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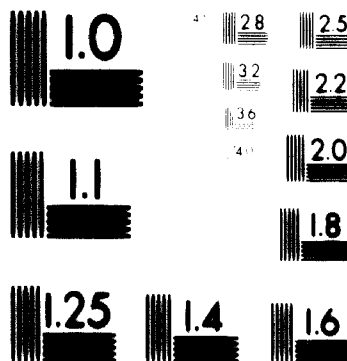
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1 OF 1



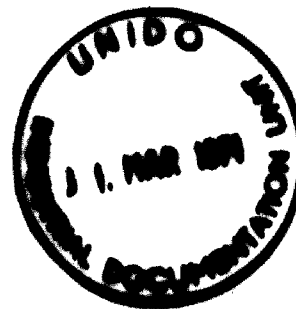
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INDUSTRIAL STUDIES AND DEVELOPMENT CENTRE
DAR-ES-SALAAM

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FEASIBILITY REPORT ON THE MANUFACTURE OF WIRE & STRIP PRODUCTS
(2nd FIVE YEAR PLAN PROJECT)

Op.

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INDUSTRIAL STUDIES AND DEVELOPMENT CENTRE

FEASIBILITY STUDY ON THE MANUFACTURE OF WIRE & STRIP PRODUCTS

(2nd Five Year Plan Project)

INTRODUCTION

In the Second Five Year Development Plan, certain wire and strip products have been included in projects earmarked for:

- a) Upcountry areas as part of Industrial Decentralization Programme.
- b) Implementation by the private sector.

This report covers the production of Paper Pins; Paper (or Gem) Clips; Staple Pins and Safety Pins. An electroplating unit forms part of the production plant.

SUMMARY:

- 1) Demand in Tanzania:
 - a. Paper pins - 12 tons/annum
 - b. Gem clips - 8.25 tons/annum
 - c. Safety pins - 5 tons/annum
 - d. Staple pins - 28 million pieces/annum.
2. Since three of the products in the mix need nickel plating a unit for this purpose has been incorporated. The approximate cost of nickel plating is estimated to be 3 Tz. shillings per kilo - a price quotation for sub-contracting in this process is in the tune of 8 shillings/kilo.
3. Except for the staple pins no profit will be realized for all the other products. This is evident as per profitability analysis

Demand (Tanzania)

(a) Paper Pins

Estimated demand (including govt. demand)	-	12 tons/annum.
Number of pieces per ton ($\frac{3}{8}$ ", 1" and $1\frac{1}{2}$ " assorted)		10,820,000 pieces.
Number of pieces to be produced per annum	-	129,840,000 pieces.
Number of pieces per day (considering 300 working days/year)	-	432,800 pieces.
Number of pieces per minute (8 working hours in a day)	-	900 pieces.

Size in demand $\frac{3}{8}$ ", 1" and $1\frac{1}{2}$ ".

Rate of growth of demand (Refer: INDCENTRE's Market Survey on Wire Products)

To meet the demand, estimated to be 900 pieces/minute, pin making machines should have a total capacity of 1,000 pieces per minute, assuming 90% efficiency.

(b) Gem Clips (Paper Clips)

Estimated demand (including govt. demand) 12 million pieces/annum
 Demand by weight (approx. 1.45 million pieces/ton - 8.25 tons/annum.
 Demand per day (8 working hours/day, 300 working days per annum) - 40,000 pieces/annum.
 Demand per minute - 83 pieces/minute
 Sizes in demand - 35 mm., 28 mm. and 24 mm lengths.
 Rate of growth of demand (Refer: INDCENTRE's Market Survey on Wire Products).

With the small demand that exists, if all 3 sizes are to be made overall efficiency in production may drop due to time involved in changing tools. Assuming 85% efficiency Gem Clip machine should have a capacity of 100 pieces per minute so as to meet the demand.

(c) Safety Pins (excluding Brass Pins)

Estimated demand - 60,000 gross/annum.
 Demand by weight (approx. 12,000 gross/ton) - 5 tons/annum.
 Demand per day (8 working hours/day, 300 working days/annum) - 200 gross/day
 Demand per minute - 60 pieces/minute.

Sizes in demand -

No. 0 (about 25 mm) No. 1 (about 29 mm) and No.2 (about 34 mm). These 3 sizes i.e. 0-1-2 come in assorted pieces. Little demand for No.3 (39 mm) and No.4 (46 mm). No.2 and 4 are not considered for production.

Machinery to produce Safety Pins at the rate of 60 pieces/minute should have a capacity of at least 75 pieces/minute, assuming 80% efficiency.

(d) Staple Pins

Estimated demand - 28 million pieces/annum
 Demand per day (8 working hours/day, 300 working days/annum) - 93,333 pieces/day
 Demand per minute - 194 pieces/minute

Sizes in demand -

Pins for two common machines used by Government offices "Comet" and "Vanguard" account for half the demand. Two other sizes would account for the demand by the private offices. It is cautioned that before production of the Staple pins commences samples of the 4 common sizes must be sent to the manufacturers of the machinery so that the right sizes of tools for the machines are supplied.

FIXED CAPITAL

	<u>Rs. Shs.</u>
1. Buildings and Construction ≈ 1,600 sq.ft. @ 35/- per sq.ft.	56,000.00
2. Machinery & Equipment	168,026.00
3. Furniture and Equipment (5% of (1))	2,800.00
Contingencies 2%	4,536.00
Total	<u>231,362.00</u> =====

COST OF PRODUCTION PER ANNUM

VARIABLE COSTS

1. Raw Materials Requirements

QTY IN METRIC TONS	SPECIFICATIONS	C.I.F. D'SALAAM TZ. SHILLINGS
A	<u>GEN CLIPS</u> (sizes: 24 mm, 28mm & 35 mm)	
3.6	Galvanized iron wire BWG 19 for 32-35 mm	8,152.00
2.4	" " " " 20 for 28-30 mm	5,520.00
<u>2.3</u>	" " " " 21 for 22-24 mm	<u>5,470.00</u>
8.3		19,142.00
B	<u>PAPER PINS</u> (Sizes: ¾", 1", 1½")	
3.5	Bright Iron Wire BWG II 23 for ¾"	7,800.00
4.0	" " " " II 22 for 1"	8,743.00
<u>4.8</u>	" " " " II 21 for 1½"	<u>10,286.00</u>
12.3		26,829.00
C	<u>STAPLES</u> (Sizes: 10, 3, +)	
2.25	Tin plated flat mild steel wire, 0.5 x 0.35 mm for No. 10 0.7 x 0.45 mm for No. 3 + Spcn according to size required. Average Price, 3,950/= @ ton	8,888.00
<u>100 kg.</u>	Adhisivo glue	<u>2,100.00</u>
		10,988.00
D	<u>SAFETY PINS</u> (Sizes: 0, 1 & 2)	
¾	Bright Iron wirt; 26 mm for No.0	1,784.00
¾	" " " 28 mm for No. 1	1,736.00
1	" " " 32 mm for No. 2	2,264.00
0.85	Bright Iron Hoop; 0.25 x 10 mm for No. 0	1,985.00
0.85	" " " 0.25 x 10 mm for No. 1	1,985.00
<u>1.2</u>	" " " 0.25 x 12 mm for No. 2	<u>2,802.00</u>
5.4		12,556.00

E. NICKEL PLANTING

ITEM	INITIAL LIQUID	MIXTURE IN	RES SUPPLY PER DAY	TOTAL REQUI-REMENT	TOTAL COST IN TZ. SHS.
1. <u>For degiling Bath</u> Metal cleaner	20	100 lit	1 kg.	320 kg.	2,400.00
2. <u>For acid solution Bath</u> Solid hydrochloric acid	15	150 "	1 "	315 "	3,712.60
3. <u>For neutralization Bath</u> Solid hydrochloric acid	5	50 "	0.5"	155 "	1,826.80
4. <u>For Nickel Plating Bath</u> Nickel Sulphate	56	250 "	0.1"	86 "	4,177.30
Nickel chloride	10	45 "	0.1"	40 "	2,200.00
Boric Acid	9	40 "	0.2"	69 "	690.00
Glittering Aid No.1	1 litre	4.5cc/ lt.	0.4lt	121lt.	1,944.70
Glittering Aid No.2	1 "	"	0.3 "	91 "	2,762.60
Nickel Anode	6 sheets	-	5	42 sheets	15,000.00
					<u>34,714.00</u>

Indirect Materials (Packaging etc.) 62,455.00

2. Labour Requirements (annual)

a) Gem Clip Unit:

Semi-skilled (1) @ 300/- per month 3,600.00

Unskilled (1) @ 200/- per month 2,400.00

b) Paper Pin Unit:

Semi-skilled (2) @ 300/- per month 7,200.00

Unskilled (1) @ 200/- per month 2,400.00

c) Staple Pins Unit:

Semi-skilled(1) @ 300/- per month 3,600.00

d) Safety Pin Unit:

Semi-skilled (4) @ 300/- per month 14,400.00

i.e. 2 males + 2 females for assembling

e) Nickel Plating Unit:

Skilled (1) @ 400/- per month 4,800.00

Semi-skilled (2) @ 300/- per month 7,200.00

Total 45,600.00

	<u>Tk.</u>	<u>Shs.</u>
3. Power Requirements (Annual)		
The average load of electrical power will be 83.35 kw and monthly consumption of about 20,840 units		53,515.00
4. Water Requirements (Annual)		
Water for WC's, washing, drinking and Nickel plating solutions etc.		
30,000 gall/month		
180 shs/month		2,160.00
	sub-total	55,675.00
5. Contingencies (1%)		2,680.00
	Total	<u>270,639.00</u>

NON-VARIABLE COSTS

	<u>Tk.</u>	<u>Shs.</u>
1. Staff Costs per Annum		
a) Production Manager - Foreman @ 1,800/- p.m.		21,600.00
b) Accountant/sales @ 1,200/- p.m.		14,400.00
c) Mechanics (2) @ 500/- p.m.		12,000.00
d) Typist-cum-clerk @ 400/- p.m.		4,800.00
e) Messenger-cum-office boy @ 250/- p.m.		3,600.00
f) Packers (2) @ 200/- p.m.		4,800.00
	Total	<u>60,600.00</u>
2. Administrative Expenses (Annual)		
Trading licence, permits, legal and audit fees, Insurance, Office equipment, Telephone, Stationery, Stamps, Land rent, site etc.		42,000.00
3. Maintenance (Annual)		
Building 2% p.a.		1,120.00
Machinery and Equipment 10% p.a.		16,800.00
Office furniture 7½%		210.00
	Total	<u>18,133.00</u>

CAPITAL COSTS

1. <u>Depreciation</u>		
Building 4%		2,240.00
Machinery and Equipment 12½%		21,003.00
Office furniture 20%		560.00
	Total	<u>23,803.00</u>
2. Interest on Bank overdraft (at 9% int.)		10,626.00

Total Capital Costs 34,429.00

CAPITAL REQUIREMENTS

	<u>Rs. Shs.</u>
1. Fixed Capital	231,362.00
2. Working Capitals:	
a) <u>Inventory</u>	
Raw Materials (3 months)	41,671.00
Finished Goods-in-stock (1 month)	36,282.50
Accounts receivables (1 month)	36,282.50
Labour (1 month)	3,800.00
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Total Capital Requirements	349,398.00

COST OF PRODUCTION PER MONTH

1. <u>VARIABLE COSTS</u>	
i) Raw Materials	13,890.00
ii) Labour	3,800.00
iii) Electricitys (a) Power	4,393.00
(b) Lighting	66.00
iv) Water	180.00
v) Contingencies (1%)	223.00
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	22,552.00
2. <u>NON-VARIABLE COSTS</u>	
i) Staff Costs	5,850.00
ii) Administrative Expenses	3,500.00
iii) Maintenance	1,511.00
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	10,861.00
3. <u>CAPITAL COSTS</u>	
i) Depreciation	1,984.00
ii) Interest on Working Capital	885.50
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	2,869.50
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Total Cost of Production per month	36,282.50

BREAKDOWN OF COST OF PRODUCTION PER ANNUM

<u>PRODUCT TONNAGE</u>	<u>5.4 M. TONS</u>	<u>8.3 M. TONS</u>	<u>12.3 M. TONS</u>	<u>2.25 M. TONS</u>
	<u>SAFETY PINS</u>	<u>GEM CLIPS</u>	<u>PAPER PINS</u>	<u>STAPLES</u>
<u>VARIABLE COSTS</u>				
Raw Materials	31,840	49,054	72,510	13,280
Labour	8,710	13,406	19,836	3,630
Electricity	10,221	15,733	23,280	4,260
Water	412	635	940	171
Contingencies (1%)	512	788	1,166	213
	51,695	79,616	117,732	21,554
<u>NON-VARIABLES COSTS</u>				
Staff Costs	11,575	17,816	26,361	4,824
Administrative Expenses	8,022	12,348	18,270	3,343
Maintenance	3,465	5,335	7,888	1,444
	23,062	35,499	42,519	9,611
<u>CAPITAL COSTS</u>				
Depreciation	4,546	7,000	10,354	1,900
Interest on W. Capital at 9%	1,760	2,710	4,005	733
	6,306	9,710	14,359	2,633
G. TOTAL	81,063	124,825	174,610	33,798

OPERATING INCOME

	<u>SAFETY PINS</u>	<u>GEM CLIPS</u>	<u>PAPER PINS</u>	<u>STAPLES</u>
Production Capacity in Metric tons	5.4	8.3	12.3	2.25
Production Cost per ton	15,011	15,039	14,196	15,021
Ex-factory price per ton	8,335	13,335	12,070	21,739
Revenue per annum	45,009	110,681	148,461	48,913

Profitability Analysis

	<u>Tz. Shs.</u>
Total annual revenue from sale of 28.25 m. tons of products	353,064.00
Total cost of production	406,254.00
	<u>- (53,190.00)</u>

Dar es Salaam, August 28, 1970

DETAILS OF MACHINERY AND EQUIPMENT

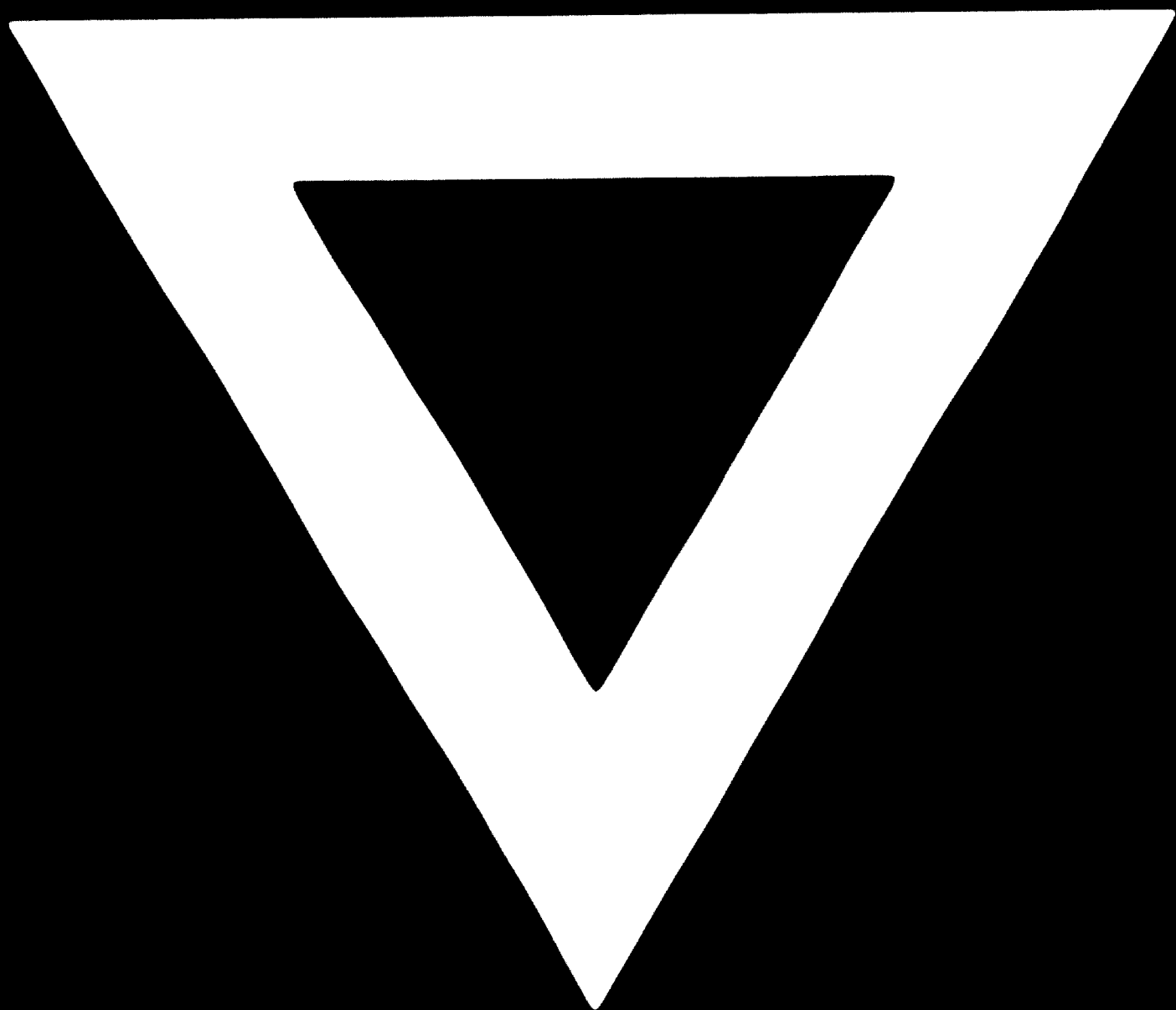
Quotations were received from various companies in Germany as well as Japan. After careful scrutinizing of these quotations and considering their prices and capacities in relation to the estimated demands of the products, Japan machinery from M/S Chuo Boeki Goshi Kaisha (Central Commercial Co.) P.O. Box 8, Ibaraki City, OSAKA, Japan, has been recommended.

	QANTITY	TYPE, AND SPECIFICATIONS OF MACHINES	PRICE C.I.F. DAR ES SALAAM
A		<u>PAPER PIN MAKING UNIT</u> (Demand 900 pieces/minute)	
	1 set	Automatic Paper Pin Making Machine Model C.35 "TOMEI", complete with 1 H.P. motor, Switch, wire stand and standard accessories for making $\frac{3}{8}$ " size pins. Capacity 250 pieces/minute	Shs.10,930.00
	1 set	Same as above for 1" size	Shs.10,930.00
	1 set	Same as above for $1\frac{1}{4}$ " size	Shs.10,930.00
	1 set	Same as above for any one size ($\frac{3}{8}$ " or 1" or $1\frac{1}{4}$ ")	Shs.10,930.00
	4 sets	Spare parts - one year running for the four machines	
		8 pieces cutting knife	
		8 pieces cutting pipe	
		8 pairs gripping die	
		8 pieces header die	
		8 pieces forwarding chuck	
		8 sets straightening rod	
		4 sets grinding stone	
			Shs. 2,880.00
		Sub Total for Paper Pin Unit	Shs.46,600.00
B		<u>GEM CLIP MAKING UNIT</u> (demand 83 pieces/minute)	
	1 set	Automatic Gem Clip making machine 'Tomei' Model BC.120. Capacity 120-150 pieces/minute, complete with $\frac{1}{2}$ H.P. motor, switch, wire stand and standard accessories for 35 mm. size	Shs. 6,268.00
	1 set	Spare parts and accessories for making 28 mm. and 24 mm. sizes.	
		17 3 pieces cutting knife	Shs. 176.80
		27 6 pieces chuck for anti backing	Shs. 441.50
		37 6 pieces forwarding chuck	Shs. 441.50
		47 3 sets straightening rollers	Shs. 482.15
		57 3 sets bending pipe	Shs. 1,205.40
		67 3 sets bending axial	Shs. 120.00
		Sub Total for Gem Clip Unit	Shs. 9,135.35

		<u>SAFETY PIN MAKING UNIT</u>	
		(Demand 7 60 pieces/minute) (sizes (0-1-2))	
C	1 set	Automatic Wire Straightening and Cutting Machine 'Tomei' Model SC 1, complete with ½ H.P. motor, wire stand. Capacity 120 pieces/minute	Shs. 5,845.00
	2 sets	Replacement parts for size 1 and 2	Shs. 1,071.00
	3 pieces	Space cutting die	Shs. 160.00
	1 set	Automatic Wire Sharpening Machine 'Tomei' Model WS.1, complete with 1 H.P. motor and switch. Capacity 1,000 pieces per minute.	Shs. 7,915.00
	1 piece	Spare grinding stone 10" ø x 4"	Shs. 357.00
	3 sets	Wire Bending and Coiling Machines for sizes 0-1-2 'Tomei' Model Bal. Group driven complete with 1 H.P. motor, Hoop carrier and roll feeder. For 1 size (say 0). Capacity 60 pieces/minute	Shs. 10,352.00
	5 pieces	Head making dies. Two for size 1 and 2 and three spares	Shs. 5,355.00
	1 set	Automatic assembling machine model EO-5; complete with 1 H.P. motor, turning table and one specific size	Shs. 9,588.00
	2 pieces	Metal moulds for 2 remaining size	Shs. 536.00
	3 "	Spare moulds for sizes 0-1-2	Shs. 803.00
	1 piece	Tumbling barrel for Paper Pins, Clips, Safety Pins (Double-Polishing Tumbler)	Shs. 5,654.00
		Sub Total for Safety Pin Unit	Shs. 63,221.00
		<u>STAPLE PIN UNIT</u> (Demand 190 pieces/minute)	
D	1 set	Automatic Staple Pin Making Machine Model S. S.P.-30 ('Tomei') Complete with ½ H.P. motor, Switch, wire stand and standard accessories for making one size of staple pins, Capacity 150/200 pieces per minute.	Shs. 7,490.00
		<u>Spare parts for 4 sizes of Staple Pins</u>	
	20 pairs	Cutting die	Shs. 1,070.00
	24 pieces	Bending die	Shs. 2,570.00
	4 sets	Straightening roller	Shs. 743.00
	4 pieces	Pushing die	Shs. 320.00
	4 "	Pressing die	Shs. 214.00
	4 "	Header	Shs. 160.00
	4 "	Rails for Standard Types	Shs. 643.00
		Sub Total for Staple Unit	Shs. 13,210.00

<u>NICKEL PLATING UNIT</u>			
1	piece	Deoiling Bath 100 x 50 x 50 cm.	Shs. 726.40
1	"	Two steps Washing Bath for Water 100 x 50 x 50 cm. Iron made, lined with 3 mm. pvc.	Shs. 1,413.60
1	"	Washing Bath for water, 50 x 50 x 50 cm. Iron made lined with 3 mm pvc.	Shs. 802.20
1	"	Washing bath for acid solution and neutralization, 50 x 50 x 50 cm. size. Iron made, lined with 3 mm. pvc.	Shs. 687.90
1	set	Horizontal Rotary Plating Bath 75 x 50 x 50 cm. size; complete with 2 pvc of plating barrel, copper tube, 1/4 HP motor and switch.	Shs. 3,935.80
1	piece	Washing bath for hot water, 50 x 50 x 50 cm. Stainless steel made.	Shs. 1,339.35
1	set	Silicon rectifier self-cooling type with Tap switch, D.C. output - 12V, 200A	Shs. 4,432.95
1	set	Filter, complete with 1/2 HP motor, and Switch, capacity - about 200 litres/hour	Shs. 3,783.70
1	set	Dehydrater with 1 HP motor & switch 16" dia x 9" depth	Shs. 3,439.35
1	set	Double polishing Tumbler - wooden, 900 mm x 400 mm dia - complete with 1 HP motor and switch.	Shs. 5,655.85
1	set	Single polishing tumbler for Safety Pins	Shs. 5,273.70
1	piece	Special plating banol for paper pins	Shs. 1,706.50
1	piece	3 kw Iron made heater for deoiling bath	Shs. 142.90
1	piece	3 kw SUS made heater for hot washing bath	Shs. 235.75
1	piece	3 kw Silica made heater for plating bath	Shs. 264.30
5	pieces	Stainless steel made baskets 250 mm dia x 250 depth	Shs. 821.45
1	set	Thermostat	Shs. 1,197.90
Sub Total			Shs. 35,859.65

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