FOSTEX D20
TLS-4000

INTERFACE DOCUMENTATION

Interface number   : 1.812.444.20

IF - Doc number   : 10.27.1750

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We reserve the right to make alterations

Order No: 10.27.1750 (Ed. 1290)

Summary

1   General Information

1.1   Ordering Information   Order number

- Interface Set
  (including Interface, Cable and Documentation)   21.812.444.20

- Interface Board (Hardware/Software)   1.812.444.20

- Software Set   1.812.989.20

- IF–Cable 5m   1.023.777.00

1.2   Slave Model

- FOSTEX D 20

- Device with compatible connection: –

1.3   Software

- First release (index 20)   1.812.989.20 (39/90)

2   Installing Procedures

2.1   TLS 4000 Requirements   Order number

- Synchronizer Board   1.812.320.23 or later

- Interface: correct setup of the DIL–SWITCHES (see section 3.3)

2.2   Slave Requirements

- The FOSTEX D20 must be equipped with the option of serial link 8310.
  Software version: 1.0 or 2.2 or later versions.

- Position of the slave dil switch:
  On the back side of the FOSTEX D20 are three dil switches.
  Use DIP switch A 1 and 2 to select the right frame format.
  (see slave manual)
  Use DIP switch A 3 and 4 to select the SYNCH signal type.
  (see 3.6 Application Hints)

- REC MODE must be switched to "EDIT".

2.3   Connection Slave–Synchronizer
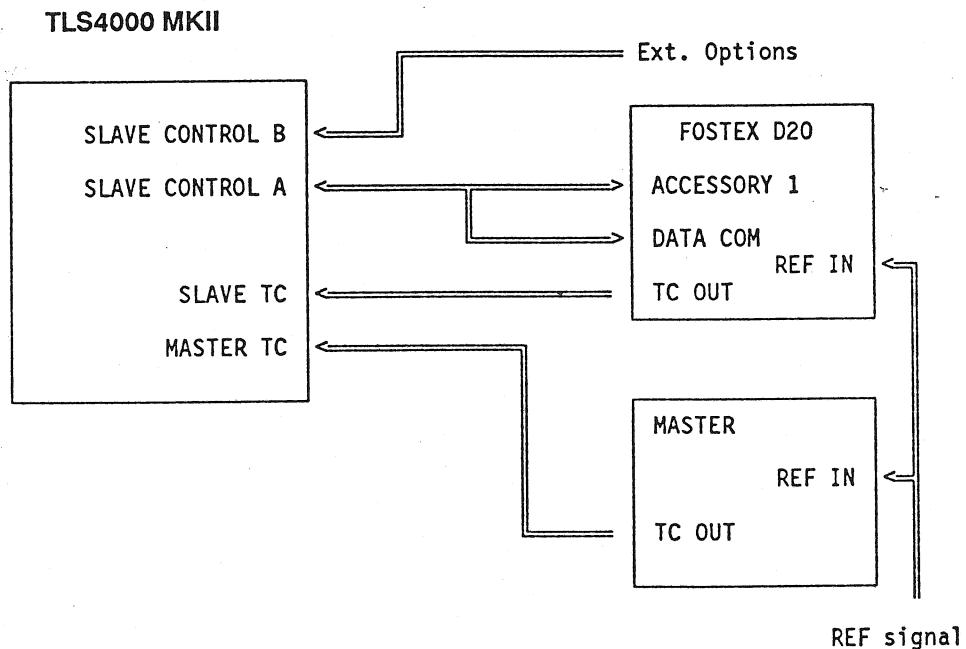
2.4   Quick Test, Adjustments

Insert the Interface after switching off the synchronizer. Connect the slave machine and switch on synchronizer and slave.
During the first 5 seconds the interface will perform a short selftest. The result is commented with some led messages. If no errors have been found, the display is available for operation messages (see section 3.5)

A good timecode on tape is essential for synchronizer operation and should be checked for master and slave.

No adjustments are necessary.

3 Operating Instructions

3.1 Technical Specifications

- **Slave type:**
  - RDAT
  - SMPTE/EBU timecode (available during wind modes) without move information
  - GOTO with PLAY – STOP sequence
  - Chase–Stop with waiting in advance
  - transition Chase to Playsync direct

- **Tapedeck Control:**
  - by serial communication RS 422 SONY protocol

- **Capstan control:**
  - frequency 9600 Hz nominal

- **Movepulse information:**   – no movepulse information available

Compensation of Record Dropin/out Delays: compensated by synchronizer (includes both transmission delays and compensation of distance between erase and record head.

- **Sync accuracy:** $\pm\, 40\, \mu s$

- **Park accuracy:** $< 40\ ms$

- **Wow & Flutter:**   within slave specifications

- **Lock time typical:**

(in CUED status,	Master Start – SYNC)	: 2 sec
(in CHASE 10* vnom,	Master Start–SYNC)	: 10 sec

3.2   Summary of Supported Functions

Tape Deck Commands:

- STOP   shuttle still or stop
- PLAY   with available varispeed range (+– 12%)
- REC   with recording types (EDIT INSERT/ASSEMBLE)
- EDIT   the same as STOP
- FORW,
- REW   with parameter control only full speed (100 play) and 5 play available.

- SHTLF,
  SHTLR   FORW/REW

- LOC,
  LOCREL   performed by interface

- REHEARSE: available

- MUTE: not implemented

- EVENT Relay: is available (see section 3.4)

- CONDITIONAL
  COMMANDS: A specific subset of single byte commands can be executed at certain timecode conditions.
                 (PLAY, STOP, RECORD, RELAY ON, RELAY OFF)

- STATUS
  Request: Status information is updated periodically by means serial communication.

- AUDIO Channel
  Control: "READY/SAVE" of both channels (only together) can be controlled. Local changes of any status can be recognized and transferred to the synchronizer.

                 CHANNEL 1 .. 2 = Audio Track 1 .. 2
                 CHANNEL 7   = Timecode Track

- TRANSPARENT
  Commands: Command and data request strings can be sent through the synchronizer to the slave.
                 Parts of the protocoll (header and checksum) are added by the interface.

- KEYBOARD
  DISABLE: Not implemented.

3.3   DIL-SWITCH Functions

DIL SWITCH SZ81 allows the setting of some general modes.

■ Switch 1:   RECORD ENABLE
Defines the polarity of RECEN (see section 3.4)
OFF :   RECORD enabled when
– low level at RECEN pin
ON   :   RECORD enabled when
– high level at RECEN pin or input open

■ Switch 2:   SYNC MODE
The interface can synchronize the slave in two different modes.
The first mode is to use the FOSTEX D-20 in an environment
with other digital machines or video machines. In this case it will
be moved to the exact master position by using a 9.6 kHz
signal. Afterwards the speed control will be given to an external
reference signal like a composite video or a digital synchronous
word signal. Be shure, that the slave dil switch are switched to
the right reference signal. (see slave manual)

The second one can be used, when the FOSTEX D-20 is whit-
hin a system with analog audio machines. If the master is in
play, the slave speed will be controlled by the 9.6 kHz signal. So
the slave can follow exactly the master time. If you need this
mode the total harmonic distortion will be much bigger than
described in the slave specifications.
(it becomes about 0.14%)
(machine specification: less than 0,05%)

OFF :   1. mode (digital or video anvirement)
ON   :   2. mode (analog envirement)

All other switches are not used and should be in OFF position.

Default settings: all switches in OFF position

3.4   Additional Features at the SLAVE CONTROL B Connector

RECEN   (PIN 2):
This signal is used to enable/disable the RECORD function with
an external hardware. According to DIL-Switch position 1 and
the level of the signal RECEN, RECORD commands are passed
to the slave or modified to PLAY.

REL1   (PIN6), REL2 (PIN7):
A general purpose relay is controlled by EVON/EVOFF
commands. The switch REL1/REL2 is closed with the command
EVON.

XVSENB/
XVSREF   (PIN5, PIN3):
                An external varispeed circuit can be connected to the TLS.
                The two signals are switched to the slave during the OFF mode
                of the synchronizer.

                enable varispeed   XVSENB: LOW = enabled
                reference frequency   XVSREF: 9600 Hz nominal

3.5   LED Diagnostic Display

Three LEDs are situated at the front of the interface board. They provide information about the result of the initial selftest and the online status.

DL 1 2 3   (Front view)
                    (# = LED blinking, - = LED off, * = LED on)

■ An initialization procedure is executed after reset and the main hardware devices are tested. Any resulting error is signalled with a blinking left LED (DL1, about 1 Hz).
  If all LEDs are blinking, the internal EEPROM of the processor had to be reconfigured. This should only happen if the processor was replaced and the interface switched on for the first time. In this case the interface should be resetted and this error message should not occur anymore.

DL 1 2 3

DL1	DL2	DL3	
#	–	–	CPU RAM test failed.
#	–	*	RAM test failed.
#	*	–	SSDA test failed.
#	#	#	Microprocessor 68HC11 had to be reconfigured

■ If no error was found, DL1 stays dark and the other two LEDs light, if communication with the slave or the synchronizer fails.

DL 1 2 3

DL1	DL2	DL3	
–	*	*	no connection with the synchronizer board
–	*	–	no connection with the SLAVE

■ If the left LED is on, a fatal processor error occurred. A reset is necessary to return to operation mode. The interface board should be checked whenever such an error was encountered.

DL1	DL2	DL3	
*	–	–	Fatal SW or HW error (eg ROM defect)
*	–	*	Watch dog error
*	*	–	Clock error
*	*	*	Illegal opcode

3.6   Test points

Not available.

3.7   Applications Hints

■ If you use the FOSTEX D20 in mode 2, you have to select the SYNCH type signal with DIP 3 and 4 of the machine dil switch A. The frame sync mode, field sync mode and composit mode are only usable, when the INPUT switch of the machine is in position "ANALOG".

■ If you want to use the word sync mode, you have to switch on DIP 5 of dil switch A of the FOSTEX D20.

■ The FOSTEX D20 can emulate three different SONY protocols.
To have the best result, use Ed–00 (SONY RM 450).

1. Switch on power and eject the cassette tape.

2. Simultaneously press Z.LOC and P.LOC.
Display will change to "2nd".

3. When the EJECT key is pressed, the display will change from "2nd" to "Ed–XX".
The necessary mode is set with the "up" and "down" keys while pressing the EJECT key.

4. Release the EJECT key and press the DISP key to save the configuration. The modified data will be battery backed up.

■ Remote switching of the synchronizer from the slave machine is available.

■ In chase mode the FOSTEX D20 has only three possibilities to control the speed. If you have the master in a loop, it can be faster to work with the EDIT WAIT mode than with the LOCK mode.

■ The serial option of the FOSTEX D20 ver.: 1.0 (9–91, 9–99) has a software bug. So we had to compensate this bug. That is the reason why the interface does not accept a REWIND from the machine keyboard if the last state was PLAY.

4 Service Instructions

4.1 Block diagram

SYNCHRONIZER   SLAVE CONTROL A   SLAVE CONTROL B
                (to FOSTEX D-20)   (Remote)

INTERFACE

REMON+
REMON-

IFVCC

IFGND

IFVCC

IFGND

IFGND

REL1   REL2

CAPCL CAPEN

PLL   FOUT   &

XUSENB

XUSREF

SSDA EVENT   CAP   CENAB ACIA   REL   RECEN

68HC11 MICROPROCESSOR SYSTEM

DIL SWITCH   LED DISPLAY
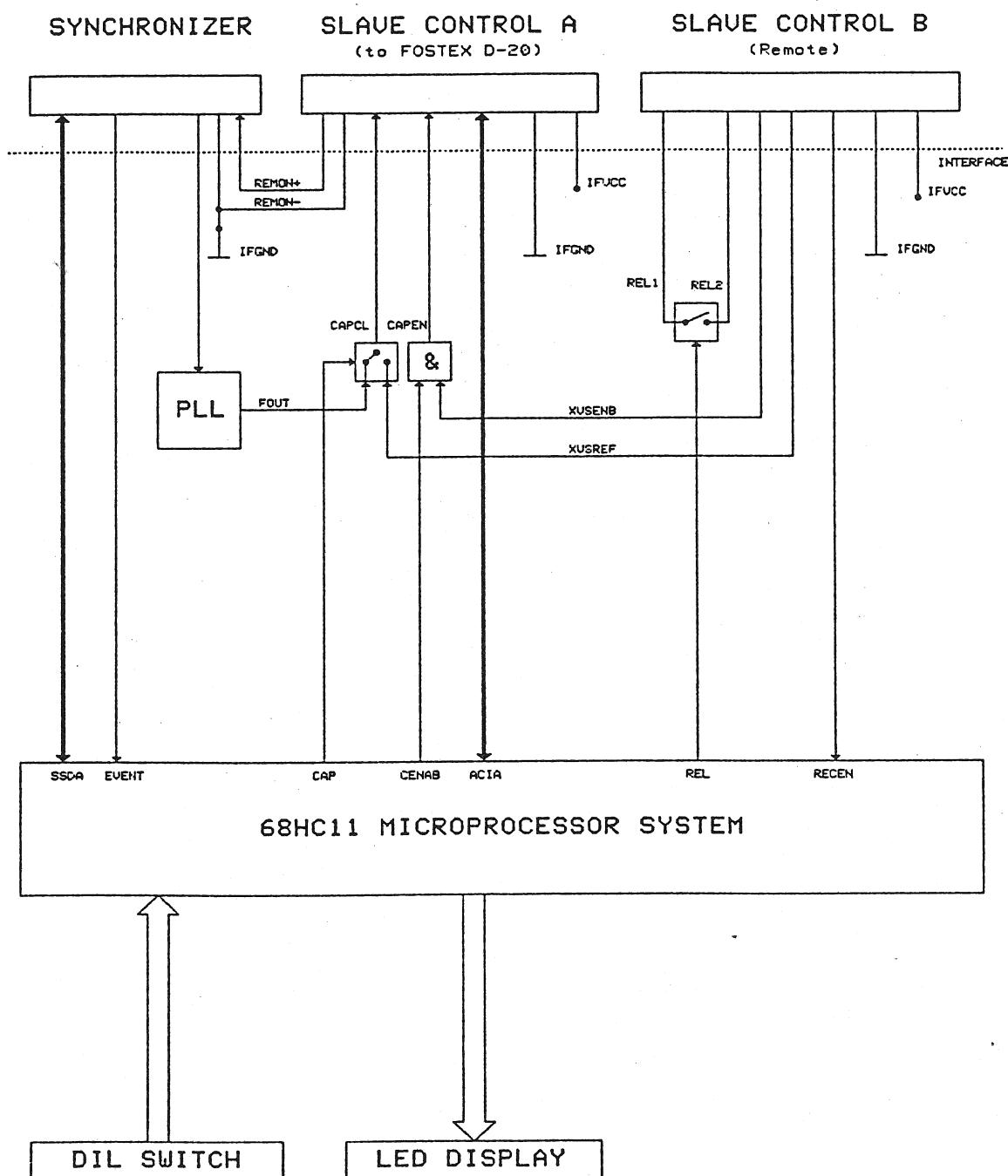
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TLS 4000 MK2				PAGE 1 OF 1
STUDER	INTERFACE FOSTEX D-20 HW		BL	1.812.444.20

TXOUT
TXIN

/READ
/WRITE

+5V
RZ7
3K3
5V

IC24 PLD16V8B4 5C
/OE
A1 A2 A3 A4 A5 A6 A7 A8 CLK
B1 B2 B3 NC NC NC NC NC

IC32 HC540 3Q
D0 D1 D2 D3 D4 D5 D6 D7
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8
OE2 OE1

55010168 5W

DATA-BUS
CLK-BUS
CAP
CENAB

C13 22P 6E   C16 22P 6D
+5V
C26 10N 5E   C12 1U 5E   C11 10U 5F
Y1 4.9152MHZ 6D
R40 4M7 6E

VCC
EXTAL
XTAL
XIRQ
MODA/LIR
MODB/VSTBY

IC21 68HC11A1 5G

PC0 PC1 PC2 PC3 PC4 PC5 PC6 PC7
D0 D1 D2 D3 D4 D5 D6 D7

PA0 PA1 PA2 PA3 PA4 PA5 PA6 PA7
SMDIR
SMCLK

+5V
RZ6 3K3 2J
RZ6 RZ6
R43 OE 6K

RES
PE0 PE1 PE2 PE3 PE4 PE5 PE6 PE7
RZ1 RZ4
3K3 5R

PD0 PD1 PD2 PD3 PD4 PD5
NC NC
LED1 LED2 LED3 REL

IC22 27C256 5M
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12 A13 A14
D0 D1 D2 D3 D4 D5 D6 D7
VCC
CE GND OE
VPP

IC35 5565 2M
A0 A1 A2 A3 A4 A5 A6 A7 A8 A9 A10 A11 A12
I/O0 I/O1 I/O2 I/O3 I/O4 I/O5 I/O6 I/O7
VCC
OE1 OE2
OE GND R/W

D0 D1 D2 D3 D4 D5 D6 D7

IRQ
E
R/W
AS

PB0 PB1 PB2 PB3 PB4 PB5 PB6 PB7
A8 A9 A10 A11 A12 A13 A14 A15
VRH VRL

+5V
R41 10K 6J
C1A 100N 5J   R46 10K 4J
GND

IC30 HC573 2G
A0 A1 A2 A3 A4 A5 A6 A7
Q0 Q1 Q2 Q3 Q4 Q5 Q6 Q7
LE OE

+5V
RZ5 3K3 3F

D0 D1 D2 D3 D4 D5 D6 D7
RZ5

A0

+5V
DL1 555-2007 3W
DL2 555-2007 3W
DL3 555-2007 3W
RL
PCA

IC33 HC540 3S
/OE
A1 A2 A3 A4 A5 A6 A7 A8 OE1
Y1 Y2 Y3 Y4 Y5 Y6 Y7 Y8
NC NC
LED1 LED2 LED3 REL

IC31 PLD16V8B4 3H
E R/W
/OE
A1 A2 A3 A4 A5 A6 A7 A8 CLK
A10 A11 A12 A13 A14 A15
B1 B2 B3 B4 B5 B6 B7 B8
ACIA
SSDA
RAM
NC
DILSW
/ROM

/READ   /READ   /READ   /WRITE

CNTL-BUS
PE7
CS-BUS
PAIN

RZ3
P1 4C   P1 2B   P1 5C
SPLT   /RES   IEVENT

RAM   DILSW

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STUDER   INTERFACE FOSTEX D-20   SC 1.812.444-20
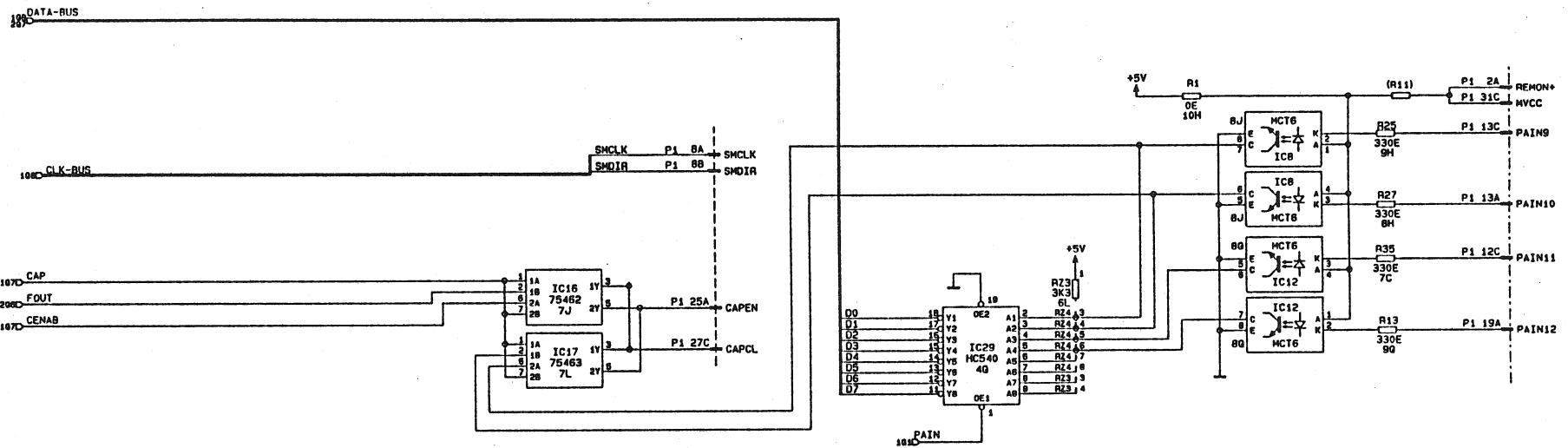
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STUDER		INTERFACE FOSTEX D-20		SC	1.812.444-20

4.3 Component arrangement
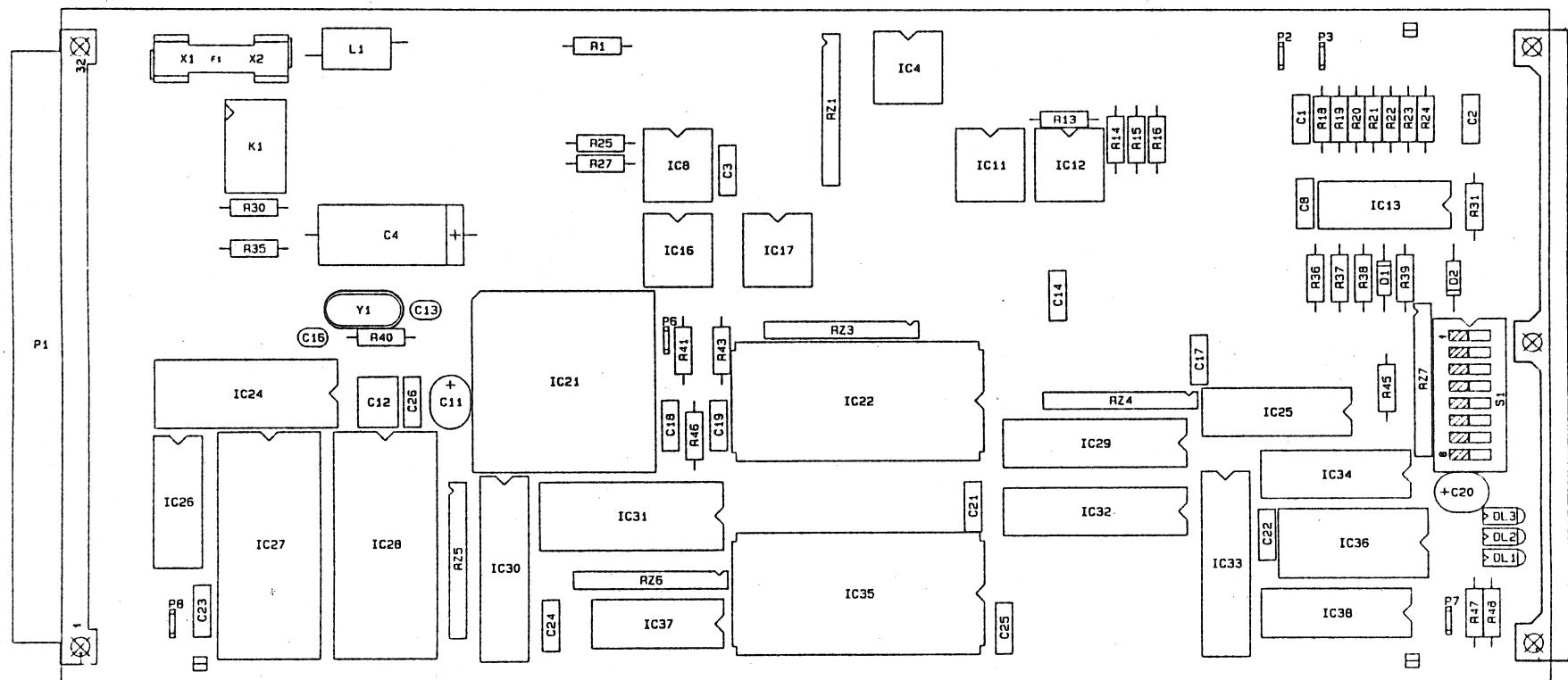
Ersatz für:	Ersetzt durch:	Kopie für:
STUDER REGENSDORF ZÜRICH	Benennung: INTERFACE FOSTEX D-20 ESE	Nummer: 1.812.444-20

4.4   Component position list

IND. POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
C....01	59.06.0683	.068 u	10%, 63V , PET	
C....02	59.06.0104	.1 u	10%, 63V , PET	
C....03	59.06.0683	.068 u	10%, 63V , PET	
C....04	59.25.6470	47 u	-20%, 63V , EL	
C....08	59.06.0683	.068 u	10%, 63V , PET	
C....11	59.26.5100	10 u	20%, 25V , EL	
C....12	59.06.0105	1 u	10%, 50V , PET	
C....13	59.34.2220	22 p	5%, 63V , CER	
C....14	59.06.0683	.068 u	10%, 63V , PET	
C....16	59.34.2220	22 p	5%, 63V , CER	
C....17	59.06.0683	.068 u	10%, 63V , PET	
C....18	59.06.0104	.1 u	10%, 63V , PET	
C....19	59.06.0683	.068 u	10%, 63V , PET	
C....20	59.26.5100	10 u	20%, 25V , EL	
C....21	59.06.0683	.068 u	10%, 63V , PET	
C....22	59.06.0472	4700 p	10%, 63V , PET	
C....23	59.06.0683	.068 u	10%, 63V , PET	
C....24	59.06.0683	.068 u	10%, 63V , PET	
C....25	59.06.0683	.068 u	10%, 63V , PET	
C....26	59.06.0103	.01 u	10%, 63V , PET	
D....01	50.04.0125		1N4448	
D....02	50.04.0125		1N4448	
DL...01	50.04.2107		LED red ,555-2007	Di
DL...02	50.04.2107		LED red ,555-2007	Di
DL...03	50.04.2107		LED red ,555-2007	Di
F....01	51.01.0115	630 mAT	250V, 5 x 20	
IC...04	50.15.0114		UA 9637	
IC...08	50.99.0111		HCT 6	
IC...11	50.15.0115		SN 75 176	GI
IC...12	50.99.0111		HCT 6	
IC...13	50.09.0104		LF 347 N	TI,NS
IC...16	50.05.0227		SN 75 462 JG	TI,NS
IC...17	50.05.0203		SN 75 463 P	TI

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IND. POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
R....21	57.11.3332	3.3 k	2%, MF	
R....22	57.11.3822	8.2 k	2%, MF	
R....23	57.11.3154	150 k	2%, MF	
R....24	57.11.3273	27 k	2%, MF	
R....25	57.11.3331	330	2%, MF	
R....27	57.11.3331	330	2%, MF	
R....30	57.11.3000	0		
R....31	57.11.3473	47 k	2%, MF	
R....34	57.11.3103	10 k	2%, MF	
R....35	57.11.3331	330	2%, MF	
R....36	57.11.3103	10 k	2%, MF	
R....37	57.11.3103	10 k	2%, MF	
R....38	57.11.3103	10 k	2%, MF	
R....39	57.11.3332	3.3 k	2%, MF	
R....40	57.11.5475	4.7 M	5%, MF	
R....41	57.11.3103	10 k	2%, MF	
R....43	57.11.3000	0		
R....45	57.11.3000	0		
R....46	57.11.3103	10 k	2%, MF	
R....47	57.11.3474	470 k	2%, MF	
R....48	57.11.3123	12 k	2%, MF	
RZ...01	57.88.4332	8 x 3.3 k	2%, Single Line	
RZ...03	57.88.4332	8 x 3.3 k	2%, Single Line	
RZ...04	57.88.4332	8 x 3.3 k	2%, Single Line	
RZ...05	57.88.4332	8 x 3.3 k	2%, Single Line	
RZ...06	57.88.4332	8 x 3.3 k	2%, Single Line	
RZ...07	57.88.4332	8 x 3.3 k	2%, Single Line	
S....01	55.01.0168		8 x ON, DIL-Switch	
Y....01	89.01.0560	4.9152Mc	Quartz	

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IND. POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.
IC...21	50.63.0004		68 HC 11 A1 FN	Mot
IC...22	50.14.2004	see note	NM 27C 256G-25, EPROM, 32K x 8, 250nsec	St
IC...24	50.18.0100	see note	16V8-25LP, GAL	St
IC...25	50.17.1163		74 HC 163	
IC...26	50.17.1014		74 HC 14	
IC...27	50.16.0114		MC 68A52	Mot
IC...28	50.16.0101		MC 68A50	Mot
IC...29	50.17.1540		74 HC 540	
IC...30	50.17.1573		74 HC 573	
IC...31	50.18.0100	see note	16V8-25LP, GAL	St
IC...32	50.17.1540		74 HC 540	
IC...33	50.17.1540		74 HC 540	
IC...34	50.07.0050		MC 14 050	
IC...35	50.14.0133		MM 6264 LP, RAM, 8K x 8, 150nsec	Hi
IC...36	50.07.0046		CD 4046 BE, MC 14046 BCP	RCA,Mot
IC...37	50.17.1074		74 HC 74	
IC...38	50.15.0103		MC 14 504	
K....01	56.04.0195	5V 2xU	100V/0.3A, Print	
L....01	62.01.0115		Wide Band HF-Choke	
P....01	54.01.0358		Card Connector 3 x 32 Euro	
P....02	54.02.0320		Faston-Connector	
P....03	54.02.0320		Faston-Connector	
P....06	54.02.0320		Faston-Connector	
P....07	54.02.0320		Faston-Connector	
P....08	54.02.0320		Faston-Connector	
R....01	57.11.3000	0		
R....13	57.11.3331	390	2%, MF	
R....14	57.11.3103	10 k	2%, MF	
R....15	57.11.3472	4.7 k	2%, MF	
R....16	57.11.3103	10 k	2%, MF	
R....18	57.11.3123	12 k	2%, MF	
R....19	57.11.3224	220 k	2%, MF	
R....20	57.11.3154	150 k	2%, MF	

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IND. POS.NO.	PART NO.	VALUE	SPECIFICATIONS / EQUIVALENT	MANUF.

Notes : Software 1.812.989.20 (IC 22)
           1.812.997.20 (IC 31)
           1.812.998.20 (IC 24)

The following ICs are socketed : IC4 .. IC22, IC24, IC27,
                                        IC28, IC31, IC35

CER = Ceramic, EL = Electrolytic, PET = Met. Polyester

Manufacturers : Di = Dialco
                 GI = General Instruments
                 Hi = Hitachi
                 Mot = Motorola
                 NS = National Semiconductor
                 RCA = RCA Corporation
                 St = Studer
                 TI = Texas Instruments

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4.5   Signal description, slave connectors

SLAVE CONTROL A:

Pin	Signal	Type	Description
1	MGND		0.0 V
2	–		
3	–		
4	–		
5	CAPEN	I out	(not used)
6	RX/RA	RS422 in	RS 422 receiver
7	–		
8	TX/TA	RS422 out	RS 422 transmitter
9	–		
10	–		
11	+5V		(not used)
12	0.0 V		(not used)
13	CAPCL	I out	capstan clock (9600Hz nominal)
14	RB	RS422 in	RS 422 receiver
15	–		
16	–		
17	–		
18	–		
19	–		
20	–		
21	–		
22	–		
23	–		
24	TB	RS422 out	RS 422 transmitter
25	MVCC	+5 V	supply voltage of FOSTEX D-20

signal types: I. out   logic output, active low
                                   (open collector, max 30V/0.3A)
                     I. in   logic input, active low, optoisolated
                                   (I–low > 10 mA)

SLAVE CONTROL B:

Pin	Signal	Type	Description
1	0.0 V		signal ground
2	RECEN PAIN11	I in	record enable/safe input (see DIL Switch 3.3)
3	XVSREF/PAIN10		external varispeed frequency
4	–		
5	XVSENB/PAIN9	I in	external varispeed enable
6	REL1		event relay contact 100V/0.3A
7	REL2		event relay contact 100V/0.3A
8	–		
9	–		
10	–		
11	+5V		(not used)
12	SREHSL/PAIN12	I in	(not used)
13	–		
14	–		
15	–		
16	–		
17	–		
18	–		
19	–		
20	0.0 V		(not used)
21	–		
22	–		
23	–		
24			
25	0.0 V		(not used)

signal types: I. out   logic output, active low
                           (open collector, max 30V/0.3A)

                 I. in   logic input, active low, optoisolated
   (I–low > 10 mA)

4.6   IF Cable Description

TLS 4000 MK2
SLAVE CONTROL A

FOSTEX D-20
ACCESSORY 1

P1
D-type
25pol
female

P2
Connector
20pol female
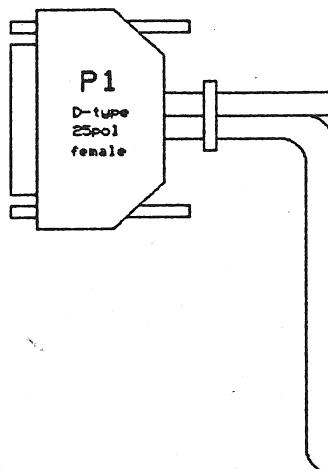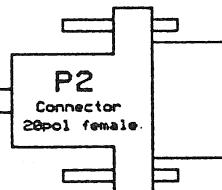
FOSTEX D-20
DATA COM

P3
D-type
9pol
male
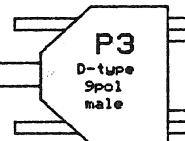
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P1. 1 .................            MGND ...............................  P2. 17
   13 .................            CAPCL ..............................     12
   25 .................            MVCC ...............................     19
                                  SCREEN ............................... Case


P1  6 .................            RX/RA ..............................  P3. 2
    8 .................            TX/TA ..............................      8
   12 .................            0,0V ...............................      1
   14 .................            RB ................................      7
   24 .................            TB ................................      3
                                  SCREEN ............................       9
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