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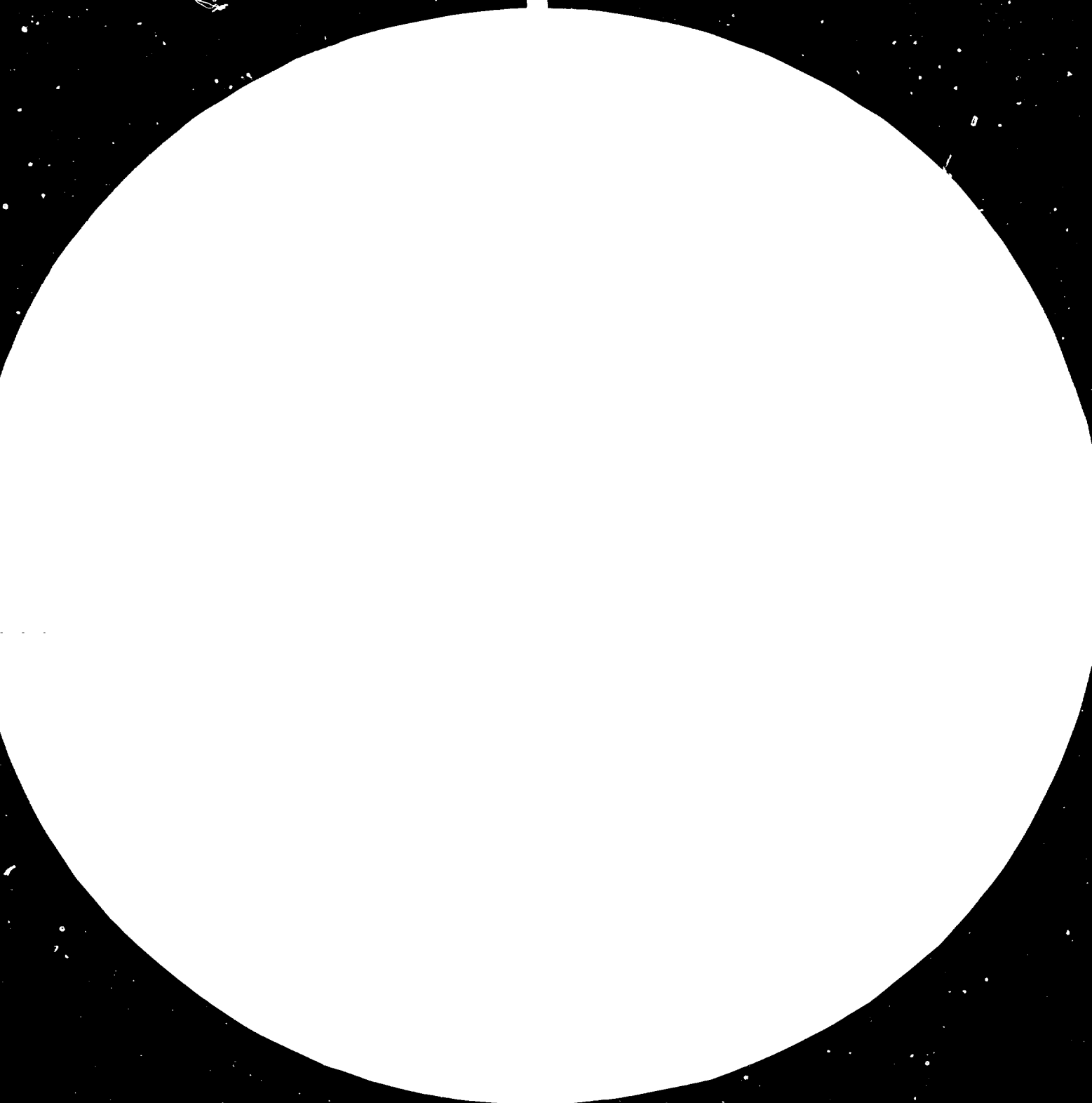
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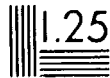
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Resolution Test Chart, 1963, NBS Monograph 17, U.S. Government Printing Office, Washington, D.C.

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10431



Distr.
LIMITED

ID/WG.339/5
22 April 1981

ENGLISH

United Nations Industrial Development Organization

Workshop on Selection of Technology for
Assembly of Electronic and Electrical
Products in Developing Countries

Utrecht, Netherlands, 4 - 8 May 1981

ISSUES FOR CONSIDERATION *

by

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ISSUES FOR CONSIDERATION

1. TECHNOLOGY AND TECHNOLOGY TRANSFER

1.1 Technology

- . technology as a relationship of knowledge, people, equipment and financial assets.
- . the relationship of technology to context and environment in which it operates and the need for adjustments to achieve viability.
- . the continuously changing nature of technology.
- . technology creation and development by R&D and by transfers.

1.2 Technology Transfer

- . finding sources of transferable technology
- . methods of transfer, contracts and agreements
- . reconciliation of objectives of suppliers and receivers
- . technology transfer in relation to receiver government economic development policies

2. FACTORS OF PRODUCTION

2.1 Manpower

- . labour - supply, skills, crafts, training and supervision
- . professional and management - supply, qualifications, training

2.2 Plant and Equipment

- . flow-chart and lay-out, alternatives and simplification
- . supply of plant component parts and maintenance
- . plant location, conditions of choice
- . plant development of increased local value-added (vertical integration)

2.3 Materials and Components

- . supply, specification and quality control
- . sources and use of indigenous parts and materials
- . stocks, buffering in relation to costs

2.4 Finance

- . investment costs - buildings, plant, facilities, working capital, land, know-how and royalties
- . relation of capital investment to labour costs and employment

3. PLANT OUTPUT :

3.1 Markets

- . product specification or specifications in relation to users requirements
- . market segments and expected rates of growth
- . product pricing policy
- . alternative suppliers, competition, including imports from low-cost countries

3.2 Distribution

- . routing of products from factory gate to users
- . product servicing and maintenance, training of distributors' personnel
- . packaging and transport, methods and costs
- . plant loading and stock holding, seasonal effects

3.3 Marketing

- . promotional activity and advertising
- . selling and general expenses
- . market intelligence and forecasting
- . product development in relation to changing markets

4. GOVERNMENT INTERESTS AND REGULATIONS

4.1 Policies

- . economic development
- . technology growth
- . employment - preferences for labour-intensive operations, indigenisation, minorities and equal opportunities

4.2 Regulations

- . import of materials, plant and equipment
- . use of indigenous materials, components and plant
- . limitations on foreign equity holding
- . limitations of royalty payments to foreign suppliers of technology

4.3 Taxes and Allowances

- . investment incentives
- . export incentives
- . research and development incentives

5. INFRASTRUCTURE

5.1 Scientific and Technical

- . availability of scientists and engineers, crafts and skills
- . service industries - mechanical, electrical, civil, instrument and electronic
- . research and development organisations - Government research establishments, Research Associations, Trade Associations
- . domestic materials and component suppliers
- . information sources - legal, patent, technical
- . education and training facilities - universities, technical colleges, management schools, craft training centres

5.2 Physical

- . transport services - road, rail, ship, air
- . communication services
- . public utilities - water, power, gas, oil, effluent disposal

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Technology choice, the central theme of the workshop, is likely to emerge from the assembly line case as a consideration of micro-level variants on this or that material, component, piece of equipment, this or that quality, this or that product specification.

Even so, each of these micro or what I would style 'sub-atomic' alternatives has to be selected in relation to environment and operating context.

Therefore, the concept guiding the 'Issues' I have selected is this : the process of technology choice is a resolution of the interests of two parties (or three if you include the receiver country government) ; the suppliers who offer a range of productive systems and associated know-how ; and the agents of the receivers who bring to the selection process a knowledge of the context and environment in the which the operating system selected must function. Detailed knowledge of the production system, which the suppliers bring to the deliberations, have therefore to be explored in relation to the detailed knowledge of receiver country conditions into which the technology is to be placed.

In this concept the word 'environment' is used to include not only the physical/geographical, but also commercial and scientific/technical infrastructure : the social politico-economic character, too, of the receiving country is included. For this reason the process of technology choice must include the relation of technologies to government policies in the receiving country, as they relate to technology and business development.

The 'Issues' I have listed therefore start with a consideration of the nature of technology and technology transfer. They then move to the production process, its inputs and then its outputs, the latter introducing markets, distribution, competition and product development. After these items I go to Government and its interests and finally to the important questions of infrastructure.

Although it is necessary to subdivide the 'Issues' in some such way as I have done - to ensure comprehensive coverage of all aspects of the matter during the workshop, the splitting does some violence to the integral nature and unity of technology and its operating environment. Therefore I propose to be at pains during the workshop to stress that whatever aspect of technology choice may be under examination by our working groups, there must be a constant awareness of the interactions and interpenetrations of all aspects, one with another.



