

INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

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COUNTRY Czechoslovakia

REPORT

SUBJECT Information on Status of Tesla Production Program

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Telephone and Transmission Installations

1. The wire circuit-connected and carrier-frequency telephone technology is a field of endeavor in which the Tesla enterprises are most heavily engaged. The results achieved thus far in technology and quality (especially durability and susceptibility to trouble) are scarcely inferior to those in the West. In contrast to the Yugoslav communications industry, which works almost exclusively with foreign licenses, by far the largest number of Czechoslovak products are based on domestic developments.
2. The export quota in the field of telecommunications installations is very high, and in the current year it has risen to approximately three times the amount of the previous year's exports. First place among the principal purchasers is taken, naturally, by the Soviet Bloc nations, followed by the markets in South America and in the Near East. The chief customer is the USSR, to which semiautomatic communications installations are delivered for the national network. But Czechoslovak communications technology is also beginning to penetrate several West European markets.

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3. For the wire-circuit communications technology, a fully transistorized amplifier mounting, U 2 CZ 54000, was produced, which is employed in loaded, if desired two and four-wire cable communications connections. In all, the mounting contains 12 two-wire and 24 four-wire amplifiers with all the necessary auxiliary equipment.
4. Another newly developed product is very interesting. It is the carrier-frequency communications apparatus for short distances, Tesla KNK 6 (photograph #1), which is provided with transistors and for the most part is finished in printed-circuit technique. With this piece of equipment a distance up to 23 kilometers can be spanned without intermediate amplifiers. A detailed description and technical parametric representation are contained in Attachment I.
5. The Tesla VDM 12 high-frequency telemetering apparatus is now in serial production. It is built for energy-supply installations, to transmit measuring and control information through high-tension circuits within a frequency range of 40-300 kilocycles. Description and data on this apparatus are contained in Attachment II.
6. The Tesla JVT² single-side-band-transmission high-frequency telephone apparatus is likewise intended for interlock-circuit telephony. It also operates in the range from 40-300 kilocycles. Data and description of this apparatus are contained in Attachment III.
7. The "normal" Tesla program for communications equipment is presented in the printed material of Attachment IV.
8. There are no new developments in the teletype sector to be reported. Only the Dalibor 302 tape-type teleprinter, which was constructed in accordance with CCITT norms and which is already widely distributed, underwent several improvements electrically and electromechanically. This piece of equipment works with the 5-unit code and can be employed by all types of enterprises. The following are the most important currently applicable data on this tape-type teleprinter:

Telegraphy speed, normal: 50 band.
 Telegraphy speed, maximum: 400 signals per minute.
 Keyboard: According to CCITT
 Alphabet: International, No. 2.

9. Among pieces of communications equipment in the broader sense are included the duplex, voice-frequency and dispatcher apparatuses, which have received unusually broad distribution in Czechoslovakia. In even the smallest artisan shop, at least one duplex apparatus for communication between workshop and office (or residence) can be found. Consequently the supply of such apparatus on the Czechoslovak market is very extensive and versatile, and the techniques employed, as well as the construction of the individual parts, are very advanced. In large enterprises the dispatcher apparatuses in many cases are connected with equipment for control of operations, for telemetering, and the like. An example of this is given in the dispatcher apparatus for mines which is described in Attachment V.

Construction of Transmitters

10. In the construction of transmitters (and likewise in the commercial receiver technology) Tesla is carrying on its former production program without alterations. In some cases small changes in wiring and/or the modernization of the tube or transistor scheme were carried out.

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11. The III TO 010/005 television frequency-gap (test) oscillator, with 100-watt picture and 50-watt sound capacity for Bands I and II, which is designated as a new product, is only a modification of a type previously available which was expanded to include remote control and fully automatic operation. Band IV/V ultra-high-frequency transmitters are already under development, but in fall 1961 it was not established whether these transmitters would be equipped with (imported) klystrons or with tetrodes manufactured in Czechoslovakia.
12. The currently valid list of transmitters, commercial receivers, and measuring and control panels for sale can be found in the Tesla printed material in Attachment VI.
13. On the Tesla MT 11 mobile radio-range apparatus, the parabolic mirror is now manufactured from a very light plastic of a foamy nature, and the reflecting mirror surfaces are damped with Al metal.
14. As for export activities in transmitter tubes, it could only be learned from Kovo employees that the export figures (especially for ultra-short-wave transmitters) for 1961 were more than twice as large as those for 1960. However the figures themselves were not given.

Radio, Television and Tape-Recording Equipment

15. In radio technology, with the increase in the production of transistors, the transistorized small receiving sets (photography #3 and Attachment VIII) have moved strongly to the fore. The T 61 portable set can be delivered in a model with two short-wave ranges (20-50 meters, 50-75 meters). It is surprising that a transistorized cable receiver, 314-B, is found in the Tesla program. It is also equipped with a medium-wave and two short-wave ranges.
16. The prize radio set of this year's season can be considered to be the model 532 A (photograph #4), with four wave ranges (ultra-short-wave, short-wave, medium-wave and long-wave), 6 tubes and 7 AM/10 FM circuits.
17. The preference for the short-wave sector is striking, and production in this area is being very extensively favored by the Czechoslovak receiver industry. A very strong interest in short-wave reception can be observed even in the listening public in Czechoslovakia. The short-wave range of these sets, which in some cases is divided into two bands, extends (according to the model being used) from approximately 17 meters to approximately 75 meters. As for Stereo equipment, only a single model, the "Stereophonic", with a simple record player, has appeared. For a long time there has been no particular interest in Czechoslovakia in stereo reproduction (with 2-channel NF- amplifier).
18. The production figures for television sets at present are about 350,000 sets per year. In number of types available, the 43-centimeter and 53-centimeter receiving sets are approximately equal, but in fabrication and sales the 43-centimeter sets at present are far out ahead, as they have been in the past. With respect to technical convenience and also automatic tuning, the Czechoslovak television sets are approximately at the level reached last year in the German Federal Republic. The receivers are built according to OIR (Organization Internationale de Radiodiffusion) standards with 12 channels and, for export, according to the CCIR standards with 10 channels. There are no television receivers with ultra-high-frequency parts or prepared for ultra-high-frequency yet in Czechoslovakia, but Tesla has an ultra-high-frequency channel selector under development at present.

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19. Large combination sets, because of the very high price, have no sales prospects. Consequently there is only a single model, the Musikschrank 4307 A, which contains a radio receiver, a 53-centimeter television set and a tape recorder. The electrical and mechanical construction of the radio and television receivers as well as the tape recorders can be described as very strong. Externally the sets make a tasteful impression, and the conventional cabinet forms prevail among the radio and television sets. Brief technical data on the sets can be obtained from Attachment IX.
20. The same pamphlet contains the technical parameters of the tape recorders, in which there is great interest in Czechoslovakia and which are being offered for sale this year in several models. The most interesting of these is the "Start" transistorized double-edged variable-width set (photograph #5) for a tape speed of 4.76 centimeters per second. A 4-sound-track ANP 212 for 9.53 and 4.76 centimeters per second with a good frequency range (50 cycles to 15,000 or 7,000 cycles) went into series production in summer 1961. The "Sonet Duo" tape recorder (photograph #6) was intentionally kept simple in construction and fittings so that it could be offered at as low a price as possible. Attachment X contains a brief description of this new development.
21. For broadcasting use by industrial enterprises, a low-frequency amplifier, type A 2 K (photograph #7), was created, which is manufactured in three models, for 10, 20, and 40 watts. The amplifier has 7 inputs and operates within a frequency range of 40 cycles to 15 kilocycles. Depending upon the model they use, the frequency range can be corrected continuously or up to a certain, fixed frequency limit. Output voltages are 100 and 1.55 volts.
22. A stereo 2-channel low-frequency amplifier with an output of 2 x 2.5 watts, is offered as another innovation. This is intended for playing records at home.

Electronic Measuring Instruments

23. The selection of electronic measuring instruments offered was unusually extensive. However, it is difficult to identify actual innovations in this field, since frequently, with only a small alteration of the measuring range or a minor alteration in the tube set-up, the same instrument is brought on to the market as an "innovation". The photographs assembled in Attachment 11 show such measuring instruments, which were developed in 1960 or 1961 but are now actually in serial production and can be delivered immediately.
24. In electrical and mechanical construction, as well as in quality, there are no differences between the Tesla measuring instruments and the corresponding instruments produced in the West. As compared with 1960, the export of measuring instruments during the past year is said to have increased by approximately 25%.
25. Tesla manufactures a 15-channel magnetic-tape instrument, which was originally developed for the Czechoslovak aircraft-safety service, but more recently several units have been exported. The instrument records 14 information sound tracks and one time trace on a 16-millimeter tape.

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High-Vacuum Technology

26. The Tesla vacuum-technology working group developed a high-vacuum resistance apparatus, the TVN 600 H, for the mass damping of metallic and non-metallic objects whereby universal damping is achieved through a rotary or planetary movement of the objects around the electrodes. This apparatus is shown in photograph #8. Several units have already been sold. A maximum of 3 months for notice of delivery has been mentioned. The most important data on the new damping instrument follows:

Maximum damping surface	1.25 m ²
Container, diameter	60 cm
Container, capacity	300 l
Electrode heating	100 200 400 800 A 32 16 8 4 V
High-tension discharge	10 kV at 150 mA
Diffusion-Vacuum pump TVD 1000	1200 l/s at 10 ⁻⁴ mm Hg
Final vacuum	better than 10 ⁻⁵ mm Hg
Rotation Vacuum pump TVR 25	28 m ³ at 760 mm Hg
Final Vacuum	better than 8.10 ⁻³ mm Hg

Time for evacuation of the empty and clean apparatus: approximately 15 minutes up to 5.10⁻⁵ mm of mercury

Power consumption of the instrument 10 kw
Weight 800 kg

27. Another new development was the TVP 300 vacuum furnace, which is intended for soldering materials which are difficult to solder.

Structural Parts

28. Approximately 95% of all the condensers, resistors and potentiometers used in Czechoslovakia by the low-voltage current, communications and electronics industries come from the Tesla component parts factory in Lanskrout.
29. The production program of the factory is contained in the general catalogue in Attachment XI. A supplement (Attachment XII) appeared in 1961. The latest component parts developments are described in the "technical reports" of Attachment XIII.
30. Construction, calibration, tolerance ratings and conditions of testing of all component parts are in accordance with international agreements. The products from Lanskrout are regarded by the industry as reliable and in accordance with tolerances. All normal types in the normal price-ranges can be delivered at once, even in large amounts, from the distributing warehouses.
31. Development in the component parts field is moving in the direction of miniaturization and sub-miniaturization. Indeed, in contrast to last year, unquestionably quite remarkable progress has been achieved in this field, but Tesla is still quite a distance behind the smallest measurements achieved in the Western countries especially if higher dielectric strength and larger loads are required of the very small component parts.

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32. A short summary of what has been achieved in the field of miniature parts is provided on page one of Attachment XIV. As for other parts, development is running its normal course. Quality and technical parameters are no better and no worse than those of the Western products.
33. What is still missing, however, are electronic elements for the assembling of regulating and control instruments. The development and manufacture of such structural elements are to begin as soon as the required large number of transistors are made available to the industry. This point can be expected to be reached approximately in the summer or fall of next year. Then they will finally get to work on the development of elements for digital measuring, controlling and regulating technology.
34. The following is a translation of the explanatory material accompanying the various photographs mentioned in this report.

Photograph #1

Tesla KNK 6 Carrier-frequency telephone installation for short distances. The following are the most important data concerning the KNK 6 installation: Low-frequency frequency band: 300-3400 cycles. Low-frequency output level of the 4-wire circuit; minus 0.4 power factor (or minus 1.5 power factor without low-frequency connection). Permissible tolerance of distortion of amplitude less than 0.4 of the CCITT limiting value. Single frequency for the transmission of the selection of rate impulses (even during conversation): 3850 cycles. Relayed television channels: 6. Operation on the low-frequency side: 2-wire operation. Bridgeable damping between two stations: 6.25 power factor. Bridgeable damping between two intermediate repeaters: 6.25 power factor.

Number of amplifiers long-distance-energized from one station: 3.
Long-distance-energizing voltage: 60 volts. Long-distance-energizing current: 20 milliamperes. Energizing of the terminal system: 220 volts plus or minus 3 percent. Power consumption of the output cabinet (with four 6-channel groups busy): 75 watts.

Photograph #3

Tesla Portable Transistor Receiver

Top: Handbag Receiver T 58 A, a medium-wave 6-circuit set with 10 transistors. Low-frequency capacity 150 Milliwatts, 6-volt operation.

Middle: Pocket Receiver T 60 A, a medium-wave 5-circuit set with 7 transistors and 70 milliwatt capacity, 6-volt operation.

Bottom: Portable Receiver for 2 x short-wave and medium-wave, 6+4-circuit wiring, 9 transistors, 9-volt operation.

Photograph #4

Tesla Prize Receiver 532 A. Ultra-short-wave, short-wave, medium-wave and long-wave ranges. Six tubes, 6+1-AM-/10-FM-circuits, 7 selector keys (+ 4 sound keys), Ferrite antenna, terminals for external loud-speaker, record player and tape recorder.

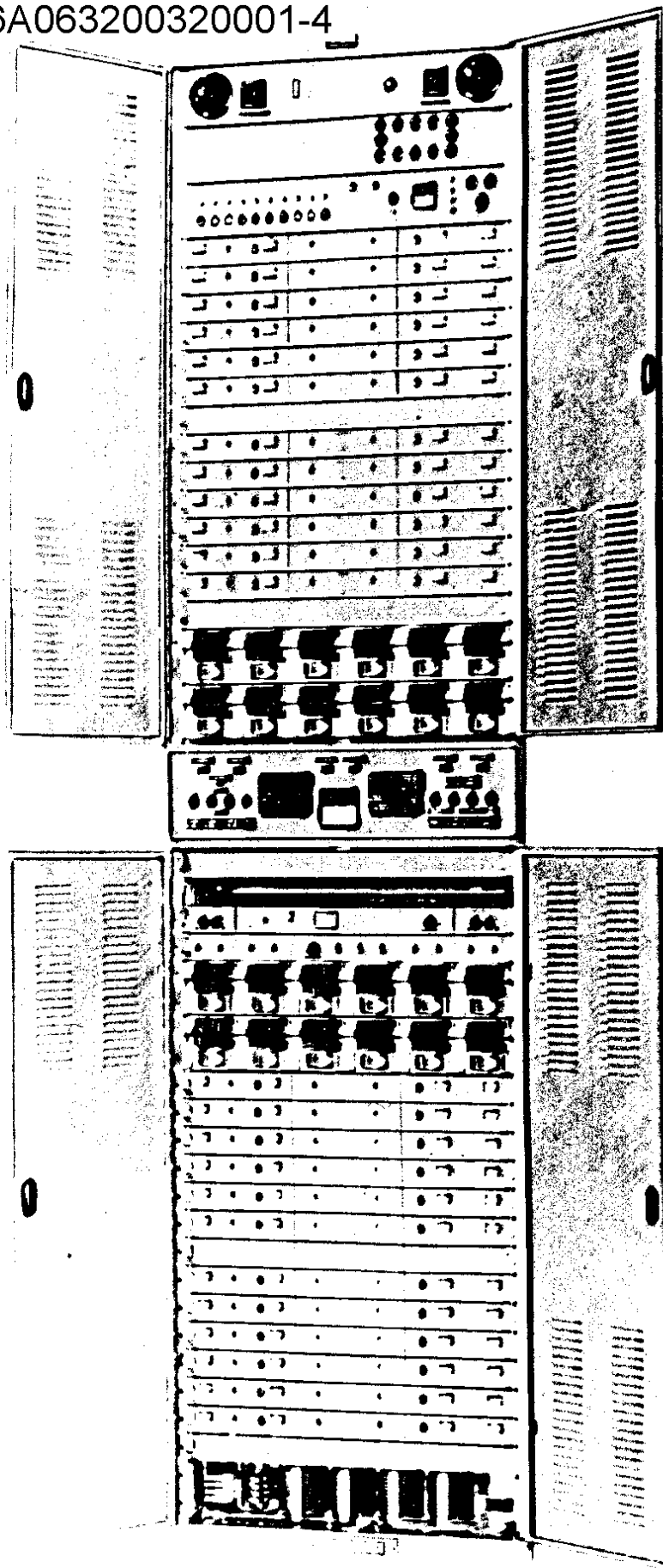
Photograph #5

Transistor Tape Recorder "Start" (Tesla). Double-edge variable-width sound track for 4.76 centimeter per second tape speed. Six transistors, 9-volt battery voltage. With a network adaptor use of the 220-volt main electric power supply is possible.

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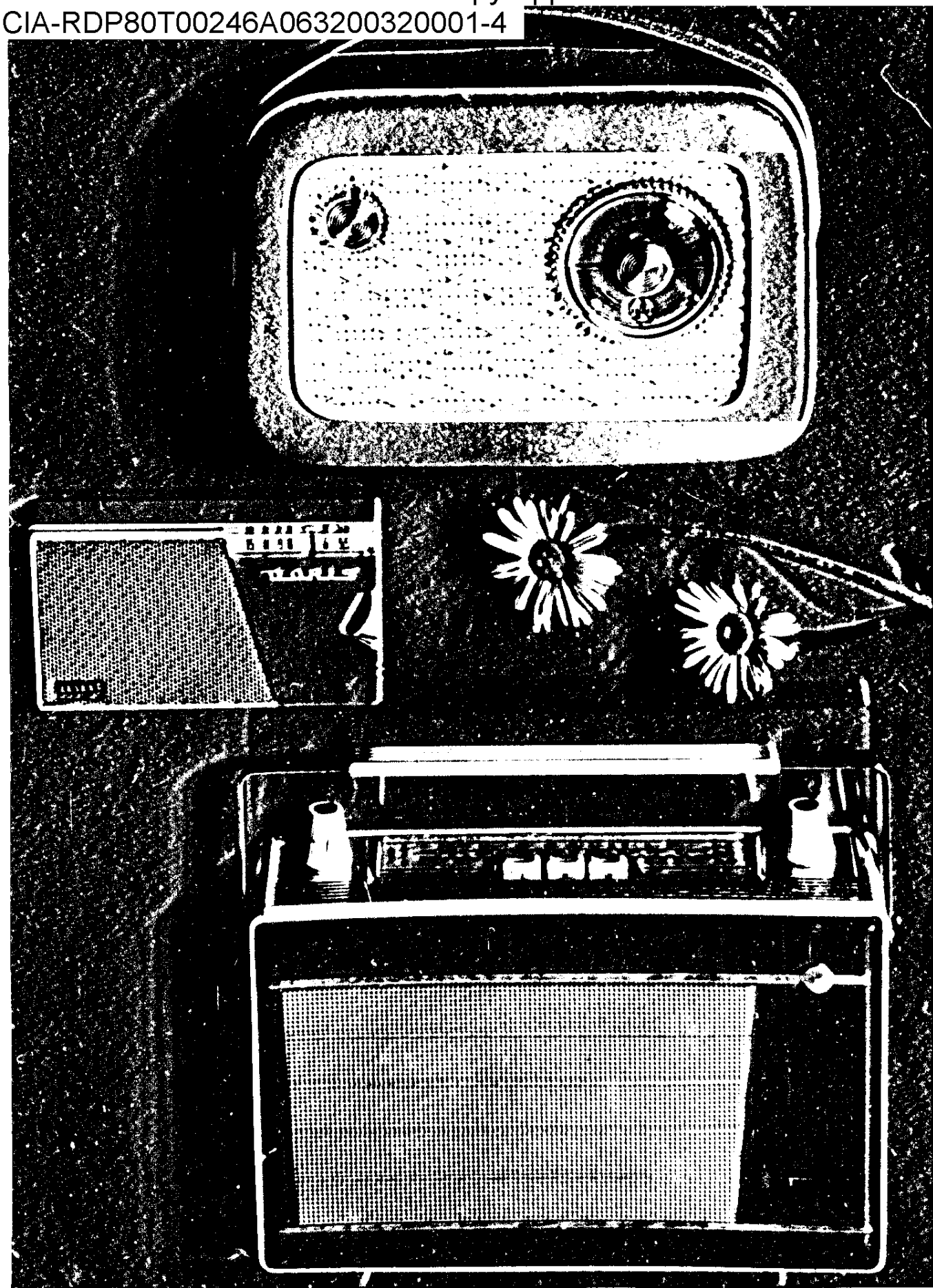
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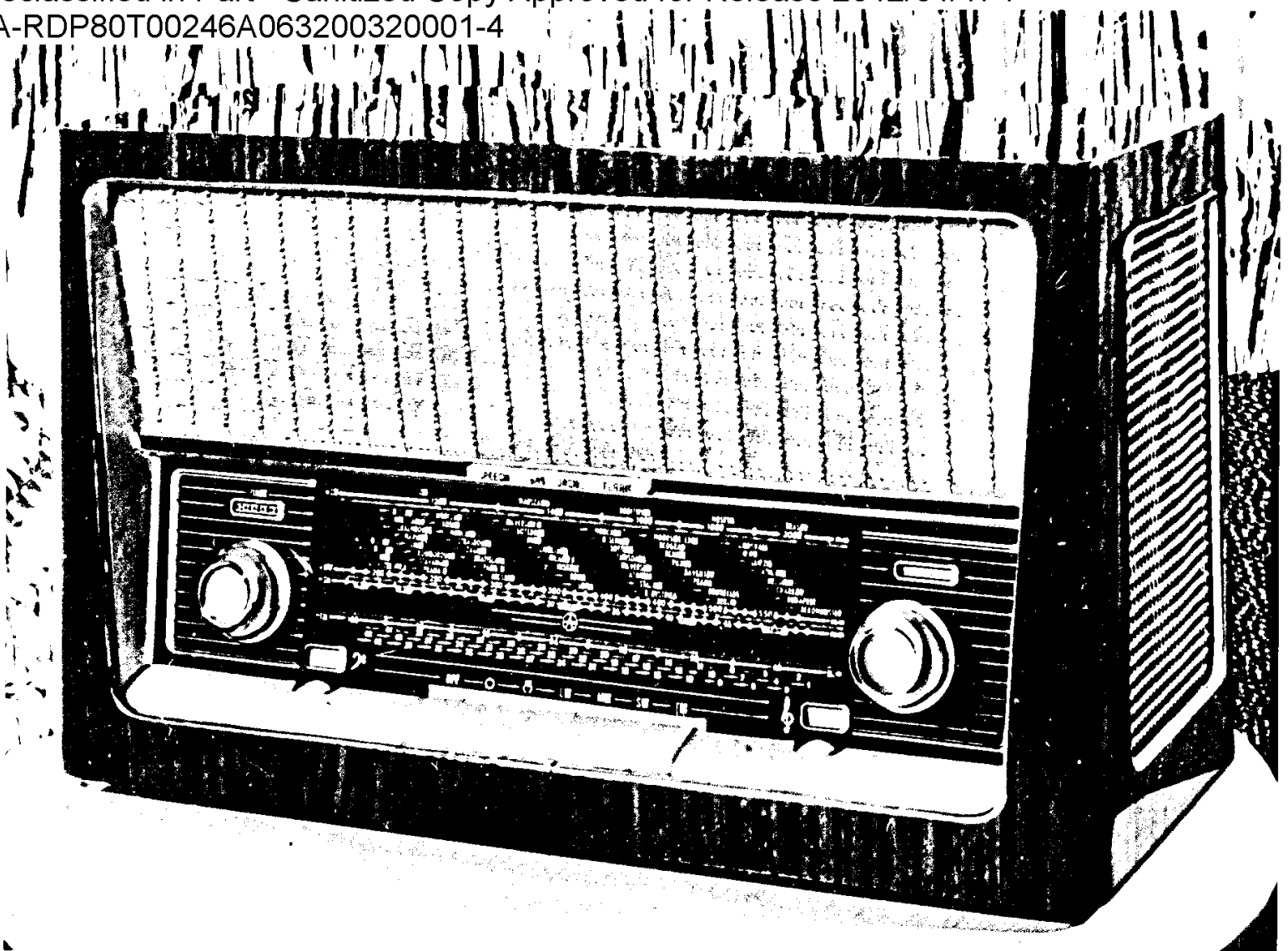
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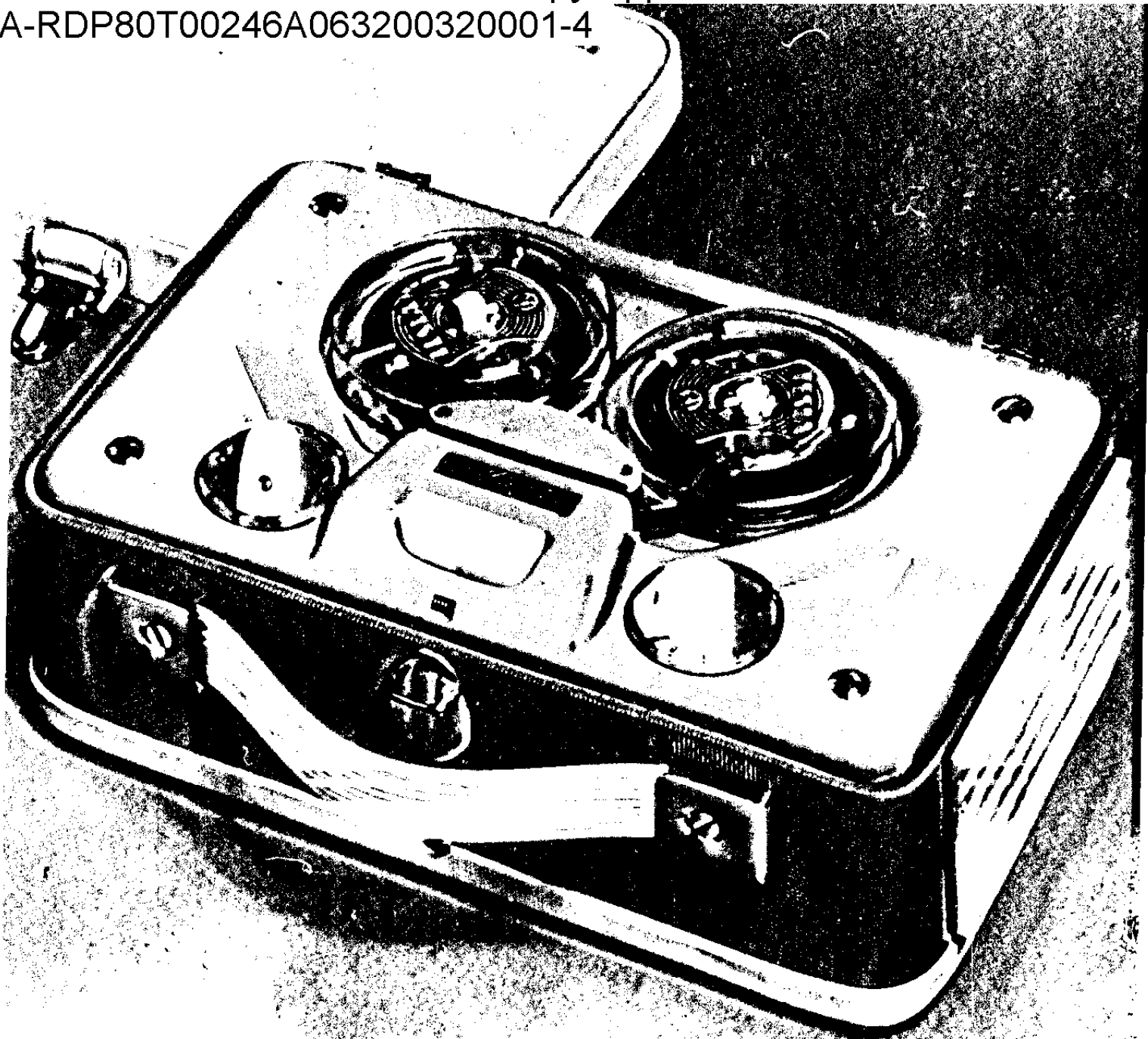
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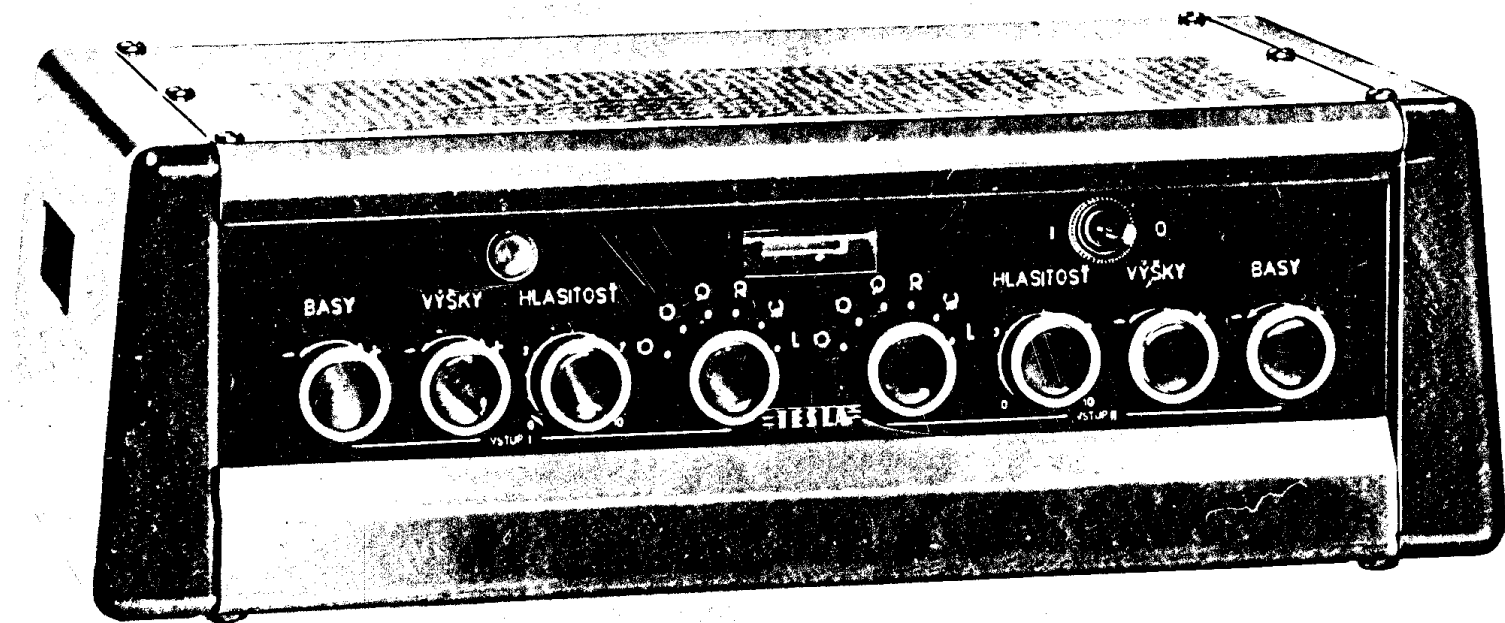
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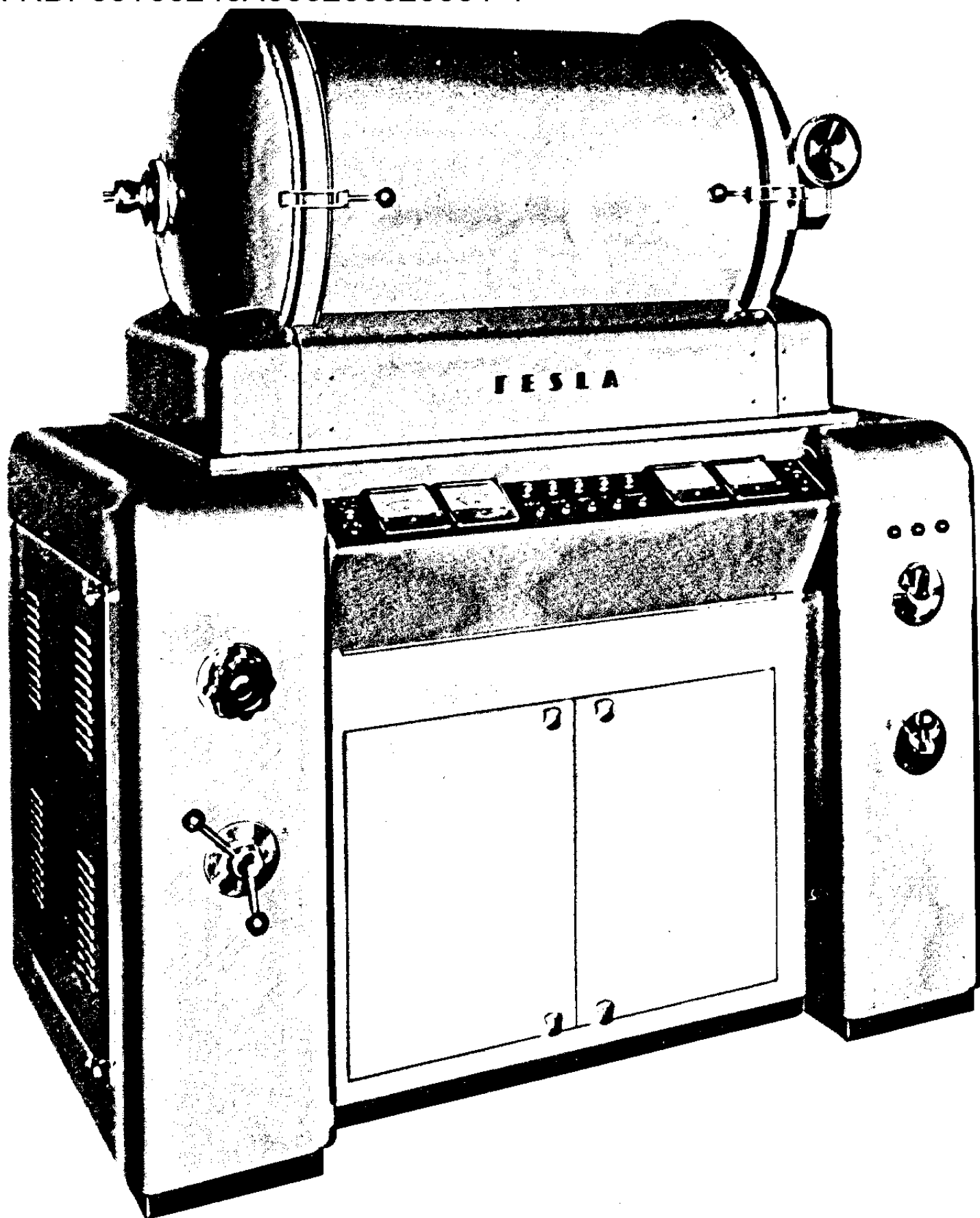
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