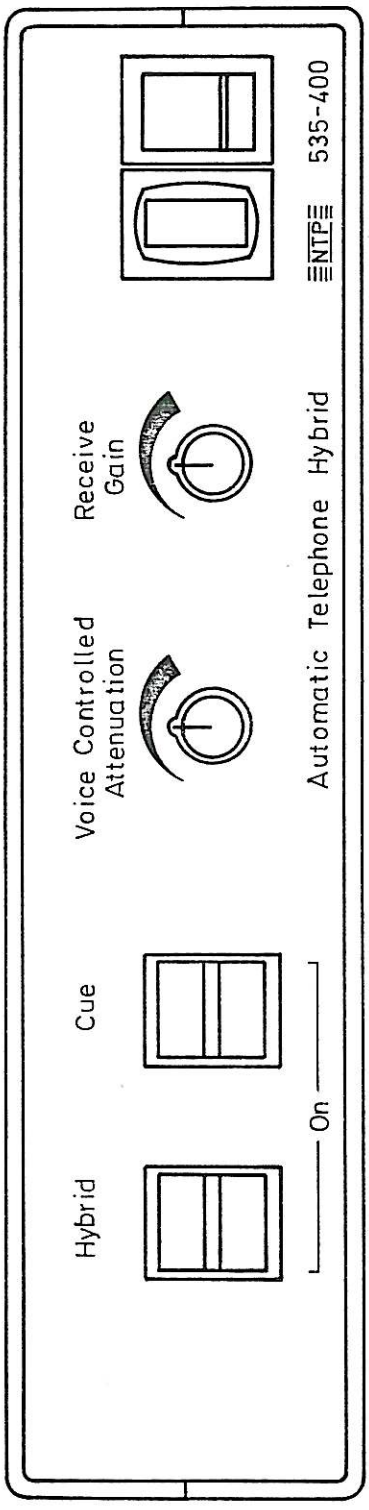


Målestok	1:1
Konstruktør:	
Tegnet	17.5.84. LS.
Godkendt	BS.
Revideret	

Automatic
Telephone Hybrid 535-400
Frontplate Layout

NTP ELEKTRONIK A/S

535-4009-A-4

INTRODUCTION

The Automatic Telephone Hybrid 535-400 is a mains powered cabinet version of the 535-200. The unit is primarily designed for broadcasting applications, e.g. in connection with telephone interviews.

Features:

- Automatic balancing of telephone line.
- Balanced transformer input/output.
- Voice controlled attenuation to increase sidetone attenuation on poor subscriber lines. (Adjustable)
- Relay circuit for switching the telephone line between the hybrid circuit and a telephone set.
- Bandpass filter in transmitting circuit.
- Electronic line-hold circuit.
- Adjustable receiving gain (30dB).
- Cueing function permitting level adjustment without switching the telephone line to the hybrid circuit.
- High voltage protection (according to CCITT K17).

BLOCK DIAGRAM

The block diagram of the 535-200C (535-2005-A-3) can be divided into four main blocks designated: Transmitting circuit, receiving circuit, compensating circuit and voice control circuit.

Transmitting circuit:

The input signal is led via a current transformer to a switched capacitor bandpass filter driven by a 2.048 MHz clock oscillator. The slope of the roll-off is +24dB/octave at 200Hz and -30dB/ octave at 3400Hz. The filter is followed by a limiter in order to prevent overloading of the telephone line. The signal is then led to a VCA which is one part of the voice control. Finally the signal is led to the output stage.

When "Hybrid" is activated, the relay will switch the telephone line from the telephone set to the output stage of the hybrid.

Receiving circuit:

The telephone line is permanently connected to the input current transformer of the receiving stage.The signal on the telephone line is summed with the signal from the compensation stage. This summed signal is led to a VCA performing the variable gain control. The gain can be adjusted from 0 to 30dB with the "Gain" potentiometer. The VCA is followed by a limiter in order to prevent the output stage being overdriven. The signal is then led to another VCA which is another part of the voice control. The VCA is followed by a switched capacitor low-pass filter. The slope of the roll-off is -30dB/octave at 3400Hz. The signal from the filter is then led to the output stage via a switch.

By activating "Cue", monitoring of the phonecall is possible, without activating "Hybrid". When "Hybrid is activated, "Cue" has no influence.

Compensation circuit.

The compensation circuit has three independent regulating circuits, each containing two filters and a synchronous rectifier.

Voice control circuit.

In order to avoid a low sidetone attenuation on poor subscriber lines, a voice control circuit has been incorporated.
Note that as the gain in the receiving circuit is increased a certain amount, the side-tone attenuation is decreased with the same amount.

If the telephone is very "weak", making it necessary to add a large amount of gain, the result might be a very low side tone attenuation. The principle in the control is that the gain is decreased in the receiving circuit, when there is signal from the studio input (equal to an increase of the sidetone attenuation) and vice versa.

With the potentiometer "Voice control" the amount of the gain change can be adjusted (1 to 12dB). The voice control can be activated either by a signal from the studio or by a signal from the telephone line. In both cases the signal must be greater than the threshold level for activating the voice control.

The voice control has a very short attack time which implies that the gain will be changed so fast that no part of the conversation will be lost.

However, the release time is infinite which implies that the control will remain activated in the direction from which a signal last was applied, i.e. also even if the signal is not present any more. It will be so, until a signal from the opposite direction will activate the control.

In case signals should arrive from both directions simultaneously, the studio input has first priority, i.e. the signal in the receive direction will be attenuated.

LINEHOLD

The 535-200C contains a current generator in order to maintain the line current flow, when the telephone line is switched from the telephone set to the hybrid.

HIGH VOLTAGE PROTECTION

The 535-200C is high voltage protected according to the CCITT recommendation K17.

OPTION: NOISE GENERATOR.

The 535-200C can be ordered with a noise generator in order to mask crosstalk from the telephone line.

TRANSMITTER SECTION

Input impedance	: 20kOhm +/-10%, balanced floating
Input CMRR at 3kHz	: >65dB
Input level, nominal	: +6dBu
Input level, overload	: +21dBu
Transmit bandwidth	: 3500 Hz (Fig. 1)
Telephone line output impedance	: 600 Ohm +/-10%, balanced floating
Telephone line output level, nominal	: -10dBm
Telephone line output level, max. (limited)	: -7dBm +/-1dB
Distortion at -6dBu input level	: <0.3% THD
Noise (unweighted, 23kHz bandwidth)	: -78dBu
Noise (weighted, CCIR 468-2)	: -68dBu

RECEIVER SECTION

Telephone line input impedance	: 20kOhm +/-10%, balanced floating
Telephone line input CMRR at 3kHz	: >65dB
Telephone line input level, nominal	: -10dBm
Telephone line input level, overload	: +10dBm
Receive bandwidth	: 3800Hz (Fig. 2)
Output impedance	: 165 Ohm +/-10%, balanced floating
Output level, nominal	: +6dBu
Output level, max. (limited)	: +9dBu +/-1dB
Distortion at 1kHz, -10dBm input level	: <0.3% THD
Noise (unweighted, 23kHz bandwidth)	: -66dBu
Noise (weighted, CCIR 468-2)	: -56dBu
Gain	: 0 to 30dB

LIMITERS

Attack time	: typ. 1 msec.
Release time	: typ. 250 msec.

VOICE CONTROL

Attack time	: typ. 3 msec.
Trigger level, transmit	: -20dBu
Trigger level, receive	: -36dBu

SIDETONE ATTENUATION (Note 1)

Measured on a regular non-compensated telephone line	: typ. 20dB

LINE HOLD

DC current	: typ. 50mA
DC voltage accross line	: typ. 5.5V

HIGH VOLTAGE PROTECTION

According to CCITT recommandation K17	: 1500V

GENERAL SPECIFICATION

Supply voltage	: 220V AC +20/-15% (110V available on request)
Current comsumption	: approx. 40mA
Fuse	: 50mA/250V slow blow
Temperature range	: 0 to +45° ambient temperature

MECHANICAL DATA

Connectors	Studio input (audio)	: XLR connector, female
	Studio output (audio)	: XLR connector, male
	Telephone line	: 9 pole D-connector, male
	Mains	: Mains cable with 3 pole plug, "EUROPE" type (with protective ground)

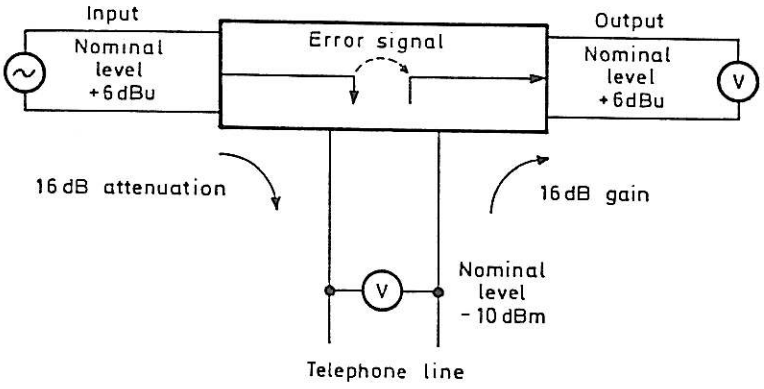
The instrument is housed in a cabinet:

Height	: 47mm
Width	: 195mm
Depth	: 190mm
Weight	: 1.8kg

Note 1:

Definition of sidetone attenuation.
A -10dBm signal at the telephone line terminals can be achieved in two different ways:
a) As a result of a +6dBu signal from the studio input of the hybrid.
b) As a result of a received signal from the telephone line.
The sidetone attenuation is then defined as the difference between the received signal and the error signal from the studio input, measured on the studio output.

The test signal should be a band limited (200 to 3400 Hz) white noise signal.



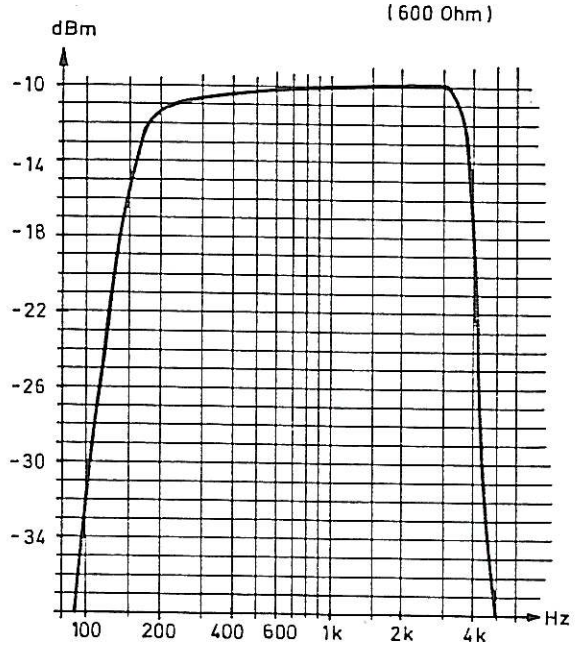


Fig.1 Frequency response; Studio input to telephone line.

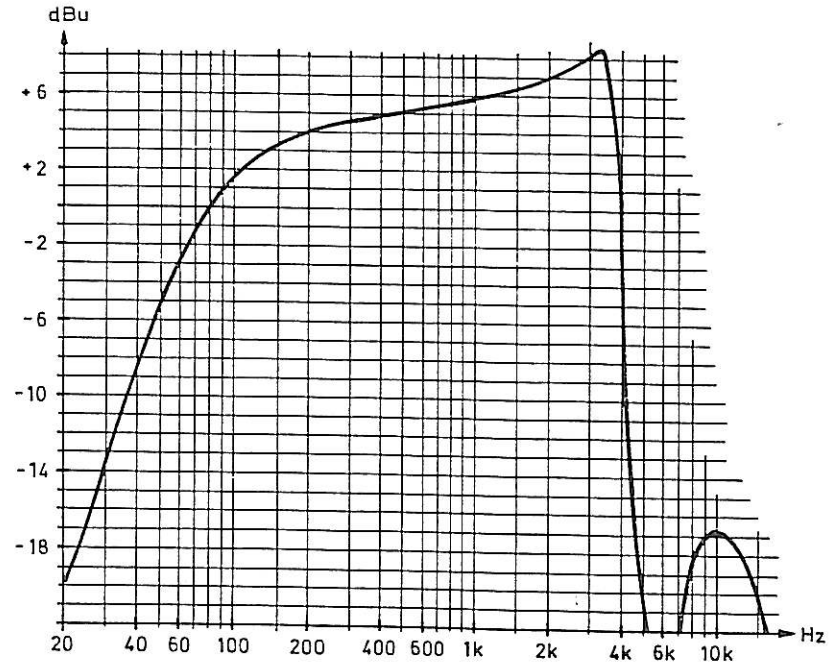


Fig. 2 Frequency response; Telephone line to studio output.

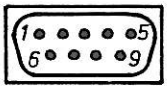
NTP ELEKTRONIK A/S

AUTOMATIC TELEPHONE HYBRID 535-400 CONNECTIONS, REAR OF INSTRUMENT

535-4002-A-4

Telephone

Line

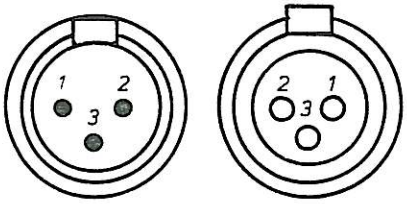


Pin	
1, 2	Telephone set
3	No connection
4, 5	Telephone line, Subscriber
6, 7, 8, 9	No connection

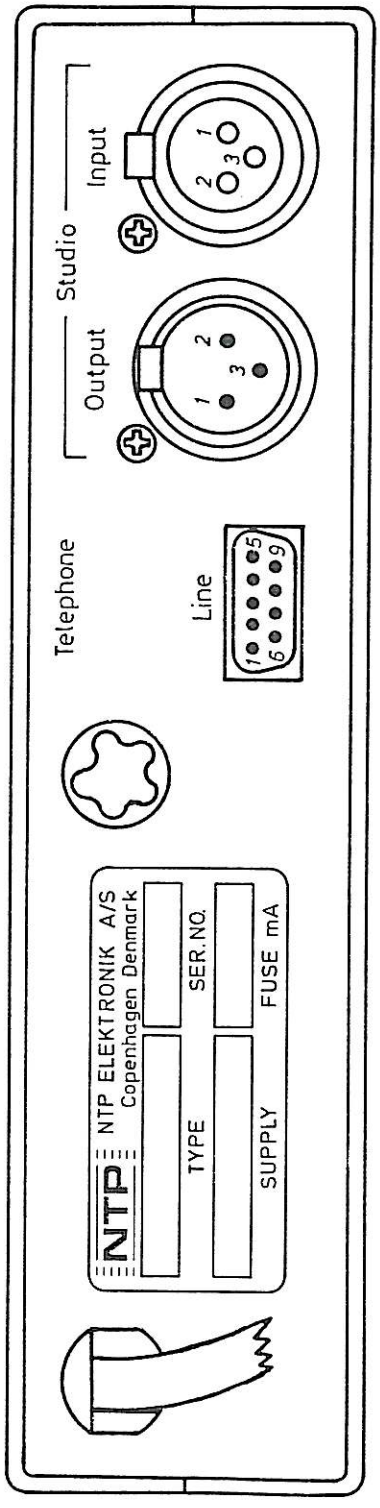
Studio

Output

Input



Pin	
1	Common
2	Signal 0°
3	Signal 180°



ændelser

Målestok	: 1:1
Konstruktør:	
Tegnet	: 17.5.84. LS.
Godkendt	: BS.
Revideret	:

Automatic
Telephone Hybrid
Rearplate Layout

535-400

NTP ELEKTRONIK A/S

535-4008-A-4

NTP ELEKTRONIK A/S

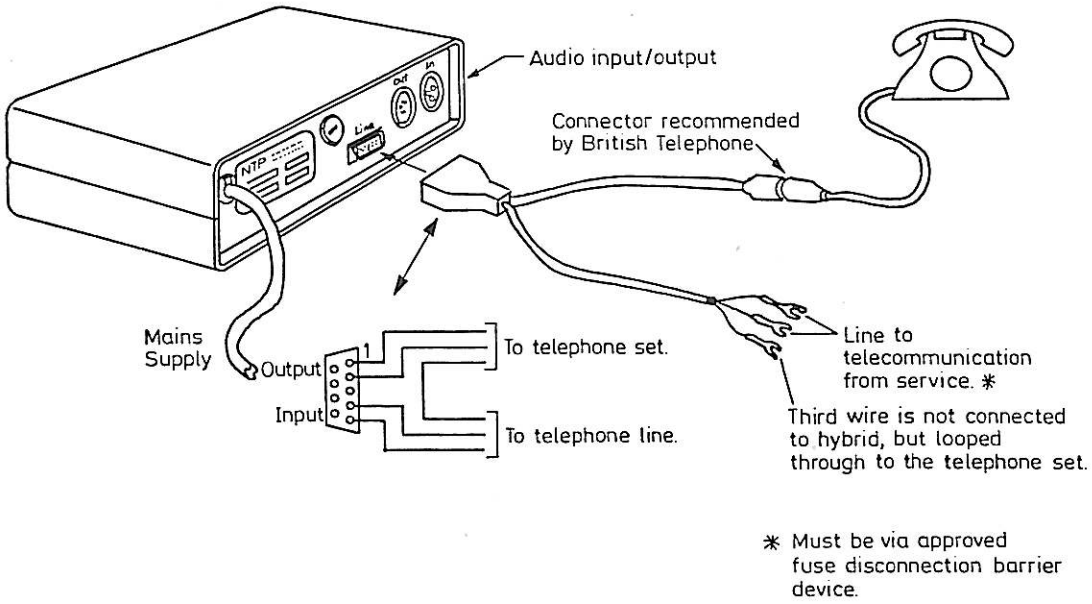
AUTOMATIC TELEPHONE HYBRID 535-400 NOTES CONCERNING USE IN THE UK

535-4005-A-4

The Automatic Telephone Hybrids 535-400 and 535-310 are approved by British Telecom on the following conditions:

1. Connection being by means of an approved plug compatible with a BT Line Jack Unit 610A.

2. Connection of the Automatic Telephone Hybrid to telecommunication services must be via an approved fuse disconnection barrier device.



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