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ENGINEERING PRODUCTS IN UAR

(Presented by the Government of

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ENGINEERING PRODUCTS IN UAR

Engineering products represent a branch of manufacturing industries which apparently seems to be simple and easy to establish. Any standard workshop can make a variety of these products on a limited scale. The quality will not be however always up to standard, and the cost will be incredibly high. Establishing industries for engineering products have to be based on carefully worked out feasibility studies, correct estimation of plant size, investment requirements & manufacturing costs, also on thorough investigations of local possibilities which would eventually justify taking such a step.

The UAR, being one of the most active developing countries, has collected a wealth of experience in industrialization problems which may be useful for other developing countries having similar local and international circumstances. Engineering industries are appealing and attractive to many developing countries but experience showed that they involve several difficulties and need careful study before deciding on establishing them, otherwise they may become a parasite to the country's economy and retard the wheels of development instead of accelerating them.

Industries based only on assembly operations of knocked down imported parts, although sometimes considered as a first phase of industrialization, cannot be considered a step towards industrialization because their added value represents a very small per cent. In most cases economical considerations do not justify even the slightest participation of locally manufactured parts and the operation remains for a long time confined only to mere assembly operations of kits whose importation cost, in some cases, exceeds the cost of the finished item. Such industries bring about very little saving in trade balance, and do not present basic contribution to industrial progress of the country.

Classification of Engineering Products

Engineering product ...lon) to that sector of manufacturing industries in which raw materials (mostly in semi-finished or finished form) are transformed into finished goods ready for marketing as consumer's goods, capital equipment or service facilities.

In Standard Industrial Trade Classification (S.I.T.C.), engineering products come under the following 5 classes (Table 1), namely:

1. Fabricated metal products
2. Machinery
3. Electrical machinery, equipment
4. Transportation equipment
5. Professional, photographic and optical goods, watches and clocks

Under each of these classes are further sub-divisions which can be taken as indicative of groups of engineering products of similar nature mostly with respect to their usage.

When elaborating the industrialization programs of the UAR, engineering products had different aspects when selected, and their classification was looked upon in different ways:

A. In the First Program (1957-1960) they came under the sector of manufacturing industries and were classified into:
   a. General consumption products
   b. Fabricated metallic structures
   c. Road and rail transport equipment
   d. Internal combustion engines
   e. Sea and river transport equipment
   f. Electrical products
   g. Consumer's goods
   h. Machine tools, tools and cutting tools and fasteners (these were listed under the iron and steel sector)

B. In the [illegible] program (1968-1972) they appeared as a separate sector covering the following groups of products:

a. Road, rail, [illegible] river transport equipment and replacement parts thereof

b. Electrical and electronic equipment

c. Pumps

d. Replacement parts for various equipment, textile, petroleum and transport

e. Miscellaneous engineering products

f. Timber industries

C. In the Third Program (1965-1972) which concentrates on heavy industries, their classification was as follows:

a. Capital equipment, fabricated metal structures and tools

b. Transportation equipment road, rail, river and sea [illegible]

c. Miscellaneous engineering products, metal containers, metal furniture and household equipment, pumps, fasteners, optical and laboratory instruments, toys, timber etc...

It is evident from the aforementioned classifications that U.R followed more or less the ISIC classification.

Engineering products before and in Industrialization Programs

It is well known, that industry flourishes and expands as factors encouraging its establishment and extension prevail. In the case of engineering products, such factors were in the past very few and limited to special cases in which manufacturing of a main product (not necessarily an engineering product) necessitated the manufacture of another engineering product as an auxiliary one e.g. food products and their requirements of containers - packing.

The circumstances which influenced the establishment of industries for engineering products can be summarized in the following points:

1. [illegible] engineering products in general is comparatively [illegible]

2. [illegible] in the [illegible] which did not [illegible]

3. [illegible] [illegible] millions till 1952

The limited requirements of the UAR were therefore mostly imported from abroad except in the cases where the products required simple operations that could be carried out by low or medium skills, such as simple fabricated metal structures, window and door frames, Kerosene stoves ... etc.

The establishment of factories did not prove feasible in most cases because the small scale copy principle could not be adopted due to the nature of many of the engineering industries. The limited number of local products could not compete with the imported articles and export market could never therefore be cultivated to booster the manufacture of engineering products.

2. The principal raw materials required for manufacture were not available in the UAR, and the few factories established till 1958 depended wholly on imports. The variety of the necessary material was large and required continued search in the world market. Iron and steel semi-finished products such as bars, sheets, and sections represented little difficulties but non-ferrous and stainless steels demanded big efforts to procure at reasonable prices due to fluctuations in their price level. In comparison with cotton, textile, food and building materials products whose sources for principal raw materials are local, many engineering products lacked therefore a very important factor, viz. that the principal raw material with correct specifications was not available. This difficulty, being recognized in due time, was overcome later partially by the erection of the steel mill at Helwan & the non ferrous rolling mills which started production in 1954 to 1958 and on a broader front by the 0,5 million ton strip mill and 1,2 million ton integrated extension of the Helwan mill and extensions in other steel mills to produce special steels and the big number of plants which are to produce non-ferrous products.

3. Engineering products depend largely on good foundries and well equipped forges for supplying cast iron, steel and non-ferrous castings as well as forged parts to be processed by various forming,

machining and heat treatment operations. The existing and forging techniques must also be well advanced and in many cases foundries have to be mechanized and forging shops ought to be well equipped for dye-forging and hot stamping to be able to supply high class semi-finished products. Such foundries and forges require high investments and are never rentable unless there have defined big customer industries to co-operate with. Because these big customers did not exist in the past, existing foundries operated only on jobbing operations, their technique remaining more or less primitive, and the only advanced foundries were those supplying the UAR's military factories and the three cast iron pipes factories. The establishment of automotive industries in 195[illegible], capital equipment and other heavy industries during coming seven years represents permanent customers for first class foundries and well equipped forges, and makes it imperative to establish them at the same time other heavy plants are erected.

4. Engineering products require an advanced technical standard for their processing and a big reserve of know-how to enable their manufacture at a high technical standard and low cost. Their production in industrially advanced countries is backed up by a huge fund of research work, experimentation and prototype work which require big expenditures, which only big industrial concerns can afford. The personnel employed by producers of such products have extensive experience in the manufacturing processes and in the handling of equipment performing such processes most of which have become special purpose equipment.

The UAR as well as all industrially developing countries are not in a position to immediately embark on such research programs and to elaborate new designs and processing data for each product. The less expensive and time saving procedure is to buy such experience and know-how from well established producers. Training of personnel who will be engaged in relevant production has to be carried out either abroad or locally with the assistance of specialized experts well acquainted with the respective production.

5. The U.A.R's investors were not familiar with industry in general, and were not ready to take such risk so long as they could invest their savings in the traditional way known to them, namely in land and real estate.

Few engineering products were manufactured in the UAR as mentioned before but none of them could be manufactured on a large scale or in mass production for the above-mentioned reasons and because of the big capital investments required for establishing well equipped factories.

The only well established engineering industries, were till 1956, of military nature: rifles, guns and ammunition. Such products must be produced on a high technical level because of their nature and of the big requirements.

Table (2) gives an approximate list of the engineering products which were manufactured in the U.A.R in 1952 before a defined policy for industrialization was laid, also industrialization programs elaborated since 1957. Few of these could be described as successful and advanced e.g. containers, electric bulbs, and wooden furniture. The main reason for their success was either that they had to be produced on a relatively large scale or that many operations could be carried out by hand and required unskilled or medium skilled low paid labour. In 1957 the First Industrialization Program was elaborated and implemented during the years 1957-1960. It included about 60 projects for engineering products, most of which were for new products, the rest being extensions to existing production at that time. These projects, their production capacity and their estimated capital investments are listed in Table (3). This extensive program could not be executed till 1960. Only projects marked (*) were executed and started production till the end of 1960. Those marked (+) could not be executed till now, mostly because intensive studies could not prove the feasibility of their execution. The investments needed for the projects which could not be completed till June 1960 were included in The Second Industrialization Program (1960-1965) which was integrated to The General Plan for Economic and Social Development of the UAR and included projects classified as follows:

		No. of Projects	Total investment L.E.000
A.	Rail and Road transport equipment	6	18670
B.	Sea & River transport equipment	1	1863
C.	Electrical & Electronic equipment	5	1798
D.	Pumps	1	358
E.	Replacement parts	4	3740
F.	Miscellaneous	18	1870
G.	Wood products	4	890
		39	29189

Table (4) shows these projects in detail, their estimated investments and products. Since preliminary studies and investigations carried out on these projects were more intensive than those for The First Program projects, and owing to experience gained in implementing the First Program most of the projects coming under The Second Program were executed till June 1965. Only projects marked (+) could not be entirely completed, and were included in The Third Industrialization Program (1965-1972).

It can be noted from Table (4) that the sizes of projects became larger than those of Table (3) relevant reasons being:-

1. Increase in local requirements of consumer's goods due to increase in population and rise in standard of living.

2. Widening of industrial circle in all sectors creating new demands on engineering products such as replacement parts, products required to feed other industries e.g. automotive feeding industries, also those needed for serving other projects such as transformers, switch gear, cables, electric motors & machine tools.

3. Bigger demand created by other sectors of the economic structure of the UAR e.g. agricultural tractors, diesel engines, transport equipment, petrol and irrigation pumps etc... as a consequence of the integrated general development schemes of the UAR.

4. Establishment of export markets for some products e.g. domestic appliances.

5. The nature of some engineering industries which necessitates establishing them on a large scale for improved economy and better rentability e.g. the automotive industry. The dependence of this industry on feeding industries to about 50 % of the parts of almost every type of vehicle necessitates the establishment of these industries on advanced basis and in size big enough to cover also the local demand on replacement parts for most of the UAR's fleet estimated at about 200,000 vehicles in 1964. The automotive industry represents, in this case, the basic permanent customer whose requirements represent the bulk of production programs for feeding industries. Although the production program of road transport equipment in the Third Program has been enlarged, it did not yet reach the size that enables the UAR's automotive industry to produce at competing world market prices, nor did the total requirements of the UAR justify establishing some of the automotive feeding industries e.g. electric equipment, fuel injection equipment and panel instruments.

Closer studies of difficulties that handicap the progress of engineering products industries in particular and other industries in general revealed the following two facts:

1. Most of raw materials needed for engineering industries had to be imported e.g. cold rolled steel sheets, bars and sections of special specifications, foundry pig-iron, forging steels, tool steels as well as non-ferrous metals and plastics raw materials which represent a big drain on foreign currency and an unfavourable influence on trade balance. The only available local raw materials are commercial hot rolled plates, sheets and sections that could be only used in fabricated metal structures.

2. All capital equipment even the simplest types of conveyors, cranes and metal forming equipment have to be imported from abroad which represented another unbalance in the UAR's foreign trade. Trials,

however, succeeded in manufacturing some machinery such as simple presses, wood working machinery and some chemical and food industry equipment, and in giving rise to the possibility of enlarging this scope by establishing well equipped factories for producing a wider range of capital equipment.

These two facts led to the decision of broadening the scope of engineering products in The Third Industrialization Program to include the production of capital equipment and of other industrial sectors to satisfy the requirements of engineering products industries of all raw materials including semi-finished parts like castings and a bigger variety of forgings.

Projects covered by the Third Industrialization Program include extensions of existing factories as well as establishment of new ones for new products. They can be classified into the following groups:

Products	No.of pro-jects	Estimated capital invest-ment L.E.000
1. Machinery and equipment		
a. Industrial equipment and fabricated structures	8	81009
b. Metal forming machinery	1	19215
c. Tools	4	4785
2. Transport Equipment		
a. Road transport equipment	18	62969
b. Rail transport equipment	5	10620
c. River & sea transport equipment	1	8790
3. Electrical and electronic equipment		
a. Electric conductors and cables	2	5079
b. Electric machinery and equipment	14	13464
c. Electronic equipment	2	3675
d. Refrigeration & air conditioning units	1	4000
4. Miscellaneous products		
a. Metal containers	4	1427
b. Household appliances	4	1807
c. Miscellaneous	17	17969
		234'09

The details of these projects are shown in Table (5)

Some of the programmed products are not new to the UAR's engineering industry and are foreseen to cover the increasing local market requirements. The products which can be considered new to the UAR's industry are the industrial equipment and machinery which are programmed with a view to attaining partial self sufficiency in some lines of industrial equipment and to exporting to neighbouring markets.

This new line in the UAR's industry had to be carefully planned after investigating all possibilities and requirements before taking such step. As can be seen from Table (4) many of the new factories to be established are relatively large, their investment being consequently enormous. The policy that could be adopted regarding specialization in families of products could not go on the same lines as similar production in industrially advanced countries where a number of big factories specializing in one family of products exist, e.g mining equipment & conveying equipment. This will be a next step for the UAR's industry after this new line reaches the stage of maturity and acquires the necessary experience and strength.

This present step towards heavy industries requires, besides big investment, a great deal of technical assistance in all forms: designing of factories, employment of experts, training of personnel on new skills and especially in organization, administration and management fields. The readiness of many industrially advanced friendly countries to give financial as well as technical assistance in this important stage of industrializing the UAR solved important obstacles towards this step. Now it is the UAR's turn to make good use of this assistance and to create a favourable atmosphere for the establishment of such industries where the local obstacles are reduced to a minimim.

Recommendations

From the foregoing demonstration of considerations to be born in mind when planning to establish industries for engineering products, the following recommendations may be made:

1. Engineering products represent an important sector in industrial development schemes, many consumer's goods, all capital equipment and transportation equipment fall within their scope. Their establishment requires special care in studying their feasibility, size of plant, capital investment & manufacturing costs and net return to the country's economy.

2. Engineering products represent an important branch serving consumers, industrial sectors and various sectors of the country's economical structure, e.g. agriculture, irrigation, transport, health, education, construction etc... This makes them look appealing and necessary for the whole economy of the country.

3. In few cases the minimum economic size of plant falls within the market requirements of the country, a case which justifies the introduction of these industries. In most cases the requirements of economical manufacture of high quality products necessitate the establishment of big size plant involving excessive capital and requiring a high standard of skill (normally not available in developing countries), and expensive know-how which has to be bought from abroad.

4. The availability of the big variety of raw materials with correct specifications is an important factor which needs careful consideration. In some outstanding cases, finished products can be bought from world market at a price level lower than that of raw materials, as in the case for some electric and electronic products offered by some countries. World politics largely influence the price level of some important raw materials on the world market e.g. copper and aluminium products. Through fluctuations in their prices they can have a serious effect on engineering products industries in case such materials are not indigenous. The step taken by the UAR towards self-sufficiency in the field of metallurgical industries to produce locally, most of the raw materials necessary for engineering industries contributed greatly to assure engineering stability to producers of engineering products.

5. The establishment of engineering products industries successfully depends largely on co-operation with metallurgical industries viz. ferrous & non-ferrous foundries and forging plants. The establishment of advanced foundry and forge shops for each engineering industry is not feasible in most cases. This shows the genuine need for co-ordinating schemes for both sectors of industry to achieve best economy and least capital expenditure.

The U.A.R endeavours to overcome this obstacle through the number of specialized foundries and forging plants planned to be established during the period of implementing The Third Industrialization Program (1965-72). This forms an important step taken by the U.A.R. towards the establishment of heavy and basic industries and consequently towards the security of all industrial activities.

Table 1

[illegible]

Classified according to

Standard Industrial Classification

34. FABRICATED [illegible] ([illegible],

[illegible])

341. TIN CANS AND OTHER TIN[illegible]

342. CUTLERY, HAND TOOLS, [illegible]

Cutlery

Edge tools

Files

Hand saws and saw blades

Other hand tools

Other hardware, e.g. builders, motor vehicle and suitcase hardware.

343. HEATING [illegible] SUPPLIES)

Enamelled iron and metal sanitary ware and other plumbers' supplies

Oil burners, domestic and industrial.

Heating and cooking [illegible], e.g. stoves (except electric),

water heaters, [illegible], steam tables

344. FABRICATED [illegible]

Fabricated structural steel and ornamental metal work

Metal doors, [illegible], frames, **moulding,** and trim. **Boiler shop products**

Sheet-metal work

34[illegible]. [illegible]

Vitreous-**enamelled products**

[illegible]obile stampings

Other [illegible] metal products.

[illegible]

Enamelling, japanning, and lacquering

[illegible]

[illegible]

[illegible] air.

347. LIGHTING FIXTURES

348. FABRICATED WIRE PRODUCTS

Nails and spikes

Other wirework, e.g. fencing, wire cable, screens, guards, grills

349. MISCELLANEOUS FABRICATED METAL PRODUCTS

Metal shipping barrels, drums, bags, and pails

Safes and vaults

Steel springs

Bolts, nuts, washers, and rivets

Screw-machine products

Collapsible tubes

Gold, silver, tin, aluminium, and other foil

Other fabricated metal products, e.g. novelties and specialities.

35. MACHINERY (EXCEPT ELECTRICAL)

351. ENGINES AND TURBINES

Steam engines, turbines, and water wheels

Diesel and semi-diesel engines

Other internal-combustion engines, except aircraft or automobile engines

352. AGRICULTURAL MACHINERY AND TRACTORS

353. CONSTRUCTION AND MINING MACHINERY AND EQUIPMENT

Construction, mining, and similar machinery

Oil-field machinery and tools

354. METAL WORKING MACHINERY

Machine tools

Metalworking machinery (except machine tools)

Tool accessories, other metalworking machinery

Accessories and machinists' precision tools

355. SPECIAL INDUSTRY MACHINERY (EXCEPT METAL WORKING MACHINERY)

Food products machinery

Textile machinery

Woodworking machinery

Paper-industries machinery

Printing-trades machinery

Other special industry machinery, e.g. leather-working, glass-making, clay-working

356. GENERAL INDUSTRIAL MACHINERY AND EQUIPMENT

Pumps, air and gas compressors, and pumping equipment

Elevators and escalators

Convevors and Conveying equipment

Blowers, exhaust and ventilating fans

Industrial trucks, tractors, trailers, and stackers

Mechanical power-transmission equipment (except ball and roller bearings)

Industrial furnaces and ovens

Mechanical stokers, domestic and industrial

Other general industrial machinery and equipment

357. OFFICE AND STORE MACHINES AND DEVICES

Computing machines and cash registers

Typewriters

Vending, amusement, and other coin-operated machines

Scales and balances

Other office and store machine and devices, e.g. mimeographing, addressing

358. SERVICE INDUSTRY AND HOUSEHOLD MACHINES

Domestic laundry equipment

Commercial laundry, dry-cleaning, and pressing machines

Sewing machines

Vacuum cleaners

Refrigerators, refrigeration machinery and complete air-conditioning units

Measuring, ... pumps

Other ... industry and ... chemical ... mines

359. **MISCELLANEOUS** ...

Valves and fittings (except plastics' valves)

Fabricated pipes and fittings

Ball and roller bearings

Machine shops (jobbing and repair)

36. ... EQUIPMENT, ... SUPPLIES

361. ELECTRICAL **GENERATING, TRANSMISSION, DISTRIBUTION, AND INDUSTRIAL APPARATUS**

Wiring devices and supplies

Carbon and graphite products for use **in** the electrical industry

Instruments for indicating, measuring, and recording electrical quantities and characteristics

Motors, generators, and motor-generator sets

Power and distribution transformers

Switchgear, switchboard apparatus, and industrial controls

Electrical welding apparatus

Other electrical equipment for industrial use, e.g. electric heating units

362. ELECTRICAL ... PRODUCTS

Electric ranges, hot plates, irons, fans, etc.

363. INSULATED ... AND CABLE

364. ELECTRICAL EQUIPMENT ... MOTOR VEHICLES, AIRCRAFT, AND RAILWAY AND CARS

365. ELECTRIC LAMPS

366. COMMUNICATION EQUIPMENT ... RELATED PRODUCTS

Radios, radio and television equipment, radar and related detection apparatus, and phonographs

Radio tubes

Phonograph records

Telephone and telegraph equipment

Other communication equipment, e.g. signals, alarms, traffic and railroad devices

36[illegible]. [illegible]

Storage batteries

Primary batteries (dry) and wet

-ray and therapeutic apparatus and non-radio electronic tubes

Other electrical products, e.g. [illegible],

extension cords, Christmas tree outfits

37. TRANSPORTATION EQUIPMENT

371. [illegible] MOTOR-VEHICLE EQUIPMENT

Motor vehicles

Passenger-car bodies

Truck and bus bodies

Motor-vehicle parts and accessories

Truck trailers

Automobile trailers (for attachment to passenger cars)

372. AIRCRAFT AND PARTS

Aircraft

Aircraft engines and engine parts

Aircraft propellers and propeller parts

Aircraft parts and auxiliary equipment

373. SHIP [illegible] BUILDING AND REPAIRING

374. RAILROAD EQUIPMENT

Locomotives and parts

Railroad and street cars

375. MOTORCYCLES, BICYCLES, AND PARTS

379. OTHER TRANSPORTATION EQUIPMENT

Farm wagons, wheelbarrows, push-carts, etc.

38. PROFESSIONAL, SCIENTIFIC, AND CONTROLLING

INSTRUMENTS, PHOTOGRAPHIC AND OPTICAL GOODS, WATCHES AND

[illegible]

381. LABORATORY, [illegible], AND ENGINEERING INSTRUMENTS

[illegible]

382. MECHANICAL MEASURING AND CONTROLLING INSTRUMENTS

383. OPTICAL INSTRUMENTS AND LENSES

384. SURGICAL, MEDICAL, AND DENTAL INSTRUMENTS AND SUPPLIES
- Surgical and medical instruments
- Surgical and orthopedic appliances and supplies
- Dental equipment and supplies

385. OPHTHALMIC GOODS

386. PHOTOGRAPHIC EQUIPMENT AND SUPPLIES

387. WATCHES, CLOCKS, CLOCKWORK OPERATED DEVICES, AND PARTS
- Watches, clocks, and parts
- Watchcases

Table 2

Engineering products manufactured in the UAR till 1952

Product	Unit	Production quantity	in 1952 value L.E.000
Insulated conduits	ton	280	92
Accumulators	No.	18000	180
Dry batteries	No.	20000	20
Dry cells	1000	1200	25
Electric bulbs	1000	2000	160
Trucks & passenger cars (assembly)	NO.	1280	1500
Aluminium utensils	ton	250	90
Enamelled ware	ton	800	240
Steel barrels	1000	200	15500
Razor blades	mill	20	80
River tugs	-	value	100
Fire extinguishers	-	value	50
Rotary pumps	No.	200	8
Kerosene stoves	1000	40	20
Zip fasteners	1000m.	100	12
Wooden chairs	1000	200	240
Parquet flooring	sq.m.	7500	75
Wooden doors & windows	100 ton	120	6000
Wooden furniture	Unit room	90000	6300
Ply wood	cu.m.	900	45

Table 3

Engineering products projects coming under the First industrialization program (1957-60)

Projects	Products		Investment
	Unit	Quantity	L.E.000
Fabricated steel structures	ton	47000	575
Cranes & elevators	ton	1200	120 +
Transmission towers	ton	3300	132
Ship yard	1000 ton	50	6883
Dry dock	--	--	4057
River transport equipment	Unit	51	700
Goods railway wagons (10 tons)	No.	600	1000 S
Truck chassis	lorries	3100	12565 S
	buses	400	
Bus bodies	No.	400	
Passenger cars	No.	12000	
Bicycles	No.	30000	153 S
Motor-cycles (less engines)	No.	2000	175 +
Diesel engines.	No.	1200	240 S
Small petrol engines	No.	5500	500 +
Leaf and coil springs	tons	100	72 S
Brake & clutch linings	tons	120	58 S
Brake drums			12 +
Cylinder lines & piston rings	livers rings	125000) 500000)	220 +
Cast iron pistons			12+
Aluminium pistons	No.	200000	60
Air, fuel & oil filter elements			24
Lubricating oil & cooling water	pumps		60 +
Radiators	No.	15000	74 S
Thick & thin bearings bushes	pair	150000	70

Spark plugs	No.	500000	45
Gears			120 +
Mechanical rubber parts			18
Gaskets	set	25000	43.5
Inlet & exhaust valves & gudgeon			60 +
Electric automotive equipment	pins		150 +
Machine tools	M/C	725	1927
Spinning machines	1000 spindle	100	1320 +
Spare parts for textile equipment	ton	1000	400 S
Concrete mixers & construction equipment	pces	500	36 +
Small irrigation pumps		2000	48 +
Filew	No.	400000	100 S
Sand paper			60
Hand tools			172
Saw blades			120
Metal cutting tools	ton	96.5	612.2
Cutlery	ton	40	65
Knives & scissors	ton	85	49
Razor blades	million	7	60
Wood screws			120
Bolts and nuts	ton	6000	425 S
Welding electrodes	million	25	202.5
Wood screws			120 S
Needles	ton	43	48
Lead pencils	gross	120000	110
Buildings metal ware	ton	2600	250 S
Butane cylinders	No.	30000	73 S
Butane stoves & ranges	No.	17000	72 S
Butane water heaters	No.	12000	179 S
Metal barrels	No.	600000	285
Tin cans	million	20	182 S
Collapsing tubes	million	6	40

Fire extinguishers	No.	10000	65
Sewing machines	No.	15000	262 S
Water meters No.	No.	30000	78 S
Surgical instruments	ton	22	506.6
Plywood			240
Electric KWH meters	No.	60000	112.5 S
Transformers			280 S
Telephone cables	Km	400	400
Telephone equipment	lines hand & aut.changes sets	15000) 786) 28000)	1,226
Underground power cables	km	1090	172.5
Bare transmission conductors	tons	3600	286
Domestic washing machines	No.	3000	24 S
Electric bulbs (extension)	million	4.5	90
Fluorescent lamps	No.	250000	+
Electronic equipment	100 set	112	3297
Domestic refrigeration units	No.	12000	300 +
Transistor radio sets (assembly).	No.	25000	200 S
Dry batteries (cells).	million	8.8	20

Table 4

Engineering Products Projects coming under the Second Industrialization Program (1960-65)

Project	Total Investment L.E.000	Value of production L.E.000
A. Transport means		
Passenger cars	6400	7500
Heavy lorries	4080	8240
Diesel engines	1937	2200
Central gear shop & automotive engines	2188	1800
Agricultural tractors	3045	2835
Railway coaches	1020	1000
Ship yard (Suez Canal)	1863	4320
B. Electric and electronic equipment		
Electric motors and fans	442	418
Automotive electric equipment	515	504
Extension of transformers & switch gear production	245	200
Electric cables & conductors	241	240
Fluorescent lamps	355	162
C. Pumps	358	342
D. Replacement parts		
For textile industry	900	875
For petroleum industries	140	200
For railways	300	480
For the automotive industry	2500	2500
E. Miscellaneous Products		
Training rifles	76	125
Shooting rifles	90	225
Air rifles	43	135
Typewriters	60	120
Calculating machines	75	120

Semi-automatic weighing scales	74	94
Ball and roller bearings	222	189
Service stations fuelling pumps	70	125
Sailing planes	36	36
Mechanical toys	100	100
Wire netting	57	49
Household appliances	90	166
Wrist watches	515	520
Rims for glasses	85	45
Artificial jewellery	62	85
Steel shutterings	100	50
Dairy containers	83	164
Artificial limbs	32	20
F. Wood industries		
Timber preservation	33	58
Seasoning and slitting of lumber	450	1200
Plywood	246	265
Fruit and vegetables boxes	161	368

Table 5

Engineering products projects coming under the third industrialization program (1965-1972)

Projects	Total Investment L.E.000	Value of production L.E.000
I. Machinery and equipment		
a) Industrial equipment and fabricated structures		
Textile equipment	7795	5979
Extension of Diesel engines production	835	658
Capital equipment plant	36000	31500
Sugar & cement mills equipment	25000	20000
Agricultural machinery and implements	2500	1200
Prototype shop	1070	200
Extension of boiler production	2505	2500
Extension of steel structures production	5403	8000
b) Metal forming equipment		
Extension of production of machine tools & production of presses & wood working machinery	19215	8152
c) Tools		
Extension of standard tools production	825	865
Central tool shop	2960	1200
Extension of files production	400	300
Production of grinding wheels	600	400
II. Transport means:		
a) Road transport equipment		
Lorries, passenger cars, engines and tractors	21056	48463
Motor cycles	2100	2196
Automotive replacement parts	1330	2565

Engine bearing shells.	1265	1214
Pistons, piston rings and cylinder liners	732	1190
Heavy lorries	5000	6369
Heavy buses bodies	894	1430
Light trucks	2400	3150
Enlargement of trailers production	1314	2083
Jeep cars	2660	3500
Micro- buses	1700	1950
Extension of tractor production	3096	4400
Small passenger cars	7400	4400
Big passenger cars	6800	9400
Extension of bicycles & motor c cles production	4120	3286
Extension of radiators production	709	600
Extension or roller chains production	49	40
Extension of leaf & coil springs production	344	300
b) Rail transport equipment		
Extension of goods wagons production	8500	15000
Automatic couplers	620	480
Pneumatic brake equipment	1500	1000
c) Sea & river transport equipment		
Ship yard at Alexandria	8790	8090
III. Electric and electronic equipment		
a) Electric conductors & cables		
1. Extension of cable & conducts/products	4194	6425
2. Aluminium cables	885	935
b) Electric machinery & equipment		
1. Electric motors up to 20 HP	525	500
2. Switches & sockets	86	158
3. Lamp Sockets	172	300
4. Transformers	4259	2755

5. [illegible]	1600	1600
6. Starters	1000	800
7. Mercury lamps	1394	1750
8. Valve sockets	317	221
9. Railway signalling equipment	500	367
10. KWH meters	963	852
11. Extension of accumulators products	530	750
12. Extension of dry batteries	208	220
13. [illegible] electric motors up to 200 HP	1000	500
14. Extension of spark plugs products	250	200
c. Electric equipment		
1. Extension of electronic parts products	3250	4300
2. V.H.F. receivers and transmitters	420	370
d. Refrigeration and air conditioning		
1. Extension of production of refrigeration and air conditioning units	4000	2600
IV. Miscellaneous products		
a. Metal containers		
1. Extension of cans	156	200
2. Petroleum containers	735	605
3. Collapsible tubes	136	200
4. Extension in barrels production	400	400
b Household appliances		
1. Extension in refrigerators & washing machines production	1389	2473
2. Mixers, irons and electric sweepers	418	246
c. Miscellaneous products		
1. Pumps and valves	2220	2500
2. Bolts and nuts (Hot and cold processes)	1145	770

3. Typewriters	1365	500
4. Calculating machines	616	350
5. Optical instruments	2604	2259
6. Electrical measuring instruments	1950	1350
7. Laboratory instruments	1500	1750
8. Measuring tools	372	170
9. Thermometers and syringes	130	108
10. Extension of water meters production	204	130
11. Extension of surgical instruments production	160	80
12. Extension of razor blades production	606	700
13. Mechanical toys	110	107
14. Extension of sewing machines production	450	450
15. Extension of plywood production	1202	1900
16. Ball bearings	339	166
17. Renewals to paper containers factory	996	2400

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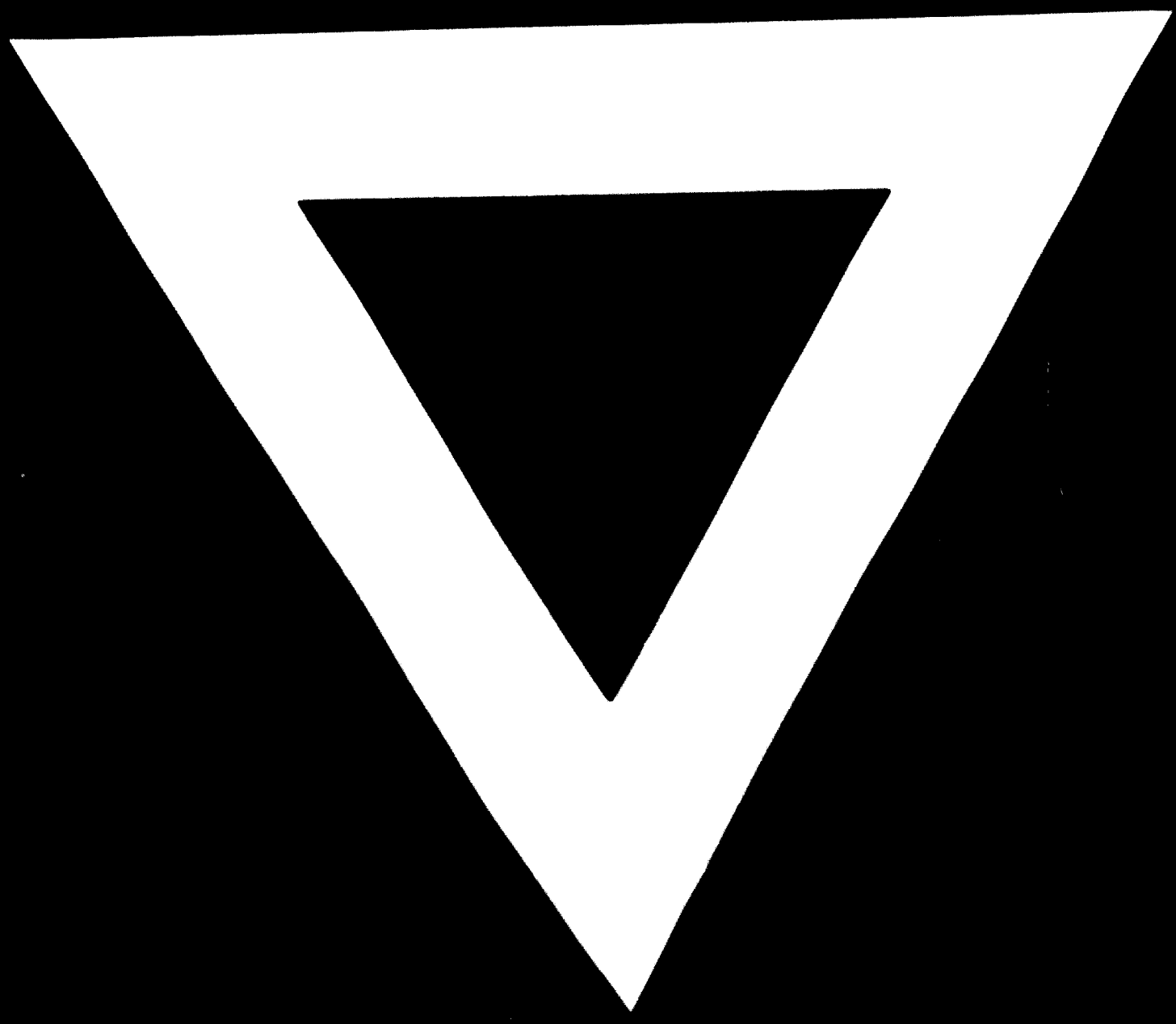

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