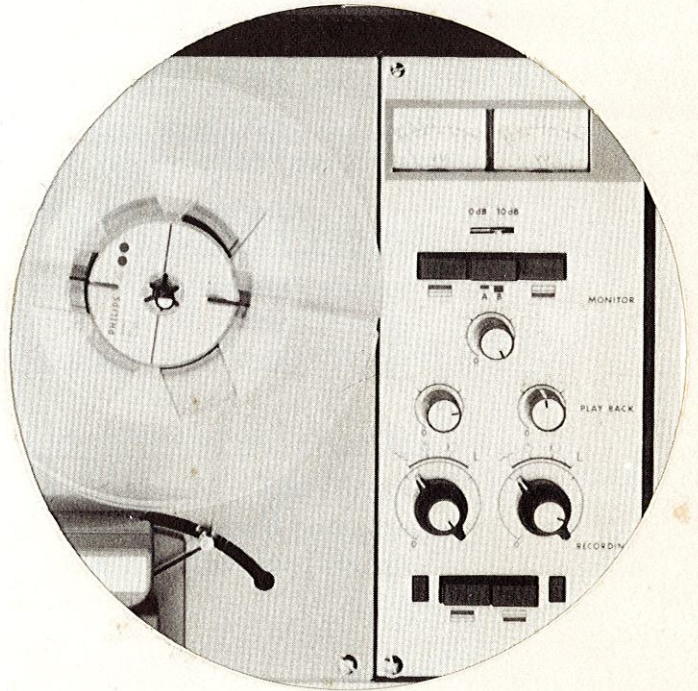


# PHILIPS

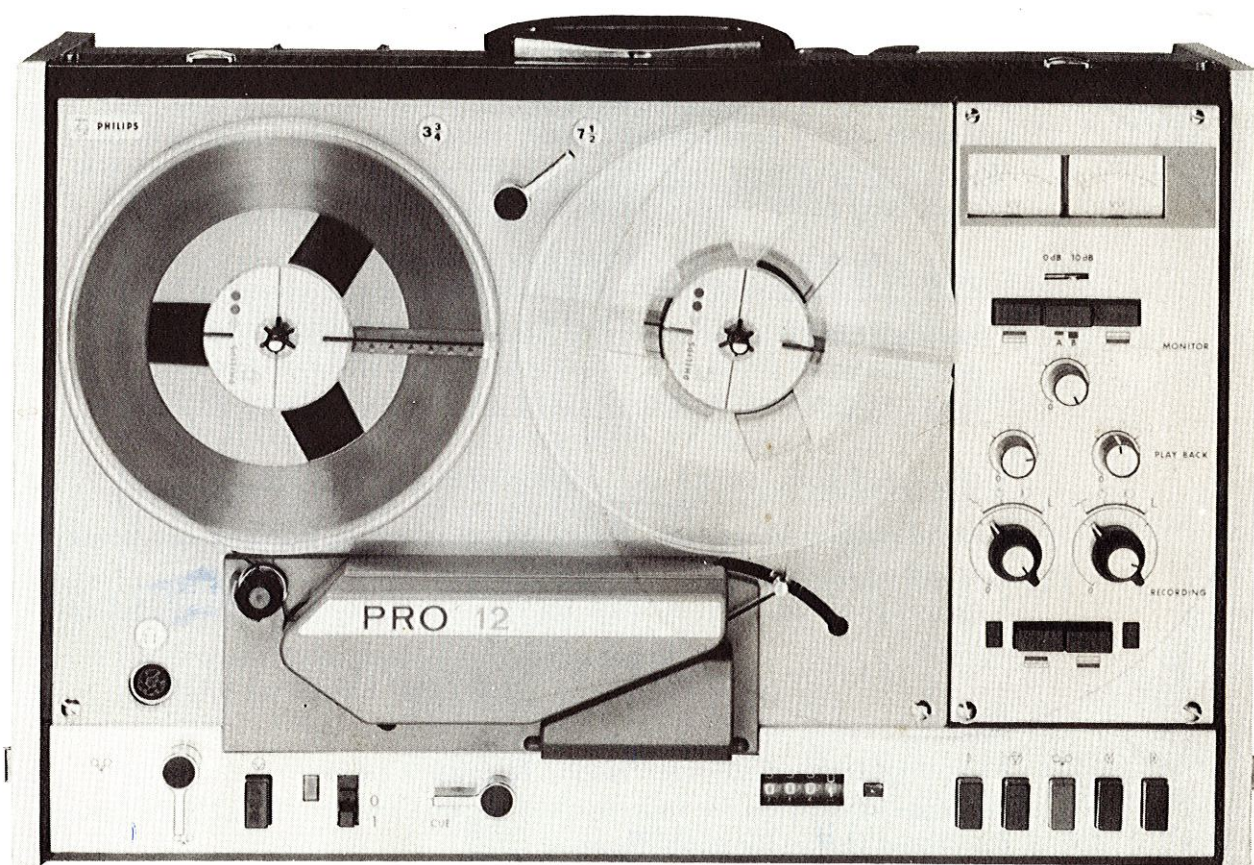


## RECORDING EQUIPMENT

AUDIO TAPE RECORDER  
COMPACT MODEL Pro' 12



ADVANCE INFORMATION



## PHILIPS TRANSISTORISED UTILITY CLASS RECORDER

### COMPACT MODEL PRO'12

#### Introduction

The progress in recording techniques has opened up new possibilities for the design and construction of new tape recorders for industrial and professional applications. These techniques have enabled us to design a recorder for applications which require industrial reliability, professional performance, long life, and transportability.

Industrial reliability means, in our opinion:

- \* lasting, trouble-free operation, even when handled by inexpert personnel;
- \* long life (at least 10 000 hours) despite intensive everyday use.

Professional performance can only be achieved and maintained if:

- \* sound quality (distortion, signal-to-noise ratio, frequency response, wow and flutter) is kept at studio level;
- \* operational facilities provide for the requirements of studio applications.

#### Features

1. Suitable for dual-track mono, two-track stereo
2. Special version for four-track mono and stereo
3. Three inputs for each channel
4. Mixing facilities of two inputs
5. Extra possibilities: multi-play  
  sound with sound
6. Check of recorded signal during recording (before and after tape)
7. Built-in monitor amplifier with loudspeaker and headphone
8. Cue and dubbing facilities with tape lifters
9. Interlocked recording buttons
10. Tape and switch
11. Pause button
12. Remote control facilities

Some extra features of the Pro'12 recorder, as compared with a Hi-Fi recorder:

1. Performance as good as that of a studio recorder
2. Three separate motors for individual drive of the capstan and the tape reels
3. Correction filters for both speeds automatically selected and independently adjustable
4. Continuously adjustable bias current for both speeds
5. Frequency response adjustable for both speeds
6. Optimal adjustment for double- and triple-play tape
7. Correction filters according to NAB or CCIR standards
8. Line input, line output, and microphone transformers (optional)
9. Hi-Fi input-output and extra monitor output
10. V.U. meter for each channel
11. Extra connection for stereo headphone
12. Mixing possibilities of inputs of both channels
13. Very low crosstalk between the two channels (better than 52 dB)
14. Operation by means of relays
15. Electro-mechanically driven pressure roller
16. Pilot tone head (optional)

### Applications

The recorder is particularly designed for use in:

Public address systems

- \* in theatres, cinemas
- \* in sports halls and stadiums
- \* in hospitals
- \* aboard ships
- \* in industries
- \* in churches

Furthermore it has all the technical and operational facilities suitable for:

- \* large broadcasting corporations and television stations;
- \* commercial broadcasting stations;
- \* small broadcasting companies;
- \* music production studios;
- \* film studios.

It is also eminently appropriate for the following applications:

- \* instruction purposes
- \* language laboratories
- \* interpreting systems
- \* law courts, congresses, houses of parliament
- \* police stations
- \* acoustical applications in the medical field
- \* deaf and dumb teaching
- \* industrial research
- \* listening and music clubs
- \* musical instruction and arrangers.

Finally, it is felt that Hi-Fi lovers, not entirely satisfied with a perfected domestic recorder (or even semi-professional equipment) and who are willing to pay more for a really professional tape recorder, might find this model ideally suitable for their discriminating requirements.

#### General description

The recorder is designed as a portable recorder, to be operated in vertical and horizontal position. The VU meters and all electronic controls are located at the right hand side of the tape deck. The push-button controls for operating the tape transport are fitted at the bottom, below the reels, which makes both horizontal and vertical use possible.

The transistorised printed wiring amplifiers are housed in the same casing as the tape deck. By means of additional components, the recorder can also be mounted in a 19-inch rack or a home-made desk. Then the casing will, naturally, not be required.

The recorder is fed from the mains. The tape deck is provided with separate motors for reels and tape drive. As far as possible operation of the recorder is effected electro-magnetically and by means of relays, avoiding vulnerable or complicated mechanical drive systems.

#### Separate heads

Separate heads are employed for recording, playback and erasing. Between the erasing and recording heads is a space for a pilot tone head. Standard mounting components for this purpose are optional. The erasing head is suitable for separate erasing of one of the tracks and for erasing both tracks simultaneously.

#### Separate amplifiers

By using separate amplifiers for recording and playback, optimum matching of the amplifiers is obtained and reproduction is possible during recording. Moreover, the amplifier channels for track 1 and 2 are separated (a total of 4 amplifiers) so that the standard version of the recorder is suitable for half-track, stereo and two-track operation.

Two-track operation especially offers several added advantages since two signals, which are not correlated, can be recorded one after another and later played back simultaneously. The original recording can be left intact, eliminating the task of transferring the recorded signal from one track to the other. Furthermore, the second track can be used for recording instructions and commentaries during television transmission, or for adding sound effects to radio plays.

#### Adjusting possibilities

The bias can be set for each speed and each channel separately. The frequency response of the recording and playback amplifier can also be adjusted for each speed and each channel separately. In this way optimal adaption to various kinds of tape is possible.

The time constant of the equalisation filters for the two speeds is automatically changed by means of the speed selector switch.







Controls

A. Tape deck

Speed selector switch

speed ~~3 3/4 in/s~~  $7 \frac{1}{2}$  in/s (19 cm/s)  
speed ~~7 1/2 in/s~~ 15 in/s (38 cm/s).

Tape deck controls





pause button   
mains switch 0-1  
playback button   
stop button   
record button   
fast rewinding button   
fast winding button 

Special levers

dubbing   
cueing 

B. Amplifier

Record track selector

track 1   
track 2   
track 1 + 2  + 

Input selectors

multi-play   
Hi-Fi   
microphone   
line 

Level controls

record level channel 1  
record level channel 2  
playback level channel 1  
playback level channel 2  
monitor level

Checking selectors

A(after) - B(before) button A-B .  
channel 1   
channel 2 

Lining-up switch

0 - 10 dB

Description of diagram (see next page)

### 1. General

Since the equipment is, in principle, a two-channel recorder, the circuit diagram comprises two identical sections, one for each channel. In the description, the circuit of channel 1 is described extensively; for channel 2 we can do with a reference to channel 1.

### 2. Inputs

Channel 1 has three inputs:

Hi-Fi: sensitivity 2 - 40 mV, 20 k $\Omega$

Mike: sensitivity 0,2 - 4 mV, 10 k $\Omega$

Line: sensitivity 100 mV, 1 M $\Omega$ .

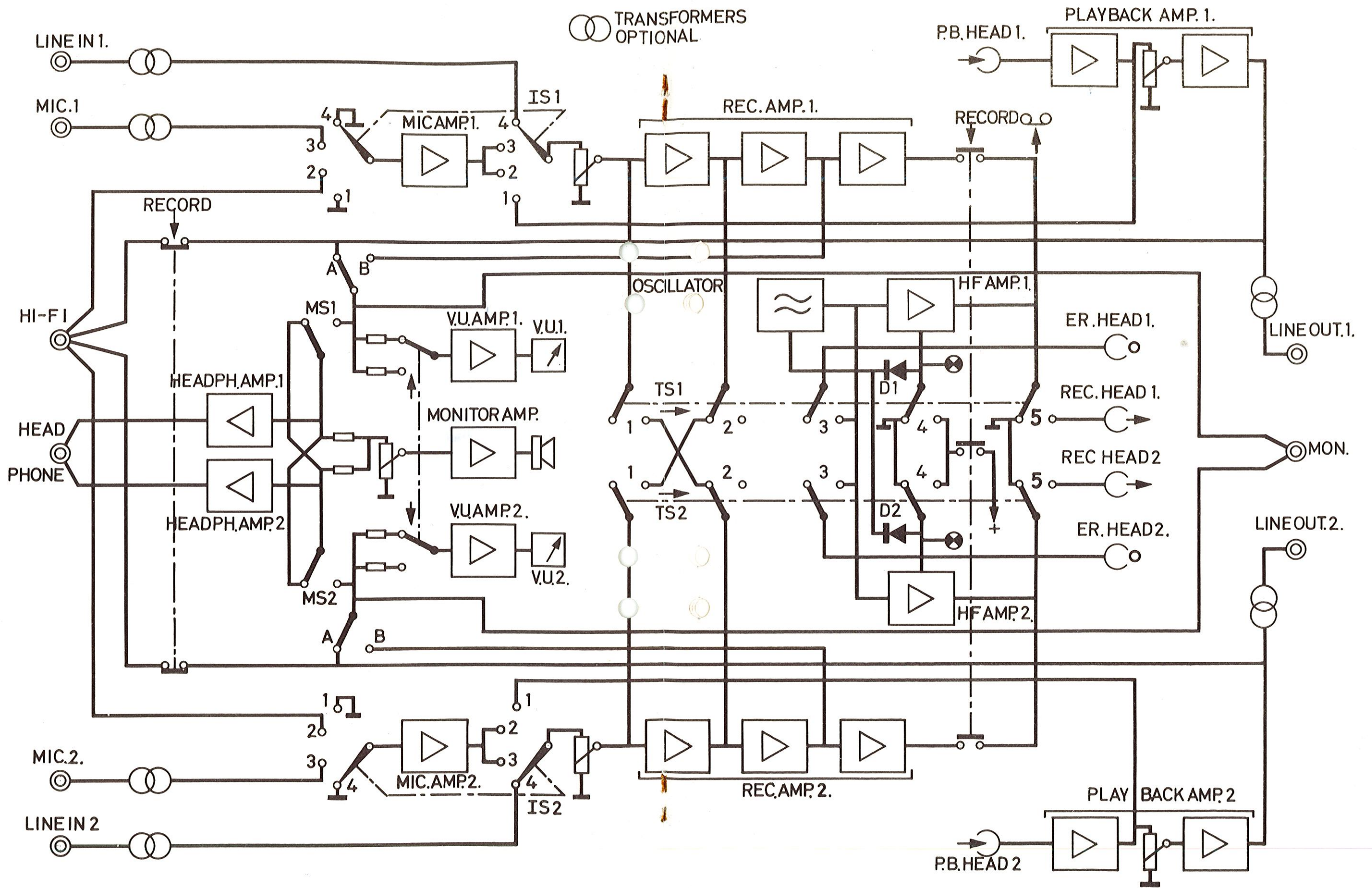
Channel 2 has got three identical inputs.

### 3. Input selector

With the input selector IS 1 one of the three inputs can be chosen.

The first position of the input selector serves for the special effects. These will be described later (see 9).





#### 4. Record track selector

After depressing the track selector of TS 1 (and the pushbutton R on the tape deck), channel 1 is ready for recording.

The input signal chosen with the input selector IS 1 is fed via the three stages of the record amplifier RA 1, the contact 5 of the track selector TS 1, to the recording head RH 1.

In addition the track selector performs the following functions:  
it switches the oscillator OS via contacts TS 1-4 and diode D1;  
it connects the erasing head EH 1 to the oscillator via contacts TS 1-3  
the connections made with the second recording amplifier RA 2 are described in point 5.

#### 5. Mixing possibility

As described above, one of the three input signals of channel 1, chosen by input selector IS 1, can be recorded on track 1. Provided that track selector TS 2 has not been depressed, one of the three signals chosen by track selector IS 2 may be mixed with the signal in channel 1. The signal in channel 2 passes the record level control and the first stage of record amplifier RA 2 and then goes via the track selector contacts TS 2-2 and TS 1-1 to the first stage of record amplifier RA 1.

As both signals have their own level control, mixing on different levels is possible.

On the other hand, when only depressing track selector TS 2, two signals may be mixed and recorded on track 2.

#### 6. Dual-track mono recording

By depressing switch TS 1 the half-track mono signal is recorded via channel 1.

In order to record on the second track, the tape reel must be reversed, and recording takes place via channel 1 in the opposite direction.

#### 7. Stereo or two-channel recording

By depressing the two track selectors TS 1 and TS 2, it is possible to record simultaneously on channel 1, an input signal chosen on input selector IS 1, and on channel 2 a signal chosen through input selector IS 2. These signals can correspond with each other, as for instance in

the case of stereo recording, or be completely different - for instance commentary on a report.

#### 8. Four-track mono or stereo recording (special version)

##### Mono-recording

For recording on track 1, only the track selector TS 1 is depressed and the recording takes place in channel 1 as described under (5). For recording on track 2, the reel is reversed and recording also takes place via channel 1 in the opposite direction.

For recording on track 3, only the track selector TS 2 is depressed and recording takes place via channel 2 as described under (5).

For recording on track 4, the reel is reversed and recording also takes place via channel 2 in the opposite direction.

##### Stereo-recording

For recording on the tracks 1 and 3 the track selectors TS 1 and TS 2 are depressed. Recording takes place as described under (7).

For recording on the tracks 2 and 4 the reel is reversed and recording takes place in the opposite direction.

#### 9. Recording while playback (multi-play)

A recording made earlier on track 1 can be played back on channel 1. If the input selector IS 1 is now set in position 1 and the track selector TS 2 is depressed, the signal from the output of the playback amplifier PB 1 can be recorded on the second track via the input selector IS 1, the first stage of record amplifier RA 1, the track selector TS 1 (contact TS 1-2) the track selector TS 2 (contact TS 2-1), and the recording amplifier RA 2.

A signal chosen through the input selector IS 2 can be mixed with it simultaneously.

On the other hand, the signal already recorded on track 2 can be duplicated on track 1 and simultaneously mixed with a new signal. By repeating this process, it is possible to add a new signal every time, so that the final recording sounds as if more than one voice or instrument has been recorded.

## 10. Monitor Circuit

Monitoring can take place in the three following ways:

1. Via monitor amplifier and built-in loudspeaker.
2. Via headphones.
3. Via an external monitor circuit by connecting a Hi-Fi stereo amplifier to the socket monitor.

For checking purposes the signal can be monitored at the input (before tape) or at the output (after tape) by means of a switch A-B. The before-after switching takes place with one push-button for both channels. Moreover, the monitor circuit for each channel can be switched in separately; for channel 1 by depression of switch MS 1, and for channel 2 with switch MS 2. By depression of both switches the two channels are monitored simultaneously.

On monitoring one channel the mono signal is reproduced via both earphones. When both channels are monitored simultaneously, the signal from track 1 is reproduced via the left-hand earphone, and that of track 2 via the right-hand earphone.

## 11. Sound with sound

An example of this can be found in language laboratories. The pupil listens to recordings made beforehand by the teacher, on track 1. Then he records his own voice on track 2, while imitating the pronunciation of the teacher. Later on both tracks are played back simultaneously so that tracks 1 and 2 can easily be compared with each other.

## 12. VU meters

With the VU meter M1 and M2 the signals before and after recording may be checked at input and output (before and after tape). Switching from input to output takes place together with the monitor selector.

## 13. Outputs

The standard version of the recorder has four outputs:

line out 1:	nom. 0.775 V on 10 000 $\Omega$	peak 4 V
line out 2:	nom. 0.775 V on 10 000 $\Omega$	peak 4 V
monitor:	nom. 2 x 0.775 V on 10 000 $\Omega$	peak 1.6 V
headphone:	nom. 2 x 1 V on 400 $\Omega$	peak 2 V

#### 14. Special inputs and outputs

On request the line inputs and outputs can be provided with transformers to make possible adaption on studio-lines. Moreover microphone transformers can be built in.

The input sensitivities are then:

0.2 mV on 50  $\Omega$

0.4 mV on 200  $\Omega$

0.65 mV on 500  $\Omega$

Technical Data

1. Tape speed *3 3/4 and 7 1/2 in/s and 15 in/s (19 cm/s)*  
(9 1/2 and 19 cm/s)
  2. Tape width 1/4 inch (6.25 mm)
  3. Tape longplay ) on P.V.C. base  
doubleplay  
tripleplay on polyester base
  4. Number of tracks two tracks  
optional: four-track instead of  
two-track heads
  5. Number of heads 3 with possibility of extra pilot  
head according to DIN 15575
  6. Reels Cine type  
max. 7 in (180 mm)  
min. 3 in (80 mm)
  7. Deviation absolute tape speed max. 0.5 %
  8. Tape slip less than 0.3 %  
(measured between beginning  
and end of the tape)
  9. Wow and flutter 0.1 % at 7 1/2 in/s  
(peak values) 0.13 % at 3 3/4 in/s
- Note: measured with EMT flutter meter type EMT 420 with ear  
correction filter.
10. a. Starting time less than 0.2 s to reach normal speed  
less than 1 s to reach normal wow  
and flutter
  - b. Stopping time  
        from normal play within 0.25 s  
        from fast winding within 2 s
  11. Fast forward and rewinding time less than 120 s for 1200 ft (360 m) tape  
(double play tape on a 7-inch reel)
  12. Fast forward and rewinding time less than 25 s measured from standstill of  
last 180 ft (55 m) of tape.
  13. Frequency response according to studio standards  
DIN 45511  
    playback at 7 1/2 in/s  
        +0 dB - 1.5 dB between 60...12 000 c/s  
        +0 dB - 2.5 dB between 40...18 000 c/s  
        +0 dB - 1.5 dB between 60...10 000 c/s  
        +0 dB - 2.5 dB between 40...15 000 c/s

- overall at 7 1/2 in/s
- +0 dB - 3 dB between 60...12 000 c/s
  - +0 dB - 5 dB between 40...18 000 c/s
  - +0 dB - 3 dB between 60...10 000 c/s
  - +0 dB - 5 dB between 40...15 000 c/s
14. Playback equalisation
- for 50 c/s acc. to CCIR standard at 7 1/2 in/s 70  $\mu$ s; at 3 3/4 in/s 90  $\mu$ s and 3180  $\mu$ s
- for 60 c/s acc. to NAB standard at 7 1/2 in/s 50  $\mu$ s and 3180  $\mu$ s; at 3 3/4 in/s 90  $\mu$ s and 3180  $\mu$ s
15. Noise level (overall)
- Measured according to DIN 45405 at 7 1/2 in/s: -56 dB (unweighted)  
at 3 3/4 in/s: -52 dB (unweighted)
- Crosstalk rejection  
better than 52 dB
- Note: Measured at 1000 c/s when recording one track at full level (3 % third harm) and HF bias on the second track. After recording the second track is reproduced.
16. Total harmonic distortion
- Recording amplifier  
less than 0.5 % (measured at a level of +6 dB over full modulation)
- Playback amplifier  
less than 0.5 % at a level of +6 dB
17. Mains voltage  
110-117-220-234 V by means of voltage adaptor
18. Inputs  
Each of the two channels has the following inputs, selectable by means of a switch.
- a. line: 100 mV, 1 M $\Omega$
  - b. microphone: 1 mV (asymmetrical), suitable for microphones from 50 to 2000  $\Omega$
  - c. diode: 2 to 40 mV (adjustable), 20 k $\Omega$
- In addition the following inputs are optional:
- d. microphone input with microphone transformer (symmetrical) for  
0.2 mV for 50  $\Omega$  microphones  
0.4 mV for 200/500  $\Omega$  (taps)
  - e. In the line input a transformer may be added: 100 mV, 10 000  $\Omega$ .

19. Outputs

Each channel has:

- a 1. line output; nom. level 0.775 V;  
max. level 4 V; load 10 000  $\Omega$
- a 2. optional a line output transformer  
may be added:  

<u>level nominal</u>	0 dBm
<u>peak</u>	+6 dBm
- b. a separate stereo monitor output for  
direct connection to separate ampli-  
fiers  
nom. level 0.775 V; max. level 4 V;  
load 10 000  $\Omega$

20. HiFi connection

The above-mentioned diode input and  
monitor output of both channels are  
connected to a combined socket acc.  
to DIN 45500 sub. 3.2.3.  
inputs 2 - 40 mV; 20 k $\Omega$   
outputs 0.5 - 2 V; 20 k $\Omega$

21. Monitor

Nominal output ca. 0.5 W on built-in  
speaker; frequency response 40...15 000  
c/s  $\pm$  2 dB

22. Headphone

Distortion 1 %  
headphone impedance: 2 x 400  $\Omega$ ; nom.  
output 2 x 1 V  
acc. to IEC the headphone is connected  
via a transformer

23. VU meters + amplifiers

up to 15 kc/s within 2 dB with respect  
to a 1000 c/s signal applied to the in-  
puts

24. Overall specification

suitable for tropical climate up to 45°C  
weight: approx. 23 kg (57 lb)  
dimensions: ~~320 x 190 x 150 cm~~ 52 cm x 34 x 24  
(12 1/2 x 7 1/2 x 20 1/8 in)

This brochure cannot be considered as a firm specification.  
Technical data and construction details are still under consideration, and  
may be modified in the course of further developments.



