WIRE PROGRAM SERVICES OF THE REICHSPOST

Report prepared by

FIELD INFORMATION AGENCY, TECHNICAL
UNITED STATES GROUP CONTROL COUNCIL FOR GERMANY

BRITISH INTELLIGENCE OBJECTIVES
SUB-COMMITTEE

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BY

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Technical Industrial Intelligence Committee

FIELD INFORMATION AGENCY, TECHNICAL

TABLE OF CONTENTS

Personnel of Investigating Team

J. A. Parrott

TARGETS VISITED AND PERSONS INTERVIEWED

Hamburg - Toll office and three local offices. Interviewed attendants.

Lohbrugge - Toll office. Interviewed attendants.

Luneburg - Toll office. Interviewed attendants.

Minden - Toll office. Interviewed attendants.

Usingen - Repeater Station. Interviewed attendants.

Furstenhagen - Interviewed Adolph Heilman.

Nürnberg - Reichspost Bldg. Interviewed Herr Enzerberger

Munich - Reichspost Direction Bldg. Interviewed Dr. Fuererand Her Mohr.
Toll offices. Interviewed attendants.

CONDITION OF TARGETS

All program equipment seen was in good condition. Very few documents available.

RESUME OF RESULTS

Reichspost employed broadcasting frequencies of about 155,210 and 260 Kc. for wired broadcasting purposes.

Three voice frequency programs were usually modulated at a toll office, mixed and distributed via broad band amplifiers and cable pairs, including the regular subscriber loops, without interferring with their low frequency use for telephone purposes.

Some information was also obtained on voice frequency program switching arrangement and open wire program carrier systems.

WIRED BROADCASTING

Shortly before the war the Reichspost is reported to have initiated a ten-year program to extend their wired broadcast service "to all potential listeners." The reasons given are:

1. The lack of adequate radio broadcasting frequencies to satisfactorily serve many areas even taking into account frequency modulation.

2. The likelihood of jamming from abroad.

It was known that a considerable number of installations had been made before the war. However, during the war the scope of this service increased greatly as it was also used for air raid warnings and to some extent for messages during raids, according to Reichspost engineers. The growth in the large cities in Northern Germany seems to have been much greater than in the south. For example, Hamburg was stated to have served about 30,000 stations, whereas the areas in and around Nürnberg and Munich had under 200. It was observed in the offices visited in the south that few facilities were provided for the service.

While there were some differences in the arrangements seen or described in documents, the facilities appear to basicly the same.

Three modulators with carriers of about 155,210 and 260 Kc. are located in a toll office program room, where up to three voice frequency program channels could be switched to their inputs individually. The outputs of the modulators are mixed through a common broad band amplifier and connected by cable pairs or open wire to subscriber local central office amplifiers or to intermediate amplifiers. The connection to the subscriber line is made at the frame through a small filter. Each line served is also equipped at the station with a filter to separate the telephone and program channels. A switch is furnished for connecting the radio set to either the line or antenna. An attached drawing shows the general way in which radio and wire programs were originated and received.

In selecting the three carriers to be used, consideration is given to the broadcasting frequency allocations in the vicinity. As the broad band amplifiers handle 145 to 300 Kc., any three carriers between 155 and 275 Kc. spaced not closer than 30 Kc. are used.

The broad band amplifier output is given as 8 volts into 150 ohms for the three carriers (presumably unmodulated).

The allowable loss from a broad band amplifier, transmitting programs, to a station is given as about 6.7 N to provide a receiving level of 10 mv across 150 ohms. For 250 Kc. the figure mentioned would permit up to 11 Km. of an 0.8 mm cable pair.

The input levels from the three programs channels were adjusted to be approximately equal at the inputs to the three modulators and also at the terminal amplifiers. The latter have about .4 N of pre-equalization between the highest and lowest carriers to allow for the terminal loop.

The amplifier equipment is capable of transmitting 30 to 10,000 cycles, but the received programs material was not more than 30 to 8,000 cycles and usually less.

An attached photograph shows on the left a modulator and transmitting rack. At the top are the three channel modulators each with a preamplifier, and at the bottom are the regular and spare transmitting amplifiers. On the right is of a terminal and contains five distribution amplifiers all fed from a single preamplifier, shown at the top with spare.

During the war, several expedients were adopted to furnish the service to a greater number of people. The basic plan was to impress an adequately high level on all the cable pairs to ground. This was first done by feeding only one wire to ground of a number of pairs. Following this, the channels were provided individual amplifiers so as to obtain more power per amplifier and avoid the inter-channel modulation which was being experienced when driving three common amplifiers at very high levels.

PROGRAM CHANNELS FOR RADIO BROADCASTING

The following types of toll cable facilities were ordinarily used for program transmission in Germany:

Circuit	Conductors Cu - mm	Loading mH	Loading Spacing Km	Cutoff Cycles
Phantom	.9	12	1.7	9,500
Pair	1.4	17	1.7	9,700
Pair	1.4	12	1.7	11,200

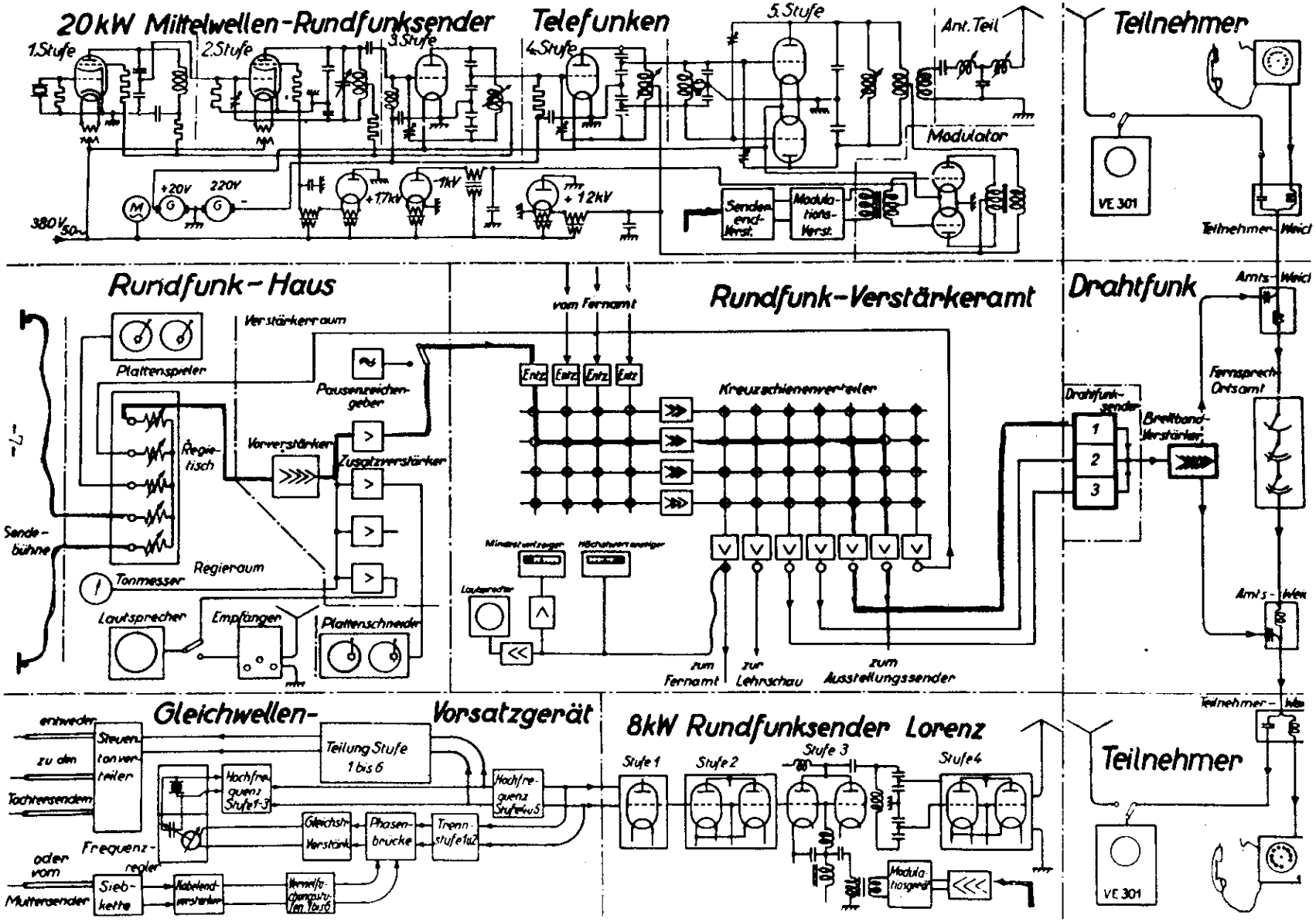
Up to the last few years, the general practice was to have the program circuit under an inner lead sheath or a shield, but more recently some of the cables have contained unshielded pairs. Amplifiers are located at 70 Km intervals and line output levels of + .7 N are usually employed at the transmitting end.

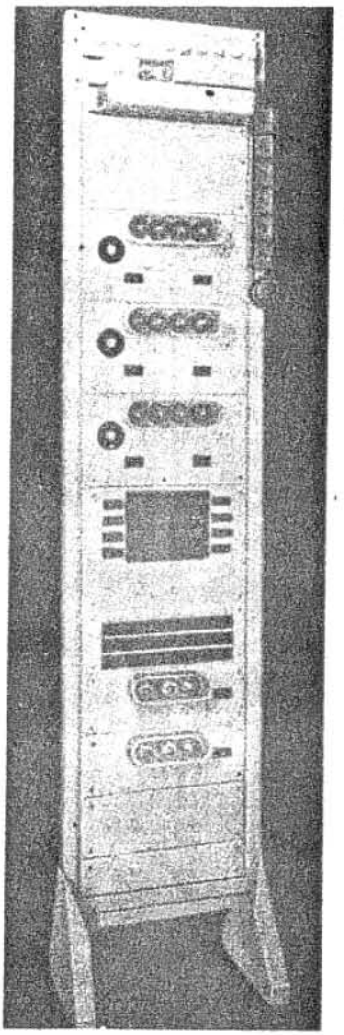
The transmitted band has generally been from 50 to 6400 cycles, but facilities with 30 to 8000 cycles are the new objective and many are understood to have been provided.

The attached photograph showing program amplifier and switching positions is principally of interest in showing the appearance of the coordinate switching and display boards. This eliminates the use of patching cords and prevents, by relays and mechanical locking devices, the switching of more than one program to one channel.

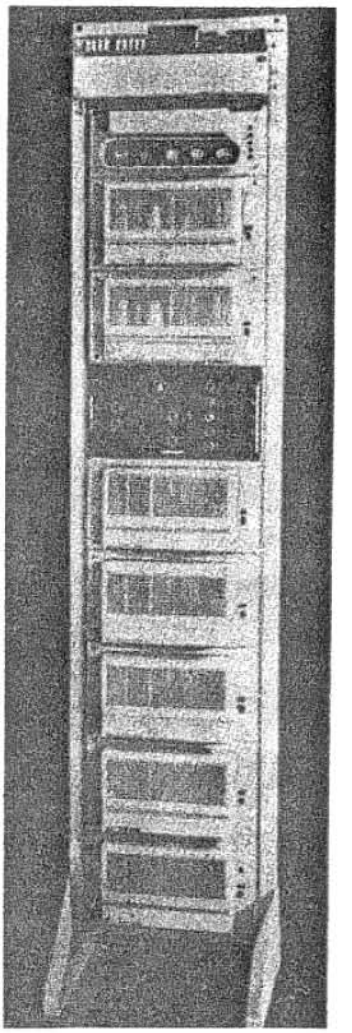
The only other matter of interest which came to attention was the availability of single channel open wire program carrier systems, no applications of which were understood to have been made in Germany although a trial was conducted, according to Herr Enzerberger of the Nürnberg office. These are of two types, the TFR, and TFRZ, simplified diagrams and photographs of which are attached. For the TFR equipment the band transmitted over the line is 34.5 to 42.5 Kc. and provides a program circuit of 30 to 8000 cycles. A pilot frequency of 34 Kc. is also used. The transmitting level is stated to be + 1.9 N and the maximum repeater section loss 6 N.

The TFRZ is a simplified system which was obtainable for any carrier frequency in the range of 60 to 280 Kc. Both sidebands and the carrier are transmitted at a level of about -1.7 N. The maximum line loss is given as 5.5 N.


20 kW Mittelwellen-Rundfunksender Telefunken
1. Stufe
2. Stufe
3. Stufe
4. Stufe
5. Stufe
Ant. Teil
Modulator
380 V 50
+20V
220V
+17kV
-1kV
+12kV
Sender-end-Verst.
Modulations-Verst.
Teilnehmer
VE 301
Teilnehmer-Meldl
Rundfunk-Haus
Verstärkerraum
Plattenspieler
Pausenzeichengeber
Vorverstärker
Zusatzverstärker
Regietisch
Sende-bühne
Regieraum
Tonmesser
Lautsprecher
Empfänger
Plattenschneider
vom Fernamt
Rundfunk-Verstärkeramt
Entz
Kreuzschienenverteiler
Mindestwertzeiger
Höchstwertanzeiger
Lautsprecher
zum Fernamt
zur Lehrschau
zum Ausstellungssender
Drahtfunk
Amts-Meldl
Fernsprech-Ortsamt
Drahtfunk-sender
Breitband-Verstärker
1
2
3
Amts-Meldl
Teilnehmer-Meldl
Gleichwellen-Vorsatzgerät
entweder
Steuer-ton-verteiler
zu den
Tochtersendern
oder vom
Muttersender
Frequenz-regler
Sieb-kette
Kabelend-verstärker
Hochfrequenz Stufe 1-3
Teilung Stufe 1 bis 6
Hochfrequenz Stufe 4 u. 5
Gleichstr. Verstärk.
Phasen-brücke
Trenn-stufe 1 u. 2
Vermittlungsämter 1 bis 6
8 kW Rundfunksender Lorenz
Stufe 1
Stufe 2
Stufe 3
Stufe 4
Modulationsgrad
Teilnehmer
VE 301
Teilnehmer-Meldl



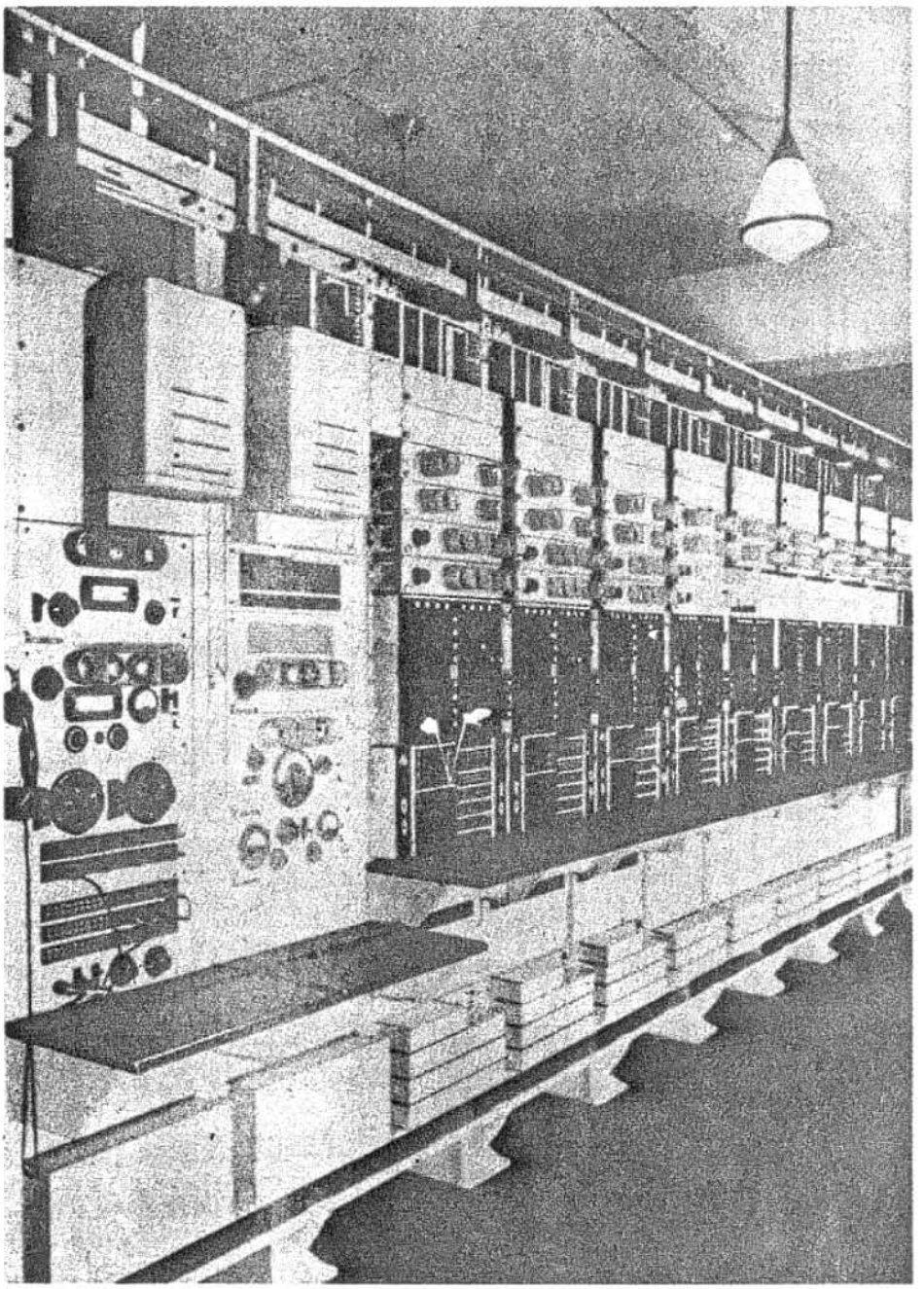
Transmitting
Channel Modulators
and Amplifier



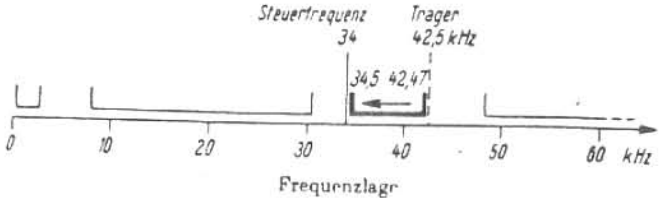
Central Office
Distribution
Amplifiers

PROGRAM POSITIONS

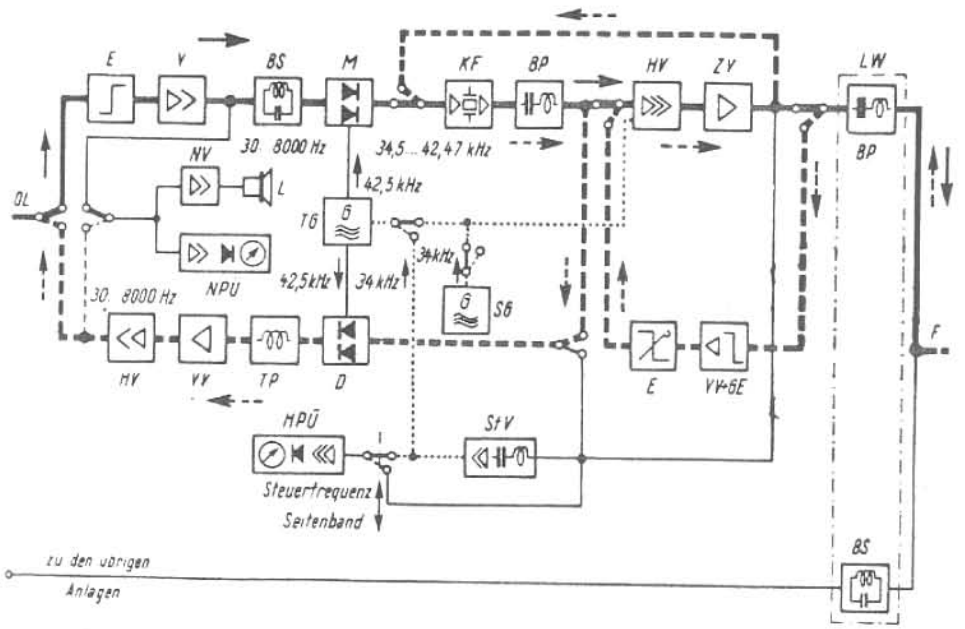
Installation for 8 programs and 36 long program channels.



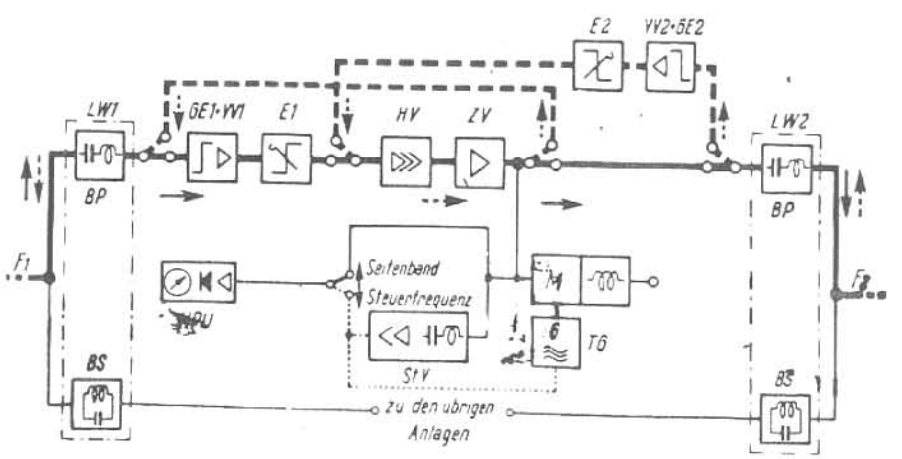
TFR SINGLE CHANNEL OPEN WIRE PROGRAM SYSTEM



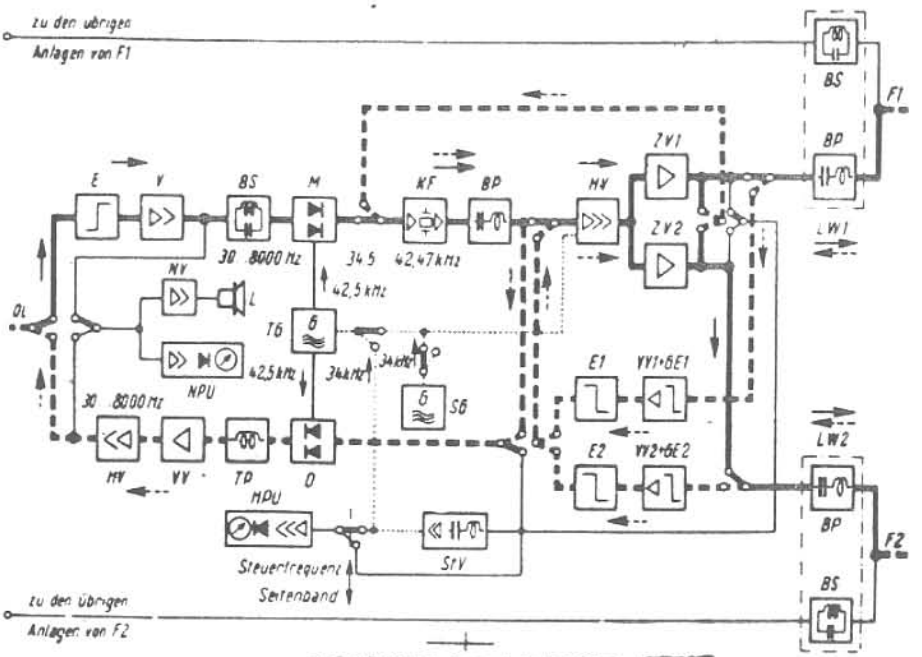
Frequenzlage



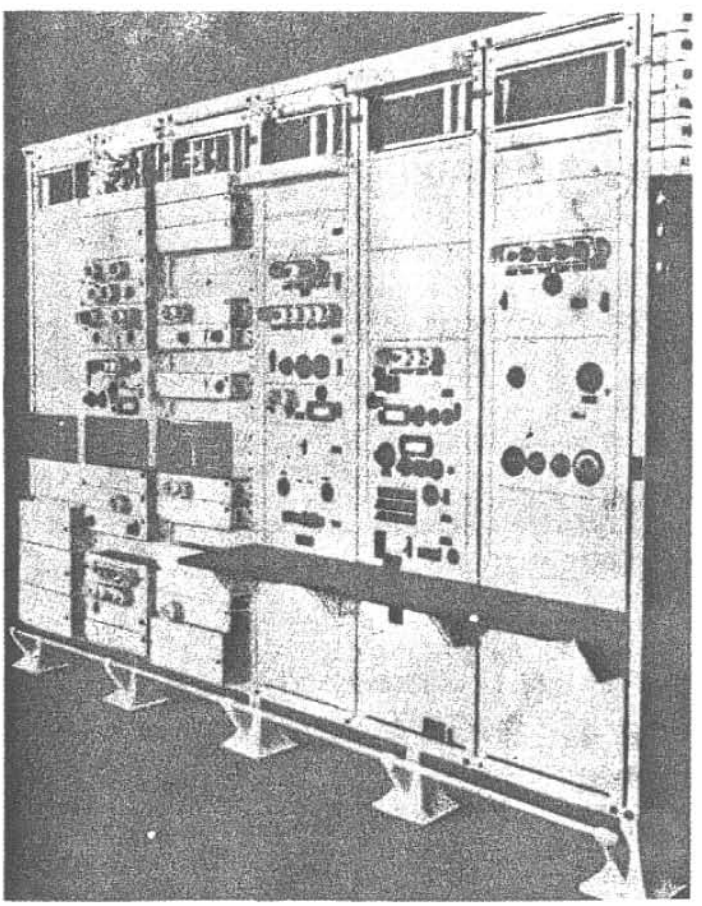
TERMINAL FOR TRANSMITTING OR RECEIVING



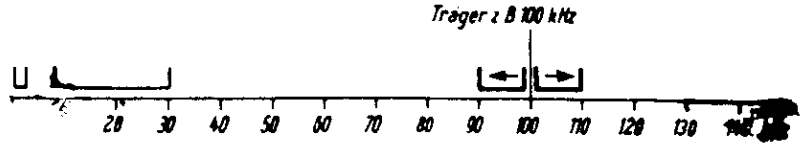
INTERMEDIATE AMPLIFIER



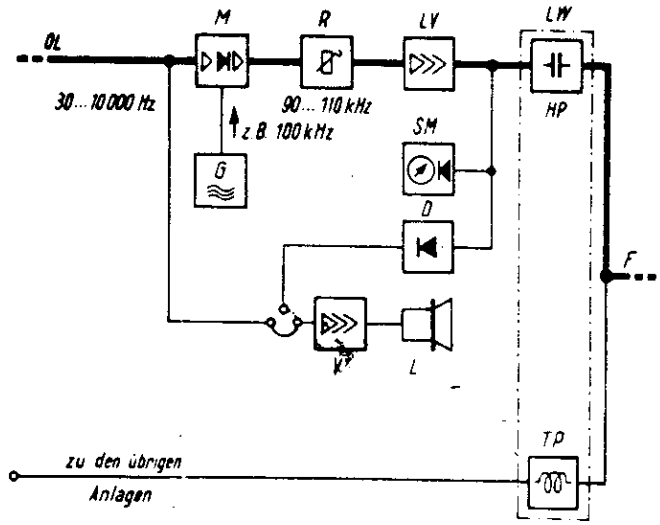
AMPLIFIER WITH BRIDGED OUTPUT



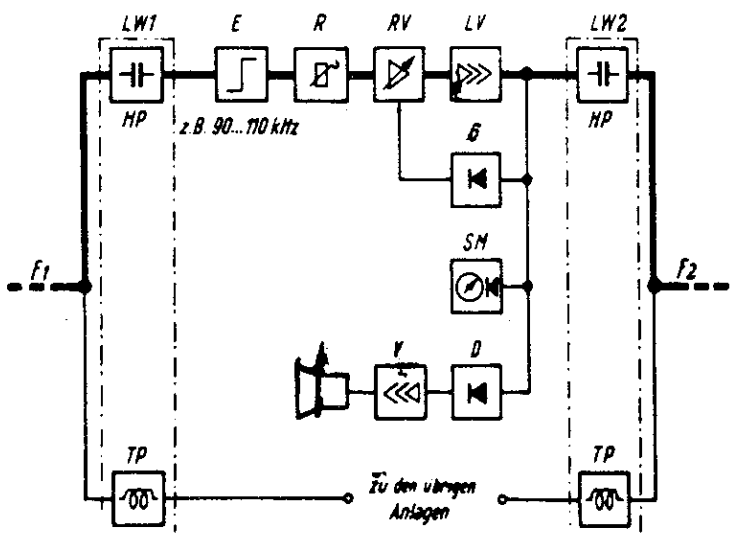
TERMINAL



Frequenzlage



TRANSMITTING TERMINAL



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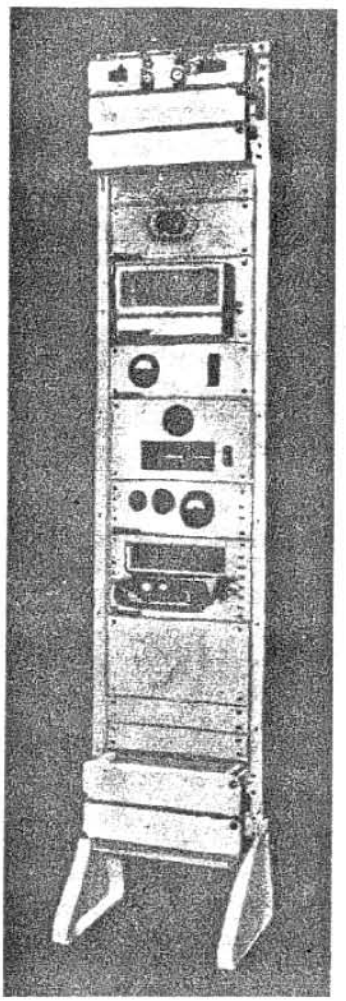

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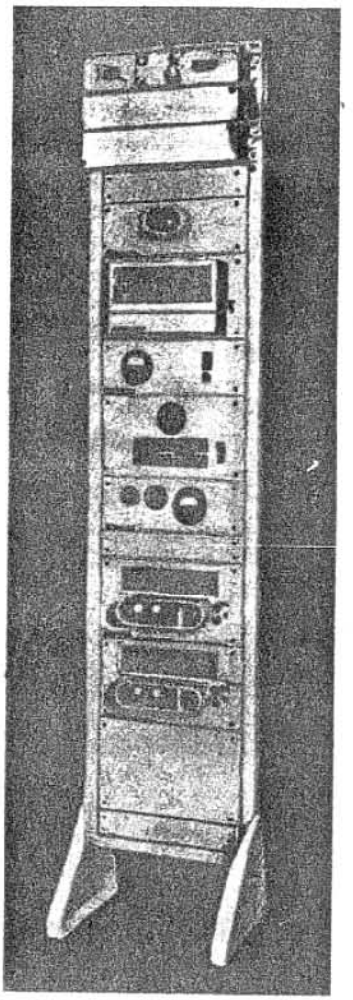

RECEIVING TERMINAL