalter	Microswitch	NB14-230.00-039	1	1	1	D2865	5930-00-687-0251
3	1770547	Drehwiderstand	Potentiometer	FCP 22 E (20kOhm Lin=1% 1W)	1			D2865	
	1770546	Drehwiderstand	Potentiometer	FCP 22 EG (2x20kOhm Lin=0,5% 1W)		1		D2865	
	1770544	Drehwiderstand	Potentiometer	FCP 22 EG (4x20kOhm Lin=0,5% 1W)			1	D2865	
4	3604100	Tiller FU-PCB	Tiller FU-PCB	105-105.12 E02	1			D2865	
	3604101	Tiller FU-PCB	Tiller FU-PCB	105-105.13 E02		1	1	D2865	
5	1710006	Lampe	Lamp	28 V 0,06A T 1 ¼ MGG7876	1	1	1	D2696	

¹ Entwicklungsstand E00 komplett nicht mehr lieferbar; Development status E00 complete no longer available

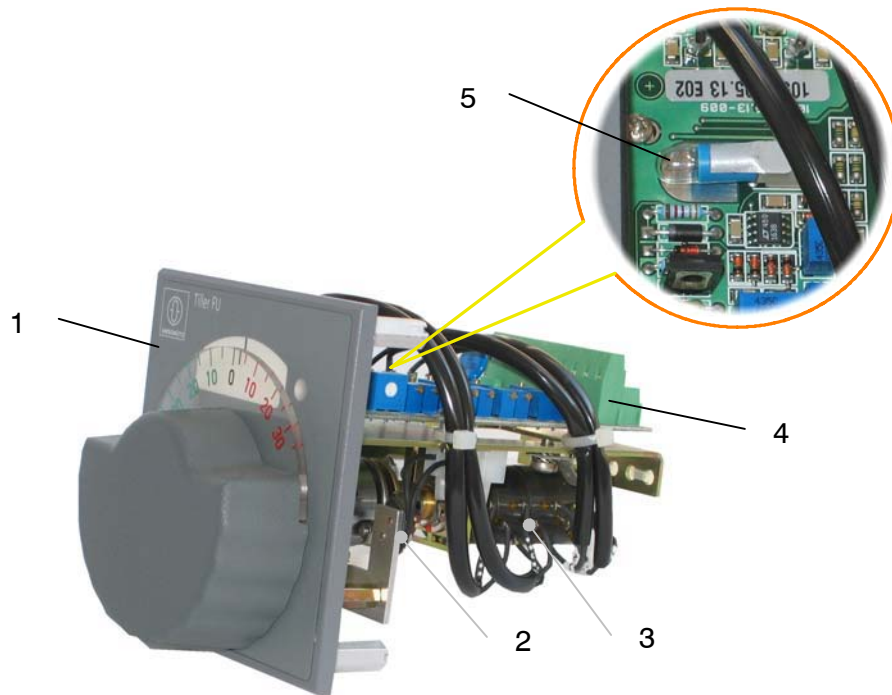
All depicted items which are not mentioned in the text are not applicable for this unit. Since further development may necessitate making modifications to existing equipment, its conformity with the relevant illustrations and drawings is not always ensured. Raytheon Anschutz will be under no liability whatever that may arise from any such differences.

Tiller FU

Type 105-105.NG020 E01, NG021 E01, NG022 E01



Ersatzteilkatalog
SPARE PARTS
CATALOGUE



Pos.	Lager-Nr. Stock-No.	Benennung	Designation	Zeichnungs-Nr. Part-No.	Stck. in Qty. in			Herst.-Code MFRC	Versorgungs-Nr. NSN
					NG020 E01	NG021 E01	NG022 E01		
1 ¹	4002015	Tiller FU, basaltgrau	Tiller FU, basalt grey	105-105.NG020 E01				D2865	
		Tiller FU	Tiller FU	105-105.NG021 E01 ²					
	4002017	Tiller FU, basaltgrau	Tiller FU Basalt grey	105-105.NG022 E01				D2865	
2	1720728	Mikroschalter	Microswitch	NB14-230.00-039	1	1	1	D2865	5930-00-687-0251
3	1770547	Drehwiderstand	Potentiometer	FCP 22 E (20kOhm Lin=1% 1W)	1			D2865	
	1770546	Drehwiderstand	Potentiometer	FCP 22 EG (2x20kOhm Lin=0,5% 1W)		1		D2865	
	1770544	Drehwiderstand	Potentiometer	FCP 22 EG (4x20kOhm Lin=0,5% 1W)			1	D2865	
4	3604100	Tiller FU-PCB	Tiller FU-PCB	105-105.12 E02	1			D2865	
	3604101	Tiller FU-PCB	Tiller FU-PCB	105-105.13 E02		1	1	D2865	
5	1710006	Lampe	Lamp	28 V 0,06A T 1 ¼ MGG7876	1	1	1	D2696	

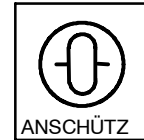
¹ andere Farben auf Anfrage; other colors on request

² nicht mehr lieferbar; no longer available

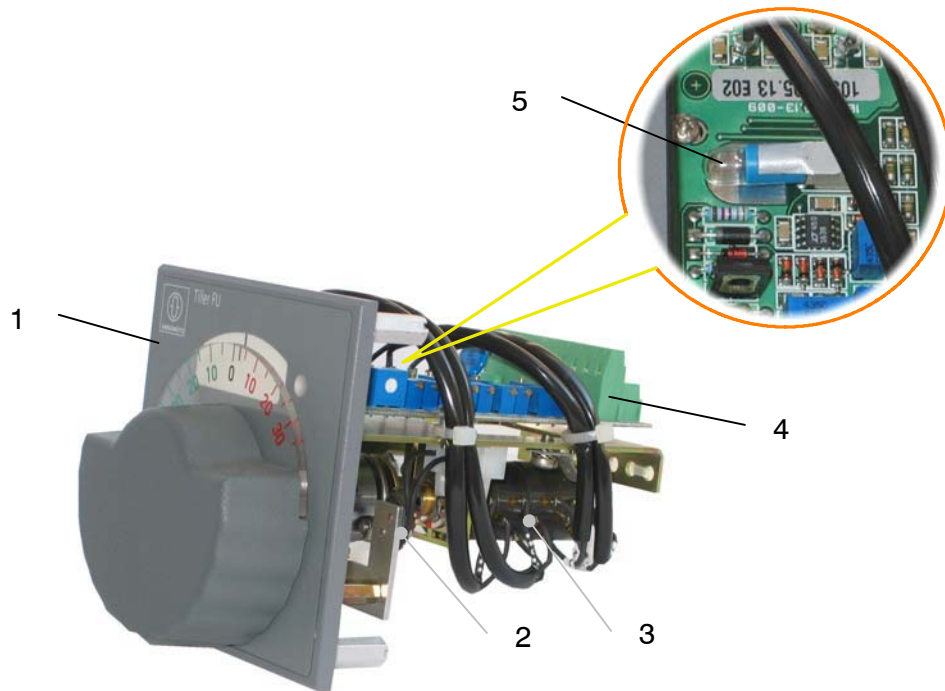
All depicted items which are not mentioned in the text are not applicable for this unit. Since further development may necessitate making modifications to existing equipment, its conformity with the relevant illustrations and drawings is not always ensured. Raytheon Anschutz will be under no liability whatever that may arise from any such differences.

Tiller FU

Type 105-105.NG021 E02, NG022 E02



Ersatzteilkatalog
SPARE PARTS
CATALOGUE

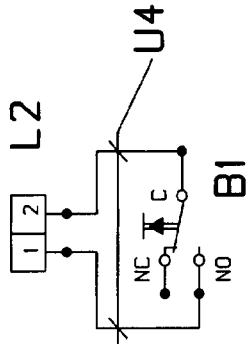
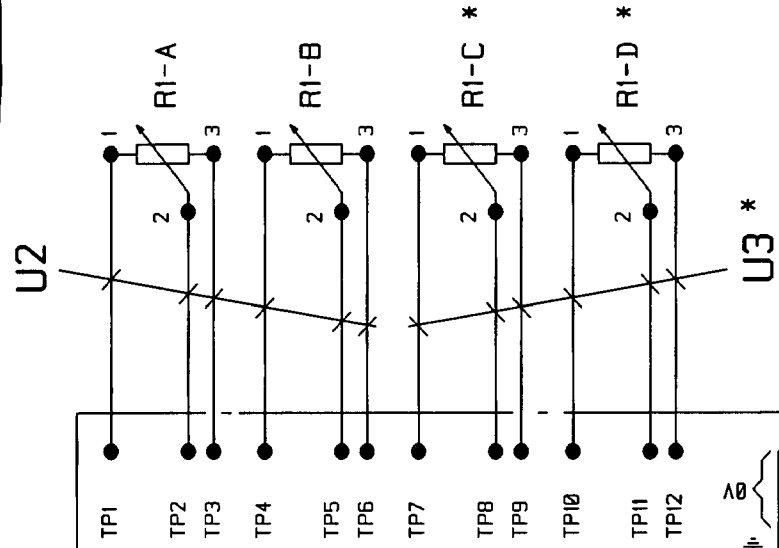
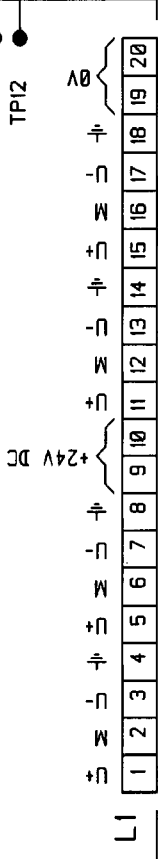


Pos.	Lager-Nr. Stock-No.	Benennung	Designation	Zeichnungs-Nr. Part-No.	Stck. in Qty. in		Herst.-Code MFRC	Versorgungs-Nr. NSN
					NG021 E02	NG022 E02		
1 ¹	4002472	Tiller FU, basaltgrau	Tiller FU, basalt grey	105-105.NG021 E02			D2865	
	4002474	Tiller FU, basaltgrau	Tiller FU, basalt grey	105-105.NG022 E02			D2865	
2	1720728	Mikroschalter	Microswitch	NB14-230.00-039	1	1	D2865	5930-00-687-0251
3	1770546	Drehwiderstand	Potentiometer	FCP 22 EG (2x20kOhm Lin=0,5% 1W)	1		D2865	
	1770544	Drehwiderstand	Potentiometer	FCP 22 EG (4x20kOhm Lin=0,5% 1W)		1	D2865	
4	3609838	Tiller FU-PCB	Tiller FU-PCB	105-105.15	1	1	D2865	
5	1710006	Lampe	Lamp	28 V 0,06A T 1 ¼ MGG7876	1	1	D2696	

¹ andere Farben auf Anfrage; other colors on request

All depicted items which are not mentioned in the text are not applicable for this unit. Since further development may necessitate making modifications to existing equipment, its conformity with the relevant illustrations and drawings is not always ensured. Raytheon Anschutz will be under no liability whatever that may arise from any such differences.

U1
TILLER-FU KARTE
TILLER FU PCB
105-105.13 E02



— 0,25² BK AN2031-11

* FOR NG022 ONLY

105-105.HP044



DIN CODE	BENENNUNG DENOMINATION	TYP / ZEICHUNGS-NR. TYPE / DRAWING NO.	POS.NO.	AUS STOCKLISTE FROM PARTS LIST	GILT FÜR APPLICABLE TO
B1	MICROSCHALTER	NB14-230.00-039	81	105-105.NG021/NG022	
L1	KLEMMENLEISTE	MKKDSN 1.5 /2POL./3POL.	10, 11	105-105.13 E02	
L2	KLEMMENLEISTE	4E/2DS	94	105-105.NG021/NG022	
U1	TILLER FU - PCB	105-105.13	5	105-105.NG021/NG022	
U2	VERDRÄHTUNG	105-105.08	7	105-105.NG021/NG022	
U3	VERDRÄHTUNG	105-105.09	8	105-105.NG022	NG022
U4	VERDRÄHTUNG	105-105.14	9	105-105.NG021/NG022	
RI-A-D	DREHWIDERSTAND 4x20K0	FCP 22 EG	33	105-105.NG022	NG022
RI-A-B	DREHWIDERSTAND 2x20K0	FCP 22 EG	33	105-105.NG021	NG021
TP1-TP12	LOTSTIFT	1016L M5-SNB	13	105-105.13 E02	

CAD

CAD B 4509 B M 1:1

ALLGEMEINTOLERANZ
ISO 2768 - mk

2004	DATUM	NAME
BEARB	18.02.	STE/KUM
GEPR	18.02.	<i>Raimund</i>
NORM	20.2.	<i>StA</i>
FREIG	11.04.03	

BENENNUNG

TILLER FU

BAUSCHALTPLAN / WIRING DIAGRAM

ZEICHNUNGSNUMMER

105-105.HP044

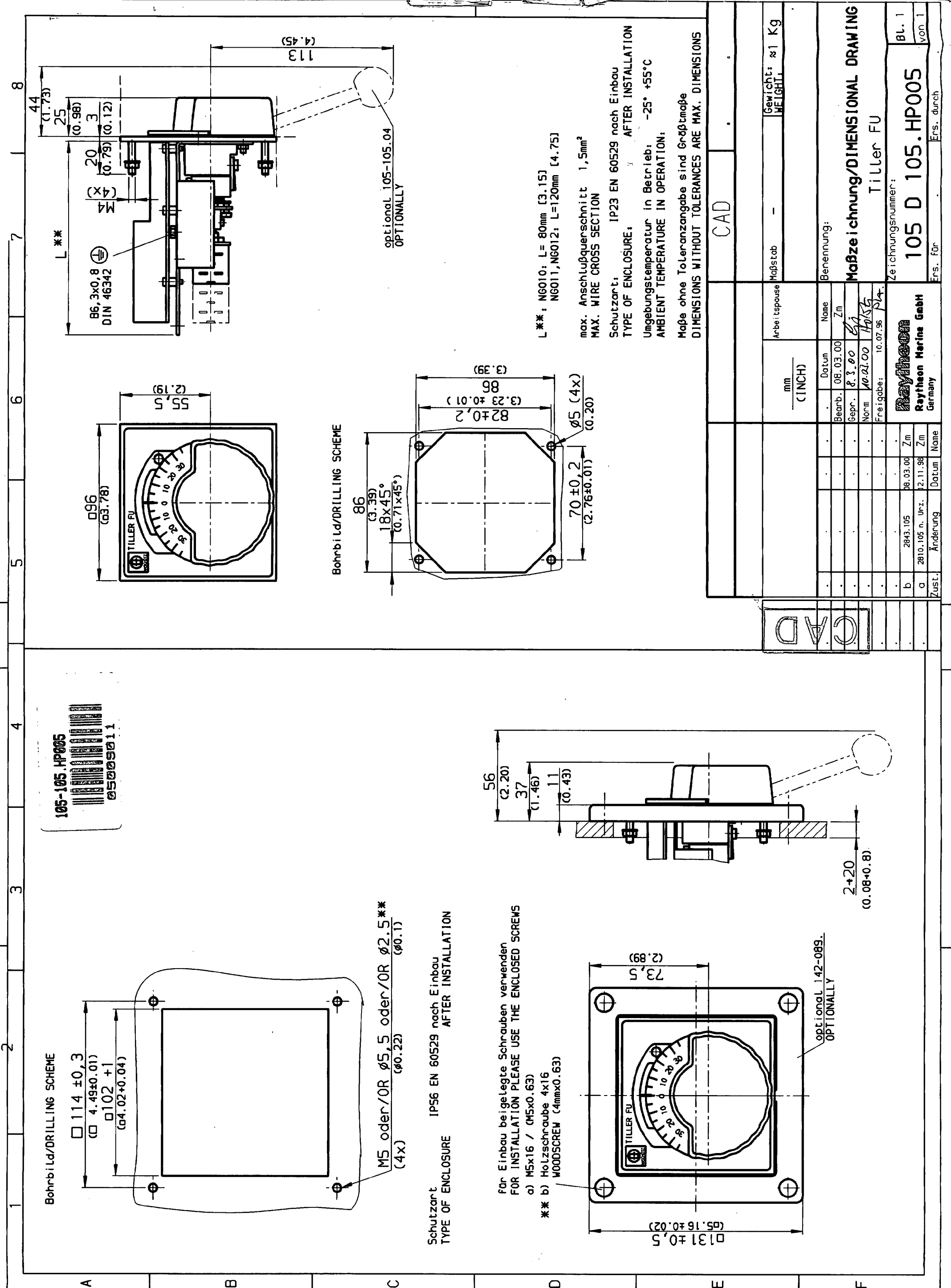
Raytheon
Raytheon Marine GmbH
Germany

ZUST	ÄNDERUNG	DATUM	NAME
A	2943.105	180204	KUM

BL. 1
VON 1

ERS.FÜR

ERS.DURCH



Bohrbild/DRILLING SCHEME

□ 114 ±0,3
(□ 4.49±0.01)
□ 102 +1
(□ 4.02±0.04)

M5 oder/OR $\phi 5,5$ oder/OR $\phi 2,5$ **
($\phi 0.22$) ($\phi 0.1$)
(4x)

Schutzart IP56 EN 60529 nach Einbau
TYPE OF ENCLOSURE AFTER INSTALLATION

für Einbau beigelagte Schrauben verwenden
FOR INSTALLATION PLEASE USE THE ENCLOSED SCREWS

a) M5x16 / (M5x0.63)
** b) Holzschraube 4x16
WOODSCREW (4mmx0.63)

optional 142-089.
OPTIONALLY

56 (2.20)
37 (1.46)
11 (0.43)
2+20 (0.08±0.8)

Bohrbild/DRILLING SCHEME

86 (3.39)
18x45° (0.71x45°)
70 ±0,2 (2.76±0.01)
 $\phi 5$ (4x) (0.20)

optional 105-105.04
OPTIONALLY

L ** : NG010; L = 80mm [3.15]
NG011, NG012; L = 120mm [4.75]

max. Anschlussquerschnitt 1,5mm²
MAX. WIRE CROSS SECTION

Schutzart: IP23 EN 60529 nach Einbau
TYPE OF ENCLOSURE: AFTER INSTALLATION

Umgebungstemperatur in Betrieb: -25° +55°C
AMBIENT TEMPERATURE IN OPERATION:

Maße ohne Toleranzangabe sind Größtmaße
DIMENSIONS WITHOUT TOLERANCES ARE MAX. DIMENSIONS

CAD

CAD

Arbeitspause		Datum		Name	
mm	(INCH)	Bearb.	08.03.00	Zm	
		Gepr.	8.3.00	W	
		Norm	10.07.00	W	
		Freigabe:	10.07.96	Pl	

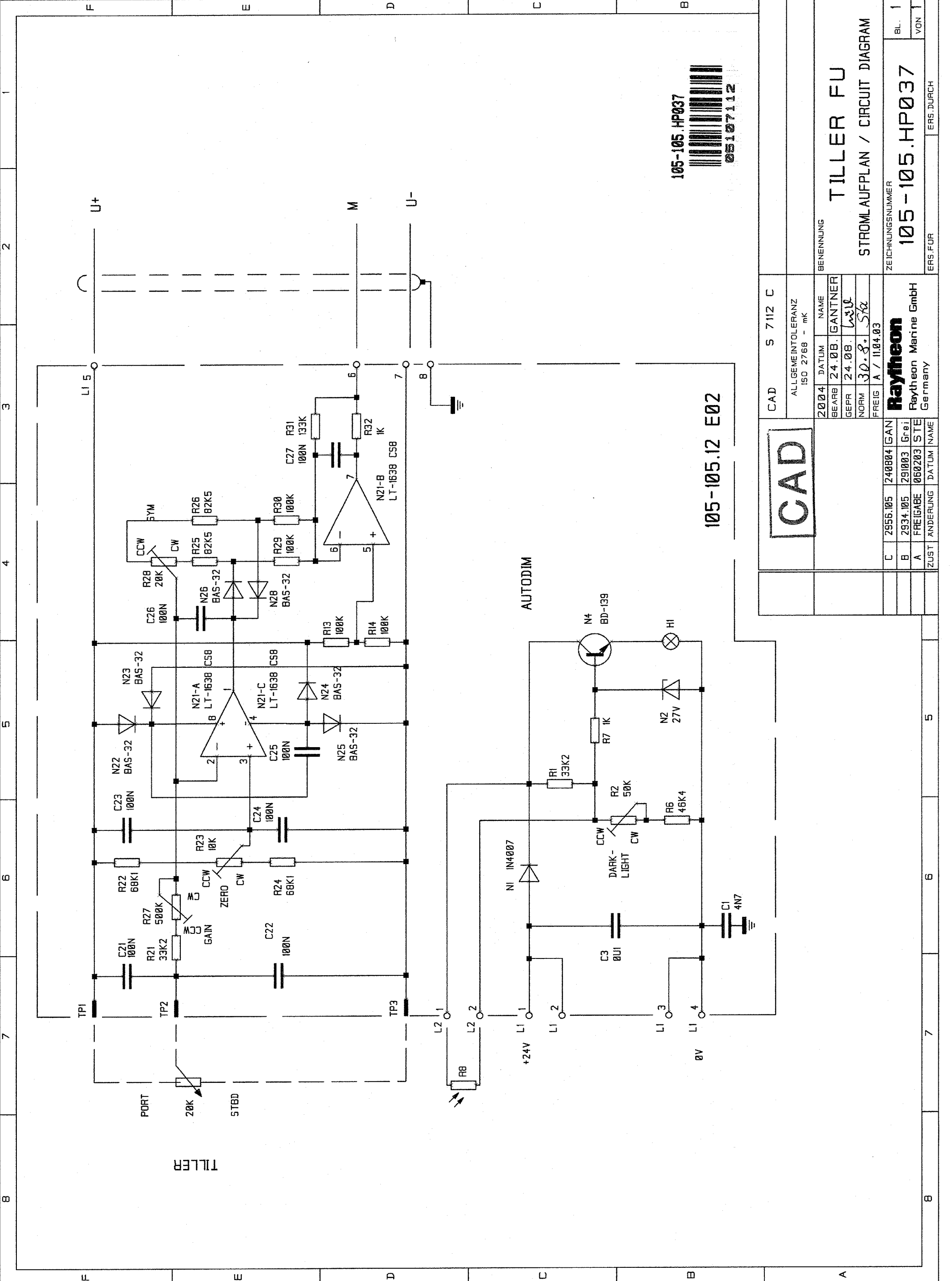
Zust.	Änderung	Datum	Name
b	2843.105	08.03.00	Zm
a	2810.105 n. urz.	12.11.98	Zm

Raytheon
Raytheon Marine GmbH
Germany

Benennung: Tiller FU
Maßstab: -
Gewicht: ≈ 1 Kg
WEIGHT:

Zeichnungsnummer: 105 D 105.HP005
Ers. für: Ers. durch

Bl. 1 von 1



105-105.HP037

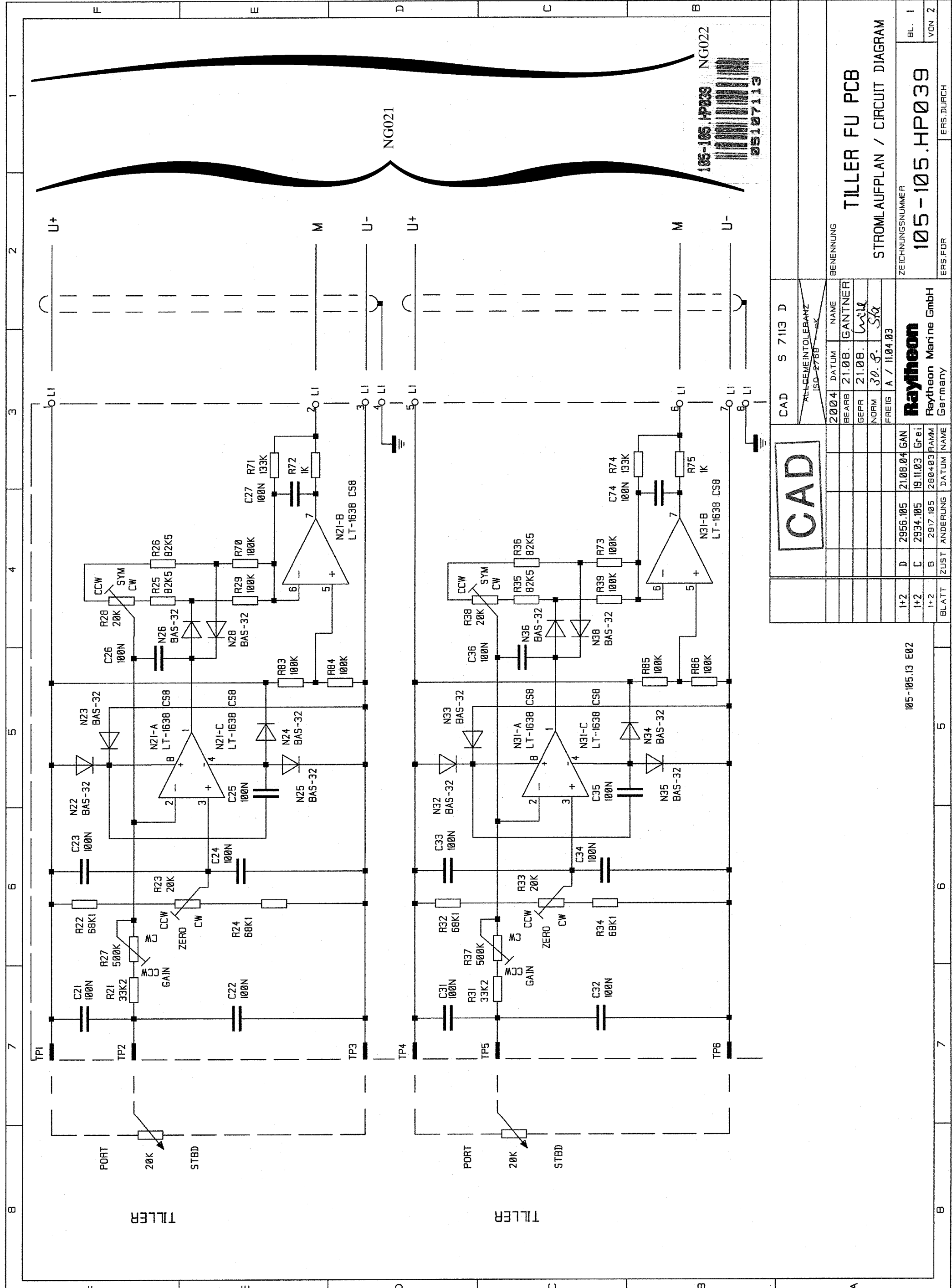
 05107112

105-105.12 E02

CAD

CAD S 7112 C	
ALLGEMEINTOLERANZ ISO 2768 - mK	
2004	DATUM NAME
BEARB	24.08. GANTNER
GEPR	24.08. <i>WJ</i>
NORM	30.8. <i>Stk</i>
FREIG	A / 11.04.03
Raytheon Raytheon Marine GmbH Germany	
C	2956.105 240804 GAN
B	2934.105 291003 Grei
A	FREIGABE 060203 STE
ZUST	ANDERUNG DATUM NAME

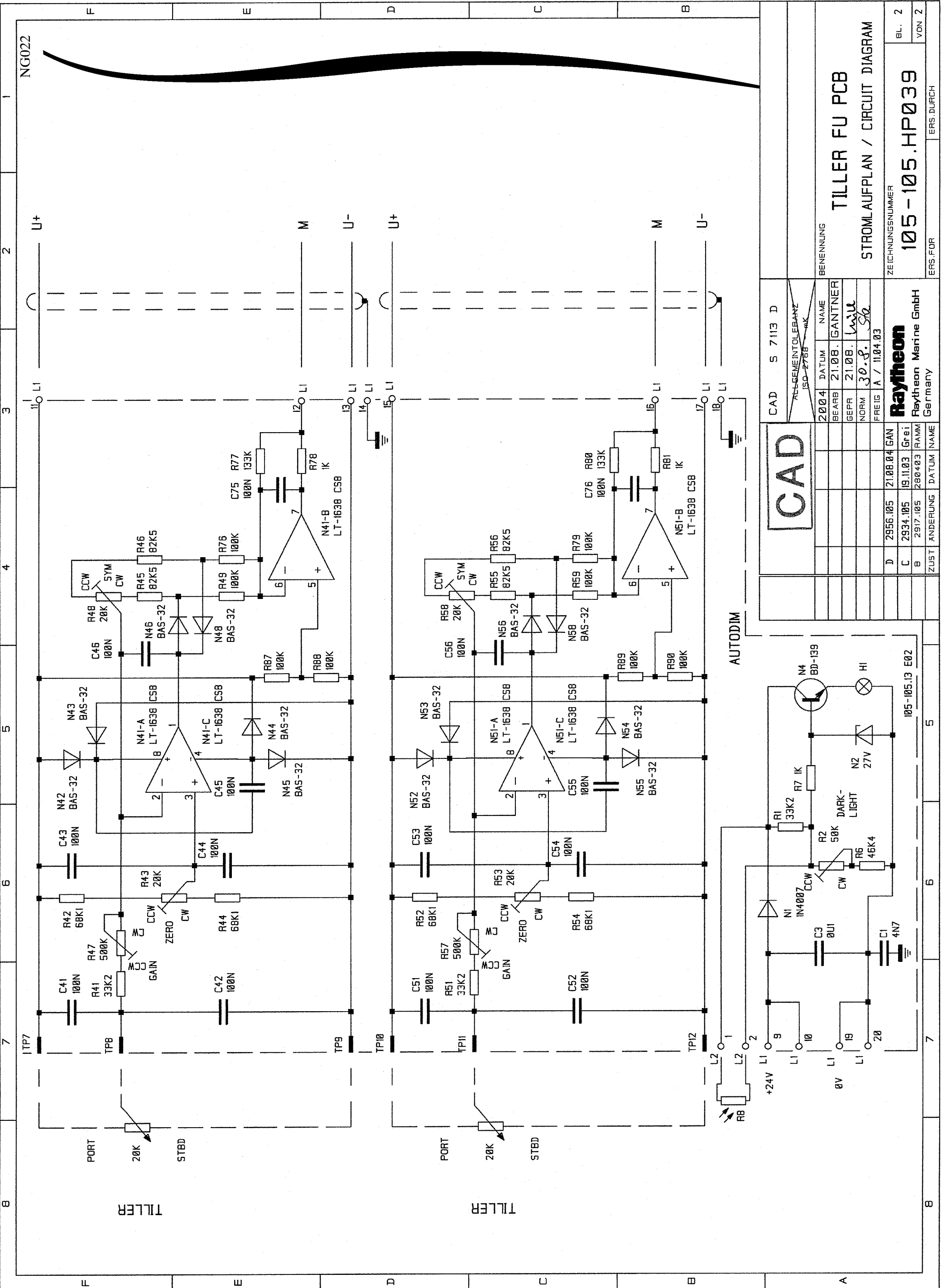
BENENNUNG
TILLER FU
 STROMLAUFPLAN / CIRCUIT DIAGRAM
 ZEICHNUNGSNUMMER
105-105.HP037
 BL. 1
 VON 1
 ERS. DURCH



105-105.HP039 NG022
 05107113

CAD S 7113 D		BENENNUNG	
ALLGEMEINTOLERANZ ISO 2768-MK		2004	NAME
		BEARB	GANTNER
		GEPR	21.08. <i>Wille</i>
		NORM	30.8. <i>St</i>
		FREIG	A / 11.04.03
<div style="border: 2px solid black; padding: 5px; display: inline-block; font-weight: bold; font-size: 24px;">CAD</div>		ZEICHNUNGSNUMMER	
		105-105.HP039	
		ERS.FÜR	
		ERS.DURCH	
BLATT 1 VON 2		ZEICHNUNGSNUMMER 105-105.HP039	
BLATT 1+2 1+2 1+2		ZUST ANDERUNG DATUM NAME	
D 2956.105 21.08.04 GAN C 2934.105 19.11.03 Grei B 2917.105 28.04.03 RAMM		Raytheon Raytheon Marine GmbH Germany	

105-105.13 E02



NG022

CAD

CAD S 7113 D		BENENNUNG	
ALLGEMEINTEILEBAHNSYSTEM		TILLER FU PCB	
2004	DATUM	NAME	GANTNER
BEARB	21.08.	ZEICHNUNGSNUMMER	105-105.HP039
GEPR	21.08.	ERS.FÜR	ERS.DURCH
NORM	30.8.	BL.	2
FREIG	A / 11.04.03	VON	2
Raytheon		Raytheon Marine GmbH	
Germany		Germany	

AUTODIM

105-105.13 E02