

The designation "control panel" is a superordinate term for the following controls and indicators:

keyboard, rotary encoder and LED display.

The analog part of the control panel (A1-A4, D1) is described under 209 031 F (AF detector).

The management of the control panel is via Bu75 with the associated PIAs.

1. Keyboard

The count of the binary counter (D23) is constantly altered by a 2.5-kHz oscillator. The six places of the binary counter are divided into two groups of three (MSB/LSB). The LSB group drives one of the eight key rows via the decoder (1-out-of-8) (D3). The MSB group scans one of the eight key columns via the selector (1-out-of-8) (D4). Thus an LSB value is assigned to each key row and an MSB value to each key column. Through the intersection of column and row, each key therefore corresponds exactly to an MSB+LSB value (= count).

When a key is actuated, it waits for the corresponding count. As soon as this is reached, the selector (D4) issues a pulse that starts the retriggerable monoflop (D25). A change in the count is then prevented by disabling the binary counter via D16. At the same time "Key Active" is signalled, the count is read into the latch (D21) and a "Key Strobe" pulse is generated. If the key remains actuated, selector (D4) sends further pulses to the retriggerable monoflop (D25), because of the oscillator on "Disable", and prevents it from releasing.

If "Key Select" is activated, the tristate disconnection (D35) opens the data path for the count in the latch and the "Key Active" signal.

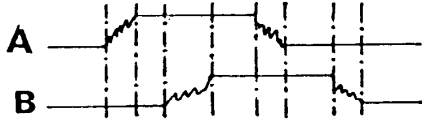
- 7088.

Ref.No. 227 031 F	Sub Control Panel	Date 1.10.87
Type 4031	Unit	Sheet 1/3
Schlumberger		Functional Description

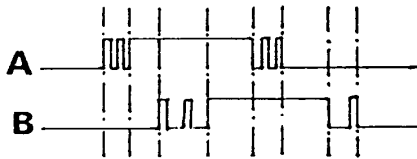
2. Rotary encoder

a) Rotor with pulse shaper

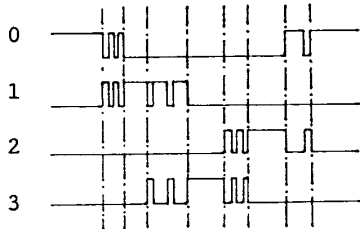
In the rotor (S1) two elements offset from one another by 90° are active, from which - used in voltage dividers - two signal shapes result:



Integration (C45, C46) and hysteresis (Schmitt trigger D22) clean the rise and fall:



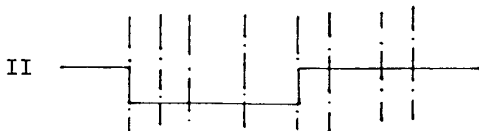
Both signals broken down in binary form by a decoder (D24) produce:



Binary 0 and 3 switch RS flipflop I (D26) with the result:



Binary 1 and 3 switch RS flipflop II (D26) with the result:



Ref.No. 227 031 F
Type 4031

Sub Control Panel
Unit

Date 1. 10. 87
Sheet 2/3

Schlumberger

Functional Description

b) Selection

The rising edge (result I) sets the output of the D flipflop (D32) Low. Thus "Strobe" becomes active on the output of the OR gate (D16). The output information (result II) = direction of rotation and the action on rotor 1 or rotor 2 is read to the output latch (D31).

The D flipflop (D32) is reset by a time constant (R1/C29) and the "Strobe" is released.

If "Rotor Select" is activated, the tristate disconnection in the latch opens the data path (D31).

3. LED display

The LEDs are driven by way of a shift register with constant-current outputs. Read-in is made by "Shift Data" and "Clock" when the address is called through active "LED Select" into the shift register (D2).

- 7088.

Ref. No. 227 031 F	Sub Control Panel	Date 1.10.87
Type 4031	Unit	Sheet 3/3
Schlumberger		Functional Description

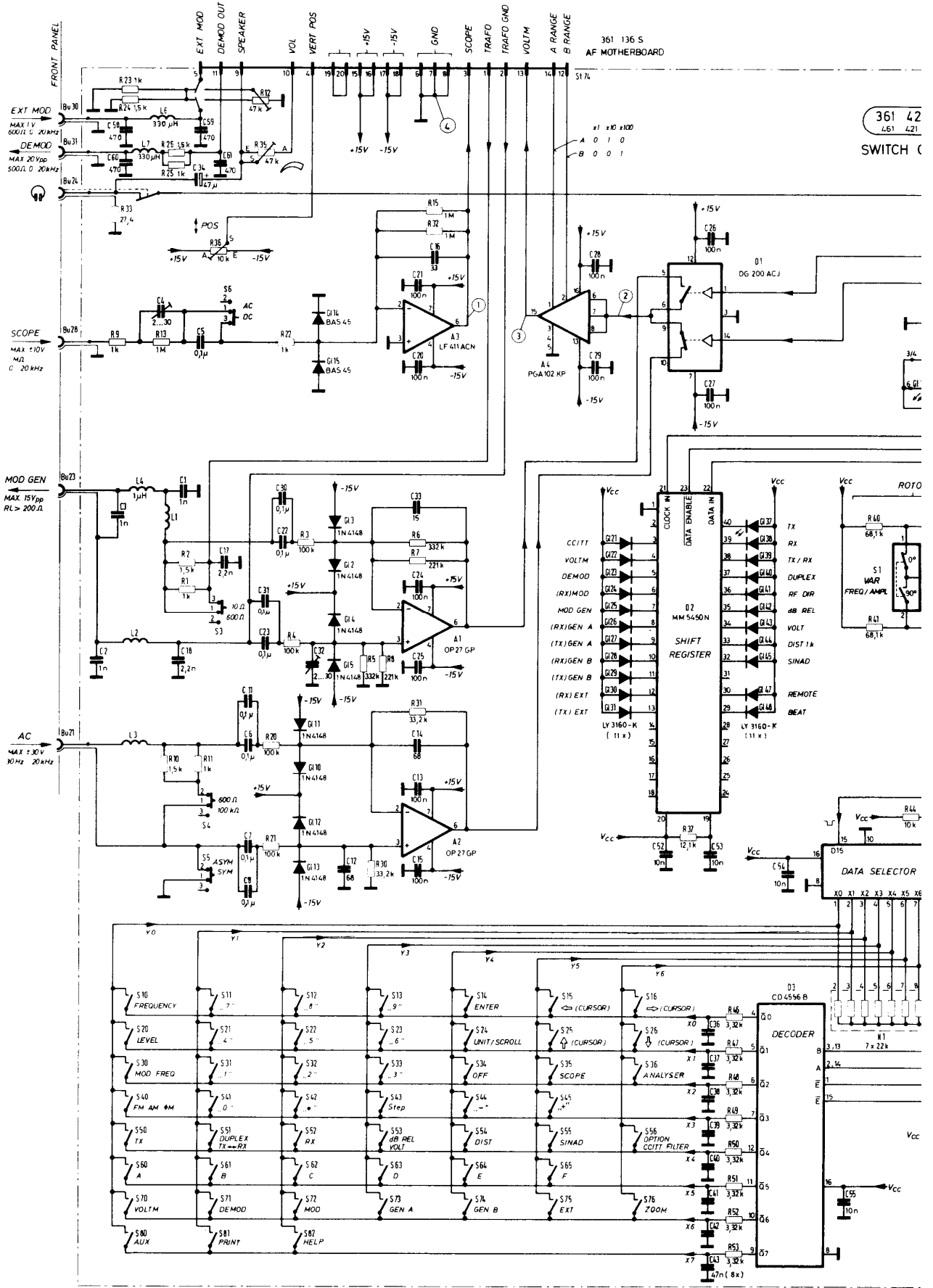
Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Sheet		
							Sub Unit	Control Panel	
AF gen., 4040, DVM	<p>1. <u>Test LEDs and keys</u> by switching on individual functions Ensure correct key assignments</p> <p>2. <u>Test handwheel</u> Press FREQUENCY key and shift cursor with key <input type="text" value="-->"/>.</p> <p>3. <u>AC voltmeter</u> Press keys VOLT\bar{M} and VOLT S4 on 100 kΩ, S5 unbal. 4 V_{rms}/1 kHz across 600 Ω to voltmeter input Bu21</p> <p>0.4 V 40 mV S4 on 600 Ω</p>	Mp3 Mp3 Mp3 Mp3	1 kHz 1 kHz 1 kHz 1 kHz	CM frequency CCW frequency	Freq. goes up Freq. goes down 1.33 V \pm 10 mV 1.33 V \pm 10 mV 1.33 V \pm 10 mV 0.66 V \pm 10 mV		Ref. No. 227 031 A Type STABILLOCK 4031	1/4	
							Issue Alteration No. 8088-64 Date 7.4.88	Name Alteration No. Issue Date	

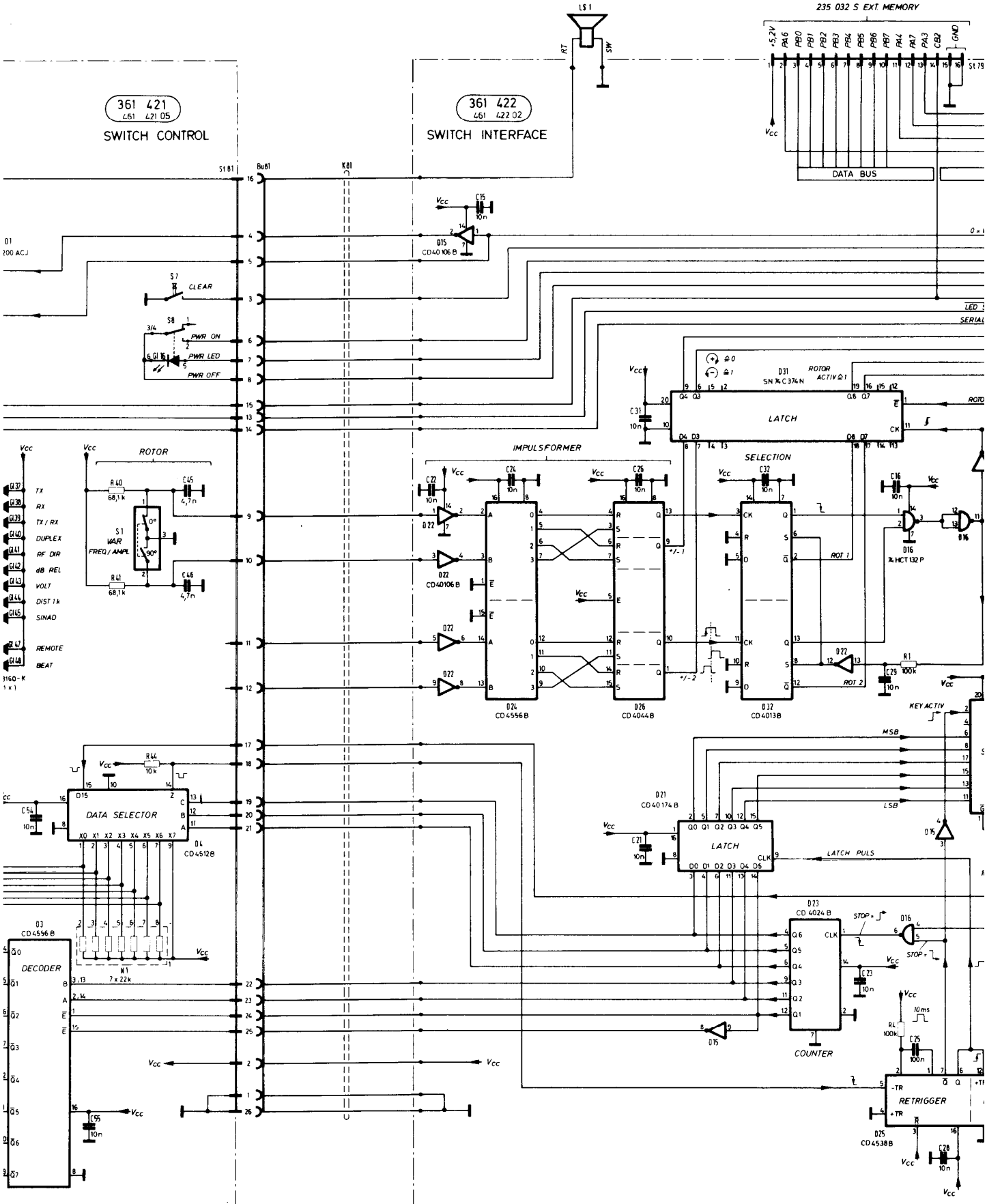
Necessary Equipment		Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value
AF gen., 4040	DVM						
<p>4. <u>Common-mode rejection</u> S4 on 100 kΩ, S5 unbal. 3 V_{rms}/1 kHz to GND (Mp4) to Bu21 Press dB REL key Join inner conductor to shield</p>		<p>1 kHz 1 kHz 1 kHz 30 Hz 30 kHz</p>	<p>Display Display Display</p>	<p>3 V 0-0.2 dB > -50 dB > -40 dB > -40 dB</p>			
<p>5. <u>DEMOD socket</u> 100 MHz, -20 dBm, 20 kHz deviation f_{mod} 1 kHz to RF socket 4031 setting: TX FREQUENCY 100 MHz, DEMOD</p>		<p>Bu31 DEMOD</p>	<p>1 kHz</p>		<p>2.82 V_{rms} \pm10 mV</p>		
<p>6. <u>Loudspeaker and phones socket</u> Setting as under 5. Volume control to right stop Phones socket</p>		<p>Bu24</p>	<p>1 kHz 1 kHz</p>		<p>Audible approx. 3.7 V_{rms}</p>		

Issue	Alteration No.	Date	Name	Issue	Alteration No.	Date	Name	Ref. No.	Sub Unit	Sheet
-	8088.64	74.88						227 031 A	Control Panel	2/4
								Type		
								STABILLOCK 4031		

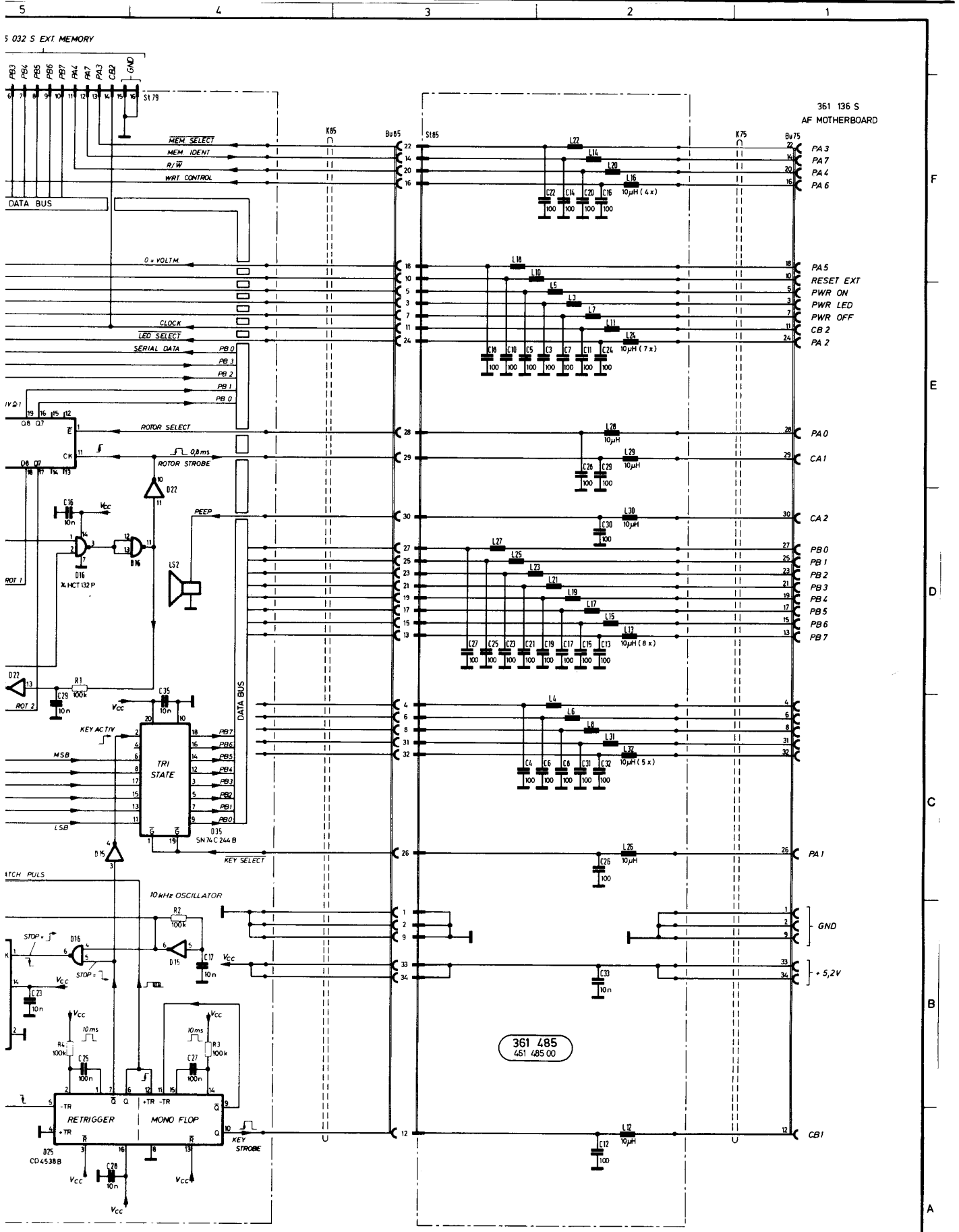
Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Sheet		
							Sub Unit	Control Panel	
DVM	<p>7. <u>MOD_GEN socket</u> S3 on 10 Ω TX, set gen. A to 1000 mV/1 kHz</p> <p>S3 on 600 Ω and measure across 600 Ω (4040 AC voltmeter)</p> <p>8. <u>Common-mode suppression MOD_GEN socket</u> S3 on 10 Ω, gen. A off 1 V_{rms}/30 kHz to GND (Mp4) to Bu23 Join inner conductor to shield</p> <p>9. <u>EXT MOD socket</u> Set RX and EXT MOD, S2 on 600 Ω 1 V_{rms}/1 kHz to Bu30 S2 on VAR and alter R12</p>	Bu23 Mp3 Bu23	1 kHz 1 kHz		1000 \pm 10 mV 1.33 V \pm 10 mV 500 \pm 10 mV				
Oscilloscope		Mp3	30 kHz	C32	Minimum < 50 mV pp				
AF gen. 4040		MOD display	1 kHz		\approx 28 kHz dev. 0-28 kHz dev.				
Issue	Alteration No.	Date	Name	Issue	Alteration No.	Date	Name	Ref. No.	227 031 A
-	8088.64	7.4.88						Type	STABILLOCK 4031
								Sub Unit	Control Panel
								Sheet	3/4

Schlumberger		Adjustment and Test Procedure										Sheet			
Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Ref. No. 227 031 A			Sub Unit Control Panel			Sheet		
							Alteration No.	Date	Name	Issue	Alteration No.	Date		Name	Type
Function generator PSU	<p>10. <u>Scope input</u> 2 V_{pp}/1 kHz squarewave to Bu28</p> <p>SCOPE key, softkey EXT Set 2 V/div, 2 ms/div Shift squarewave with R26 (POS) Apply approx. 5 Vdc Test switch S6 AC/DC</p>	Mp1	1 kHz 1 kHz DC	C4	2 V _{pp} squarewave w/o overshoot OK OK									4/4	
							8088.64	7.4.88							





sw BLACK	bl BLUE	
br BROWN	vi VIOLET	04 B
rd RED	gr GREY	03 B
ro ROSE	wh WHITE	Ausg
yl YELLOW	tr TRANSPARENT	ISS
gn GREEN		

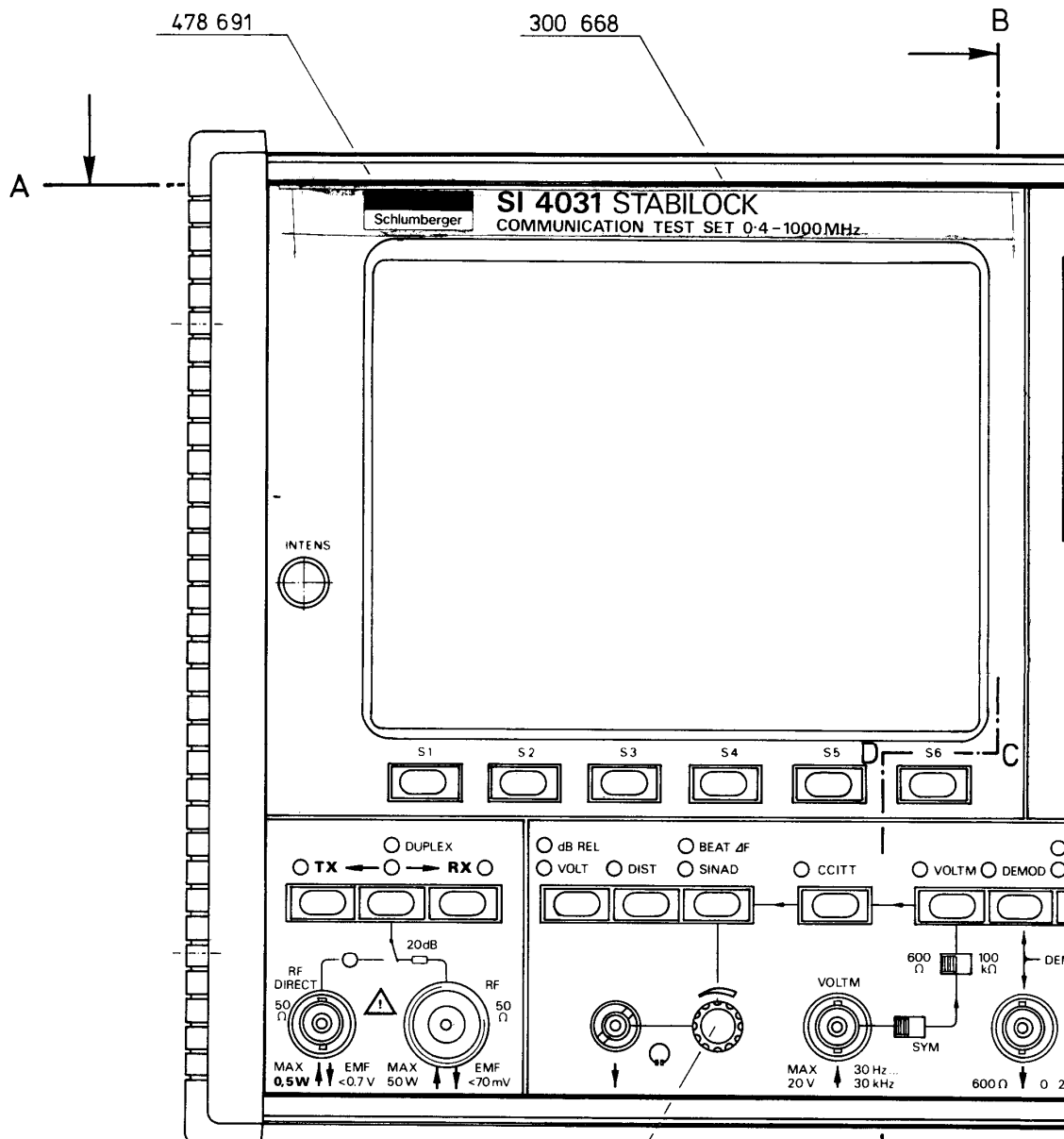


bl	BLUE			norm			
v	VIOLET	D4	8088_22	11.2.88	Kr	sepr	10.2.88
gr	GREY	D3	8088_19	10.2.88	Kr	beerb	10.2.88
wh	WHITE	Ausg	A Mttig	Datum	Name	Datum	Name
tr	TRANSPARENT	ISS	MODIF	DATE	NAME	DATE	NAME
				1988			

Schlumberger o/s
 Meßgeräteeu u. Vertrieb GmbH
 8 München 46

CONTROL PANEL

227 031 S
 Typ: 4031

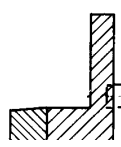


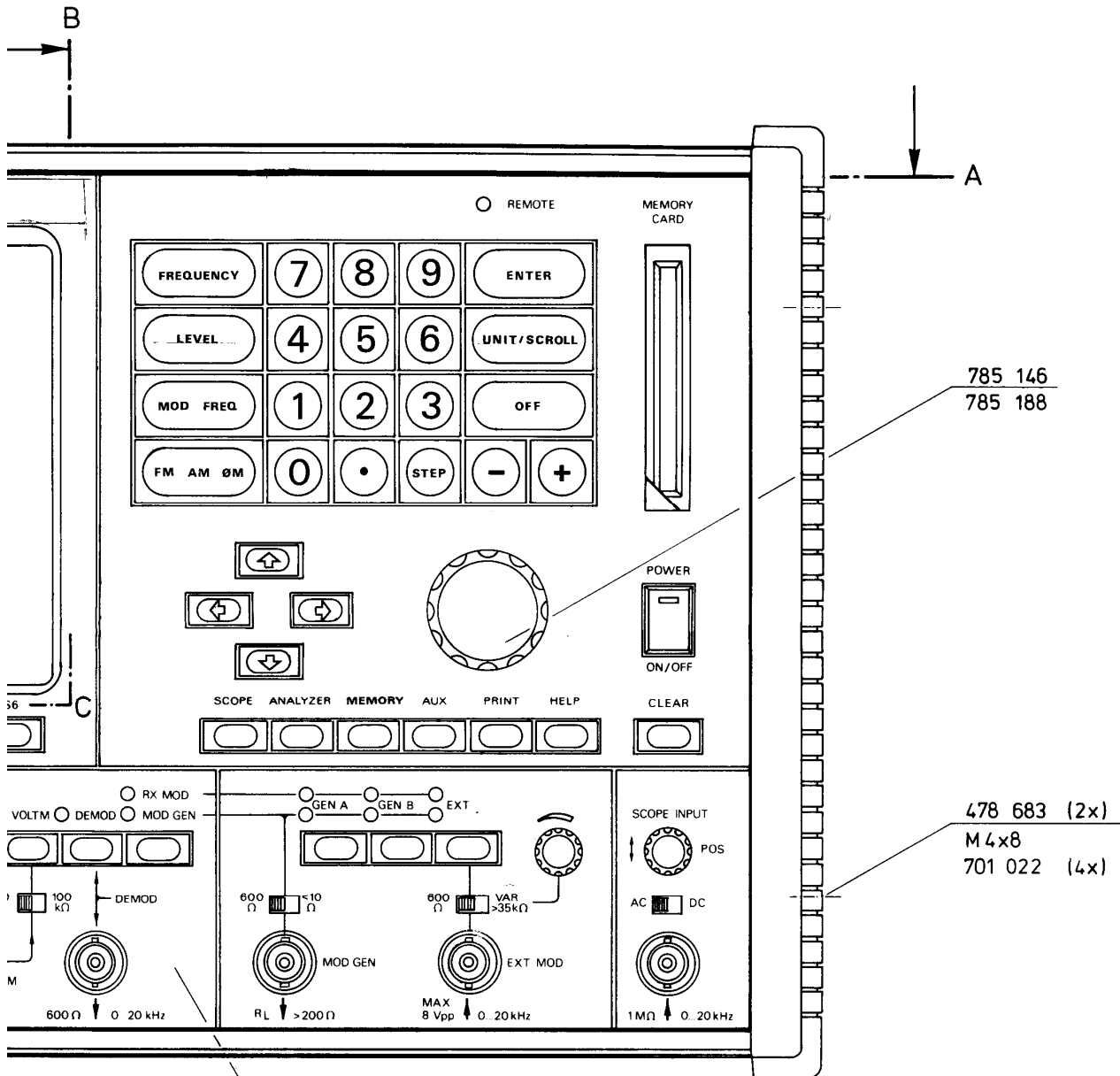
785 104 } 3x
785 185 }

Schnitt A-A

361 421

M:
7





785 146
785 188

478 683 (2x)
M 4x8
701 022 (4x)

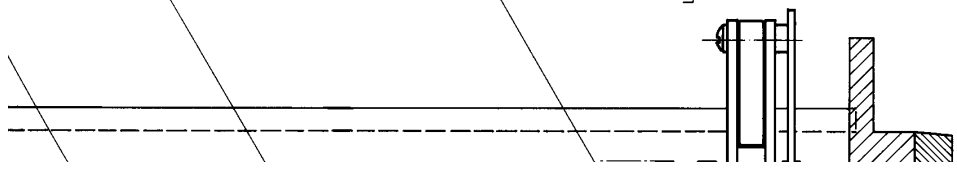
377 253

A

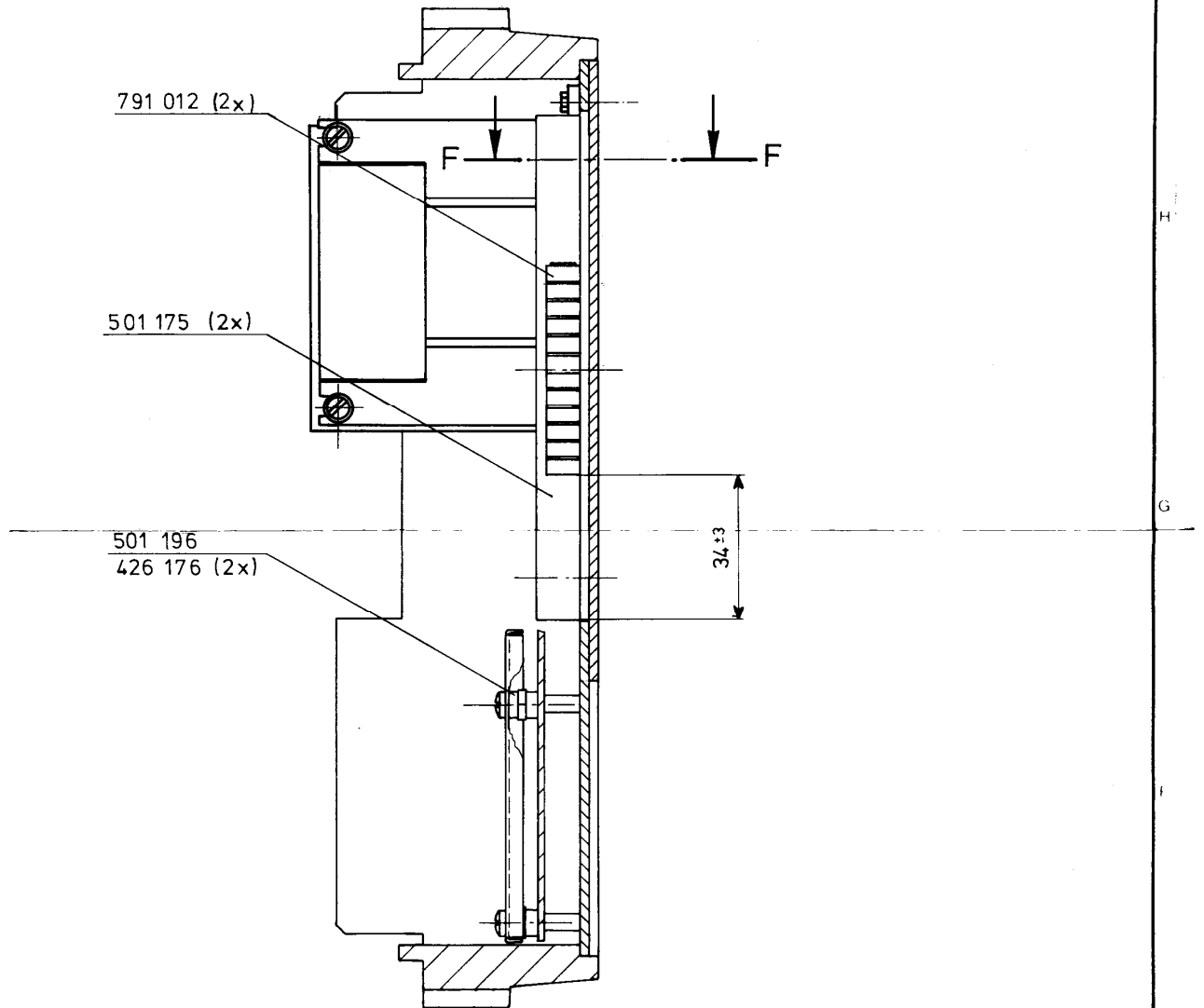
M3x6 DIN 7985
701 640 (10x)

M 3 DIN 934
704 110
J3,2 DIN 6797
706 105

8x

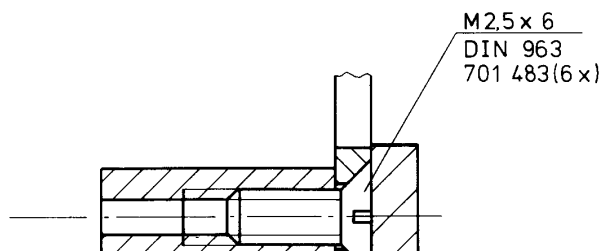


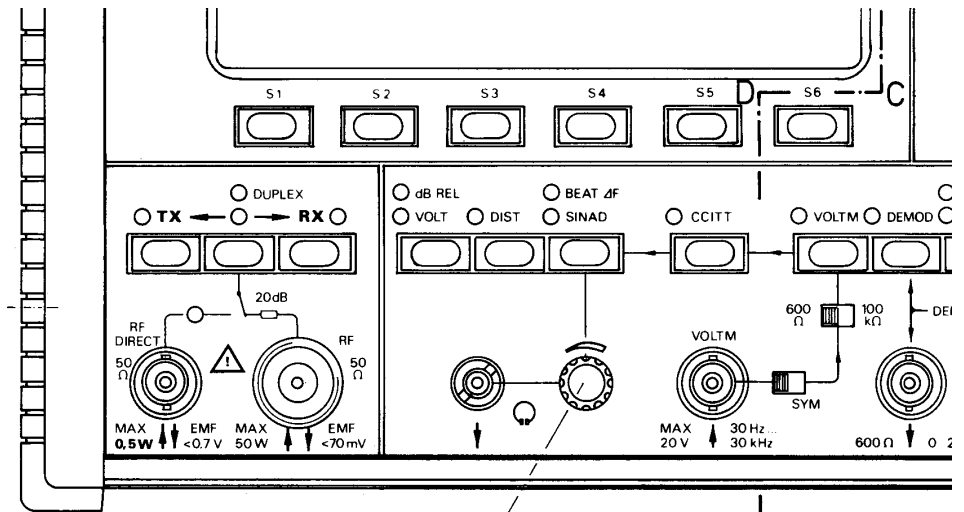
Schnitt B-E



Schnitt F-F

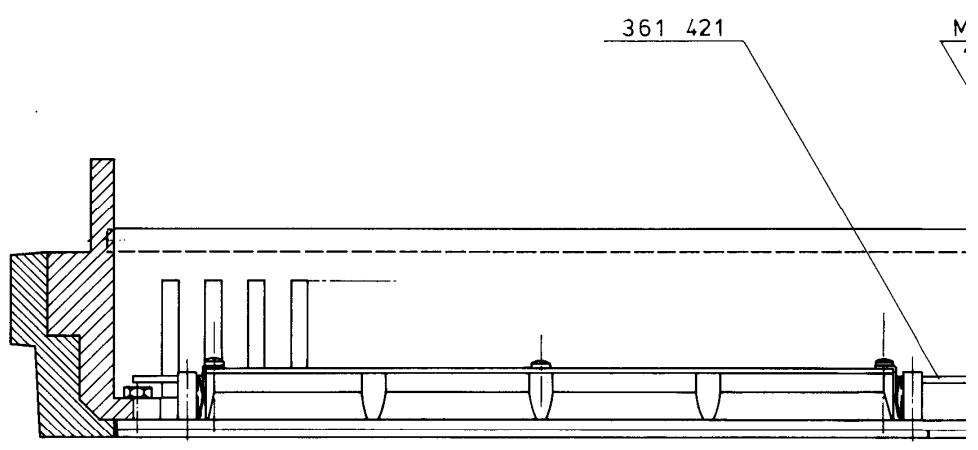
M 5:1

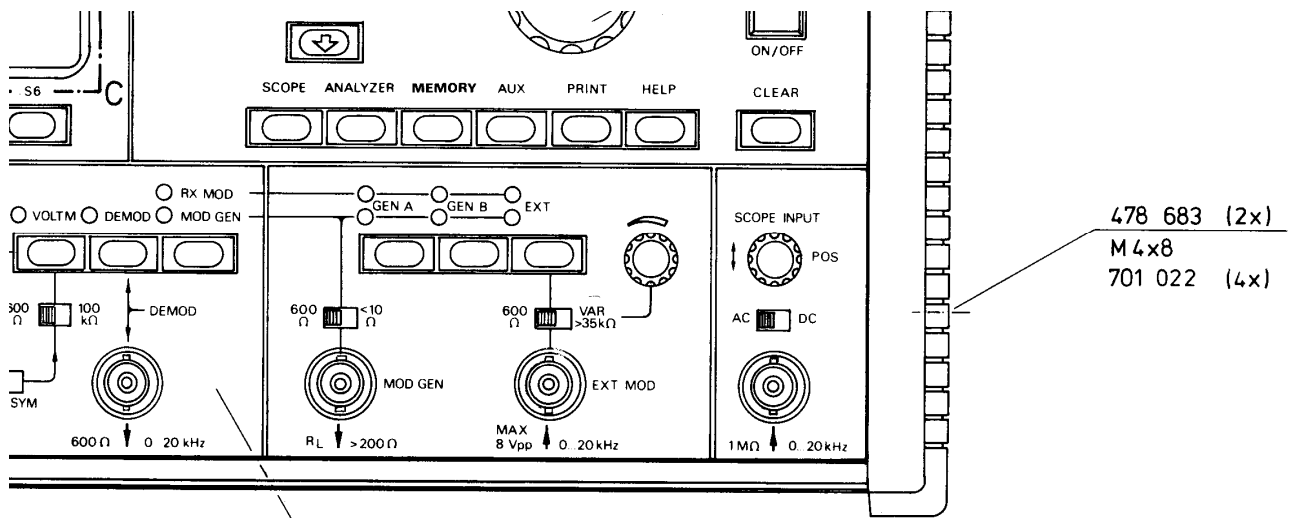




785 104 } 3x
785 185

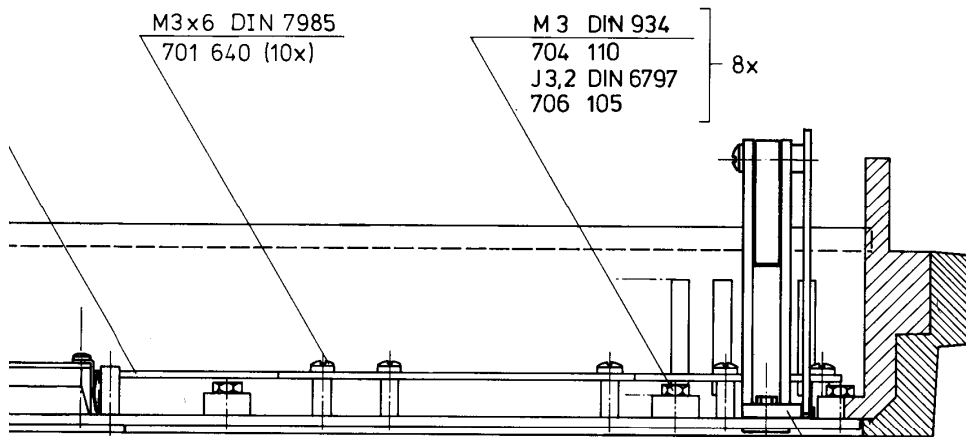
Schnitt A-A





377 253

A-A



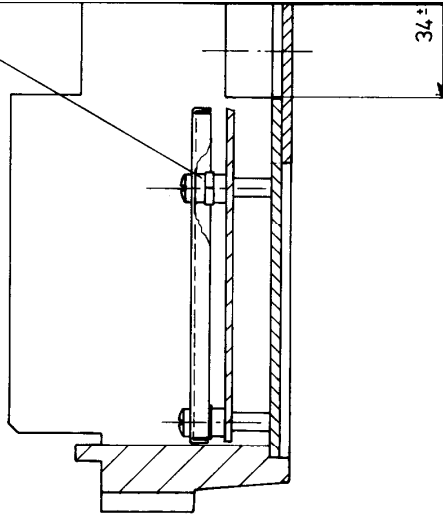
235 032
M3 DIN 934
704 110 (2x)

verwendet in:

Gerät:

501 196
426 176 (2x)

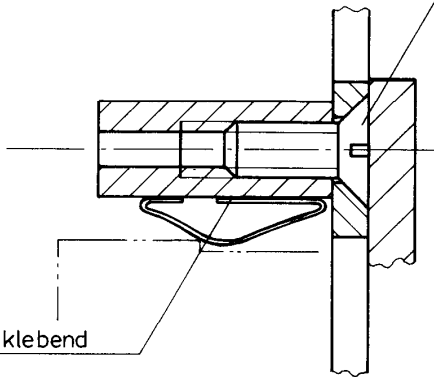
34±



:)
:)

Schnitt F-F
M 5:1

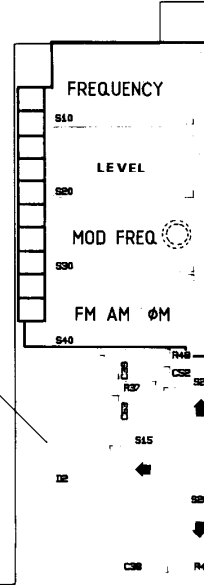
M2,5 x 6
DIN 963
701 483(6 x)



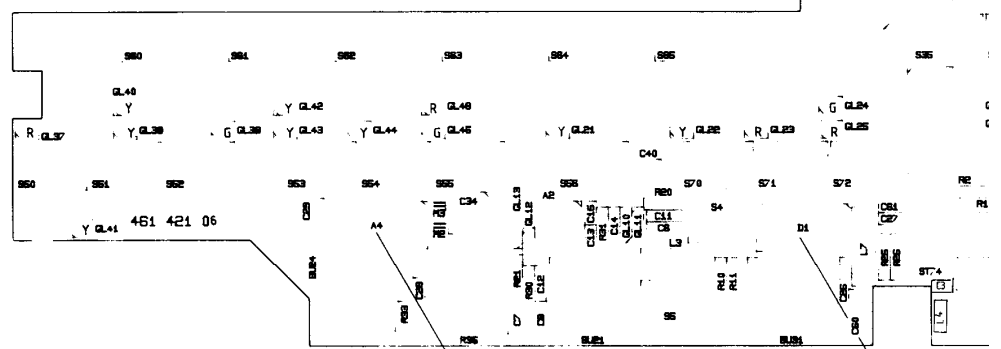
selbstklebend

80822 12.1.87 708216 9.11.85 70842 2.3.87 Adr1 7088119 19.8.87 Mo 708892 21.7.87 Mo 70849 9.4.87 Ko 7083718 3.8.87 RAM 708622 16.2.87 Kr		1987 21.7.87, Morasch 	Schlumberger Meßgeräte GmbH Inge-Städter-Str. 1 8000 München 40	
			1:1 (5:1)	CONTROL PANEL
			227 031	Gerät : 4031 / 201 231

I
H
G
F
E
D



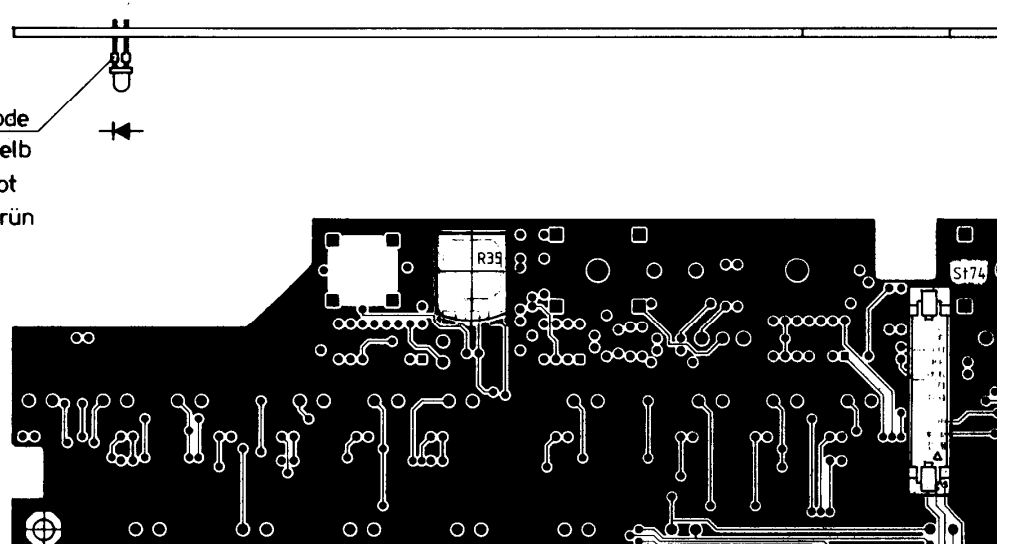
834 954

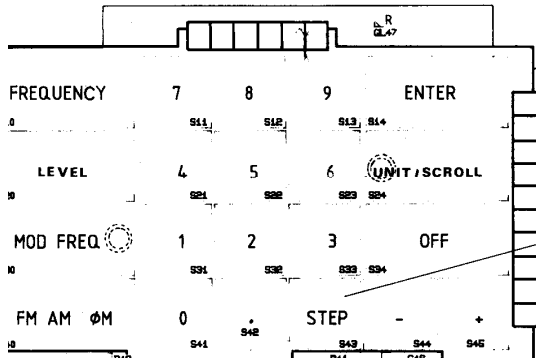


834 943 (3x)

834

Gl20... Gl53 / Kathode
 Diodenfarbe : Y = gelb
 R = rot
 G = grün

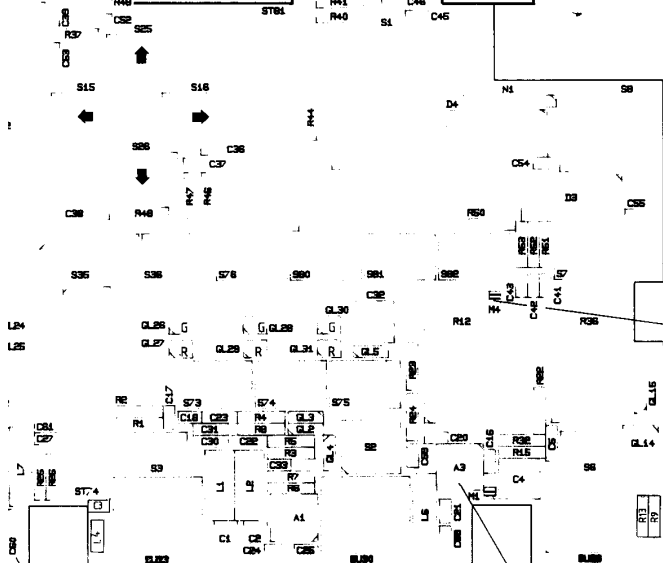




300 679
zusammen mit den
Schaltern eingebaut

mit Lehre
montiert

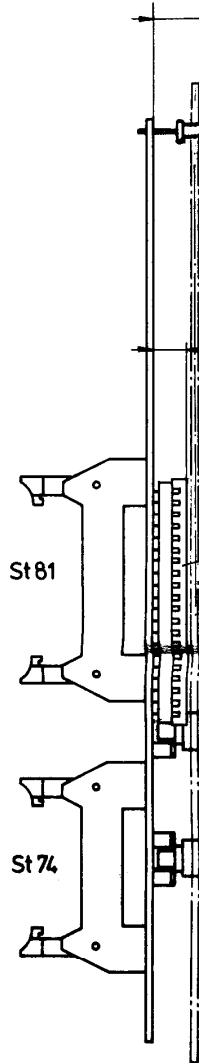
841 343
841 344



786 009 (4x)

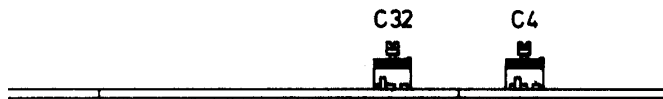
834 942

834 941 (3x)



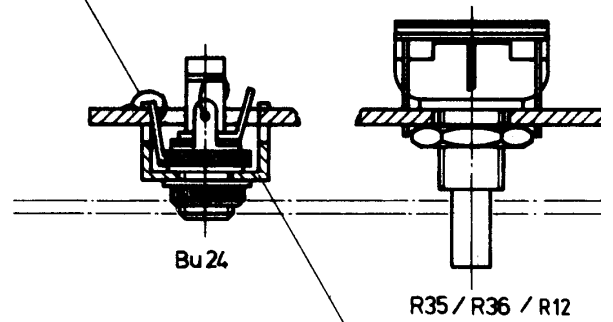
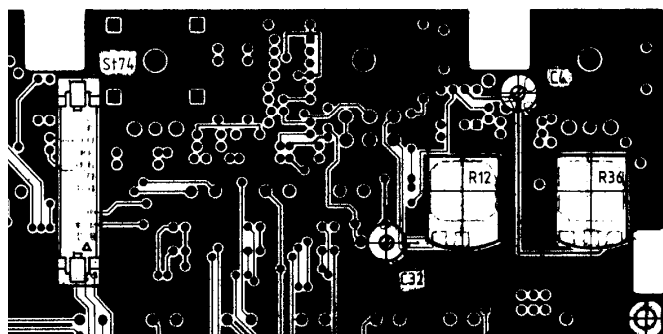
C32

C4

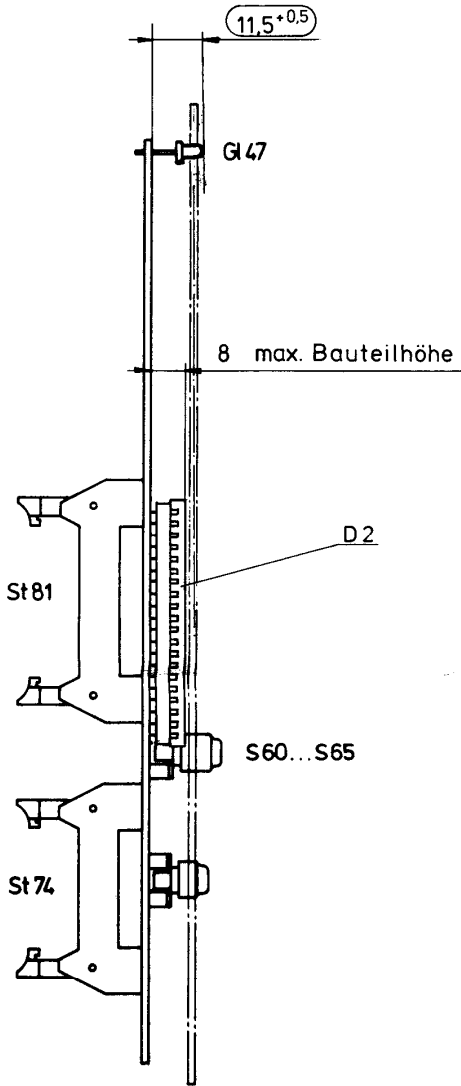


Einze

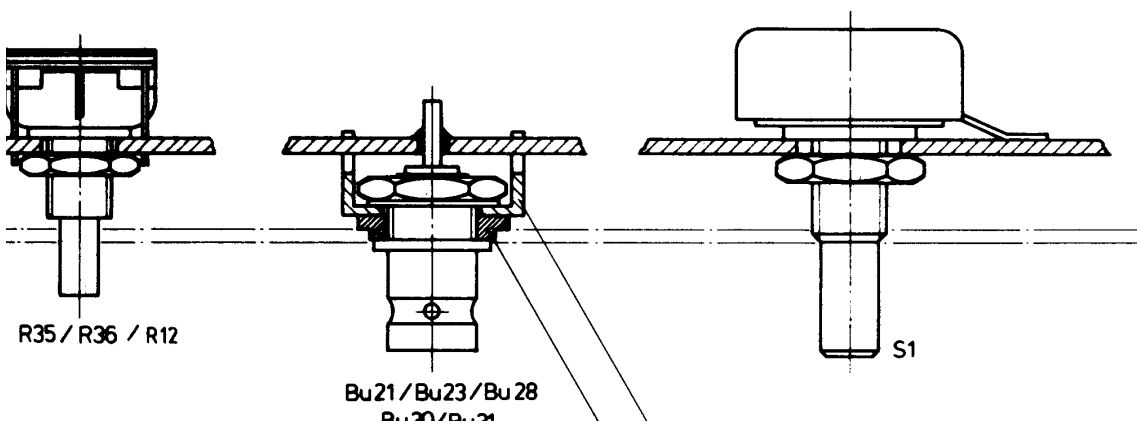
880 020
l=15mm (2x)

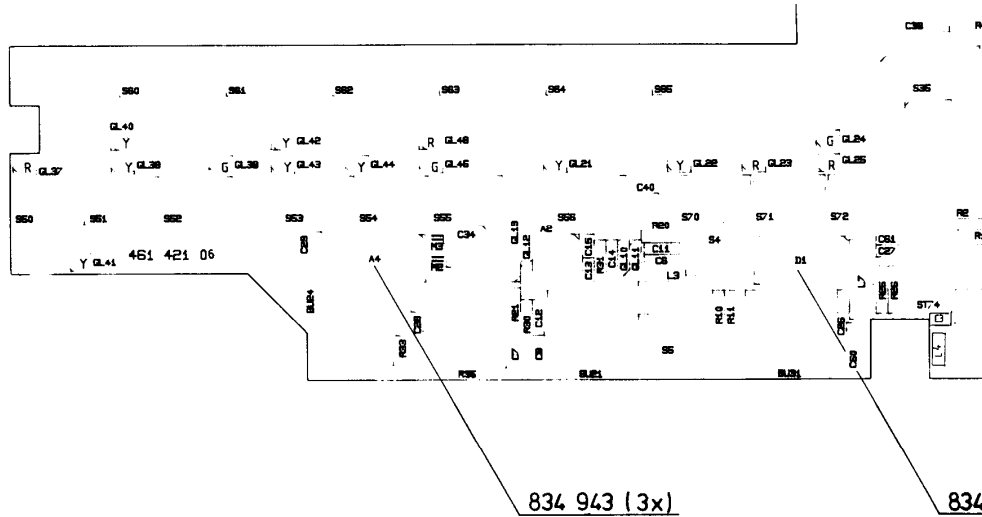


weich gelötet

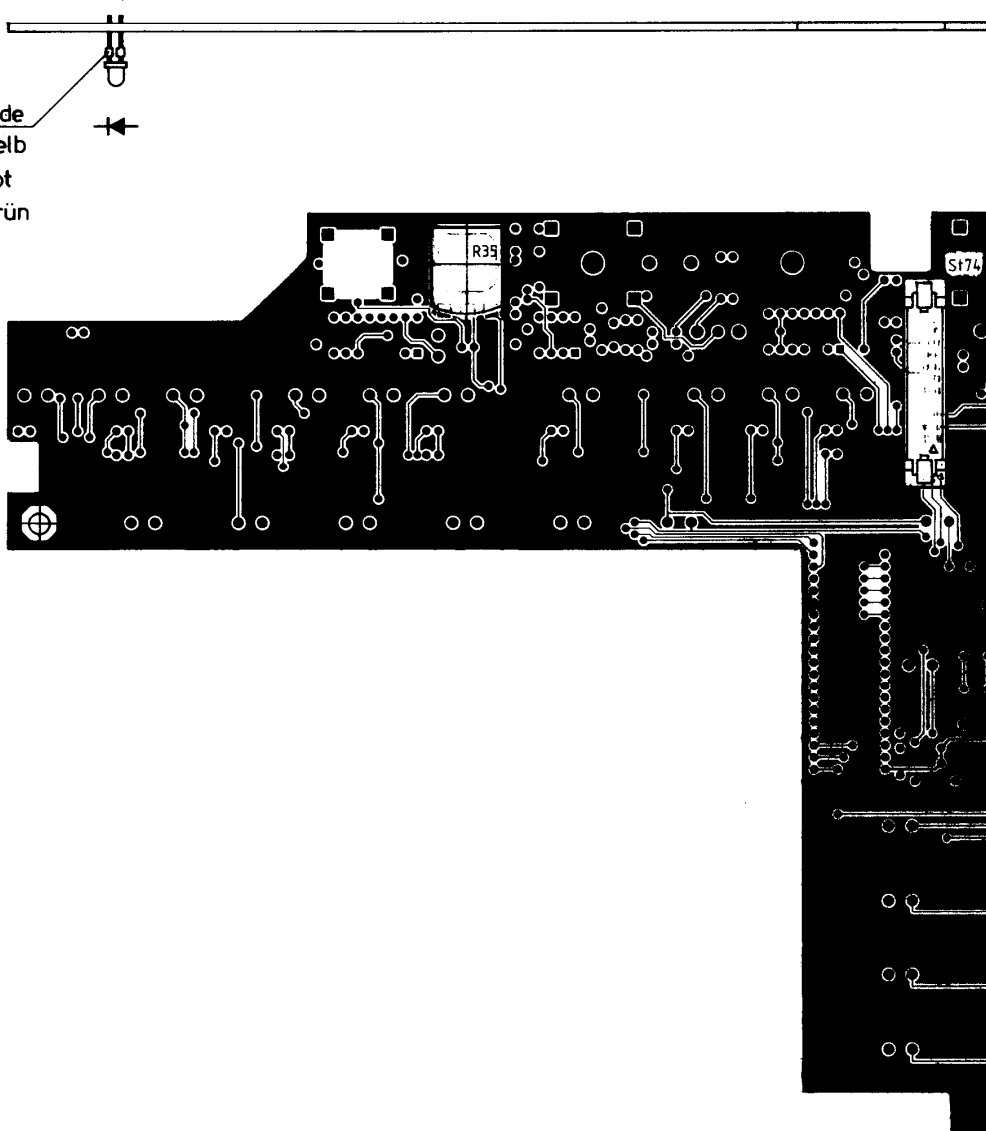


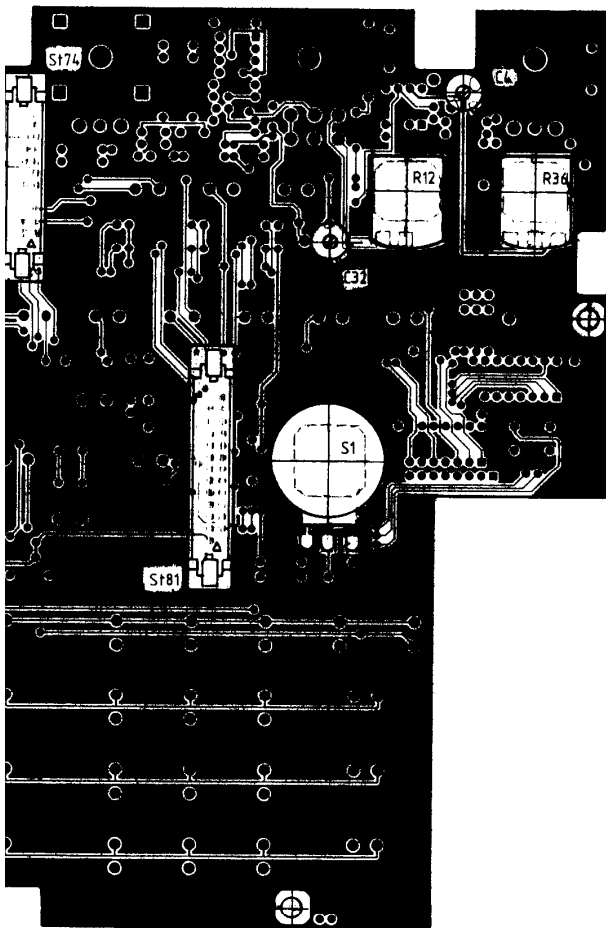
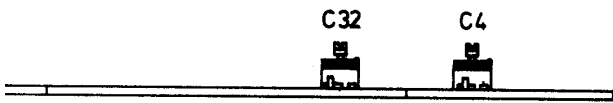
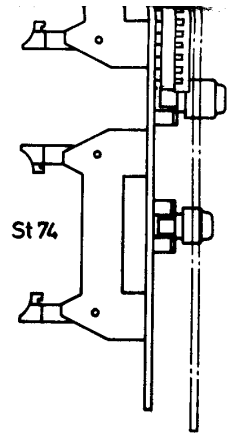
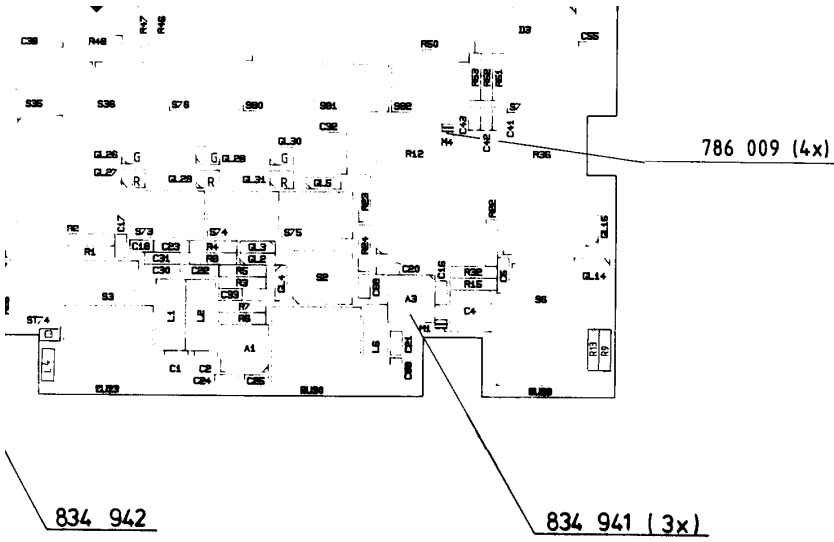
Einzelheiten M2:1





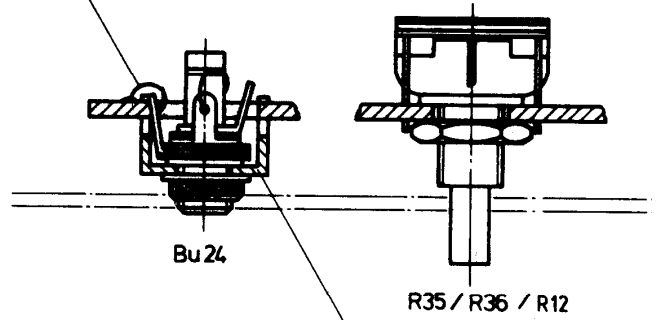
Gl 20... Gl 53 / Kathode
 Diodenfarbe : Y = gelb
 R = rot
 G = grün





880 020
l=15 mm (2x)

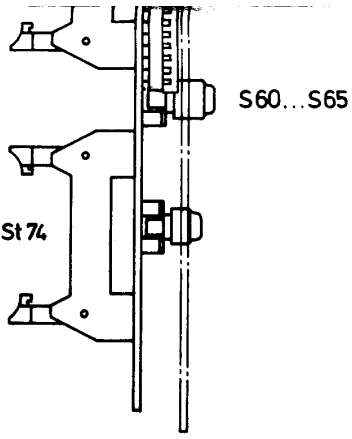
Einzelhei



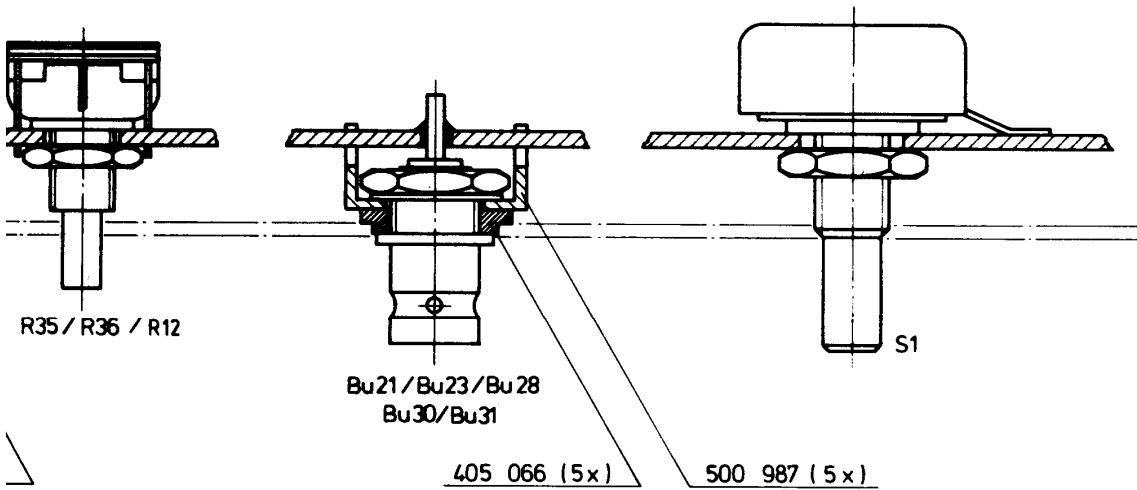
501 099
884 124

verwendet in:

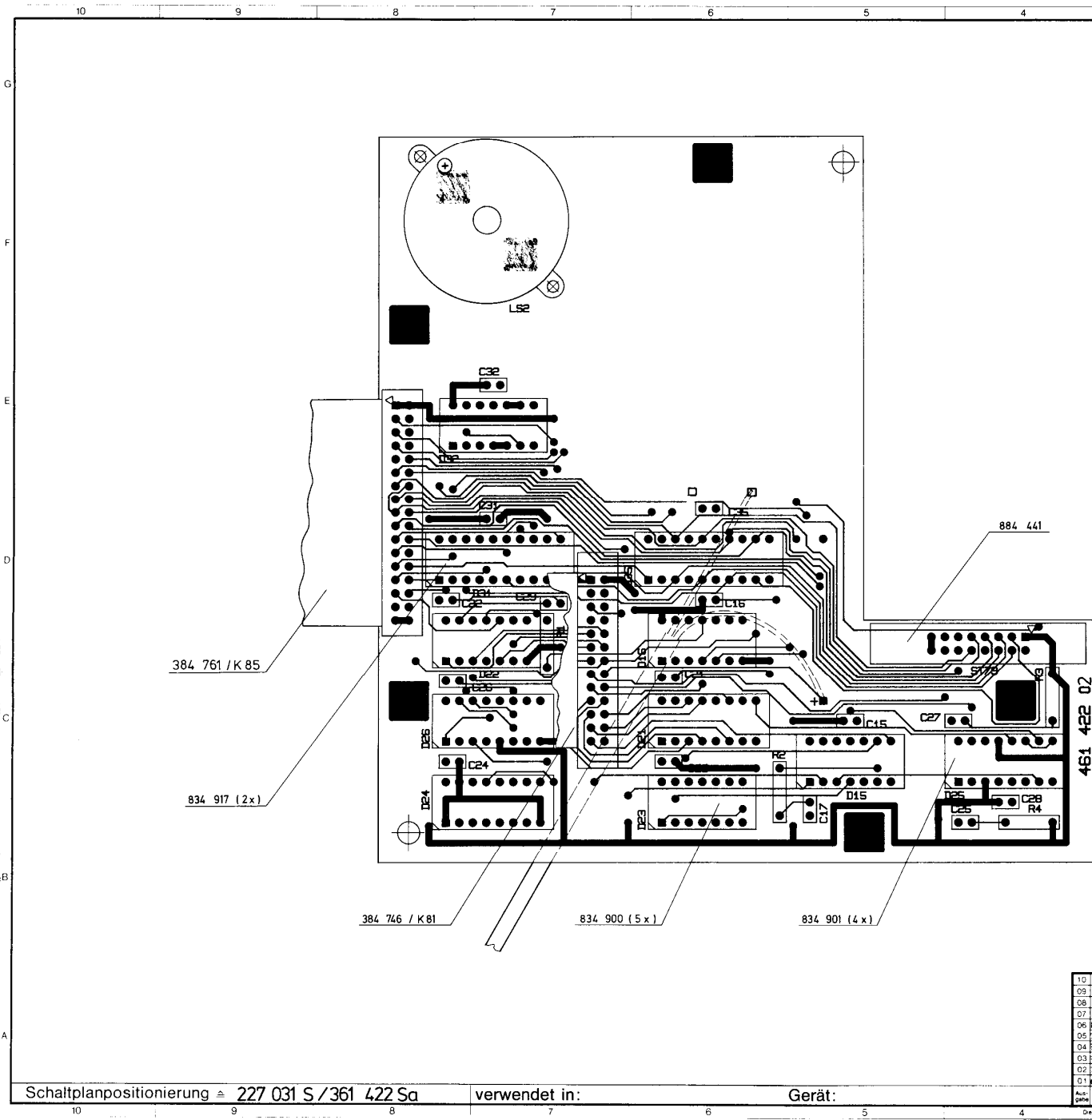
Gerät:



Einzelheiten M 2:1



01 02 3088.64 13.4.88 St 7 03 8088.42 15.3.88 Mo 04 8088.29 13.2.88 R12 05 8088.2 13.2.88 06 7088.164 9.11.88 07 7088.150 3.3.87 R12 08 7088.93 23.7.87 St 7 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100	Schlumberger Meßgeräte GmbH Inhaberstraße 61a 80331 München 48	
				0.2 1:1 (2:1)	Bestückte Leiterplatte Typ: SWITCH CONTROL
				1987 237 Name: Staffler Zeichner: Staffler Gepr.	361 421 Gerät: 4031/227 031



Schaltplanpositionierung ≙ 227 031 S / 361 422 Sa

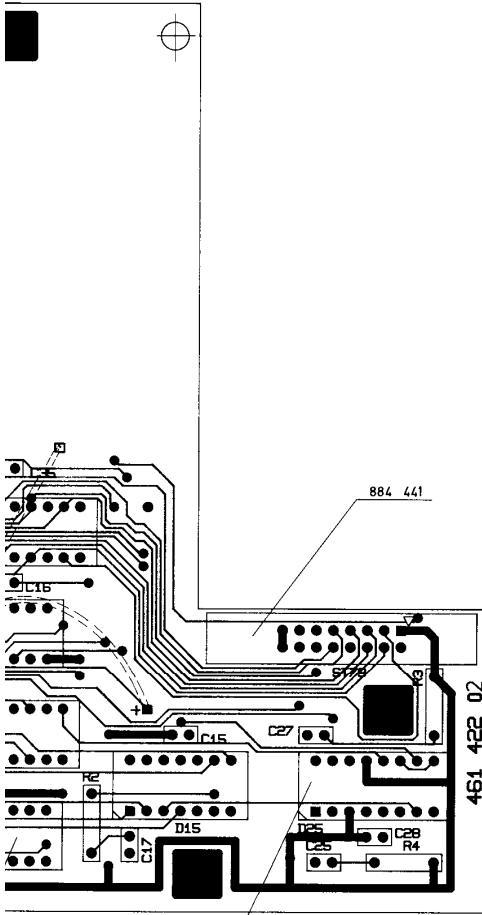
verwendet in:

Gerät:

10
09
08
07
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01
00

6 5 4 3 2 1

weich gelötet

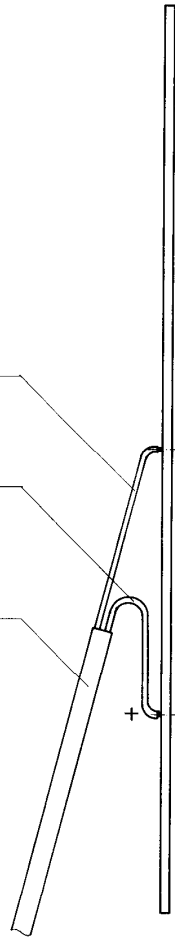


834 901 (4 x)

880 168_sw
L=260 mm

880 167_rt
L=260 mm

889 002
L=200 mm



⊖ = Kontrollmaß

10				Titel	Freimaßtoleranzen	Maßstab	Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46
09						2:1	
08							Bestückte Leiterplatte
07							Typ: SWITCH INTERFACE
06	2089 17	02.07.88	Z. S.	Werkstatt			361 422
05	1088 10	30.7.87	Mo.				Gerät: 4031 / 202 231
04	1088 10	30.7.87	Mo.				
03	1088 10	30.7.87	Mo.				
02	1088 10	30.7.87	Mo.				
01	1088 10	30.7.87	Mo.				
00	1088 10	30.7.87	Mo.				
Ans.gabe	Andg.	Metg.	Datum	Name	1986	Datum	Name
					ger.	4.2.86	KC
					bezt.	4.12.86	J. G.
					ger.		

Gerät:

5

4

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2	3	4	5	6	7	8
Pos REF NO	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos REF. NO	Wert VALUE	Bezeichnung Schlumberger PART NO	Hersteller MANUFACT
1	Bestückte Leiterplatte PRINTED CIRCUIT BOARD	361 421	SCHL				
	hierzu see	361 421 Sa	SCHL				
1	Bestückte Leiterplatte PRINTED CIRCUIT BOARD	361 422	SCHL				
	Hierzu see	361 422 Sa	SCHL				
Ls 1		855 007	ENDR				

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS aus OF 1 Blatt SHEETS
06									
05					Tag DATE	Name NAME	Bezeichnung Schlumberger PART NO		Blatt Nr. SHEET NO 1
04					4.8.87	Morasch	227 031 Sa		
03				geschr	4.8.87	Morasch	Hierzu Schaltplan SEE CIRCUIT DIAGRAM		
02				bearb			227 031 S		
01				gepr			Gerät: 4031		
-	7088.109	4.8.87	Mo.						
Ausgabe ISSUE	And-Mittig Nr MODIFIC NO	Tag DATE	Name NAME						

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schädlich.

1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT
A 1	OP 27 GP	834 224	PMI				
A 2	OP 27 GP	834 224	PMI				
A 3	LF 411 ACN	834 211	NSC	C 11	0,1 µF ± 5 % 63 V-	812 370	VAL
A 4	PGA 102 KP	834 225	BURR	C 12	68 pF ± 2 % 63 V-	810 514	RES
				C 13	100 nF ± 10 % 50 V-	813 121	STET
				C 14	68 pF ± 2 % 63 V-	810 514	RES
				C 15	100 nF ± 10 % 50 V-	813 121	STET
Bu 21	22 BNC - 50 - 0 - 5	886 280	SUHN	C 16	33 pF ± 2 % 63 V-	810 511	RES
				C 17	10 nF ± 10 % 50 V-	813 115	STET
Bu 23	22 BNC - 50 - 0 - 5	886 280	SUHN	C 18	2,2 nF ± 5 % 50 V-	813 070	VAL
Bu 24	39 F 111	884 124	BURR				
				C 20	100 nF ± 10 % 50 V-	813 121	STET
				C 21	100 nF ± 10 % 50 V-	813 121	STET
				C 22	0,1 µF ± 5 % 63 V-	812 370	VAL
Bu 28	22 BNC - 50 - 0 - 5	886 280	SUHN	C 23	0,1 µF ± 5 % 63 V-	812 370	VAL
				C 24			
Bu 30	22 BNC - 50 - 0 - 5	886 280	SUHN	C 25			
Bu 31	22 BNC - 50 - 0 - 5	886 280	SUHN	C 26	100 nF ± 10 % 50 V-	813 121	STET
				C 27			
C 1	1 nF ± 5 % 50 V-	813 066	SIE	C 28			
C 2	1 nF ± 5 % 50 V-	813 066	SIE	C 29			
C 3	1 nF ± 5 % 50 V-	813 066	SIE	C 30	0,1 µF ± 5 % 63V-	812 370	VAL
C 4	2...30 pF	817 062	VAL	C 31	0,1 µF ± 5 % 63 V-	812 370	VAL
C 5				C 32	2 ... 30 pF	817 062	VAL
C 6	0,1 µF ± 5 % 63 V-	812 370	VAL	C 33	15 pF ± 2 % 63 V-	810 507	RES
C 7				C 34	47 µF ± 20 % 10 V-	814 078	SEA
C 8	0,1 µF ± 5 % 63 V-	812 370	VAL				

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS	
06			Benennung DESCRIPTION							Bestückte Leiterplatte
05			Tag DATE				Typ: SWITCH CONTROL		Blatt SHEETS	
04			Name NAME				Bezeichnung Schlumberger PART NO		Blatt Nr SHEET NO	
03			geschr	8.7.86	Morasch	361 421 Sa		1		
02	8088.21	12.2.88	Di			Hierzu Schaltplan SEE CIRCUIT DIAGRAM				
01	7088.23	13.7.87	Staff			227 031 S				
-	7088.18	9.2.87	Kr.	bearb		Gerät: 4031				
Ausgabe ISSUE	Änd.-Mittig Nr. MODIFIC NO	Tag DATE	Name NAME	bearb						

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2	3	4	5	6	7	8
Pos REF. NO	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT
C 36				D 1	DG 200 ACJ	834 482	SIL
C 37				D 2	MM 5450 N	834 378	NS
C 38				D 3	CN 45 56 B	834 348	NS
C 39	47 nF \pm 10 % 50 V-	813 119	STET	D 4	CD 4512 B	834 397	RCA
C 40							
C 41							
C 42							
C 43							
				GI 2			
C 45	4,7 nF \pm 10 % 50 V-	813 074	STET	GI 3			
C 46	4,7 nF \pm 10 % 50 V-	813 074	STET	GI 4	1 N 4148	830 240	ITT
				GI 5			
C 52				GI 10			
C 53				GI 11			
C 54	10 nF \pm 10 % 50V-	813 115	STET	GI 12	1 N 4148	830 240	ITT
C 55				GI 13			
				GI 14	BAS 45	830 554	VAL
				GI 15	BAS 45	830 554	VAL
C 58				GI 16		in S 8	
C 59	470 pF \pm 5 % 50 V-	813 062	VAL				
C 60							
C 61							

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67a 8000 München 46			Schaltteilliste EL PARTS LIST		LIST SHEETS
06			Benennung DESCRIPTION						Bestückte Leiterplatte
05			Tag DATE				Typ: SWITCH CONTROL	OF	
04			Name NAME					SHEETS	
03									
02	8088.21	12.2.88	Di					Blatt Nr. SHEET NO.	
01	7088.93	13.7.87	Staff			361 421 Sa		2	
-	7088.18	9.2.87	Kr.	geschr	3.7.86	Morasch	Bezeichnung Schlumberger PART NO		
Aus- gabe ISSUE	And-Mittig Nr MODIFIC. NO	Tag DATE	Name NAME	hearb			Hierzu: Schaltplan SEE CIRCUIT DIAGRAM		
				gepr			227 031 S		
							Gerät:	4031	

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2		3	4	5	6		7	8
Pos. REF. NO.	Wert VALUE		Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE		Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
					G1 47	LR 3160 - G rot		856 041	SIE
G1 21	LY 3160 - K	gelb	856 042	SIE	G1 48	LR 3160 - G rot		856 041	SIE
GL 22	LY 3160 - K	gelb	856 042	SIE					
G1 23	LR 3160 - G	rot	856 041	SIE					
G1 24	TLHG 4403	grün	856 044	TELE					
G1 25	LR 3160 - G	rot	856 041	SIE					
G1 26	TLHG 4403	grün	856 044	TELE					
G1 27	LR 3160 - G	rot	856 041	SIE					
G1 28	TLHG 4403	grün	856 044	TELE					
G1 29	LR 3160 - G	rot	856 041	SIE					
G1 30	TLHG 4403	grün	856 044	TELE					
G1 31	LR 3160 - G	rot	856 041	SIE					
					L 1				
					L 2	4312 020 36640		821 040	VAL
					L 3				
					L 4	1 $\mu\text{H} \pm 10\%$		821 122	GOW
G1 37	LR 3160 - G	rot	856 041	SIE	L 6	330 $\mu\text{H} \pm 5\%$		821 051	DELE
G1 38	TLHG 4403	grün	856 044	TELE	L 7	330 $\mu\text{H} \pm 5\%$		821 051	DELE
G1 39	LY 3160 - K	gelb	856 042	SIE					
G1 40	LY 3160 - K	gelb	856 042	SIE					
G1 41	LY 3160 - K	gelb	856 042	SIE					
G1 42	LY 3160 - K	gelb	856 042	SIE	N 1	7 x 22 k Ω		804 510	DALE
G1 43	LY 3160 - K	gelb	856 042	SIE					
G1 44	LY 3160 - K	gelb	856 042	SIE					
G1 45	TLHG 4403	grün	856 044	TELE					

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS	
06			Benennung DESCRIPTION							Bestückte Leiterplatte
05			Typ: SWITCH CONTROL						Blatt SHEETS	
04										Blatt Nr. SHEET NO
03							3			
02	8088.21	12.2.88	Di	Tag DATE	Name NAME	Bezeichnung Schlumberger PART NO		361 421 Sa		
01	7088.93	13.7.87	Staff			Hierzu Schaltplan SEE CIRCUIT DIAGRAM				
-	7088.18	9.2.87	Kr.	geschr. 03.09.86	Münch	227 031 S				
Aus- gabe ISSUE	Änd- Nr MODIFIC. NO	Tag DATE	Name NAME	bearb. gepr.		Gerät:				

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1	2	3	4	5	6	7	8
Pos REF NO	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos REF NO	Wert VALUE	Bezeichnung Schlumberger PART NO	Hersteller MANUFACT
R 1	1 kΩ ± 1 %	802 037	VAL				
R 2	1,5 kΩ ± 1 %	802 039	VAL				
R 3	100 kΩ ± 0,25 %	802 661	VAL	R 30	33,2 kΩ ± 0,25 %	802 655	VAL
R 4	100 kΩ ± 0,25 %	802 661	VAL	R 31	33,2 kΩ ± 0,25 %	802 655	VAL
R 5	332 kΩ ± 0,25 %	802 667	VAL	R 32	1 MΩ ± 1 %	802 073	VAL
R 6	332 kΩ ± 0,25 %	802 667	VAL	R 33	27,4 Ω ± 1 %	802 018	VAL
R 7	221 kΩ ± 0,25 %	802 665	VAL				
R 8	221 kΩ ± 0,25 %	802 665	VAL	R 35	47 kΩ ± 20 %	807 051	RUF
R 9	1 kΩ ± 1 %	802 037	VAL	R 36	10 kΩ ± 20 %	807 050	RUF
R 10	1,5 kΩ ± 1 %	802 039	VAL	R 37	12,1 kΩ ± 1 %	802 050	VAL
R 11	1 kΩ ± 1 %	802 037	VAL				
R 12	47 kΩ ± 20 %	807 051	RUF				
R 13	1 MΩ ± 1 %	802 073	VAL	R 40	68,1 kΩ ± 1 %	802 059	VAL
				R 41	68,1 kΩ ± 1 %	802 059	VAL
R 15	1 MΩ ± 1 %	802 073	VAL				
				R 44	10 kΩ ± 1 %	802 049	VAL
				R 46			
R 20	100 kΩ ± 0,25 %	802 661	VAL	R 47			
R 21	100 kΩ ± 0,25 %	802 661	VAL	R 48			
R 22	1 kΩ ± 1 %	802 037	VAL	R 49	3,32 kΩ ± 1 %	802 043	VAL
R 23	1 kΩ ± 1 %	802 037	VAL	R 50			
R 24	1,5 kΩ ± 1 %	802 039	VAL	R 51			
R 25	1 kΩ ± 1 %	802 037	VAL	R 52			
R 26	1,5 kΩ ± 1 %	802 039	VAL	R 53			

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS aus OF 6 Blatt SHEETS	
06										Benennung DESCRIPTION Bestückte Leiterplatte Typ: SWITCH CONTROL
05							Bezeichnung Schlumberger PART NO 361 421 Sa		Blatt Nr SHEET NO 4	
04							Hierzu Schaltplan SEE CIRCUIT DIAGRAM 227 031 S			
03							Gerät: 4031			
02	8088.2	12.2.88	Di	Tag DATE	Name NAME					
01	7088.93	13.7.87	Staff	geschr.	8.7.86	Morasch				
-	7088.18	9.2.87	Kr.	bearb.		<i>[Signature]</i>				
Aus- gabe ISSUE	Änd- Mittig Nr MODIFIC. NO.	Tag DATE	Name NAME	geschr.						

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1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT
S 1	RPC 25	847 002	MEGA				
S 2	MFP 220	841 065	KNITT				
S 3	1101 M 2 CQ	841 063	C u.K	S 30	„MOD. FREQU.“	841 348	MARQ
S 4	1101 M 2 CQ	841 063	C u.K	S 31	6401.0013 „1“	841 351	MARQ
S 5	1101 M 2 CQ	841 063	C u.K	S 32	6401.0023 „2“	841 352	MARQ
S 6	1101 M 2 CQ	841 063	C u.K	S 33	6401.0033 „3“	841 353	MARQ
S 7	6450.0003	841 376	MARQ	S 34	„OFF“	841 399	MARQ
S 8	SEF-rot-1L-gn-Au-EE	841 166	ITT	S 35	6450.0003	841 376	MARQ
				S 36	6450.0003	841 376	MARQ
S 10	„FREQUENCY“	841 345	MARQ				
S 11	6401.0073 „7“	841 357	MARQ				
S 12	6401.0083 „8“	841 358	MARQ				
S 13	6401.0093 „9“	841 359	MARQ	S 40	„FM AM PH“	841 347	SCHL
S 14	„ENTER“	841 349	MARQ	S 41	6401.0103 „0“	841 350	MARQ
S 15	6450.481 „←“	841 397	MARQ	S 42	6401.0313 „•“	841 368	MARQ
S 16	6450.481 „→“	841 397	MARQ	S 43	„STEP“	841 343 841 344	MARQ
				S 44	6401.0333 „-“	841 367	MARQ
				S 45	6401.0323 „+“	841 366	MARQ
S 20	„LEVEL“	841 338	MARQ				
S 21	6401.0043 „4“	841 354	MARQ				
S 22	6401.0053 „5“	841 355	MARQ				
S 23	6401.0063 „6“	841 356	MARQ	S 50	6450.0003	841 376	MARQ
S 24	„UNIT/SCROLL	841 339	MARQ	S 51	6450.0003	841 376	MARQ
S 25	6450.441 „↑“	841 396	MARQ	S 52	6450.0003	841 376	MARQ
S 26	6450.441 „↓“	841 396	MARQ	S 53	6450.0003	841 376	MARQ
				S 54	6450.0003	841 376	MARQ

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS	
06			Benennung DESCRIPTION							Bestückte Leiterplatte
05			Typ: SWITCH CONTROL						Blatt SHEETS	
04										Blatt Nr SHEET NO
03	7088.164	9.11.87	Mo.	Tag DATE	Name NAME	Bezeichnung Schlumberger PART NO	361 421 Sa	5		
02	7088.130	3.9.87	ADY	geschr	7.7.86	Morasch	Hierzu Schaltplan SEE CIRCUIT DIAGRAM			
01	7088.93	13.7.87	Staff	bearb			227 031 S			
-	7088.18	9.2.87	Kr.	gepr			Gerät: 4031			
Ausgabe ISSUE	And-Mittig Nr MODIFIC. NO.	Tag DATE	Name NAME							

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1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO	Hersteller MANUFACT
S 55	6450.0003	841 376	MARQ	S 82	6450.0003	841 376	MARQ
S 56	6450.0003	841 376	MARQ				
S 60							
S 61							
S 62	Sonderhöhe	894 143	SCHL				
S 63							
S 64							
S 65				St 74	3428 - 3202	884 445	3 M
S 70	6450.0003	841 376	MARQ				
S 71	6450.0003	841 376	MARQ				
S 72	6450.0003	841 376	MARQ	St 81	3429 - 2302	884 447	3 M
S 73	6450.0003	841 376	MARQ				
S 74	6450.0003	841 376	MARQ				
S 75	6450.0003	841 376	MARQ				
S 76	6450.0003	841 376	MARQ				
S 80	6450.0003	841 376	MARQ				
S 81	6450.0003	841 376	MARQ				

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST Benennung DESCRIPTION Bestückte Leiterplatte Typ: SWITCH CONTROL		Liste besteht LIST CONSISTS aus OF 6 Blatt SHEETS
06									
05									
04									
03									
02									
01									
-	7088.18	9.2.87	Kr.	geschr	8.7.86	Morasch	Bezeichnung Schlumberger PART NO	361 421 Sa	Blatt Nr SHEET NO 6
Aus- gabe ISSUE	And-Mittig Nr MODIFIC. NO	Tag DATE	Name NAME	bearb			Hierzu Schaltplan SEE CIRCUIT DIAGRAM	227 031 S	
				gepr			Gerät: 4031		

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1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT
				C 22	10 nF $\pm 10\%$ 50V-	813 115	STET
Bu 75	in K 75			C 23	10 nF $\pm 10\%$ 50V-	813 115	STET
Bu 81	in K 81			C 24	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 25	100 nF $\pm 10\%$ 50 V-	813 121	RÖD
				C 26	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 27	100 nF $\pm 10\%$ 50 V-	813 121	RÖD
				C 28	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 29	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 30	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 31	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 32	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 33	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 34	10 nF $\pm 10\%$ 50V-	813 115	STET
				C 35	10 nF $\pm 10\%$ 50V-	813 115	STET
C 15	10 nF 10% 50V-	813 115	STET				
C 16	10 nF 10% 50V-	813 115	STET				
C 17	2,2 nF $\pm 5\%$ 50 V-	813 070	SIE				
C 21	10nF 10% 50V-	813 115	STET				

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS aus 2 OF Blatt SHEETS		
06			Benennung DESCRIPTION							Bestückte Leiterplatte Typ: Switch Interface	
05							Bezeichnung Schlumberger PART NO.		361 422 Sa		Blatt Nr SHEET NO 1
04							Hierzu Schaltplan SEE CIRCUIT DIAGRAM		227 031 S		
03				Gerät: 4031							
02											
01	7088.55	11.5.87	Stapf	36	Tag DATE	Name NAME					
	6088.65	3.12.86	Stapf	geschr.	4.7.86	Dietrich					
Ausgabe ISSUE	Änd.-Mittlg. Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb.							

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1	2	3	4	5	6	7	8	
Pos REF NO	Wert VALUE	Bezeichnung Schlumberger PART NO.	Hersteller MANUFACT	Pos REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART NO	Hersteller MANUFACT	
D 15	CD 40 106 B	834 374	NAT					
D 16	74 HCT 132 P	834 459	VAL	Ls 2	SM 2	855 005	SONIT	
				R 1	100 kΩ ± 1 %	802 061	RÖD	
D 21	CD 40 174 B	834 392	RCA	R 2	100 kΩ ± 1 %	802 061	RÖD	
D 22	CD 40 106 B	834 374	NAT	R 3	100 kΩ ± 1 %	802 061	RÖD	
D 23	CD 4024 B	834 395	RCA	R 4	100 kΩ ± 1 %	802 061	RÖD	
D 24	CD 4556 B	834 348	RCA					
D 25	CD 4538 BE	834 322	RCA					
D 26	CD 4044 B	834 386	RCA					
				St 79	3408-2302	884 441	3 M	
D 31	SN 74 C 374 N	834 330	TEX					
D 32	CD 4013 B	834 685	RCA					
D 35	SN 74 C 244 B	834 373	TEX					
K 75	Kabelbaum	384 744	SCHL					
K 81	Kabelbaum	384 746	SCHL					
07								
06								
05								
04								
03								
02								
01	7088.55	11.5.87	Stg	1986	Tag DATE	Name NAME		
—	6088.65	3.12.86	Stg	geschr	4.7.86	Dietrich		
Ausgabe ISSUE	Änd.-Mittig. Nr. MODIFIC. NO	Tag DATE	Name NAME	bearb. gopr.				
Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46				Schaltteilliste EL. PARTS LIST Benennung DESCRIPTION Bestückte Leiterplatte Typ: Switch Interface			Liste besteht LIST CONSISTS aus OF 2 Blatt SHEET NO	
				Hierzu Schaltplan SEE CIRCUIT DIAGRAM 227 031 S		2		
				Gerät: 4031				

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig

The duplex FM demodulator is a broadband receiver in the frequency range 27 through 1000 MHz, containing synthesizer, mixer and IF conditioning.

The LO signal is generated by a synthesizer. Its reference frequency is produced by the 10-MHz crystal of the 4031 and divided by two (D1/361 440). The dividers of the PLL circuit (D1/361 383) are set by the slave computer. The processor also selects one of the two oscillators, which together cover a frequency range of 72 to 96 MHz. The VCO signal is fed via a buffer amplifier (T2) and the divider D2 to the PLL integrated circuit D1.

The VCO signal goes by way of the motherboard (361 440) to the multiplier (361 464). First it is divided by eight (D1, D2) and the resulting 9-12 MHz is fed to the step-recovery diode G11 via the low-impedance emitter follower T1. Here a frequency spectrum is produced that covers the entire frequency range and serves the mixer as an LO signal.

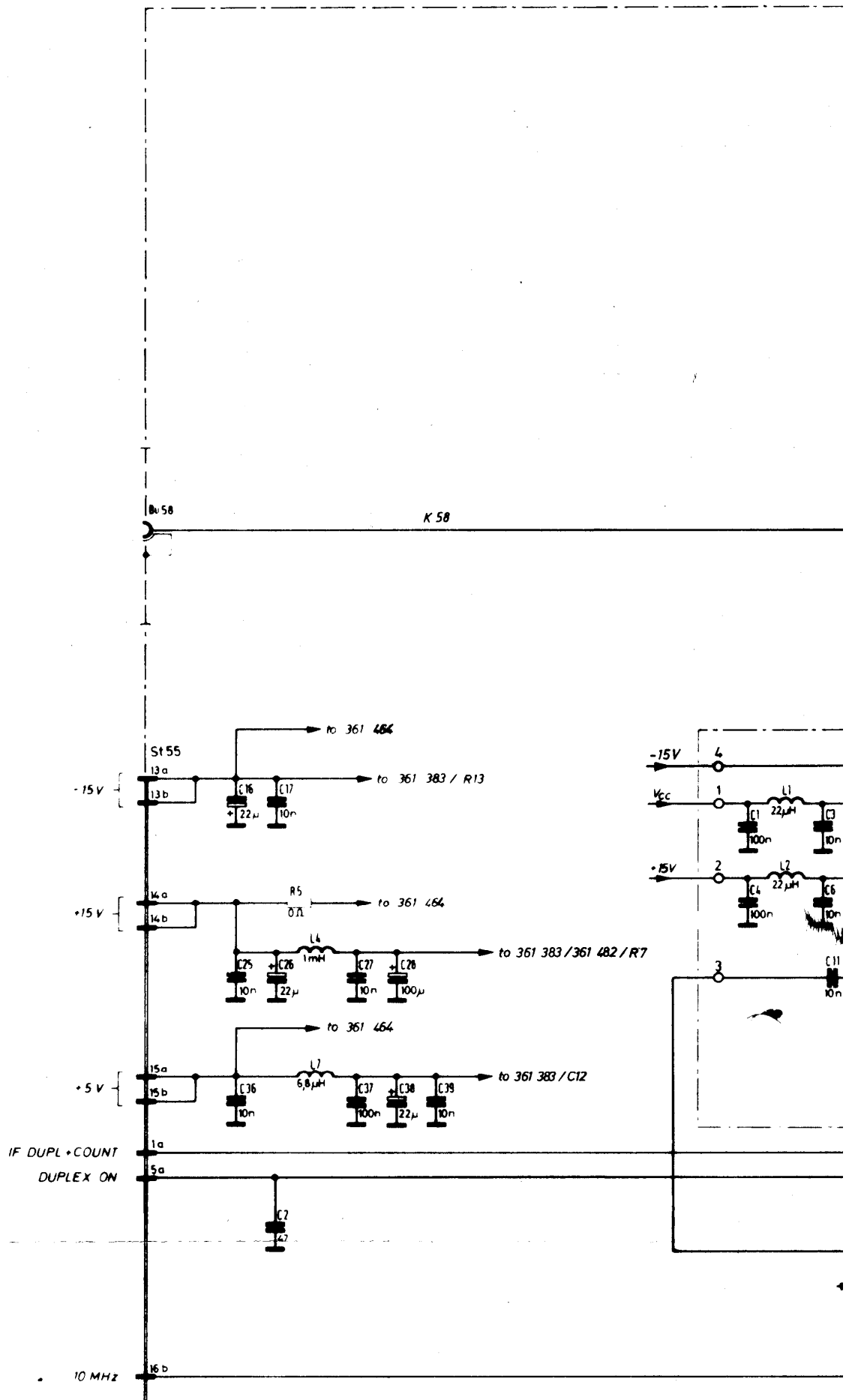
The intermediate frequency produced in the diode mixer (G12-G16) from the LO signal and the RF signal (from 361 470) on socket Bu58 is transferred via an impedance transformer T2 to the IF filter (L5-L8) and the IF amplifier (T3). The IF signal is output via switch D3 to the IF line in the duplex mode.

01 8088.27/182.88
- 7088.22

Ref.No. 229 033 F	Sub Duplex FM Demodulator	Date 13.2.87
Type 4031	Unit	Sheet 1/1

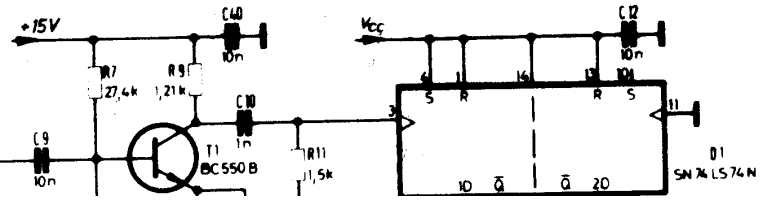
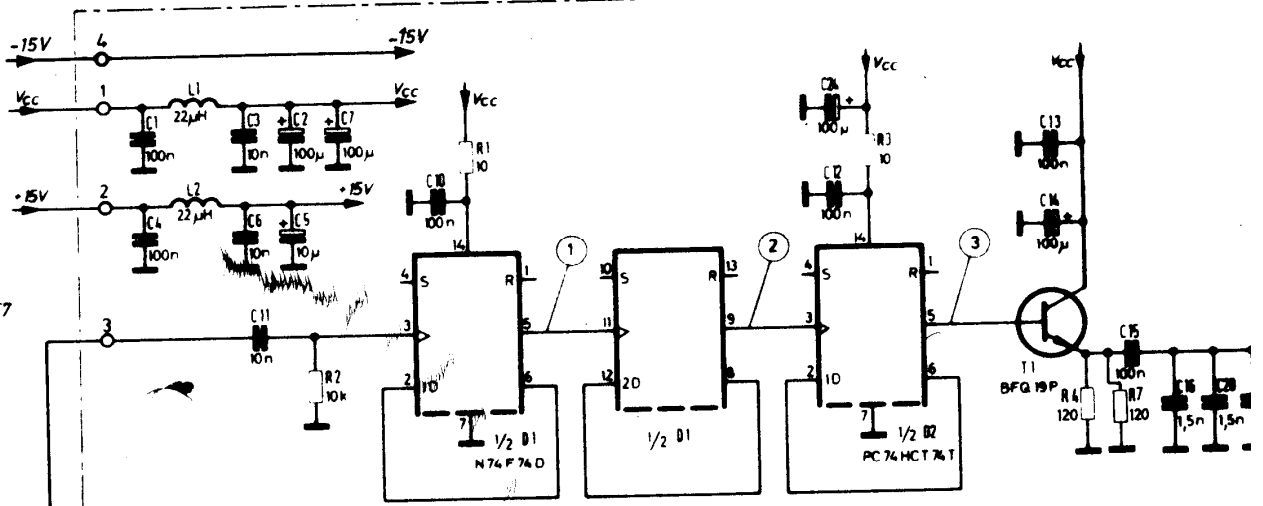
Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Issue	Alteration No.	Date	Name	Ref. No.	Sub Unit	Sheet																				
							Alteration No.	Date	Name	No.	Duplex FM Demodulator	1/3																					
4031, DVM	<p>1. <u>Check supply voltages (361 464)</u></p> <p>2. <u>Oscillator adjustment (361 482)</u></p> <p>2.1 <u>Frequency entry via 4031</u> DUPLX key then frequency entry</p> <p>Input frequ. Oscillator frequ.</p> <table border="1"> <tr> <td>35.64 MHz</td> <td>95.8 MHz</td> </tr> <tr> <td>30.7 MHz</td> <td>83.0 MHz</td> </tr> <tr> <td>30.63 MHz</td> <td>82.8 MHz</td> </tr> <tr> <td>26.55 MHz</td> <td>72.0 MHz</td> </tr> </table> <p>LED G12 (361 383) off = synchronized</p> <p>2.2 <u>Tuning voltage</u> Check referred to GND without core If voltage tolerance is exceeded at upper corner frequency, set to +10 V with brass core (821 916)</p>	35.64 MHz	95.8 MHz	30.7 MHz	83.0 MHz	30.63 MHz	82.8 MHz	26.55 MHz	72.0 MHz	Bu5 Bu2 Bu3	DC DC DC		+5 V ±50 mV +15 V ±50 mV -15 V ±50 mV					229 033 A															
35.64 MHz	95.8 MHz																																
30.7 MHz	83.0 MHz																																
30.63 MHz	82.8 MHz																																
26.55 MHz	72.0 MHz																																
DVM		Mp3	95.8 MHz 83.0 MHz 82.8 MHz 72.0 MHz	(L3) (L3) (L5) (L5)	± +11.5 V ≥ -4 V ± +11.5 V ≥ -5 V																												
<table border="1"> <thead> <tr> <th>Issue</th> <th>Alteration No.</th> <th>Date</th> <th>Name</th> <th>Issue</th> <th>Alteration No.</th> <th>Date</th> <th>Name</th> <th>Ref. No.</th> <th>Type</th> </tr> </thead> <tbody> <tr> <td>01</td> <td>8099.27</td> <td></td> <td>M.2.88</td> <td></td> <td></td> <td></td> <td></td> <td>229 033 A</td> <td>STABILOCK 4031</td> </tr> </tbody> </table>												Issue	Alteration No.	Date	Name	Issue	Alteration No.	Date	Name	Ref. No.	Type	01	8099.27		M.2.88					229 033 A	STABILOCK 4031	Sub Unit	Sheet
Issue	Alteration No.	Date	Name	Issue	Alteration No.	Date	Name	Ref. No.	Type																								
01	8099.27		M.2.88					229 033 A	STABILOCK 4031																								

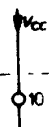
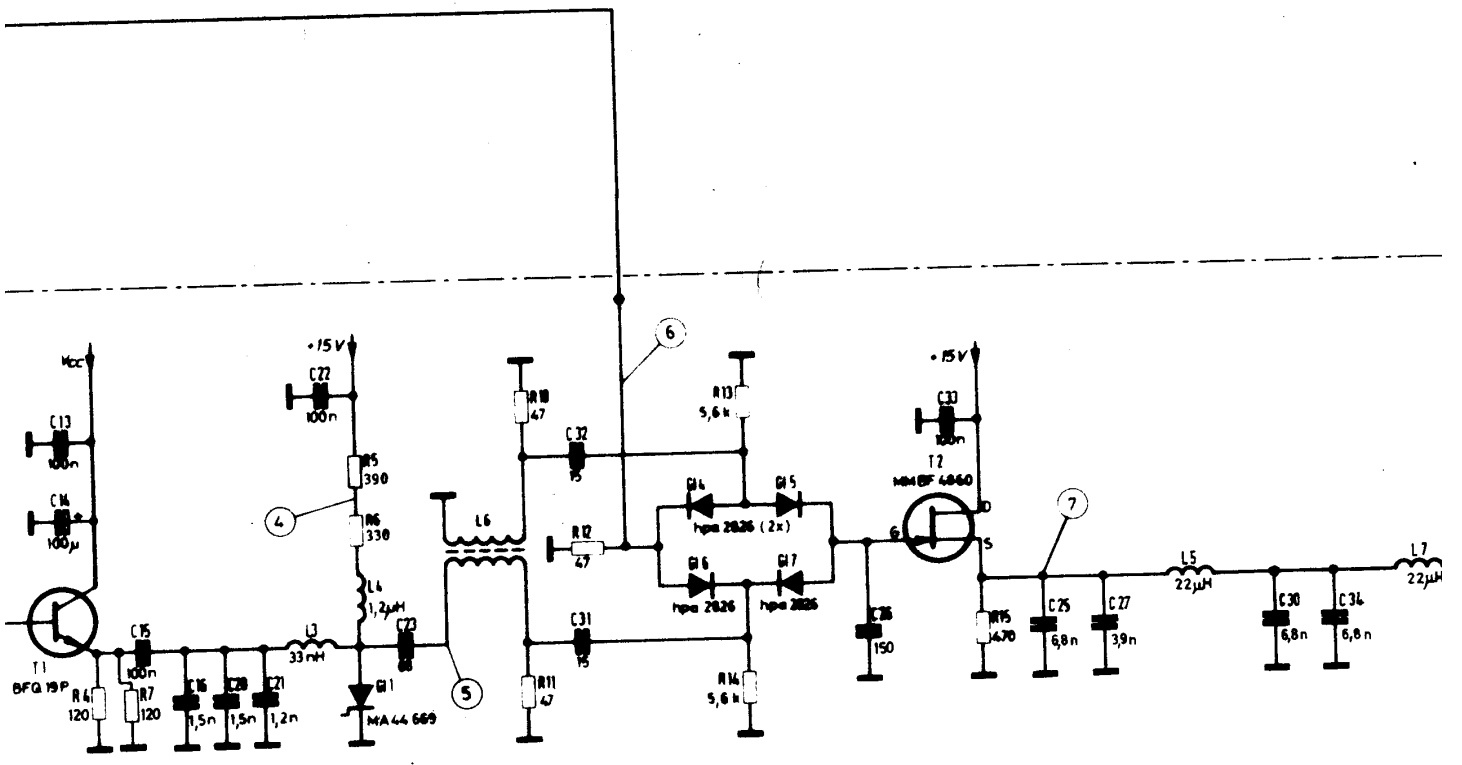
Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Ref. No. 229 033 A				Sub Unit	Sheet			
							Alteration No.	Date	Name	Date			Alteration No.	Date	Name
4002 on Bu RF	5. Spurious deviation Set frequency 30 MHz, 13 dBm (Bu RF) 999 MHz, 13 dBm carrier = unmod. RX level ≤ -60 dBm				≤ 30 Hz ≤ 100 Hz										



to 361 383 / 361 482 / R7

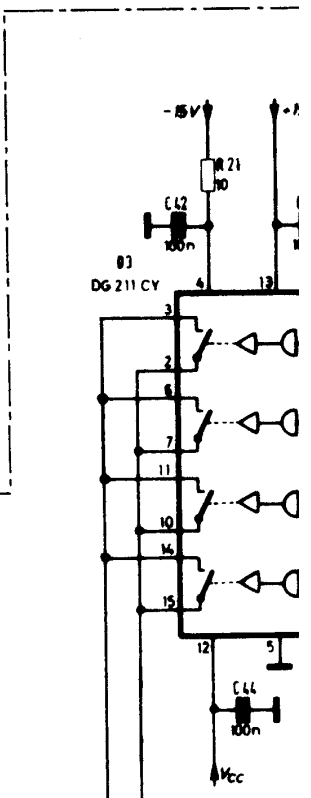
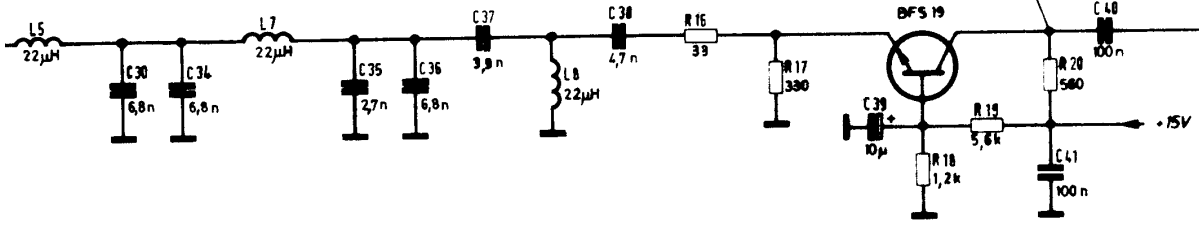
to 361 383 / C12



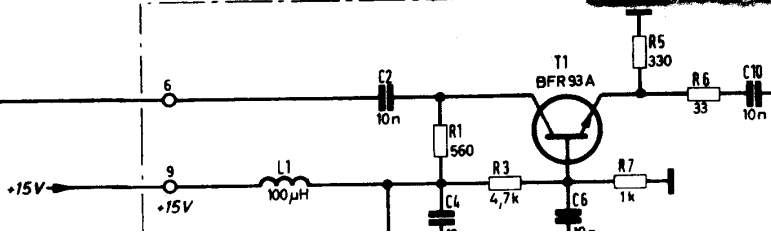


PHASE LOCKED LOOP
361 383

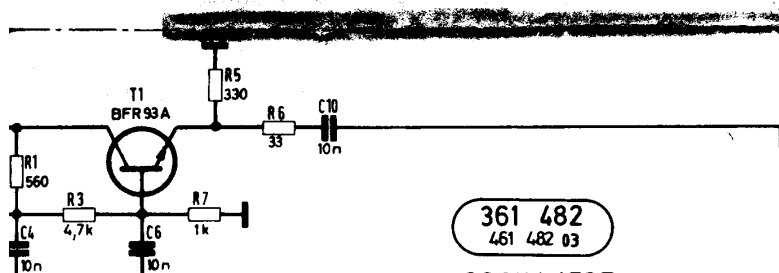
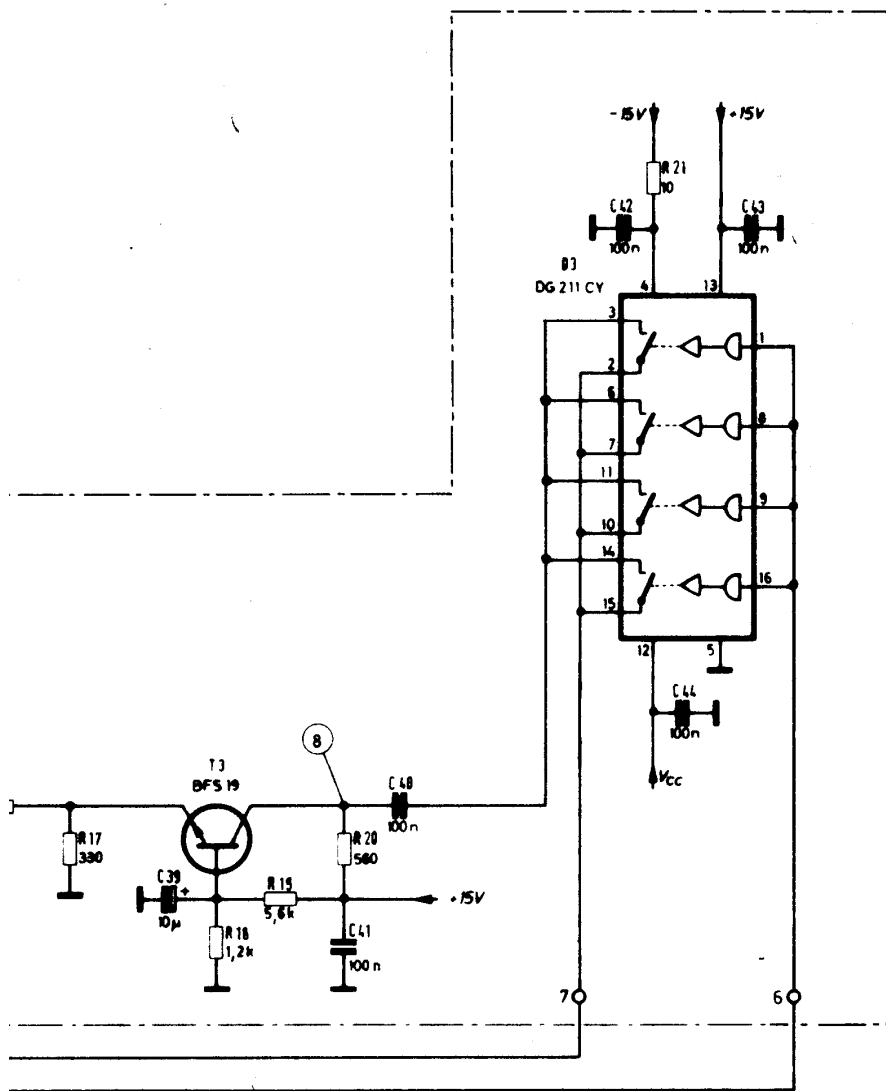
361 464
461 464 03
MULTIPLIER



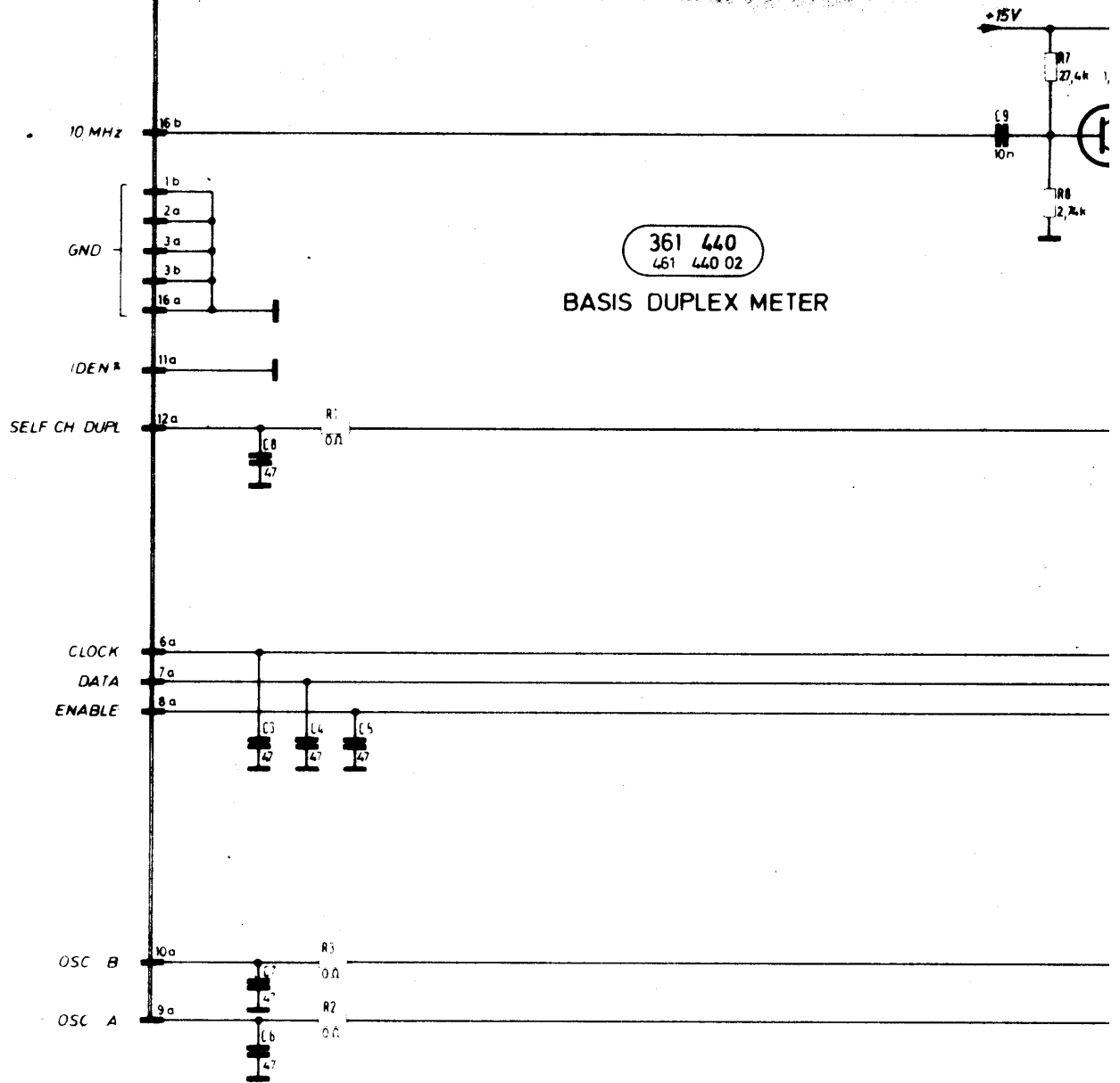
LED LOOP

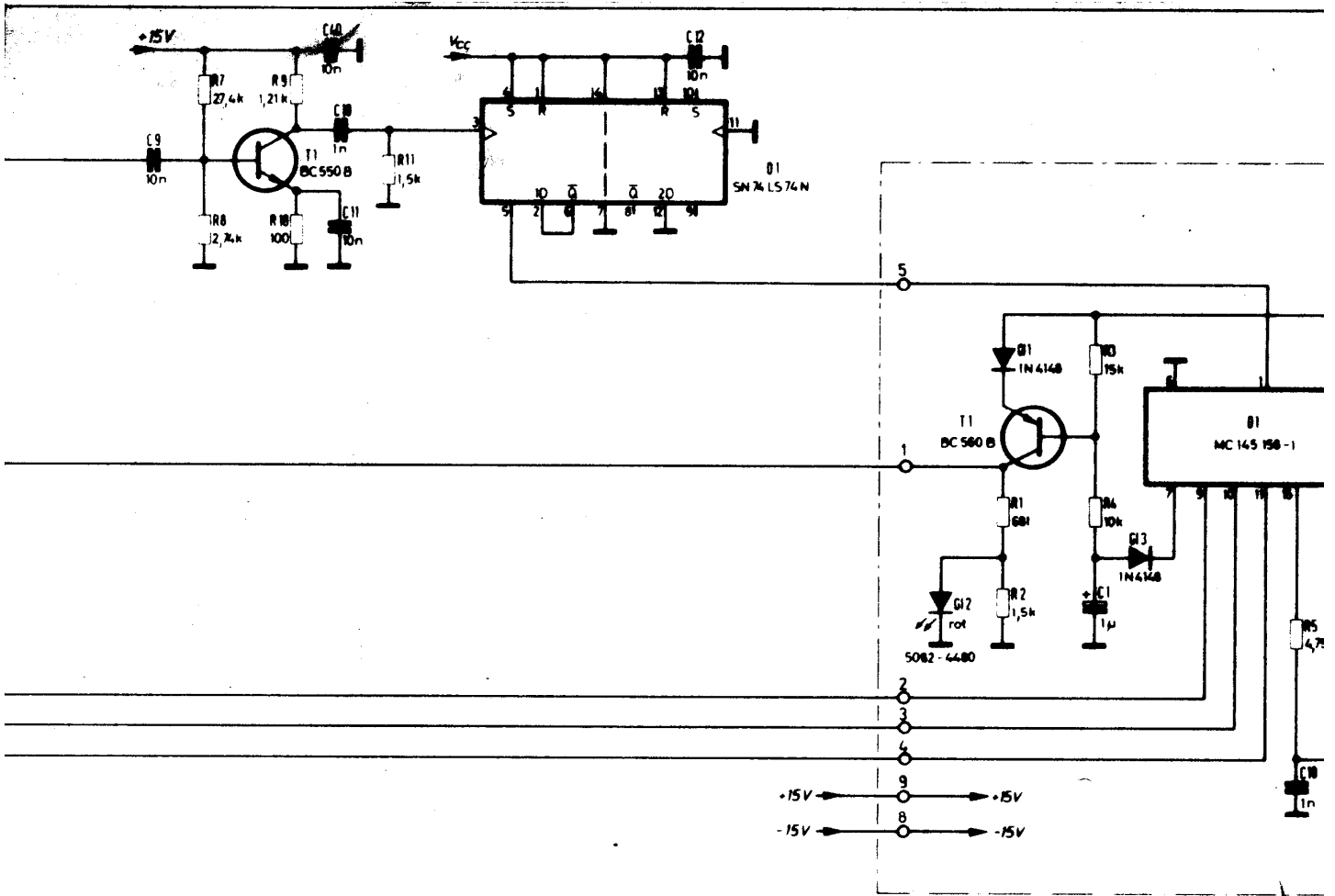


361 482
461 482 03



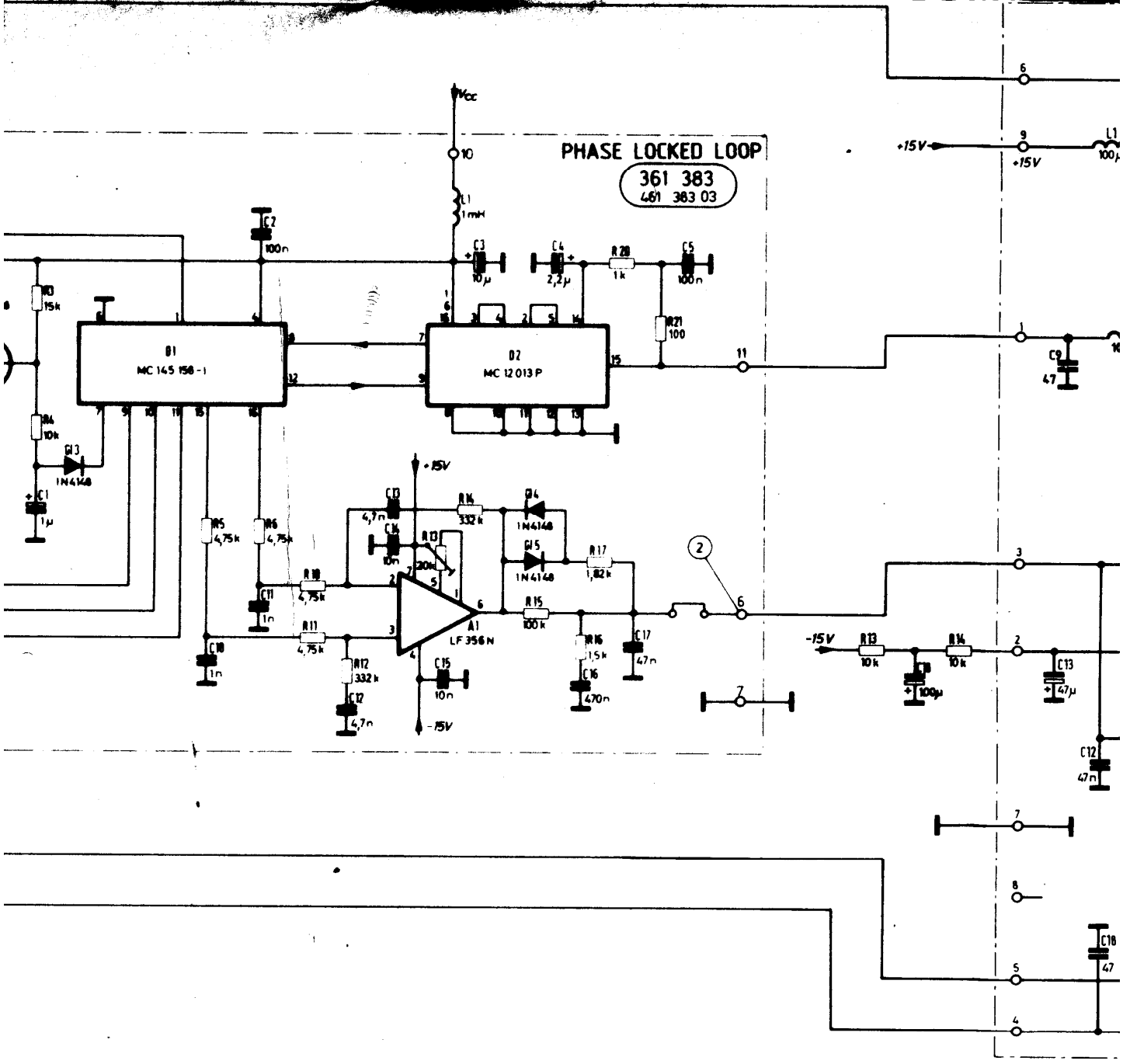
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 461 482 03



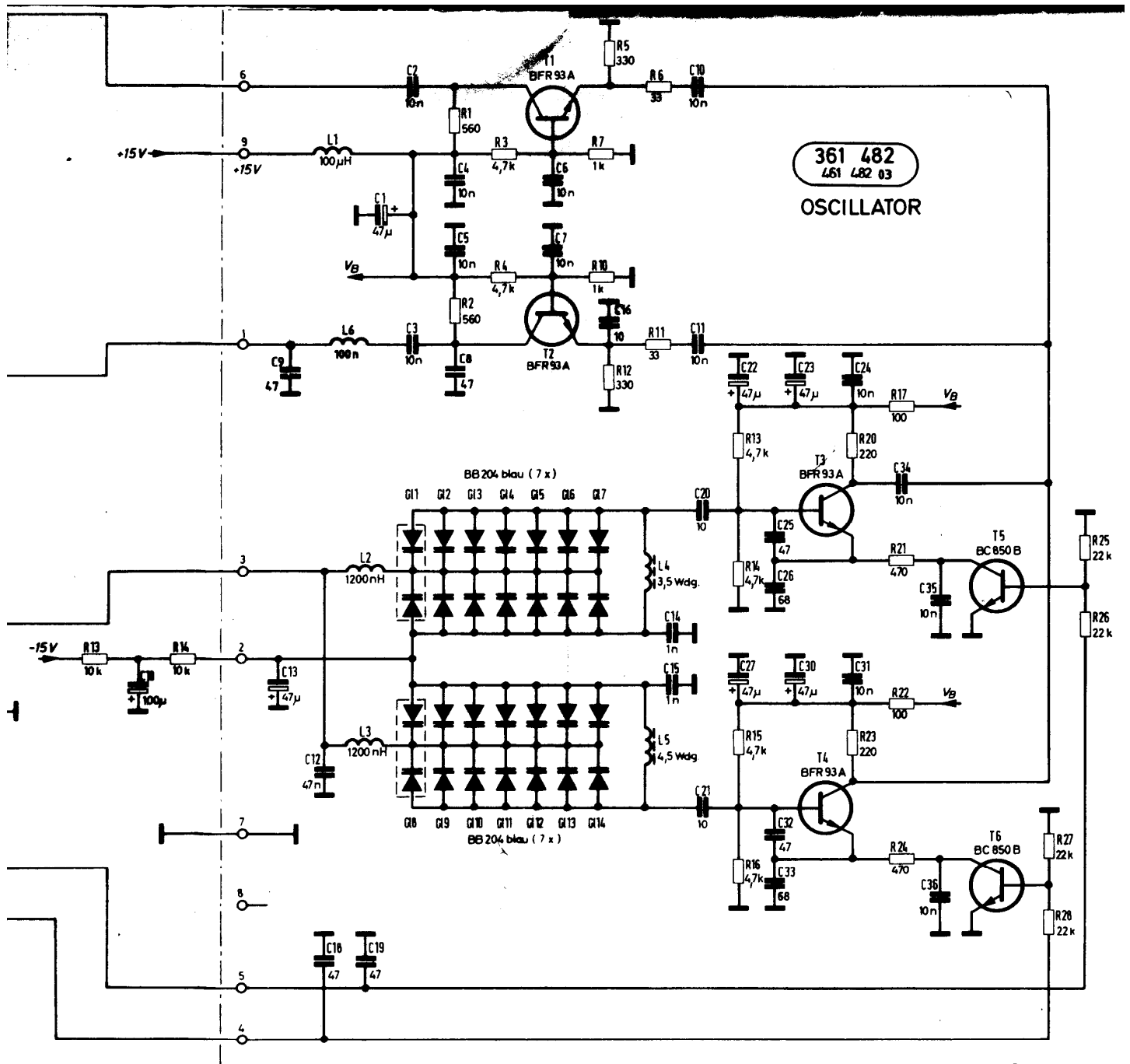


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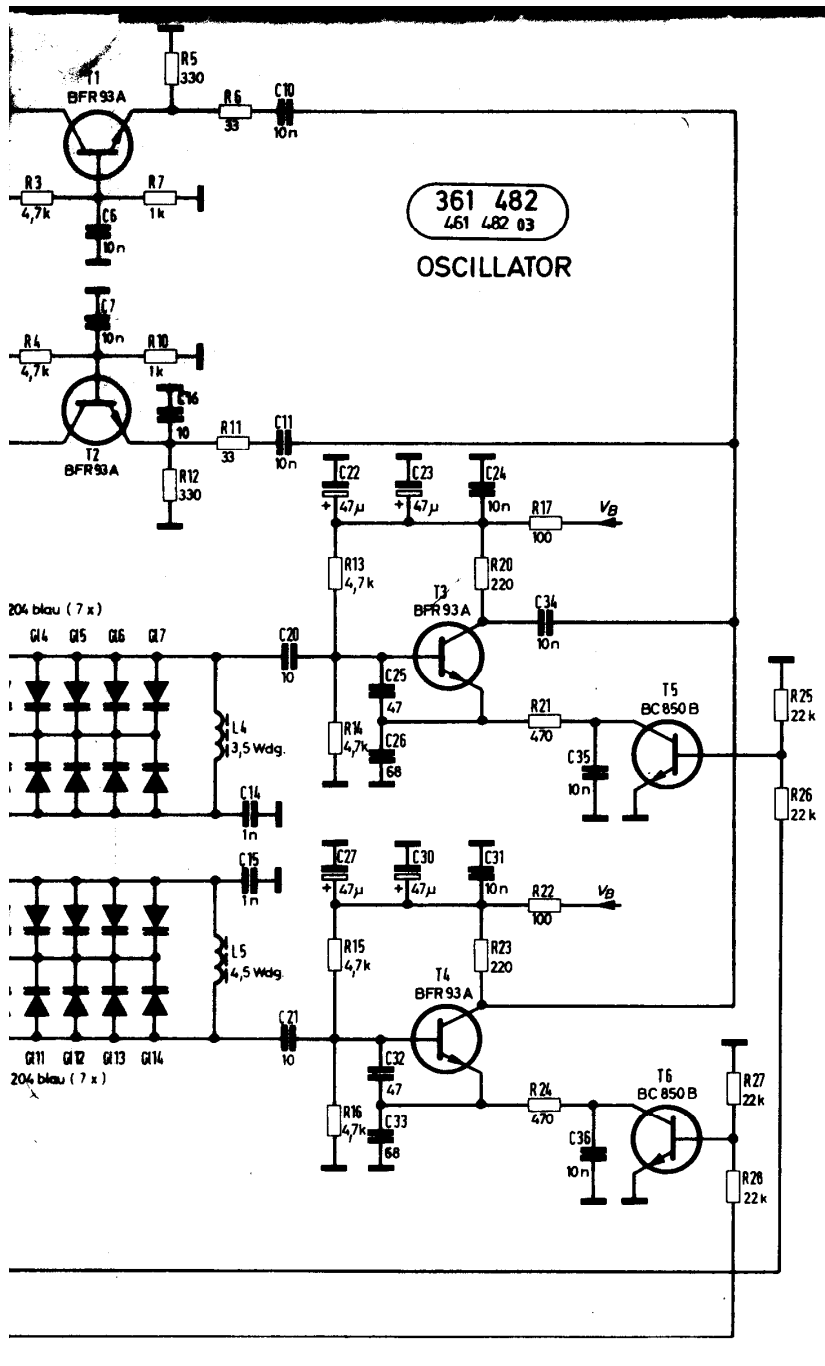
361 383
481 383 03



06	0000.213	18.1
Auss	A. M. H. G.	100
ISS	MC 101	14



08 0088.213		18.11.88		Mo.		22.9.87		Kr.		Schumberger Meßgeräte GmbH	DUPLEX METE
Ausg.	A. Müllg.	Druck	Name	Datum	Name						
SS	Müllg.	AT	198	AT	Name						



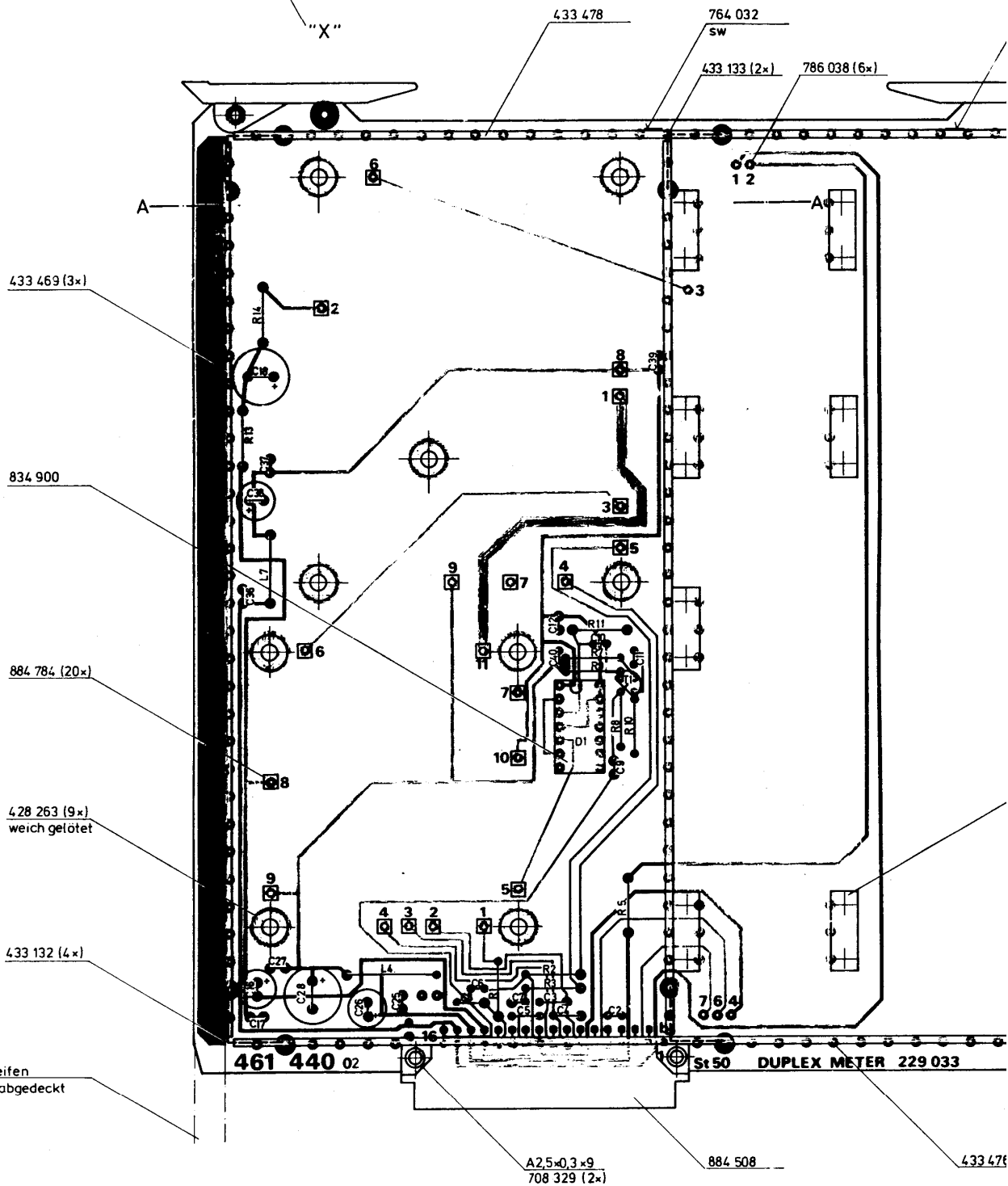
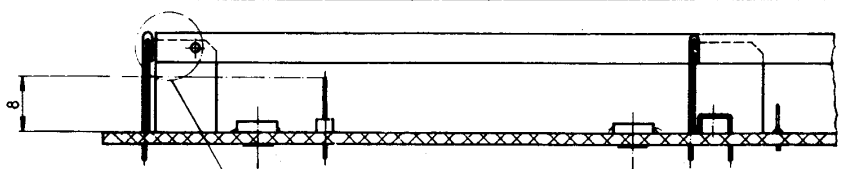
		Humberger Messgeräte GmbH Mess- und Prüftechnik 85071 München, Germany
29.87	Kr.	
Platz	Name	
ATE	Name	

DUPLEX METER

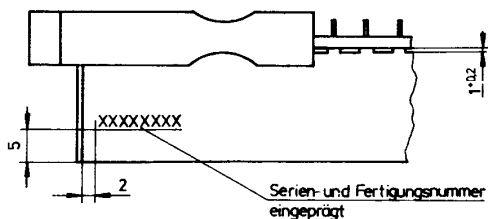
229 033 S

Typ: 4031

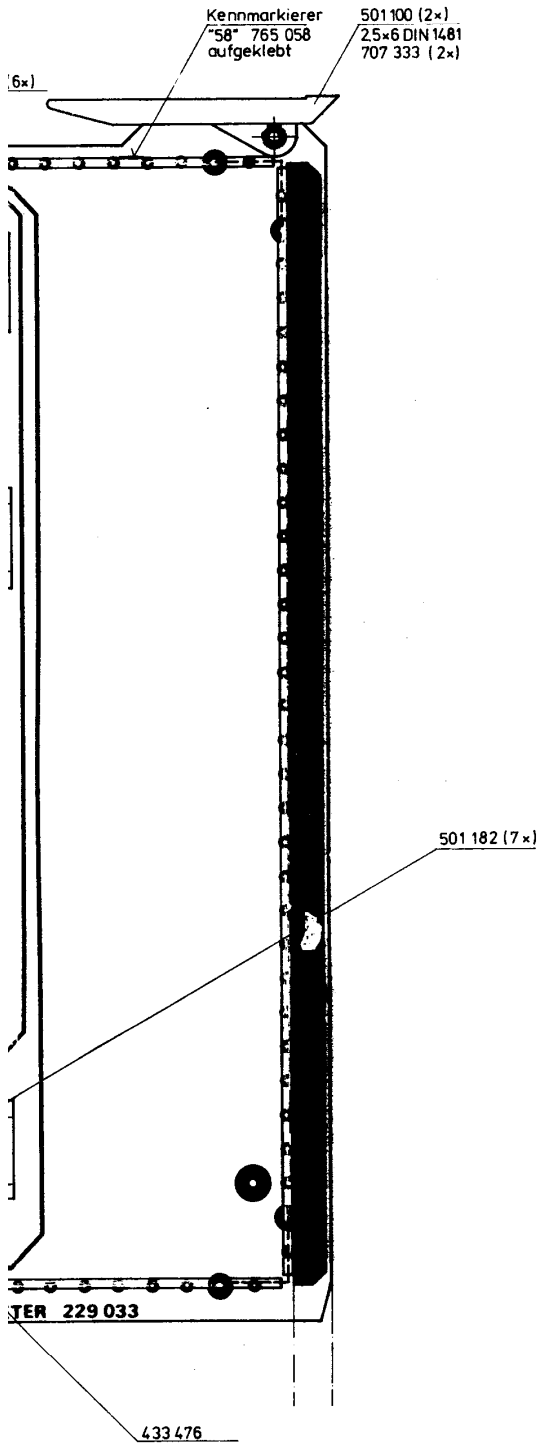
Schnitt A-A



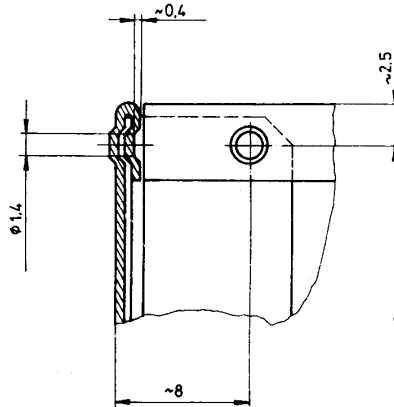
beide Randstreifen vor dem Lötten abgedeckt



Schnitt A-A



Einzelheit "X"
M 5:1



4 x Ecken gerichtet
formschlüssig
zusammengefügt
und verstemmt
(8 x)

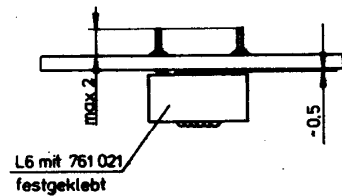
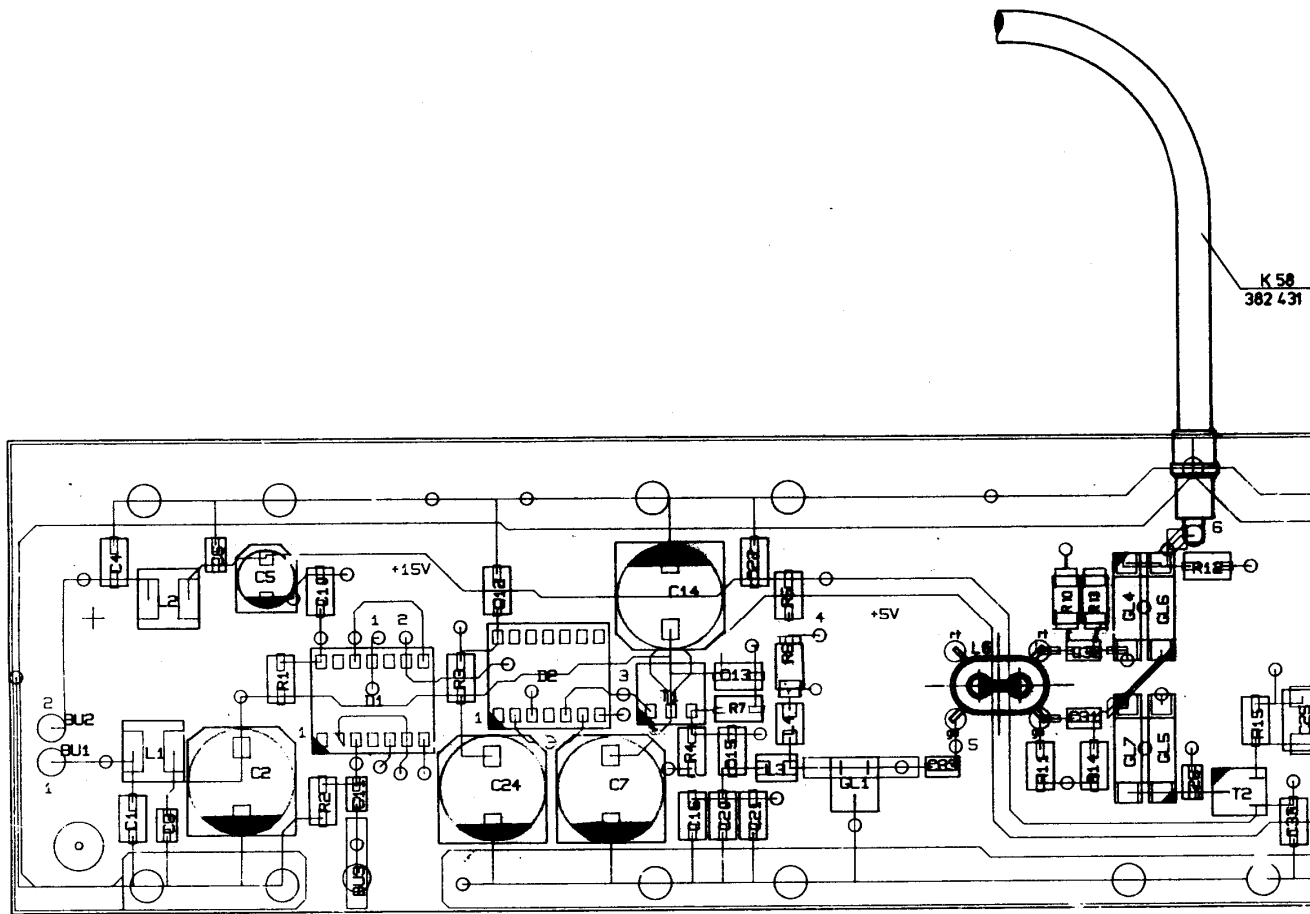
Kontrollmaß

te

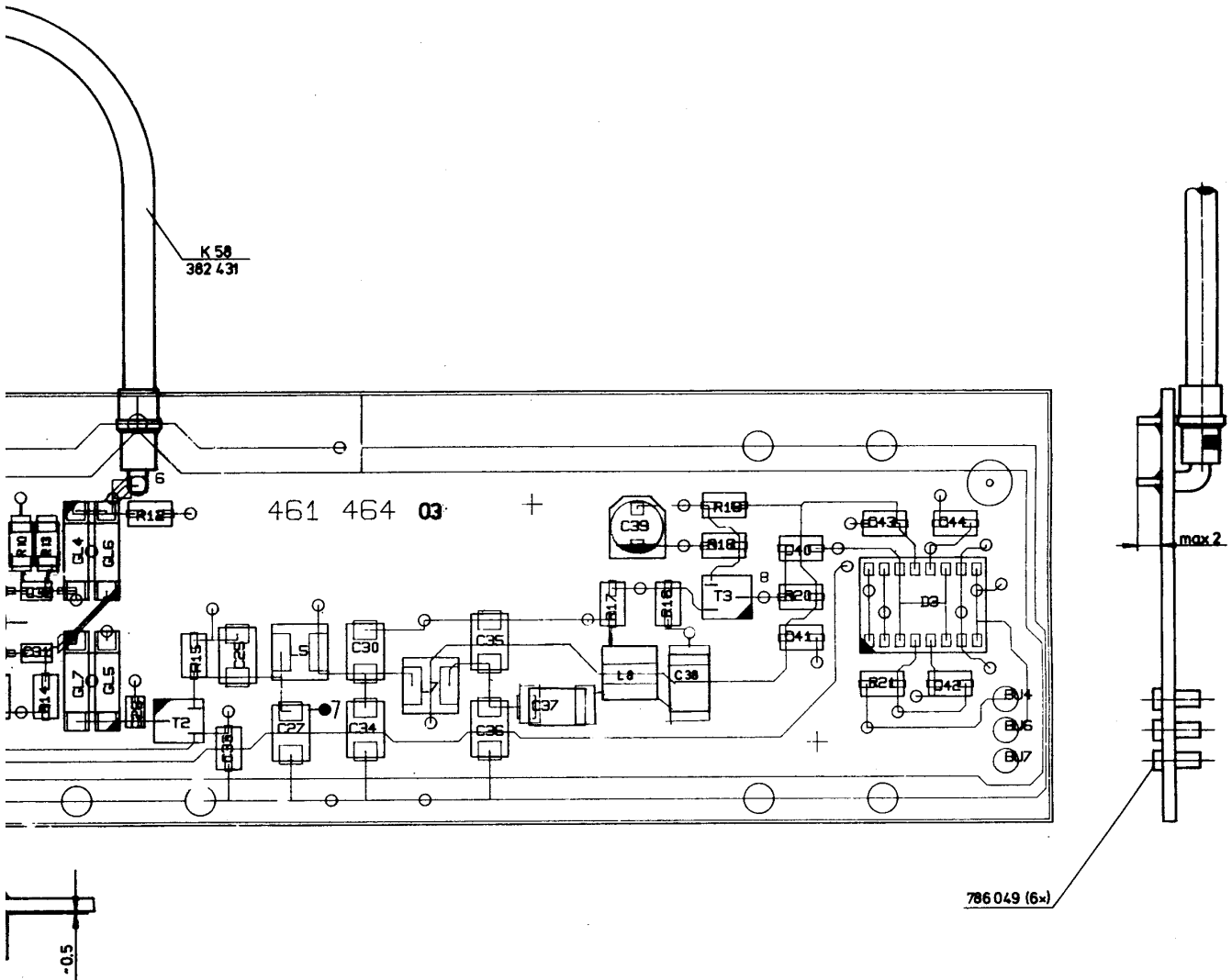
verpackt in:

Gerät:

229 033 2005.01.15 2005.01.15 2005.01.15	0.2 2:1 (5:1)	Schlumberger Meßgeräte G Gatter Straß 4 80331 München 40
		Bestückte Leiterpla Typ: Basis DUPLEX METE 361 440 Gerat. 00317 229 033



Reflow gelötet
 Hierzu Bauteilklebe-
 maske 461 464 03
 Bu1.. Bu 7 / K 58 / L 6
 weichgelötet



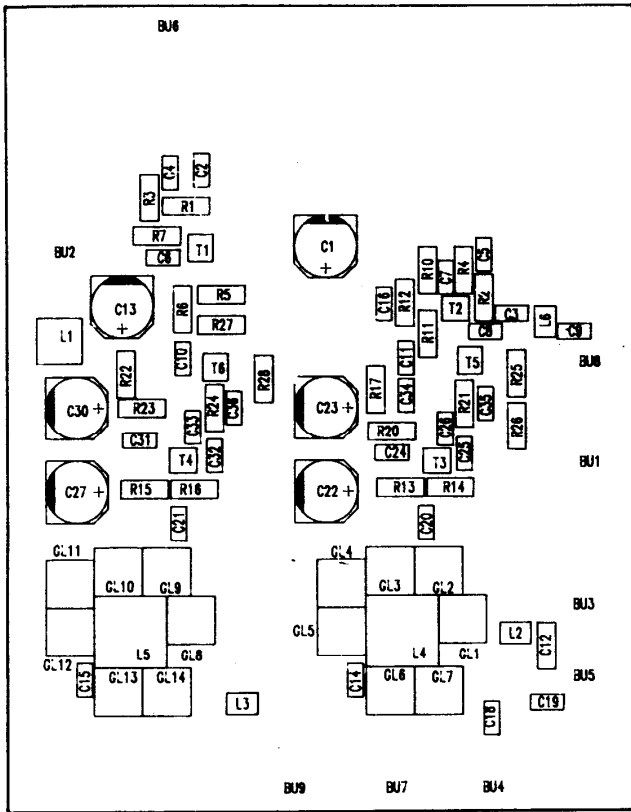
⊖ - Kontrollmaß

10					Schlumberger Maßgeräte GmbH Industriestraße 47 8200 München 48
9					
8				4:1	Bestückte Leiterplatte Typ: MULTIPLIER
7					
6					361 464
5					
4					
3					
2					
1					

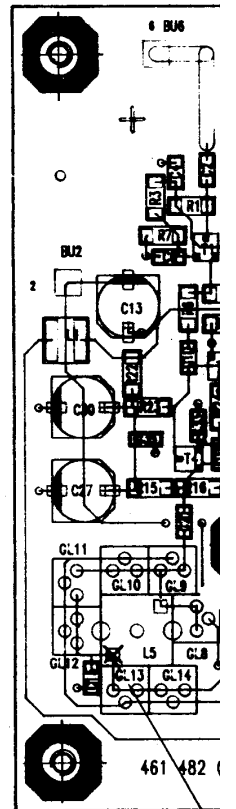
let in: Gerät:

Alle Zeichnungen sind ohne Gewähr. Verantwortlich: technische Verwaltung, 8200 München, 48, 48/100, 48/100/100, 48/100/100/100.

Ansicht = Sollbestückung lt. Stromlauf 229 033 S bzw 229 061 S



Ansicht mit Leiterba



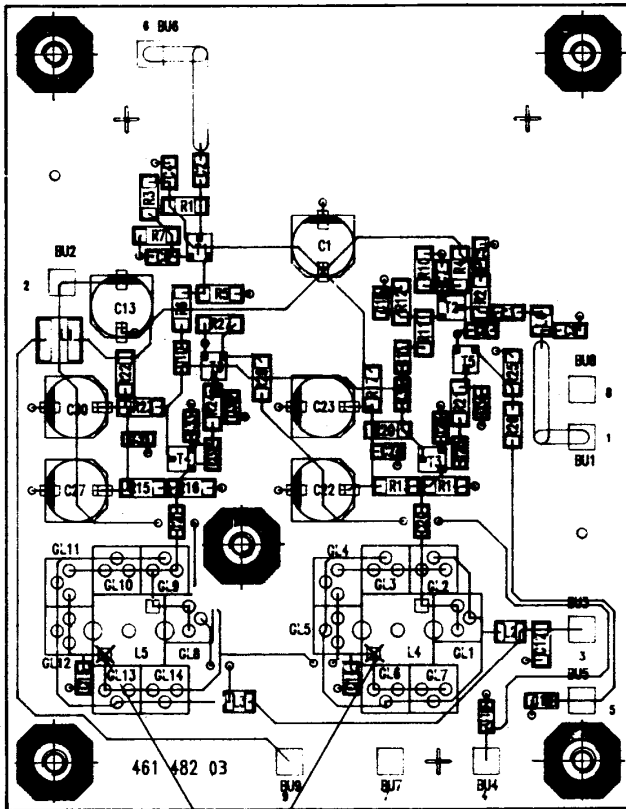
onierung ≙

verwendet in:

Gerät

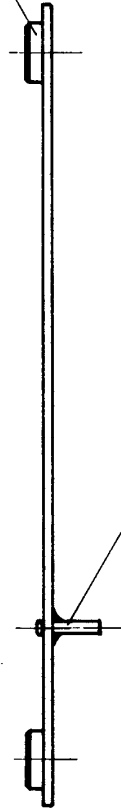
weich gelötet
 Reflow gelötet
 hierzu Bauteilklebmaske
 461 482 03

Ansicht mit Leiterbahnen, vollbestückt, nur zur Orientierung



langes Ende von L4/L5

704 035(5x)



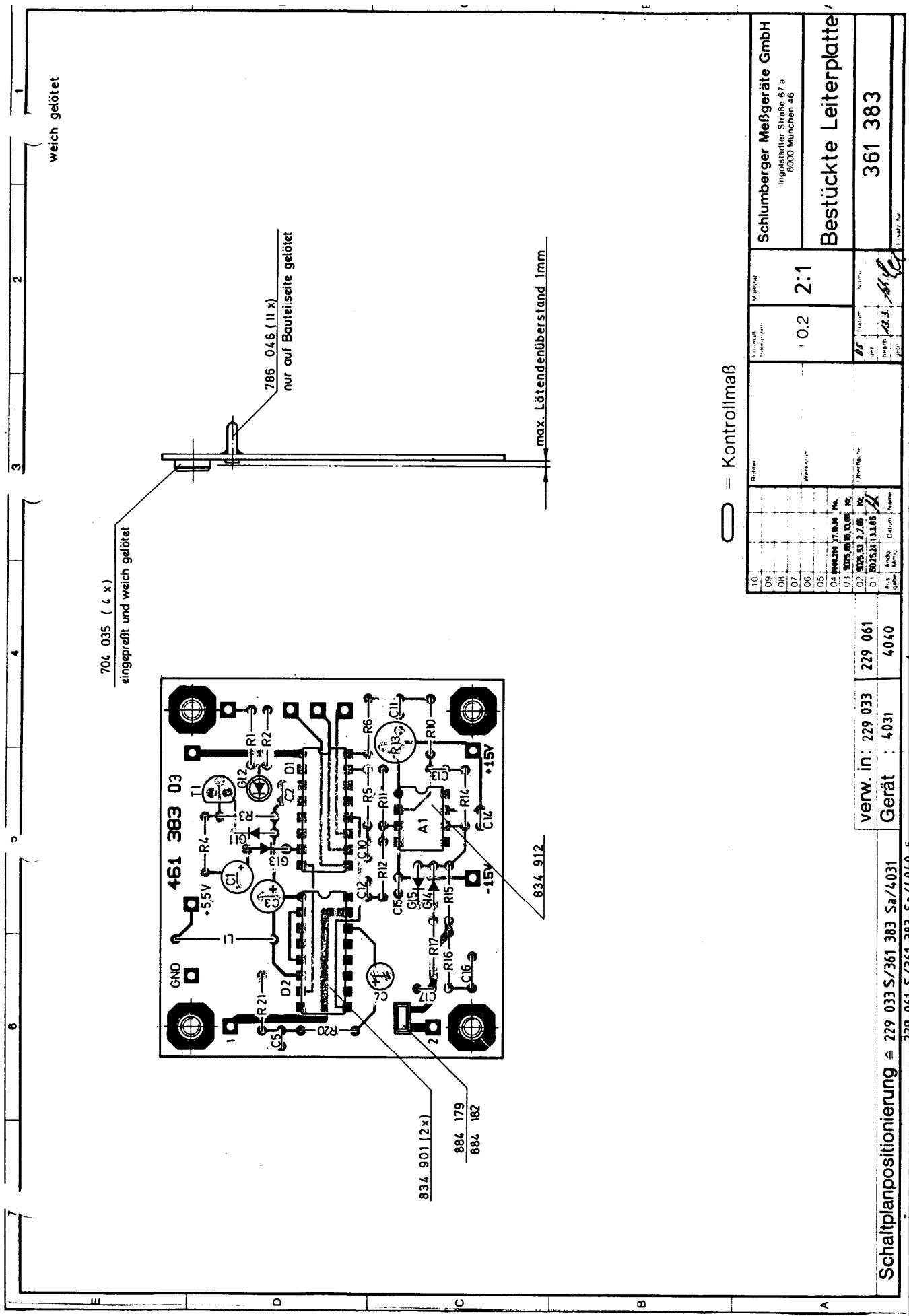
786 046(9x)

nur auf Bauteil-
 seite gelötet

= Kontrollmaß

10				Reibteil	Fremd- toleranzen	Meßstab	Schlumberger Meßgeräte GmbH Ingoledtler Straße 67 a 8000 München 48	
09				Werkstück	2:1	Bestückte Leiterplatte Typ: OSCILLATOR		
08								
07								
06	0000,20	10,11,00	Pa.					
05	0000,20	27,10,00	St.					
04				Oberfläche	1998	Datum	Name	
03					01	27.10.	Staffler	
02					361 482			
01				Aus- gabe	And- maß	Datum	Name	
							Gerät: 461 482 03 729 061/729 833	

Gerät



10	9	8	7	6	5	4	3	2	1

10	09	08	07	06	05	04	03	02	01

verw. in: 229 033		229 061	
Gerät : 4031		4040	

Schaltplanpositionierung ≙ 229 033 S/361 383 Sa/4031		229 044 S/244 383 S-71414	
Schlumberger Meßgeräte GmbH		Ingolstädter Straße 67 a	
		8030 München 46	
Bestückte Leiterplatte		361 383	

1	2	3	4	5	6	7	8
Pos. REF NO	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
1	Bestückte Leiterplatte PRINTED CIRCUIT BOARD	361 383	SCHL				
	hierzu see	361 383 Sa					
1	Bestückte Leiterplatte PRINTED CIRCUIT BOARD	361 440	SCHL				
	hierzu see	361 440 Sa					
1	Bestückte Leiterplatte PRINTED CIRCUIT BOARD	361 464	SCHL				
	hierzu see	361 464 Sa					
1	Bestückte Leiterplatte PRINTED CIRCUIT BOARD	361 482	SCHL				
	hierzu see	361 482 Sa					
K 58	HF-Kabel RF-CABLE	382 424	SCHL				

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS aus OF Blatt ! 1 SHEETS
06									
05							Bezeichnung Schlumberger PART. NO 229 033 Sa		Blatt Nr SHEET NO 1
04				1988	Tag DATE 2.5.	Name NAME Staffler	Hierzu Schaltplan SEE CIRCUIT DIAGRAM 229 033 S		
03							Gerät: 4031		
02									
01									
--	0011.69	27.5.88	Staffl.	geschr.					
Ausgabe ISSUE	And-Mittig. Nr MODIFIC. NO	Tag DATE	Name NAME	gepr.					

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig

1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
				C 25	10 nF \pm 10 % 50 V-	813 115	VIT
				C 26	22 μ F \pm 20 % 25 V-	814 077	RÖD
				C 27	10 nF \pm 10 % 50 V-	813 115	VIT
				C 28	100 μ F -10 +100 % 25 V-	814 066	RÖD
C 2	47 pF \pm 2 % 63 V-	810 512	RES				
C 3	47 pF \pm 2 % 63 V-	810 526	RES				
C 4	47 pF \pm 2 % 63 V-	810 526	RES				
C 5	47 pF \pm 2 % 63 V-	810 526	RES				
C 6	47 pF \pm 2 % 63 V-	810 512	RES				
C 7	47 pF \pm 2 % 63 V-	810 512	RES				
C 8	47 pF \pm 2 % 63 V-	810 526	RES				
C 9	10 nF \pm 10 % 50 V-	813 115	VIT	C 36	10 nF \pm 10 % 50 V-	813 115	VIT
C 10	1 nF \pm 5 % 50 V-	813 066	SIE	C 37	100 nF \pm 10 % 50 V-	813 121	VIT
C 11	10 nF \pm 10 % 50 V-	813 115	VIT	C 38	22 μ F \pm 20 % 25 V-	814 077	RÖD
C 12	10 nF \pm 10 % 50 V-	813 115	VIT	C 39	10 nF \pm 10 % 50 V-	813 115	VIT
				C 40	10 nF \pm 10 % 50 V-	813 115	VIT
C 16	22 μ F \pm 20 % 25 V-	814 077	RÖD				
C 17	10 nF \pm 10 % 50 V-	813 115	VIT				
C 18	100 μ F -10+100 % 25 V-	814 066	RÖD				

07				Schlumberger Meßgeräte GmbH Ingoistädter Straße 67 a 8000 München 46		Schaltteilliste EL. PARTS LIST Benennung DESCRIPTION Bestückte Leiterplatte Typ: DUPLEX METER		Liste besteht LIST CONSISTS aus OF 2 Blatt SHEETS
06								
05				geschr. 5.8.87 Morasch	Hierzu Schaltplan SEE CIRCUIT DIAGRAM 229 033 S	1		
04				bearb. 11.8.87 <i>[Signature]</i>	Gerät: 4031			
03				gedr. <i>[Signature]</i>				
02								
01								
-	7088.141	11.8.87	<i>[Signature]</i>					
Ausgabe ISSUE	And.-Mitgl. Nr.	Tag DATE	Name NAME					

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
D 1	SN 74 LS 74 N	834 626	TEX				
				R 13	10 k Ω \pm 1 %	802 049	RÖD
				R 14	10 k Ω \pm 1 %	802 049	RÖD
				St 50	100 - 632 - 053	884 508	PAN
L 4	1 mH \pm 5 %	821 054	GOW				
L 7	6,8 μ H \pm 10 %	821 016	GOW	T 1	BC 550 B	832 127	SIE
R 1	0 Ω	805 050	POL				
R 2	0 Ω	805 050	POL				
R 3	0 Ω	805 050	POL				
R 5	0 Ω	805 050	POL				
R 7	27,4 k Ω \pm 1 %	802 054	RÖD				
R 8	2,74 k Ω \pm 1 %	802 042	RÖD				
R 9	1,21 k Ω \pm 1 %	802 038	RÖD				
R 10	100 Ω \pm 1 %	802 025	RÖD				
R 11	1,5 k Ω \pm 1 %	802 039	RÖD				

07										
06										
05										
04										
03										
02										
01	3088.8	1.2.88	Steff	Tag DATE	Name NAME	Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schalteilliste EL. PARTS LIST Benennung DESCRIPTION: Bestückte Leiterplatte Typ: DUPLEX METER	Liste besteht LIST CONSISTS aus OF: 2 Blatt SHEETS: 2
-	7088.111	11.8.87	geschr.	5.8.87	Morasch					
Aus- gabe ISSUE	Änd.-Mittig. Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb. 11.8.87	gepr.	Hierzu Schaltplan SEE CIRCUIT DIAGRAM	229 033 S	Gerät: 4031		

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
C 1	100 nF ± 10 % 50 V-	813 375	VIT				
C 2	100 µF ± 20 % 6,3 V-	814 394	RÖD				
C 3	10 nF ± 10 % 50 V-	813 332	VIT	C 30	6,8 nF ± 5 % 50 V-	813 257	VIT
C 4	100 nF ± 10 % 50 V-	813 375	VIT	C 31	15 pF ± 5 % 50 V-	813 225	VIT
C 5	10 µF ± 20 % 16 V-	814 382	RÖD	C 32	15 pF ± 5 % 50 V-	813 225	VIT
C 6	10 nF ± 10 % 50 V-	813 332	VIT	C 33	100 nF ± 10 % 50 V-	813 375	VIT
C 7	100 µF ± 20 % 6,3 V-	814 394	RÖD	C 34	6,8 nF ± 5 % 50 V-	813 257	VIT
				C 35	2,7 nF ± 5 % 50 V-	813 252	VIT
				C 36	6,8 nF ± 5 % 50 V-	813 257	VIT
C 10	100 nF ± 10 % 50 V-	813 375	VIT	C 37	3,9 nF ± 5 % 50 V-	813 254	VIT
C 11	10 nF ± 10 % 50 V-	813 332	VIT	C 38	4,7 nF ± 5 % 50 V-	813 255	VIT
C 12	100 nF ± 10 % 50 V-	813 375	VIT	C 39	10 µF ± 20 % 16 V-	814 382	RÖD
C 13	100 nF ± 10 % 50 V-	813 375	VIT	C 40	100 nF ± 10 % 50 V-	813 375	VIT
C 14	100 µF ± 20 % 6,3 V-	814 394	RÖD	C 41	100 nF ± 10 % 50 V-	813 375	VIT
C 15	100 nF ± 10 % 50 V-	813 375	VIT	C 42	100 nF ± 10 % 50 V-	813 375	VIT
C 16	1,5 nF ± 5 % 50 V-	813 249	VIT	C 43	100 nF ± 10 % 50 V-	813 375	VIT
				C 44	100 nF ± 10 % 50 V-	813 375	VIT
				D 1	N 74 F 74 D	834 478	VAL
C 20	1,5 nF ± 5 % 50 V-	813 249	VIT	D 2	PC 74 HCT 74 T	834 433	VAL
C 21	1,2 nF ± 5 % 50 V-	813 248	VIT	D 3	DG 211 CY	834 471	SILL
C 22	100 nF ± 10 % 50 V-	813 375	VIT				
C 23	68 pF ± 5 % 50 V-	813 233	VIT	G1 1	MA 44669-287	830 518	M/A
C 24	100 µF ± 20 % 6,3 V-	814 394	RÖD				
C 25	6,8 nF ± 5 % 50 V-	813 257	VIT				
C 26	150 pF ± 5 % 50 V-	813 237	VIT	G1 4	hpa 2826	893 020	HEW
C 27	3,9 nF ± 5 % 50 V-	813 254	VIT	G1 5	hpa 2826	893 020	HEW

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS		
06			Benennung DESCRIPTION							Bestückte Leiterplatte Typ: MULTIPLIER	
05							Bezeichnung Schlumberger PART. NO.		361 464 Sa		2
04							Hierzu Schaltplan SEE CIRCUIT DIAGRAM		229 033 S		Blatt SHEETS
03	7088.158	23.10.87	Kr.					Blatt Nr. SHEET NO.			
02	7088.143	29.9.87	Staff	Tag DATE	Name NAME			1			
01	7088.147	28.9.87	Staff	gesch.	10.8.87	Morasch					
-	7088.132	4.9.87		bearb.	4.9.87						
Aus- gabe ISSUE	Änd.-Mittig. Nr. MODIFIC. NO.	Tag DATE	Name NAME	gepr.			Gerät: 4031				

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2			3		4		5		6		7		8		
Pos. REF. NO.	Wert VALUE			Bezeichnung Schlumberger PART. NO.		Hersteller MANUFACT		Pos. REF. NO.	Wert VALUE			Bezeichnung Schlumberger PART. NO.		Hersteller MANUFACT		
G1 6	hpa 2826			893 020		HEW		R 16	33 Ω ± 2 %			804 719		VAL		
G1 7	hpa 2826			893 020		HEW		R 17	330 Ω ± 2 %			804 731		VAL		
								R 18	1,2 kΩ ± 2 %			804 738		VAL		
L 1	22 μH ± 15 %			821 318		SIE		R 19	5,6 kΩ ± 2 %			804 746		VAL		
L 2	22 μH ± 15 %			821 318		SIE		R 20	560 Ω ± 2 %			804 734		VAL		
L 3	33 nH ± 10 %			821 209		STET		R 21	10 Ω ± 2 %			804 713		VAL		
L 4	1,2 μH ± 5 %			821 228		STET										
L 5	22 μH ± 5 %			821 318		SIE		T 1	BFQ 19 P			832 290		SIE		
L 6	Übertrager			390 048		SCHL		T 2	MM BF 4860			832 434		MOT		
L 7	22 μH ± 15 %			821 318		SIE		T 3	BFS 19			832 286		VAL		
L 8	22 μH ± 15 %			821 318		SIE										
R 1	10 Ω ± 2 %			804 713		VAL										
R 2	10 kΩ ± 2 %			804 749		VAL										
R 3	10 Ω ± 2 %			804 713		VAL										
R 4	120 Ω ± 2 %			804 726		VAL										
R 5	390 Ω ± 2 %			804 732		VAL										
R 6	330 Ω ± 2 %			804 731		VAL										
R 7	120 Ω ± 2 %			804 726		VAL										
R 10	47 Ω ± 2 %			804 721		VAL										
R 11	47 Ω ± 2 %			804 721		VAL										
R 12	47 Ω ± 2 %			804 721		VAL										
R 13	5,6 kΩ ± 2 %			804 746		VAL										
R 14	5,6 kΩ ± 2 %			804 746		VAL										
R 15	470 Ω ± 2 %			804 733		VAL										
07								Schaltteilliste EL. PARTS LIST				Liste besteht LIST CONSISTS aus OF 2 Blatt SHEETS				
06																Benennung DESCRIPTION Bestückte Leiterplatte Typ: MULTIPLIER
05																
04																
03	8088.34	8.3.88	Kr.													
02	7088.171	23.11.87	Di													
01	7088.147	28.9.87	Staff													
	7088.132	4.9.87		geschr.	10.8.87	Morasch			Bezeichnung Schlumberger PART. NO. 361 464 Sa				Blatt Nr. SHEET NO. 2			
Ausgabe ISSUE	Änd.-Mittlg. Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb.	4.9.87				Hierzu Schaltplan SEE CIRCUIT DIAGRAM 229 033 S							
				gepr.					Gerät: 4031							

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2		3		4	5		6		7		8
Pos. REF. NO.	Wert VALUE		Bezeichnung Schlumberger PART. NO.		Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE		Bezeichnung Schlumberger PART. NO.		Hersteller MANUFACT	
						C 24	10 nF ± 10 % 50 V-		813 332		VIT	
						C 25	47 pF ± 5 % 50 V-		813 231		VIT	
						C 26	68 pF ± 5 % 50 V-		813 233		VIT	
						C 27	47 µF ± 20 % 16 V-		814 386		RÖD	
C 1	47 µF ± 20 % 16 V-		814 386		RÖD							
C 2	10 nF ± 10 % 50 V-		813 332		VIT							
C 3	10 nF ± 10 % 50 V-		813 332		VIT	C 30	47 µF ± 20 % 16 V-		814 386		RÖD	
C 4	10 nF ± 10 % 50 V-		813 332		VIT	C 31	10 nF ± 10 % 50 V-		813 332		VIT	
C 5	10 nF ± 10 % 50 V-		813 332		VIT	C 32	47 pF ± 5 % 50 V-		813 231		VIT	
C 6	10 nF ± 10 % 50 V-		813 332		VIT	C 33	68 pF ± 5 % 50 V-		813 233		VIT	
C 7	10 nF ± 10 % 50 V-		813 332		VIT	C 34	10 nF ± 10 % 50 V-		813 332		VIT	
C 8	47 pF ± 5 % 50 V-		813 231		VIT	C 35	10 nF ± 10 % 50 V-		813 332		VIT	
C 9	47 pF ± 5 % 50 V-		813 231		VIT	C 36	10 nF ± 10 % 50 V-		813 332		VIT	
C 10	10 nF ± 10 % 50 V-		813 332		VIT							
C 11	10 nF ± 10 % 50 V-		813 332		VIT							
C 12	47 nF ± 20 % 50 V-		813 371		VIT							
C 13	47 µF ± 20 % 16 V-		814 386		RÖD	G1 1	BB 204		830 612		TELE	
C 14	1 nF ± 5 % 50 V-		813 247		VIT	G1 2	BB 204		830 612		TELE	
C 15	1 nF ± 5 % 50 V-		813 247		VIT	G1 3	BB 204		830 612		TELE	
C 16	10 pF ± 5 % 50 V-		813 223		VIT	G1 4	BB 204		830 612		TELE	
						G1 5	BB 204		830 612		TELE	
C 18	47 pF ± 5 % 50 V-		813 231		VIT	G1 6	BB 204		830 612		TELE	
C 19	47 pF ± 5 % 50 V-		813 231		VIT	G1 7	BB 204		830 612		TELE	
C 20	10 pF ± 5 % 50 V-		813 223		VIT	G1 8	BB 204		830 612		TELE	
C 21	10 pF ± 5 % 50 V-		813 223		VIT	G1 9	BB 204		830 612		TELE	
C 22	47 µF ± 20 % 16 V-		814 386		RÖD	G1 10	BB 204		830 612		TELE	
C 23	47 µF ± 20 % 16 V-		814 386		RÖD	G1 11	BB 204		830 612		TELE	
07						Schaltteilliste EL. PARTS LIST Bestückte Leiterplatte Typ: Oszillator					Liste besteht LIST CONSISTS	
06											Benennung DESCRIPTION	
05						Bezeichnung Schlumberger PART. NO. 361 482 Sa					Blatt SHEETS	
04											Hierzu Schaltplan SEE CIRCUIT DIAGRAM 229 033 S / 229 061	
03						Gerät: 4031 / 4040					1	
02	8088,200	27.10.83	Mo.									
01	8088,164	19.9.88	Lehner									
-	7088,179	15.12.87	Mo.	geschr.	30.11.87	Morasch						
Ausgabe ISSUE	Änd.-Mittig. Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb. gepr.								

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2		3		4	5	6		7		8
Pos. REF. NO.	Wert VALUE		Bezeichnung Schlumberger PART. NO.		Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE		Bezeichnung Schlumberger PART. NO.		Hersteller MANUFACT
G1 12	BB 204		830 612		TELE	R 15	4,7 kΩ ± 2 %		804 745		VAL
G1 13	BB 204		830 612		TELE	R 16	4,7 kΩ ± 2 %		804 745		VAL
G1 14	BB 204		830 612		TELE	R 17	100 Ω ± 2 %		804 725		VAL
L 1	100 μH ± 15 %		821 322		SIE	R 20	220 Ω ± 2 %		804 729		VAL
L 2	1200 nH ± 5 %		821 228		STET	R 21	470 Ω ± 2 %		804 733		VAL
L 3	1200 nH ± 5 %		821 228		STET	R 22	100 Ω ± 2 %		804 725		VAL
L 4	3,5 Wind.		821 921		NEO	R 23	220 Ω ± 2 %		804 729		VAL
L 5	4,5 Wind.		821 922		NEO	R 24	470 Ω ± 2 %		804 733		VAL
L 6	100 nH ± 5 %		821 215		STET	R 25	22 kΩ ± 2 %		804 753		VAL
						R 26	22 kΩ ± 2 %		804 753		VAL
						R 27	22 kΩ ± 2 %		804 753		VAL
R 1	560 Ω ± 2 %		804 734		VAL	R 28	22 kΩ ± 2 %		804 753		VAL
R 2	560 Ω ± 2 %		804 734		VAL						
R 3	4,7 kΩ ± 2 %		804 745		VAL						
R 4	4,7 kΩ ± 2 %		804 745		VAL						
R 5	330 Ω ± 2 %		804 731		VAL						
R 6	33 Ω ± 2 %		804 719		VAL	T 1	BFR 93 A		832 287		VAL
R 7	1 kΩ ± 2 %		804 737		VAL	T 2	BFR 93 A		832 287		VAL
						T 3	BFR 93 A		832 287		VAL
						T 4	BFR 93 A		832 287		VAL
R 10	1 kΩ ± 2 %		804 737		VAL	T 5	BC 850 B		832 284		VAL
R 11	33 Ω ± 2 %		804 719		VAL	T 6	BC 850 B		832 284		VAL
R 12	330 Ω ± 2 %		804 731		VAL						
R 13	4,7 kΩ ± 2 %		804 745		VAL						
R 14	4,7 kΩ ± 2 %		804 745		VAL						

07											
06											
05											
04											
03											
02	8088.290	27.10.88	Mo.		Tag	Name	Schalteilliste EL. PARTS LIST Beschreibung DESCRIPTION Bestückte Leiterplatte Typ: Oszillator				Liste besteht LIST CONSISTS aus OF 2 Blatt SHEETS
01	8088.27	17.2.88	Mo.		DATE	NAME					Bezeichnung Schlumberger PART NO. 361 482 Sa
-	7088.179	15.12.87	Mo.	geschr	30.11.87	Morasc	Hierzu Schaltplan SEE CIRCUIT DIAGRAM 229 033 S / 229 061 S				
Aus- gabe ISSUE	Änd.-Mittig Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb.			Gerät: 4031 / 4040				

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
A 1	LF 356 N	834 059	NS	G1 5	1 N 4148	830 240	ITT
C 1	1 μ F \pm 20% 50 V-	814 070	MATSU	L 1	1 mH \pm 5%	821 054	DELE
C 2	100 nF \pm 10% 50 V-	813 121	STET				
C 3	10 μ F \pm 20% 25 V-	814 076	MATSU	R 1	681 Ω \pm 1%	802 035	RÖD
C 4	2,2 μ F \pm 20% 50 V-	814 072	MATSU	R 2	1,5 k Ω \pm 1%	802 039	RÖD
C 5	100 nF \pm 10% 50 V-	813 121	STET	R 3	15 k Ω \pm 1%	802 051	RÖD
				R 4	10 k Ω \pm 1%	802 049	RÖD
				R 5	4,75 k Ω \pm 1%	802 045	RÖD
				R 6	4,75 k Ω \pm 1%	802 045	RÖD
C 10	1 nF \pm 5% 50 V-	813 066	VAL				
C 11	1 nF \pm 5% 50 V-	813 066	VAL				
C 12	4,7 nF \pm 5% 50 V-	813 074	VAL	R 10	4,75 k Ω \pm 1%	802 045	RÖD
C 13	4,7 nF \pm 5% 50 V-	813 074	VAL	R 11	4,75 k Ω \pm 1%	802 045	RÖD
C 14	10 nF -20+100% 63 V-	810 593	STET	R 12	332 k Ω \pm 1%	802 067	RÖD
C 15	10 nF -20+100% 63 V-	810 593	STET	R 13	20 k Ω \pm 10%	807 615	BOURN
C 16	470 nF \pm 10% 50 V-	813 125	STET	R 14	332 k Ω \pm 1%	802 067	RÖD
C 17	47 nF \pm 10% 50 V-	813 119	STET	R 15	100 k Ω \pm 1%	802 061	RÖD
				R 16	1,5 k Ω \pm 1%	802 039	RÖD
D 1	MC 145 158 - 1	834 408	MOTO	R 17	3,92 k Ω \pm 1%	802 044	RÖD
D 2	MC 12 013 P	834 385	MOTO				
G1 1	1 N 4148	830 240	ITT	R 20	1 k Ω \pm 1%	802 037	RÖD
G1 2	5082 - 4480 rot	830 541	HP	R 21	100 Ω \pm 1%	802 025	RÖD
G1 3	1 N 4148	830 240	ITT				
G1 4	1 N 4148	830 240	ITT	T 1	BC 560 B	832 128	SIE

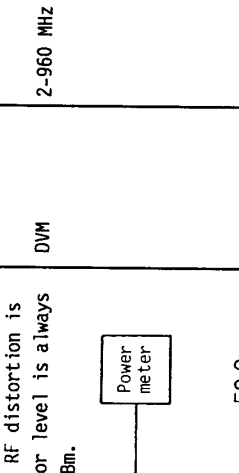
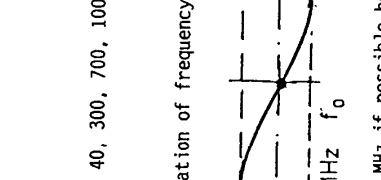
07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS
06									
05									Blatt SHEETS
04	5025.200	27.10.88	Mc.						Blatt Nr SHEET NO 1
03	5025.86	16.10.85	Kr.						
02	5025.76	12.8.85	Hei.	1985	Tag DATE	Name NAME	Bezeichnung Schlumberger PART. NO	361 383 Sa	
01	5025.53	2.7.85	Kr.	geschr.	14.6.85	Kr.	Hierzu Schaltplan SEE CIRCUIT DIAGRAM	229 051/061 S / 229 033 S	
Ausgabe ISSUE	Änd.-Mittg. Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb.			Gerät:	4040 / 4031	

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig

The RF power meter consists of a primary guide with two coaxial output couplings. One output coupling conducts part of the RF to the duplex stage. Via the other output coupling part of the RF goes to the electronics of the measuring head. The frequency rectified by G11 is boosted by a temperature-compensated amplifier and fed via another amplifier to the output, where a DC voltage proportional to the RF voltage finally appears.

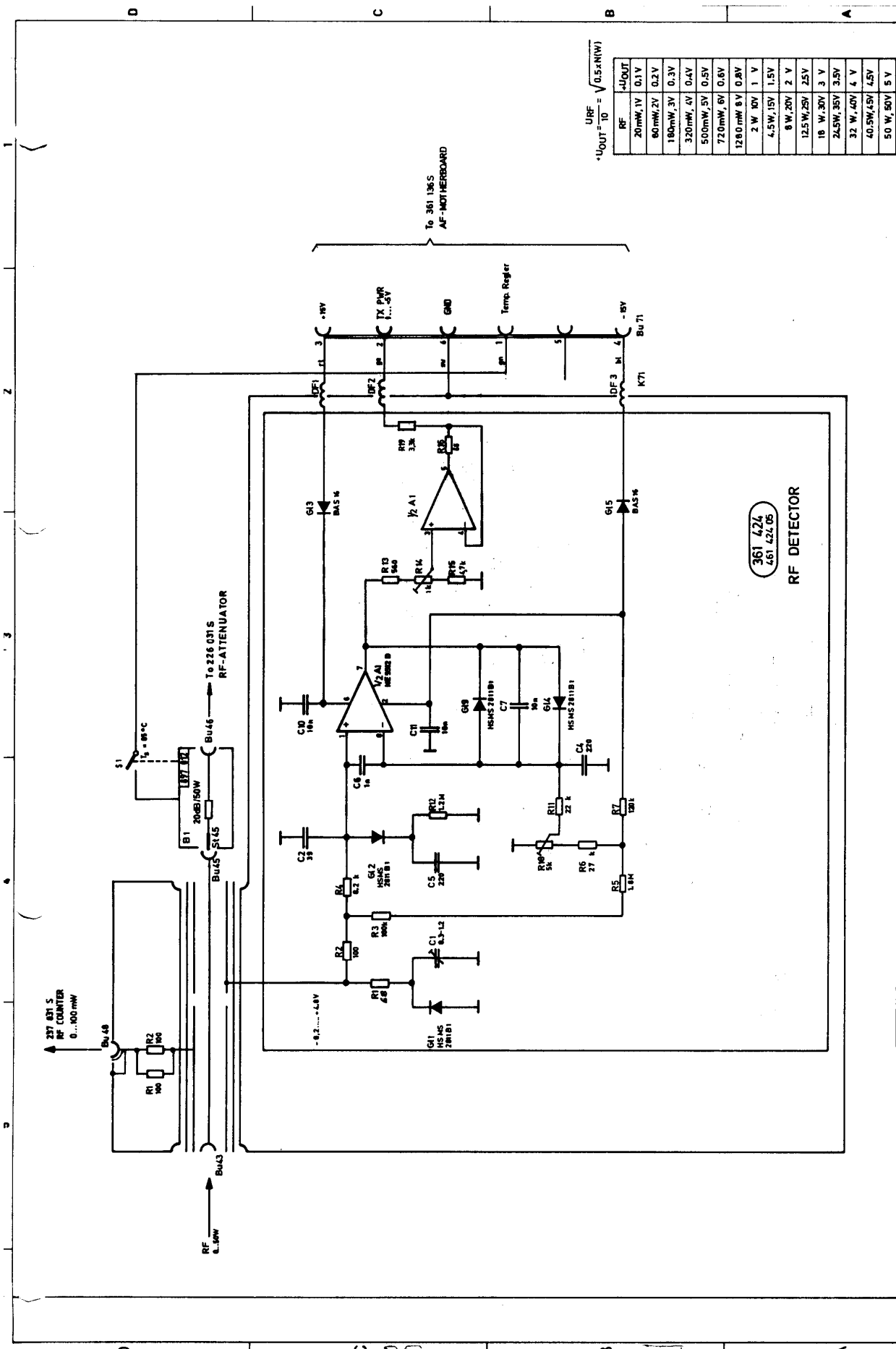
- 7088.22

Ref. No. 229 031 F	Sub RF Power Meter	Date 13.2.87
Type 4031	Unit	Sheet 1/1
Schlumberger	Functional Description	

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value
<p>Signal generator 2-1000 MHz, P_{max} 20 dBm</p> <p>Broadband power amplifier > 20 dBm,</p> <p>Boonton power meter +20 dBm DVM</p>	<p>1. Frequency response 2 MHz to 1 GHz, P_{max} 20 dBm</p> <p>Ensure that the test setup is properly RF, broadband and low in reflection. Select the LP filter so that RF distortion is > 45 dBc at the test frequency. The generator level is always adjusted so that the power meter shows 13 dBm.</p>  <p>Determination of frequency with average frequency response eg</p>  <p>f₀ < 500 MHz if possible because test setup is more stable</p>	<p>DVM</p> <p>DVM</p>	<p>550-1000 MHz</p> <p>2-960 MHz</p> <p>f₀ (50-500 MHz)</p>	<p>C1</p> <p>(C1)</p>	<p>Same DVM display = 100 mV ΔV_{max} = 15.500 MHz < 2.5 mV 2-15/500-960 < 3.5 mV</p>	
<p>Issue Alteration No. Date</p> <p>- 7088.11 21.1.87</p>	<p>Name</p>	<p>Name</p>	<p>Ref. No. 229 031 A</p>	<p>Sub Unit RF Power Meter</p>	<p>Type STABILLOCK 4031</p>	<p>Sheet</p>
Schlumberger						<p>1/2</p>

Adjustment and Test Procedure

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Ref. No. 229 031 A			Sheet	
							Issue	Alteration No.	Date		Sub Unit
DVM, Signal source	2. <u>Duplex output coupling</u> 50- Ω termination on Bu45 Coupling attenuation 3. <u>Zero point and linearity 20 mW</u> 50- Ω termination on Bu45 160 MHz, 8 W to Bu43 Zero point fine adjustment: 5 mW on Bu43 0 mW on Bu43 20 mW on Bu43	Bu43, 48	1 GHz		27 \pm 1 dB		27 MHz				
			w/o RF	R18 R14	5-10 mV						
			160 MHz/8 W		2 V \pm 20 mV						
			160 MHz		50 mV < 25 mV 100 \pm 5 mV						
							STABLOCK 4031			2/2	



$U_{OUT} = 10 \sqrt{0.5 \times N(W)}$

RF	U _{OUT}
20mW, 1V	0.1V
60mW, 2V	0.2V
180mW, 3V	0.3V
320mW, 4V	0.4V
500mW, 5V	0.5V
720mW, 6V	0.6V
1280mW, 8V	0.8V
2 W, 10V	1 V
4.5 W, 15V	1.5V
9 W, 20V	2 V
12.5 W, 25V	2.5V
18 W, 30V	3 V
24.5 W, 35V	3.5V
32 W, 40V	4 V
40.5 W, 45V	4.5V
50 W, 50V	5 V

RF-POWER METER

229 031 S
Gerät: 4031

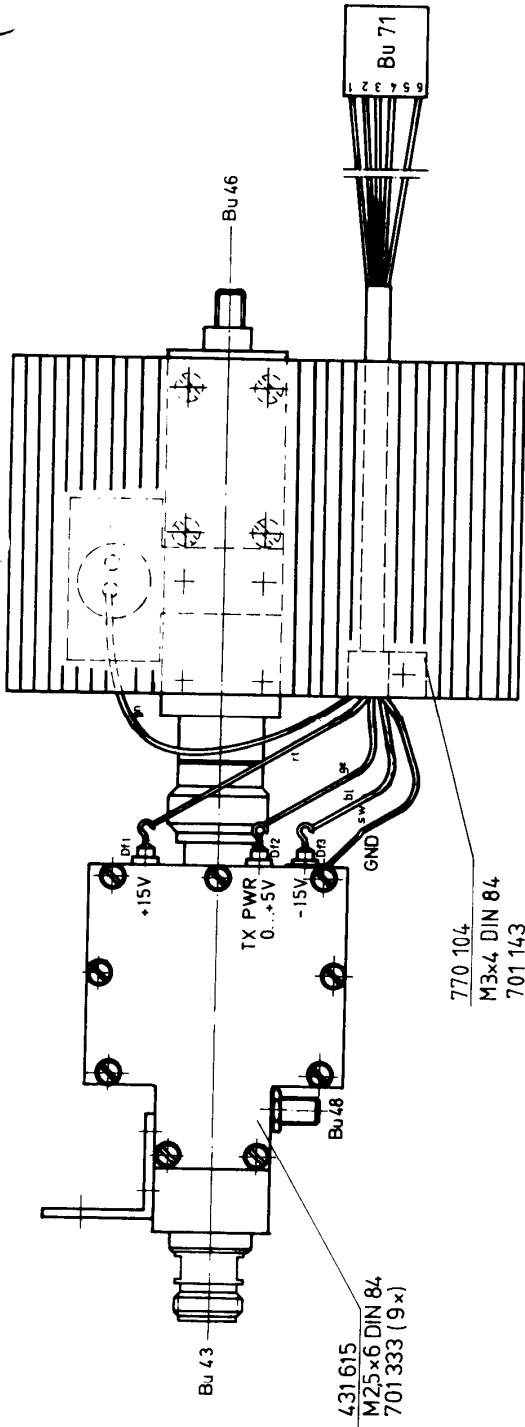
Schubertberger Messtechnik GmbH
Ingenieurstr. 50
8000 München 48

NO.	DATE	BY	REVISION
04	1988.02.04
07	1988.12.21
08	1988.03.21

Bitte beachten bei einer Expansion, Veranschaulichung, Nachbau oder sonstiger Vervielfältigung:

- W BLACK
- B BROWN
- R RED
- O ORANGE
- Y YELLOW
- GR GREEN
- BL BLUE
- W WHITE
- BR BROWN
- TR TRANSPARENT

weich gelötet



431 615
M2,5x6 DIN 84
701 333 (9 x)

770 104
M3x4 DIN 84
701 143
J3,2 DIN 6797
706 105

300 675

897 012
M3x30 DIN 84
701 155 (4 x)

501 051
mit Wärmeleitpaste
761 008 montiert

300 688
M3x4 DIN 84
701 143
J3,2 DIN 6797
706 105
2 x

○ = Kontrollmaß

verw. in: 202 231
Gerät : 4031

Schaltplanpositionierung = 229 031 S/Sa

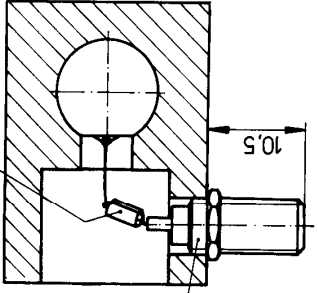
Fremd- Lieferanten		M1:1		Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46	
Rollen		1:1		RF-POWER METER	
Version		1986		Gerät: 031/202 231	
Oberfläche		gez. 23.10. Staffler		229 031	
No.		Name			
01 204.23 (2,2,2,2) S/Sa		Staffler			
02 706.21 (3,3,2,2) S/Sa		beard			
03 706.21 (3,3,2,2) S/Sa		66			
04 706.21 (3,3,2,2) S/Sa		66			
05 706.21 (3,3,2,2) S/Sa		66			
06 706.21 (3,3,2,2) S/Sa		66			
07 706.21 (3,3,2,2) S/Sa		66			
08 706.21 (3,3,2,2) S/Sa		66			
09 706.21 (3,3,2,2) S/Sa		66			
10 706.21 (3,3,2,2) S/Sa		66			

schnitt A-B
M2:1

weiß gelötet

Zeichnungs-u. Seriennummer eingepreßt

802 352 (2x)R1+R2 verdrillt und verlotet: stumpf aufgelötet



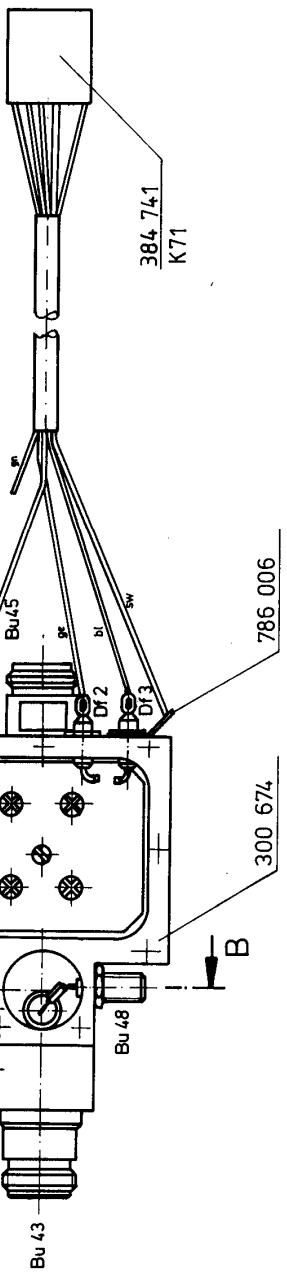
886 295 ohne Scheibe montiert lackgesichert

429 257
M3x5 DIN 84
701 144
J3.2 DIN 6797 (2x)
706 105

361 424
M25x5 DIN 7985
701 656 (4x)
401 061

816 044 (3x) stumpf auf Leiterplatte gelötet

229 031 XXXX

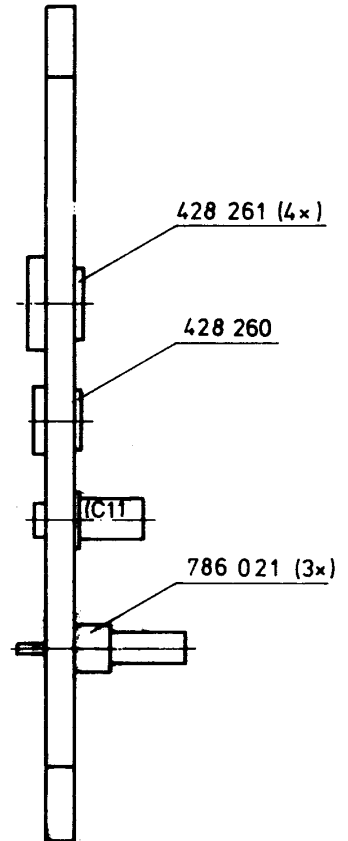
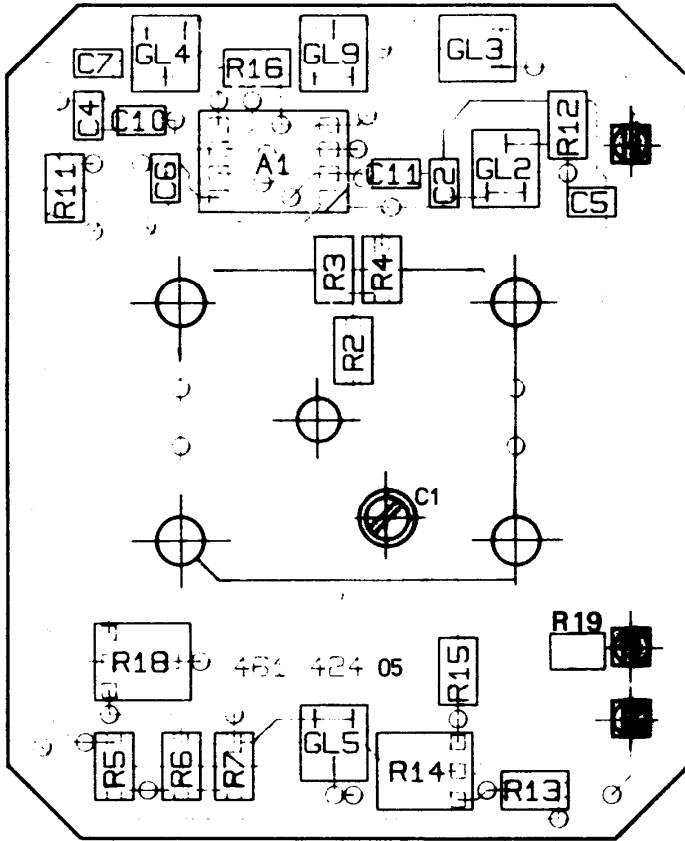


○ = Kontrollmaß

Schlumberger Meßgeräte GmbH Ingolstädter Straße 67 a 8000 München 46		RF-DETECTOR		300 675	
Maßstab	1:1 (2:1)	Name	Steiffler	Erstellt für	
Freimaß- toleranzen	±0,2	Datum	1985	bearb.	
		gez.	23.10.	gepr.	
Richtteil		Werkstoff		Oberfläche	
10					
09					
08					
07	802 352	A 12.8	SW		
06	706 105	67.17	C.S.		
05	701 144	20.8	SW		
04	701 656	15.22	SW		
03	706 105	10.2.87	No.		
02	401 061	5.77	SW		
01	361 424	30.10.85	SW		
Ausg.	Angg.	Datum	Name		
gepr.	gepr.				

verw. in: 229 031
Gerät : 4031

Schaltplanpositionierung ≈ 229 031 S/Sa



1	2	3	4	5	6	7	8
Pos REF. NO	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
				R 1	100 $\Omega \pm 1\%$	802 352	VAL
				R 2	100 $\Omega \pm 1\%$	802 352	VAL
1	Bestückte Leiterplatte	361 424	SCHL				
	hierzu	361 424 Sa		S 1	Typ 3106	848 006	Eberle
B1	Dämpfungsglied	897 012	SCHL				
				St 45	in B1	897 012	
Bu 43	99 24 16 - 00	886 326	SPINN				
Bu 45	99 24 17	886 026	SPINN				
Bu 46	in B1						
Bu 48	22 SMA - 50 - 0 - 3	886 295	SUHN				
Df 1	2x800 pF -20+50 %	816 044	CRL				
Df 2	2x800 pF -20+50 %	816 044	CRL				
Df 3	2x800 pF -20+50 %	816 044	CRL				
K 71	Kabelbaum	384 741	SCHL				

07				Schlumberger Meßgeräte GmbH			Schaltteilliste		Liste besteht LIST CONSISTS
06				Ingolstädter Straße 67a 8000 München 46			EL. PARTS LIST		
05							Benennung DESCRIPTION		aus OF
04							RF - POWER METER		Blatt SHEETS
03	8088.220	1.12.88	Staff				Bezeichnung Schlumberger PART. NO		Blatt Nr. SHEET NO
02	7088.179	15.12.87	Staff				229 031 Sa		
01	7088.27	4.3.87	Mo.	1986	Tag DATE	Name NAME	Hierzu Schaltplan SEE CIRCUIT DIAGRAM		
--	7088.25	25.2.87	Staff	geschr.	23.4.86	Coenen	229 031 S		
Ausgabe ISSUE	Änd.-Mittig. Nr. MODIFIC. NO	Tag DATE	Name NAME	bearb. gedr.		<i>Coenen</i>	Gerät: 4031		1

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

1	2	3	4	5	6	7	8
Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT	Pos. REF. NO.	Wert VALUE	Bezeichnung Schlumberger PART. NO.	Hersteller MANUFACT
A 1	NE 5512 D	834 207	VAL	G1 9	HS MS 2811 B 1	830 551	HP
				R 1	68 Ω ± 2 %	804 723	VAL
C 1	0,3...1,2 pF	817 070	TECKE	R 2	100 Ω ± 2 %	804 725	VAL
C 2	39 pF ± 5 %	813 230	VAL	R 3	100 kΩ ± 2 %	804 761	VAL
				R 4	8,2 kΩ ± 2 %	804 748	VAL
C 4	220 pF ± 5 % 50 V-	813 239	VAL	R 5	1,8 MΩ ± 2 %	804 776	VAL
C 5	220 pF ± 5 % 50 V-	813 239	VAL	R 6	27 kΩ ± 2 %	804 754	VAL
C 6	1 nF ± 5 % 50 V-	813 247	VAL	R 7	120 kΩ ± 2 %	804 762	VAL
C 7	10 nF ± 10 % 50 V-	813 332	VAL				
C 10	10 nF ± 10 % 50 V-	813 332	VAL	R 11	22 kΩ ± 2 %	804 753	VAL
C 11	10 nF ± 10 % 50 V-	813 332	VAL	R 12	1,2 MΩ ± 2 %	804 774	VAL
				R 13	560 Ω ± 2 %	804 734	VAL
				R 14	1 kΩ ± 25 %	807 737	BOU
				R 15	4,7 kΩ ± 2 %	804 745	VAL
				R 16	68 Ω ± 2 %	804 723	VAL
G1 1	HS MS 2811 B 1	830 551	HP				
G1 2	HS MS 2811 B 1	830 551	HP	R 18	5 kΩ ± 25 %	807 739	BOU
G1 3	BAS 16	830 552	VAL	R 19	3,3 kΩ ± 2 %	804 743	VAL
G1 4	HS MS 2811 B 1	830 551	HP				
G1 5	BAS 16	830 552	VAL				

07				Schlumberger Meßgeräte GmbH Ingolstädter Straße 67a 8000 München 46			Schaltteilliste EL. PARTS LIST		Liste besteht LIST CONSISTS aus OF 1
06									
05							Bezeichnung Schlumberger PART. NO. 361 424 Sa		Blatt Nr. SHEET NO
04							Hierzu Schaltplan SEE CIRCUIT DIAGRAM 229 031 S		
03	8088.79	15.5.88	Re	1986	Tag DATE 15.7.86	Name NAME Dietrich			
02	7088.163	5.11.87	Di						
01	6088.59	22.11.86	Staff						
-	6088.52	10.11.86	Re	geschr.					
Ausgabe ISSUE	Änd.-Mittig. Nr. MODIFIC. NO.	Tag DATE	Name NAME	bearb. gedr.			Gerät: 4031		

Diese Zeichnung ist unser Eigentum. Vervielfältigung, unbefugte Verwertung, Mitteilung an andere ist strafbar und schadenersatzpflichtig.

The IF unit can roughly be divided up into: AM demodulator, FM demodulator, AF section, squelch, IF counter and digital controller.

1. AM demodulator

The IF signal is preset to levels between -5 and -15 dBm with the aid of the attenuator and preamplifiers. In this way the necessary dynamic range of the AM detector is limited to 10 dB. The AM detector is based on the principle of an envelope demodulator and is implemented with an LM 318. The Schottky dual diode BAS 7004 represents the rectifier. In demodulation there is approximately the same load on the positive and negative envelope, which prevents nonlinear distortion. In the region of the threshold voltage of the Schottky diode the op-amp sees no feedback, sets its gain from a factor of 1.25 to 10^5 and bridges the threshold-voltage interval with its inherent speed. For this reason the threshold voltage of the Schottky diode reduces from 0.4 V to virtually 0.0 V. With the voltage divider based on R87 the change in amplification is compensated by spread between the units of the entire AM demodulator including the AF section. This precise level adjustment means that even very low power could be measured by way of the AM branch.

2. FM demodulator

2.1 FM broadband

The IF signal can be processed broadband, ie 450 ± 30 kHz, with an input level on the IF unit of 0 to -40 dBm. The 40-dB dynamic range is produced by the preamplifier and the voltage comparator, which converts the IF signal to TTL levels. The signal conditioned in this way is fed as an input to the FM discriminator. The switching threshold of the voltage comparator is fixed. The FM discriminator works as a count discriminator. This has a linear characteristic, therefore the frequency/voltage conversion is linear. To make the monoflop independent of thermal effects, its supply voltage is generated separately by a stabilizer circuit. The pulse width is set to approx. $1.3 \mu\text{s}$ ($\pm 0.1 \mu\text{s}$) by an RC network. The following pulse amplifier produces better temperature stability and greater sensitivity in the FM discriminator.

- 8088.30

Ref. No. 229 032 F	Sub IF Stage	Date 25.12.88
Type 4031	Unit	Sheet 1/9

Schlumberger Functional Description

A DC voltage is produced for an unmodulated carrier frequency of 450 kHz on the following lowpass filter, this appearing as 0 V because of the compensation voltage of the DAC. Intermediate frequencies < 450 kHz appear at the AF output as positive voltage and those > 450 kHz as negative voltage with sensitivity of 200 mV/kHz. In the AF filter not only the voltage pulses of the monoflop are integrated, the carrier component (usually 450 kHz) is also filtered out of the AF. The frequency offset of the synthesizer in duplex mode is compensated by a D/A converter. The setting accuracy of the synthesizer is ± 32 kHz. The expected offset of the synthesizer is calculated in advance by the μP and preset by the DAC. Voltage transients of the AF output are avoided with the aid of the squelch. While the DAC is presetting, there is no input signal on the IF unit and so the squelch disables the output. The DAC can alter the offset in 333 Hz ($\pm 10\%$) per increment. This accuracy is produced by the two reference sources D5 and D6, which define the control-voltage range precisely to ± 42.5 kHz with the aid of the two spindle trimmers R125 and R126. The following op-amp serves as a current/voltage converter and is configured as an inverting amplifier. The output of the op-amp is a voltage value with which the DC voltage of the discriminator can be compensated to zero.

2.2 FM narrowband

The signal path and working of the circuit are the same for FM broadband and FM narrowband, with the exception of the interconnection of a two-stage 40-dB amplifier with ceramic filter in the input. This improves the sensitivity and selectivity of the squelch and of the IF offset counter by 40 dB.

2.3 PM

In phase modulation the IF signal is fed through the entire FM discriminator and the AF filter as for FM. For phase modulation a deemphasis is necessary however. For this purpose an active highpass filter consisting of A16 and A21 is interconnected after the AF amplifier.

Ref.No. 229 032 F		Sub IF Stage		Date <i>25.2.88</i>	
Type 4031		Unit		Sheet 2/9	
Schlumberger			Functional Description		

- 8088.30

3. Squelch

The squelch is derived from the IF signal level. The level is measured by a voltage comparator with reference level. This reference level is set low-impedance across R42 and R39. If the reference level is exceeded by the signal level, voltage comparator A3 pulls its output Low, the following integrator network discharges, the subsequent voltage comparator A5 goes High and thus disconnects the AF section from the output. To avoid any flutter of the output switch for signal levels about the switching level, switching hysteresis of approx. 4 dB is implemented with R100, R99 and R80. The squelch has the same switching level for FM broadband and Φ M. For AM and FM narrowband the squelch is suppressed by the software.

4. AF section

4.1 AF filter

The AM and FM demodulators have a common AF section. This includes the AF filter and the AF amplifier with output buffer. The AF filter is a three-section lowpass filter (6th-order Chebyshev) with ripple of 0-20 kHz < 0.5 dB. Carrier suppression is usually > 60 dB.

4.2 AF amplifier

The AF amplifier with its variable gain between a factor of 14 and 15 increases the sensitivity of the discriminator to 200 mV/kHz. This is set with trimming potentiometer R211. The conditioned AF is fed via output switch D13 to output buffer A22 and as a TX demodulated signal to pin A27 of connector St64/ $Z_i = 0 \Omega$, and from there by way of the motherboard to the AF detector.

5. IF counter

The IF counter is fed with the TTL signal of the limiter amplifier. The final count is made in the timer outside of the IF circuit board. The timer can count maximally 100 kHz with sufficient accuracy, so the IF frequency is divided by ten with D10-A and conducted via the selection logic D14-C, D14-B and D14-A as IF frequency or the IF offset frequency as IF count signal via pin A12 to the timer.

- 20.11.30

Ref.No. 229 032 F	Sub IF Stage	Date 25.11.88
Type 4031	Unit	Sheet 3/9
Schlumberger		Functional Description

The IF offset frequency must satisfy a requirement for 1 Hz accuracy, whereas 10 Hz accuracy is sufficient for the IF frequency. The 8 MHz/600 mV_{pp} is converted to TTL levels with line receiver A6. Division of the master-crystal frequency 8 MHz by 16 produces a very accurate 500-kHz signal that can be mixed with the IF frequency. Mixing on D15-C results in a difference frequency, accurate to 1 Hz, between 20 and max. 80 kHz, depending on the IF frequency, that is applied to the timer via the selection logic. The mixer is followed by a bandpass filter to reject the sum mixed frequency. If the IF counter is operated as an RF counter, a frequency between 7.3 and 245 kHz will appear on IF count pin St64/A12.

The TX offset is produced by dividing the very accurate 500 kHz by ten and subsequent mixing with the IF offset frequency on D15-B. This results in a difference frequency of 0-30 kHz, maximally 3 kHz being permitted by the bandwidth limiting. This is again done by precisely scaled lowpass filters, the sum mixed frequency being eliminated automatically. Monoflop D16-A produces the necessary pulse slope so that signals of as little as 1 Hz can be heard properly, as is necessary for very precise adjustments.

6. Digital controller

The IF unit is controlled entirely digitally by the μ P. For this purpose there is a slave device bus and an 8-bit data bus. Two bits of the SD bus (A5, A6) are used for board addressing and four bits (A7, A8, A9, A10) for device addressing D23. D23 (1-out-of-16 decoder) selects three addresses of 16 possible ones and provides the remaining 13 for the addressing of options.

IF device addressing:

Slave device bus		Device
CB2	MSB	LSB
↓	XX110100	Latch for switching functions
↓	XX110010	Latch for D/A converter
↓	XX110001	Signal for squelch and activation of ident bits

The latches react active High and the signalling line active Low. The following switching functions can be implemented with the data bus:

Ref.No. 229 032 F Type 4031	Sub IF Stage Unit	Date <i>25.2.88</i>
		Sheet 4/9
Schlumberger		Functional Description

MSB	D ₇	1/0	IF offset/IF frequency applied to A ₁₂
	D ₆	1/0	AM/FM switchover
	D ₅	1/0	FM narrowband on/off
	D ₄	1/0	ΦM/FM switchover
	D ₃	1/0	Disable/enable squelch
	D ₂	1/0	Analyzer on/off
	D ₁	1/0	Analyzer filter 15 kHz/3 kHz bandwidth
	D ₀	1/0	FM broadband on/off

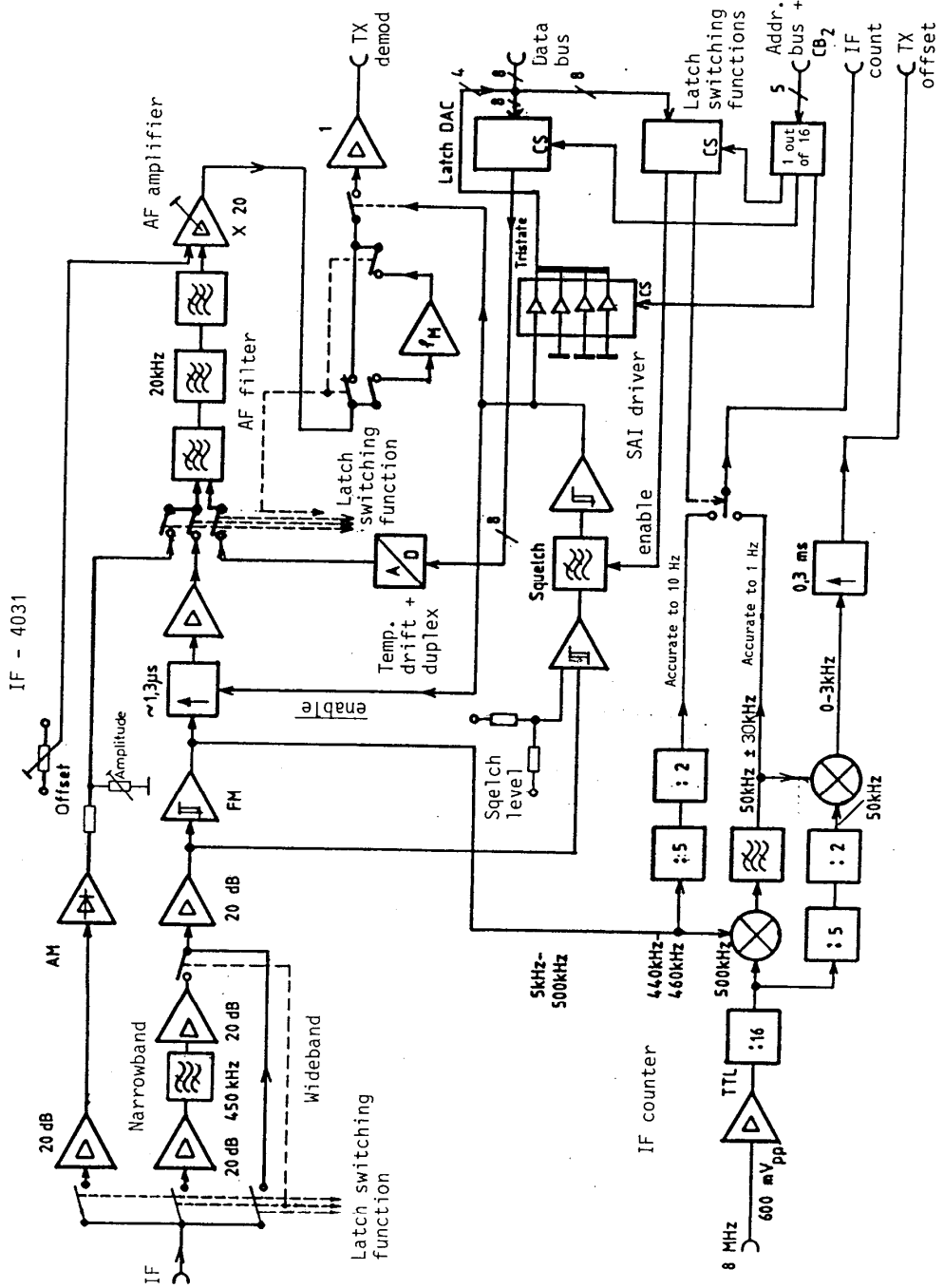
With the latch for the D/A converter it is possible to cover a range of 450 kHz \pm 42.5 kHz with a stepping width of approx. 333 Hz.

The signalling line of the squelch can only be sampled during the address pulse (MSB).

MSB-1 and MSB-2 also function as ident bits, enabling the software to detect the hardware modification status of the IF unit.

Ref.No. 229 032 F Type 4031	Sub IF Stage Unit	Date <i>25.2.88</i>
		Sheet 5/9

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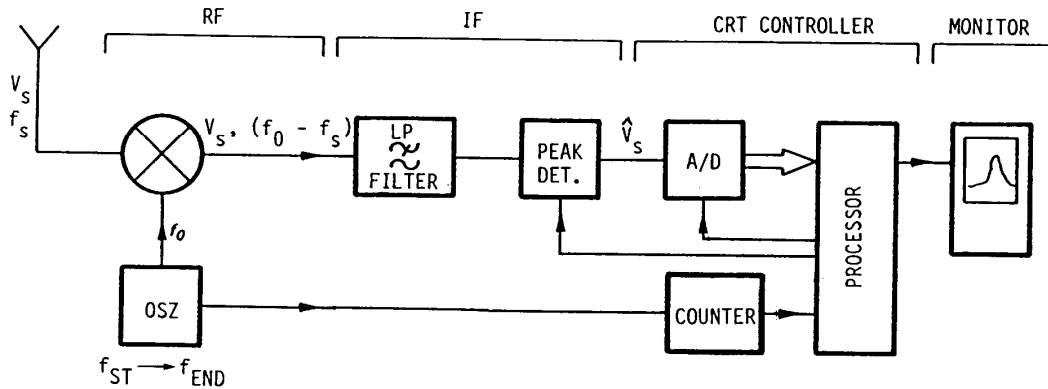


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Ref.No. 229 032 F Type 4031	Sub IF Stage Unit	Date 25.2.88
		Sheet 6/9

Analyzer

1. System description



A speciality of this spectrum analyzer is that the RF signal is down-converted directly into the AF region. If the signal voltage of the difference frequency $|f_0 - f_s|$ is within the passband of the low-pass filter, the signal variable \hat{V}_s can be measured at its output and be shown related to the frequency $|f_0 - f_s|$.

The peak detector forms the peak-voltage value \hat{V}_s of the voltage V_s , which is quantized by an 8-bit A/D converter and fed to the processor. In order to achieve the required dynamic range of > 70 dB for the analyzer, despite the low resolution of the converter (8 bits = maximum possible resolution of 48 dB), the signal is divided into three dynamic ranges. Range $\times 1 \hat{=} 0$ dB, range $\times 10 \hat{=} -20$ dB, range $\times 100 \hat{=} -40$ dB. These ranges are sampled by the A/D converter one after the other and quantized, the processor providing for complete evaluation:

- selection of the momentarily required dynamic range,
- logarithmizing of the measured signal voltage,
- assignment of the signal frequency f_s ,
- display of the measured result on the screen.

Ref.No. 229 032 F Type 4031	Sub IF Stage Unit	Date <i>27.2.89</i>
		Sheet 7/9
Schlumberger		Functional Description

- 7088.33

2. Circuit description of analyzer part of IF

The RF signal (St64, B15) down-converted to the AF range is fed via the lowpass filters (15 kHz, 3 kHz) and D32 to three peak detectors. (The filter bandwidth of the spectrum analyzer can be switched between 30 kHz and 6 kHz.) Here the peak value of the signal is measured in three dynamic ranges (x1, x10, x100).

The control logic, triggered by groups of three pulses from the CRT controller, switches the peak values one after the other by means of switch D33 to buffer A43 and then resets the three peak detectors. The voltage following buffer A43 is measured by the A/D converter on the CRT controller (always when the different peak values are applied).

A new group of three pulses initiates application of the next peak values.

Special features

Peak detectors

The three peak detectors are entirely identical in design. Each consists of a detector for the positive peak voltage and, following an inverter, a detector for the negative peak voltage. The greater of the two voltages is held on the capacitor (C215, C216, C220).

Control logic

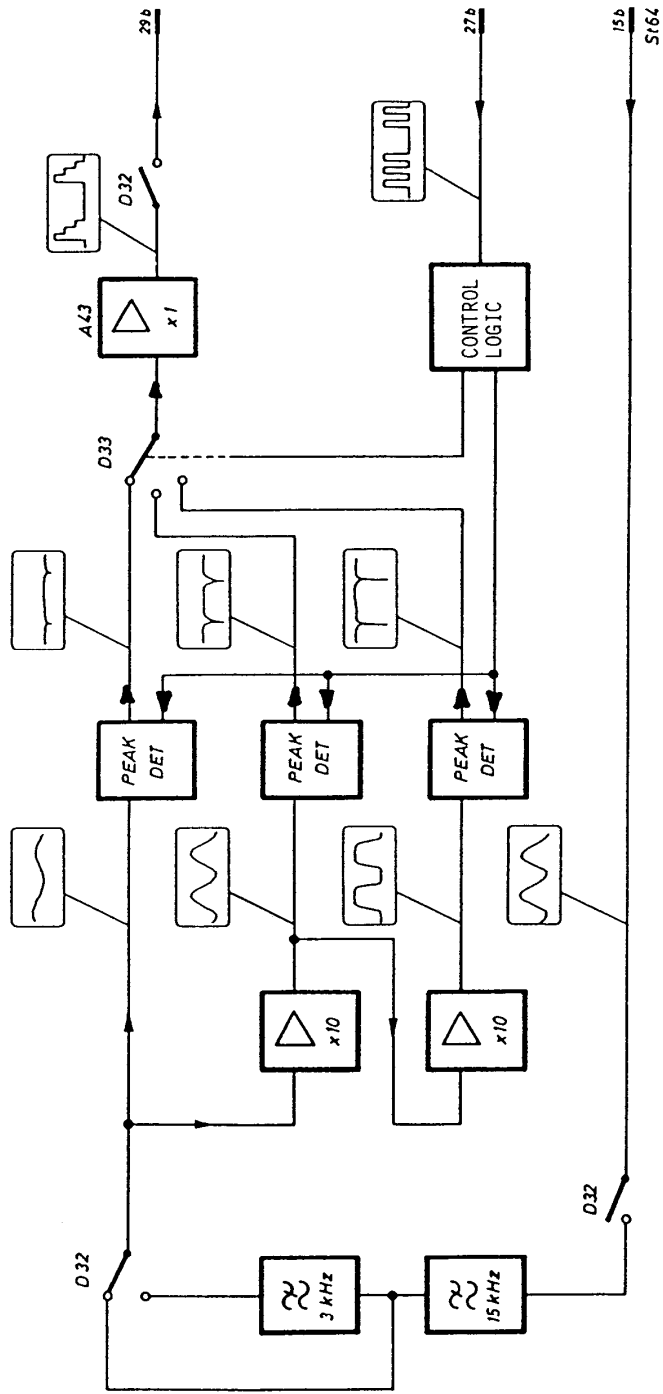
Each pulse of the group of three pulses increments the 1-out-of-10 counter (D30) by one place and thus switches the three peak values of the peak detectors through to the buffer (A43). The monoflops (D34) are then individually retriggered. After the third pulse, when monoflop D34-A has already released and D34-B is still held, the three peak detectors are discharged to ground via the switches D33. At the same time recharging of the capacitors is prevented by the transistors (BC 850 B). The counter (D30) is reset during this interval.

Input/output switch in D32

In non-analyzer mode the input signal is taken to ground (D32 10/11) and the output signal isolated (D32 15/14).

- 7088.33

Ref.No. 229 032 F	Sub IF Stage	Date 27.2.87
Type 4031	Unit	Sheet 8/9
Schlumberger		Functional Description



- 70 88.93

Ref. No. 229 032 F Type 4031	Sub IF Stage Unit	Date 16.1.87
		Sheet 9/9

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Issue	Alteration No.	Date	Name	Date	Name	Ref. No.	Sub IF Unit	Sheet
							Alteration No.	Date	Name	Date	Name	Type	1/12		
IF adapter, DVM	<p>Set and check voltages</p> <p>+15 V</p> <p>-15 V</p> <p>+5 V A</p> <p>+5 V D</p>	Mp17 Mp18 Mp19 Mp20	DC DC DC DC		+15 V ± -15 V ± +5 V ± +5 V ±										
Signal generator	<p>Set FM broadband</p> <p>Set DAC to zero</p> <p>Set IF = 407500 Hz</p> <p>Set DAC to 1</p> <p>Set IF = 492500 Hz</p> <p>Check:</p> <p>Set IF = 450 kHz</p> <p>Set DAC to centre</p>	Mp4 Mp4 Mp4	DC DC DC	R126 R125	0 V ±5 mV 0 V ±5 mV 0 V ±30 mV										
IF adapter, DVM, Signal generator	<p>AM</p> <p>Set AM path</p> <p>Offset without input level</p> <p>Feed in 450 kHz/-5 dBm unmod.</p> <p>450 kHz/-15 dBm, 70% AM, f_{mod} 1 kHz</p>	Mp4 Mp4 Mp4	DC DC 1 kHz	R92	0 V ±20 mV 2.5 ±0.2 V 0.79 V _p ±0.55 V										

MSB	LSB	CB2
00101XX0		↓
00000000		↓

Data bus
11111111
↓

MSB	LSB	CB2
00101XX0		↓

Necessary Equipment		Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	
Issue	Alteration No.							
Audio analyzer		<u>AF frequency response</u> 450 kHz/-5 dBm, 70% AM, f_{mod} 1 kHz <u>AF distortion</u> 450 kHz/-15 dBm, 70% AM, f_{mod} 3 kHz	Mp4 Mp4	3 kHz 10 kHz 3 kHz		±0.1 dB ±0.3 dB < 2%		
Schlumberger		Adjustment and Test Procedure						Sheet 2/12
Alteration No.		Name		Date		Ref. No.		
7088.171		23.11.88				229 032 A		
Issue		Name		Date		Type		
						STABLOCK 4031		
Alteration No.		Name		Date		Sub IF Unit		

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Sheet								
							Sub Unit	IF Unit							
IF adapter, Signal generator, DVM	<p>FM</p> <p>Set FM broadband</p> <table border="1" style="margin-left: 20px;"> <tr><td>MSB</td><td>LSB</td><td>CB2</td></tr> <tr><td>00101XX0</td><td></td><td>↓</td></tr> </table> <p>Feed in 450 kHz unmod./0 dBm (B15) Offset adjustment with DAC 20 kHz dev., f_{mod} 1 kHz, 0 dBm Check: Feed in 470 kHz unmod./0 dBm Set maximum sensitivity 3 kHz dev., f_{mod} 1 kHz, amplitude < -40 dBm</p> <p>Squelch</p> <p>Enable squelch Set 450 kHz unmod./-42 dBm Turn trimmer until squelch just switches Check: Alter level without attenuator between -34 and -46 dBm. Squelch cuts out at -40 dBm ±2 dB and in with hysteresis of approx. 2 dB</p>	MSB	LSB	CB2	00101XX0		↓	Mp4 Mp4 Mp4 Mp4	DC 1 kHz DC 1 kHz	(0 bus) R211 R50	50 mV 4 V _p ±20 mV 4 V ±20 mV ~				
		MSB	LSB	CB2											
00101XX0		↓													
Ref. No. 229 032 A	Sub Unit	IF Unit	Sheet 3/12												
Signal generator		Mp9 Mp9	DC DC	R42	TTL (High) TTL (High)		Type STABILLOCK 4031								
Schlumberger		Adjustment and Test Procedure													

Schlumberger		Adjustment and Test Procedure											Sheet
Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value							
IF adapter, Audio analyzer, Signal generator	AF frequency response 450 kHz/-20 dBm, 20 kHz dev. referred to f_{mod} 1 kHz	Mp4 Mp4 Mp4	3 kHz 10 kHz 20 kHz		< ± 0.1 dB < ± 0.2 dB < -2 dB								
Audio analyzer	Noise 450 kHz/-20 dBm, 3 kHz dev., f_{mod} 1 kHz (CCITT)	Mp4	1 kHz		> 60 dB S/N								
	AF distortion, FM broadband 450 kHz/-20 dBm, 6 kHz dev., f_{mod} 3 kHz	Mp4	3 kHz		1%								
Peak dev. meter	Peak spurious deviation, FM broadband 450 kHz unmod./-30 dBm	Mp4	DC		< 15 Hz								
Issue	Alteration No.	Date	Name	Issue	Alteration No.	Date	Name	Ref. No.	229 032 A	Sub Unit	IF Unit	Sheet	
-	7088.171	23.11.87										4/12	
								Type	STABILOCK 4031				

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Sheet				
							Sub Unit	IF Unit	Sheet	5/12	
IF adapter, Audio analyzer, Signal generator	<p> MSB LSB CB2 00001XX1 ↓ </p> <p> Set FM narrowband 450 kHz/-40 dBm, 3 kHz dev., f_{mod} 1 kHz Offset adjustment with DAC Measure sensitivity 450 kHz/-77 dBm, 3 kHz dev., f_{mod} 1 kHz AF distortion, FM narrowband 450 kHz/-70 dBm, 3 kHz dev., f_{mod} 6 kHz Peak spurious deviation, FM narrowband 450 kHz/-50 dBm unmod. </p>	Mp4	1 kHz		600 mV _p ±6 mV						
		Mp4	1 kHz		20 dB SINAD						
		Mp4	6 kHz		< 2%						
		Mp4	DC		< 15 Hz						
Issue	Alteration No.	Date	Name	Issue	Alteration No.	Date	Name	Ref. No.	Sub Unit	IF Unit	Sheet
-	7088-171	23.11.87						229 032 A			
								Type	STABLOCK 4031		

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Revision History				Sheet						
							Issue	Alteration No.	Date	Name		Sub Unit	IF Unit				
	<p>Phase modulation</p> <table border="1" style="margin-left: 20px;"> <tr> <td>MSB</td> <td>LSB</td> <td>CB2</td> </tr> <tr> <td>00111XX0</td> <td>↓</td> <td></td> </tr> </table> <p>Set ϕ_M 450 kHz/-20 dBm, 1 rad, f_{mod} 1 kHz</p> <p>Frequency response ϕ_M 450 kHz/-20 dBm, 2 rad (referred to f_{mod} 1 kHz)</p> <p>Distortion ϕ_M 450 kHz/-20 dBm, 6 rad, f_{mod} 3 kHz</p>	MSB	LSB	CB2	00111XX0	↓		Mp4 Mp4 Mp4	1 kHz 0.3-3 kHz 0.2-10 kHz 3 kHz	R221	200 mV _p < ±0.2 dB < ±0.4 dB < 1%		Ref. No. 229 032 A	Type STABLOCK 4031			6/12
MSB	LSB	CB2															
00111XX0	↓																
							Issue	Alteration No.	Date	Name	Sub Unit	IF Unit					
							-	7088.171	23.11.87								

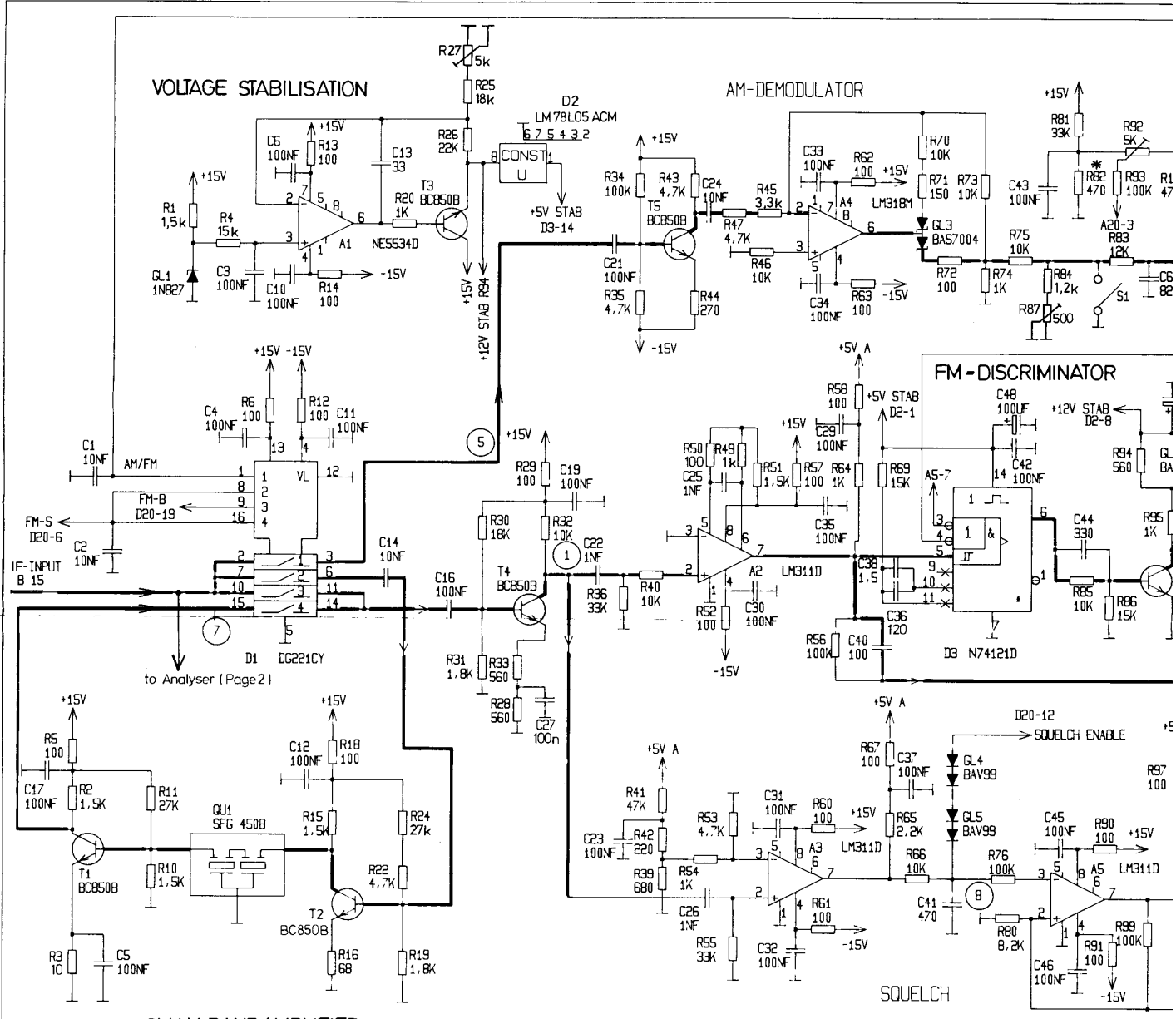
Schlumberger

Adjustment and Test Procedure

Necessary Equipment	Measuring Procedure	Measuring Point	Frequency	Adjustment	Set Value	Actual Value	Ref. No. 229 032 A				Sub IF Unit	Sheet	
							Alteration No.	Date	Name	Alteration No.			Date
	<p>Check of digital controller Replace connection with St64/27b Feed in 500 MHz/0 dBm on RF socket Analyzer must display 500 MHz with approx. 0 dBm</p>												
							6088.54	25.3.88					

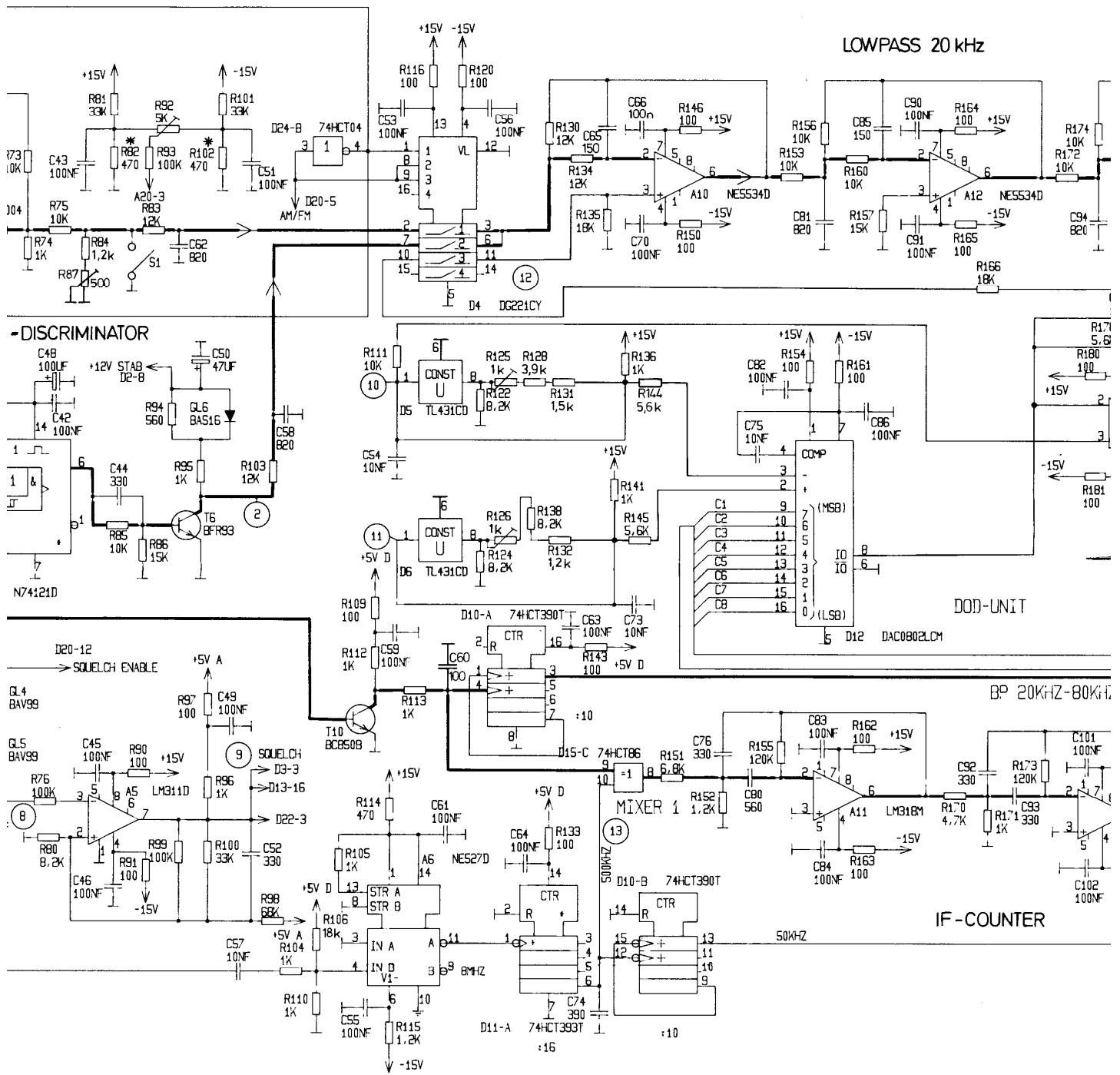
Schlumberger

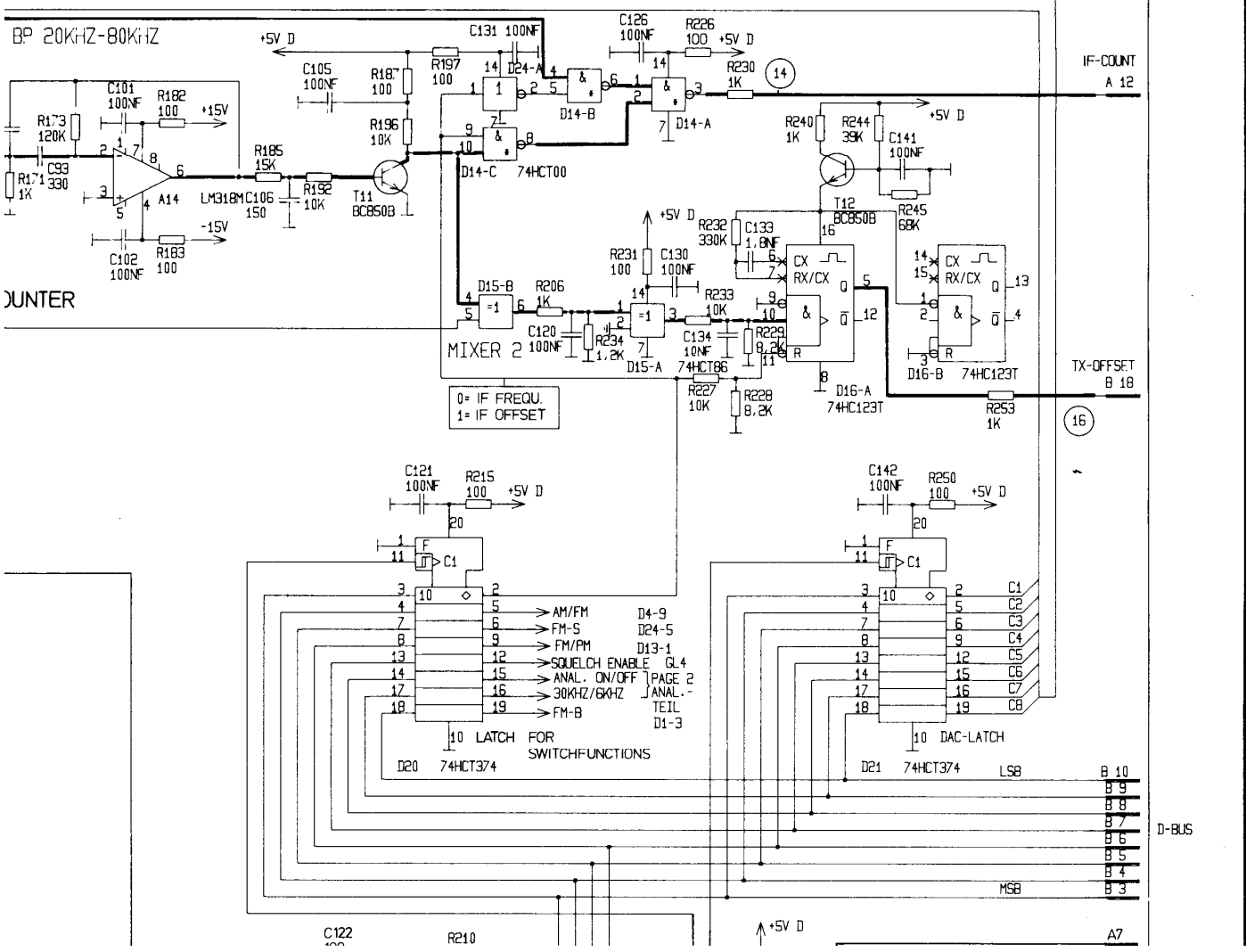
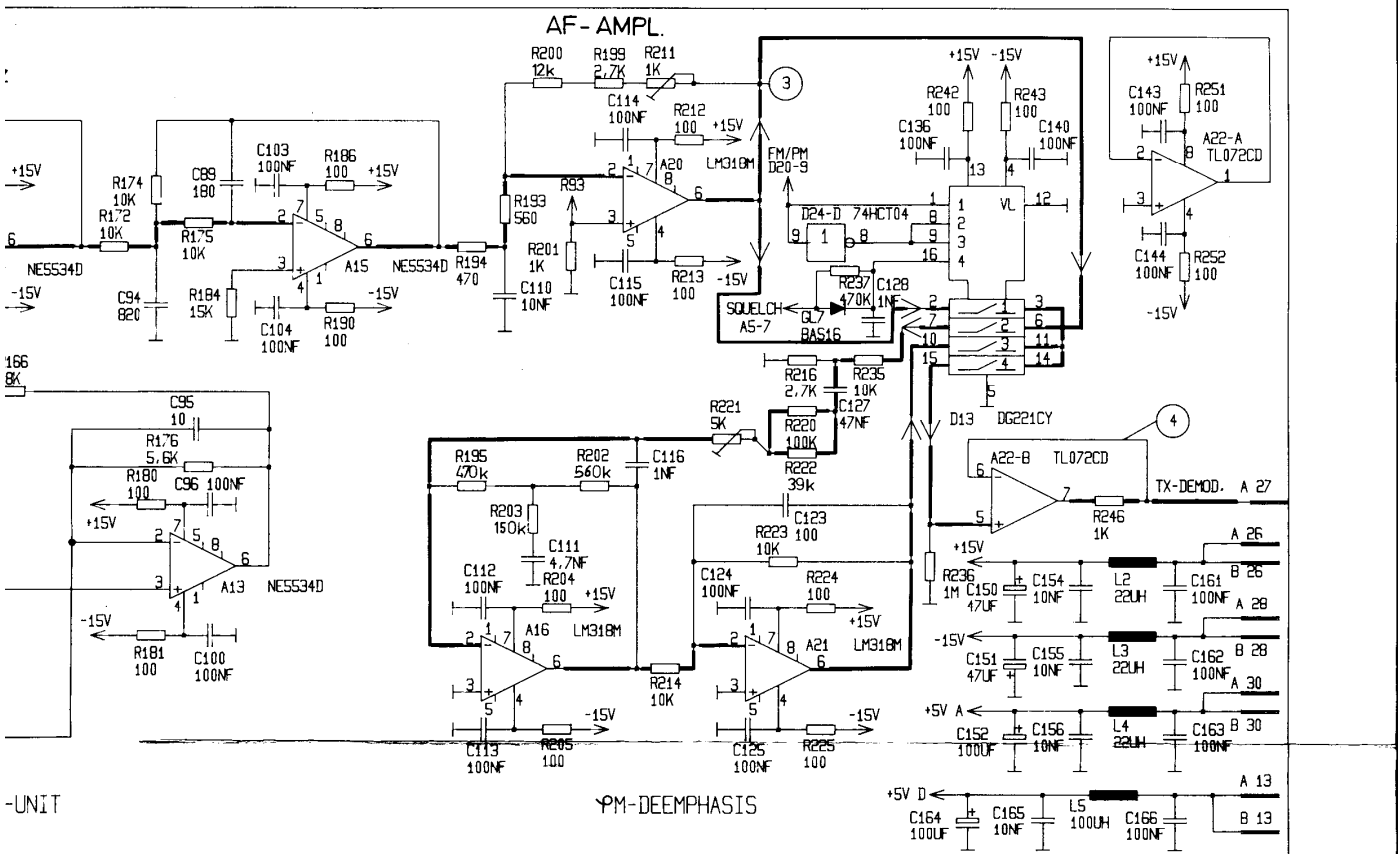
Adjustment and Test Procedure

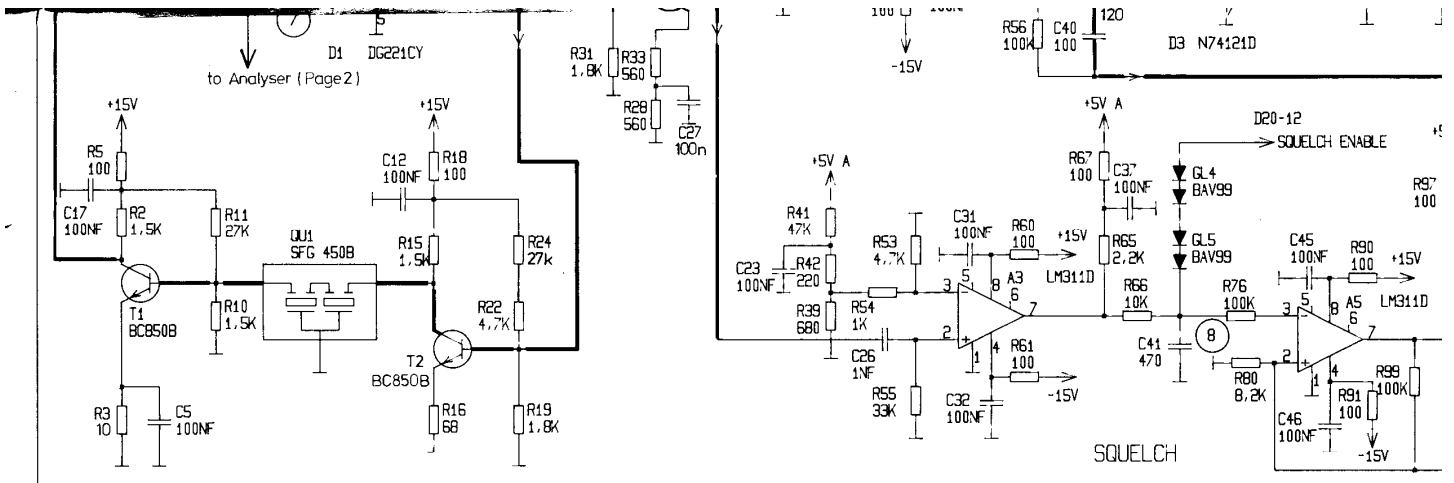


8MHz
 A 32
 600mV PP

* ≙ Prüffeldwert







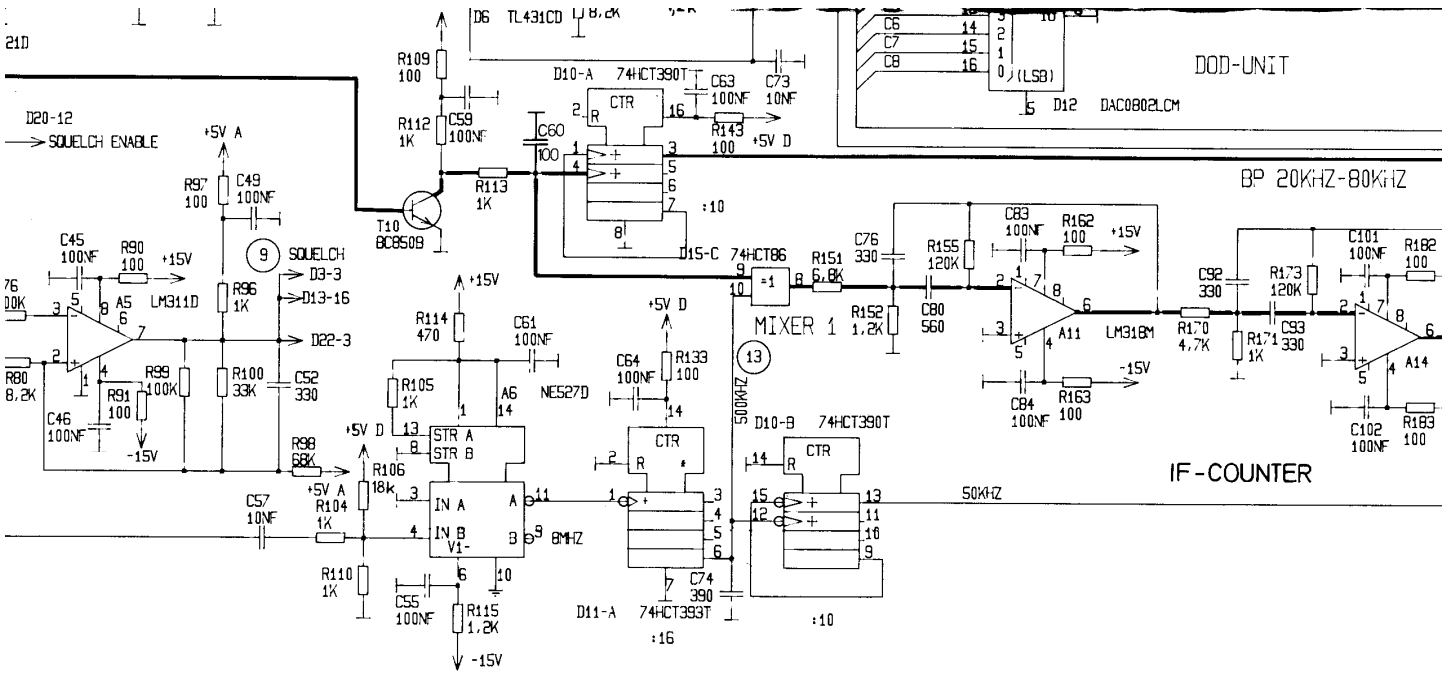
SMALLBAND AMPLIFIER

8MHz

A 32
600MV pp

* ≙ Prüffeldwert

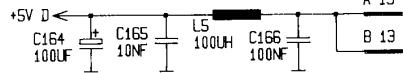
21D



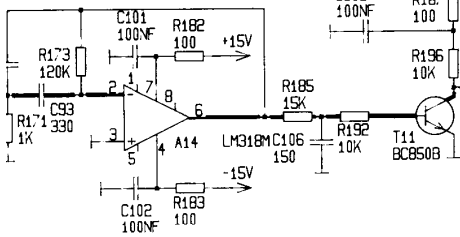
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02 BROWN	06 VIOLET	12 01
03 RED	07 GREY	13
04 ROSE	08 WHITE	14 A-51
05 YELLOW	09 TRANSPARENT	15
10 GREEN		

UNIT

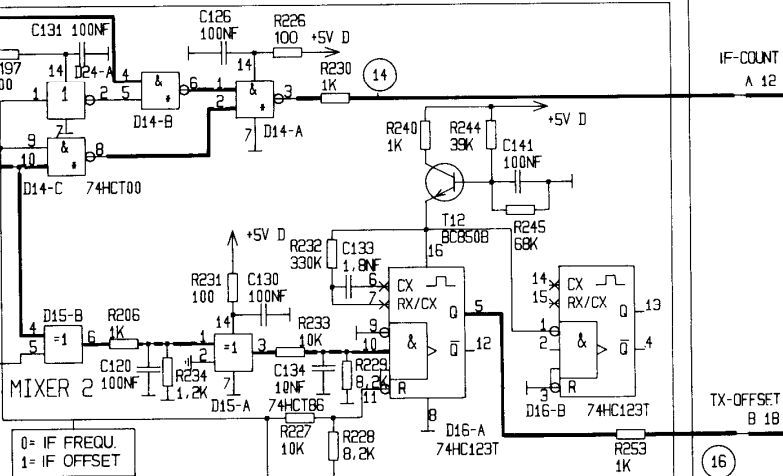
PM-DEEMPHASIS



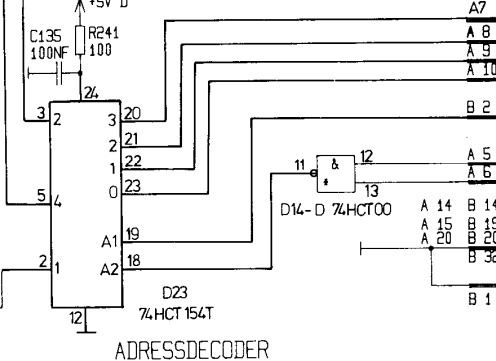
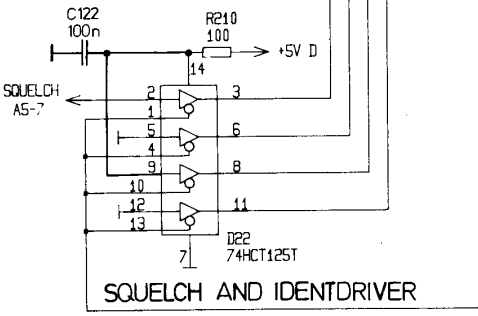
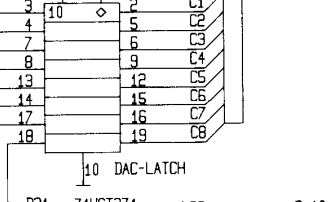
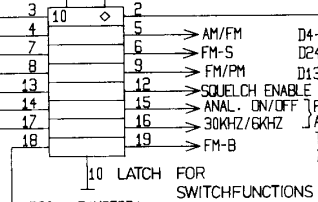
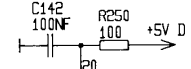
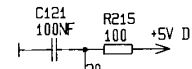
BP 20KHZ-80KHZ



UNTER



0 = IF FREQU
1 = IF OFFSET



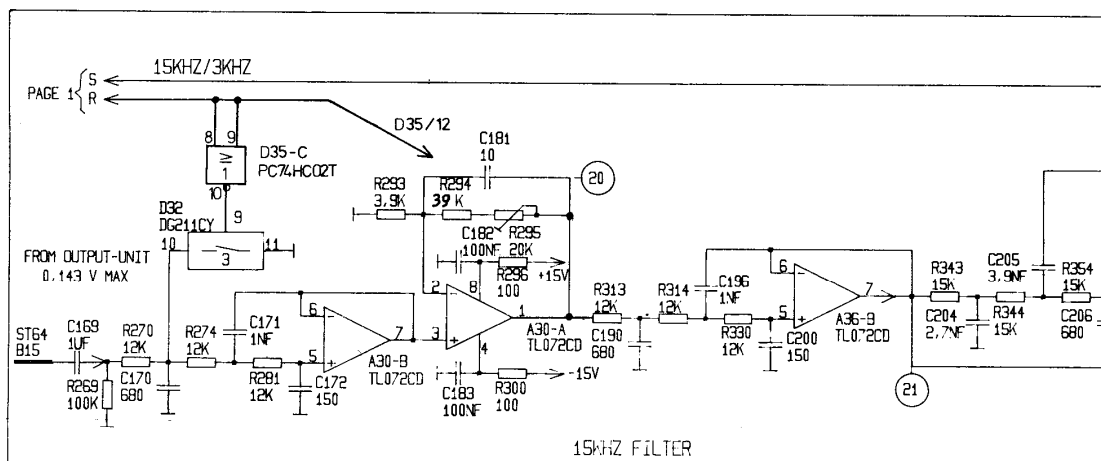
BLACK	b. BLUE
BROWN	v. VIOLET
RED	gr. GREY
ROSE	ws. WHITE
YELLOW	tr. TRANSPARENT
GREEN	

02	8088.54	24.3.88	Ca	norm	
01	7088.177	1.12.87	Kr	gepr	
-	7088.142	25.3.87	Kg	bepr	25.9.
Autz	A	Mitg	Datum	Notiz	Datum
ISS	MODE	DATE	NAME		1387

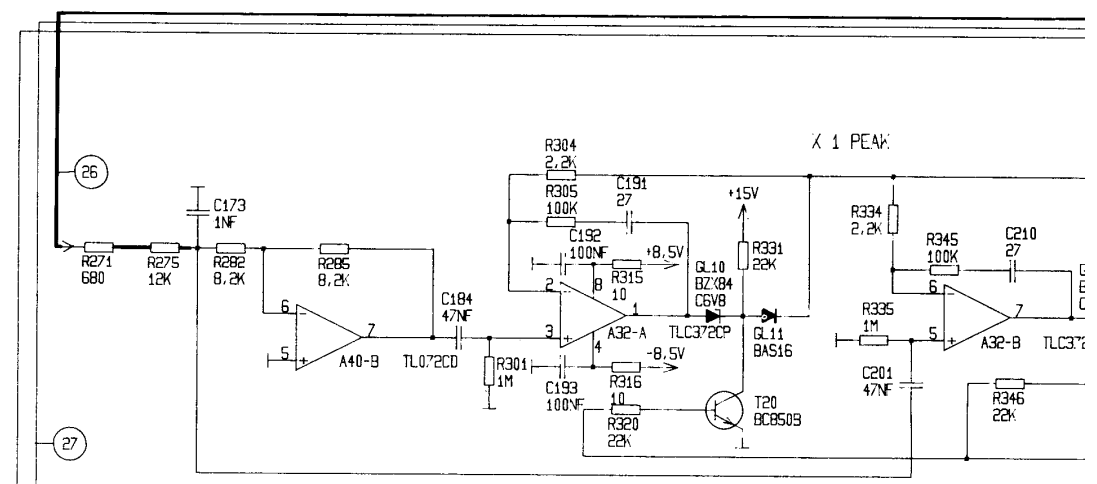
Schlumberger Meßgeräte GmbH
Ingolstädter Straße 67a
8000 München 48

IF UNIT

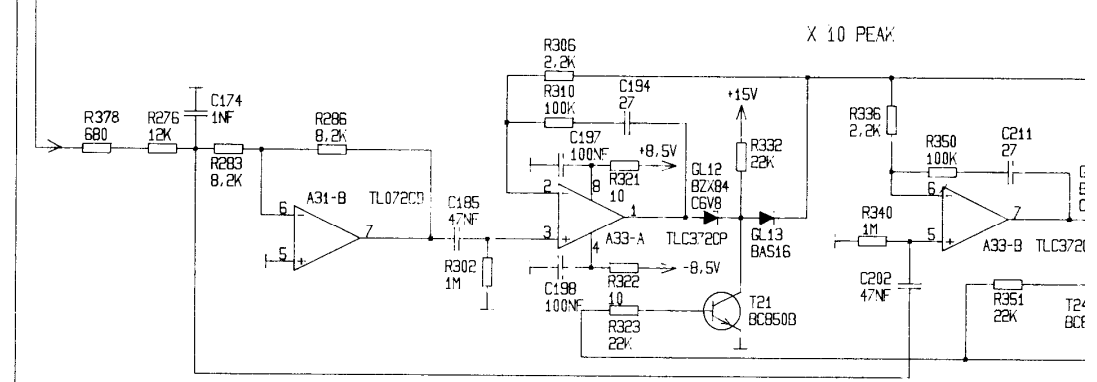
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Typ: 4031



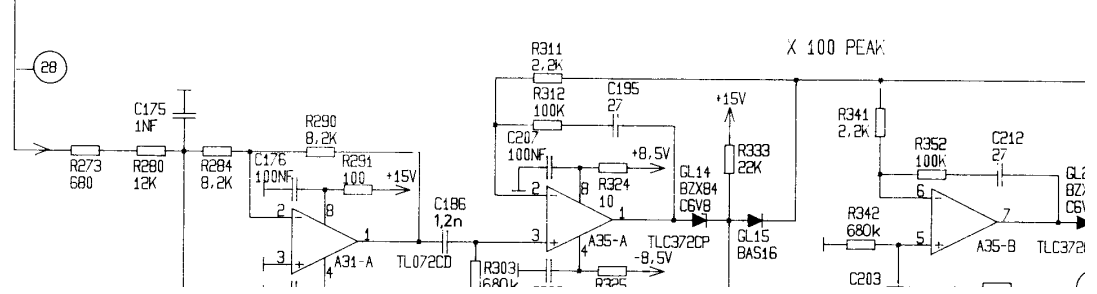
15KHZ FILTER



X 1 PEAK



X 10 PEAK



X 100 PEAK