

EX020060

1	2	3	4	5	6	7	8	9
Itd. Nr.	Stück	Benennung	Zeichnungs-Nr.	Form	Abmessungen	DIN- u. Modell-Nr. Bezugsquelle	Werkstoff	Bemerkung
✓ 1	1	Tüble 10TE				Zoll-Nr. 30809 - 677		Schroff
✓ 2	1	Frontplatte w/friß 10TE				" 20838 - 002		"
✓ 3	1	Befehlsplatte				" 21100 - 105		"
✓ 4	1	Rückwand				" 30809 - 642		"
✓ 5	1	Befehlsgruppenwechsel akt				" 30809 - 701		"
✓ 6	1	" akt				" 30809 - 700		"
✓ 7	2	Zylinderwerke M25x4				" 21100 - 431		"
✗ 8	4	Metallcylinder				" 21100 - 661		"
9	4	Kontaktscheitel				" 21100 379		"
10								
11								
12								
13								
14								
15								
16								
17								
18								

Buchstf. Änderung Name Dat.

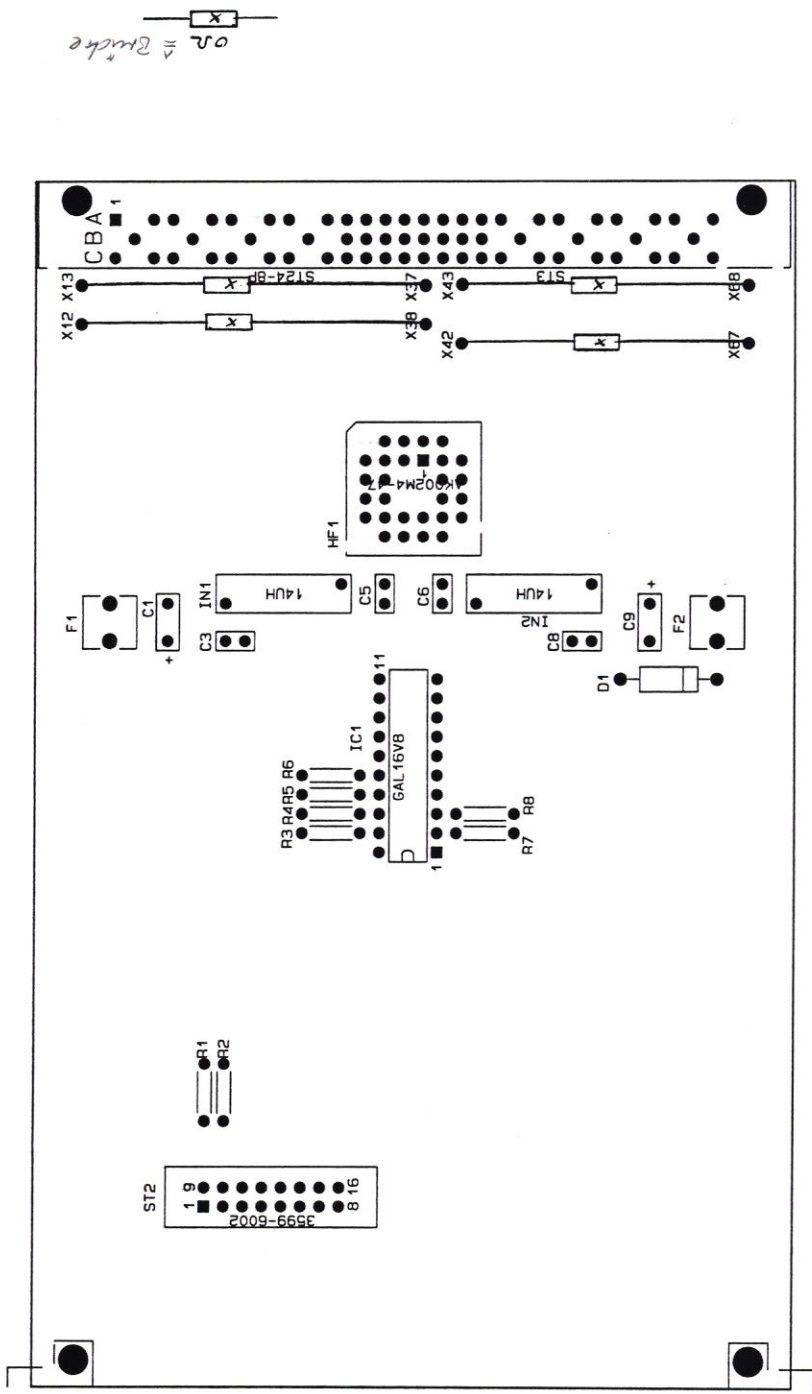
Name Datum 10. Sept. 1986

Benennung, Zeichnungs-Nr. Blatt: 1 Blattzahl: 111

FR 602 111

1111

TEXAS 10-000



FG447.111

MAT2

GSI MAT2KON1  
18-JUL-1996 L005



E L E K T R . S T U E C K L I S T E

\*RM: 1 EINHEIT = 2.54MM

ST.	BAUTEIL-BEZEICHNUNG	WERT/TYP	RM	HERSTELLER	LG-NR.	BEMERKUNGEN	AUFRUF-NAHME
1	DIP20*D1				13 220	CAB/DALEKTRON 110-91-320 DUAL-IN-LINE ZUM LOETEN	
4	C3, C5, C6, C8	100N	1	UNION CARB	11 096	Union Carbide C320C104K1R5CA stehend Vielschicht-K	100N*A
2	C1, C9	22U	2	STC	11 326	TANTAL-TROPFEN-KONDENSATOR 35V, RM=5.08	22U*TANA
1	D1	1N4007	5		13 002	DIODE 1N4007, GEH. A23F, RM=12.7MM	1N4007
2	MICRO-HALTER			WICKMANN	17 007	MICRO-FUSE HALTER SENKRECHT NR 19556	
2	F1, F2	0A200			17 020	MICRO-FUSE SICHERUNG MIT HALTER STEHEND	FOA200*30003
1	PL-PG28			AMP	ELEX	STECKSOCKEL MIT LOETPINS BEST.-NR.: 821581-1	
1	HF1	AK002M4-47		ALPHA	APL-DL	ALPHA FET SP4T NON-REFLECT. SWITCH, INTEGRAL DRIV	AK002M4-47*PLA1
1	IC1	GAL16V8		LATTICE	EE-JH	ELECTRICALLY ERASABLE GENERIC ARRAY LOGIC	GAL16V8
2	IN1, IN2	14UH	6			INDUKTIVITAET 14UH RM=15.24MM	14UH
2	R7, R8	1K	3		10 687	METALLSCHICHT-WIDERSTAND 0,4W 1% RASTER=3	1K0*K
1	R1	2K2			10 695	METALLSCHICHT-WIDERSTAND 0,25W 1% RASTER=3	2K2*K
5	R2, R3, R4, R5, R6	2K7			10 697	METALLSCHICHT-WIDERSTAND 0,25W 1% RASTER=3	2K7*K
4	WIDERSTAND	OR				DRAHTBRUECKE	
1	ST2	3599-6002	3M		14 754	3M3599-6002 16POL PIN GERADE LOETST. 1-8,9-16 O.BB	ST16P*CI
1	ST	3452-6600	3M		14 574	3M3452-6600 16POL PIN 1-8,9-16 O.BB	
5	KOAX-KONTAKT			ERNI		KOAXIALKONTAKT, NR.: 594 211	
1	ST3	ST24-8P		ERNI	APL-DL	ERNI 593 817 MESSERL. STV-M 24/8-M-abc, 8PINS STECK	ST24-8P*PA1
1	LD1	HLMP 1719		HP	13 820	3mm LEUCHTDIODE GELB 1,9V / 2mA	
4	LD2, LD3, LD4, LD5	HLMP 1790		HP	13 821	3mm LEUCHTDIODE GRUEN 1,8V / 2mA	
1	LD6	HLMP 1700		HP	13 819	3mm LEUCHTDIODE ROT 1,8V / 2mA	
6	CLIPSE FUER LD1-6						
1	KABEL 16POL.	105mm		3M	14 631	FLACHBAND-KABEL	
1	SCHRUMPFSCHLAUCH	300mm			12 047		
1	LEITERPLATTE	FG447.111					

BEZ.: GSI DARMSTADT MAT2

NUMMER: FG447.111

BEARB.: LOOS

DATUM: 18.Sep.1996

BLATT: 1 VON 1



Vertical text or markings along the right edge of the page, possibly bleed-through from the reverse side.

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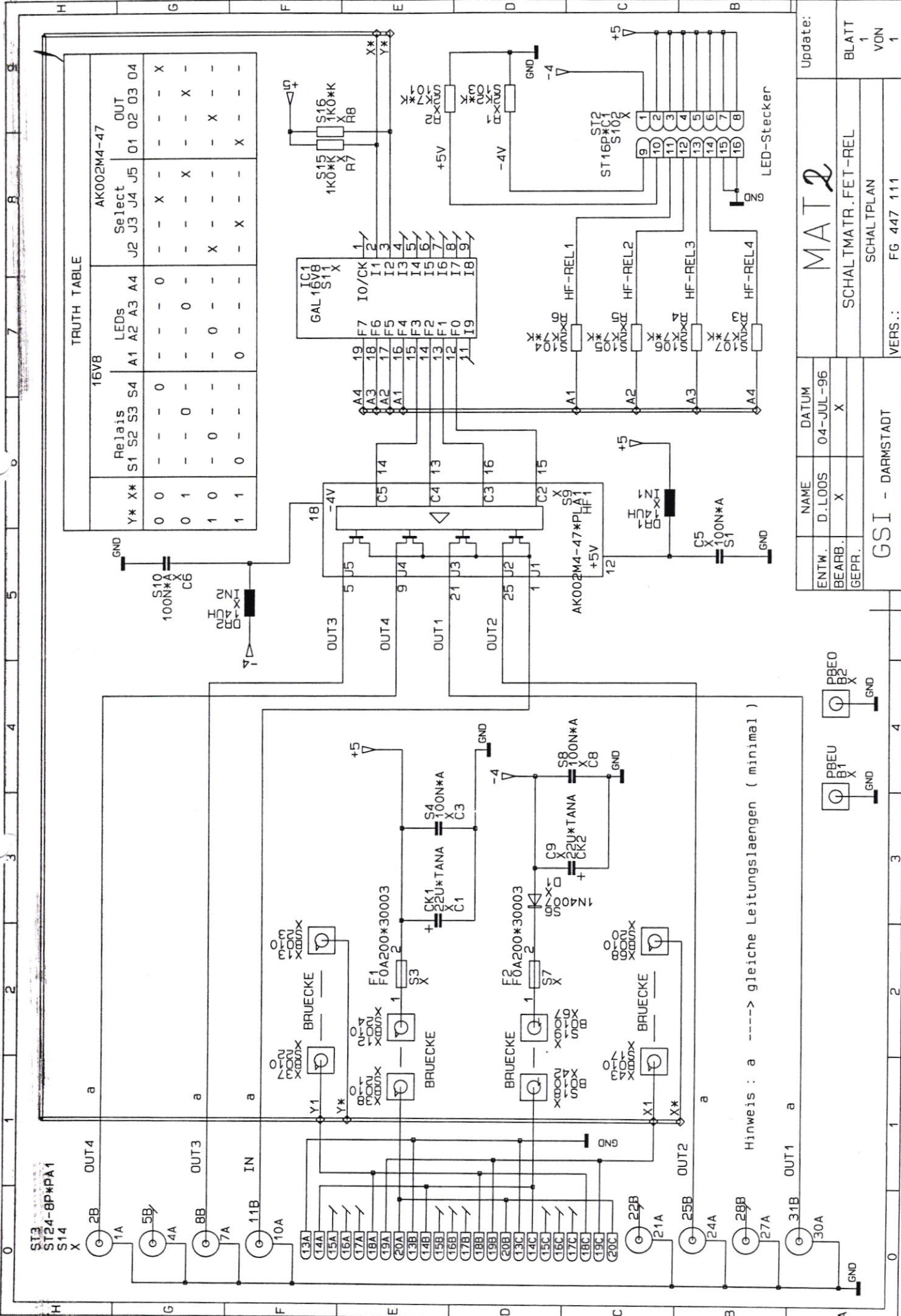
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TRUTH TABLE

15V8		AK002M4-47			
Y*	X*	Relais S1 S2 S3 S4	LEDs A1 A2 A3 A4	Select J2 J3 J4 J5	OUT O1 O2 O3 O4
0	0	- - - 0	- - - 0	- - - X	- - - X
0	1	- - - 0	- - - 0	- - - X	- - - X
1	0	- - - 0	- - - 0	- - - X	- - - X
1	1	- - - 0	- - - 0	- - - X	- - - X

NAME	DATUM	Update:	
D. LOOS	04-JUL-96	MAT2	
BEARB.	X	SCHALTMATR. FET-REL	
GEPR.		SCHALTPLAN	
GSI - DARMSTADT		VERS.:	FG 447 111
		BLATT	1
		VON	1

Hinweis : a ----> gleiche Leitungslaengen ( minimal )

\*COMMENT

PAL OUT: NEGATIVE LOGIG

Die Pinbelegung der PAL'S IC10,IC17 ist fuer GAL'S UND PAL'S ausgelegt.

PAL STECKPLATZ IC17

PLATZ:SIS PULSZENTRALE ELR-RAUM

\*IDENTIFICATION

FILE NAME: US10\$ROOT:[DBAPL.F447.LOGIC.111]RELSELECT.DCB  
ENTW./VERS.: D.LOOS/APL 08.08.1996  
KOMMENTAR: SCHALTMATRIX FG447.110 (LAY OUT VERSION)  
>CODE NR.:

\*DECLARATIONS

X-VARIABLES =2;  
Y-VARIABLES =4;

\*X-NAMES

X,Y ; 2 BIT EINGAENGE

\*Y-NAMES

A[4..1],S1,S2,S3,S4 ; 8 AUSGAENGE

\*PAL

TYPE=GAL16V8\_C8;

\*PINS

X=2,Y=3,A[4..1]=[19..16],S1=13,S2=12,S3=15,S4=14;

; PIN>>>10=GND,20=VDD

\*FUNKTION-TABLE

EINGANGSSEITE		AUSGANGSSEITE			
Y	X	S4	S3	S2	S1
1	1	1	1	1	0
1	0	1	1	0	1
0	1	1	0	1	1
0	0	0	1	1	1
REST		1	1	1	1

;BEI ALLEN ANDEREM CODE

\*FUNKTION-TABLE

EINGANGSSEITE		AUSGANGSSEITE			
Y	X	A4	A3	A2	A1
1	1	1	1	1	0
1	0	1	1	0	1
0	1	1	0	1	1
0	0	0	1	1	1
REST		1	1	1	1

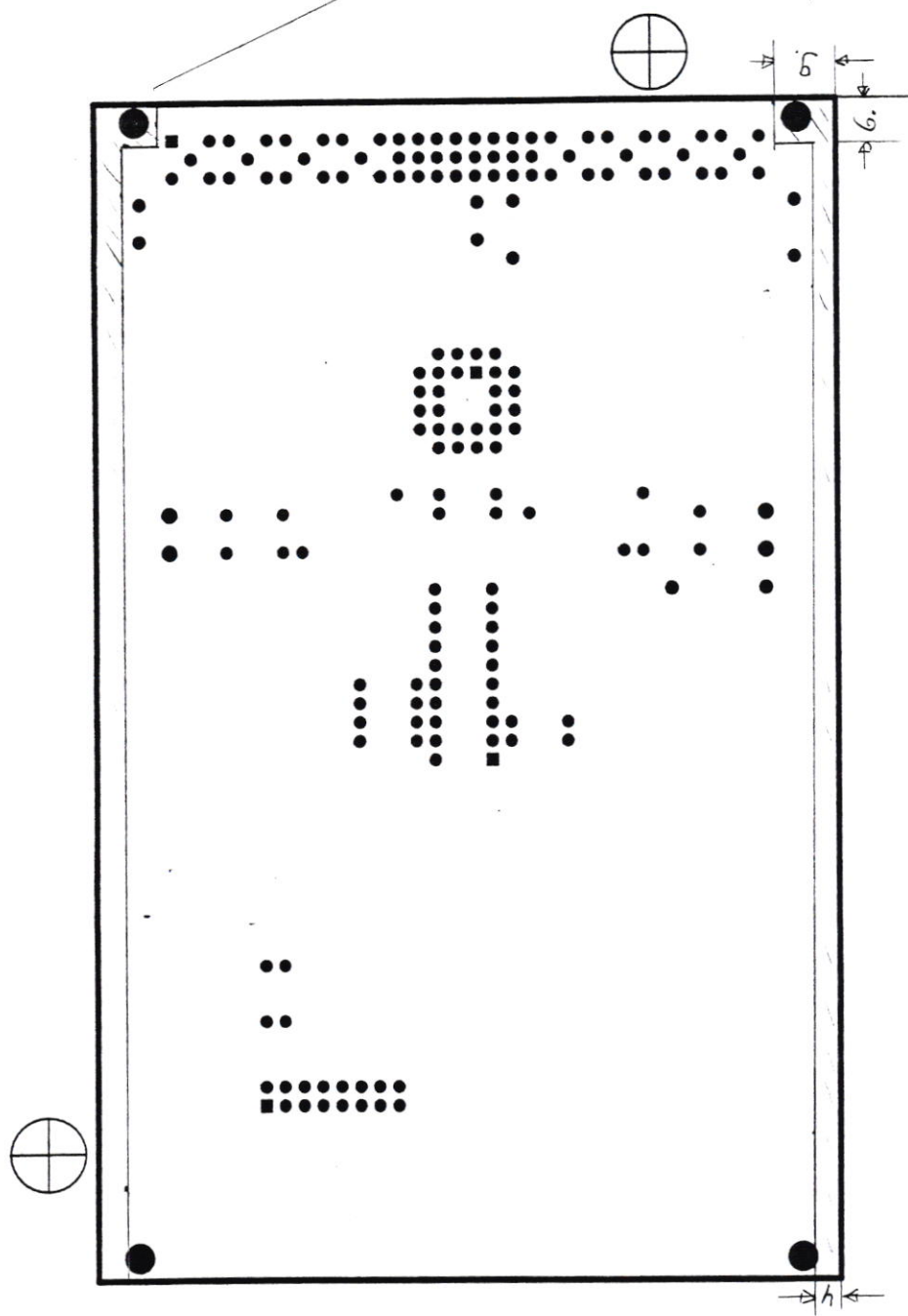
;BEI ALLEN ANDEREM CODE

\*RUN-CONTROLL

LISTING = PLOT,FUSE-PLOT,PINOUT,EQUATINS;  
PROGFORMAT =JEDEC;  
;SWITCH(1)=1;  
\*END







LÖTSTOPTMASKE

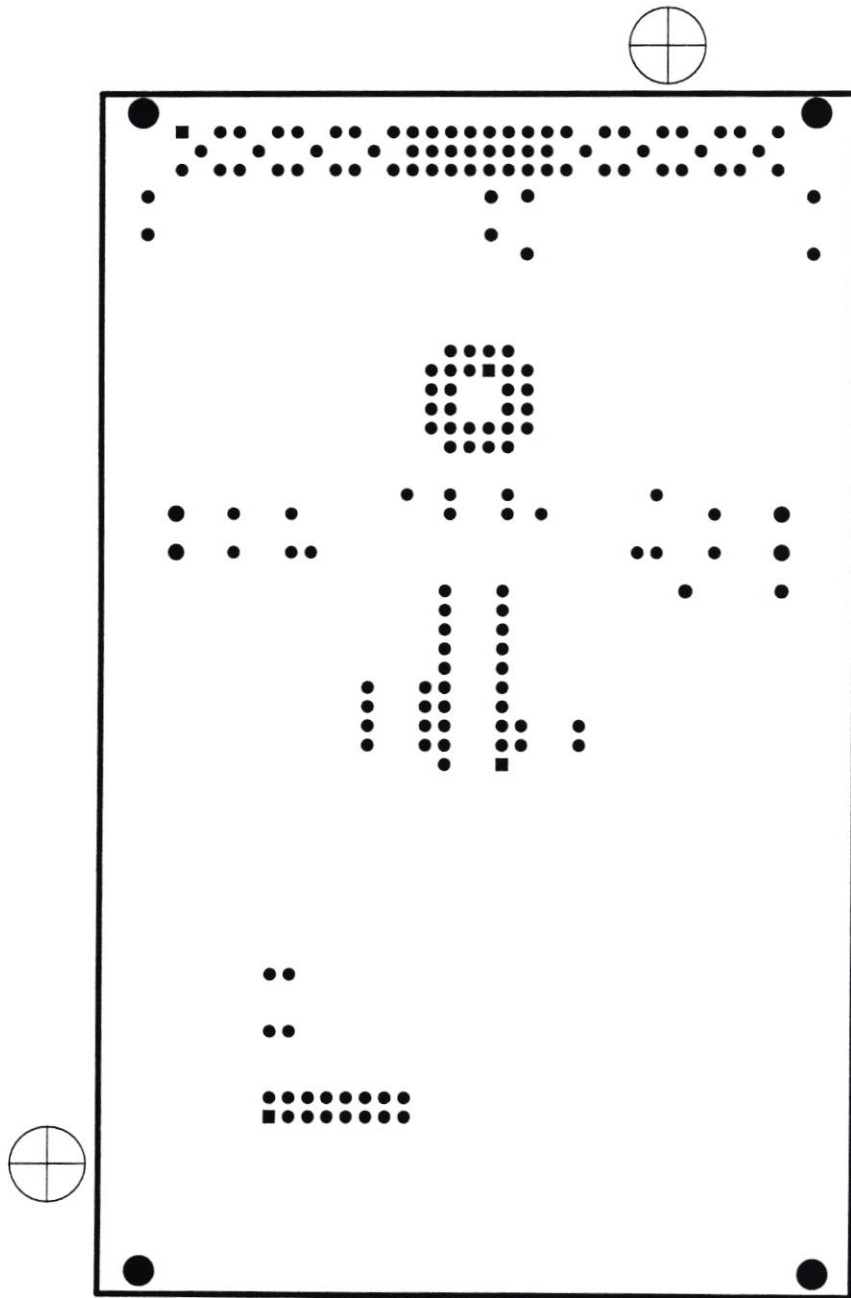
Layer 1 + Layer 2  
 Bitte nach Skizze  
 abkleben  
 Freifläche varzinieren

L005  
 25.09.96

FG447.111

MAT2

GSI MAT2LSM1  
 18-JUL-1996 L005

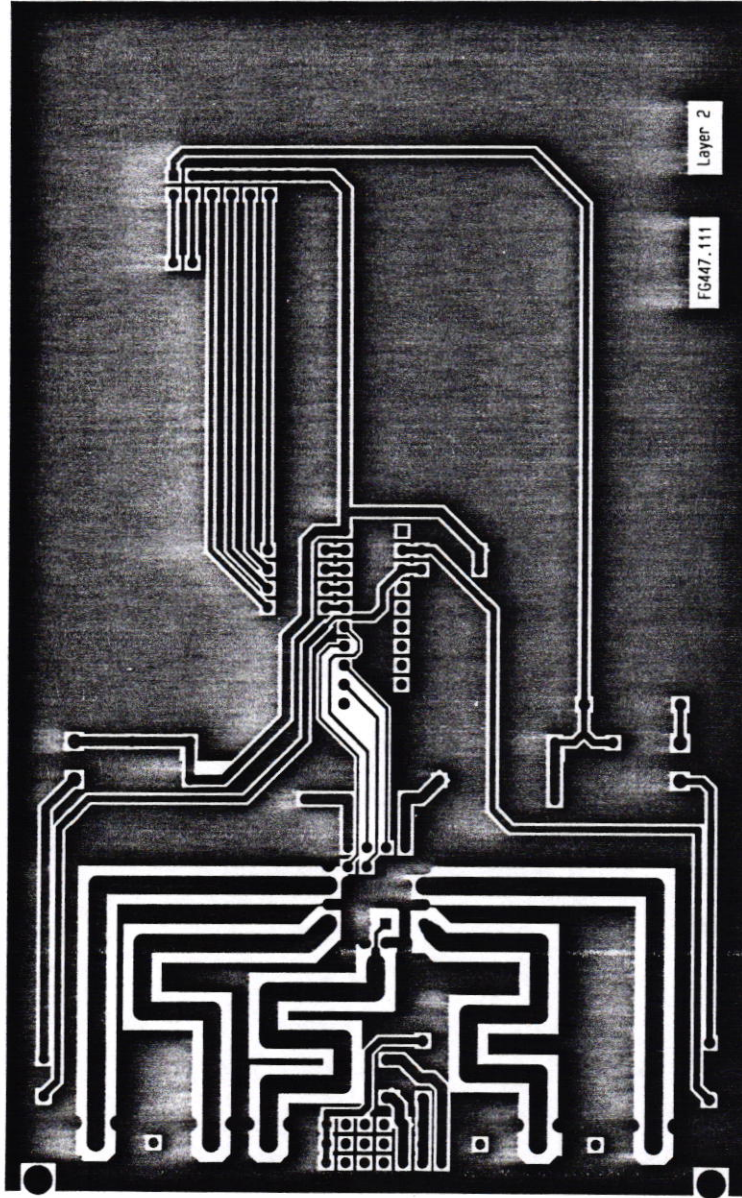


FG447.111

MAT2

GSI MAT2LSM1  
18-JUL-1996 L00S

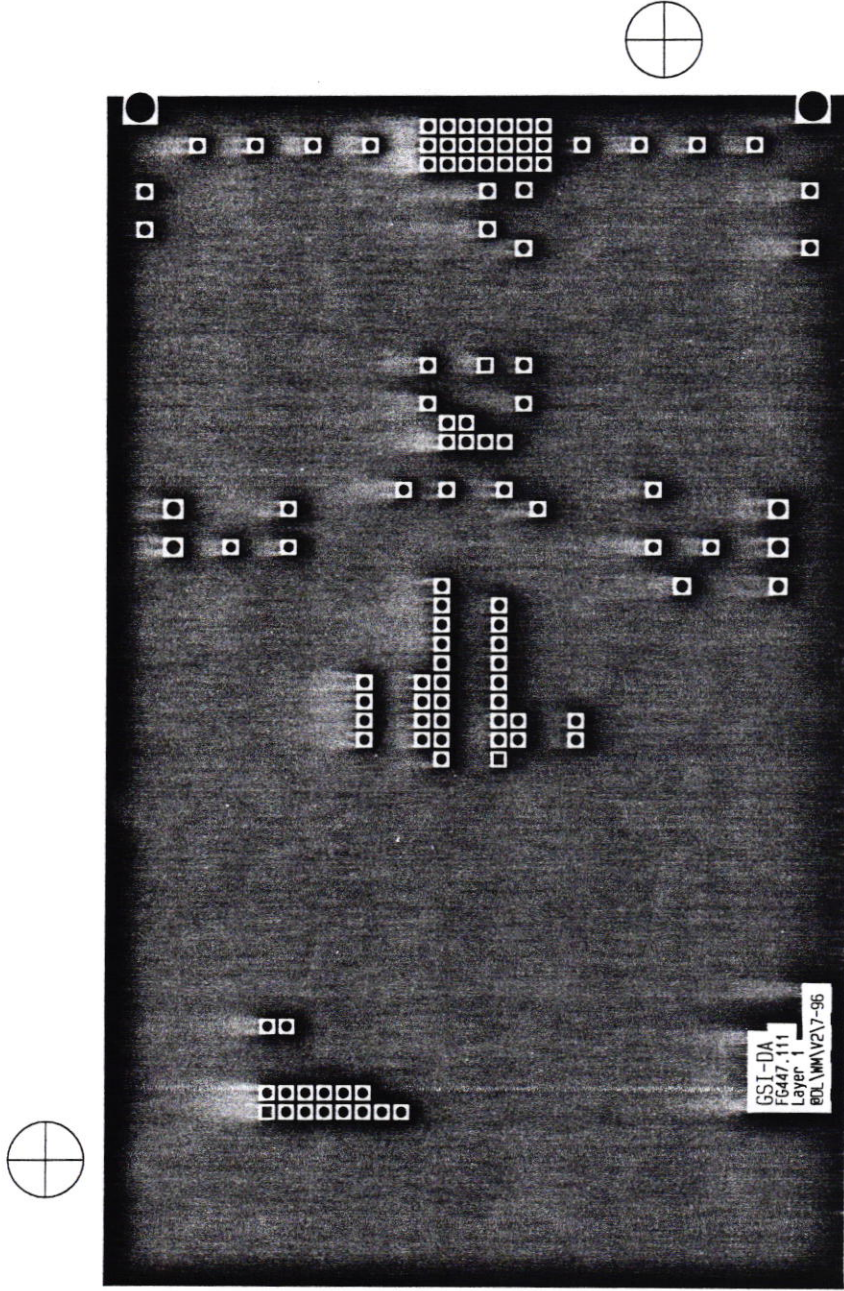




GSI\_MAT2L2  
18-JUL-1996 L00S

MAT2

FG447.111



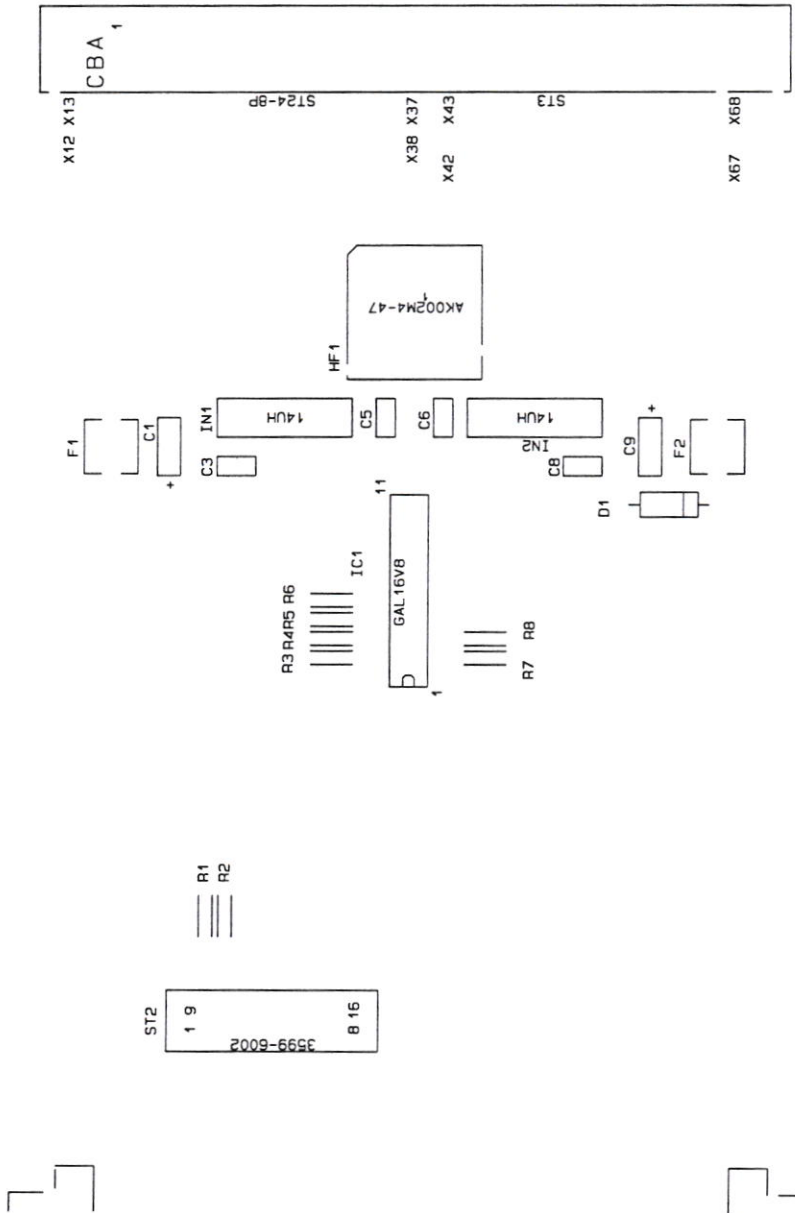
GSI\_MAT2L 1  
18-JUL-1996 L00S

MAT2

FG447.111



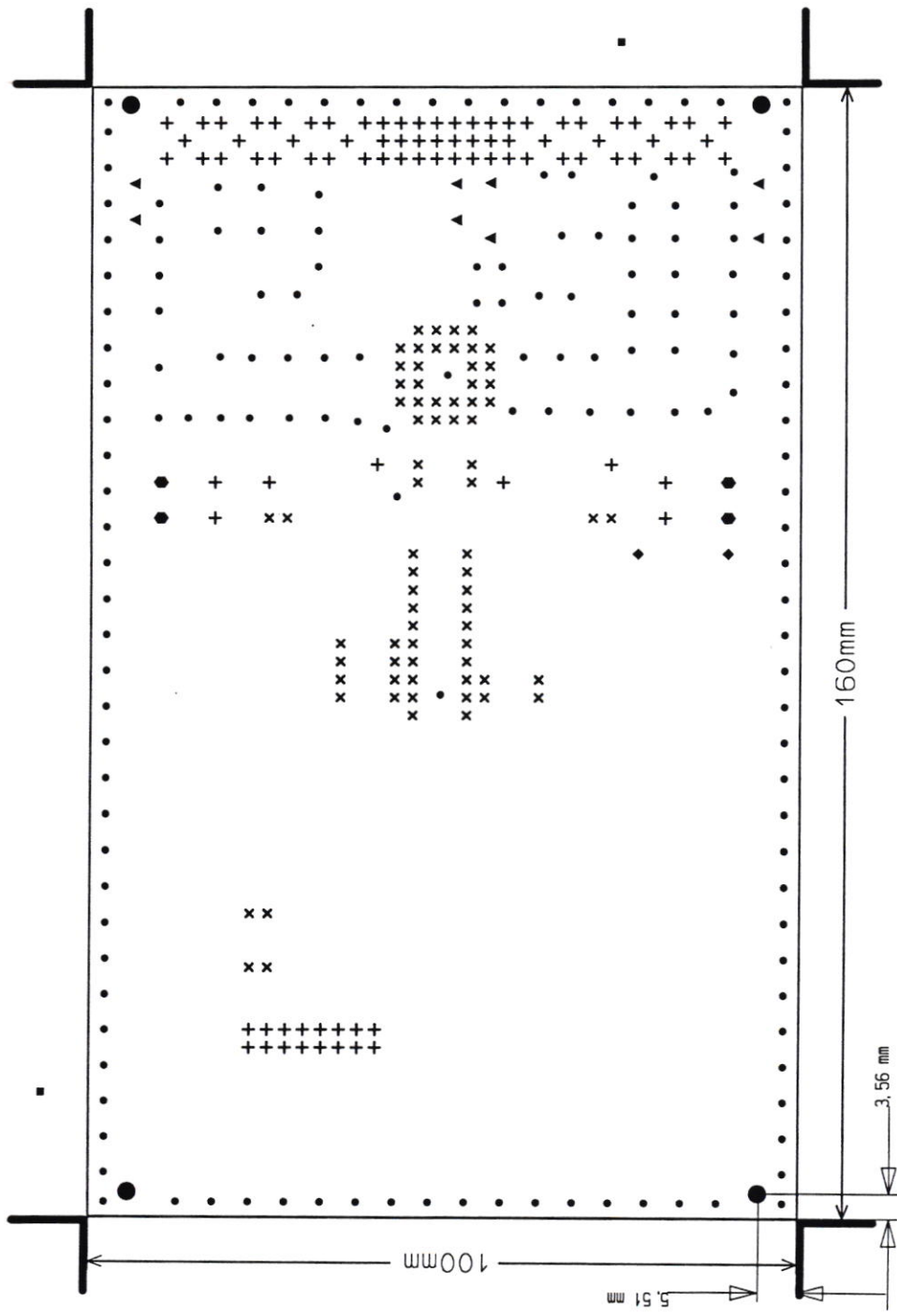




GSI MAT2BST1  
 18-JUL-1996 L00S

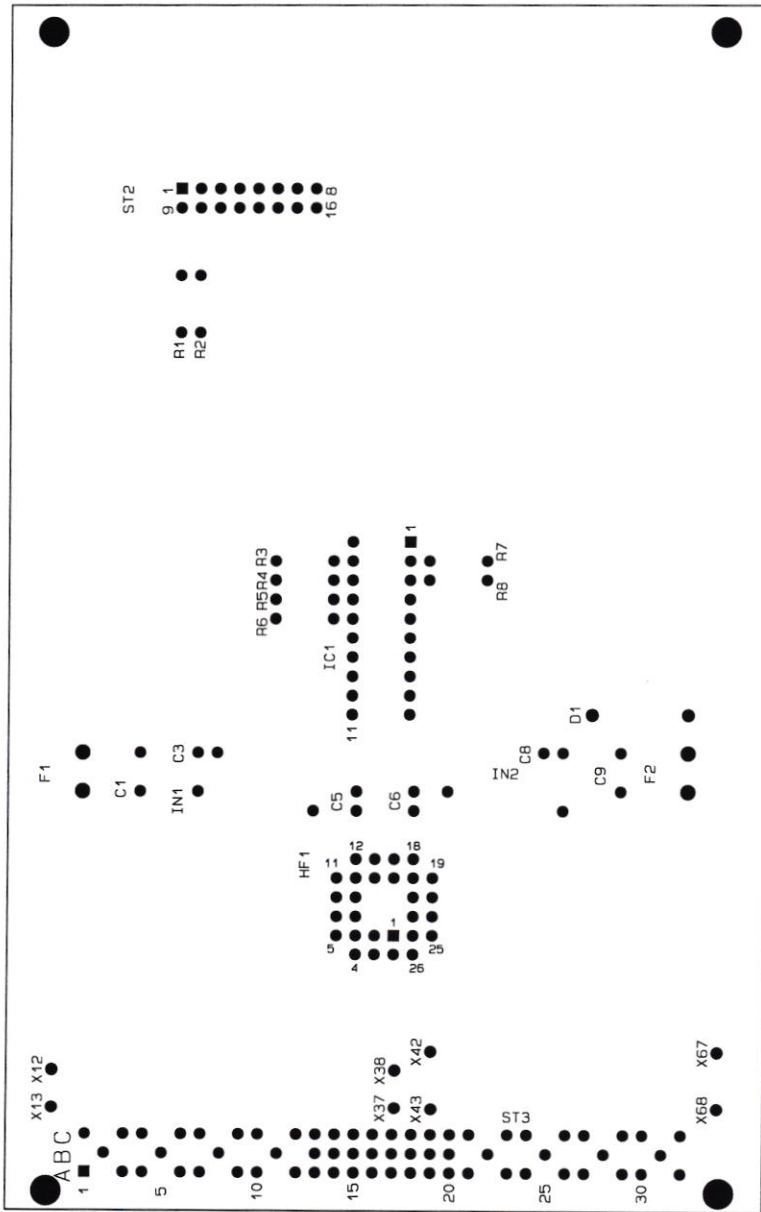
MAT2

FG447.111



- 3.000 P /0004
- 1.400 P /0004
- ◆ 1.100 P /0002
- ▲ 1.000 P /0008
- + 0.900 P /0088
- x 0.800 P /0072
- 0.500 P /0163
- 0.025 P /0002

GSI MAT2BLS  
 18-JUL-1996 L00S  
 MAT2 FG447.111  
 Bohrkontrollfilm mit Masszeichnung fuer die Platine MAT2



GSI MAT2KON2  
18-JUL-1996 L00S

MAT2

FG447.111

EX-020-060



1	2	3	4	5	6	7	8	9
Id. Nr.	Stück	Benennung	Zeichnungs-Nr.	Format	Abmessungen	DIN- u. Modell-Nr. Bezugsquelle	Werkstoff	Bemerkung
1	1	Tafel 10TE				B.V.N. 30809-677		Schroff
2	1	Frontplatte us-frip 10TE				" 20838-002		"
3	1	Befehlsplatte				* 21100-105		"
4	1	Rückwand				" 30809-642		"
5	1	Befehlsplatzenwechsel				" 30809-701		"
6	1	"				" 30809-700		"
7	2	Zylinderschraube M2,5x4				" 21100-431		"
8	4	Metallspindel				" 21100-661		"
9	4	Kabineisenstücke				" 21100-379		"
10								
11								
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14								
15								
16								
17								
18								

Buchst.	Anderung	Name	Dat.	Benennung, Zeichnungs-Nr.		Blatt: 1
				10. Sept. 1986		Blattzahl: 1
						FG 447.111





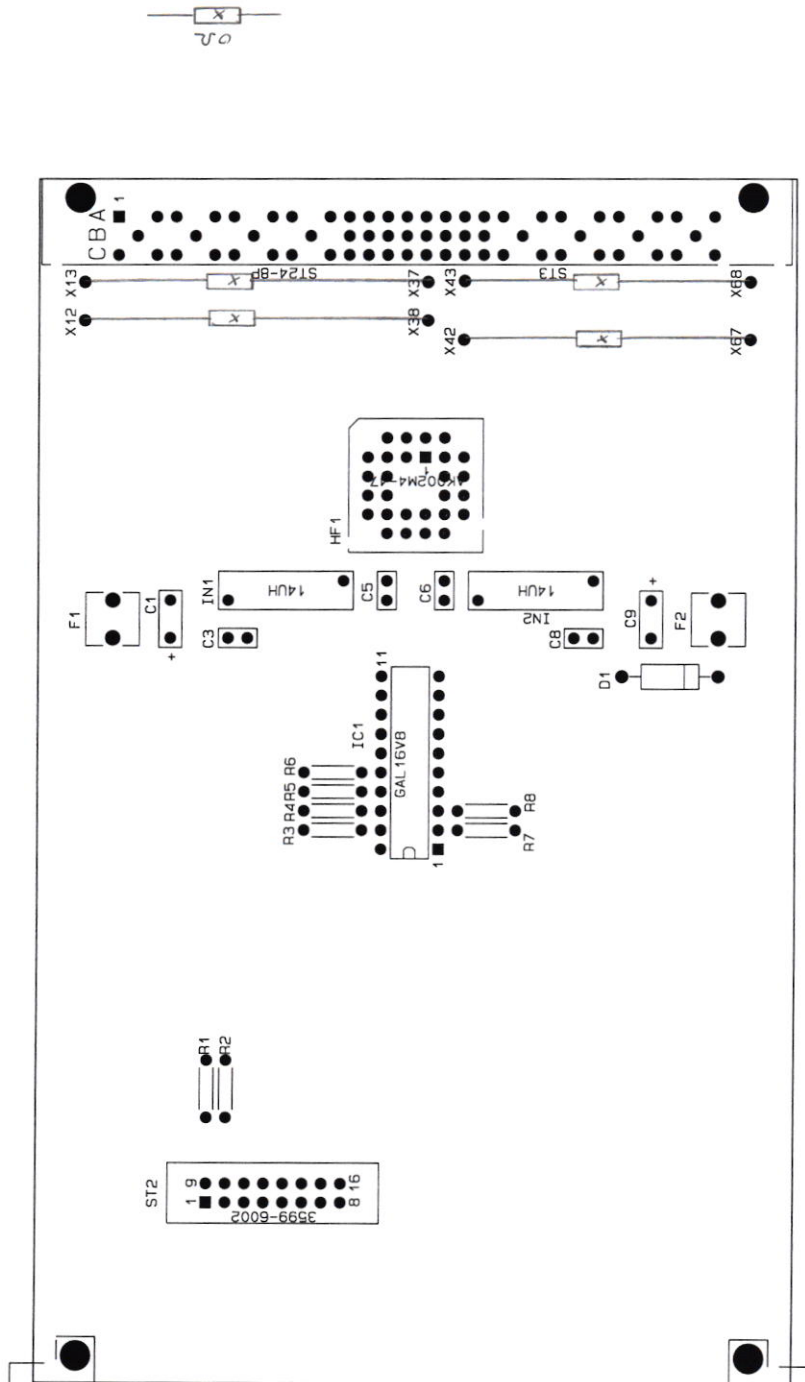
E L E K T R . S T U E C K L I S T E

\*RM: 1 EINHEIT = 2.54MM

ST.	BAUTEIL-BEZEICHNUNG	WERT/TYP	RM	HERSTELLER	LG-NR.	BEMERKUNGEN	AUFRUF-NAHME
1		DIP20*DI			13 220	CAB/DALEKTRON 110-91-320 DUAL-IN-LINE ZUM LOETEN	
2					14 471	<del>FUER FRONTPLATTENBESTAND</del>	
4	C3, C5, C6, C8	100N	1	UNION CARB	11 096	Union Carbide C320C104K1R5CA stehend Vielschicht-K	100N*A
2	C1, C9	22U	2	STC	11 326	TANTAL-TROPFEN-KONDENSATOR 35V, RM=5.08	22U*TANA
1	D1	1N4007	5		13 002	DIODE 1N4007, GEH. A23F, RM=12.7MM	1N4007
2	MICRO-HALTER			WICKMANN	17 007	MICRO-FUSE HALTER SENKRECHT NR 19556	
2	F1, F2	0A200			17 020	MICRO-FUSE SICHERUNG MIT HALTER STEHEND	FOA200*30003
1	PL-FG28			AMP	ELEX	STECKSOCKEL MIT LOETPINS BEST.-NR.: 821581-1	
1	HF1	AK002M4-47		ALPHA	APL-DL	ALPHA FET SP4T NON-REFLECT. SWITCH , INTEGRAL DRIV	AK002M4-47*PLAI
1	IC1	GAL16V8		LATTICE	EE-JH	ELECTRICALLY ERASABLE GENERIC ARRAY LOGIC	GAL16V8
2	IN1, IN2	14UH	6		12101	INDUKTIVITAET 14UH RM=15.24MM	14UH
2	R7, R8	1K	3		10 687	METALLSCHICHT-WIDERSTAND 0,4W 1% RASTER=3	1K0*K
1	R1	2K2			10 695	METALLSCHICHT-WIDERSTAND 0,25W 1% RASTER=3	2K2*K
5	R2, R3, R4, R5, R6	2K7			10 697	METALLSCHICHT-WIDERSTAND 0,25W 1% RASTER=3	2K7*K
4	WIDERSTAND	OR				DRAHTBRUECKE	
1	ST2	3599-6002	3M		14 754	3M3599-6002 16POL PIN GERADE LOETST. 1-8,9-16 O.BB	ST16P*CI
1	ST	3452-6600	3M		14 574	3M3452-6600 16POL PIN 1-8,9-16 O.BB	
5	KOAX-KONTAKT			ERNI		KOAXIALKONTAKT, NR.: 594 211	
1	ST3	ST24-8P		ERNI	APL-DL	ERNI 593 817 MESSERL. STV-M 24/8-M-abc,8PINS STECK	ST24-8P*PAL
1	LD1	HLMP 1719		HP	13 820	3mm LEUCHTDIODE GELB 1,9V / 2mA	
4	LD2, LD3, LD4, LD5	HLMP 1790		HP	13 821	3mm LEUCHTDIODE GRUEN 1,8V / 2mA	
1	LD6	HLMP 1700		HP	13 819	3mm LEUCHTDIODE ROT 1,8V / 2mA	
6	CLIPSE FUER LD1-6						
1	KABEL 16POL.	105mm		3M	14 631	FLACHBAND-KABEL	
	SCHRUMPFSCHLAUCH	300mm			12 047		
1	LEITERPLATE	FG447.111					

GS1 DARMSTADT	BEZ.:	NUMMER:	BEARB.:	DATUM	BLATT
MAT2		FG447.111	LOOS	18.Sep.1996	1 VON 1

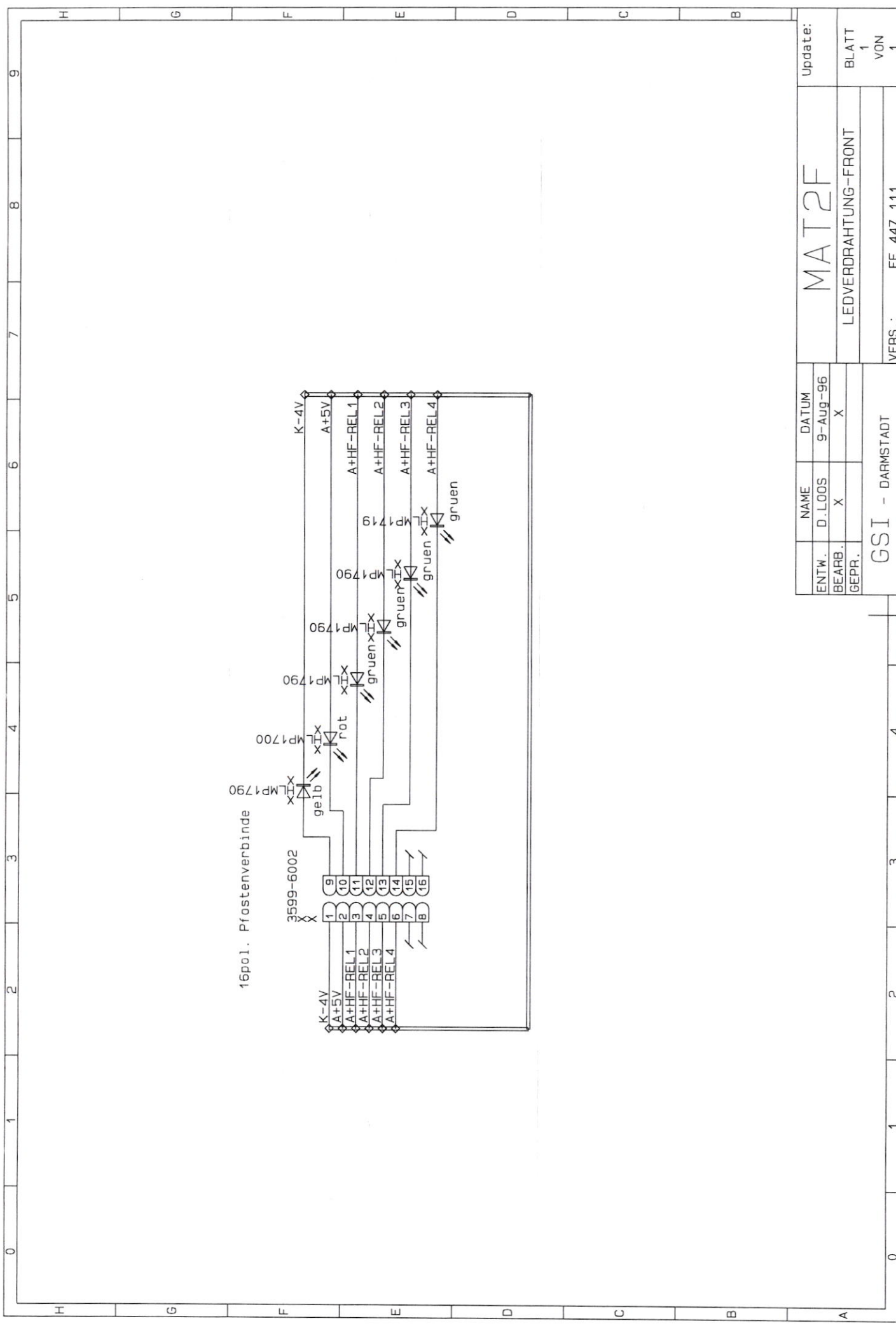




GSI MAT2KON1  
18-JUL-1996 L00S

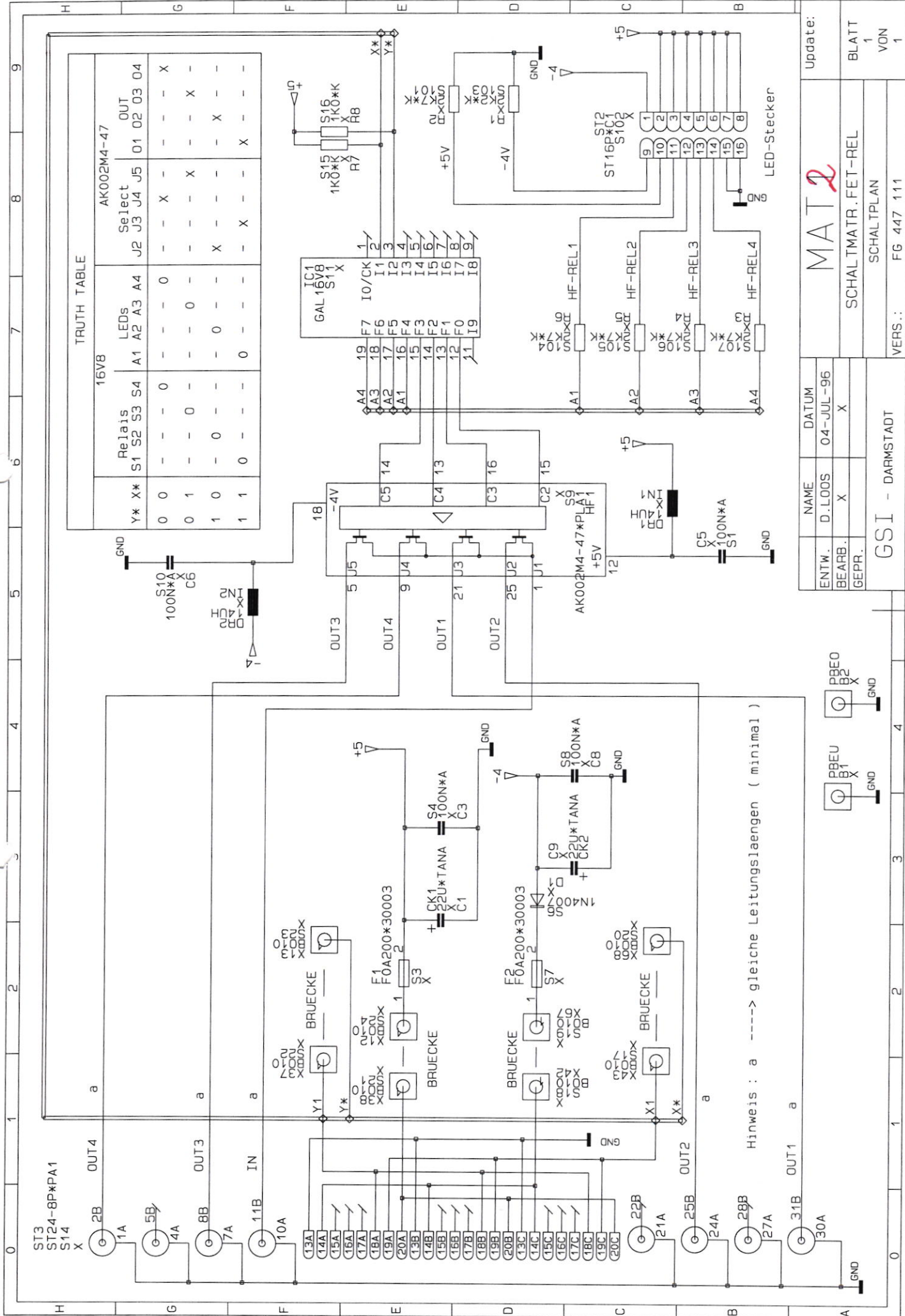
MAT2

FG447.111



Update:		MAT2F	
ENTW.	D.LOOS	9-Aug-96	
BEARB.	X	X	
GEPR.			
GSI - DARMSTADT		LEDVERDRÄHTUNG-FRONT	
VERS.: FE 447 111		BLATT 1	
		VON 1	





TRUTH TABLE

16V8				AK002M4-47			
Y*	X**	Relais	LEDs	Select	OUT		
		S1 S2 S3 S4	A1 A2 A3 A4	J2 J3 J4 J5	O1 O2 O3 O4		
0	0	- - - 0	- - - 0	- - - X	- - - X		
0	1	- - - 0	- - - 0	- - - X	- - - X		
1	0	- - - 0	- - - 0	- - - X	- - - X		
1	1	0 - - -	0 - - -	- - - X	- - - X		

ENTW.	D. LOOS	DATUM	04-JUL-96
BEARB.	X		X
GEPR.			

Update:

MAT 2

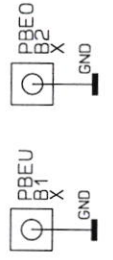
SCHALTMATR. FET-REL

SCHALTPLAN

VERS.: FG 447 111

BLATT 1 VON 1

Hinweis : a ----> gleiche Leitungslaengen ( minimal )

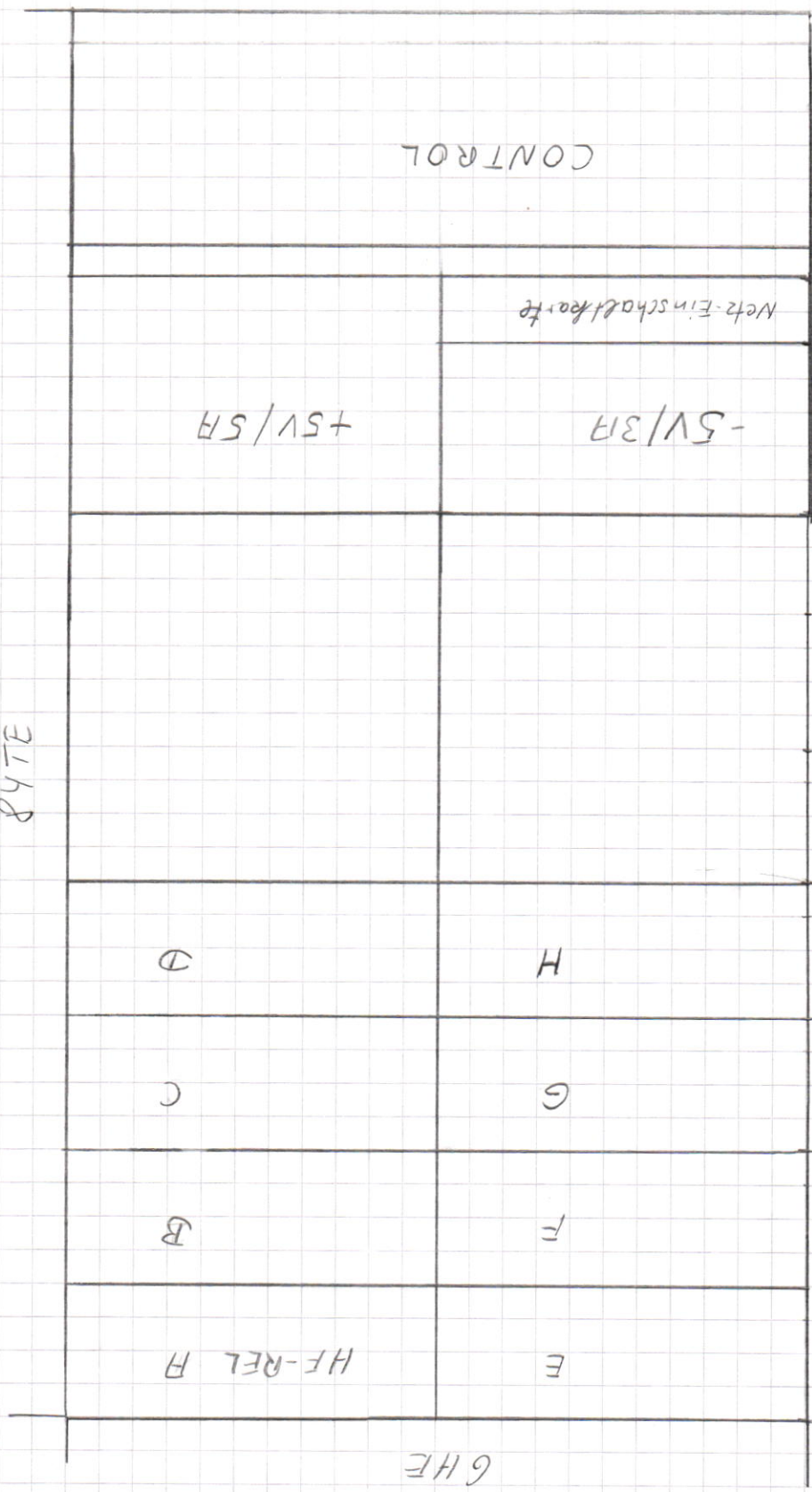






STN-PP\*P1 \ D.5

BYTE

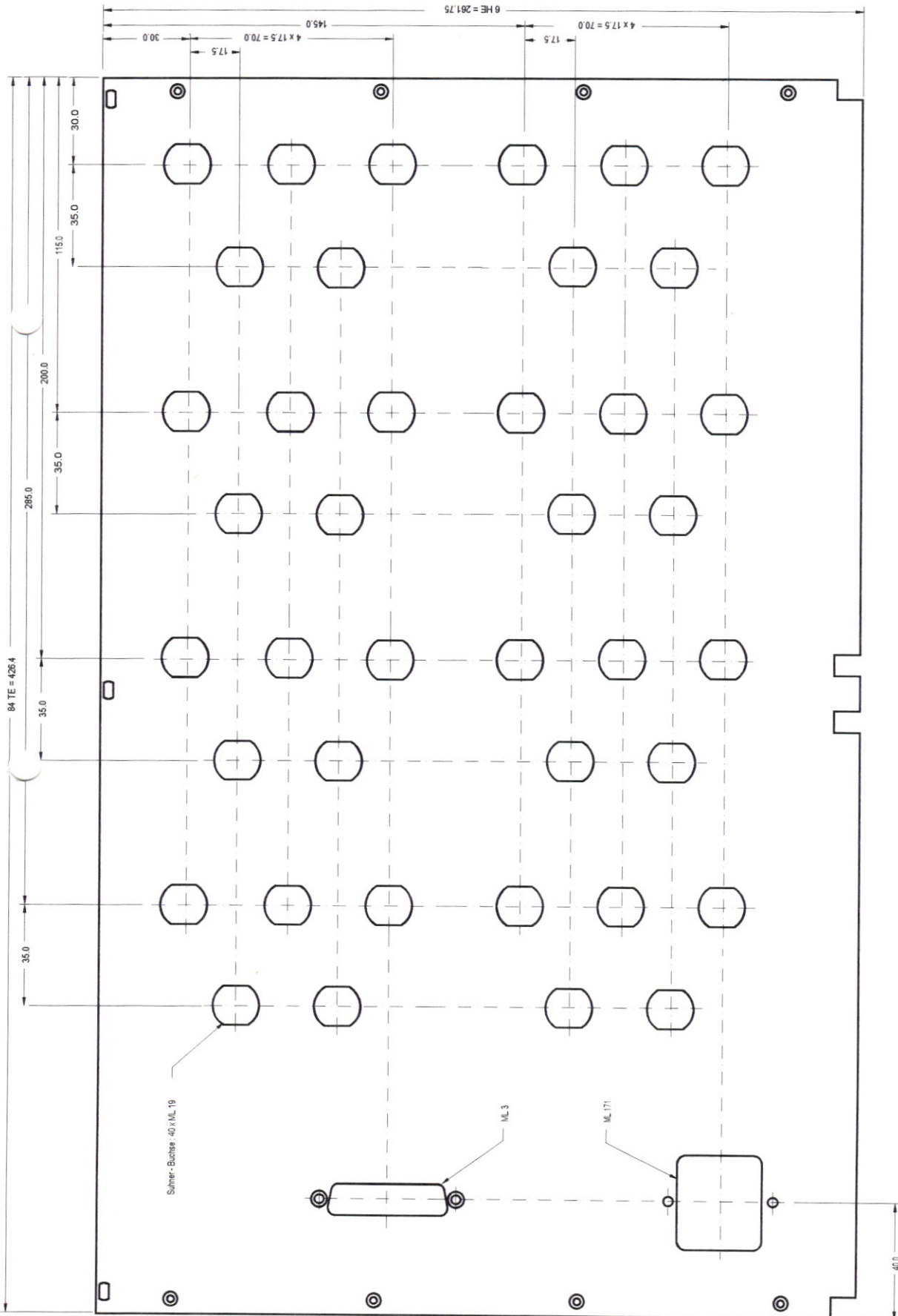


LEHOPPL x 5

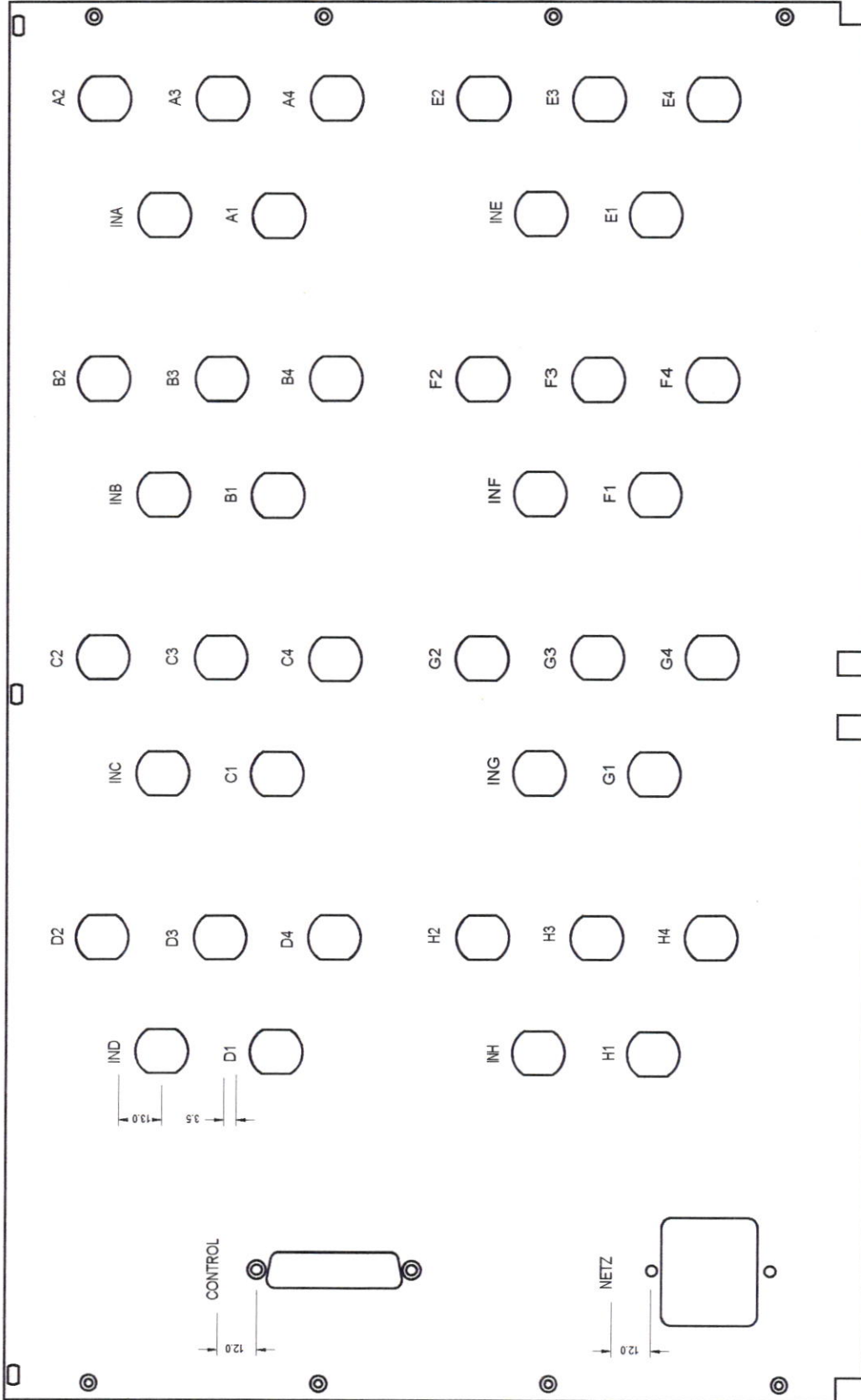
HF-Rel. - Einleitung  
 6HE-Einschub  
 "Front"  
 "Loos  
 08.11.95

File  
 (MATPW1)

FI 447



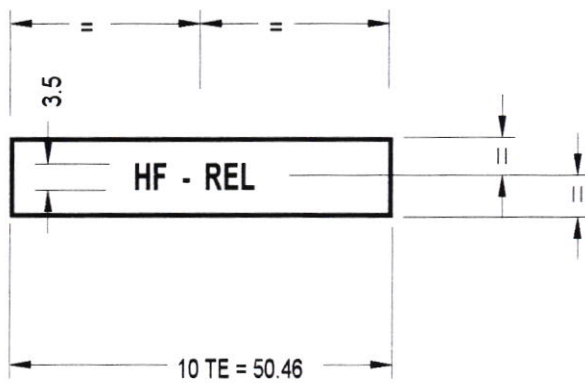
Maßstab: 1:1		Schaltmatrizen	
Rückplatte - klappbar 6 HE / 84 TE			
Zust.	Änderung	Datum	Name
			J-Heider
		Erzst.	3.1.1996
		Exp.	
		Norm	
Zust.		GSI	
Änderung		DARMSTADT	
Datum		FM 447 150 010	
Name		Bohrplan	
Blatt		1	
BL		1	



Gravur :  
 senkrechte Mittelschrift 3.5 mm hoch  
 ( nur Großbuchstaben )

Modell: 1:1		Schaltmatrizen	
Datum	Name	Rückplatte - klappbar 6 HE / 64 TE	
Bearb. 3.1.1996	J. Heider		
Exp.	Norm		
Zust. Änderung		Datum Name	
		GSI	
		DARMSDORF	
		FM 447 150 020	
		Blatt 1	
		1 BL	
		Gravurplan	

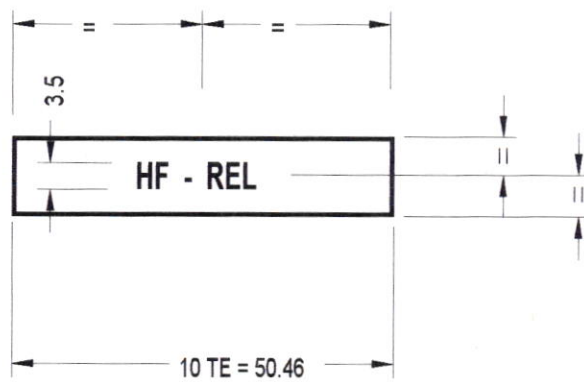




**Gravur :**  
 senkrechte Mittelschrift 3,5 mm hoch  
 ( nur Großbuchstaben )

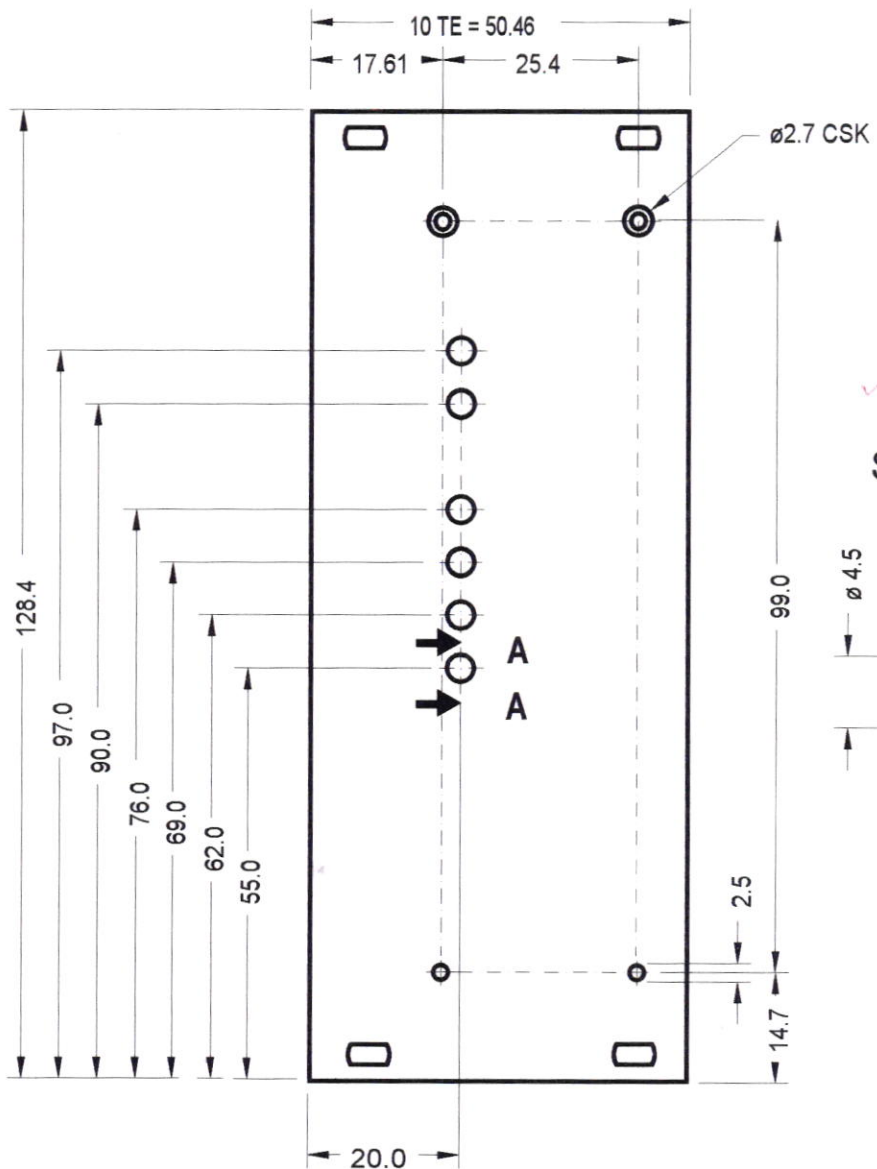
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				Datum		Name	
				Bearb. 2.1.1996		J.Heider	
				Gepr.			
				Norm			
				<b>G S I</b>		FM 447 110 030	
						Blatt 1	
Zust.	Änderung	Datum	Name	DARMSTADT		Gravurplan	
						1 BL.	



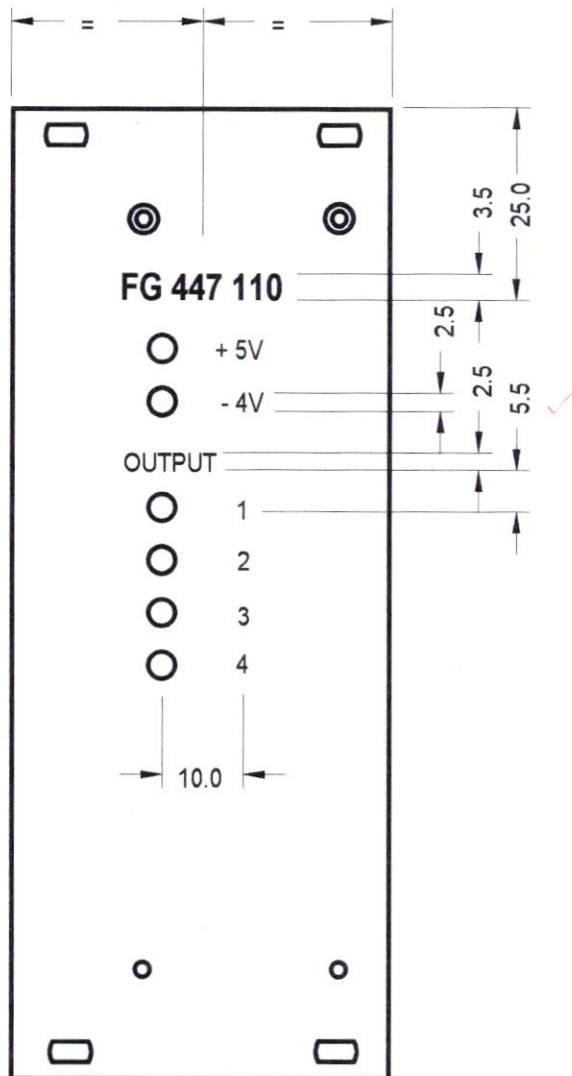


**Gravur :**  
 senkrechte Mittelschrift 3,5 mm hoch  
 ( nur Großbuchstaben )

				Maßstab 1:1			
				HF - Relais - Einschub			
				Datum	Name	Griff 10 TE	
				Bearb. 2.1.1996	J.Heider		
				Gepr.			
				Norm			
				<b>G S I</b>		FM 447 110 030	
Zust.	Änderung	Datum	Name	DARMSTADT		Gravurplan	1 BL.



				Maßstab 1:1			
				HF - Relais - Einschub			
				Datum 2.1.1996		Name J.Heider	
				Teilfrontplatte 3 HE / 10 TE			
				<b>G S I</b> FM 447 110 010			
Zust.	Änderung	Datum	Name	Bohrplan			



Gravur :

senkrechte Mittelschrift 2.5 und 3.5 mm hoch

( nur Großbuchstaben )

				Maßstab 1:1	
				HF - Relais - Einschub	
		Datum		Name	
		Bearb. 2.1.1996		J.Heider	
		Gepr.			
		Norm			
				<b>G S I</b> FM 447 110 020	
				1 BL.	
Zust.	Änderung	Datum	Name	DARMSTADT	
				Gravurplan	

Federleiste  
Matrix A - H

ST24-8P  
X  
X



- 13A
- 14A
- 15A
- 16A
- 17A
- 18A
- 19A
- 20A
- 21A
- 22A
- 23A
- 24A
- 25A
- 26A
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- 90A
- 91A
- 92A
- 93A
- 94A
- 95A
- 96A
- 97A
- 98A
- 99A
- 100A



Federleiste  
Control

1A	1C
2A	2C
3A	3C
4A	4C
5A	5C
6A	6C
7A	7C
8A	8C
9A	9C
10A	10C
11A	11C
12A	12C
13A	13C
14A	14C
15A	15C
16A	16C
17A	17C
18A	18C
19A	19C
20A	20C
21A	21C
22A	22C
23A	23C
24A	24C
25A	25C
26A	26C
27A	27C
28A	28C
29A	29C
30A	30C
31A	31C
32A	32C

ENTW.	NAME	DATUM	MASSTAB
BEARB.	D.LOODS	24-Nov-95	MATPW1
GEPR.	X	X	RAHMENVERdraHTUNG
GSI - DARMSTADT			Federleisten-Pinout
VERS. FE 447 110			BLATT 2
			VON 2

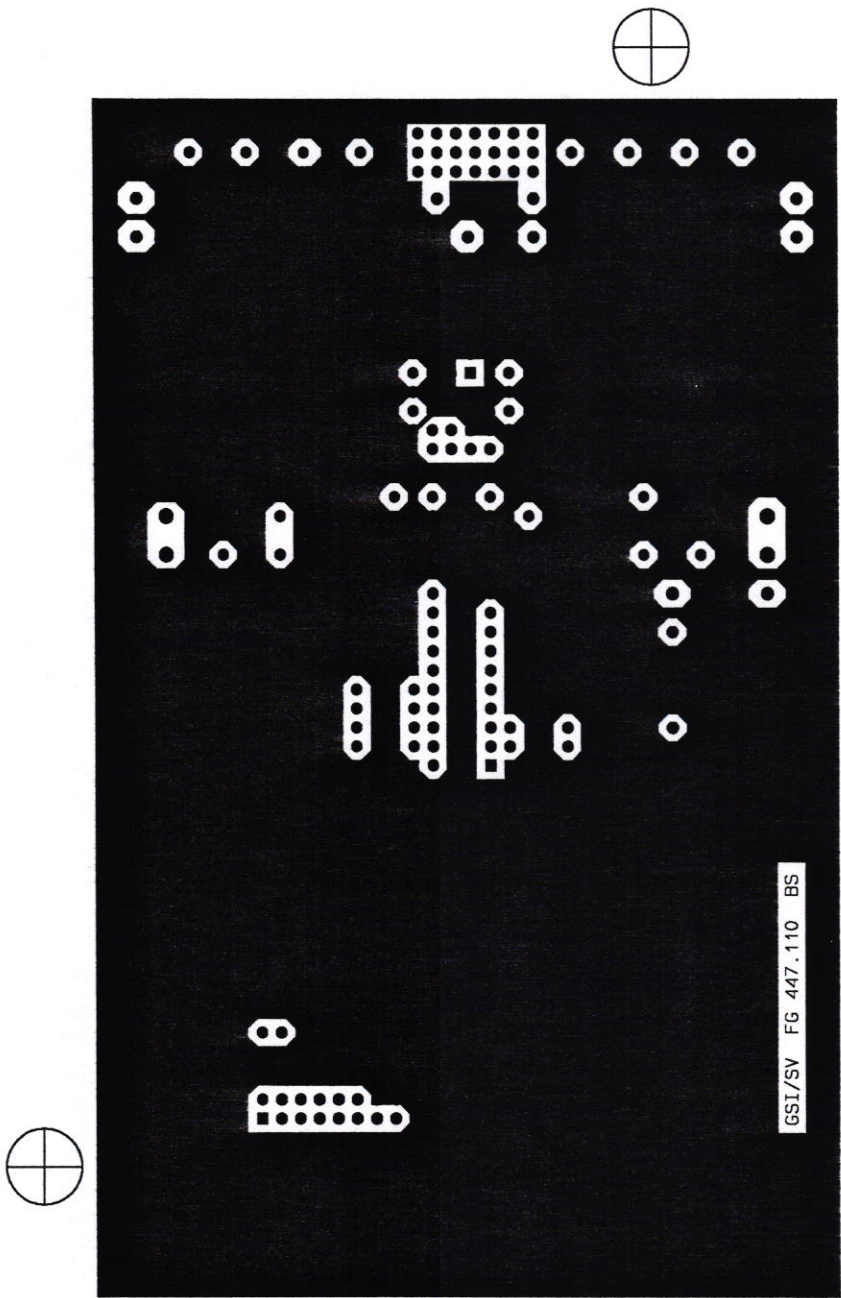
E L E K T R . S T U E C K L I S T E

\*RM: 1 EINHEIT = 2.54MM

ST.	BAUTEIL-BEZEICHNUNG	WERT/TYP	RM	HERSTELLER	LG-NR.	BEMERKUNGEN	AUFRUF-NAHME
1	DIP20*D1				13 220	CAB/DALEKTRON 110-91-320 DUAL-IN-LINE ZUM LOETEN	
2	LEITERPLATTENHALTER				14 471	FUER FRONTPLATTENBEFESTIGUNG	
2	MUTTERN	M2,5			62 545	BEF. VG-LEISTE	
2	ZYLINDERKOPFSCHRAUBEN	M2,5X10			62 440	BEF. VG-LEISTE	
4	C3,C5,C6,C8	100N	1	UNION CARB	11 096	Union Carbide C320C104K1R5CA stehend Vielschicht-K	100N*A
2	C1,C9	22U	2	STC	11 326	TANTAL-TROPFEN-KONDENSATOR 35V, RM=5.08	22U*TANA
1	D1	1N4007	5		13 002	DIODE 1N4007, GEH. A23F, RM=12.7MM	1N4007
2	MICRO-HALTER			WICKMANN	17 007	MICRO-FUSE HALTER SENKRECHT NR 19556	
2	F1,F2	0A200			17 020	MICRO-FUSE SICHERUNG MIT HALTER STEHEND	FOA200*30003
1	PL-PG28			AMP	ELEX	STECKSOCKEL MIT LOETPINS BEST.-NR.: 821581-1	
1	HF1	AK002M4-47		ALPHA	APL-DL	ALPHA FET SP4T NON-REFLECT. SWITCH , INTEGRAL DRIV	AK002M4-47*PLA1
1	IC1	GAL16V8		LATTICE	EE-JH	ELECTRICALLY ERASABLE GENERIC ARRAY LOGIC	GAL16V8
2	IN1,IN2	14UH	6			INDUKTIVITAET 14UH RM=15.24MM	14UH
2	R7,R8	1K	3		10 687	METALLSCHICHT-WIDERSTAND 0,4W 1% RASTER=3	1K0*K
1	R1	2K2			10 695	METALLSCHICHT-WIDERSTAND 0,25W 1% RASTER=3	2K2*K
5	R2,R3,R4,R5,R6	2K7			10 697	METALLSCHICHT-WIDERSTAND 0,25W 1% RASTER=3	2K7*K
1	ST2	ST-3599-6002		3M	14 754	3M3599-6002 16POL PIN GERADE LOETST. 1-8,9-16 O.BB	ST16P*CI
5	KOAX-KONTAKT			ERNI		KOAXIALKONTAKT, NR.: 594 211	
1	ST1	ST24-8P		ERNI		MESSERLEISTE STV-M 24/8-M-abc, NR.: 593 817	ST24-8P*P1
1	LEITERPLATE	FG 447.110					

GS1 DARMSTADT	BEZ.:	NUMBER:	BEARB.:	DATUM	BLATT
		FG 447.110	LOOS	15.Jan.1996	1 VON 1

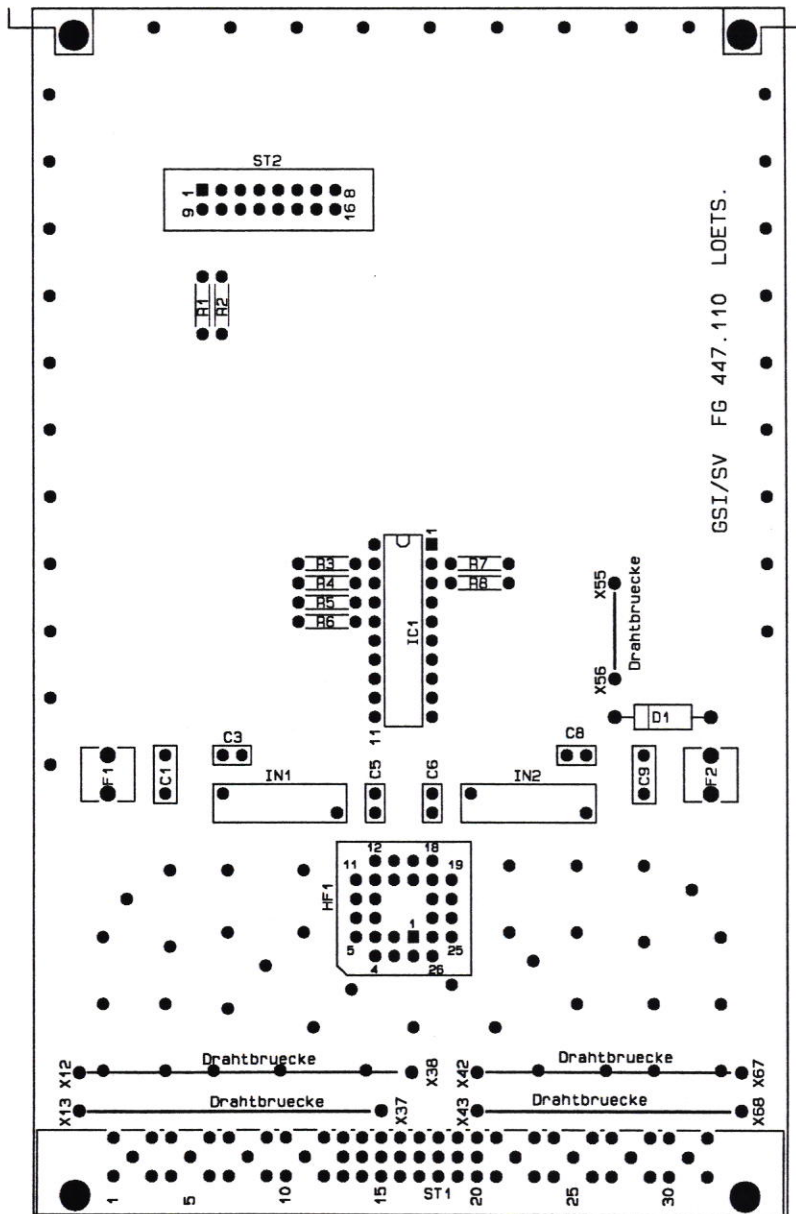




FG 447.110

MAT1

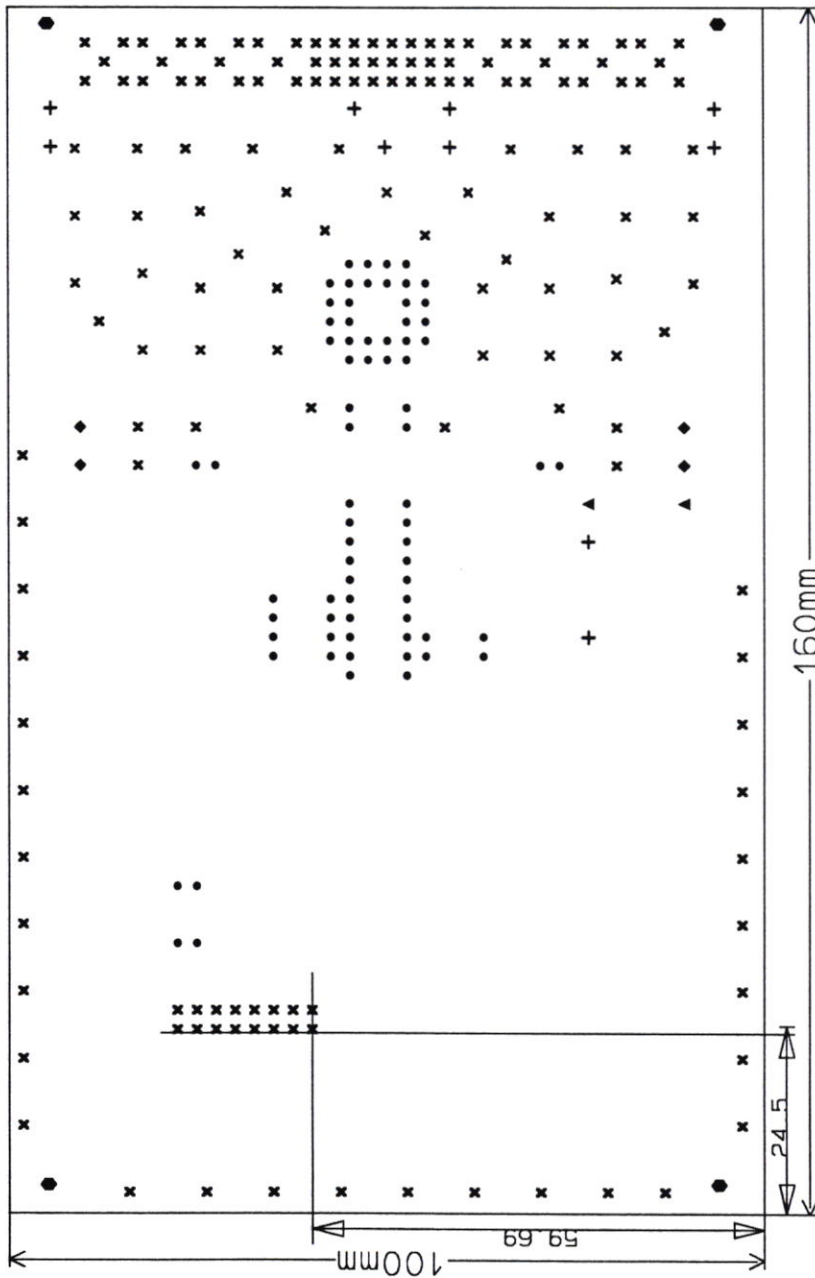
GSI MAT1L1  
16-JAN-1996 L005



GSI/SV FG 447.110 LOETS.

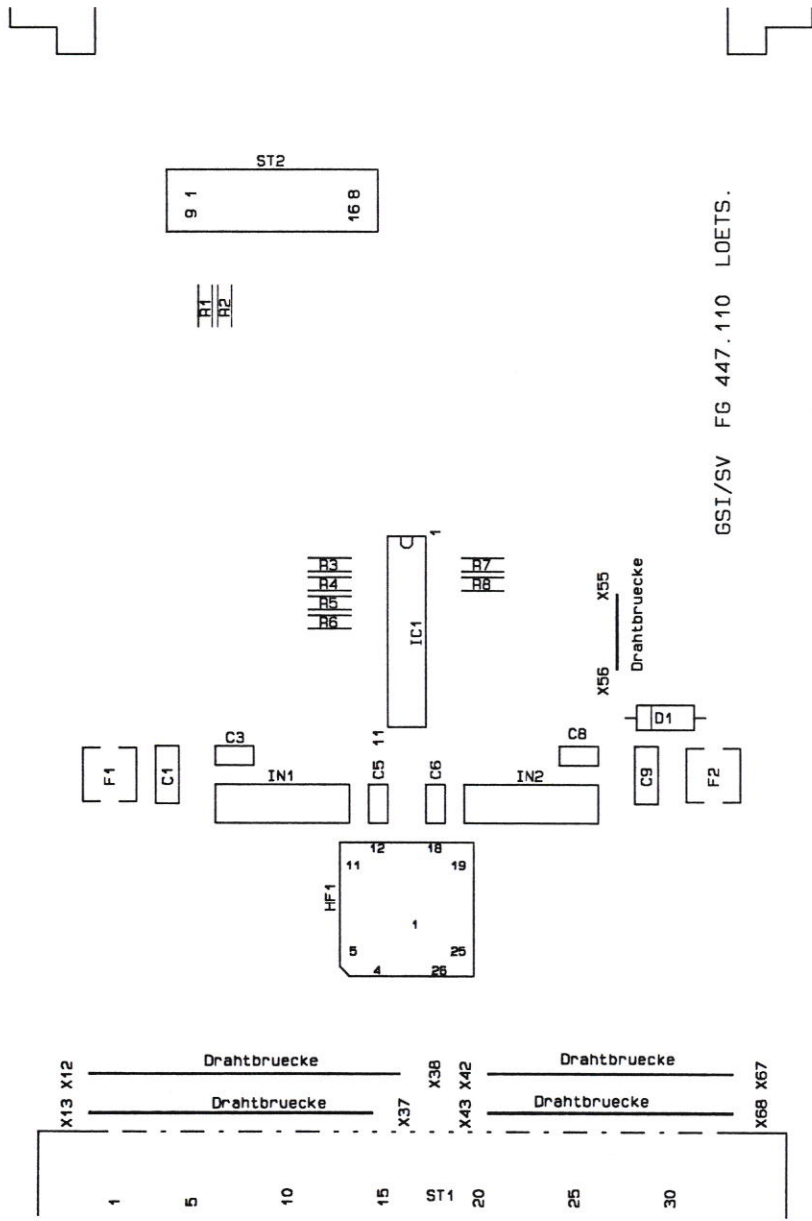
MAT1

GSI MAT1KON2  
16-JAN-1996 LOOS



- 3.000 P /0004
- ◆ 1.400 P /0004
- ▲ 1.100 P /0002
- + 1.000 P /0010
- x 0.900 P /0155
- 0.800 P /0072
- 0.025 P /0002

GSI MAT1BLS MAT1 FG 447.110  
 16-JAN-1996 L00S  
 Bohrkontrollfilm mit Masszeichnung fuer die Platine MAT1

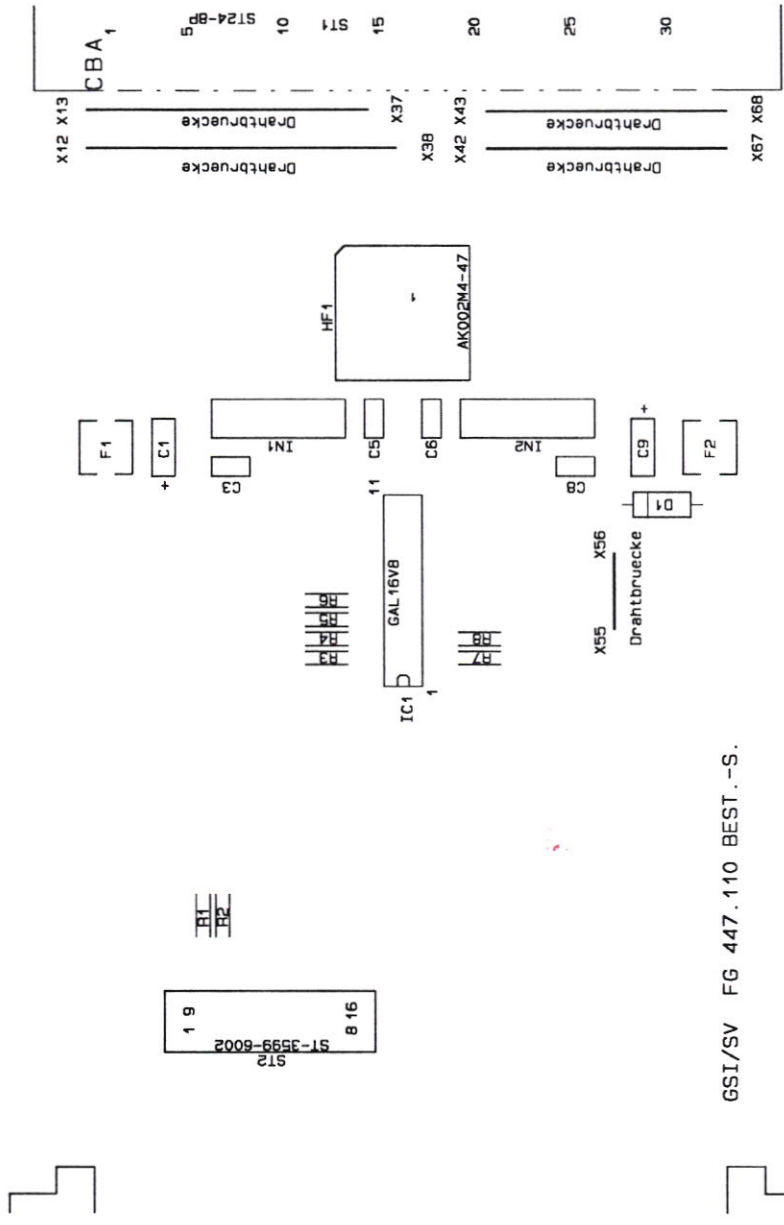


GSI/SV FG 447.110 LOETS.

FG 447.110

MAT1

GSI MAT1BST2  
16-JAN-1996 L00S



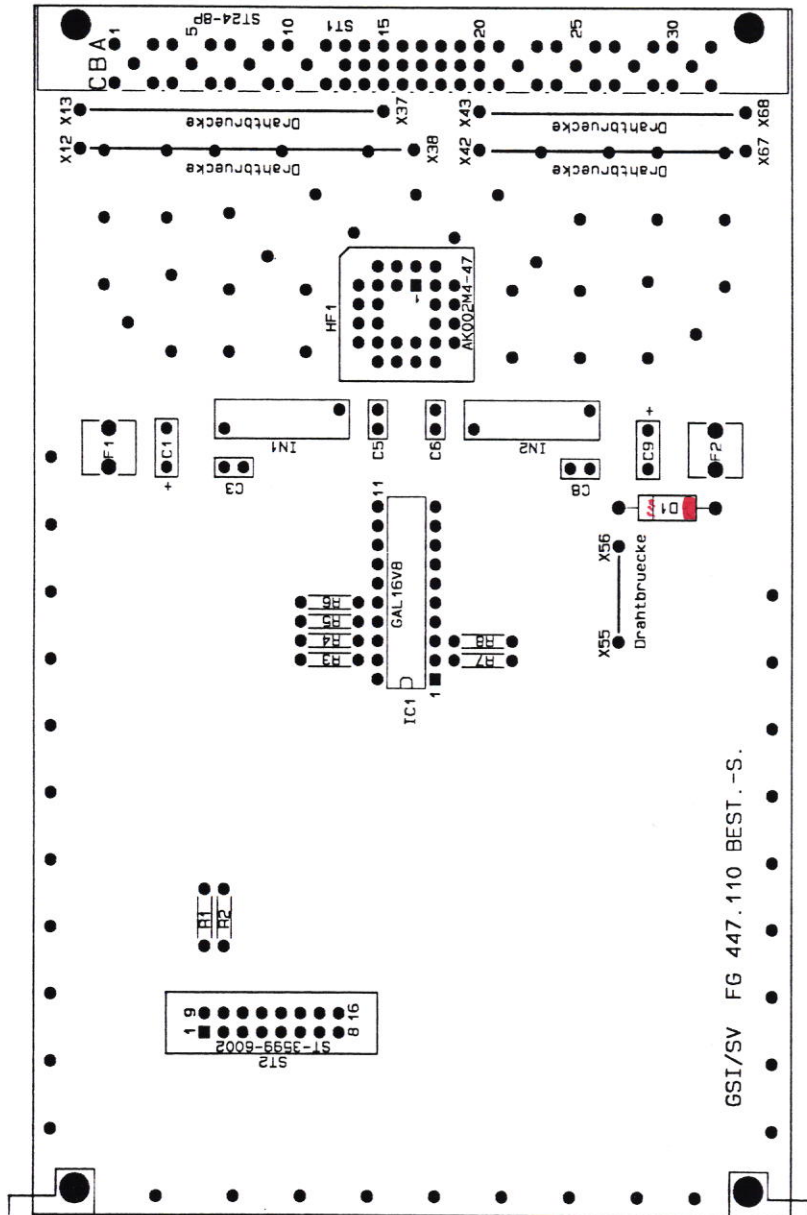
GSI/SV FG 447.110 BEST.-S.

FG 447.110

MAT1

GSI MAT1BST1  
16-JAN-1996 L005

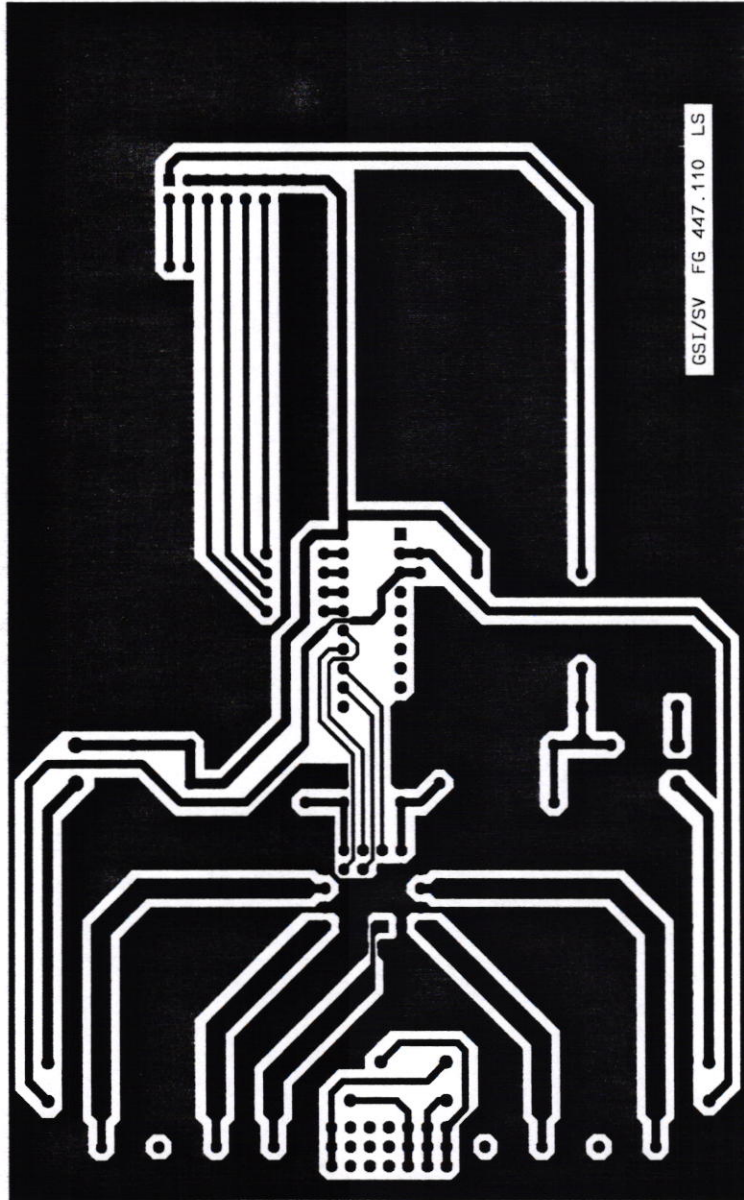




GSI MAT1KON1  
16-JAN-1996 L005

MAT1

FG 447.110

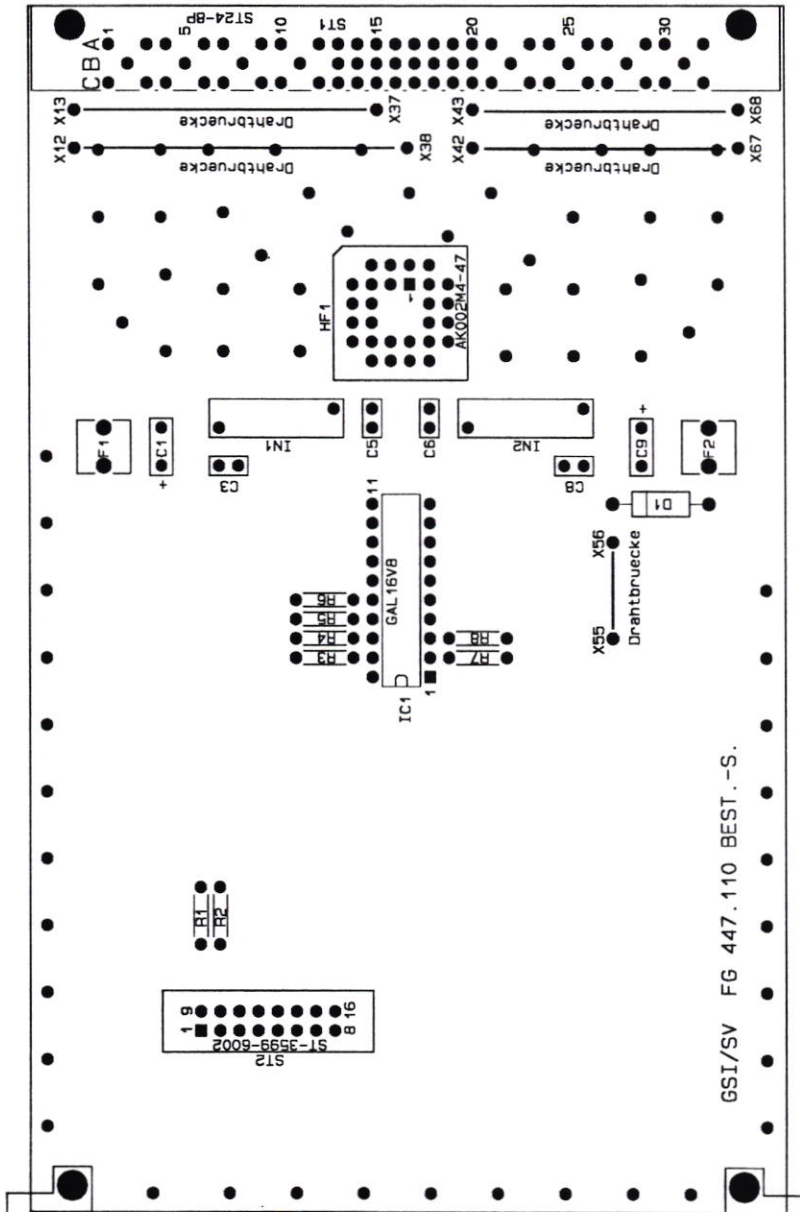


GSI/SV FG 447.110 LS

GSI MAT1L2  
16-JAN-1996 L00S

MAT1

FG 447.110

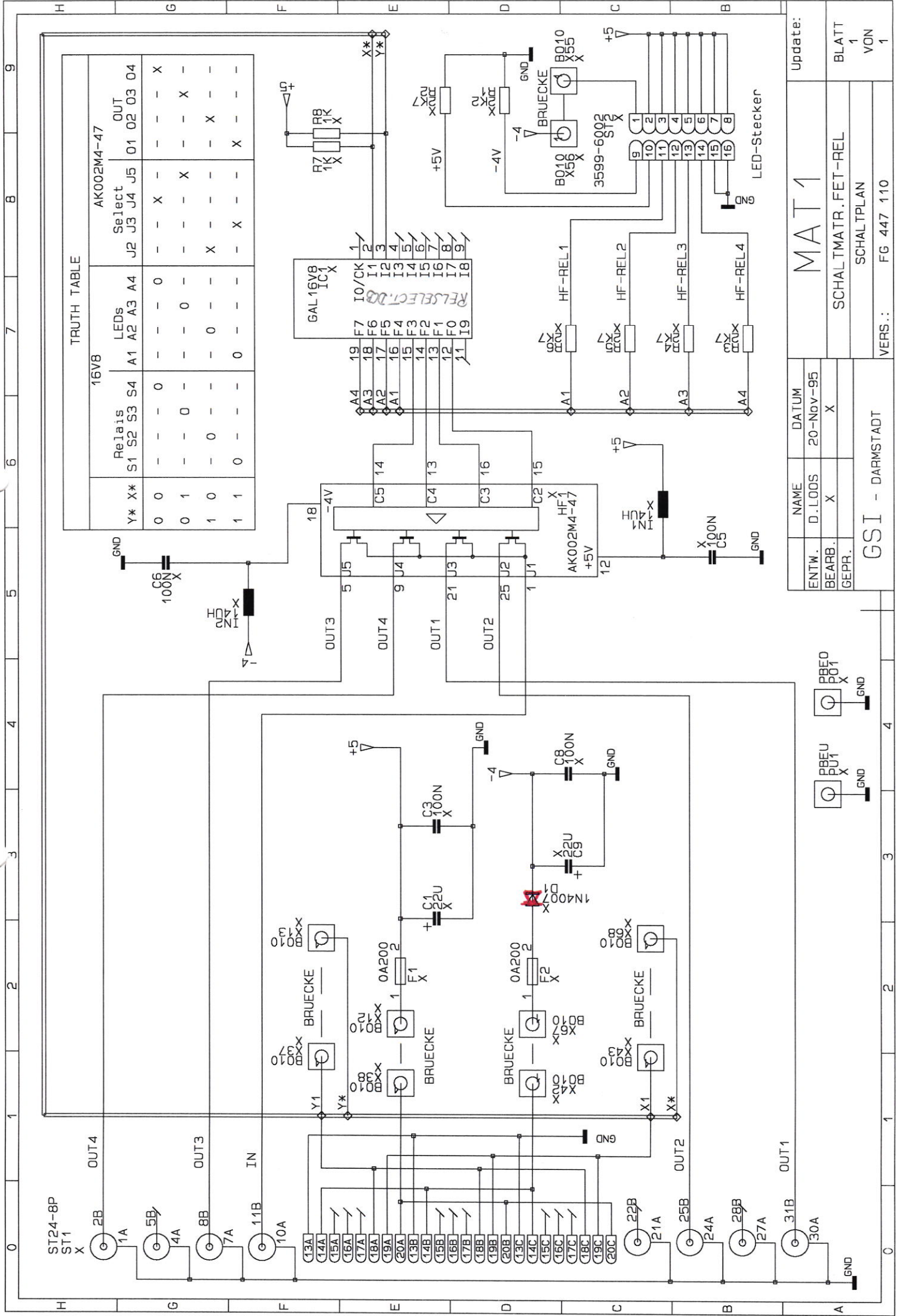


GSI MAT1KON1

16-JAN-1996 L005

MAT 1

FG 447.110



TRUTH TABLE

16V8		AK002M4-47					
Relays		Select					
Y* X*	S1 S2 S3 S4	A1	A2	A3	A4	J2 J3 J4 J5	OUT
0	0	-	-	0	-	-	-
0	0	-	-	0	-	-	-
0	1	-	-	0	-	-	-
1	0	-	-	0	-	-	-
1	1	0	-	-	0	-	-

Update:

NAME	DATUM
ENTW. D. LOOS	20-Nov-95
BEARB. X	X
GEPR.	

MAT 1

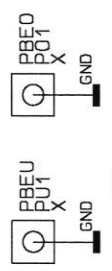
SCHALTMATR. FET-REL

SCHALTPLAN

VERS.: FG 447 110

BLATT 1

VON 1







# case styles

## outline dimensions (inch/mm)

case no.	A	B	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	wt. grams	NOTES*	
RRR137	.29 7.11	.14 3.56	.030 .76	.020 .51	.145 3.68	.110 2.79	.006 .15	.010 .25	.030 .76											.015	A13, C5, E2, F11
SSS173	1.25 31.75	1.25 31.75	.75 19.05	.63 16.00	.38 9.65	1.000 25.40	.125 3.18	1.000 25.40												.75	A10, A18, D17
TTT166	.375 9.53	.500 12.70	.15 3.81	.020 .51	.075 1.91	.250 6.35	.425 10.80	.187 4.75	.050 1.27	.050 1.27	.070 1.78	.270 6.86	.540 13.72	.060 1.52	.095 2.41	.445 11.30	.208 5.28	.415 10.54		.8	A19, F12
TTT167	.375 9.53	.500 12.70	.23 5.84	.020 0.51	.075 1.91	.250 6.35	.425 10.80	.187 4.75	.050 1.27	.050 1.27	.070 1.78	.270 6.86	.540 13.72	.060 1.52	.095 2.41	.445 11.30	.208 5.28	.415 10.54		.8	A19, F13
VVV180	1.80 45.72	1.75 44.45	.50 12.70	.125 3.18	1.675 42.55	.125 3.18	1.625 41.28	.23 5.84	.63 16.00	1.13 28.70	.88 22.36									.34	A4, D17
AB185	4.76 120.90	3.00 76.20	.53 13.46	.150 3.81	4.610 117.09	1.500 38.10	.125 3.18	.38 9.65	.25 6.35	1.13 28.70	.500 12.70									183	A4, D17
AB186	4.76 120.90	3.00 76.20	.53 13.46	.150 3.81	4.610 117.09	1.500 38.10	.125 3.18	.38 9.65	.25 6.35	1.13 28.70	.500 12.70									153	A4, D17
AB204	6.13 155.70	3.00 76.20	.53 13.46	.162 4.11	5.962 151.43	1.500 38.10	.115 2.95	.50 12.70	.25 6.35	1.13 28.70	.50 12.70									215	A4, C2, D17
AF190	1.80 4.57	.090 2.29	.020 .51	.100 2.54	.083 2.11	.076 1.93	.005 .13	.022 .56	.210 5.33	.060 1.52	.060 1.52	.060 1.52	.020 0.51							.04	A16, C6, E3, F14
AF320	.200 5.08	.100 2.54	.020 .51	.070 1.78	.068 1.73	.057 1.45	.005 .13	.020 .51	.230 5.84	.065 1.65	.060 1.52	.080 2.03	.036 0.91							.04	A28, C6, E3, F26
AG191	.310 7.87	.400 10.16	.095 2.41	.003 .08	.007 .18	.035 .89	.055 1.40	.020 .51	.050 1.27											.40	A17, C7, E4, F15
AH202	.375 9.53	.500 12.70	.25 6.35	.020 .51	.035 .89	.050 1.27	.140 3.55	.180 4.57	.320 8.13	.360 9.14	.450 11.43	.465 11.81	.095 2.41	.135 3.43	.240 6.10	.280 7.11				.60	A19
AN213	.456 11.56	.497 12.37	.170 4.32	.020 .51	.029 .74	.017 .43	.050 1.27	.035 .89												2.0	A23, E6, F18
AR214	2.25 57.15	1.38 35.05	1.25 31.75	.50 12.70	.150 3.81	3.100 78.74	.138 3.51	1.238 31.45	3.25 82.65	.12 3.05	.69 17.53	1.50 38.10	.30 7.62	.41 10.41	.71 18.03	.41 10.41	.150 3.81			74.0	A6, A18, D17
AT224	.150 3.81	.150 3.81	.150 3.81	.050 1.27	.030 .76	.025 .64	.028 .71	.050 1.27	.160 4.06	.030 0.76										.15	A21, F17
AV243	1.01 25.65	1.63 41.40	1.59 40.39	.30 7.62	1.05 26.67	.14 3.56	.46 11.68	.12 3.05	.030 .76											.18	A22, D17

tolerance .x±.1 .xx±.03 .xxx±.015 inch

oz. = grams x.0353

### \*NOTES:

#### A. MATERIAL AND FINISH

- A4. Case material: aluminum alloy. Finish: iridite per MIL-C-5541.
- A6. Case material: aluminum alloy. Finish: blue paint over iridite.
- A10. Case material: aluminum alloy. Finish: grey paint or yellow iridite.
- A11. Case material: aluminum alloy. Finish: blue anodize.
- A13. Case material: plastic. Lead finish: tin or tin-lead plate.
- A16. Case material: ceramic. Lead material: #42 alloy. Finish: tin plate.
- A17. Case material: CRS. Lead material: kovar. Finish: gold plate 50 micro inches.
- A18. Mounting bracket finish: iridite or clear anodize.
- A19. Case material plastic, G-10 base. Termination finish: solder plate
- A21. Open-style, ceramic base. Termination finish: solder plate over nickel.
- A22. Case material: aluminum alloy. Finish: nickel plate; heat sink: black anodize.
- A23. Case material: plastic. Lead finish: solder plate.
- A28. Case material: ceramic. Lead material: Kovar. Finish: Solder plate over nickel.

#### C. MARKING

- C2. Consecutive marking n = no. of way power splitter.
- C5. RF output is identified by index mark.
- C6. RF input lead (1) identified by diagonally cut lead. Orientation is also indicated by underline in marking.
- C7. lead #1 is identified by diagonally cut lead, located near letter M in marking.

#### D. CONNECTORS

- D17. Connectors: Female SMA only.

#### E. SPECIAL TOLERANCES

- E2. Lead width ±.010; lead thickness ±.005 inch.
- E3. Lead width ±.005; lead thickness ±.002; cap diameter ±.005 inch.
- E4. All tolerances are ±.005 except where minimum or maximum limits are shown.
- E6. Lead width ±.005 inch.

#### F. PACKAGING

- F1-26. Tape and reel packaging available. See Tape & Reel packaging information for details.

**Mini-Circuits**

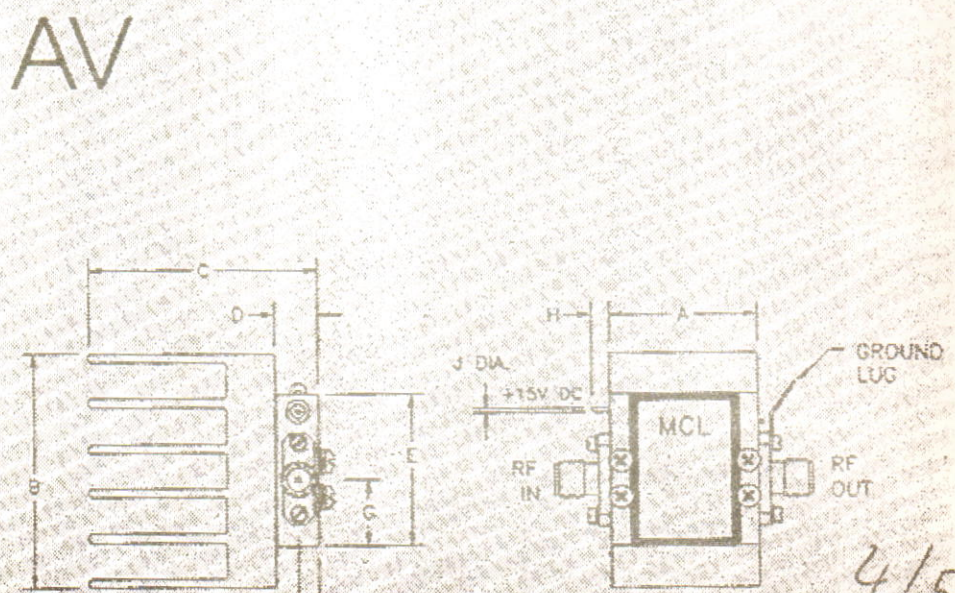
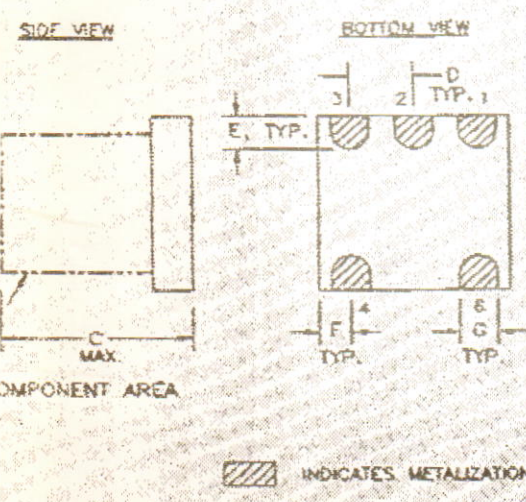
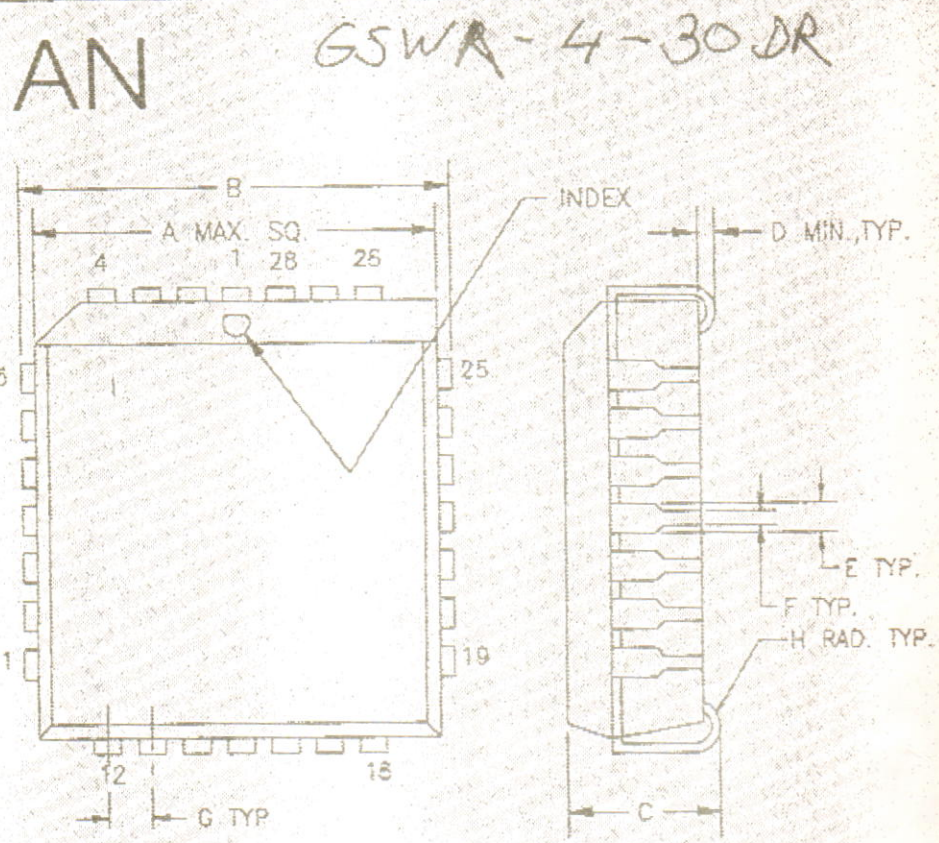
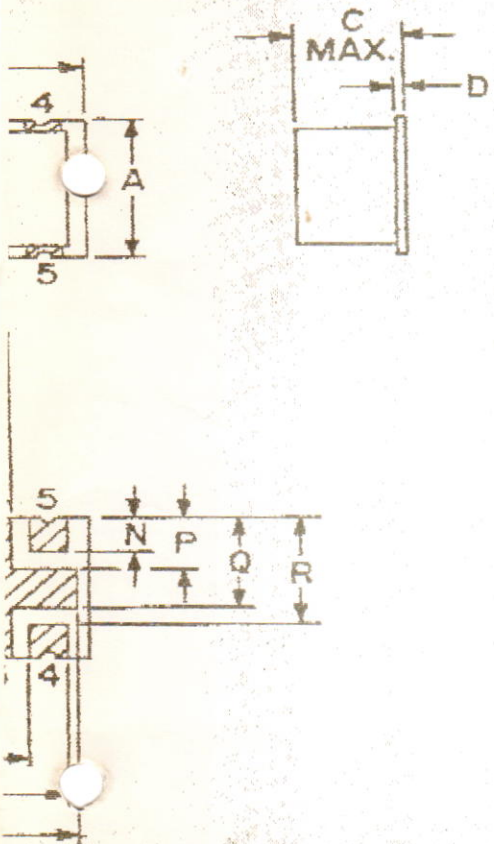
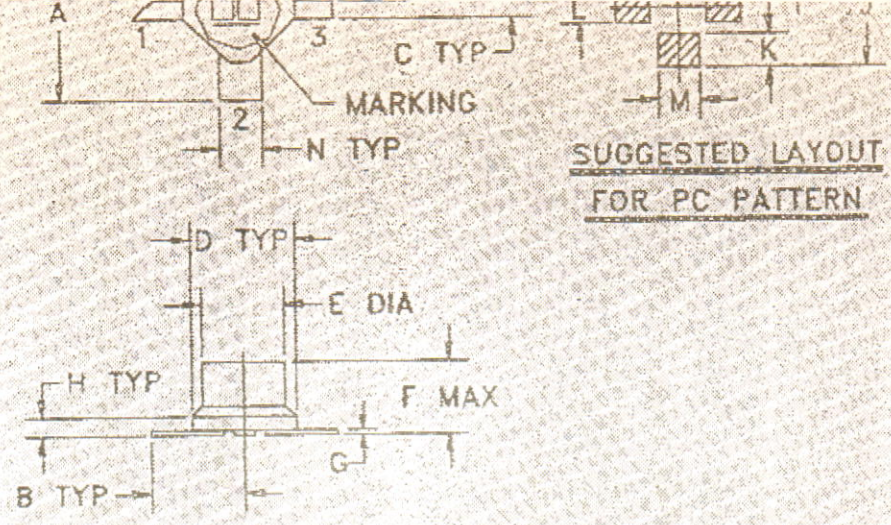
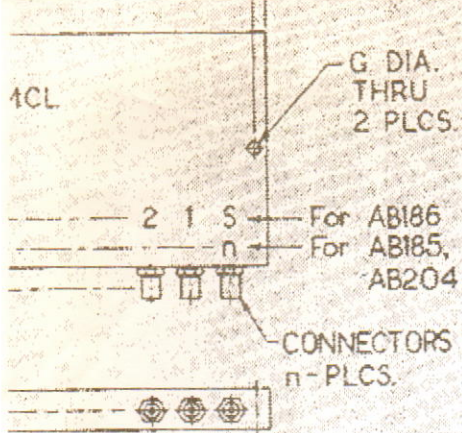
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P.S.

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# Mini-Circuits

# Switches

SPDT/SP4T

GoAs reflective & absorptive  
up to 6 GHz

SURFACE MOUNT



MODEL NO.	Frequency Band	Frequency Band				Insertion Loss (dB)	Return Loss (dB)	Isolation (dB)	Switching Time (ns)	Power Handling (dBm)
		F	F <sub>max</sub>	F <sub>min</sub>	F <sub>max</sub>					
SW-1	DC to 20MHz	0	20	0	20	0.5	20	10	10	
SW-2	DC to 30MHz	0	30	0	30	0.5	20	10	10	
SW-3	DC to 50MHz	0	50	0	50	0.5	20	10	10	
SW-4	DC to 100MHz	0	100	0	100	0.5	20	10	10	
SW-5	DC to 200MHz	0	200	0	200	0.5	20	10	10	
SW-6	DC to 300MHz	0	300	0	300	0.5	20	10	10	
SW-7	DC to 500MHz	0	500	0	500	0.5	20	10	10	
SW-8	DC to 1GHz	0	1000	0	1000	0.5	20	10	10	

### Features

- Excellent repeatability & stability
- Built-in hybrid coupler
- High isolation, 20 dB typical
- Low voltage drive & low power
- Key-top mounted
- 50 Ohm I/O
- Low DC current

### Notes

1. These switches are not intended for use as a switch in a transmission line.
2. Typical insertion loss is 0.5 dB at 1 GHz.
3. Return loss is 20 dB typical.
4. Isolation is 20 dB typical.
5. Switching time is 10 ns typical.
6. Power handling is 10 dBm typical.
7. For more information, contact our sales department.
8. For more information, contact our sales department.
9. For more information, contact our sales department.
10. For more information, contact our sales department.

### Control Logic

Control Logic	Pin 1	Pin 2	Pin 3	Pin 4
Logic 1	0	0	0	0
Logic 2	0	0	1	0
Logic 3	0	1	0	0
Logic 4	0	1	1	0
Logic 5	1	0	0	0
Logic 6	1	0	1	0
Logic 7	1	1	0	0
Logic 8	1	1	1	0

### Additional Specifications

Specification	Value
Insertion Loss (dB)	0.5
Return Loss (dB)	20
Isolation (dB)	20
Switching Time (ns)	10
Power Handling (dBm)	10
Operating Temperature (°C)	-40 to 85
Storage Temperature (°C)	-55 to 125
Humidity (RH)	5 to 95
Shock (g)	10
Vibration (g)	10

FOR CUSTOM PRICING AT CATALOG PRICES CONTACT OUR APPLICATIONS DEPT.  
ALL CATALOG ITEMS GUARANTEED TO BE SHIPPED WORKING WITHIN 1 WEEK!

AVAILABLE FOR TAP & TEST

DESIGNED WORKING BOARD

ORDER NUMBER

3/2

# SURFACE MOUNT Switches

## SPDT/SP4T

GaAs, reflective & absorptive  
dc to 5 GHz

# Mini-Circuits



GWSA

VSWA\*  
VSWR\*

YSWA  
YSW

MODEL NO.	FREQ. GHz	REFLECTIVE	RETURN LOSS, dB						1dB COMPRESSION, dBm						ISOLATION, dB						EAPD DATA	CASE STYLE	CONNECTOR	PRICE \$
			FREQUENCY BAND						FREQUENCY BAND						FREQUENCY BAND									
			B		C*		C*		A		B		C*		B		C*		C*					
DC-3			1.25	1.8	2.0	3.0	2.75	3.9	22	—	28	—	28	—	50	40	37	32	31	26	—	AN213	hb	19.95
*VSW-2-50DR	DC-5		1.0	1.5	1.2	1.7	1.5	2.1	20	15	20	19	24.0	20	50	—	40	32	28	22	13-14	AG191	ef	42.95
*VSWA-2-50DR	DC-5		1.1	1.5	1.4	1.9	1.9	2.7	18	13	20	17	22.5	20	50	—	38	27	30	19	13-14	AG191	ef	43.95
YSW-2-50DR	DC-5		0.9	1.5	1.3	1.7	1.4	2.1	20	15	20	19	—	—	40	32	28	22	—	—	13-14	KKX155	ef	14.95
YSWA-2-50DR	DC-5		1.1	1.5	1.4	1.9	1.9	2.7	18	13	20	17	—	—	40	27	20	19	—	—	13-14	KKK155	ef	23.95

A = DC to 500MHz

B = 500MHz to 2000MHz

C\* = 2000MHz to 5000MHz

### features

- excellent repeatability, specification limits 4.5σ typical from mean.
- high isolation, 80 dB typical
- low video break thru
- very fast switching
- (SPDT).
- low DC

### pin connections

see case style outline drawings

PORT	ef	hb
RF IN	4	1
RF OUT 1	12	25
RF OUT 2	14	21
RF OUT 3	—	9
RF OUT 4	—	5
Control 1	2	15,16,13,14*
Control 2	—	—
Control 3	19	12
Control 4	7	18
Control 5	9,17	—
Other pins	All other pins	

### NOTES:

- Video leakage from switching signal to RF ports.
- VSW and VSWA models.
- Typical isolation in VSWA models decreases 5 dB/octave.
- For GWSA-4-30DR, frequency response is guaranteed.
- Moisture Resistance of nGWSA models is guaranteed.
- Environmental specifications are available in General Information.
- Units are non-hermetic unless otherwise specified. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
- Prices and Specifications subject to change without notice.
  - Absolute maximum power, voltage and current ratings for VSW, VSWA, YSW, YSWA models:
    - RF input power, +22 dBm from DC to 2 GHz, +24 dBm from 2 GHz to 5 GHz.
    - For YSWA, VSWA, +20 dBm at "OFF" port, +24 dBm total.
  - Absolute maximum power, voltage and current ratings for GWSA-4-30DR model:
    - RF Input power (dBm): DC-100 MHz 100-500 MHz 500-3000 MHz
 

Steady state control:	+20 dBm	+24 dBm	+30 dBm
As modulator:	+8 dBm	+14 dBm	+20 dBm
- For reflective switches VSW, YSW models, OFF state of RF output is low impedance.

Control Ports	RF outputs						
	1	2	3	4			
Low	High	High	High	On	Off	Off	Off
High	Low	High	High	Off	On	Off	Off
High	High	Low	High	Off	Off	On	Off
High	High	High	Low	Off	Off	Off	On
VSW, VSWA	Low	—	—	On	Off	—	—
YSW, YSWA	High	—	—	Off	On	—	—

### additional specifications

Model Series	GWSA	VSW, VSWA	YSW, YSWA
Control Voltage, max.	0/5.5	0/5.5	
Low threshold, max.	0.8	0.8	
High threshold, min.	3.5	2.0	
Control Current, mA	High V: 0.2 max Low V: 0.02 max	High V: 2 typ., 5 max. Low V: 0.2 max.	
Positive Supply V.	+5±0.5	+5±0.5	
Negative Supply V.	-5±0.25	-5±0.5	
VSWR	1.28 typ., ON 1.24 typ., OFF DC-2GHz	1.4 typ., 2.0 max.	
Rise/Fall time (10%-90%), ns	25 typ.	1.5 typ., 3 max.	
Switching time, 50% of Control to 90% RF (Turn-on), ns to 10% RF (Turn-off), ns	45 typ.	3 typ., 5 max.	
**Video Leakage, mVp-p	30 typ.	30 typ.	
Temperature, °C operating	-30 to 85	-55 to 100	-55 to 85
storage	-55 to 100	-52 to 125	-55 to 100
MTBF, hrs @85°C case	30X10 <sup>6</sup>	30X10 <sup>6</sup>	

ALL CATALOG ITEMS GUARANTEED TO BE SHIPPED WORLDWIDE WITHIN 1 WEEK!

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AVAILABLE ON TAPE & REEL

3/5



# SURFACE MOUNT Switches

## SPDT/SP4T

GaAs, reflective & absorptive  
dc to 5 GHz

# Mini-Circuits



GSWA

VSWA\*  
VSW\*

YSWA  
YSW

MODEL NO.	FREQ. GHz	REFLECTIVE	ATTEN. LOSS, dB						1dB COMPRESSION, dBm						ISOLATION, dB						EAPD DATA	CASE STYLE	CONNECTION	PRICE \$
			B		C*		A		B		C*		B		C*		See RF/IF Designer handbook Page	Note B	Qty. (1-9)					
			Typ.	Max.	Typ.	Max.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.	Typ.	Min.				Typ.				
DC-3		●	1.25	1.8	2.0	3.0	2.75	3.9	22	—	28	—	28	—	50	40	37	32	31	26	—	AN213	hb	19.95
*VSW-2-50DR	DC-5	●	1.0	1.5	1.2	1.7	1.5	2.1	20	15	20	19	24.0	20	50	40	40	32	28	22	13-14	AG191	ef	42.95
*VSWA-2-50DR	DC-5	●	1.1	1.5	1.4	1.9	1.9	2.7	18	13	20	17	22.5	20	50	40	38	27	30	19	13-14	AG191	ef	43.95
YSW-2-50DR	DC-5	●	0.9	1.5	1.3	1.7	1.4	2.1	20	15	20	19	24.0	20	50	40	40	32	28	22	13-14	KKK155	ef	14.95
YSWA-2-50DR	DC-5	●	1.1	1.5	1.4	1.9	1.9	2.7	18	13	20	17	22.5	20	50	40	31	27	20	19	13-14	KKK155	ef	23.95

B = DC to 500MHz

B = 500MHz to 2000MHz

C = 2000MHz to 5000MHz

### features

- excellent repeatability, specification limits 4.5σ typical from mean.
- high isolation, 80 dB typical at 5 MHz
- low video break thru, 30 mVp-p typical.
- very fast switching, 3 nsec typical (SPDT).
- low DC power consumption, 120mW typical.

### pin connections

see case style outline drawings

PORT	ef	hb
RF IN	4	1
RF OUT 1	12	25
RF OUT 2	14	21
RF OUT 3	—	9
RF OUT 4	—	5
Control 1	2	15,16,13,14*
Control 2	—	—
+5V	19	12
-5V	7	18
NOT USED	9,17	—
GND EXT.	All other pins	All other pins

\* Control 1,2,3,4 respectively.

### control logic

Model Series	Control Ports				RF outputs			
	1	2	3	4	1	2	3	4
GSWA	Low	High	High	High	On	Off	Off	Off
	High	Low	High	High	Off	On	Off	Off
	High	High	Low	High	Off	Off	On	Off
	High	High	High	Low	Off	Off	Off	On
VSW, VSWA	Low	—	—	—	On	Off	—	—
YSW, YSWA	High	—	—	—	Off	On	—	—

### additional specifications

Model Series	GSWA	VSW, VSWA	YSW, YSWA
Control Voltage, max.	0/ 5.5	0/ 5.5	
Low threshold, max.	0.8	0.8	
High threshold, min.	3.5	2.0	
Control Current, mA	High V: 0.2 max Low V: 0.02 max	High V: 2 typ., 5 max. Low V: 0.2 max.	
Positive Supply V.	+5±0.5	+5±0.5	
Negative Supply V.	-5±0.25	-5±0.5	
VSWR	1.28 typ., ON 1.24 typ., OFF DC: 2GHz	1.4 typ., 2.0 max.	
Rise/ Fall time (10%-90%), ns	25 typ.	1.5 typ., 3 max.	
Switching time, 50% of Control to 90% RF (Turn-on), ns	45 typ.	3 typ., 5 max.	
to 10% RF (Turn-off), ns			
**Video Leakage, mVp-p	30 typ.	30 typ.	
Temperature, °C operating storage	-30 to 85 -55 to 100	-55 to 100 -52 to 125	-55 to 85 -55 to 100
MTBF, hrs @85°C case	30X10 <sup>6</sup>	30X10 <sup>6</sup>	

### NOTES:

- Video leakage or break through is defined as leakage of TTL switching signal to RF output ports.
- VSW and VSWA models are hermetically sealed.
- Typical isolation in VSW/A, YSW/A at 5 MHz is 80 dB and decreases 5 dB/octave from 5-1000 MHz.
- For GSWA-4-30DR, frequency band C=2GHz to 3 GHz. Moisture Resistance of models on this page is not guaranteed.
- Environmental specifications and re-flow soldering information available in General Information Section.
- Units are non-hermetic unless otherwise noted. For details on case dimensions & finishes see "Case Styles & Outline Drawings".
- Prices and Specifications subject to change without notice.
- Absolute maximum power, voltage and current ratings for VSW, VSWA, YSW, YSWA models:
  - RF input power, +22 dBm from DC to 2 GHz, +24 dBm from 2 GHz to 5 GHz.
  - For YSWA, VSWA, +20 dBm at "OFF" port, +24 dBm total.
- Absolute maximum power, voltage and current ratings for GSWA-4-30DR model:
  - RF input power(dBm): DC-100 MHz 100-500 MHz 500-3000 MHz  
Steady state control: +20 dBm +24 dBm +30 dBm  
As modulator: +8 dBm +14 dBm +20 dBm
- For reflective switches VSW, YSW models, OFF state of RF output is low impedance.

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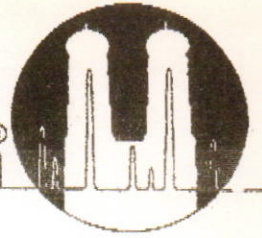
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**Entwicklung**  
**Herrn Dipl. Ing. Arno Schwinn**  
**Postfach 110552**

**D- 64245 Darmstadt**

- Seite - 2

**Bearb.: A. Irzik \**  
**Angebot**  
**Nr. 5/39-17488/**  
 Datum: 29.09.95

Pos.	Menge	Bezeichnung	Einzel- Preis	Gesamt Preis
------	-------	-------------	------------------	-----------------

LIEFERUNG: netto frei Haus

ANGEBOTSGÜLTIGKEIT: 30 Tage, freibleibend

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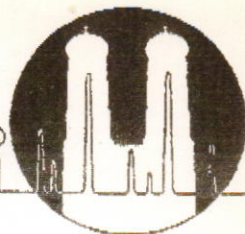
*[Handwritten Signature]*  
 i.A. Andreas Irzik

Bankverbindungen: \* Kreissparkasse Traunstein: Kto-Nr. 366 690    USS-Währungs-Kto.-Nr. 3100 122 16    BLZ: 710 520 50 \*  
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 Geschäftsführer: Andreas Gebauer, Eintragung Amtsgericht München HRB 54445

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**Postfach 110552**

**D- 64245 Darmstadt**

**Bearb.: A. Irzik \**  
**Angebot**  
**Nr. 5/39-17488/**  
**Datum: 29.09.95**

**Ihre FAX-Nr.: 06159/71-2985**

Pos.	Menge	Bezeichnung	Unsere USt-ID-Nr.	DE129422330
			Einzel- Preis	Gesamt Preis

1	50St	MCL GSWA-4-30DR	32.90DM	1645.00DM
		Mini-Circuits SP4T Switch DC-3 GHz		

Preis bei Abnahme von 25 Stück: DM 33,70DM

Sehr geehrter Herr Schwinn,

vielen Dank für Ihre Anfrage.

Nachfolgend unsere Liefer- und Zahlungsbedingungen:

PRODUKTGRUPPE: HF-/Mikrowellenkomponenten      HERSTELLER: MINI-CIRCUITS, USA

LIEFERZEIT: ca. 3 Wochen ab Auftragserteilung

PREISSTELLUNG: verzollt, rein netto, inkl. Verp., exkl. MwSt.

Unsere Preise basieren auf einem Umrechnungskurs von 1 US-\$/DM 1,50.  
Kursänderungen am Tage der Rechnungsstellung werden prozentual angeglichen.

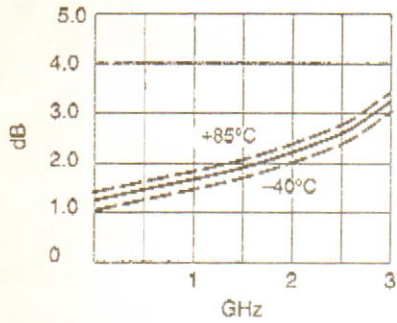
ZAHLUNG: 14 Tage 2%, 30 Tage netto

Bankverbindungen: \* Kreissparkasse Traunstein: Kto-Nr. 366 690    USS-Währungs-Kto.-Nr. 3100 122 16    BLZ: 710 520 50 \*  
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Geschäftsführer: Andreas Gebauer, Eintragung Amtsgericht München HRB 54445

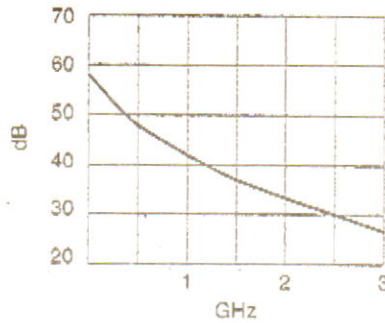
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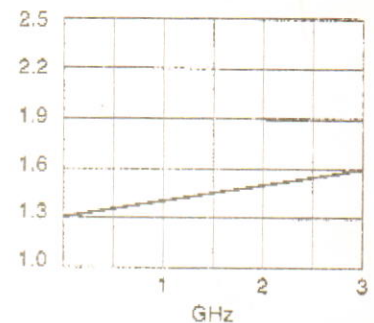
**Typical Performance Data**



Insertion Loss vs. Frequency



Isolation vs. Frequency



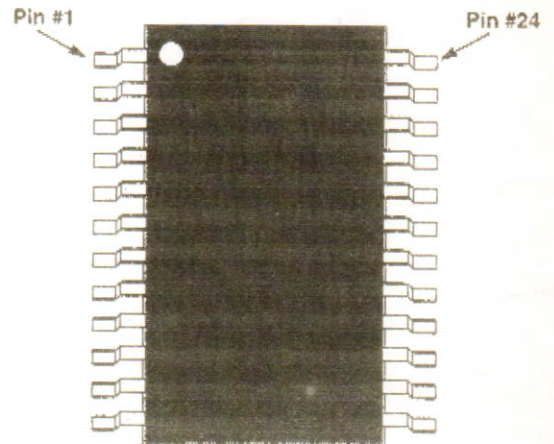
VSWR vs. Frequency

**Truth Table**

V1	V2	V3	V4	V5	V6	V7	V8	Insertion Loss from J1 To:
0	-5	-5	0	-5	0	-5	0	J2
-5	0	0	-5	-5	0	-5	0	J3
0	-5	0	-5	-5	0	0	-5	J4
0	-5	0	-5	0	-5	-5	0	J5

**Pin Out<sup>1</sup>**

Pin #	Description	Pin #	Description
1	J1	24	GND
2	GND	23	GND
3	GND	22	GND
4	J5	21	J2
5	GND	20	GND
6	GND	19	GND
7	J4	18	J3
8	GND	17	GND
9	V8	16	V1
10	V6	15	V3
11	V5	14	V4
12	V7	13	V2



**Absolute Maximum Ratings**

RF Input Power: 2W > 500 MHz 0/-8V  
 0.5W @ 50 MHz 0/-8V  
 Control Voltage: +0.2V, -10V  
 Operating Temperature: -40°C to 85°C

Storage Temperature: -65°C to 150°C  
 $\theta_{JC}$ : 25°C/W  
 Note: Exceeding these parameters may cause irreversible damage.

1. For schematic diagram refer to AS002M4-00.

315



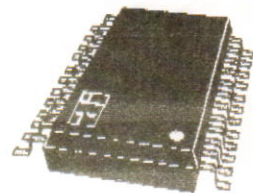


# GaAs MMIC FET SP4T Non-Reflective Switch In 24 Lead SOIC Package DC-3 GHz

AS419M4-49

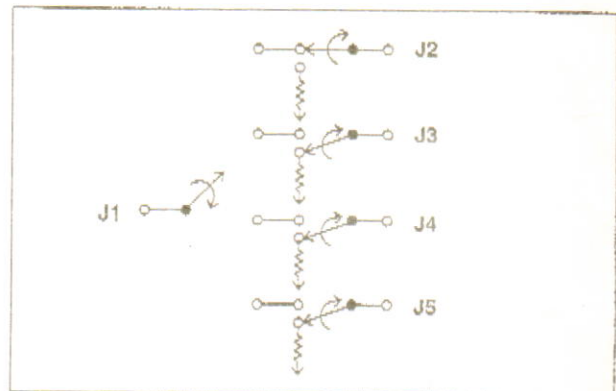
## Features

- Surface Mount 24 Lead SOIC Package
- Designed for Commercial Applications



## Description

The AS419M4-49 is a non-reflective SP4T FET MMIC Switch. The chip is packaged in the 24 lead SOIC package.



## Electrical Specifications at 25°C

Insertion Loss <sup>1</sup>	DC - 0.5 GHz	1.3 dB	Max
	DC - 1 GHz	1.4 dB	Max
	DC - 2 GHz	1.9 dB	Max
	DC - 3 GHz	3.2 dB	Max
Isolation	DC - 0.5 GHz	40 dB	Min
	DC - 1 GHz	34 dB	Min
	DC - 2 GHz	28 dB	Min
	DC - 3 GHz	25 dB	Min
VSWR (I/O)	DC - 0.5 GHz	1.3:1	dB Max
	DC - 1.0 GHz	1.5:1	dB Max
	DC - 3 GHz	1.9:1	dB Max

1. Insertion loss changes by 0.003 dB/°C.

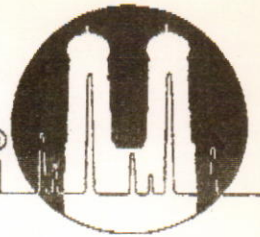
2. Measured with 1 ns risetime pulse and 500 MHz bandwidth.

## Operating Characteristics at 25°C

Impedance	50 Ohms Nominal		
Switching Characteristics			
RISE, FALL (10/90% or 90/10% RF)	4	ns	Typ
ON, OFF (50% CTL to 90/10% RF)	8	ns	Typ
Video Feedthru <sup>2</sup>	15	mV	Typ
Input Power for 1 dB Compression			
0.5-3 GHz	0/-5	0/-10	
0.001 GHz	27	33	dBm Typ
0.001 GHz	21	26	dBm Typ
Intercept Points			
0.5-3 GHz	IP2	IP3	
0.001 GHz	65	46	dBm Typ
0.001 GHz	55	40	dBm Typ
Control Voltage			
V <sub>0</sub> (Low)	0 to -0.2V @ 20 μA Max		
V <sub>0</sub> (High)	-5V @ 50 μA to -10V @ 200 μA		

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**FAXBRIEF VON:** MUNICOM GmbH, D83224-GRASSAU  
FAX: 08641-3039 (TEL 08641-9585-0)

**AN:** GSI GmbH  
Entwicklung  
**ZU HDN:** Herrn Dipl.Ing. Arno Schwinn

**DATUM:** 29.09.95

**EMPFÄNGERFAX:** 06159/71-2985

Nr. 5/39-17500/

Ihre Anfrage nach ALPHA Ind. SP4T Switches

Sehr geehrter Herr Schwinn,

vielen Dank für Ihre Anfrage. Wie telefonisch besprochen erhalten Sie die als Anlagen beigefügten Datenblätter über SP4T Schalter. Das gewünschte Angebot erhalten Sie dann von Frau Helene Fletcher.

Bitte rufen Sie uns an, wenn Sie weitere Informationen oder techn. Beratung wünschen.  
Sie erreichen mich über ISDN unter der Nummer 08641/9585-19.

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Geschäftsführer: Andreas Gebauer, Eintragung Amtsgericht München HRB 54445

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Postfach 110522  
D-40244 Düsseldorf

Angebot Nr. 3441-177501  
Datum: 14.10.93

Pos.	Stange	Bezeichnung	Einheit	Preis	Quant.

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Montage und Montagearbeiten sind im Preis enthalten

PRODUKTION - GIBT NICHT ZURÜCK - KEINE RÜCKGABEN

Pos. 1 ca. 3 Wochen ab Auftragserteilung

Pos. 2 ab Lager

Die Lagerware ist der Zwischenverkauf vorbehalten

RECHNUNGSSTELLEN: keine weitere, inkl. MwSt. und Zinsen

LAUFZEIT: 14 Tage ab Lager

LIEFERUNG: 1mal

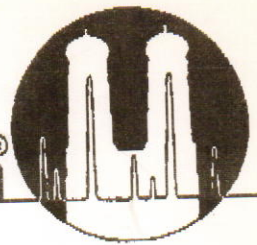
ANFORDERUNGSZEIT: 10 Tage, freibleibend

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Mit freundlichen Grüßen  
Ulrich G. G. G. G.

A. K. K. K.  
Ulrich G. G. G. G.

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Herrn Dipl.Ing. Arno Schwinn  
Postfach 110552  
D- 64245 Darmstadt**

**Angebot  
Nr. 5/41-17750/  
Datum: 10.10.95**

Pos.	Menge	Bezeichnung	Einzel- Preis	Gesamt Preis
------	-------	-------------	------------------	-----------------

vielen Dank für Ihre Anfrage.

Nachfolgend unsere Liefer- und Zahlungsbedingungen:

PRODUKTGRUPPE: GaAs MMIC SPST FET Switch    Hersteller: Alpha Industries, USA

LIEFERZEIT:    Pos. 1 ca. 3 Wochen ab Auftragserteilung  
                  Pos. 2 ab Lager  
                  Für Lagerware ist der Zwischenverkauf vorbehalten.

PREISSTELLUNG: verzollt, rein netto, inkl. Verp., exkl. MwSt.

ZAHLUNG:        14 Tage 2%, 30 Tage netto

LIEFERUNG:      frei Haus

ANGEBOTSGÜLTIGKEIT: 30 Tage, freibleibend

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Mit freundlichen Grüßen  
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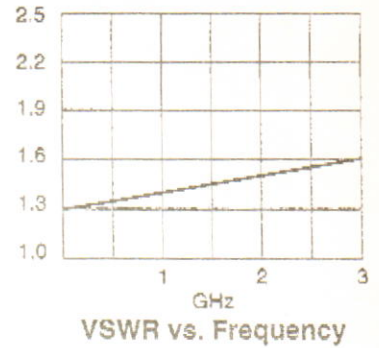
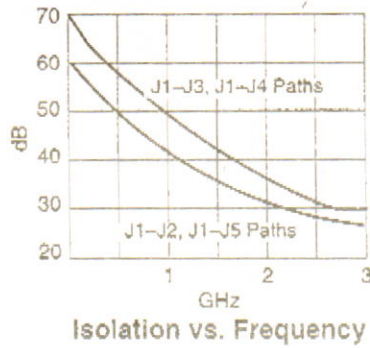
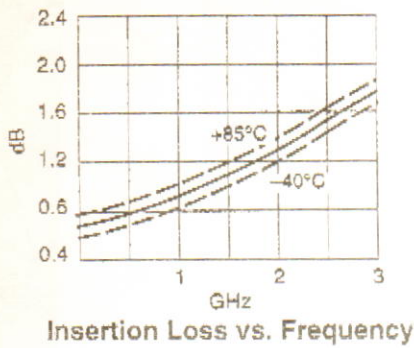
*A. Karin Trisinger*  
i.A. Helen Fletcher

Bankverbindungen: \* Kreissparkasse Traubsteln: Kto.-Nr. 366 690    USS-Währungs-Kto.-Nr. 3100 122 16    BLZ: 710 520 50 \*

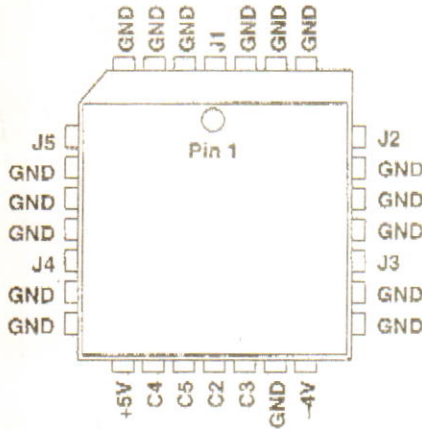
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Andreas Gebauer, Eintragung Amtsgericht München HRB 54445

Typical Performance Data



Pin Out<sup>1</sup>



Absolute Maximum Ratings

- RF Input Power: 0.8W > 500 MHz  
0.2W @ 50 MHz
- Bias Voltages: +7.0V, -6V
- Control Voltages: +7.0V
- Operating Temperature: -40°C to 85°C
- Storage Temperature: -65 to 150°C
- Thermal Resistance: 30°C/W

Truth Table

Control Logic				Condition of J1 to:			
C2	C3	C4	C5	J2	J3	J4	J5
0	0	0	0	Insertion Loss	Insertion Loss	Insertion Loss	Insertion Loss
0	1	1	1	Insertion Loss	Isolation	Isolation	Isolation
1	0	1	1	Isolation	Insertion Loss	Isolation	Isolation
1	1	0	1	Isolation	Isolation	Insertion Loss	Isolation
1	1	1	0	Isolation	Isolation	Isolation	Insertion Loss
1	1	1	1	Isolation	Isolation	Isolation	Isolation

1. For schematic diagram refer to AK002M4-00.

575



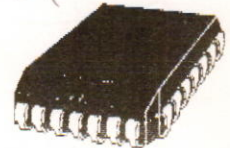


# FET SP4T Non-Reflective Switch With Integral Driver In PLCC 28 Package DC-3 GHz

105th best seller  
 on 11.10.95

AK002M4-47

40 = 4T

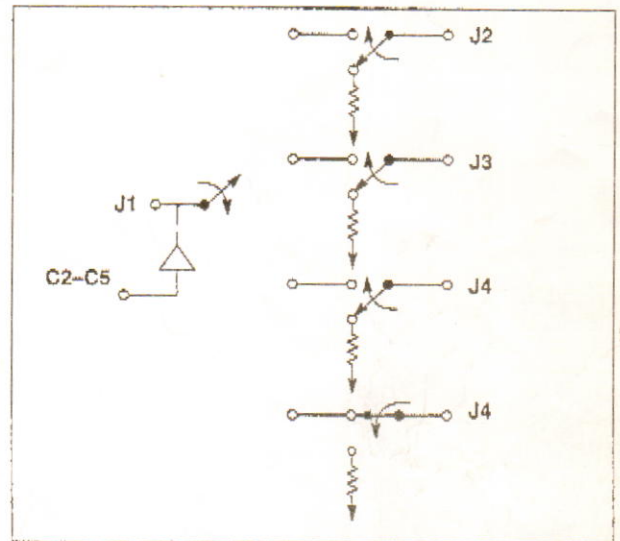


## Features

- Integral Driver +5V, -4V Bias Supplies; CMOS and TTL Compatible
- Low DC Power Consumption - 20 mW per Arm
- 28 Lead Plastic Chip Carrier (PLCC)
- Individual TTL Control for Each Port
- Non-Reflective
- Base Station Switch Matrix Applications

## Description

The AK002M4-47 is a SP4T non-reflective FET MMIC switch. The switch consists of a GaAs SP4T chip and an integral driver. This unit is used in telecommunication applications (e.g. base station switch matrixes) and requires 4 lines of control logic.



## Electrical Specifications at 25°C

Insertion Loss <sup>1</sup>	DC - 0.5 GHz	1.1	dB	Max
	DC - 1 GHz	1.4	dB	Max
DC - 2 GHz	1.6	dB	Max	
DC - 3 GHz	2.1	dB	Max	
Isolation	DC - 0.5 GHz	48	dB	Min
	DC - 1 GHz	42	dB	Min
	DC - 2 GHz	33	dB	Min
	DC - 3 GHz	27	dB	Min
VSWR (I/O)	DC - 0.5 GHz	1.3:1		Max
	DC - 1 GHz	1.5:1		Max
	DC - 3 GHz	1.7:1		Max

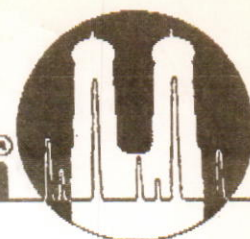
1. Insertion loss changes by 0.003 dB/°C
2. Measured in 500 MHz bandwidth with 1 ns risetime pulse.
3. Bias voltage and ground must be connected before TTL voltage is applied to avoid irreversible damage to the device. Consult factory for application notes.

## Operating Characteristics at 25°C

Impedance	50 Ohms Nominal		
Switching Characteristics			
RISE, FALL (10/90% or 90/10% RF)	15	ns	Typ
ON, OFF (50% CTL to 90/10% RF)	35	ns	Typ
Video Feedthru <sup>2</sup>	30	mV	Typ
Input Power for 1 dB Compression			
0.5-3 GHz	+24	dBm	Typ
0.001 GHz	+16	dBm	Typ
Intermodulation Intercept Point for two-tone input power up to +13 dBm			
Intercept Points		IP2	IP3
0.5-2 GHz	+68	+62	+40 dBm Typ
0.001 GHz	+57	+51	+29 dBm Typ
Logic Drives (Volts)		Min	Max
Low (0)	0	0.5	Volts
High (1)	4	5	Volts
Bias Voltage		+5V ± 0.5V @ 3 mA Typ	
		-4V ± 0.25V @ 12 mA Typ <sup>3,4</sup>	

4. Current increases from 12 mA to 16 mA @ +85°C.

**municom**



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Tel.: 08641 / 9585-0, Fax 08641 / 3039

**GSI GmbH**  
**Entwicklung**  
**Herrn Dipl.Ing. Arno Schwinn**  
**Postfach 110552**  
**D- 64245 Darmstadt**

**Angebot**  
**Nr. 5/41-17750/**  
Datum: 10.10.95

**Ihre Anfrage:                      Telefonisch am 09.10.95                      Ihre FAX-Nr.: 06159/71-2985**

Pos.	Menge	Bezeichnung	Unsere USt-ID-Nr.	DE129422330
			Einzel-	Gesamt
			Preis	Preis

1	25St	<b>AK002M4-47</b>	33.15 \$	828.75 \$
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Manufacturer: Alpha Industries, USA  
 FET SP4T Non-Reflective Switch  
 - with Integral Driver  
 - DC-3 GHz  
 - Package: 28 Lead Plastic Chip Carrier (PLCC)

Hinweis zum U.S. Export-Kontroll-Recht:  
 G-DEST License  
 ECCN: 3A96G

2	25St	AS419M4-49	35.25 \$	881.25 \$
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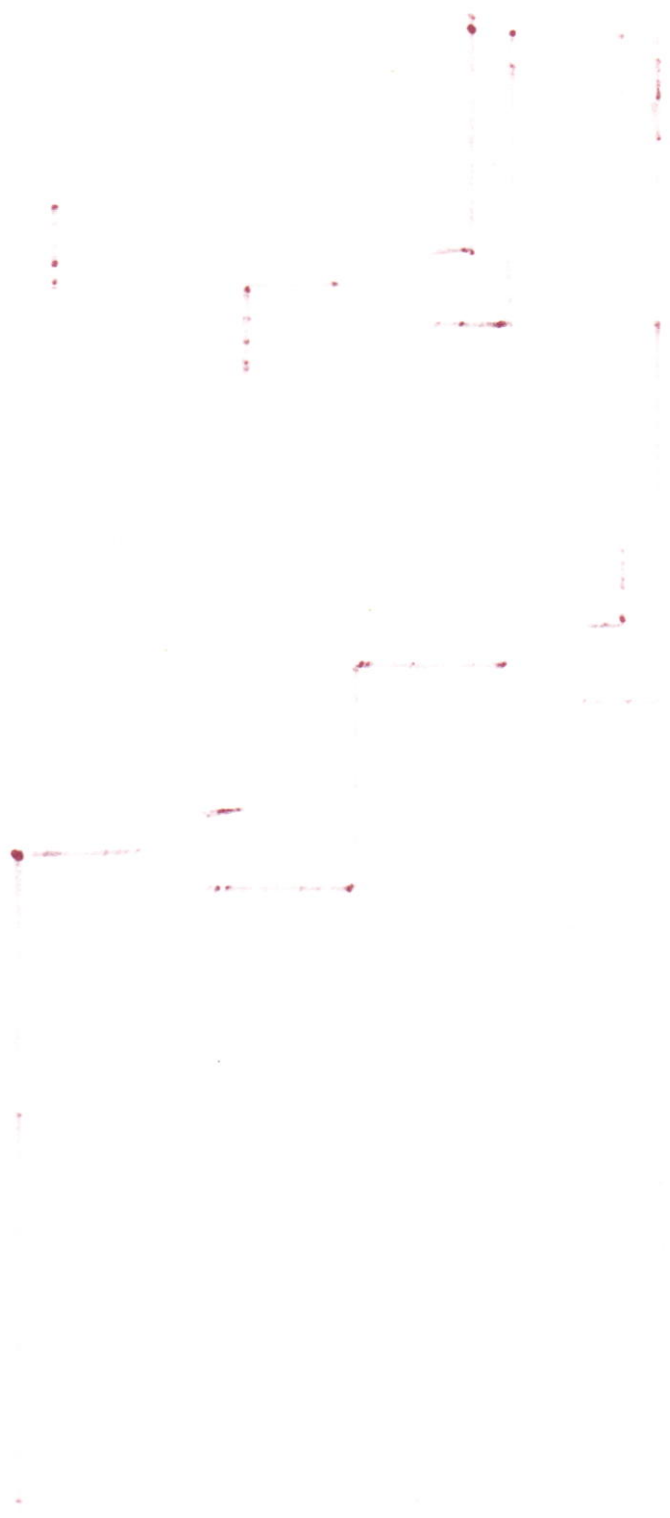
Manufacturer: Alpha Industries  
 GaAs MMIC SPST FET Switch

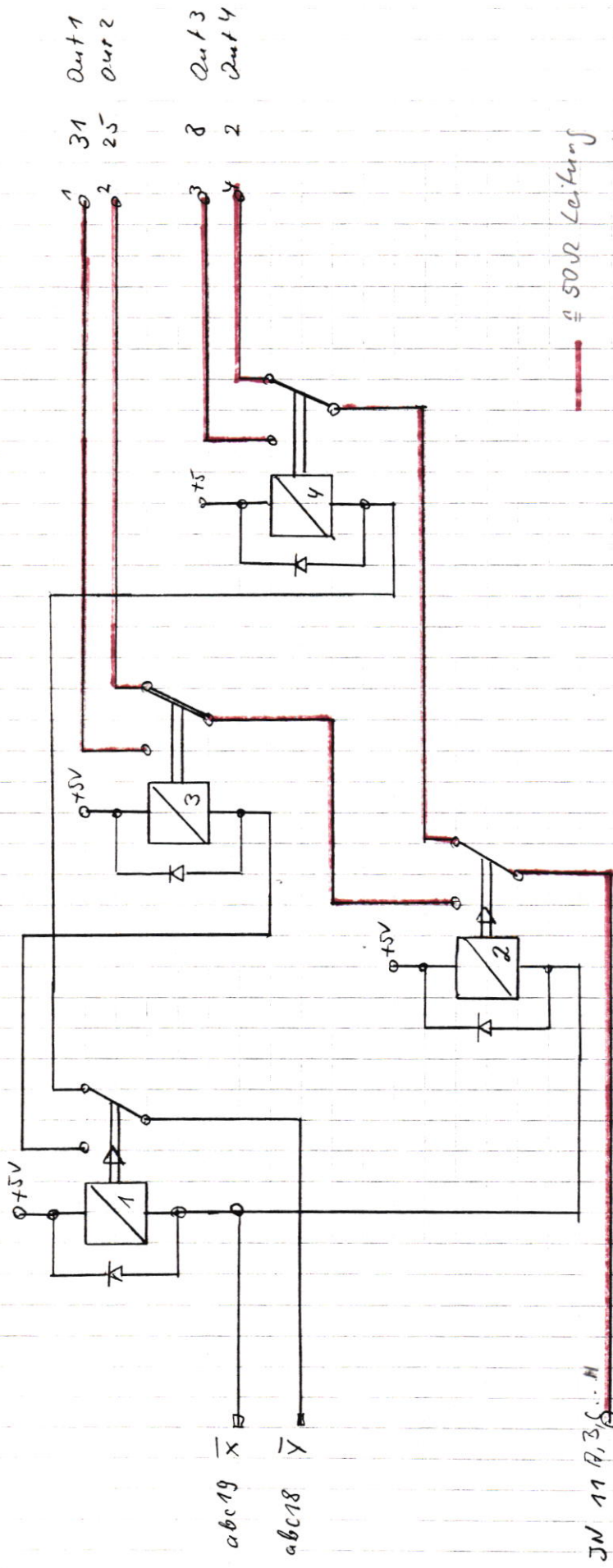
Hinweis zum U.S. Export-Kontroll-Recht:  
 G-DEST License  
 ECCN: 3A96G

Sehr geehrter Herr Schwinn,

©BUS Administration 1993. Copyright (C) AHNERT, HANNOVER







— = 50Ω Leitung  
 Rel = Signal / TTL etc.

X <sub>A</sub>	Y <sub>A</sub>	Out 1	Out 2	Out 3	Out 4
1	1			X	
1	0		X		
0	1	X			
0	0	X			

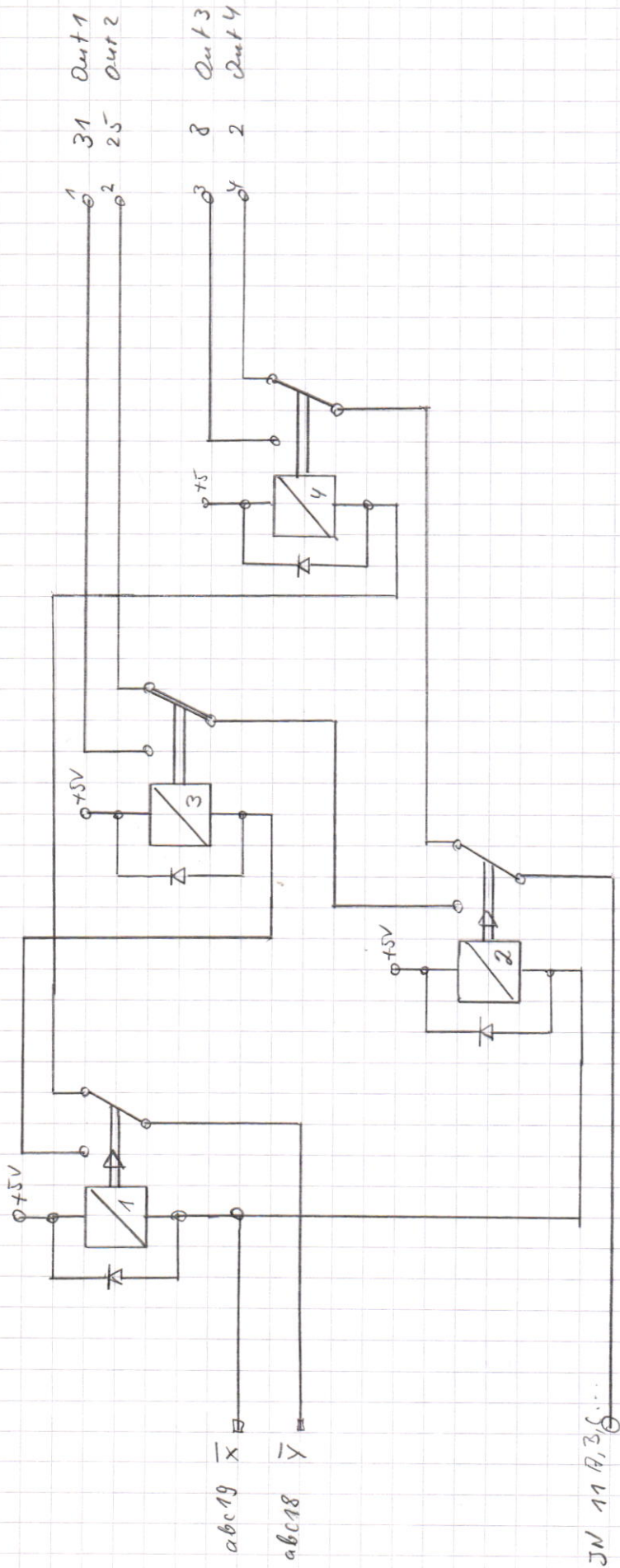
4x Relais SDS - RF 1 - DC 5V

Relais Matrix

Mech. Relais Version

2005  
 07.11.95





4x Relais SDS - RF 1 - DC 5V

Relais Matrix

Mech. Relais Version

```
LISTING = PLOT,FUSE-PLOT,PINOUT,EQUATINS;  
PROGFORMAT =JEDEC;  
;SWITCH(1)=1;  
*END  
;  
*COMMENT  
;
```



\*IDENTIFICATION

FILE NAME: US10\$ROOT:[DBAPL.FG447.LOGIC.011]RELSELECT.DCB
ENTW./VERS.: D.LOOS/APL 15.01.1996
KOMMENTAR: SELECT-ERZEUGUNG FUER HF-RELAIS-MATRIX FG 447 010/111
>CODE NR.:

\*X-NAMES
X,Y ; 2 EINGAENGE
\*Y-NAMES
A[4..1],S1,S2,S3,S4 ; 8 EINGAENGE

\*PAL
TYPE=GAL16V8\_C8;

\*PINS
X=2,Y=3,A[4..1]=[19..16],S1=13,S2=12,S3=15,S4=14;

; PIN>>> 10=GND,20=VDD

\*\*\*\*\*

\*FUNKTION-TABLE ;

EINGANGSSEITE : AUSGANGSSEITE
\$ (( Y , X )) : ((S4, S3, S2, S1 ));
| | : | | | | | | | | ;
| | : | | | | | | | | ;
V V : V V V V V V V V ;

Table with 4 rows of logic values and 4 columns of output labels (SELECT-RELAIS 1-4). Values range from 0 to 1.

REST : 1 1 1 1 ;

\*\*\*\*\*

\*FUNKTION-TABLE ;

EINGANGSSEITE : AUSGANGSSEITE
\$ (( Y , X )) : (( A4, A3, A2, A1 ));
| | : | | | | | | | | ;
| | : | | | | | | | | ;
V V : V V V V V V V V ;

Table with 4 rows of logic values and 4 columns of output labels. Values range from 0 to 1.

REST : 1 1 1 1 ;

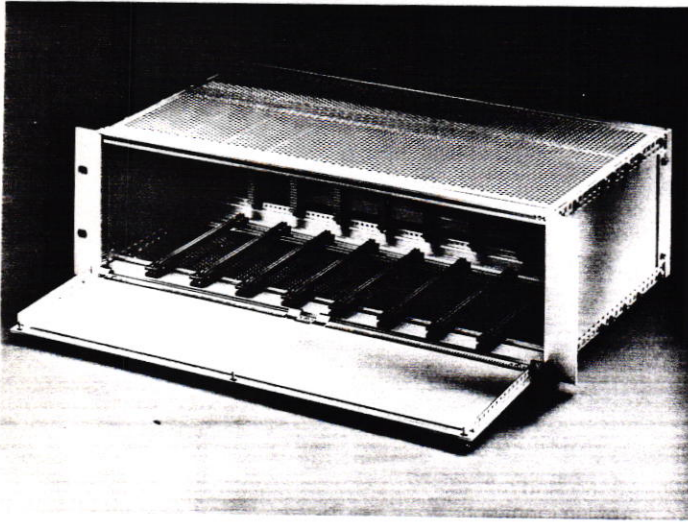
\*\*\*\*\*

\*RUN-CONTROLL





Bausätze

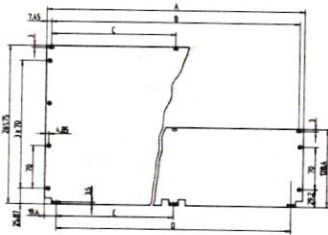


Frontprofil (klappbar), geschirmt, bestellen

Lieferumfang

Pos.	Menge	Benennung	Material	Oberfläche	Bemerkung
1	1	Frontplatte	Al 2,5 mm	farblos chromatiert	2 Führungszapfen eingepreßt
2	6	Einpreßnippel	St rostfrei		
3	1	Trägerwinkel	Al-Profil	farblos chromatiert	
4	1	Kontaktwinkel	Al-Profil	farblos chromatiert	
5	1	Vertikal-Kontaktstreifen	St rostfrei		auf Pos. 4 aufgesteckt
6	2	Klebe-Kontaktstreifen	St rostfrei		auf Pos. 1 geklebt
7	1 Satz	Scharniere	Zn-Druckguß	matt verchromt	
8	1 Satz	Befestigungsmaterial			

Maßbild

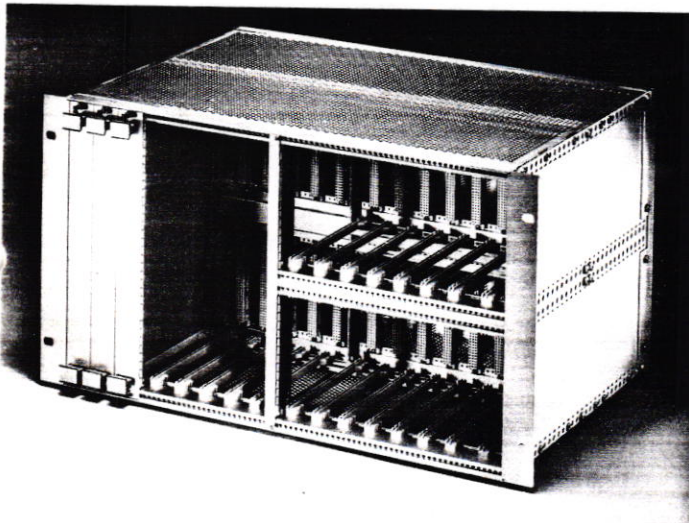


BLA43396

TE	A	B	C	D	E
42	213,0	198,1	101,6	174,2	87,1
63	319,7	304,8	157,5	280,9	40,5
84	426,4	411,5	208,3	387,6	93,8

Lieferform: Bausatz.

Breite TE	Bestell-Nr.	
	3 HE	6 HE
42	<b>20845-383</b>	<b>20845-397</b>
63	<b>20845-384</b>	<b>20845-398</b>
84	<b>20845-385</b>	<b>20845-399</b>



Frontprofil, geschirmt, für gemischten Ausbau bestellen

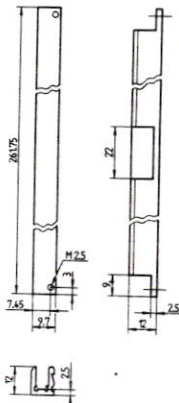
Zur Abdeckung bei Unterteilung des Einbaurums in 6 HE und 2 x 3 HE.

Lieferumfang

Pos.	Menge	Benennung	Material	Oberfläche	Bemerkung
1	1	Frontprofil	Al-Profil	farblos chromatiert	
2	1	Vertikal-Kontaktstreifen	St rostfrei		auf Pos. 1 aufgesteckt
3	1 Satz	Befestigungsmaterial			

Frontprofil, geschirmt 6 HE, 2 TE	Bestell-Nr.
2 x 3 HE-Ausbau links	<b>20845-537</b>
2 x 3 HE-Ausbau rechts	<b>20845-538</b>

Maßbild



BLA43417

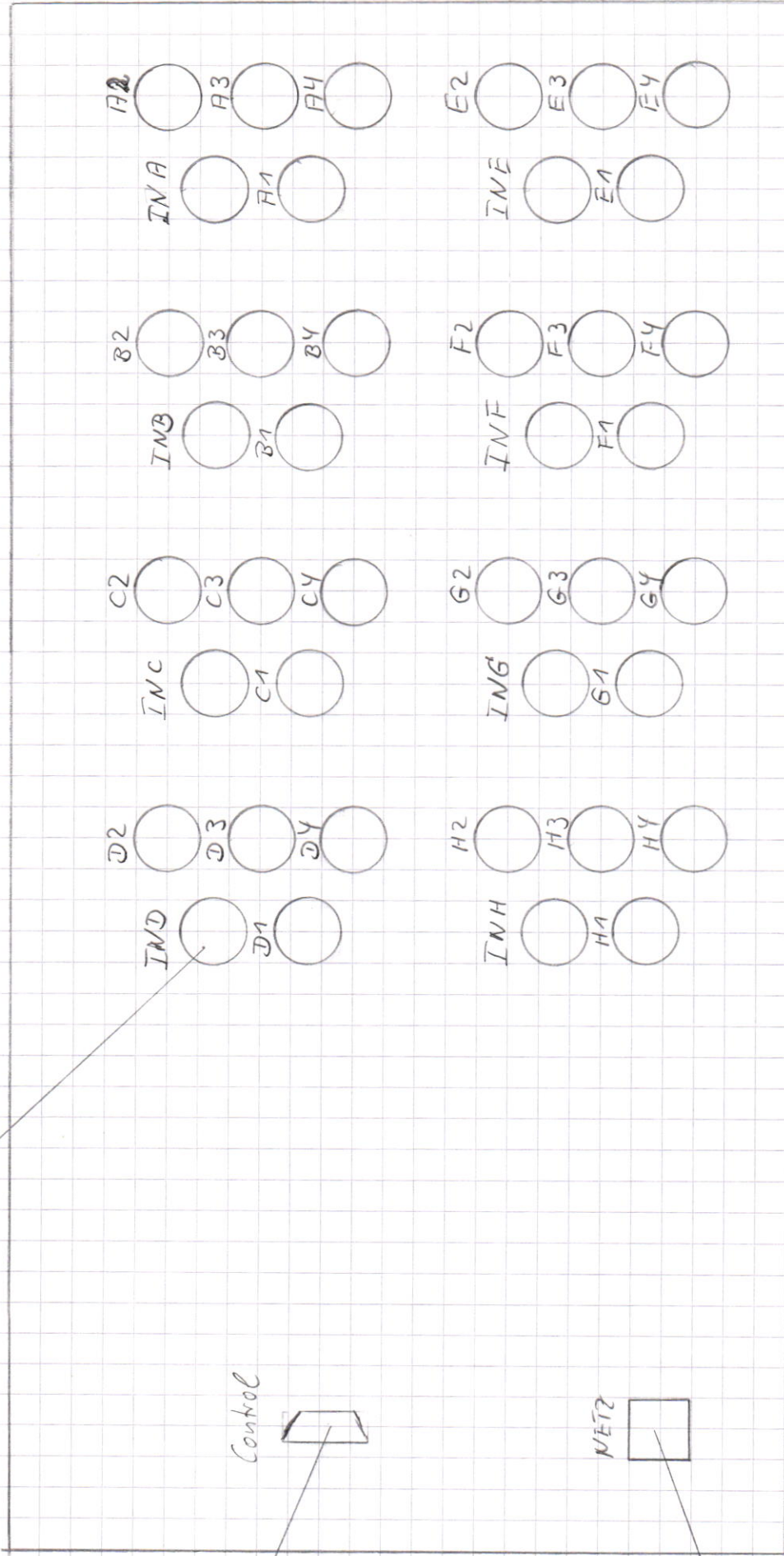
Streben für die Montage verkürzter Modul-/Profilschienen . . . . .  Seite 34.38





40 x Buchse, N" (Söhner)

8YTE



Rückplatte GHE/8YTE

Schaltmatrizen  
FH 450

Loos  
08.11.95

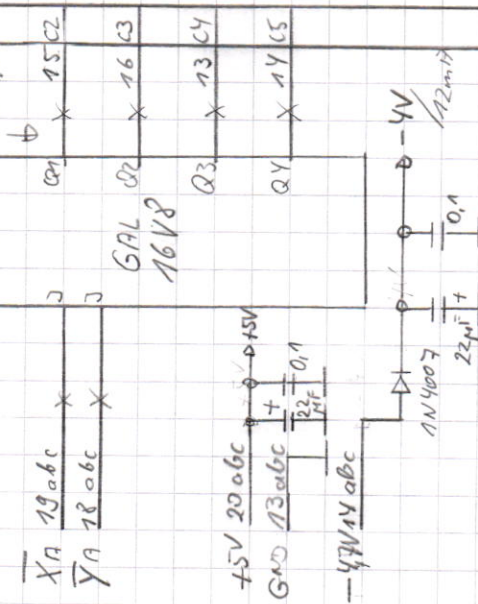




X = 10k

ST24-8P\*P7

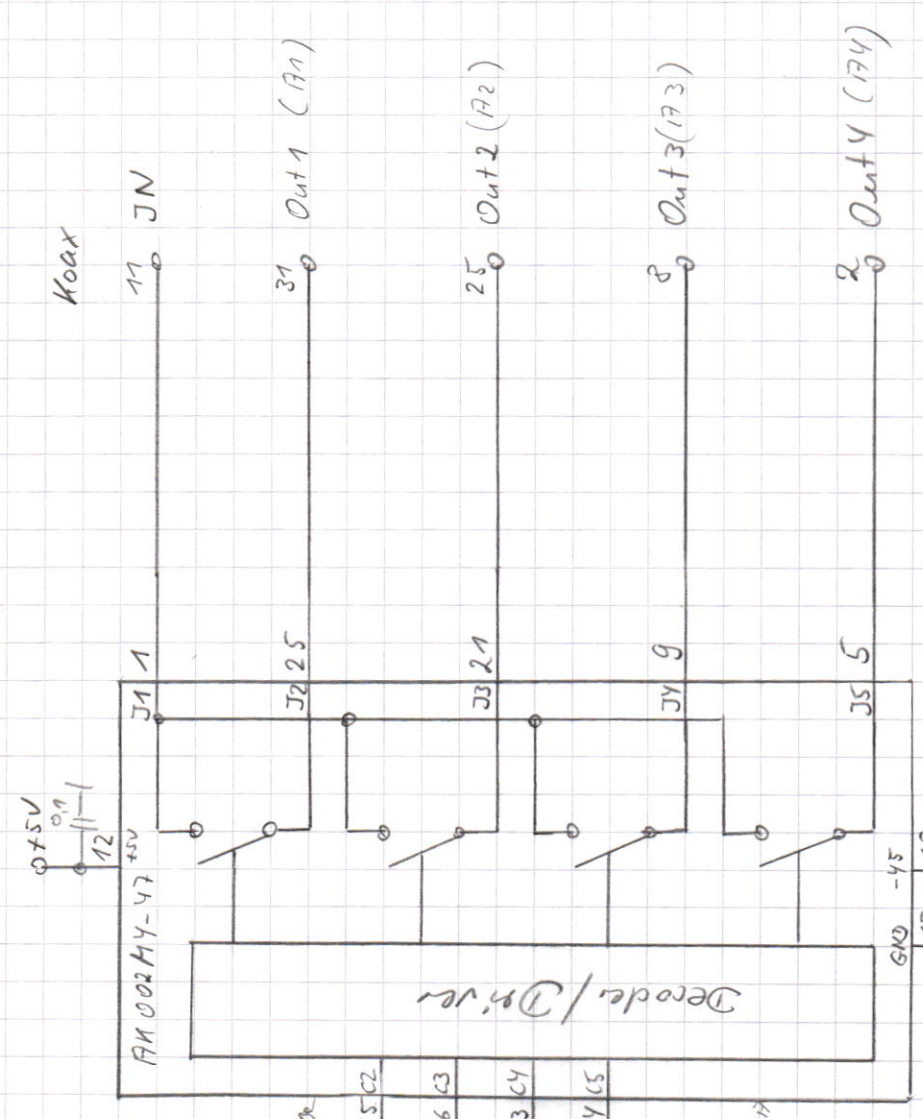
Achtung DDP  
 74LS139  
 Ausgang nicht an-  
 schlieÙen



Truth Table

Y X GAL	C2 C3 C4 C5	AM002HY-47	J2 J3 J4 J5	Out1	Out2	Out3	Out4
X	X	X	X	X	-	-	-
1	1	0	1	1	1	-	-
1	0	1	0	1	1	-	-
0	1	1	0	1	1	-	-
0	0	1	1	0	1	-	-
-	-	1	1	1	1	-	-
JN	OUT						

X = Durchlauf  
 - = geopent



RL AM002HY-47 \* PL

FOR 200 \* 30003

FET-Halbleiter-Relais  
 Schaltmatrizen

# Mini-Circuits



# Switches

SPDT/SP4T  
GaAs, reflective & absorptive  
dc to 2 GHz

SWITCH	CASE STYLE	PART NO.	FREQUENCY BAND		FREQUENCY BAND		FREQUENCY BAND		MODEL NO.
			A	B	A	B	A	B	
SW1	...	...	...	...	...	...	...	...	...
SW2	...	...	...	...	...	...	...	...	...
SW3	...	...	...	...	...	...	...	...	...

Features

- excellent repeatability
- limited 24-hour lead time
- high isolation, 50 dB typical
- low wave break thru, <math>S\_{22}</math> <math>S\_{33}</math>
- key features include:
- GaAs
- low DC resistance
- thru connection

control logic

Control	Logic
...	...
...	...
...	...

additional specifications

Parameter	Value
...	...
...	...
...	...

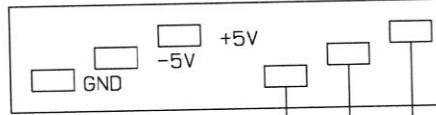
NOTES

1. For reflective New York models, SW1 note only, see page 10.
2. For absorptive New York models, SW2 note only, see page 10.
3. For thru connection, SW3 note only, see page 10.
4. For thru connection, SW4 note only, see page 10.
5. For thru connection, SW5 note only, see page 10.
6. For thru connection, SW6 note only, see page 10.
7. For thru connection, SW7 note only, see page 10.
8. For thru connection, SW8 note only, see page 10.
9. For thru connection, SW9 note only, see page 10.
10. For thru connection, SW10 note only, see page 10.

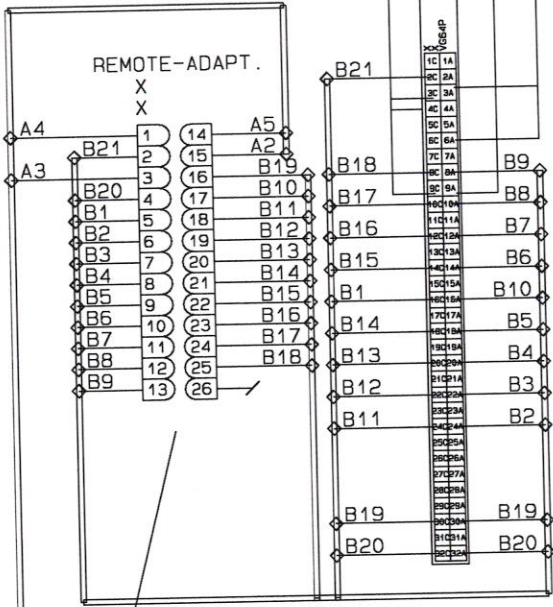
ALL DATA IS GUARANTEED TO BE SHIPPED WORLDWIDE WITHIN 1 WEEK  
FOR CUSTOM PRODUCTS AT CATALOG PRICES CONTACT OUR APPLICATIONS DEPT.  
THESE POSITIVE POINTS ARE...  
WARRANTY...  
...



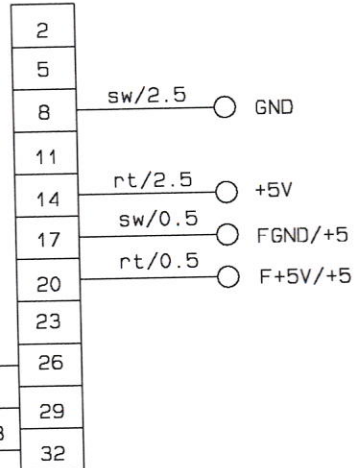
CONTROL



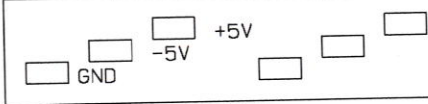
\* ALLE SPANNUNGSVERSORUNGSGS-LEITUNGEN 0.5qmm  
 +5V = rt  
 -5V = ge  
 GND = sw



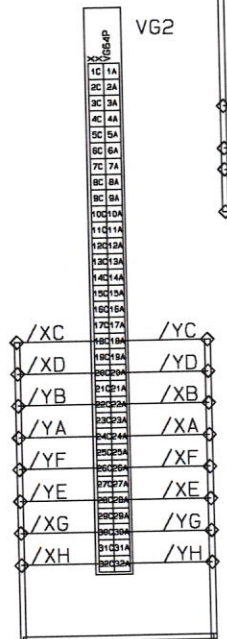
+5V/5A



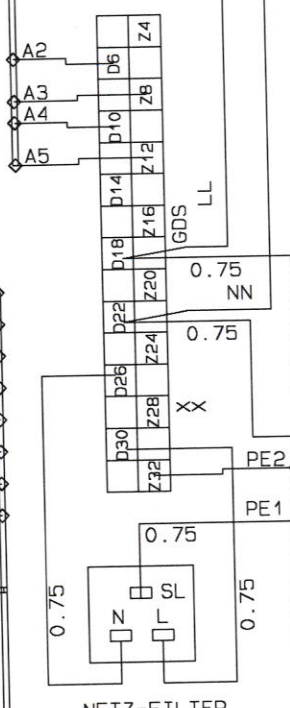
JEWELTS  
SCHIENE



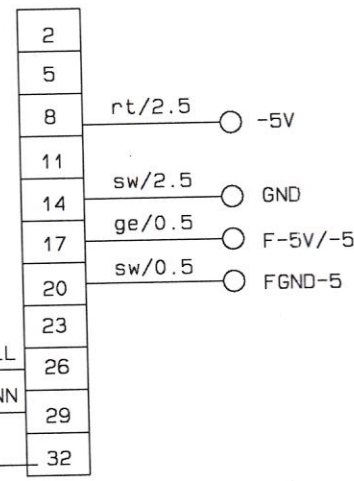
25 POL. FLACHKABEL



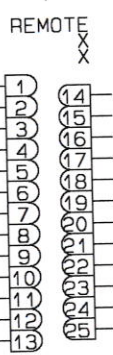
NETZ



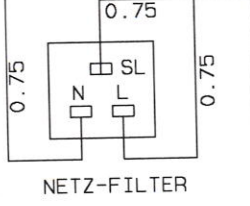
-4, 7V/3A



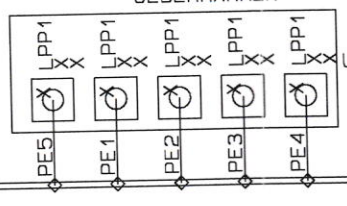
JEWELTS  
SCHIENE



NETZ-FILTER



UEBERRAHMEN



GND/0V  
UEBERRAHM  
MASSE

F  
E  
D  
C  
B  
A



MASSTAB	MATERIAL	VERS.	FE 447 150	GSI - DARMSTADT	GEPR.	
		RAHMENVERDRÄHTUNG			BEARB.	X
VON	1				ENTW.	D. LOOS
BLATT	2			DATUM		18-JAN-95

