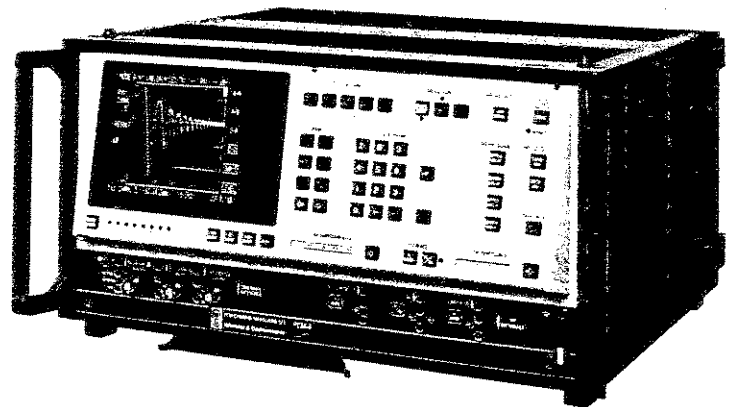


Shortform operating instructions



PCM Channel Measuring Set PCM-4
for measurements on PCM coders/decoders
between analog and digital interfaces

Order No. BN 0984/00.89, Edition 2

↗

Shortform operating instructions for the PCM-4 PCM Channel Measuring Set

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1 Self-test, calibration

```
CPU-2/1 (MASTER)  RAM-ROM O.K.  
CPU-2/2 (DISPLAY) RAM-ROM O.K.  
CPU-2/3 (MEAS.)   RAM-ROM O.K.  
EVAL.-CIRCUIT     RAM-ROM O.K.  
CALIBRATING      O.K.  
TEST KEYS         O.K.  
BATTERY CHECK     O.K.
```

SELECT MODE NO.

The PCM-4 performs a self-test immediately after switch on; this is followed by a calibration routine. Each successfully completed part of the self-test is indicated by O. K. on the VDU screen. The unit is now ready for use. If a fault is detected during the self-test, an audible or visual warning is given indicating the location of the fault (see Appendix B.1, operating manual). If a fault is found during calibration, the error display page is shown on the VDU (see Appendix B.2, operating manual).

1.1 Software status display

MODE A 01 * SOFTWARE #

VERSION: 0984-0093.090

```
CPU-2/1 (MASTER)  REV.: 06.011  
CPU-2/2 (DISPLAY) REV.: 06.012  
CPU-2/3 (MEAS.)   REV.: 06.006  
EVAL. CIRCUIT     REV.: 02.004  
COUPLING CARD 1   REV.: 06.005  
TOLERANCE SET     REV.: 00.000
```

The software version can be displayed on instruments from series D onwards by pressing the following keys one after the other:

MODE LISTA + **0** + **1** + **ENTER**

The number of the software version fitted to the instrument is displayed on the VDU.

2 Main parameter menus

MODE A * MEASUREMENT MODE LIST *

- (1) LEVEL MEASUREMENT
- (2) LOSS MEASUREMENT
- (3) VAR. OF GAIN WITH FREQUENCY
- (4) VAR. OF GAIN WITH INPUT LEVEL
- (5) TOTAL DISTORTION
- (6) IDLE CHANNEL NOISE
- (7) CROSSTALK
- (8) OUT-OF-BAND MEASUREMENT
- (9) HARM./INTERM.DISTORTION

Mode list A measurements

SELECT MODE NO.

MODE B * MEASUREMENT MODE LIST *

- (1) RETURN LOSS
- (2) LONGIT. CONVERSION LOSS
- (3) LONGIT. CONVERSION TRANSFER LOSS
- (4) PEAK CODE
- (5) GROUP DELAY
- (6) SIGNALLING DISTORTION
- (7) INTERFERENCE FROM SIGNALLING
- (8) ERROR MEASUREMENT
- (9) SPECIAL MODES

Mode list B measurements

SELECT MODE NO.

PARAM. # GENERAL PARAMETERS #

- <1> DIGITAL CONFIGURATION
- <2> FRAME SELECTION
- <3> DIGITAL TX INTERFACE
- <4> DIGITAL RX INTERFACE
- <5> DIGITAL WORDS IN TX FRAME
- <6> TX ERROR INSERTION
- <7> PCM ENCODING
- <8> SCANNER PARAMETER
- <9> SPECIAL PARAMETER

General parameter list

RTN

SELECT PARAMETER GROUP NO. OR RTN

VAR. MODE # MODE MODIFICATION #

- <1> ANALOG SIGNAL GENERATION
- <2> DIGITAL SIGNAL GENERATION
- <3> RX-FILTER
- <4> MEASUREMENT RUN
- <5> MEASUREMENT CONDITIONS
- <6> AUX. FUNCTIONS
- <7> SPECIAL SIGNALLING PARAM.
- <8> CHANNEL CYCLE PARAM.

Mode modifications

RTN

SELECT VARIABLE MODE NO. OR RTN

3 Parameter list 0: printer/plotter

PARAM. 0	# PRINTER / PLOTTER #
-PLOT-	
** <1>	MAN RESULTS (LINKED & COND.)
<2>	RESULTS (LINKED)
-PRINT-	
<3>	MAN RESULTS
<6>	AUTO ALL
<7>	IF OUT OF TOL.
<8>	ALL % TOL. LIM.
<9>	IF OUT OF TOL. & TOL. LIM.
SELECT NO. ENTER OR RTN	

A complete results display consists of:

- labels
- results (graph or table)

The results display can be printed out on a matrix printer or a plotter (PCM-4 as system controller).

Instrument addresses:

PCM-4 SC = ON
Plotter = 29
Printer = 30

Note: Printer and plotter must be switched on before the PCM-4.

P 01:

When the Print/Plot key is pressed, the complete results display as selected (graphical or numerical display) will be plotted.

If no results are shown on the display, only the display labels will be plotted.

P 02:

This parameter is intended for use when several measurements are to be made under the same conditions. At the end of each measurement, the results curve can be plotted out on the same sheet of paper as previous results; the labels are not plotted.

P 03:

After the measurement is completed, pressing Print/Plot will cause the table of results to be printed out by the matrix printer.

P 06:

Automatic printout of the results of all subsequent measurements (matrix printer).

P 07:

Automatic printout of results which lie outside the specified tolerance values.

P 08:

Automatic printout of all results with appropriate tolerance values shown as upper and lower limits.

P 09:

Automatic printout of results which lie outside the specified tolerance values together with the appropriate tolerance value.

4 Parameter list 1

4.1 Configuring the interface

PARAM.1	# DIGITAL CONFIGURATION #
** <11>	GENERAL CONFIG. TX/RX 2M/ 2Mbit/s
<12>	64k/64kbit/s
<13>	64k/ 2Mbit/s
<14>	2M/64kbit/s
<15>	THROUGH 2Mbit/s TRANSP.
<16>	THROUGH 2Mbit/s INSERT.
<21>	DIGITAL LOOP (A-A) 2Mbit/s/ALL TS
<22>	2Mbit/s/SLCT TS
** <23>	OPEN/AUX. SIGN.
<24>	64kbit/s

RTN

SELECT NO. ENTER OR RTN

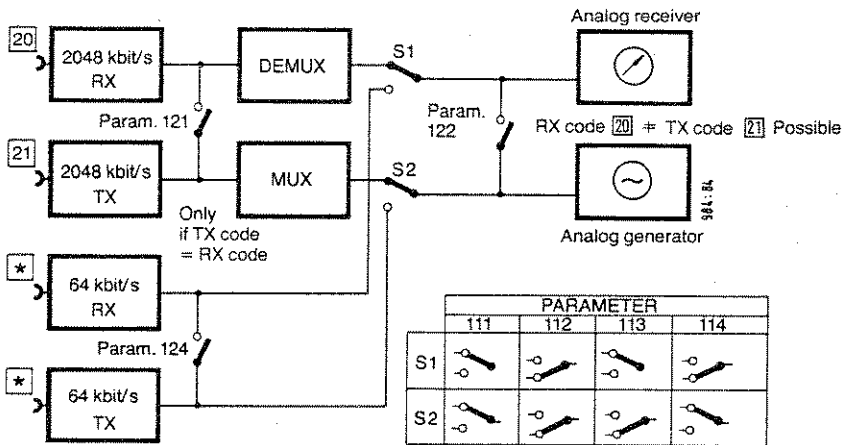
Possible parameter combinations

	121	122	123	124	124	124
111	Y	Y	Y	N	N	N
112	Y	Y*	Y	N	Y	Y
113	N	N	Y	N	N	N
114	N	N	Y	N	N	N
115	N	N	Y	N	N	N
116	N	N	Y	N	N	N

* from series E onwards

	Codir.	Parallel	Serial

Interface and internal loop switching depends on parameters selected:



* see table on p. 11

The RX and TX interfaces used for measurements are determined by the parameters 111 to 114 and the configuration (A-A, A-D, D-A, D-D).

```

PARAM.1      * DIGITAL CONFIGURATION *

## <11> GENERAL CONFIG. TX/RX 2M/ 2Mbit/s
<12>                               64k/64kbit/s
<13>                               64k/ 2Mbit/s
<14>                               2M/64kbit/s
    
```

	111		112		113		114	
	TX	RX	TX	RX	TX	RX	TX	RX
A-A	A	A	A	A	A	A	A	A
A-D	A	2M	A	64 k	A	2M	A	64 k
D-A	2M	A	64 k	A	64 k	A	2M	A
D-D	2M	2M	64 k	64 k	64 k	2M	2M	64 k

A = Analog
64 k = 64 kbit/s
2M = 2048 kbit/s

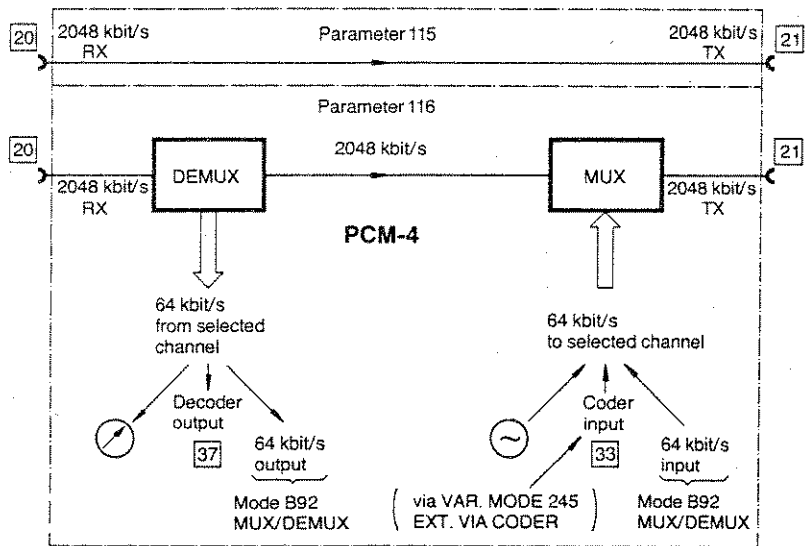
4.2 Digital loop circuits

It is usually necessary to form a digital loop when making measurements in A-A mode. The following digital loops can be formed using parameters 115, 116, 121, 122 and 124; the loops are opened by parameter 123:



P 115:
Standby operation for parameter 116. Measurements and signal monitoring of the 2048 kbit/s signal are not possible.

P 116:
Measurement and insertion in through signals. Additional parameters: P 123 must be selected, P 212 and P 222 must not be selected.



<21>	DIGITAL LOOP (R-R)	2Nbit/s/ALL TS
<22>		2Nbit/s/SLCT TS
** <23>		OPEN/AUX. SIGN.

P 121:

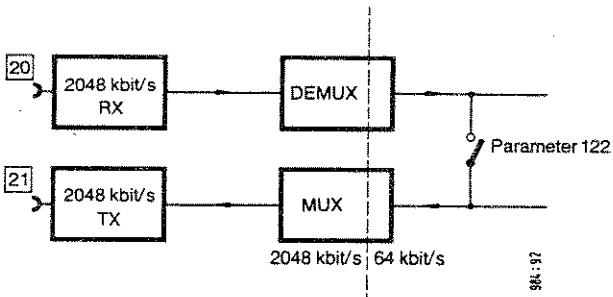
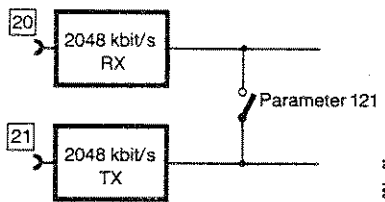
The digital loop is at the 2048 kbit/s level. The received digital frames are looped-through to the transmitter and retransmitted unchanged (transparent loop). The line codes for the receiver (parameter 3xx) and the transmitter (parameter 4xx) must be the same.

P 122:

The digital loop is at the 64 kbit/s level. Channel switching is possible: the information in one channel of the received 2048 kbit/s signal can be inserted into another channel of the transmitted signal. The line codes of the receiver and transmitter need not be the same.

P 123:

The 2048 kbit/s digital loop is open.



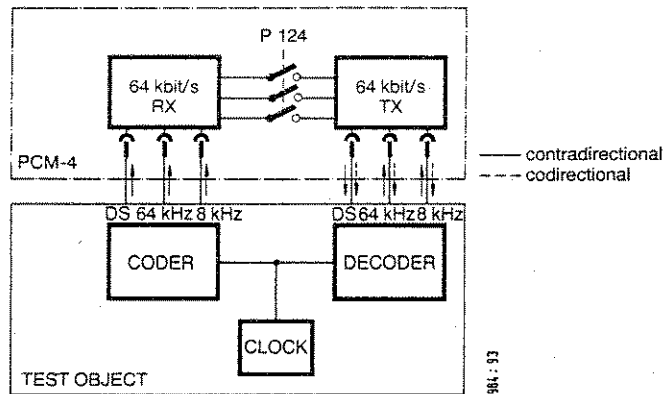
<24> 64kbit/s RTN
 SELECT NO. ENTER OR RTN

P 124:

The 64 kbit/s signal and the 64 kHz and 8 kHz clock signals are fed from the interface input through to the output via an internal digital loop. When the loop is closed, the 64 kbit/s data stream is displayed on the 8 green LEDs below the VDU screen. The loop can be closed using serial or parallel co- or contradirectional interfaces; codirectional interfaces conforming to CCITT G.703 cannot be used.

64 kbit/s interface connections:

	Serial		Parallel		Codirectional to G.703	
	TX	RX	TX	RX	TX	RX
DS	49	46	53	52	41	40
64 kHz	50	47				
8 kHz	51	48				



Codec connection with interface matching

5 Parameter list 2

5.1 Frame selection

PARAM.2	#	FRAME SELECTION	#
** <11>	TX FRAME TYPE	6.704 / TS 16 INT.	
<12>		6.704 / TS 16 EXT.	
<13>		6.704 / TS 16 TELEPH.	
<14>		ALL 32 TS TELEPH.	
** <21>	RX FRAME TYPE	6.704 / TS 16 INT.	
<22>		6.704 / TS 16 EXT.	
<23>		6.704 / TS 16 TELEPH.	
<24>		ALL 32 TS TELEPH.	

P 211/221:

Frame structure:
timeslot 0
timeslots 1 to 15
timeslot 16

FAS and NFAS
information channels
MFAS and NMFAS in
frame 0, otherwise signalling
channel. Signalling
generated internally (see
parameter 5xx).
information channels

timeslot 17 to 31

P 212/222:

Frame structure:
timeslot 0
timeslots 1 to 15
timeslot 16, P 212
timeslot 16, P 222

FAS and NFAS
information channels
64 kbit/s data from receiver
64 kbit/s data to trans-
mitter; no MFAS or signal-
ling
information channels

timeslots 17 to 31

P 213/223:

Frame structure:
timeslot 0
timeslots 1 to 31

FAS and NFAS
information channels, no
MFAS or signalling

P 214/224:

Frame structure:
timeslots 0 to 31

information channels; no
FAS, MFAS or signalling

5.2 CRC

** <31>	CRC-4 MULTIFRAME	OFF	
<32>		ON	<input type="checkbox"/>
SELECT NO. ENTER OR RTN			

P 231:

CRC-4 check bits not inserted into 2048 kbit/s
signal

P 232:

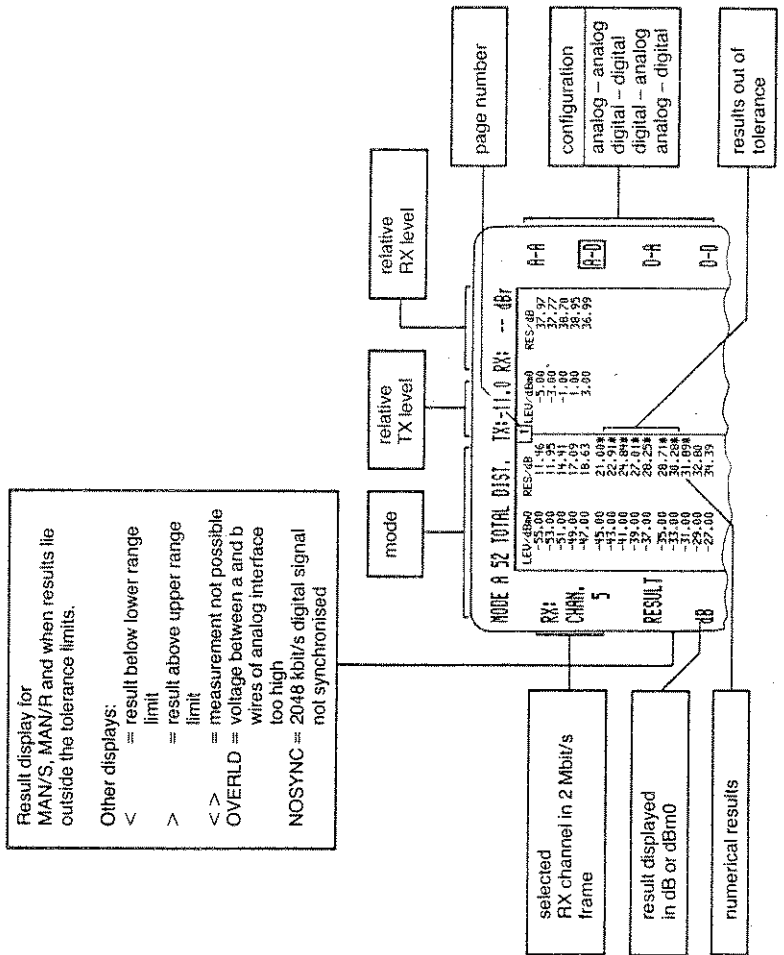
CRC-4 check bits inserted into 2048 kbit/s signal

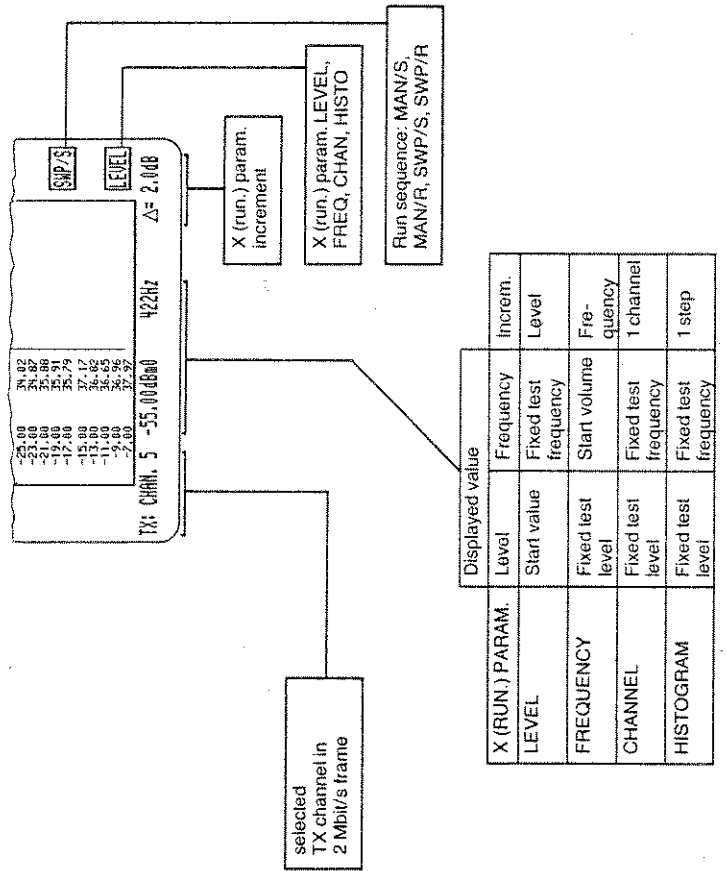
P 629:

Setting CRC word error rate in steps of 0.1 %
between 0.1 and 99.9 %

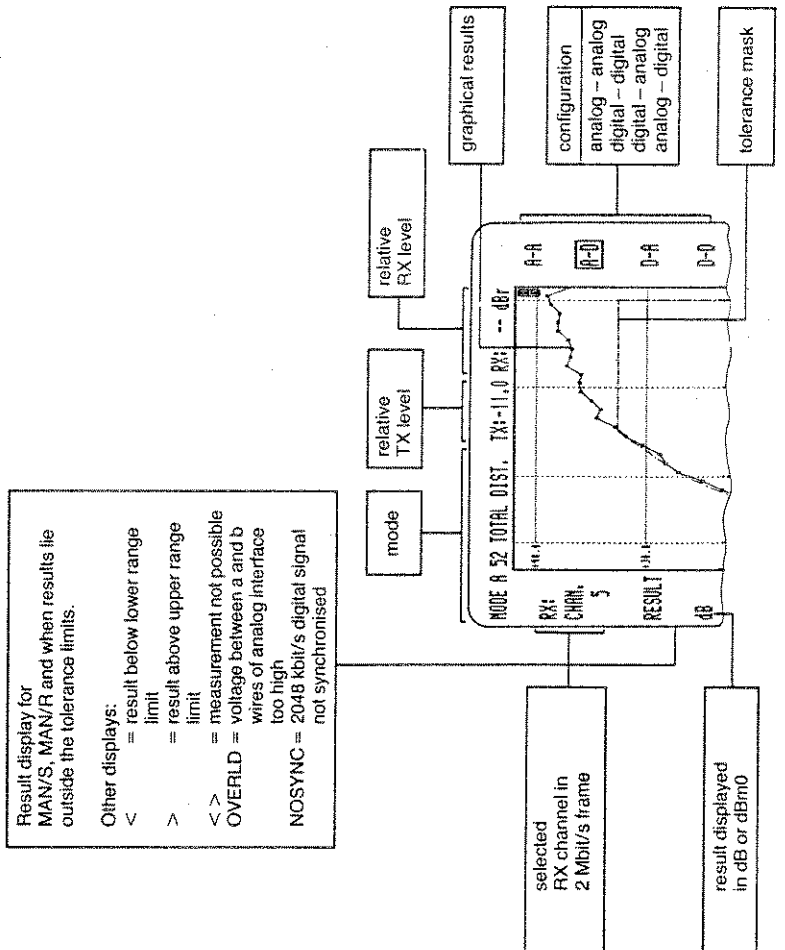
7 Results display

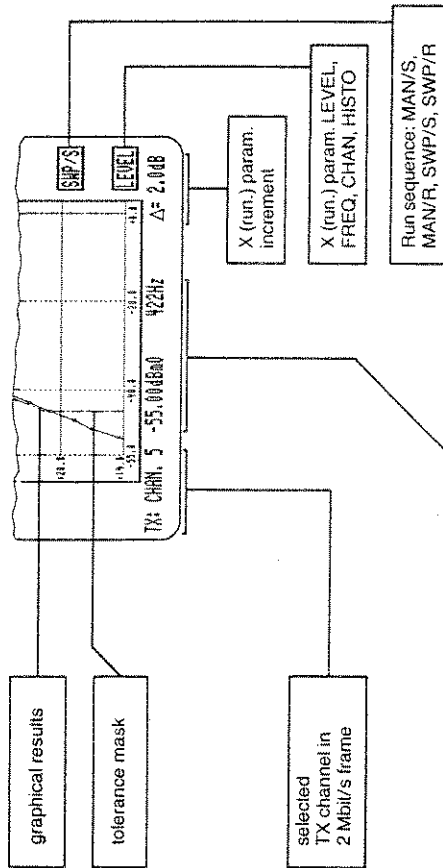
7.1 Numerical display





7.2 Graphical display





	Displayed value		
X (RUN) PARAM. LEVEL	Level	Frequency	Increm. Level
FREQUENCY	Start value	Fixed test frequency	Level
CHANNEL	Fixed test level	Start volume	Frequency
HISTOGRAM	Fixed test level	Fixed test frequency	1 channel
	Fixed test level	Fixed test frequency	1 step

8 Setup memory

STO-MODE	STO	RTN
STO-MODE	STO	RTN
SE. NO.	MODE	FREE %
(01) R11 A-D	(21)	86 %
(02) R12 A-D	(22)	
(03) R21 A-D	(23)	
(04) R22 A-D	(24)	
(05) R51 A-D	(25)	
(06) R52 A-D	(26)	
(07) R91 A-D	(27)	
(08) R92 A-D	(28)	
(09) R511 A-D	(29)	
(10) R512 A-D	(30)	
(11) R513 A-D	(31)	
(12) R514 A-D	(32)	
(13) R515 A-D	(33)	
(14) R516 A-D	(34)	
(15) R517 A-D	(35)	
(16) R518 A-D	(36)	
(17) R519 A-D	(37)	
(18) R520 A-D	(38)	
(19) R521 A-D	(39)	
(20) R522 A-D	(40)	

8.1 Store

Press:

to Softkey 6
 Displays setup list
 Selects memory address
 Stores setup
 Exit STO mode

8.2 Erase setup

A setup is erased by entering the memory address preceded by a - sign in STO mode

8.3 Erase all setups

Enter + + + in STO mode to erase all setups

8.4 Recall

Press:

RE-
CALL

Displays setup list

1

to

4

0

Selects memory address of setup to be recalled

ENTER

Recalls setup and displays corresponding results page

RCL-MODE		SETUP LIST		RCL	
S. NO.	MODE	S. NO.	MODE	S. NO.	MODE
1	P-A	1	P-A	1	P-A
2	P-A	2	P-A	2	P-A
3	P-A	3	P-A	3	P-A
4	P-A	4	P-A	4	P-A
5	P-A	5	P-A	5	P-A
6	P-A	6	P-A	6	P-A
7	P-A	7	P-A	7	P-A
8	P-A	8	P-A	8	P-A
9	P-A	9	P-A	9	P-A
10	P-A	10	P-A	10	P-A
11	P-A	11	P-A	11	P-A
12	P-A	12	P-A	12	P-A
13	P-A	13	P-A	13	P-A
14	P-A	14	P-A	14	P-A
15	P-A	15	P-A	15	P-A
16	P-A	16	P-A	16	P-A
17	P-A	17	P-A	17	P-A
18	P-A	18	P-A	18	P-A
19	P-A	19	P-A	19	P-A
20	P-A	20	P-A	20	P-A

(50) PERS. SEQUENCE (*) FREE 86 %

8.5 Adding a setup to a sequence

Press:

or Displays setup list
 Softkey 1 PRO is displayed next to softkey 1
 to Selects a setup
 Marks setup as part of a sequence (*) Ready to enter channel step parameter (■)
 to Enters the number of channel steps for this mode This parameter cannot be entered if the X parameter is CHANNEL
 Confirms entry
 Softkey 6 Exit PRO mode

PRO-MODE	S. INH	MODE	CH	S. INH	MODE	CH
	(01)	B1	A-D	(21)		
	(02)	B2	D-D	(22)		
	(03)	B22	D-D	(23)		
	(04)	B51	D-A	(24)		
	(05)	B511	A-D	(25)		
	(06)	B1	A-D	(26)		
	(07)	B52	A-A	(27)		
	(08)	B52	A-A	(28)		
	(09)	B511	A-A	(29)		
	(10)			(30)		
	(11)			(31)		
	(12)			(32)		
	(13)			(33)		
	(14)			(34)		
	(15)			(35)		
	(16)			(36)		
	(17)			(37)		
	(18)			(38)		
	(19)			(39)		
	(20)			(40)		
	(99)					

FREE 86 x

8.6 Removing a setup from sequence

A setup can be removed from a sequence by entering the memory address of the setup preceded by a - sign in PRO mode

8.7 Clearing a sequence

By entering + + + in PRO mode, the sequence is cleared. All setups remain stored.

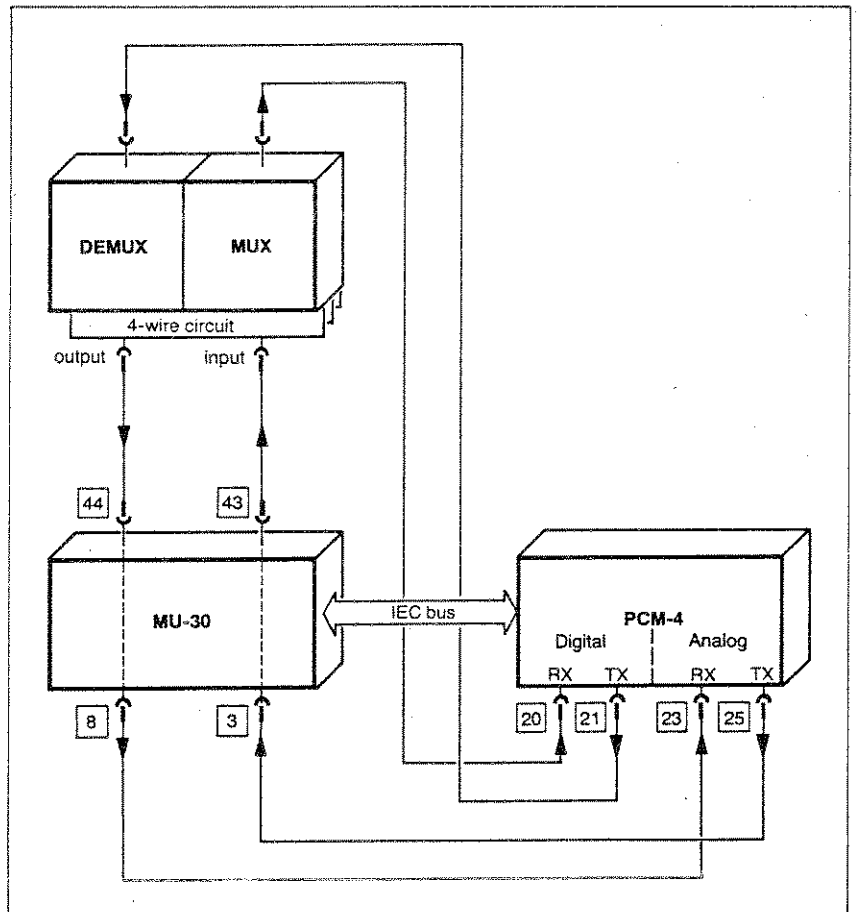
Starting a sequence

Press:

Displays setup list

Displays first page of results for first measurement mode in the sequence

9 Using the PCM-4 with the MU-30
9.1 4-wire circuit measurements



--- circuit if MU-30 not used

)

Select measurement mode e. g. **A** + **1** + **1** + **ENTER**

) Configurations (A-A, A-D, D-A, D-D), close digital loop for A-A measurements (parameter 121)

) Analog interface 4-wire

) Relative level Set as required

) **Further settings**

) X (running) parameter Frequency
Level
Channels*): 3 to 30 → parameters 211, 212, 221, 222
3 to 31 → parameters 213, 223
3 to 32 → parameters 214, 224

) Measurement run Single measurement MAN/S
Repetitive MAN/R
Single sweep SWP/S
Repetitive sweep SWP/R

) Sequence (select with recall). The measurement starts with the channel selected by the stored setup. All the measurements in subsequent channels are carried out according to the instructions stored in PROG (memory mode). For measurements versus channel number, the measurements start in the first specified channel (lowest X value) and end with the last specified channel (highest X value).

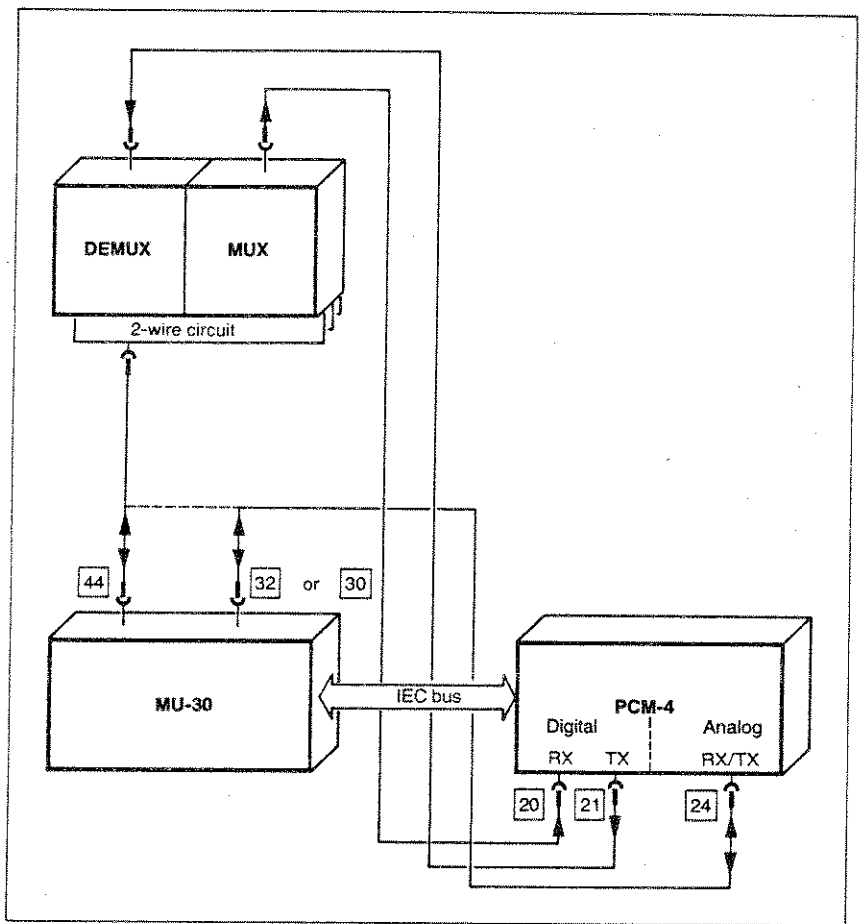
) Other parameters X parameter frequency or level:
Upper and lower X and Y limits
X parameter step Δ
RX and TX channels to be measured
Start frequency (X parameter frequency)
Start level (X parameter level)
Result in dBm0 (parameter 911) or dB (parameter 912)

) X parameter channel:
Starting and finishing channel (at least 3 channels)
Test frequency and level

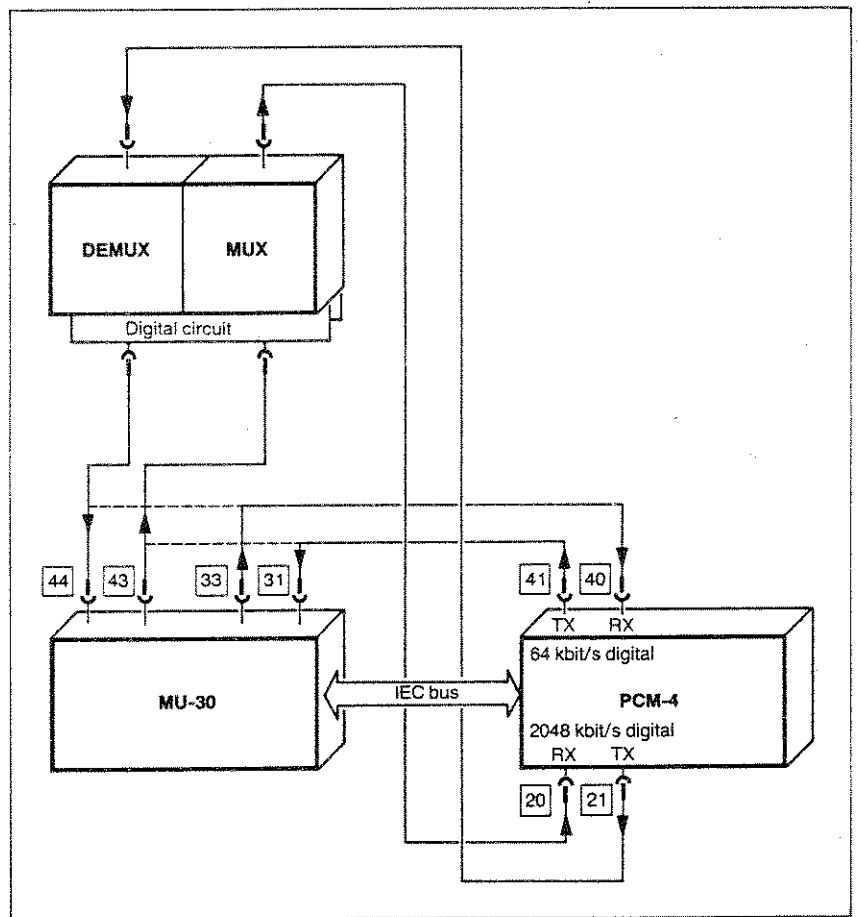
) Control of MU-30 test point selector
Parameters 811 and 821

) *) If the X parameter is channel or time, at least 3 channels or time intervals will be displayed.

9.2 2-wire circuit measurements



9.3 Digital circuit measurements



--- circuit if MU-30 not used

Select measurement mode e. g. **[B]** + **[8]** + **[Z]** + **[ENTER]** error rate in 64 kbit/s channel

Configuration

must be selected via parameters 111 to 114

Parameter 111 2 Mbit/s / 2 Mbit/s, corresponds to D-D

Parameter 112 64 kbit/s / 64 kbit/s, corresponds to A-A

Parameter 113 64 kbit/s / 2 Mbit/s, corresponds to A-D

Parameter 114 2 Mbit/s / 64 kbit/s, corresponds to D-A

If parameter 112 is selected, the 2 Mbit/s digital loop must be closed using parameter 121.

Further settings

X (running) parameter

Time

Channels*): 3 to 30 → parameters 211, 212, 221, 222

3 to 31 → parameters 213, 223

3 to 32 → parameters 214, 224

Measurement run

Single measurement MAN/S

Repetitive MAN/R

Single sweep SWP/S

Repetitive sweep SWP/R

Sequence (select with recall). The measurement starts with the channel selected by the stored setup. All the measurements in subsequent channels are carried out according to the instructions stored in PROG (memory mode). For measurements versus channel number the measurements start in the first specified channel (lowest X value) and finish with the last specified channel (highest X value).

Other parameters

Pseudorandom sequence $2^9 - 1$ PRS9

Pseudorandom sequence $2^{11} - 1$ PRS11

8 bit word WORD

Error insertion ERROR

Set the starting and finishing channel (minimum 3 channels) using X upper and lower value settings

Increment Δ

Control of MU-30 test point scanner

Parameters 813 and 823

*) If the X parameter is channel or time, at least 3 channels will be displayed.

10 Controls and connections

10.1 Front panel, numerical order

1	MODE LIST A	MODE A measurement modes
1	MODE LIST B	MODE B measurement modes
1	GENRL PARAM	General parameter list
1	STO MODE	Storing or erasing setups, linking setups to form a sequence
1	RCL MODE	Recalling stored setups, linking setups to form a sequence Recalling a stored sequence
2	GRAPH NUM	Results displayed as graph or table (numerical)
2	START	Start measurement
2	STOP	Stop measurement
3	VAR MODE	Modify measurement mode
4	LOCAL	Switch from remote to local mode
5	LEVEL	Set level value when level is X axis parameter
5	FREQ	Set frequency value when frequency is X axis parameter
5	Δ	X (running) parameter step for SWP/S and SWP/R measurements
5	BOTH CHAN	Simultaneous selection of TX and RX channels
5	SEND CHAN	TX channel
5	RECV CHAN	RX channel
5	→	Increase value of X parameter by Δ
5	←	Decrease value of X parameter by Δ
6		Numerical keypad
6	ENTER	Concludes entry
7	UPPER VALUE	Change upper value of graph scale
7	LOWER VALUE	Change lower value of graph scale
8	RECV dBr	Change relative RX level (dBr)
8	SEND dBr	Change relative TX level (dBr)

- ↗
- 10 GENRL RESET Reset to standard values
 - 11 DIGIT WORD Listing and selection of 8 bit words to be displayed in real-time on 8 LEDs
 - 12 LINK RESLT Link results together to form a graph
 - 12 Δ NUM Scroll forwards through numerical results
 - 12 CLR RESLT Clears graphics and numerical results
 - 12 PLOT Controls a graphics plotter in graphics mode or a matrix printer in numerical mode
 - 13 → Setting analog receiver input impedance
 - 14 4-WIRE Switching from analog 2-wire interface
 - 14 TX/RX Switching from analog 4-wire to 2-wire interface
 - 15 → Analog generator output impedance selector
 - 20 RX SIGNAL Digital receiver input
 - 21 TX SIGNAL Digital generator output
 - 22 TX CLOCK 2048 kHz clock output
 - 23 RECIEVE RX Analog 4-wire receiver input
 - 24 TX/RX Analog 2-wire output/input (A-D or D-A only)
 - 25 SEND TX Analog 4-wire generator output

10.2 Back panel, numerical order

- 31 AUX. SIGNAL Auxiliary signal output (VAR. MODE 151 to 154)
- 32 SIGNAL TRIGGER Output
- 33 ANALOG ENCODER Input. In D-A and D-D configurations, an analog signal can be inserted into the selected TX channel. Ext. coder operation via VAR. MODE 224
- 36 VF Unbalanced VF output
- 37 ANALOG DECODER Output. In A-D and D-D configurations, the selected RX channel is output as analog signal
- 38 SIGNALLING DISTORTION Signalling receiver input. Must be switched to earth
- 39 SIGNALLING DISTORTION Signalling output. Floating

- 60** **SIGNALLING INPUT** Pin 1: a bit
Pin 2: b bit
Pin 3: c bit
Pin 4: d bit
Pin 10: 500 Hz clock output
Pin 11: ext. signalling = LOW
Pin 13: + 5 V/50 mA
Pin 14: earth
- 61** **FRAME TRIGGER** 8 kHz frame trigger output
TTL level, rising edge at start of TS 0
- 62** **SIGNALLING ERROR OUTPUT** Pin 1: a bit
Pin 2: b bit
Pin 3: c bit
Pin 4: d bit
Pin 5: error pulse for frame error
Pin 6:
Pin 7: error pulse for multiframe error
Pin 8: error pulse for code error
Pin 9:
Pin 10:
Pin 11: 500 Hz clock output
Pin 12:
Pin 13: + 5 V/50 mA
Pin 14: earth
- 63** **EXT. FRAME** Frame trigger input for operation without FAS (parameter 224)
TTL input, rising edge of signal corresponds to start of TS 0
- 64** **Ext. Clock** Clock and sync. input
- 65** **Clock** 2048 kHz clock output

10.3 Front panel, alphabetical order

- 5** **BOTH CHAN** Simultaneous selection of RX and TX channels
- 12** **CLR RESLT** Clears graphic and numerical results display
- 11** **DIGIT WORD** Listing and selection of digital words; display in real-time on 8 LEDs
- 2** **ENTER** Used to confirm numerical keypad entries
- 5** **FREQ** Alters frequency when this is set as X axis parameter
- 1** **GENRL PARAM** Lists all general parameter groups

7	UPPER VALUE	Change upper value of graphical axes (X and Y)
3	VAR MODE	Measurement mode modification
14	2-WIRE	Switches from 4-wire analog to 2-wire analog interface (D-A and A-D only)
14	4-WIRE	Switches from 2-wire analog to 4-wire analog interface
5	Δ	Changes X increment value in SWP/S and SWP/R modes
5	←	Reduces X value by Δ
5	→	Increases X value by Δ
13	→	Sets input impedance for analog receiver
15	→	Sets output impedance for analog generator
6		Numerical keypad

10.4 Back panel, alphabetical order

37	ANALOG DECODER	Analog decoder output. In A-D and A-A modes, the contents of the selected RX channel are output as an analog signal
33	ANALOG ENCODER	Analog encoder input. In D-A and D-D modes, the input signal is inserted into the selected TX channel. External coder operation is selected with parameter 224 (VAR. MODE)
31	AUX SIGNAL	Auxiliary signal output (VAR. MODE 151 to 154)
65	CLOCK	2048 kHz clock output
34	EXT. CLOCK	Clock/sync. input
63	EXT. FRAME	Frame trigger input for operation without frame alignment signals (PARAM. 224) TTL input; rising edge of trigger signal corresponds to start of timeslot 0
61	FRAME TRIGGER	8 kHz frame trigger output. TTL level; rising edge of trigger signal corresponds to start of timeslot 0
38	SIGNALLING DISTORTION	Signalling receiver input; must be connected to ground
39	SIGNALLING DISTORTION	Signalling output

62] **SIGNALLING ERROR OUTPUT** Pin 1: a bit output
Pin 2: b bit output
Pin 3: c bit output
Pin 4: d bit output
Pin 5: frame error pulse
Pin 6:
Pin 7: multiframe error pulse
Pin 8: code error pulse
Pin 9:
Pin 10:
Pin 11: 500 Hz clock output
Pin 12:
Pin 13: + 5 V/50 mA
Pin 14: ground

60] **SIGNALLING INPUT** Pin 1: a bit input
Pin 2: b bit input
Pin 3: c bit input
Pin 4: d bit input
Pin 10: 500 Hz clock output
Pin 11: Ext. signalling = LOW
Pin 13: + 5 V/50 mA
Pin 14: ground

32] **SIGNAL TRIGGER** Signal trigger output

36] **VF** Unbalanced VF output



Wandel & Goltermann

Postbox 12 62 · D-7412 Eningen u. A.
Tel. + 49-71 21-86-0 · Telex 7 29 833