TI 62/81 E

"HALF SPEED DISC CUTTING"

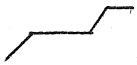
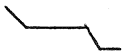
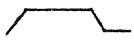
- The following table shows the frequency response alterations which are occuring when a tape recorded at a given speed with a given flux equalisation is played back at half-speed with another equalisation.

- This leaflet describes how to modify the A80-VU Prelistening Reproducer in order to achieve half-speed disc cutting without external frequency response compensation.

A. Bourget/js 27.04.1981

1/2 Speed Equalisation

f	A	B	C	D	E	F
8.0	0.00	-16.04	-5.71	10.33	-16.04	0.00
10.0	0.00	-14.16	-5.55	8.61	-14.16	0.00
12.5	0.00	-12.31	-5.31	7.00	-12.31	0.00
16.0	0.00	-10.33	-4.96	5.37	-10.33	0.00
20.0	0.00	- 8.61	-4.52	4.09	- 8.61	0.00
25.0	0.00	- 7.00	-3.99	3.01	- 7.00	0.00
31.5	0.00	- 5.47	-3.35	2.12	- 5.47	0.00
40.0	0.00	- 4.09	-2.66	1.43	- 4.09	0.00
50.0	0.00	- 3.01	-2.04	0.97	- 3.01	0.00
63.0	0.00	- 2.12	-1.49	0.63	- 2.12	0.00
80.0	0.00	- 1.43	-1.04	0.39	- 1.43	0.00
100	0.00	- 0.97	-0.72	0.25	- 0.97	0.00
125	0.00	- 0.64	-0.50	0.15	- 0.65	0.00
160	0.00	- 0.40	-0.33	0.08	- 0.41	0.00
200	0.00	- 0.26	-0.25	+ 0.03	- 0.28	0.00
250	0.00	- 0.15	-0.20	- 0.01	- 0.19	0.00
315	0.00	- 0.09	-0.21	- 0.06	- 0.15	0.00
400	0.00	- 0.03	-0.25	- 0.12	- 0.13	0.00
500	0.00	+ 0.01	-0.36	- 0.19	- 0.15	0.00
630	0.00	+ 0.06	-0.49	- 0.31	- 0.18	0.00
800	0.00	0.12	-0.72	- 0.46	- 0.26	0.00
1'000	0.00	0.19	-1.04	- 0.67	- 0.37	0.00
1'250	0.00	0.30	-1.46	- 0.93	- 0.53	0.00
1'600	0.00	0.46	-2.06	- 1.28	- 0.78	0.00
2'000	0.00	0.67	-2.67	- 1.62	- 1.05	0.00
2'500	0.00	0.93	-3.32	- 1.96	- 1.36	0.00
3'150	0.00	1.21	-3.96	- 2.27	- 1.69	0.00
4'000	0.00	1.62	-4.53	- 2.52	- 2.01	0.00
5'000	0.00	1.96	-4.96	- 2.70	- 2.26	0.00
6'300	0.00	2.27	-5.30	- 2.84	- 2.46	0.00
8'000	0.00	2.52	-5.55	- 2.93	- 2.62	0.00
10.0 K	0.00	2.70	-5.71	- 2.99	- 2.72	0.00
Hz	dB	dB	dB	dB	dB	dB

f	A	B	C	D	E	F
12.5 K	0.00	2.83	-5.82	- 3.02	- 2.80	0.00
16.0 K	0.00	2.93	-5.90	- 3.06	- 2.84	0.00
20.0 K	0.00	2.99	-5.94	- 3.07	- 2.87	0.00
25.0 K	0.00	3.02	-5.97	- 3.08	- 2.89	0.00
31.5 K	0.00	3.05	-5.99	- 3.09	- 2.90	0.00
40.0 K	0.00	3.07	-6.00	- 3.09	- 2.91	0.00
50.0 K	0.00	3.08	-6.01	- 3.09	- 2.91	0.00
63.0 K	0.00	3.09	-6.01	- 3.09	- 2.92	0.00
80.0 K	0.00	3.09	-6.02	- 3.10	- 2.92	0.00
100 K	0.00	3.10	-6.02	- 3.10	- 2.92	0.00
Hz	dB	dB	dB	dB	dB	dB
Curve:	——					——
1	x	x	6'360 µs	6'360 µs	x	x
2	x	3'180 µs	3'180 µs	x	3'180 µs	x
3	x	50 µs	100 µs	100 µs	70 µs	x
4	x	35 µs	50 µs	70 µs	50 µs	x

A : Master Tape : AES, 17.5 µs / 30 ips
Repro Equalisation : IEC, 35 µs / 15 ips

B : Master Tape : AES, 17.5 µs / 30 ips
Repro Equalisation: NAB, 50 & 3'180 µs / 15 ips

C : Master Tape : NAB, 50 & 3'180 µs / 15 ips
Repro Equalisation : NAB, 50 & 3'180 µs / 7.5 ips

D : Master Tape : NAB, 50 & 3'180 µs / 15 ips
Repro Equalisation : IEC, 70 µs / 7.5 ips

E : Master Tape : IEC, 35 µs / 15 ips
Repro Equalisation : NAB, 50 & 3'180 µs / 7.5 ips

F : Master Tape : IEC, 35 µs / 15 ips
Repro Equalisation : IEC, 70 µs / 7.5 ips

- N.B.: 1 The 0 dB point has not been taken systematically at 1 kHz because of time constants.

- N.B.: 2 The reproduce level difference between normal speed and 1/2 speed has not been added to the values. (usually: - 6 dB).

- N.B.: 3 AES : Audio Engineering Society
IEC : International Electrotechnical Commission
NAB : National Association of Broadcasters

- N.B.: 4 Sometimes, tape flux equalisation time constants are also refered to CCIR or DIN standards, which are identical to IEC recommendations at 7.5 and 15 ips.

CCIR : Commité Consultatif International de Radiodiffusion
DIN : Deutsche Industrie Normen

- Frequencies corresponding to the equalisation time constants:

τ	f
17.5 µs	9'095 Hz
35 µs	4'547 Hz
50 µs	3'183 Hz
70 µs	2'274 Hz
100 µs	1'592 Hz
3'180 µs	50 Hz
6'360 µs	25 Hz

- A flat replay frequency response can be obtained by 3 means:

  a) - Use of an equaliser adjusted to compensate for the values given in the table.

  b) - Use of a specially designed compensation amplifier.

  c) - Modification of the play back time constants of the tape reproducer used for disc cutting. (best solution).

- The most common case is:

Recording	15 ips / NAB	(50 + 3'180 µs)
Replay	7.5 ips / special	(100 + 6'360 µs)

- So, here are the instructions to convert a Studer 7.5/15 ips conventional equalisation board (1.080.814) into a special half speed NAB equalisation board.

- N.B.: For some reasons of convenience for the modification, the equalisation standards have been reversed at the low speed, i.e.:

Speed	NAB	IEC
15	50 & 3'180	35
7.5	70	100 & 6'360
Ips	µs	µs

In other words, to operate with NAB standard one has to select:

Normal speed : 15 Ips + NAB ⟶ 50 + 3'180 µs

Half speed : 7.5 Ips + IEC ⟶ 100 + 6'360 µs

- Here is the list of the resistors that have to be changed:

Resistor	Old Value (conventional)	New Value (for 1/2 speed)
R 2	470 kOhm	1.8 MOhm
R 17	8.45 kOhm	12 kOhm
R 19	27 kOhm	47 kOhm
R 25	20.5 kOhm	33 kOhm
R 29	60 kOhm	47 kOhm

In addition, the resistor R 2 has to be connected to the pin Nb 12 instead of the pin Nb 11.

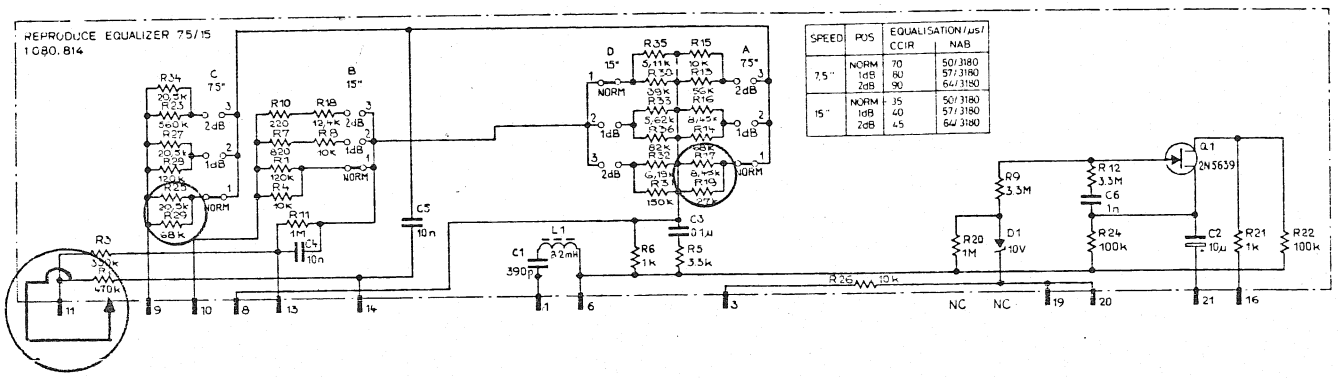
- The following diagrams are showing the elements that have to be changed.

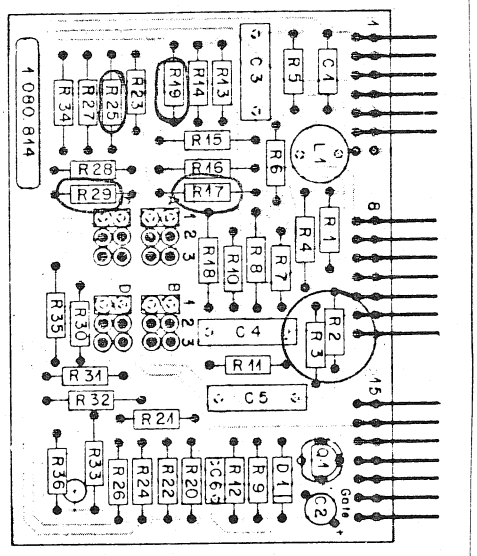
- Normally the following figures are to be expected:

Replay frequency response at half speed : 10 Hz - 10 kHz $\pm$ 1.0 dB

REPRODUCE PREAMPLIFIER 1.080.804 (WITH REPRODUCE EQUALIZER 1.080.814 / 815)

R21 IS BRIDGED IF SWITCHING CODE 1.080.811 IS USED





REPR EQUAL PCB 7.5"/15" 1.080.814