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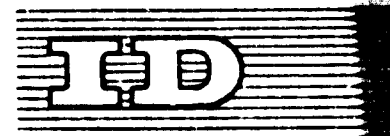
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Development Meeting on the Manufacture
of Telecommunications Equipment
(including low-cost receivers for sound
broadcasting and television)

Vienna, 13 - 24 October 1969

THE STAGE OF MANUFACTURE OF TELECOMMUNICATION
EQUIPMENT IN INDIA ^{1/}

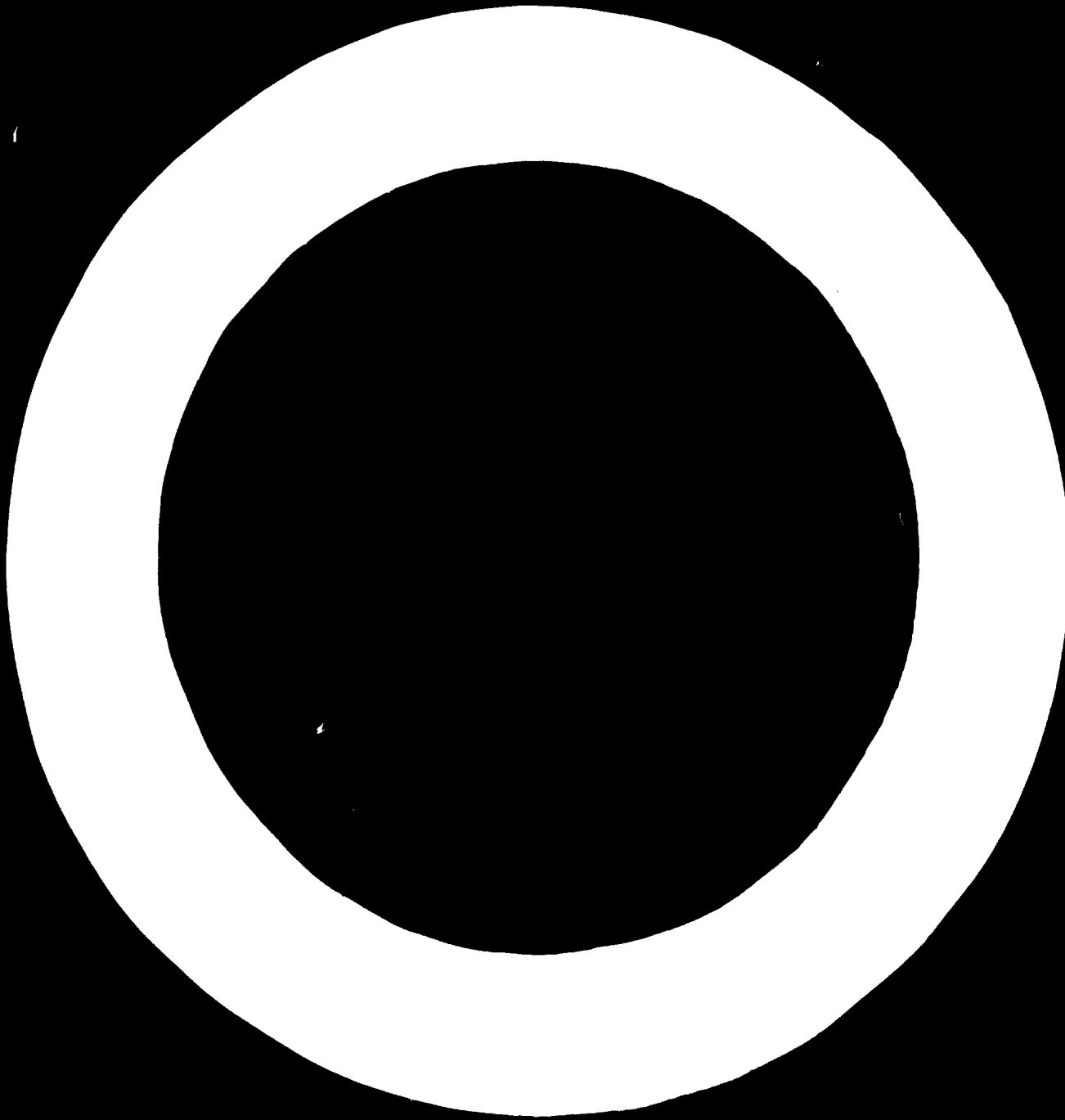
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1. INTRODUCTION

1.1.1. The Committee has been reviewing the progress made in 1957 in the setting up of the JCS system. The Committee has also reviewed the progress of the work under the plan for the development of the JCS system. The Committee's findings are set out in the following paragraphs.

- (a) to assess the progress made in the development of the JCS system;
- (b) to assess the progress made in the development of the JCS system;
- (c) to recommend ways in which the JCS system could be improved.

1.1.2. The Committee has also reviewed the progress made in the development of the JCS system. This report gives details of the progress made in the development of the JCS system. The Committee has also reviewed the progress made in the development of the JCS system. The Committee's findings are set out in the following paragraphs.

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1.2.4. The assessment in the Public Committee report does not include specific communication equipment, like telephone, telephone switching equipment etc. and also items like cable, bulk long distance and local, and teleprinters.

1.2.5. The assessment also does not include production that would be developed primarily for export. For example, equipment, instruments etc.

1.3. Specific matters: The table which summarizes the production trends, the turnover recorded in 1972 as well as the estimated investment is given in Annexure III. Specific call for manufacture of basic and raw materials and substitution of indigenous available raw materials, for the manufacture of components etc. have been envisaged.

1.4. Programme for production is being taken towards the implementation of the recommendations of the Public Committee so that self-sufficiency is achieved in the foreseeable future.

2. Agency/Agencies in charge of matters concerning electronics.

2.1 Administrative efforts made by the Government.

2.1.1. In India the Electronic activities are handled both by the Government and the private enterprise. The Government runs the telephone and telegraph services and the Government Communication Service. The entire telecommunication equipment including switching equipment, telecommunication apparatus, signalling equipment, microwave equipment and cable, both local and long distance as well as teleprinters are made in factories owned by Government. Most of the electronic equipment required for the strategic needs are also made in Government owned factories.

2.1.2. The Government plans the development of the electronics industry in the country and regulates the industrial licensing for the manufacture of all electronic items.

2.1.3. One of the important measures undertaken by Government recently was to invite manufacturers to submit proposals for establishing additional capacity for the manufacture of the L.T.L quantities of components as would be required by 1973, which would be of the order of 2500 crores, i.e. 25 billion, per annum. The response has been excellent and this target is expected to be fully reached.

2.2 Civil and Industrial sector:

2.2.1. Private industry is primarily engaged in the manufacture of electronic components, radio, television set and testing instruments. The private factories manufacture all types of components and some of the manufacturing units are manufacturing these components on the basis of the technical know-how obtained from manufacturers in foreign countries. A number of manufacturers all over the world in Europe, America and Japan have collaboration arrangements with Indian manufacturers.

2.2.2. The manufacturing units have founded associations for promoting the development of the industry. Some of the important associations are the Radio and Television Manufacturers Association, Electronic Components Industries Association, the All India Radio Merchants Association, Federation of Small Scale Industries Association etc. Amongst the professional institutions concerned with electronics are the Institution of Telecommunication Engineers, Institution of Electronics and Radio Engineers etc.

2.3 Research and Development: Research and Development organizations active in the field of electronics in India can be broadly categorized under four major heads -

(i) National Laboratories like -

National Physical Laboratory, Central Electronic Engineering Research Institute, All India Institute of Instrumentation, Central Electro-Scientific Research Institute, etc.

(ii) Laboratories connected with user departments like -

Telecommunication Research Centre of the Department of Posts, Research Department of the Ministry of Defence, Central Electronics Directorate, etc. Reports giving brief details of activities of these laboratories in the field of electronics are available in the annual reports of the respective departments.

(iii) Laboratories connected with Government sponsored institutions such as -

India Institute of Science, Institute of Technology of Electronics, Central Research Laboratory and Indian Institute of Technology.

(iv) Laboratories with industry such as -

Research and Development Section of the Post Electronic, Indian Telephone Industries and several other units of the other Government engineering organizations.

2.4 Developmental trends:

2.4.1 The National Laboratories are carrying out applied research in the area of Electronics and with short range and long range applications. Some of the fields are instrumentation, electronic controlled devices, computer electronics such as television receivers. Specialized equipment being developed are microwave components, microwave tubes, silicon devices and integrated circuits.

2.4.2 Laboratories attached with user departments are engaged in developing a number of types of equipments. The specialized equipment such as communication equipment for land lines including earth cables, microwave radio relay lines, digital transmission systems, electronic exchanges and test equipments for aerial communication equipments, surveillance and tracking studies. Electronic Division of the Defence Research Organisation has developed electronic instruments for missile guidance, battlefield radar and reactor control etc.

2.4.3 Government institutions have concentrated on fundamental studies in areas such as propagation of electro-magnetic waves, dielectric and plasma columns and superconducting lines, solid state devices, switching transistors, optical surface laser, studies of surface plasmon and radio wave propagation, atmospheric noise, generation of millimeter waves. Research on being set up in servo control systems in number of institutions. Research on computer is being conducted in All India Institute of Fundamental Research, Jadavpur University and Indian Statistical Institute.

2.4.4 Research in industry has been oriented towards improvement in the quality of the products, higher productivity and reduction in cost.

2.5.1.1 Telegraph Service. There are about 3.5 million telegraph lines and linking up 100% eventually will go in India for telegraph service. For setting up the telegraph transmission, we are developing automatic switching (ATS) and we are now working on automatic switching (ATS) centres.

2.5.1.2 Telegraph Service. We had our first telegraph exchange in 1973, and we are now working on developing a telegraph exchange at New Delhi, and we have also started working on a wide area network and there is a plan to set up a wide area network. In fact, we have 25 exchanges which are called as central exchanges. The number of exchanges will be increased to 50 which are called as central to 14.14 telegraph lines in 1973.

2.5.2 Very High Frequency

2.5.2.1 India is directly connected to 31 countries by VHF telegraph channel, 3 cables telegraph channel, 11 cables telegraph channel and 11 radio circuits. Through the cable, we are connected to all the countries over the world.

2.5.2.2 We have a direct link with all the countries through the Indian cable satellite. The link will be established during 1978.

2.5.2.3 The special interest is that we have a direct link with all the countries through which we are connected to all the countries in a satellite technology.

2.5.3 Television

2.5.3.1 About 1000 television sets are being produced in India as follows:-

- (a) 1000 white sets
- (b) 1000 black sets
- (c) 1000 colour sets
- (d) 1000 sets for export
- (e) 1000 sets for export
- (f) 1000 sets for export

2.5.3.2 The number of television sets being produced in India is nearly 7 million by 1973. The number of television sets being produced in India is nearly 7 million by 1973. The number of television sets being produced in India is nearly 7 million by 1973.

2.5.3.3 India is now producing 1000 television sets in India. Television sets are being produced in India. The number of television sets being produced in India is nearly 7 million by 1973.

2.5.4 Industrial Electronics. The number of television sets being produced in India is nearly 7 million by 1973. The number of television sets being produced in India is nearly 7 million by 1973. The number of television sets being produced in India is nearly 7 million by 1973.

2.5.5 Radio-electronics: Radio-electronics is playing an important role in the development of India. With the growth of programme, the quantity of radio-electronics and quantity of radio-electronics is increasing, it is expected to increase rapidly in the coming years.

2.5.6 Other radio-electronics:

2.5.6.1 General: Also include those who work on modernization, improvement and development of radio-electronics. The quantity of production is increasing. But the production of radio-electronics is still very low. The quantity of production is still very low. The quantity of production is still very low. The quantity of production is still very low.

2.5.6.2 Radio-telephony: Radio-telephony is the main part of the communication system. The quantity of production is increasing. The quantity of production is increasing. The quantity of production is increasing. The quantity of production is increasing.

2.6 Current situation and growth of Electronic Industries:

The growth and development of electronic industries are recorded by the committee headed by the late Mr. B. K. Chatterjee. The actual position regarding the different categories of electronic industries is summarized below:

2.6.1 Electronic components: The manufacture of electronic components is included amongst the light engineering industries of the Government. The present capacity being licensed is about Rs. 100 crores. The Government is being made to set up additional capacity for the manufacture of electronic components to keep in with the present and future demand. With the expansion envisaged the annual production of electronic components will increase to about Rs. 150 crores (1971) or 1971. Production is expected to be Rs. 100 crores (1971) or 1971.

2.6.2 Entertainment Equipment: It is being continued, the present production of 3 million broadcast receivers is being worked up to 7 million receivers in the next few years. The 3 million radio receivers of current production 2,5 million radio receivers, 1,5 million valve type receivers. The number of channels produced is about 7% of the total production of 3 million receiver production. A receiver industry has been set up with indigenous know-how and it will start with the production of 10,000 receivers this year, rising to 2,500 receivers next year. In addition, India is producing public address system, recorders, hearing aids and other receivers.

2.6.3 Professional Electronic Equipment: The production of electronic equipment industry is still in the early stages and is mainly catering to communication needs. Most electronic equipment is imported component like transistors, resistors, etc. A large variety of radio communication equipment. The main industrial equipment for civil communication is the Indian telephone industry which produce a variety of equipment like automatic switching equipment, carrier telephony, etc. carrier telephony, central cable system, etc. The production of electronic instruments etc. The total production is of the order of Rs. 20 crores. Teleprinters are being manufactured by Hindustan Teleprinter. The present production is 3,000 teleprinters per year which is being increased to 1,700 machines in the course of the next few years.

2.6.1 Guidelines: Guidelines for development of the electronic industry have been given for clarity in the schedule. It is suggested that the Government is actively engaged in implementing this plan and the projects suggested therein. Due emphasis should be given to all the factors which are likely to influence the industry viz. price, technology, education, etc.

2.6.5 Foreign Investment: Foreign investment is encouraged in the form of joint venture in the field of electronic, electrical and telecommunication equipment, electronic components, electronic instruments and test equipment, etc. Joint venture is not precluded in other electronic industries also. The Government should allow maximum freedom in the field of joint venture which may be accepted as a joint venture in the field of electronic components and telecommunication equipment and test equipment, etc. Existing foreign companies should be encouraged to set up joint ventures in India and to gradually bring down their cost of production wherever they produce a large quantity of electronic equipment. They should be allowed to manufacture new items. There is no restriction on the foreign exchange requirements of U.S.A. and other countries in the field of investment.

2.6.6 Foreign Buy-back: Foreign buy-back is allowed in the field of electronic equipment, including components, test instruments, equipment, etc. except the part which is of electronic and telecommunication. The foreign buy-back should be at least 20% of the value of the equipment. Technical assistance should be provided in such cases. The technical assistance should be subject to the terms and conditions of the Government. The general guideline for foreign buy-back is 5% of the value of the equipment and the date of shipment whichever is earlier. The export credit should be given. There are general guidelines but depending on the nature of the equipment, the realistic cost should be involved, the world market price should be higher etc., and so on. The Government should consider the possibility of foreign buy-back in the field of electronic equipment and test equipment. The foreign buy-back should be at least 20% of the value of the equipment. The percentage is slightly reduced in such cases. Foreign companies which are wanted to invest should be given slightly lower rate of interest. There are terms and conditions which should be followed by foreign companies which are to share their know-how.

2.7 Growth, Education and Training

2.7.1 Under the constitution, technical education is the responsibility of the state Government. The Government should provide for the maintenance of four central Universities of technical institutions of all India level.

2.7.2 The Government should be responsible for being guided to train the technical personnel required for the field of electronic equipment. The number of facilities for degree courses in the field of electronic equipment are provided by organization of selected colleges of institutions. The Government should be laid on a part-time course in these courses.

2.7.3 The enrolment target for the third Plan was 25,000 for the Degree Courses and 5,000 for the Diploma courses. To meet this target, 121 Degree Institutions and 271 Institutions of Diploma level had been started. This includes Girls Polytechnic. Considerable expansion is expected during the fourth Five Year Plan. In 1961-62, 1,30,000 students were admitted in the degree level and 55,000 at the diploma level.

2.7.4 By the end of 1961, 15 centres had been started for post graduate education and research in technical education.

3. International Co-operation carried out by the Government

3.1 India has been actively participating in the conference of International Telecommunication Union (ITU), International Consultative Committee on Telegraphy, and the International Conference on Telecommunication. We have also been participating actively in the electronics and telecommunication conference of the IRE, IREX and the electronics instrumentation unit of the International Scientific Group Commission. India is a member of the International Electrotechnical Union.

3.2 There is useful exchange of specialists in the fields of electronics and telecommunication between India and other countries especially in Africa and Asia. More such scientists are also being exchanged between India and the advanced countries. India is also participating in the UNCTAD Plan, UNCTAD Development Plan and other bilateral arrangements. The facilities at the experimental Satellite Communication Station at Madras is available to the trainees of the countries in this region.

FIGURE 11

Equipment Inventory
by Category
(in thousands of dollars)

Figure 11 shows (continued, 1950-1951)

Equipment Item	1950	1951	1950	1951
1. Radio, television, and computer equipment	14.7	17	21.7	20.0
2. Low power electronic equipment	2.7	3.1	1.0	2.0
3. Servo, control and test equipment	1.7	2.0	5.7	2.0
4. High power electronic equipment and other industrial equipment	1.0	2.0	5.0	2.0
5. Electronic test equipment	3.0	1.0	2.0	12.0
6. Test, control, and other equipment	1.0	1.0	3.0	1.0
7. Test equipment	1.0	3.0	7.0	3.0
Total	27.8	39.1	65.1	47.0

ANNEXURE I

Telecommunication Centre of P. W. D. and Telegraphs

Telecommunication Centre is one of the units of the P. W. D. and Telegraphs Department and is entrusted with equipment for use in the country. The development work done in the P. W. D. has been utilized extensively for developing and designing the communication equipment for the second and the third five Year Plans. The principal areas of activities which have been in the fields of carrier system, electro-mechanical switching equipment, electronic measuring equipment and power plant etc. emphasis has been made in the field of microwave and solid state equipment design as well as in the design of pulse and digital transmission. During the fourth five year plan the work in the above fields will continue with effort to make and improve these equipment and service continuously. Indigenous materials and components are becoming available and design efforts are required to make use of these to the maximum extent possible for saving scarce foreign exchange. The other fields where new work has to be started immediately are dot transmission, picture, facsimile, T.V. transmission subscriber apparatus, external plants etc. so as to provide new services and new facilities.

The main items of work in the field of electronics are:

- (1) design and development of interim type 270 channels system for large tube carrier cables.
- (2) design of transistorized type 900 channels system for small tube carrier cables.
- (3) re-design of the existing multi-flooding equipment to accommodate indigenous components.
- (4) picture and facsimile transmission.
- (5) electronic measuring instruments of various types.
- (6) design of solid state 900 channel microwave system in the new 400 Mc/s range.
- (7) design of solid state 2 and 30 channels microwave systems in the 7000 Mc/s range.
- (8) design of solid state heterodyne 300 channels microwave systems 200 Mc/s range.
- (9) design of T.V. transmission facilities.
- (10) design of low power units for scatter and satellite communications.

- (11) Development of
- (12) Design of
- (13) Construction of
- (14) Installation of
- (15) Development of

No.	1937	1938	1939
Public Buildings	11, 10	10, 200	8
Public utility property (including...)	35, 110	12, 000, 000	50
Public works (including...)	32	2, 000	6
Public works (including...)	575	1, 000	12
Public works (including...)	225	12, 000	52
Public carrier systems (including...)	12	2, 000	48
Over wire carrier systems (including...)	4213	5, 000	80
Over wire lines (including...)	244, 000	37, 000	15
Teler (including...)	50, 000, 000	12, 000	24
Wire systems (including...)	325	2, 000	32
Public Call Office	3, 000	2, 000	17
Combined Post and Telegraph Offices	11, 151	2, 400	23

ATTACHED TO THE REPORT OF THE

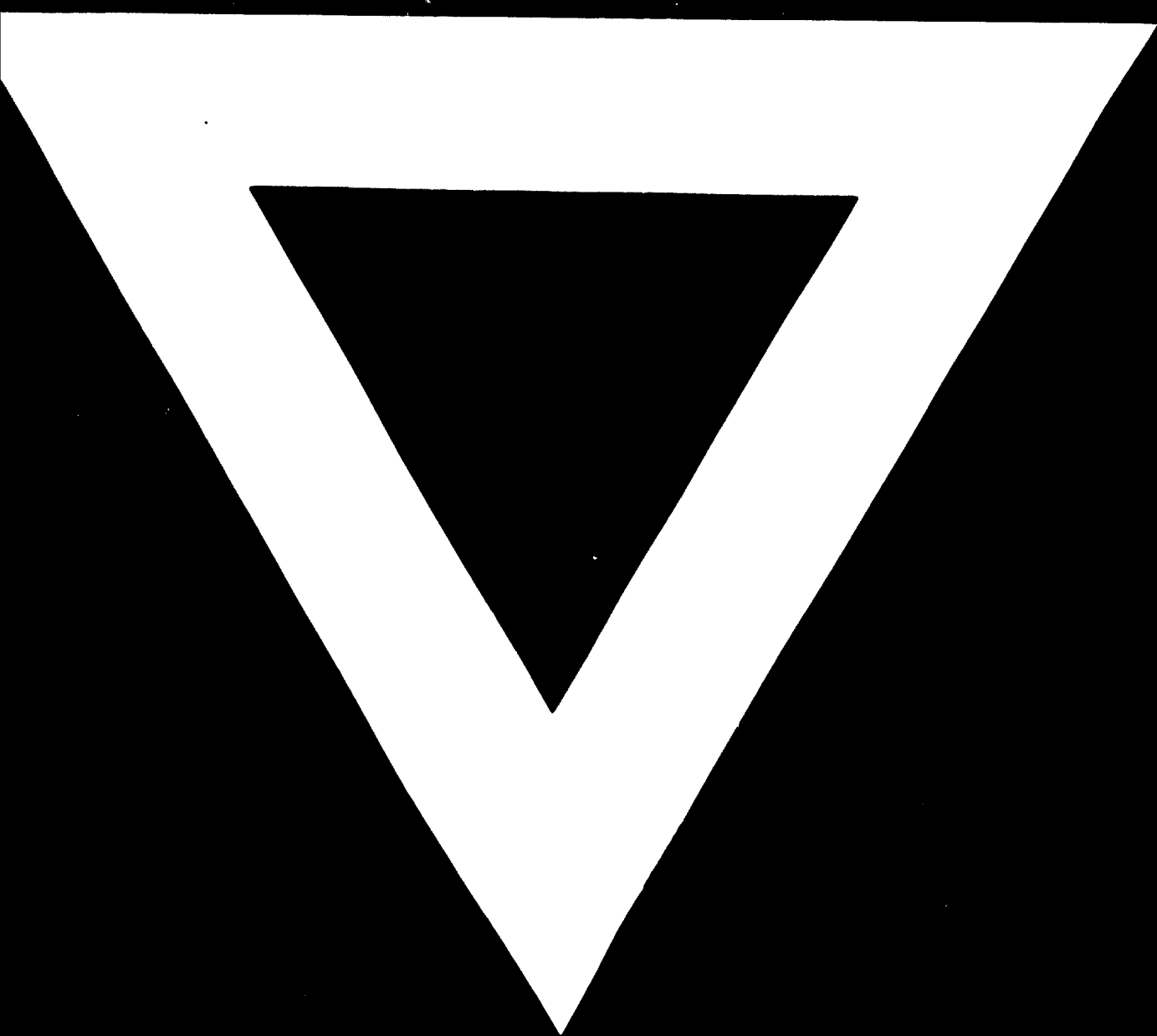
COMMISSION ON THE

STATE OF TEXAS

(Oil and Gas Industry - General Information)

Sr. Item	1970	1971	1972
1. Semiconductors (Silicon including diodes)	.0	1.0	1.0
2. Transistors	12.0	20.0	30.0
3. Potentiometers (including controls)	.0	10.0	1.0
4. Character and resistors	1.0	2.0	5.0
5. Electrically sensitive	3.0	50.0	100.0
6. Plastic film and flexible capacitors	10.0	70.0	100.0
7. Ceramic capacitors	1.0	100.0	100.0
8. Variable tuning capacitors	3.0	7.0	10.0
9. Transformers	25.0	25.0	70.0
10. Loudspeakers	3.5	1.5	10.0
11. Valve and Switches	3.0	5.0	5.0
12. Integrated Circuits	-	1.0	5.0





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