

(7) Problems of operating rates and line balancing

Nothing of note.

1-5-3 Analysis of Products Quality

Nothing of note.

1-5-4 Products Design

In contrast to the indications in the originally designed specifications the actual machine processing for the main parts involve a smaller number of processes, and processing is intensive and has been corrected. For example, the original specifications envisaging mass production included repeated drilling operations have been corrected to allow a number of operations to take place at one location. This allows for passing over the second drilling operation and going on the the next process after first drilling.

It is necessary to reconsider standards and operational methods in the light of present conditions to make these more streamlined.

1-5-5 Production Development and Design System

Nothing of special note.

Table AI-1-5-1 AME NO.1 SHOP MANNING ORGANIZATION

Section	Manager	Admin. Staff	Engin'g Staff	Foreman	Skilled Workers	Semiskilled Workers	Unskilled Workers	(Unit: persons)	
								Total Workers	Total Workers
Shop Manager	1							1	
Assembly				2				2	
Production				1				1	
Progress				1				1	
Store				1				1	
Winding Section					5	15	5	25	
Painting Section				1	1	4	2	8	
Motor Assembly					2	3	1	6	
Repair Section				2	2	4	-	6	
Fan Assembly				2	2	1	2	5	
Generator Section				3	3	3	1	7	
Front guard				1	1	3	3	7	
Milling Section				4	4	3	1	8	
Press Section				1	1	4	3	9	
Turning Section				1	5	13	1	19	
Grinding Section					3	2	-	5	
Diecasting Section					2	2	-	4	
Welding Section					1	4	-	5	
Boring Section				1	-	1	-	2	
Drilling Section					3	6	2	11	
Progress Section					-	6	-	6	
Component Store				1	-	5	1	7	
Raw Store				1	1	1	-	3	
Tool Store				1	1	-	-	2	
Total	1			11	37	80	22	151	

Table AI-1-5-2 MOTOR: MANNING ORGANIZATION

Section	Foreman	(Unit: persons)			Total Workers
		Skilled Workers	Semiskilled Workers	Unskilled Workers	
Turning Section		4	8	1	13
Press Section	1	1	5	1	8
Motor Assembly		2	3	1	6
Milling Section		3	3		6
Winding Section		3	6	3	12
Drilling Section		2	7	1	10
Painting Section	1		2	2	5
Grinding Section		2	2		4
Diecasting Section		2	2		4
Total	2	19	38	9	68

Table AI-1-5-3 FAN: MANNING ORGANIZATION

(Unit: persons)

Section	Foreman	Skilled Workers	Semiskilled Workers	Unskilled Workers	Total Workers
Fan Section		4	4	3	11
Turning Section		3	10	1	14
Drilling Section		1	5		6
Diecasting Section		2	1		3
Winding Section		4	10	2	16
Press Section	1	1	6	1	9
Front Guard, Rear Guard		1	3	2	6
Welding Section		1	1		2
Grinding Section		2	2		4
Milling Section		2	1		3
Painting Section	1	1	4	2	8
Total	2	22	47	11	82

Table AI-1-5-4(1) RM AND CP SUPPLY PERFORMANCE
- MODEL 7.5kW MOTOR (1) -

Part No. and Part Name	Qty	Raw Material	kg	No. of Oper'n	LP
1 CST79 Stator Lamination	1	Cold Rolled Silicon Steel Strip 5.23 0.5t	6240	2	LP
2 B0100102 Packing for Terminal Box	1	Neoprene rubber sheet 55.65 - 1.6t (or) 1.5t	0.6mtr	2	LP
3 W995-ICA Washer for Terminal Screw	3	Brass Sheet & Plate BSP 3.8 1/2H 1.0t	0.8mtr	2	LP
4 W995-ICA Washer for Grounding	2	Brass Sheet & Plate BSP 33 1/2H 1.0t	24	2	LP
5 S0140203 Ball Bearing Flinger A	1	Electro Galvanized Steel Sheet SECC P0 3.1.6t	24	2	LP
6 B0140204 Ball Bearing Flinger B	1	Electro Galvanized Steel Sheed SECC P0 3.1.6t	1.6	2	LP
7 B-0140307 Packing for Flinger Cover	1	Neoprene Rubber Sheet 53.65, 1.6t (or) 1.5t	24	2	LP
8 B-0120406 Slide Plate	1	Electro Galvanized Steel Sheet SECC P.03 - 1.6t			
9 B-0090204 Balancing Weight for Rotor	8	Electro Galvanized Steel Sheet P0.3, 0.5t, 0.8t, 1.2t, 1.6t			
10 B0140201 Cast Aluminium Case Rotor	1	Virgin Aluminium Ingot	216	2	LP
11 B0140208 Rotor Shaft	1	Carbon Steel for Machine Structural Use S45C-500	922	5	LP
12 B-0140306 Flinger Cover	1	Electro Galvanized Steel Sheet Secc pc-3-1.0t	59	2	LP
13 B-0140101 Frame	1	Casting	180nos	5	LP
14 B-0090103 Terminal Box	1	Casting	180nos	2	LP
15 B-0090108 Terminal Box Cover	1	Casting	100nos	2	LP
16 B-0140205 Outer Fan	1	Casting	180nos	5	LP
17 B-0140301 End Shield A	1	Casting	180nos	4	LP
18 B-0140302 End Shield B	1	Casting	180nos	4	LP
19 B-0140401 Sliding Base	1	Casting	180nos	4	LP
20 B-0140402 Shifting Rod A	1	Casting	180nos	4	LP
21 B-0140402 Shifting Rod-B	1	Casting	180nos	3	LP
22 B-0140303 Fan Cover	1	Casting	180nos	3	LP
23 R050x1160PA Rivet for Lamination	8	Casting			IP
24 B-0140102 U Terminal U Marked It	1				IP
25 B-0140102 V Terminal V Marked It	1				IP
26 B-0140102 W Terminal W Marked It	1				IP
27 B-0090104 Bushing	1				IP
28 466800 Name Plate 0.4t	1				IP
29 R1.23x0040LA Rivet for Name Plate RMR2.3x4	4				IP
30 XA-10B-16DL Screw for Stator BT 10x16	1				IP

Notes: LP: Local Production IP: Imported Parts

Table AI-1-5-4(2) RM AND CP SUPPLY PERFORMANCE
 - MODEL 7.5kW MOTOR (2) -

Part No. and Part Name	Qty	Raw Material	kgs	No. of Oper'n
31 SN5+012x100 Screw for Terminal Box JLA-5x12	3			IP
32 S14+006x100 Screw for Terminal Box Cover	2			IP
33 VN100182900 Eye Bolt EB10x18	1			IP
34 SV-5+014EA00 Ground Screw JNK5x14	1			IP
35 SN5+012x100 Terminal Screw JNK-5x12	3			IP
36 NG-051PLO Nut for Terminal Screw N5	3			IP
37 JB6308UND0 Ball Bearing-A	1			IP
38 JB6304URD0 Ball Bearing-B	1			IP
39 B0140206 Key for Outer Fan HNYC 10x8x28	1			IP
40 XK08C 22 DL Set Screw for Outer Fan MKHT 8x22	1			IP
41 UA-0320LJ Retaining Ring for Outer Fan (Tapper&Collar)	1			IP
42 B-0140207 Pulley Key XNY (10x8x50)	1			IP
43 B-0140304 Flinger 'A'	1			IP
44 B-014035 Flinger 'B'	1			IP
45 B-0140308 Wave Shaped Spring Washer (Tapper&Collar)	1			IP
46 VG-08035PL00 Bolt for Mounting End Shield 'A' (8x35)	4			IP
47 VG-08035PL00 Bolt for Mounting End Shield 'B' (8x35)	4			IP
48 VG-06020PL00 Bolt for Mounting Fan Cover (6x20)	4			IP
49 WA-06 ZNI Spring Washer for Fan Cover SM6	4			IP
50 SN5+012x100 Screw for Mounting Fan Cover NK 5x12	4			IP
51 B-0140404 Adjusting Bolt B10x120	1			IP
52 B-0140405 Nut for Adjusting Bolt M10	1			IP
53 PD-020x020x1 Set Pin for Adjusting Bolt WP (7x20)	1			IP
54 B-0140405 Mounting Bolt M10	4			IP
55 NG-101PLO Nut for Mounting Bolt M10	4			IP

Note: IP: Imported Parts

Table AI-1-5-5(1)

RM AND CP SUPPLY PERFORMANCE
- MODEL 130Y0: CEILING FAN (1) -

Part No. and Part Name	Qty	Raw Material	kgs	No. of Oper'n	LP
1 60mm d.x0.5t Washer	3	Brass Sheet & Plate BSF3-0.8tx28	1	2	LP
2 Shaft	1	Cold Finished Steel Bar 835C D 270x2000L	17pcs	4	LP
3 Blade	3	Aluminum Sheet & Plate ALI 3H	24pcs	3	LP
4 Blade Frame	3	Cold Rolled Steel Sheet & Plate SPC7 8tx914x1809	351.6	3	LP
5 80mm d.x1.6t Washer	8	Brass Sheet & Plate BSD-3.1.6tx37	7.9	1	LP
6 Pipe	1	Carbon Steel Pipe for Structural Purpose STK30-240x900L	100pcs	1	LP
7 LX2-35 Suspender	7	Cold Finished Steel Bar 815CD 8dx2000L	18.5	1	LP
8 CX1710 Reactance End Sheet	8	Cold Rolled Sheet & Plate SPC1.1.2tx915Wx1830L	63.2	1	LP
9 Stator Core and Rotor Core	6	Silicon Steel Plate H23 0.5tx200 Roll	48.1	1	LP
10 Rotor Core with Diecasting	1	Aluminum Alloy for Diecasting (AL)	40	2	LP
11 CXY56 Coupling	1	Cold Finished Steel Bar SSC-D (330x2000L)			LP
12 40mm d.x8.5t Washer	4	Brass Sheet & Plate BSP-3 (0.5tx40)	21	1	LP
13 Speed Regulator Cover	1	Cold Rolled Carbon Steel Sheet & Plate SPVA 0.8tx915Wx1830L	9pcs	4	LP
14 Speed Regulator Base	1	Cold Rolled Steel Sheet & Plate SPC3 1.6tx915Wx1830L	37.8	4	LP
15 C170 Reactance Core	1	Silicon Steel Plate H23 (0.5x9151Wx1830L)	16.9	1	LP
16		Solder	0.2		LP
17		Solderite Flux S-100	0.01		LP
18 Stator Coil		PVC Wire PV.F.0.60	1.5	1	LP
19 Reactance Coil		PVC Wire PVP 0.550	26	1	LP
20		Cottons Sleeve 20x150m (ROLL)	0.75	1	LP
21 Slot Insulator A		Press Board 0.25tx800Wx1000L	12.8(sh)	1	LP
22 Slot Insulator B		Press Board (0.25tx800Wx1000L)	17.5	1	LP
23 Slot Insulator C		Empire Cloth (0.18tx900Wx1000L)	5.8	1	LP
24		Empire Tube 20 (1M/PCS)	8.45	1	LP
25		Empire Tube 60 (1M/PCS)	3.35	1	LP
26		Empire Tube 50 (1M/PCS)	11pcs	1	LP
27 Cotton Tape		Spun Rayon Tape 13W (3m/Roll)	0.55	1	LP
28		Lead Wire 0.180x30-200 Roll	7.5	1	LP
29 Insulator		Press Board 0.13tx800Wx1000L	0.58shts	1	LP
30 Insulator		Press Board 0.18tx800Wx1000L	1.40shts	1	LP
31 Insulator		Press Board 0.5tx800Wx1000L	1	1	LP
32		Cotton Tape 19W (30m/Roll)	6.75Roll	1	LP
33		Varnished Tube (Black) 20 (1M/PCS)	41.25	1	LP
34		Varnished Tube (Red) 20 (1M/PCS)	41.25	1	LP
35		Varnished Tube (White) 20 (1M/PCS)	13.5 Roll	1	LP
36		Vinyl Tube (Black) 40 (100m/Roll)	0.1 Roll	1	LP
37		Vinyl Tube (White) 40 (100m/Roll)	0.1 Roll	1	LP
38		Vinyl Tube (Red) 40 (100m/Roll)	0.2 Roll	1	LP
39		Vinyl Tube (Black) 40 (100m/Roll)	0.15 Roll	1	LP
40		Varnish Silk 0.18tx900Wx1000L	1.2shts	1	LP
		Empire Tube 30 (1M/PCS)	22.5pcs	1	LP

Note: LP: Local Production

Table AI-1-5-5(2)

RM AND CP SUPPLY PERFORMANCE
- MODEL 130YO: CEILING FAN (2) -

	Qty	Raw Material	kgs	No. of Oper'n
41	3	60mm d.x35L Plus Set Screw		IP
42	3	60mm d.x1 Spring Washer		IP
43	1	6201 Bearing		IP
44	1	CYZ.702 Thrust Washer		IP
45	1	13040 50R Name Plate		IP
46	2	47.6L Rivet		IP
47	1	6304.2 Ball Bearing		IP
48	1	C43-703 Washer for Ball Bearing		IP
49	4	C4-15 Stator Core Tightening Tube		IP
50	9	50mm d.x10L Round Head Rivet		IP
51	6	80mm d.x16L Plus Set Screw		IP
52	6	80mm d. Spring Washer		IP
53	1	13040-55 Canopy		IP
54	2	50mm d.x10L Plus Set Screw		IP
55	1	20mm d.x15L Lateral Pin		IP
56	1	80mm d. Hexagonal Nut		IP
57	1	140YB-38 Pipe Holding Bolt		IP
58	4	40mm d.+5L Plus Set Screw		IP
59	2	K1-93 Cord Bushing		IP
60	1	130Y0 51R Name Plate		IP
61	1	6YZ-105 Connection Diegran Paper		IP
62	6	40mm d. Hexagonal Nut		IP
63	1	140ZZ-1001-A Switch		IP
64	1	N6-630 Terminal Washer		IP
65	2	40mm d.x45L Plus Set Screw		IP
66	16	CX3-603 Shading Coil		IP
67	16	6x3-604 Magnetic Hedge 0.7t		IP
68	1	CX2-206 60RD Bushing		IP
69	16	CU-130B Fiber for Hedge 1.6t		IP
70	1	Suspender Rubber		IP
71	1	CY-1713 Switch KN		IP

Note: IP: Imported Parts

Table AI-1-5-6 LOCAL AND IMPORTED CP AND RM
 - ELECTRIC PRODUCTS -

	(Unit: pcs)	
	Motor 7.5kW	Fan 130Y0
Component Parts	55	71

Local Material, Worked Locally	10	2
Locally Worked	12	38
Imported CP	33	31
Imported RM	53	69

Table AI-1-5-7 PRODUCTION IN THE LAST 3 YEARS

Type	Year	B.E	R.E	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Total
Electric Motor																
0.75kW	1984/85	500	500	-	-	-	-	-	-	-	-	100	-	-	-	100
	1985/86	500	500	-	-	-	-	-	-	-	200	100	-	100	-	400
	1986/87	500	700	-	-	-	-	-	350	-	230	-	-	-	-	580
1.5kW	1984/85	300	300	-	-	150	-	-	-	-	-	66	134	100	-	600
	1985/86	300	300	-	-	-	150	150	60	90	-	100	-	-	300	
	1986/87	300	300	-	-	-	-	-	100	-	-	100	-	-	200	300
3.7kW	1984/85	100	100	-	-	-	-	-	-	-	-	-	-	-	-	100
	1985/86	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
	1986/87	100	340	-	60	-	-	100	-	-	-	80	-	-	100	340
7.5kW	1984/85	100	100	-	-	-	-	-	-	-	-	-	89	-	-	89
	1985/86	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
	1986/87	100	100	50	-	-	-	-	150	-	-	-	100	17	35	235
ST-NHC	1984/85	100	100	-	-	-	-	-	-	-	-	-	-	-	-	117
	1985/86	50	50	-	-	-	-	-	-	-	-	-	-	-	-	-
	1986/87	100	100	-	-	-	-	-	-	-	-	-	18	-	-	18
STC-NHC	1984/85	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
	1985/86	50	50	-	-	-	-	-	-	-	-	-	-	-	-	-
	1986/87	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
4F 4A	1984/85	-	-	-	-	-	-	-	50	-	-	-	-	-	-	50
	1985/86	-	-	-	-	-	-	50	-	-	-	-	-	-	-	50
	1986/87	-	-	-	-	-	-	-	-	-	-	20	-	-	-	20
Electric Fan																
30-SP	1984/85	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
	1985/86	100	100	-	-	-	-	-	-	-	-	-	-	-	-	-
	1986/87	100	300	42	39	-	-	-	-	-	-	-	275	-	160	241
40-XP	1984/85	500	750	200	100	175	-	-	-	-	-	-	-	-	-	750
	1985/86	500	500	-	225	-	-	-	-	-	-	125	-	150	-	500
	1986/87	500	750	-	-	-	-	-	-	-	50	175	-	210	-	435
130Y0	1984/85	2000	3000	-	-	562	-	-	600	600	600	200	-	-	500	3662
	1985/86	2000	2000	-	500	500	-	-	-	-	-	-	-	500	-	1500
	1986/87	2000	2000	-	-	500	500	-	-	-	-	-	-	500	500	2000
Iron Base																
NA-51	1984/85	-	-	-	-	1000	-	-	-	-	-	-	-	-	2130	3130
	1985/86	-	-	-	-	3466	4	-	1235	2065	655	1000	1500	2345	-	12270
	1986/87	-	-	500	1500	1500	1500	1500	-	3000	780	2070	-	-	-	12350

Notes: B.E: Budget Estimate R.E: Revised Estimate

Table AI-1-5-8 NO.3 HI AME SHOP PROBLEM EQUIPMENT LIST .

Sr No	Name of Shop	Line	Equipment which has Problem		
			Item No.	Name of Equipment	Model
1	AME1-120	Motor Ass'y		Fan Balancing	ND-5E
2	AME1-112	Ass'y	NL-2-5-12-A	Balancing M/C for Armature	H2B/5
3	AME1-113	Ass'y		Sand Saw	SM/320
4	AME1-128	Painting		Spray Booth	JGETRO
5	AME1-151	Winding		Winding Insulator Tester	KIT-10
6	AME1-079/E12	Grinding	5043	-Cylindrical Grinding	
7	AME1-011/A6	Grinding	PSM.300	Surface Grinding	GEJO
8	AME1-001/J61	Press	3rd 2-4(2)	55 ton Press	PD-XGC-55 SU-II
9	AME1-002/J60	Press	3rd 2-4(2)	55 ton Press	PD-XGC-55 SU-II
10	AME1-072/E21	Fargmann	A70212-13at	236 Balancing	LOS
11	AME1-055/E7	Turning	5373/8006	High Speed Lathe	DL-24
12	AME1-083/E3	Milling		Horizontal Milling	
13	AME1-039/E17	Drilling		Drilling M/C	
14	AME1-1117/1	Drilling		Upright Drilling	
15	AME1-035/E16	Drilling		Column Drilling	
16	AME1-029/E18	Drilling		Drilling M/C	TB-15
17	AME1-033/E18	Drilling		Drilling M/C	TB-15
18	AME1-042/E24	Drilling		Upright Drilling	5-BAST
19	AME1-043/E14	Drilling		Radial Drilling	
20	AME1-044/E6	Drilling		Drilling M/C	4W
21	AME1-E26	Turning		Precision Cutting Lathe	
22	AME1-137	Fargmann	7108/2	Diesel Engine Load Test	A-130
23	AME1 139	Fargmann	7108/3	Diesel Engine Load Test	A-130

Table AI-1-5-9 MACHINES EQUIPMENT & REQUIRED LIST
TO COVER THE PRODUCTION

No	Nomenclature	Q'ty	Remarks
1	High Speed Lathe	1 no	
2	Radial Drilling Machie	1 no	
3	Balancing Machine	1 no	for Armature
4	Turret Lathe (4A-Horizontal)	1 no	
5	Turret Lathe (3A-Horizontal)	1 no	
6	Winding Insulation Tester	1 no	
7	Vertical Lathe	1 no	
8	Rheostat (4KVA, 13.2 Ω -132 Ω , 17.4A-1.7VA)	1 no	

Figure AI-1-5-1 MACHINE LAYOUT OF AME COMPONENT MANUFACTURING SHOP NO.1

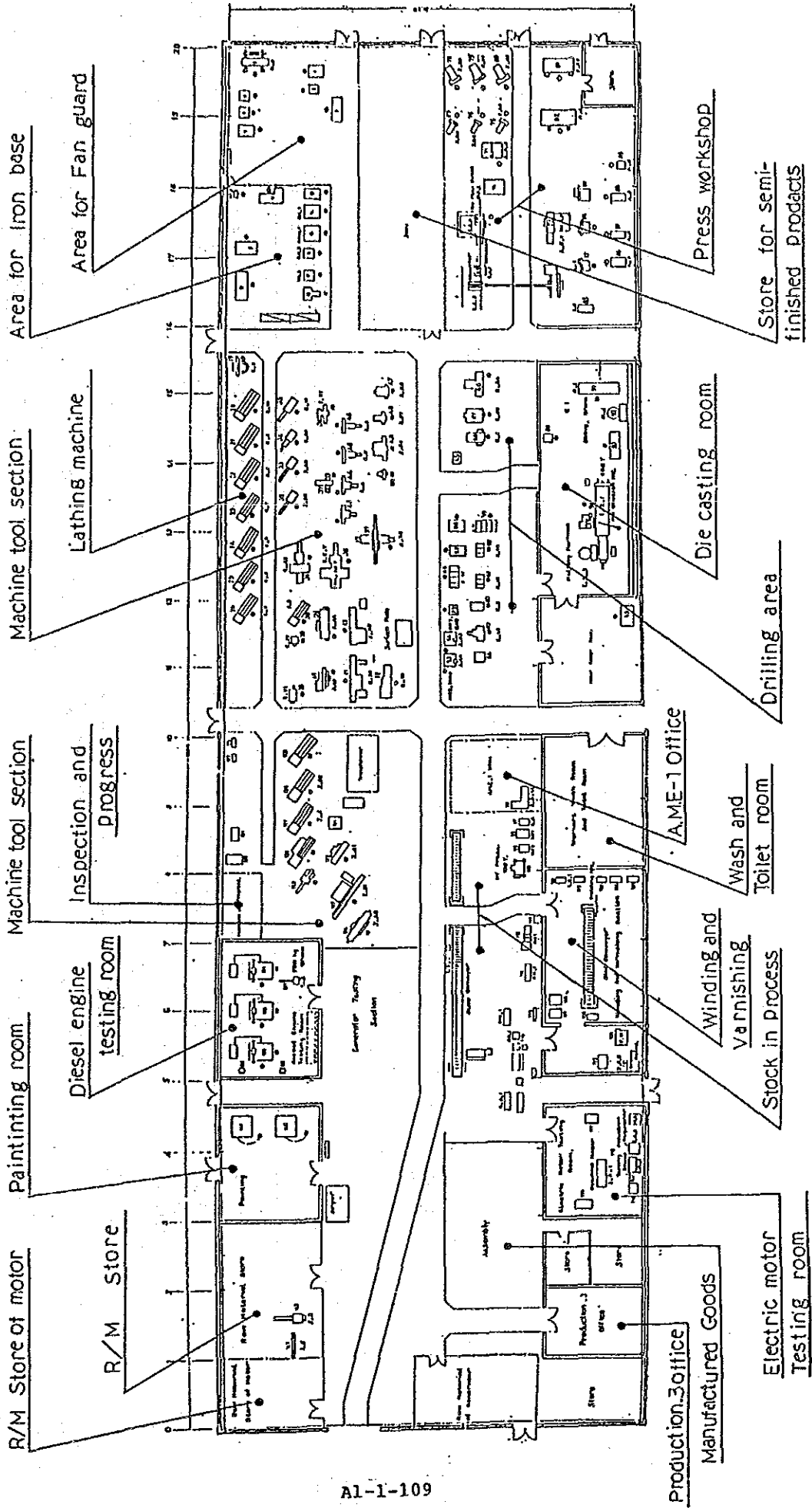
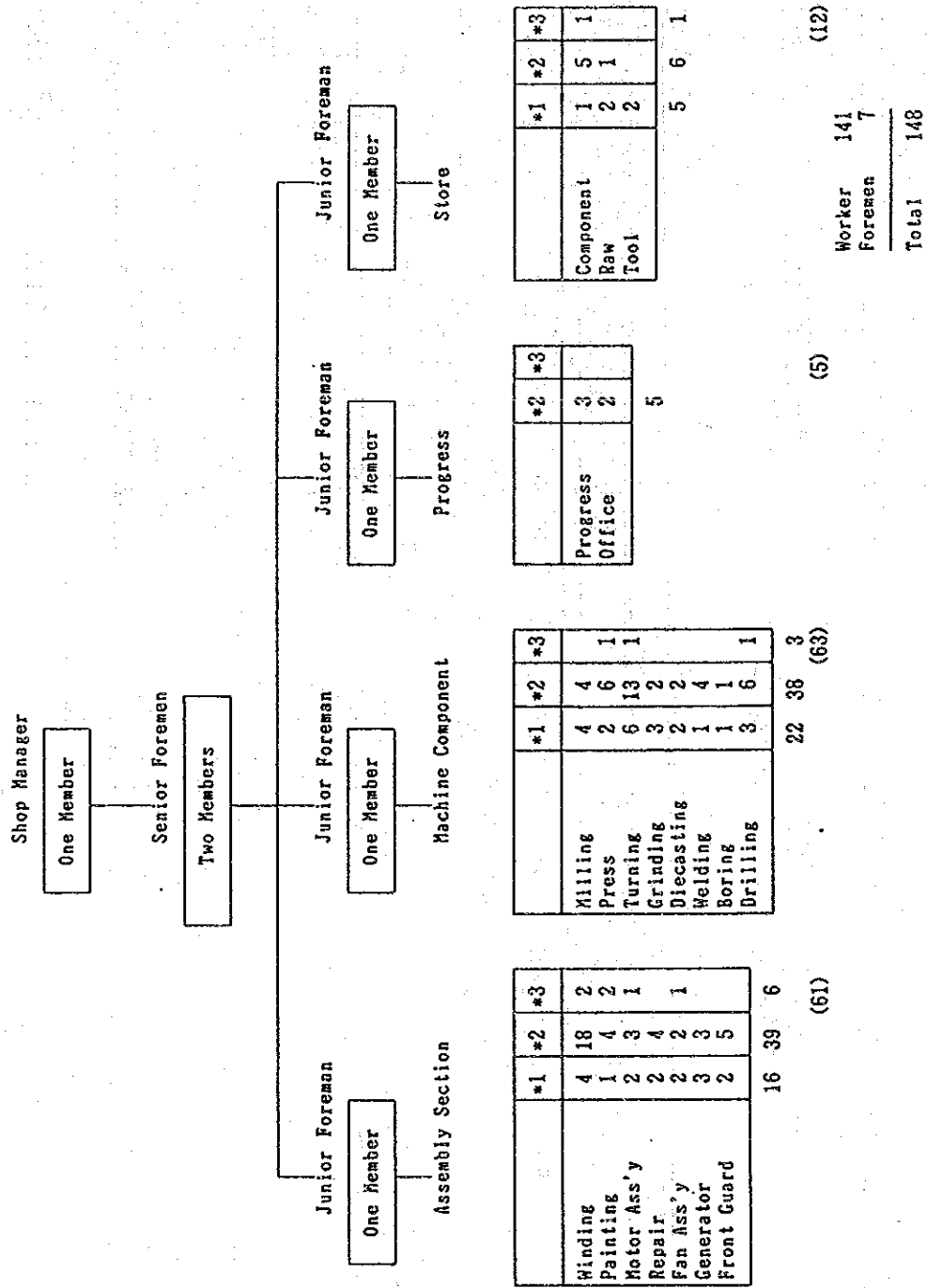


Figure AI-1-5-2 ORGANIZATION CHART, AMEL, NO.3 III



Notes: *1: Skilled Worker *2: Semiskilled Worker *3: Unskilled Worker

Figure AI-1-5-3(1) PROCESS CHART (MODEL 1.5KW MOTOR)

	Foundry		Drilling		Grinding		Die casting		Winding		Assembly		Other	
	Lathing		Milling		Press	Appearance		Painting		Testing				
Frame	•	•	•	•	•	•	•	•	•	•	•	•	•	•
End Shield A and B	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Outer fan	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Fan cover	•	•	•	•	•	•	•	•	•	•	•	•	•	•
Switch Cover	•													
Terminal box					•	•	•	•	•	•	•	•	•	•
Terminal box Cover					•	•	•	•	•	•	•	•	•	•
Stator									•					
Rotor					•	•	•	•	•	•	•	•	•	•
Shaft					•	•	•	•	•	•	•	•	•	•

Figure AI-1-5-3 (2-1) PROCESS CHART (MODEL 130YO FAN)

	Foundry		Drilling		Grinding		Die casting		Winding		Assembly		Other	
	Lathing		Milling		Press	Appearance		Painting		Testing				
Yoke	•	•	•		•	•								
Yoke cover	•	•	•											
Shaft	•	•	•		•	•								
Speed reg cover					•	•								
Coupling	•					•								
Speed reg base					•	•								
Pipe	•													
Reacting Core					•	•								
Stator					•	•								

Figure AI-1-5-3(2-2) PROCESS CHART (MODEL 130YO FAN)

	Foundry	Lathing	Drilling	Milling	Grinding	Press	Die casting	Appearance	Winding	Painting	Assembly	Testing	Other
Rotor		•				•		•					
Blade						•				•		•	
						•							•
						•				•			

Figure AI-1-5-4(1) FLOW CHART (MOTOR) 3mm D. EM-FB 4P 7.5kW 400V 50HZ

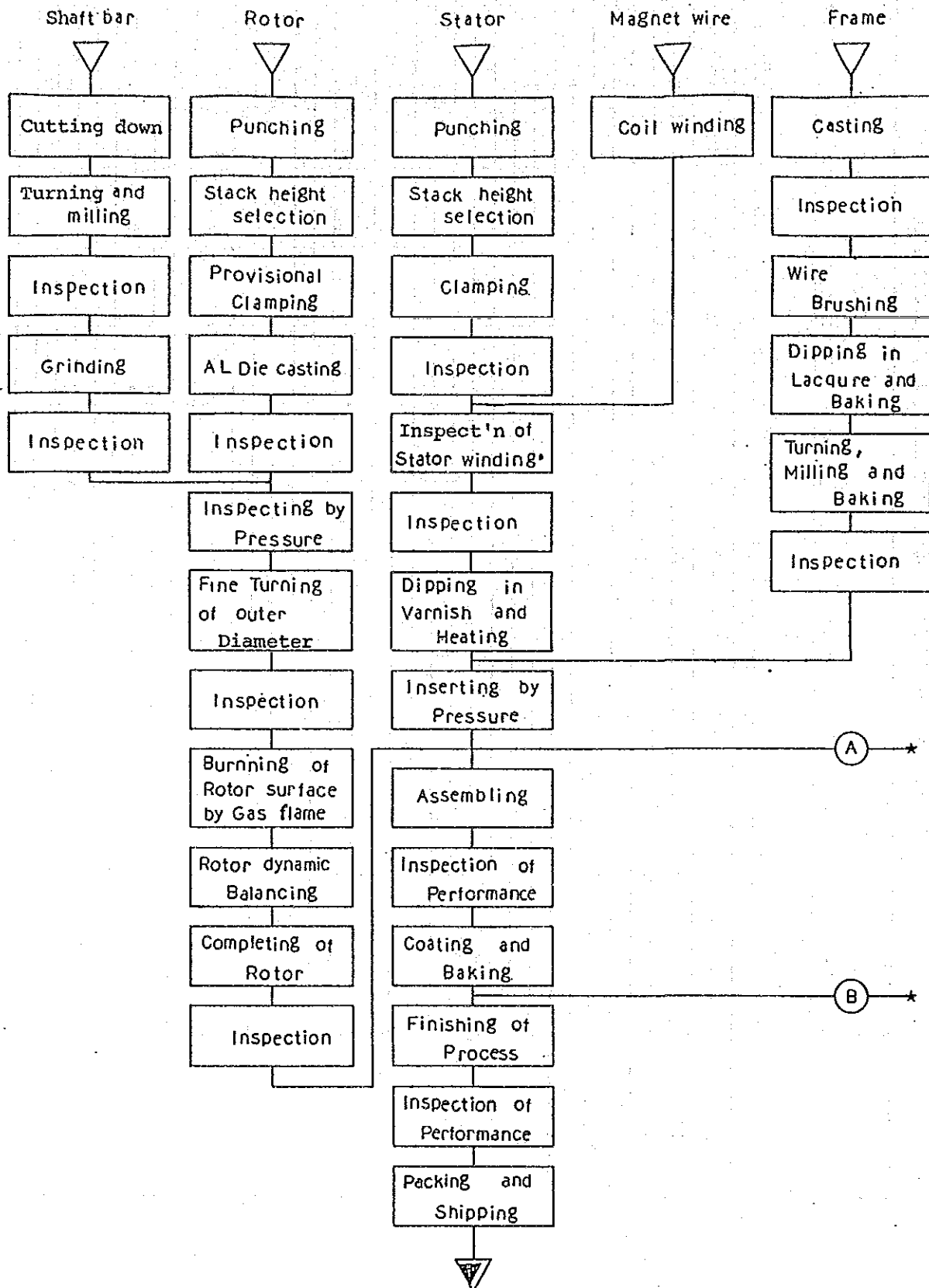


Figure AI-1-5-4(2) FLOW CHART (GENERAL) 3mm D. EM-FB 4P 7.5kW 400V 50HZ

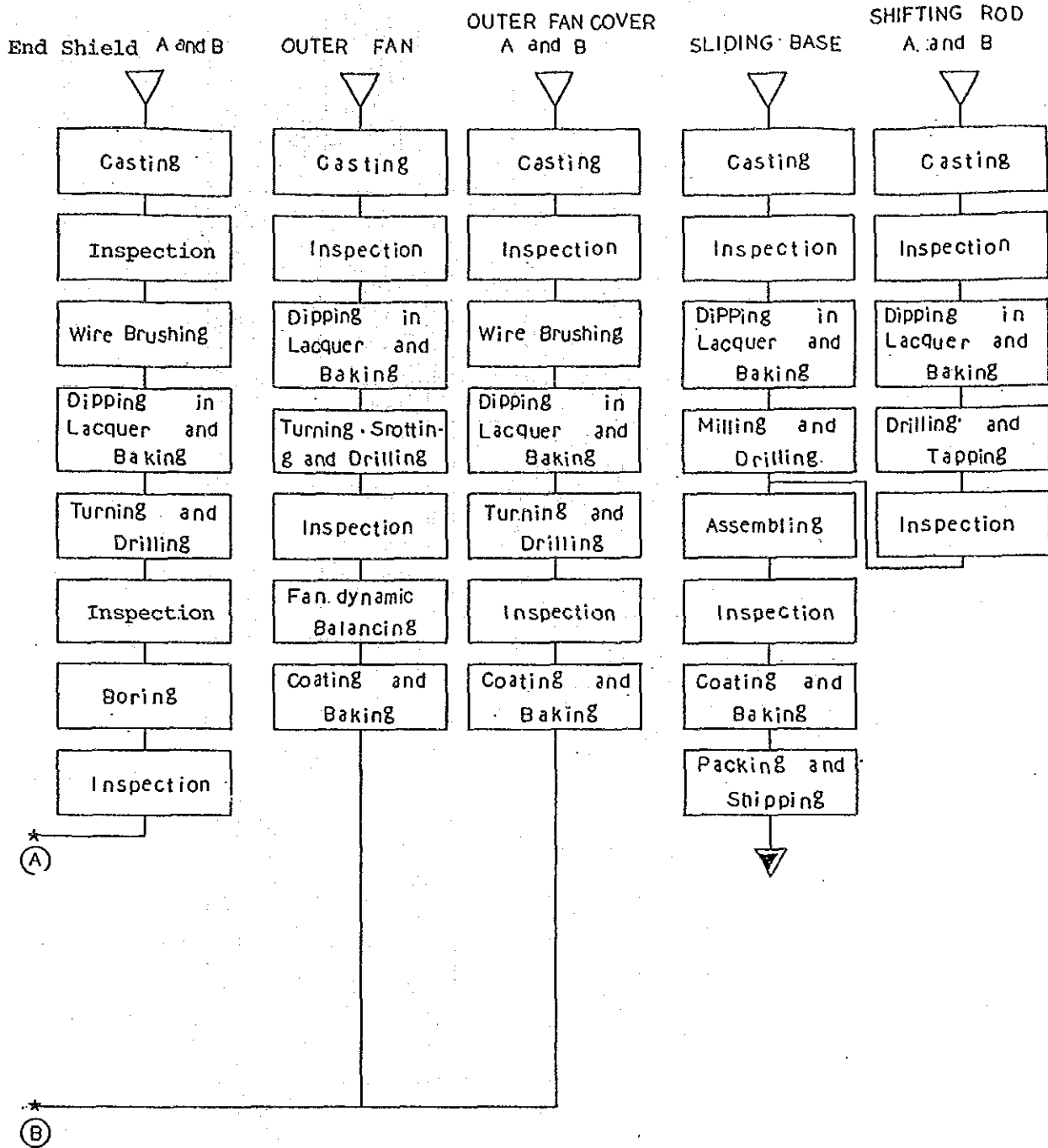


Figure AI-1-5-5(1) FLOW CHART - MODEL 1.5kW MOTOR FRAME

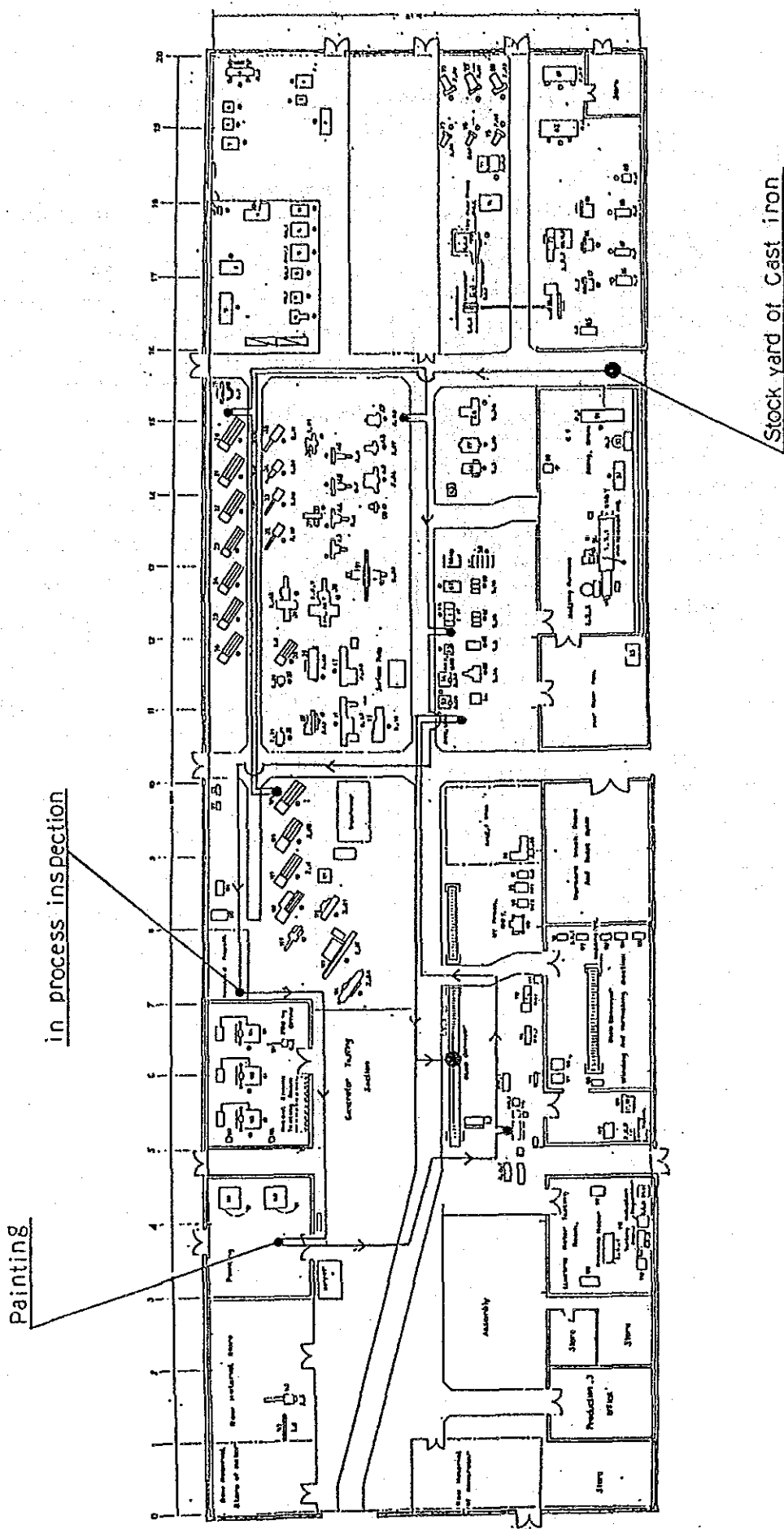


Figure AI-1-5-5(2) FLOW CHART - MODEL 130YO FAN ROTOR

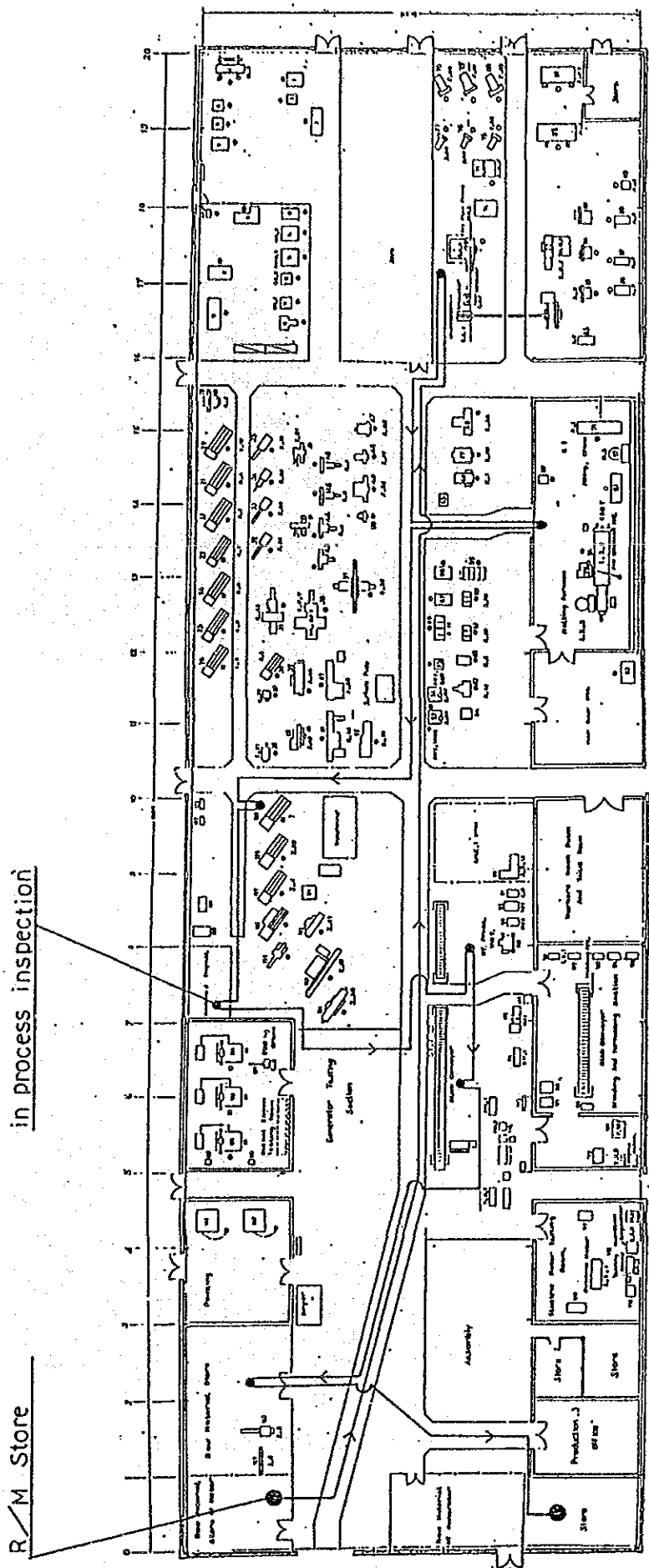
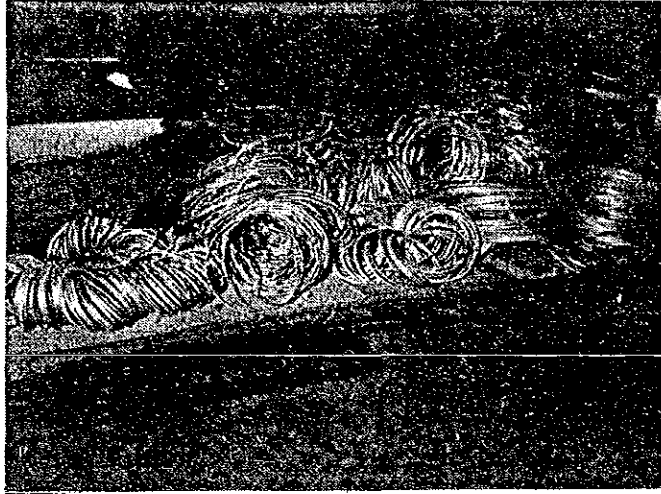
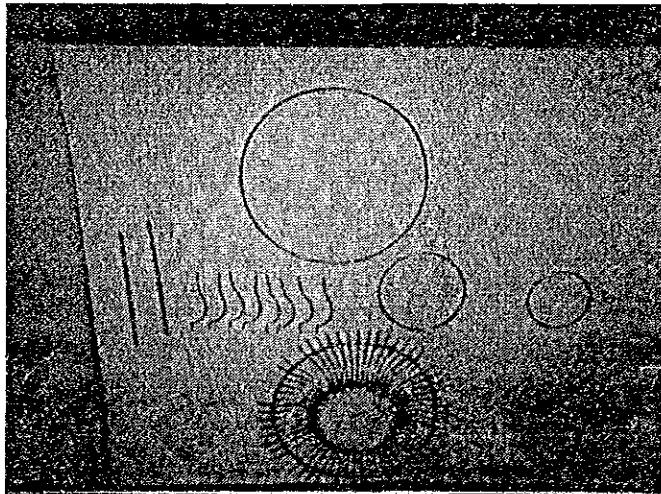


Figure AI-1-5-6(1) STEEL WIRE FAN GUARD IN PROCESS

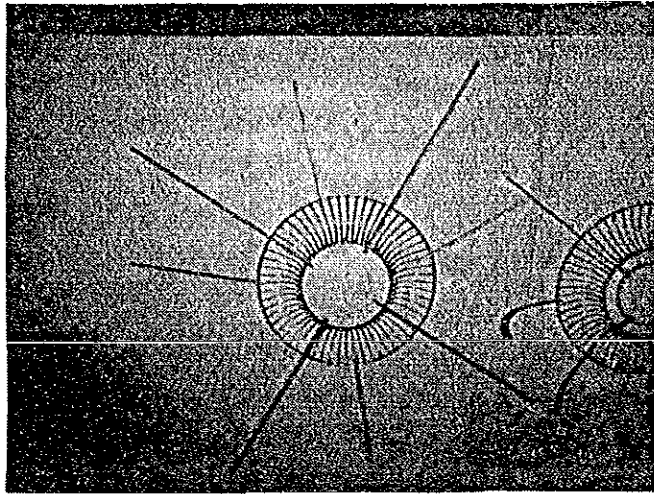


FEB/12 AME SHOP FAN GUARD

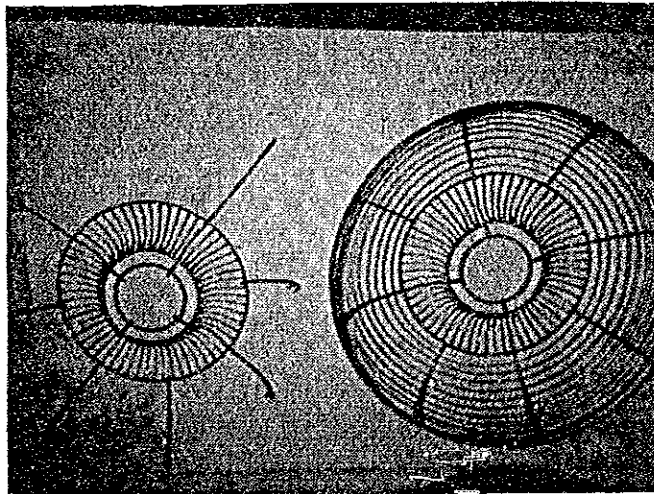


FEB/12 AME SHOP FAN GUARD

Figure AI-1-5-6(2) STEEL WIRE FAN GUARD IN PROCESS

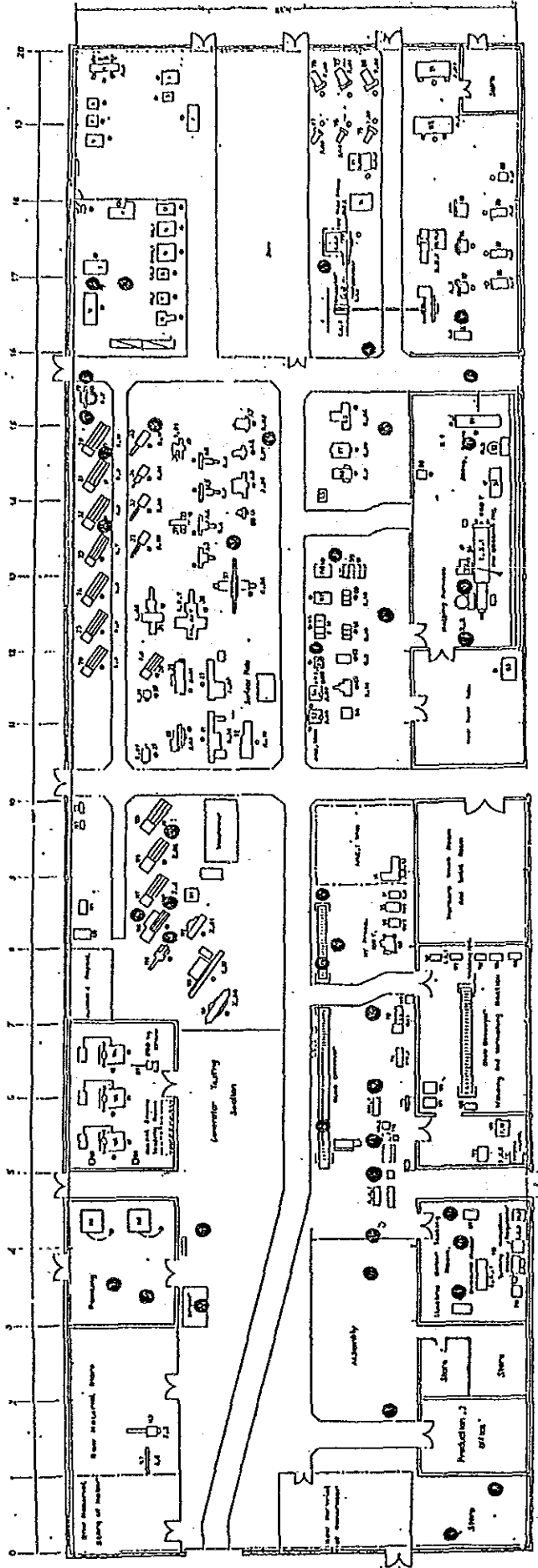


FEB/12 AME SHOP FAN GUARD



FEB/12 AME SHOP FAN GUARD

Figure AI-1-5-7 SITUATION OF THE WORKS IN PROCESS (20 POINT)



● : Works in process

Figure AI-1-5-8(1) COMPONENT PARTS IN PROGRESS
(Ref. to Table AI-1-5-8 and Fig. AI-1-5-9)

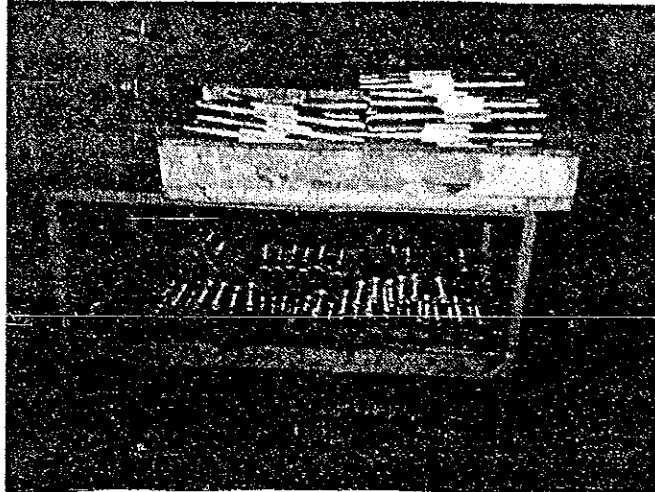


12 MOTOR COVER

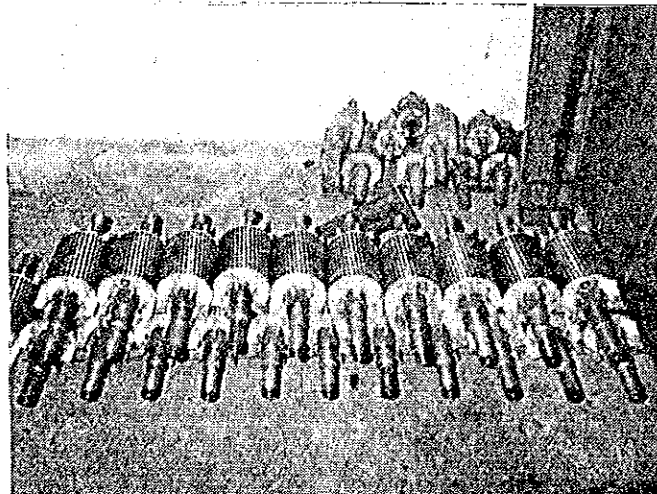


20 MOTOR. SWITCH BOX, FREAME

Figure AI-1-5-8(2) COMPONENT PARTS IN PROGRESS
(Ref. to Table AI-1-5-8 and Fig. AI-1-5-9)

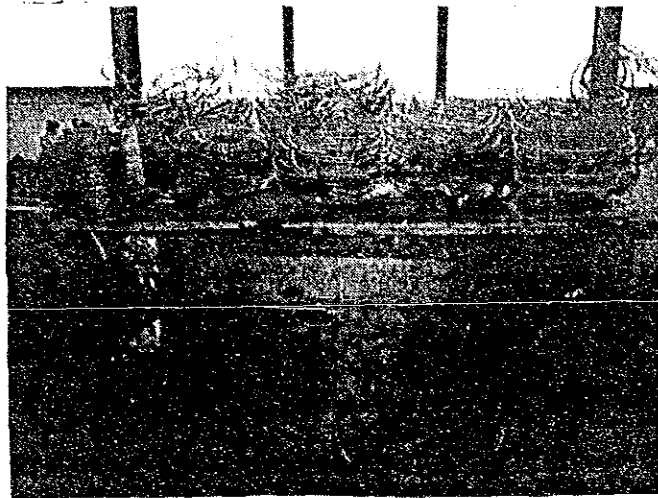


13 MOTOR SHAFT



31 MOTOR. ROTOR ASSEMBLY

Figure AI-1-5-8(3) COMPONENT PARTS IN PROGRESS
(Ref. to Table AI-1-5-8 and Fig. AI-1-5-9)

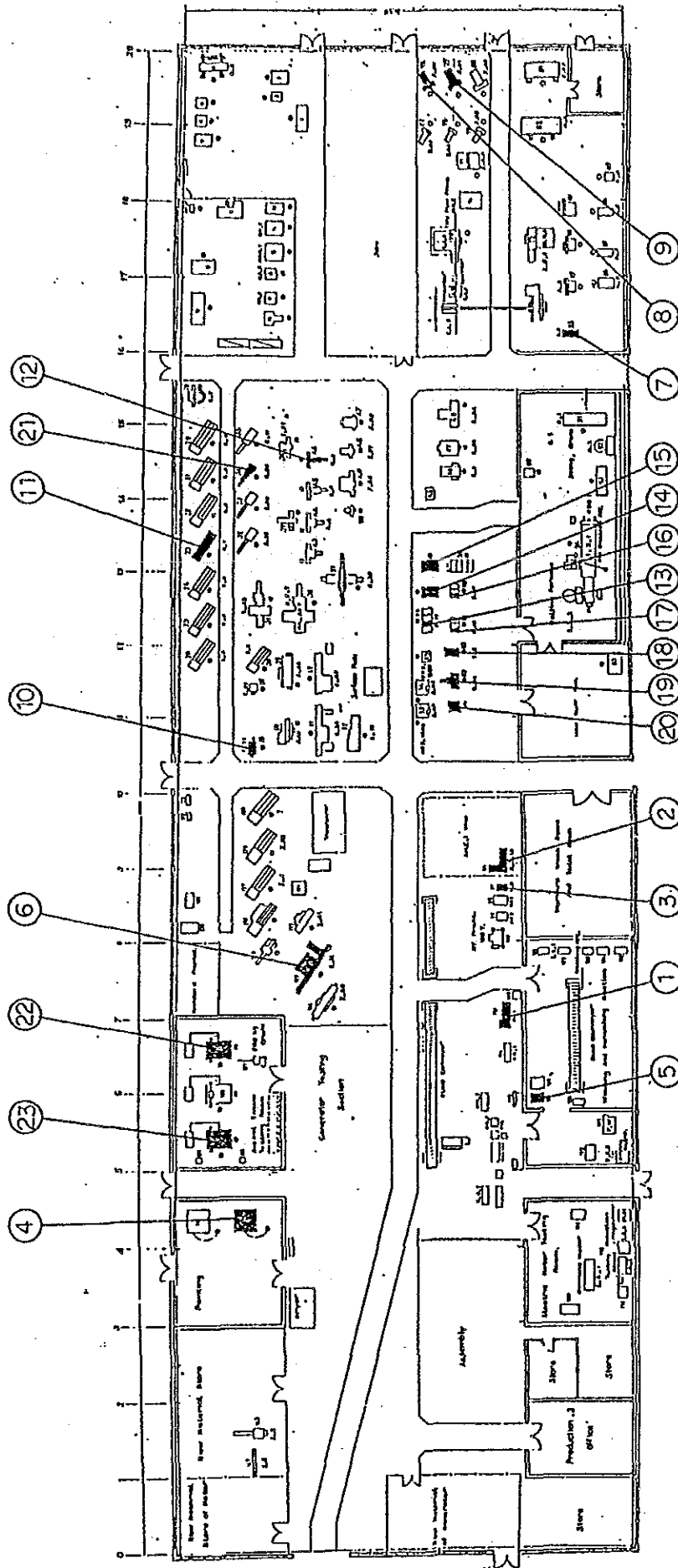


7 FAN GUARD



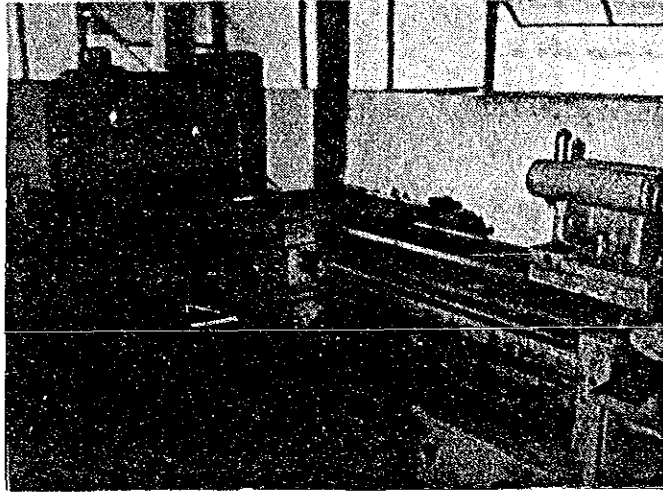
18 FAN STAND

Figure AI-1-5-9 MACHINE EQUIPMENT WHICH HAS PROBLEM (23 NUMBERS)

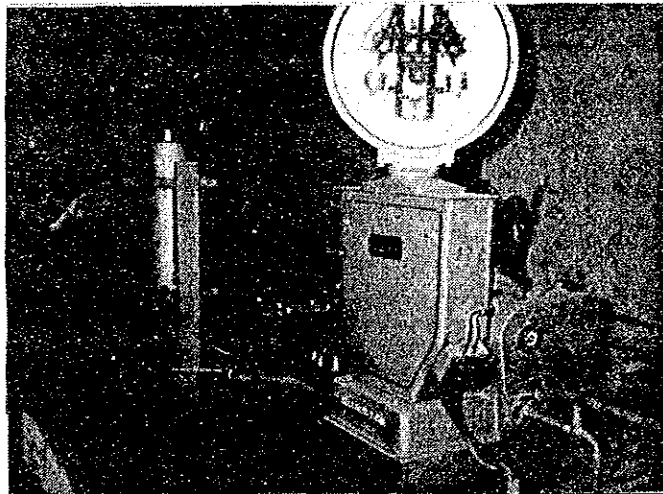


ANSWER : Problem M/E

Figure AI-1-5-10(1) DETERIORATION OF EQUIPMENT

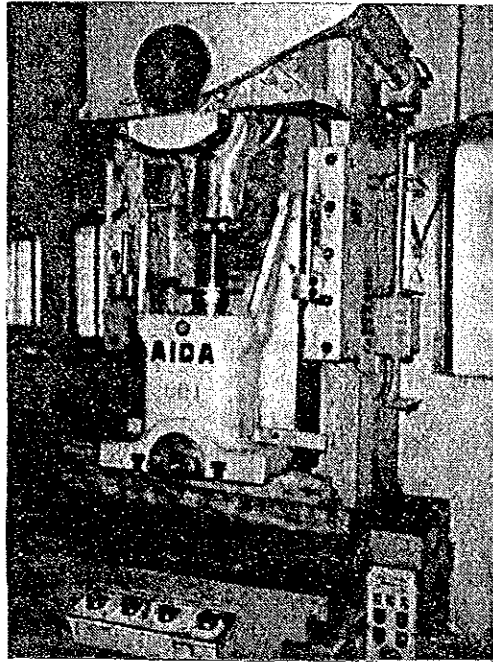


11 HIGH SPEED LATHE

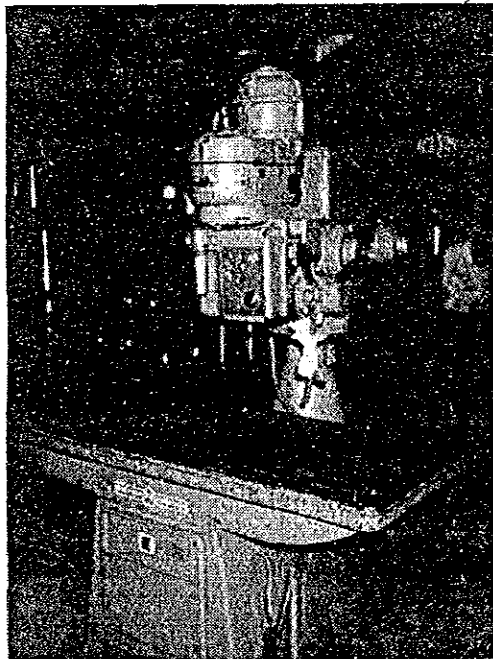


22 DIESEL ENGINE LOAD TEST

Figure AI-1-5-10(2) DETERIORATION OF EQUIPMENT

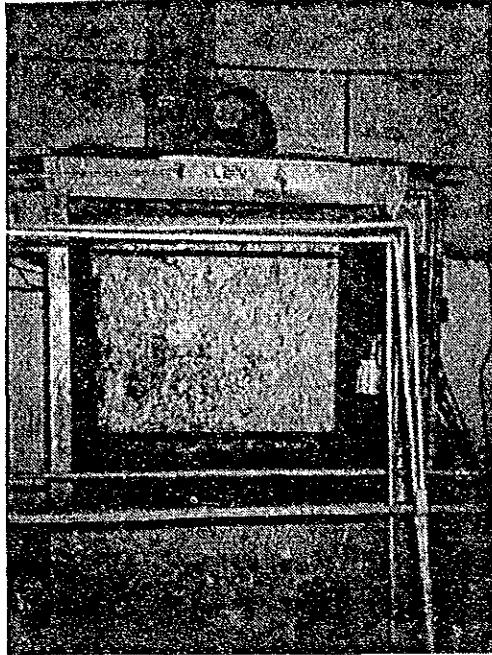


8 55 TON PRESS

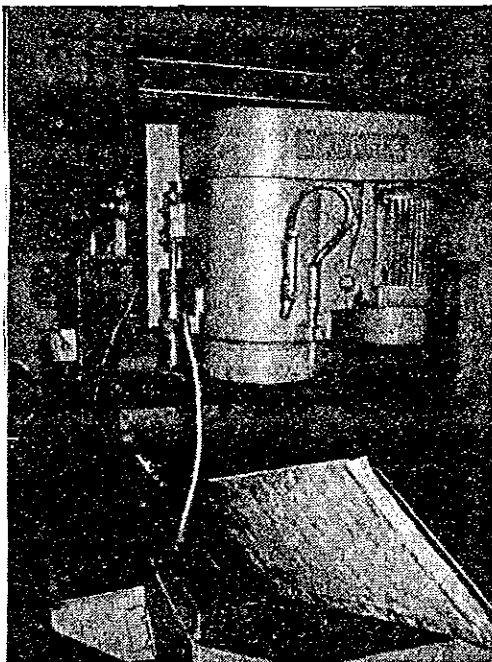


19 RADIAL DRILLING

Figure AI-1-5-10(3) DETERIORATION OF EQUIPMENT



4 SPRAY BOOTH



7 SURFACE GRINDER

1-6 Electric Accessories

Electric Accessories (E/A) are produced in the the Bakelite Molding Shop and the Electric Accessories Manufacturing Plant.

At present, there are 32 types of electric accessories being produced including holders, plugs, sockets, circuit breakers, etc. However, in the future, HIC intends to reorganize production and continue only 14 types of item which are of the British model. But, if a demand exists for electric accessories other than these 14 production will be continued as long as the metal patterns are usable.

The present evaluation concentrated on these 14 electric accessories.

1-6-1 Production Processes

(1) Working equipment and layout

1) Bakelite molding shop (hereinafter referred to as the molding line)

This shop is responsible for production of the castings for electric accessories and for casting production of items ordered from other shops. The shop consists of a metal pattern store area, raw materials store, castings factory, finished products factory, and an office (on the second floor). As space between machinery in the castings factory is cramped operational efficiency, for example such as materials and finished product conveyance is poor. Heat from the molding machines is trapped in the shop and the working environment is extremely poor (refer to Fig.AI-1-6-1).

2) Electric accessories manufacturing plant (hereinafter referred to as the assembly line)

The three conveyer belts installed in the assembly line are not in operation and are used as work benches. Further, the experimental facilities room for the circuit breakers are equipped with air conditioning and individual devices are well taken care of and in good storage condition. Sufficient space as an assembling plant is available. But, lighting is dark considering that manual operations are numerous. (Fig.AI-1-6-2)

3) Molding dies

The dies are stacked and ranged carefully in wooden racks in the metal pattern storeroom.

(2) Organization and personnel (refer to Fig.AI-1-6-3)

1) Organization

The organization of the Bakelite Molding Shop and Electric Accessories Manufacturing plant is composed of 2 plant managers, 1 shop manager, in control of an office, sub-store and 4 production lines.

2) Personnel

The total number of personnel is 98 and personnel organization is as follows:

plant manager	2	shop manager	1
foremen	3	skilled labor	47
semiskilled labor	30	unskilled labor	15

Besides the above there is one repair man permanently available for repairs of the molding machine.

Because of poor working environment work attendance is 80-85%, which is a low level compared to other shops. Many workers give notice after 1-2 years.

(3) Supply performance for raw materials and parts

Of the holders, plugs, sockets, circuit breakers, etc. making up the 14 items concerned in the present evaluation the situation for supply of parts for 13 items are shown in Table AI-1-6-1. The remaining item is the Switch W3001 which is imported as a completed product.

The delivery period for parts requested from Production No.1 shop in particular is uncertain. Further, a large number of parts received exceed the drawing plan allowance for product precision.

(4) Equipment capacity and production performance

The annual production performances for the period after April, 1981 and the long term output schedule for the period hereafter are indicated in Fig.AI-1-6-4.

Production capacity at the time of installation was 1,500,000 items per year according to planning designs then. In contrast to this HIC reports present capacity as 1,250,000 per year. However, production performance of HIC is approximately 900,000 per year.

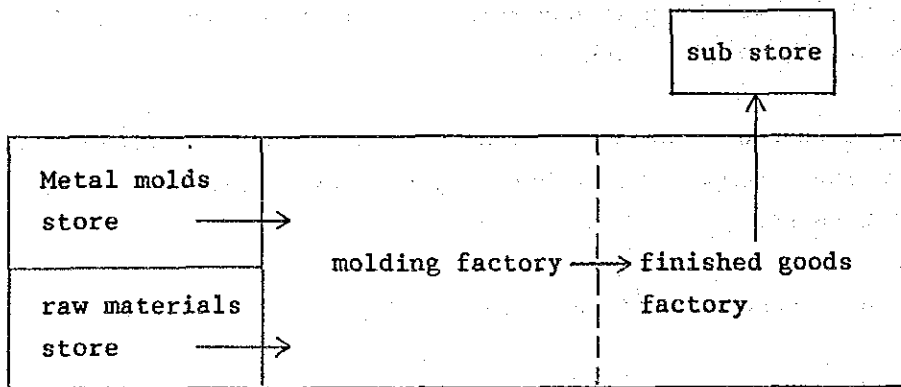
1-6-2 Analysis of Production Processing

(1) Outline analysis of processing

The production process analysis for the assembly line is shown in Figs.AI-1-6-5(1) to AI-1-6-5(5).

(2) Process flow

The outline for the flow chart of the Bakelite molding shop is as follows:



No problem has been found with the flow of production.

(3) Problems and improvement of production methods and process chains

1) Molding line

Production is carried out without the implementation of the plan for renewal of the metal patterns. As a result, much labor is required for the repair after production processing.

2) Assembly line

Molds manufactured in this shop, imported products, and parts manufactured in Production No.1 shop are all handled on the assembly line. The precision of parts manufactured in Production No.1 is very poor. Despite this, parts which can be assembled are used to avoid production stoppages. The above is true of the molding shop as well as of Production No.1.

(4) Problems and improvement of operation methods and division of labor

1) Molding line

One operator is placed in charge of each molding machine. However, as the metal patterns have only one face after pouring in the material to the molding machine the operator waits while baking proceeds. If an extra face could be added to the metal molds then the operators could be preparing one face while the other was baking. This would ensure an increase in the equipment operating rate and productive output.

In order to ensure improvement of operating capacity, lengthen the life of metal mold and product quality it is necessary to train skilled operators.

2) Assembly line

The conveyer line is not used effectively. Thought must be given to the present layout for operating methods which do not require use of the conveyer line.

(5) Problems and Improvement of Equipment Layout and Material Handling

No problems with layout or handling of equipment. However, lack of space between machinery and equipment requires attention.

(6) Problems and improvement of equipment facilities

1) Molding line

As the bakelite molding machine was made before 1964 it has been in operation for more than 20 years. The operating machinery has been carefully used but is nevertheless badly worn and has numerous problem points. As a result of frequent breakdowns the machine's operating rate is poor and it poses a problem for output increase.

Since the machinery is outdated even if sent to Japan for overhauling there is no assurance that parts would be available. Therefore the introduction of new machinery is advisable (Refer to Table AI-1-6-2).

2) Assembly line

The belt of the conveyer line is badly worn and requires replacement.

3) Dies

Dies are ranged on wooden shelves and each face is oiled before storing. However, most metal pattern have passed their renewal period and products manufactured with these molds have a low commodity value because of flash or surface scratches. Several of the dies with multiple item producing faces do not manufacture their full load successfully. Deterioration of the dies results in poor productivity and a low capacity (cf. Table AI-1-6-3).

(7) Problems and improvement of operating rates and line balancing

1) Operating rates

a) Molding line

As aforementioned, because of deterioration of dies and equipment operating rates are extremely low. The replacement of machinery

and metal molds, and operator training are urgent tasks for the improvement of operating rates.

b) Assembly line

If parts produced according to drawing specifications could be received improvement of operating rates could easily be effected.

c) Line balance

No problems at present.

(8) Problems and improvement of material and parts reception

Shop planning is not possible because the machined parts received from Production No.1 Shop are always received behind schedule.

(9) Problems and improvement of finished product dispatch

No problems with dispatch exist as the products produced in the bakelite molding shop are placed in the store immediately.

1-6-3 Analysis of Products Quality

(1) Occurrence of rejects

1) Reject rate for molding line

The reject rate is high because of the deterioration of the metal molds and molding machine. Products with surface scratching which would be judged defective in Japan are passed by HI. If inspection were done according to regulations the number of rejects would be even higher (cf. Tables AI-1-6-4 (1) to AI-1-6-4 (6)).

2) Reject rate for the assembly line

Rejects are found among the machined products of the conveyer line and the operating efficiency is poor. Further, the reject rate for some machined parts exceeds 10%. Direction of production shop No.1 must be made to ensure that machined parts are made there according to specifications (cf. Table AI-1-6-5).

3) On inspection at the local site it was found that even items passed as shown on Table AI-1-6-6 had surface scratches and burrs, etc. and it was immediately obvious for evident reasons that the commodity value of the finished products is low. It is necessary to have supervision to improve the technological expertise of operators for the purposes of production, and to ensure technical expertise for maintenance of the equipment and metal molds so that products to standard are possible.

(2) Relation with preceding and following operations

The low quality level of the machined parts has an adverse effect on the productivity and safety of the shop. It is therefore urgent to ensure a prompt improvement of product quality of the machined parts.

(3) Problems and improvement of quality control criteria and inspection methods.

There is no problem with the actual quality standards employed. However, at present the production of products meeting these is not easy. It is at present not easy to maintain quality and production because the working equipment is superannuated and some dies are running beyond the standard life of service.

Therefore, the improvement of equipment quality and dies which are being produced in molding line and in Production No.1 Shop is advisable.

1-6-4 Maintenance of Equipment

(1) Maintenance system

Breakdowns are frequent because of deterioration of machinery. One maintenance person is permanently available and when repairs become numerous another repair man is dispatched from the electric service.

(2) Repairs performance

An equipment repairs registrar exists and indicates the date and nature of the repairs which are carried out but does not have records

for the spare parts used by each machine.

(3) Problems and improvement of maintenance

Maintenance is almost entirely concerned with dealing with problems once they arise, but if a policy of maintaining by preventive inspections could be established control of spare parts, etc. would as a matter of course change.

Table AI-1-6-1 IMPORTED AND LOCALLY PRODUCED COMPONENT PARTS
 - ELECTRIC ACCESSORIES -

(Unit: pcs)

Product Number	Molded at Molding Line	Imported	Produced by Other Shops of HIC	Total
9000	3	2	4	9
9022	3	2	4	9
9041	2	1	2	5
9059	2	4	4	10
9042	2	3	2	7
532	2	4	4	10
9059-B	2	3	3	8
W3011	4	6	5	15
BS2021	6	20	4	30
BS2022	6	20	4	30
BS2023	6	20	4	30
533	2	4	4	10
W1803	2	4	3	9

Table AI-1-6-2(1) MACHINE LIST IN BAKELITE MOLDING SHOP

Quantity	Designation	Model/T	Month	Sr.No.	Maker's Name	Q'ty
1	Injection Molding M/C	N.200A	1. 1974	2-7267434	The Japan Steel Works LTD.	1
2	Injection Molding M/C	W.15	8. 1964	7619	Ikegai Iron Works LTD.	1
3	Compression Molding M/C	37 TON	1964	1949	Matsuda	20
3	Compression Molding M/C	37 TON	1964	8413	Matsuda	
3	Compression Molding M/C	37 TON	1964	8414	Matsuda	
3	Compression Molding M/C	37 TON	1964	8823	Matsuda	
4	Compression Molding M/C	37 TON	7. 1971	25.26.27.28	Matsushita Electric Industrial Co. LTD.	4
5	Compression Molding M/C	50 TON	7. 1974	29.30	Matsushita Electric Industrial Co. LTD.	2
6	Drilling & Tapping M/C	7 BIT	3. 1973	7AB.116.16	Tokushu Koki Seisakusho Co. LTD.	9
6	Drilling & Tapping M/C		3. 1973	7AB.11617	Tokushu Koki Seisakusho Co. LTD.	
6	Drilling & Tapping M/C		11. 1973	7AB.11671	Tokushu Koki Seisakusho Co. LTD.	
6	Drilling & Tapping M/C		1. 1974	7AB.11691	Tokushu Koki Seisakusho Co. LTD.	
6	Drilling & Tapping M/C		1. 1974	7AB.11692	Tokushu Koki Seisakusho Co. LTD.	
6	Drilling & Tapping M/C		1. 1974	7AB.11694	Tokushu Koki Seisakusho Co. LTD.	
7	Sensitive Bench Drilling M/C	NSD 340	3. 1964			2
8	Electric Bench Drill	MODEL 100				1
9	Drilling M/C	YSD 360	1. 1969	7AB.11181	Yoshida Machine Tool Co. LTD.	2
9	Drilling M/C		1. 1974	7AB.11693	Yoshida Machine Tool Co. LTD.	
9	Drilling M/C	ASD 305			Mitsubishi Co. LTD.	4
10	Drilling M/C	NSD 340				13
10	Drilling M/C		7. 1973	DM.3	Matsushita Electric Co. LTD.	
10	Drilling M/C		7. 1973	DM.4	Matsushita Electric Co. LTD.	
10	Drilling M/C		7. 1973	DM.5	Matsushita Electric Co. LTD.	
10	Drilling M/C		7. 1973	DM.6	Matsushita Electric Co. LTD.	
10	Drilling M/C		7. 1973	DM.8	Matsushita Electric Co. LTD.	
10	Drilling M/C		7. 1973	DM.9	Matsushita Electric Co. LTD.	
10	Drilling M/C		7. 1973	DM.10	Matsushita Electric Co. LTD.	
10	Drilling M/C		6. 1974	DR.11	Matsushita Electric Co. LTD.	
10	Drilling M/C		6. 1974	DR.12	Matsushita Electric Co. LTD.	
10	Drilling M/C		6. 1974	DR.13	Matsushita Electric Co. LTD.	
10	Drilling M/C		6. 1974	DR.15	Matsushita Electric Co. LTD.	
10	Drilling M/C		3. 1964	341819	Matsushita Electric Co. LTD.	2
11	Deflasher		2. 1959		Mitsubishi Electric Co. LTD.	1
12	Buffing M/C					1
13	Chamfering M/C		3. 1963		Ikada E. LTD. Sumida Tokyo JAPAN	3
14	Conveyor					1
15	Dryer	DR 50	10. 1967	68192	Ohdate Co. LTD.	1
16	Cresher		1967	3137	Matsushita Electric Co. LTD.	1
17	Hand Press		3. 1973		Matsushita Electric Co. LTD.	47
18	Spot Welder	YG 1507 DB	5. 1971	B.1.1	Matsushita Electric Co. LTD.	1
19	Trip-Out Tester		5. 1971	D.S.1	Matsushita Electric Co. LTD.	2
				D.S.2	Matsushita Electric Co. LTD.	
20	Over Shooting Tester		5. 1971	C.3	Matsushita Electric Co. LTD.	1

Table AI-1-6-2(2) MACHINE LIST IN BAKELITE MOLDING SHOP

Nomenclature	Model/T	Month	Sr.No.	Maker's Name	Q'ty
21 Over Load Testing	C.2.2.	5, 1971			1
22 Temperature Recorder					1
23 Vacuum Tube Bolt Meter	VP-955C				1
24 Temperature Tester				Matsushita Electric Industrial Co. LTD.	1
25 Make & Break Tester			WS.006560	Matsushita Electric Industrial Co. LTD.	1
26 Electric Drying Oven				Matsushita Electric Industrial Co. LTD.	1
27 Mechanical Load Testing			7305280		1
28 Dial Electric Strength Tester					4
29 Screw Inserting Machine	P.5				14
30 Portable Compressor	N.5				2
					1

Tabel AI-1-6-3(1) DIE LIST IN DAKELITE HOLDING SHOP

(Unit: pcs)

Sr. No.	Model	Nomenclature	Received in the Year											Total	Rem.	
			1966	1970	1971	1972	1975	1977	1979	1980	1983	1987				
1	9000	Body	4		1	2							3	4	14	
		Washer	4		1	2							2		9	
		Cap	4		1	2							2		9	
2	9022	Body			1										1	
		Washer			1										1	
		Base	3		1	2								2	10	
3	9059	Body	2	1	1							2	2		5	
		Lid	2									2			5	
4	9014	Bottom		2											2	
		Body		2											2	
		Cap		2											2	
		Press Button		3											3	
		Washer		2											2	
5	9041	Body	3		1	1							2		7	
		Cap	3		1	1						2			7	
6	9027	Body	2												2	
		Head	2												2	
7	9028	Body	2								1				3	
		Cap	2								1				3	
		Middle Part	2								1				3	
8	9042	Body	2			1							2		5	
		Cover	2			1							2		5	
9	9069	Body	2												2	
		Upper Part	2												2	
10	W-3011	Body	2								2	1	1		7	
		Cap	2								2				5	
		Handle	2										1		5	
11	W-3011/2	Body										2			2	
		Cap													2	
12	W-1803	Body										1			5	
		Cap										1			6	
13	WS-3900	Body A													1	
		Cap A													1	
		Body B													1	
		Cap B													1	
		Handle													1	
14	WH-4011	Body													2	
15	WK-1011	Body													1	
		Cap													1	
		Safety Snap Cap													1	

Tabel AI-1-6-3(2) DIE LIST IN BAKELITE MOLDING SHOP

(Unit: pcs)

Sr. No.	Model	Nomenclature	Received in the Year							Total	Rev.			
			1966	1970	1971	1972	1975	1977	1979			1980	1983	1987
16	WK-1020	Body		1									1	
		Cap		1									1	
17	WS-3901	Body C		1									1	
		Cap C		1									1	
18	W-3514	Body		1									1	
		Cap		1									1	
		Bottom		1									1	
		Nail Plate		1									1	
19	WH-5031	Body		1									1	
		Cap		1									1	
		Handle		1									1	
20	WK-1030	Body		1									1	
		Cap		1									1	
		Circuit Breaker		1									1	
1	BS-2021	Cover				1							1	2
		Body				1							1	2
		Handle				1							1	4
		Movable Frame				1							1	3
Lighting Fixture														
1	L-226	Socket Body								1				1
		Lamp Pin Holder								1				1
2	L-227	Socket Body								2				2
		Lamp Pin Holder								2				2
		Front Cover								2				2
3	L-231	Socket Body								2				2
		Lamp Pin Holder								1				1
		Front Cover								1				1
4	G-41	Socket Body								1				1

Table AI-1-6-4(1) NO.2 PRODUCTION INSPECTION DEPT.
DAILY PRODUCTION REPORT

	Nomenclature	Oper.	Sub.	Acc.	Lin.	Rej.
6. 1.88	Electric Iron Handle (A)	Chamf	150	150		
	Electric Iron Plastic Heel	Chamf	670	645		25
	Rice Cooker Handle	Chamf	156	156		
7. 1.88	Keyless Pendent Holder Body (A)	Chamf	720	720		
	Keyless Pendent Holder Body (C)	Chamf	1,550	1,360	130	60
	Keyless Pendent Holder Cap (A)	Chamf	650	600	30	20
	Keyless Pendent Holder Cap (C)	Chamf	1,160	1,020	90	50
	Keyless Pendent Holder Washer (A)	Chamf	2,680	2,680		
	Three way Cluster with Adaptor Body	Chamf	726	543	160	23
	Three way Cluster with Adaptor Body	Chamf	540	519	7	14
	Square Toggle Switch body	Chamf	850	740	56	54
	Square Toggle Switch Cap	Chamf	1,515	1,460	30	25
	Square Toggle Switch Handle	Chamf	1,825	1,800		25
	Lamp Socket Body	Chamf	500	476		24
	Lamp Socket F-C	Chamf	540	520		20
	Electric Iron Handle (B)	Chamf	133	133		
	Electric Iron Handle (A)	Chamf	150	150		
	Electric Iron Plastic Heel	Chamf	680	680		
	Spin Socket 532	Final	2,000	2,000		
	Square Toggle Switch	Final	1,925	1,825	100	
8. 1.88	Keyless Pendent Holder Cap	Chamf	2,510	2,410	100	
	Three way Cluster with Adaptor Body	Chamf	270	248		22
	Round Model Cut Out Cap	Chamf	190	185		5
	Square Toggle Switch body	Chamf	650	630		20
	Square Toggle Switch Cap	Chamf	1,090	1,040	20	30
	Square Toggle Switch Handle	Chamf	1,250	1,230		20
	Lamp Socket Front Cover L 227	Chamf	380	355		25
	Lamp Socket L.P.H.	Chamf	930	900		30
	NA.51 Handle A	Chamf	150	150		
	NA.51 Handle B	Chamf	110	104	6	
	Three Pin Socket 532	Final	1,500	1,500		
	Square Toggle Switch	Final	1,825	1,825		

Notes: Oper. Operation Sub. Submitted Acc. Accepted
Lin. Re-touched in Line Rej. Rejected

Table AI-1-6-4(2) NO.2 PRODUCTION INSPECTION DEPT.
DAILY PRODUCTION REPORT

	Nomenclature	Oper.	Sub.	Acc.	Lin.	Rej.
13. 1.88	Keyless Pendent Holder Body	Chamf	1,560	1,560		
	Keyless Pendent Holder Cap	Chamf	2,270	2,213		57
	Keyless Pendent Holder Washer	Chamf	2,200	2,200		
	Round Model Cut Out Body	Chamf	870	859	11	
	Round Model Cut Out Cap	Chamf	85	85		
	Three Pin Socket Cap 532	Chamf	1,090	1,070		20
	Square Toggle Switch Body	Chamf	1,320	1,290		30
	Square Toggle Switch Cap	Chamf	1,750	1,600	127	23
	Square Toggle Switch Handle	Chamf	2,000	2,000		
	Circuit Breaker Cover BS 2021	Chamf	435	413		22
	Lamp Socket Body L 227	Chamf	710	685		25
	Bakelite Switch	Chamf	188	188		
	NA. 51 Handle A	Chamf	150			
	NA. 51 Handle B	Chamf	120			
	Pendent Switch	Final	600	600		
	Three Way Cluster with Adaptor	Final	500	500		
	Tride Tap with Adaptor	Final	500	500		
14. 1.88	Keyless Pendent Holder Body (A)	Chamf	560	542		18
	Keyless Pendent Holder Body (C)	Chamf	1,650	1,600	25	25
	Keyless Pendent Holder Cap (A)	Chamf	640	640		
	Keyless Pendent Holder Cap (C)	Chamf	700	580	100	20
	Keyless Pendent Holder Washer (A)	Chamf	1,165	1,165		
	Three Pin Socket (Cap)	Chamf	397	337		
	Square Toggle Switch Body	Chamf	2,000	1,900	75	30
	Square Toggle Switch Cap	Chamf	1,650	1,530	100	20
	Lamp Socket Body	Chamf	1,180	1,150		30
	Lamp Socket F-C	Chamf	1,530	1,500		30
	L.T.M. 76	Chamf	530	530		
	Electric Iron Handle (B)	Chamf	120	119	1	
	B S 2021 Handle 15A	Chamf	717	717		
	Electric Iron Handel (A)	Chamf	98	98		

Table AI-1-6-4(3) NO.2 PRODUCTION INSPECTION DEPT.
DAILY PRODUCTION REPORT

	Nomenclature	Oper.	Sub.	Acc.	Lin.	Rej.
15. 1.88	Keyless Pendent Holder Body	Chamf	1,240	1,210		30
	Keyless Pendent Holder Cap	Chamf	710	710		
	Square Toggle Switch Body	Chamf	950	920		30
	Square Toggle Switch Cap	Chamf	825	800		25
	Circuit Breaker BS 2021 Cover	Chamf	270	256		14
	Lamp Socket Body L 227	Chamf	720	700		20
	Lamp Socket Front Cover L 227	Chamf	830	800		30
	Lamp Socket L.P.A. L 227	Chamf	630	605		25
	Bakelite Switch	Chamf	360	360		
	NA. 51 Handle B	Chamf	120	120		
	Square Toggle Switch Handle	Chamf	2,800	2,800		
	Circuit Breaker BS 2021	Final	150	150		
	Square Toggle Switch	Final	2,040	2,040		
18. 1.88	Keyless Pendent Holder Body	Chamf	1,725	1,605	80	40
	Keyless Pendent Holder Cap	Chamf	1,350	1,150	200	
	Keyless Pendent Holder Washer	Chamf	1,500	1,500		
	Square Toggle Switch Body	Chamf	1,920	1,845	36	39
	Square Toggle Switch Cap	Chamf	2,430	2,330	72	28
	Square Toggle Switch Handle	Chamf	1,840	1,840		
	Lamp Socket Body	Chamf	620	600		20
	Lamp Socket F.C.	Chamf	410	395		15
	Lamp Socket L.P.A.	Chamf	800	770		30
	NA. 51 Handle B	Chamf	100	100		
	L.T.M.76	Chamf	549	549		
	Circuit Breaker Movable Frame	Chamf	21	21		
	Circuit Breaker Movable Frame	Final	100	100		
	Square Toggle Switch	Final	1,880	1,880		
19. 1.88	Keyless Pendent Holder Body	Chamf	1,511	1,411	75	25
	Keyless Pendent Holder Cap	Chamf	1,145	1,145		
	Keyless Pendent Holder Washer	Chamf	1,465	1,465		
	Round Model Cut Out Body	Chamf	301	245	56	
	Round Model Cut Out Cap	Chamf	360	358	2	

Table AI-1-6-4(4) NO.2 PRODUCTION INSPECTION DEPT.
DAILY PRODUCTION REPORT

	Nomenclature	Oper.	Sub.	Acc.	Lin.	Rej.
19. 1.88	Square Toggle Switch Body	Chamf	1,500	1,375	100	25
	Square Toggle Switch Cap	Chamf	645	600	35	10
	Square Toggle Switch Handle	Chamf	1,550	1,550		
	Lamp Socket Front Cover	Chamf	385	385		
	Lamp Socket L.P.A.	Chamf	720	690		
	Circuit Breaker Cover	Chamf	270	237		33
	Circuit Breaker BS 2021	Final	100	100		
	Square Toggle Switch	Final	2,140	2,040	100	
20. 1.88	Keyless Pendent Holder Body	Chamf	1,360	1,240	86	34
	Keyless Pendent Holder Cap	Chamf	650	435	193	22
	Round Model Cut Out Body	Chamf	255	242	2	11
	Three Way Cluster with Adaptor u.p	Chamf	71	71		
	Three Pin Socket Cap 532	Chamf	195	195		
	Square Toggle Switch Body	Chamf	2,220	2,190		30
	Square Toggle Switch Cap	Chamf	900	700	165	35
	Square Toggle Switch Handle	Chamf	1,750	1,750		
	Lamp Socket Body L 227	Chamf	870	837		33
	Circuit Breaker BS 2021 Movable Frame	Chamf	99	93		6
	SR. 18E Stand	Chamf	55	55		
	L.T.H. 76	Chamf	194	194		
	NA. 51 Handle B	Chamf	129	129		
	Square Toggle Switch	Final	2,140	2,040	100	
	Keyless Pendent Holder	Final	1,000	1,000		
21. 1.88	Keyless Pendent Holder Body(A)		270	270		
	Keyless Pendent Holder Body(C)		640	600	15	25
	Keyless Pendent Holder Cap (A)		800	550	250	
	Keyless Pendent Holder Washer(C)		750	750		
	Round Model Cut Out Body		278	270	8	
	Round Model Cut Out Cap		935	914	16	5
	Square Toggle Switch Body		2,000	1,850	100	50
	Square Toggle Switch Cap		1,320	1,235	55	30
	Square Toggle Switch Handle		1,750	1,730		20

Table AI-1-6-4(5) NO.2 PRODUCTION INSPECTION DEPT.
DAILY PRODUCTION REPORT

	Nomenclature	Oper.	Sub.	Acc.	Lin.	Rej.
21. 1.88	Lamp Socket Body	Chamf	490	472		18
	BS 2021 Cover	Chamf	120	112		8
	L.T.M.	Chamf	254	254		
	NA. 51 Handle (B)	Chamf	120	120		
	HAZDA Knob	Chamf	100	100		
	Keyless Pendent Holder	Final	2,000	2,000		
	Squire Toggle Swicth	Final	2,240	2,120	120	
22. 1.88	Keyless Pendent Holder Body	Chamf	700	700		
	Keyless Pendent Holder Cap	Chamf	910	690	195	25
	Bottom Holder Base	Chamf	135	125		10
	3Way Cluster with 2Pin Combined Plag Body "		175	163		12
	3Way Cluster with 2Pin Combined Plag Plate "		1,200	1,190		10
	Keyless Pendent Holder Washer	Chamf	720	720		
	Squire Toggle Swicth Body	Chamf	1,370	1,350	20	
	Squire Toggle Swicth Cap	Chamf	1,700	1,600	66	34
	Lamp Socket Body	Chamf	420	410		10
	Lamp Socket Front Cover	Chamf	500	470		30
	Lamp Socket L.P.A.	Chamf	920	900		20
	L.T.H. 76 Cap	Chamf	500	500		
	NA 51 Dial Knob	Chamf	146	146		
	Keyless Pendent Holder	Final	2,000	2,000		
	Squire Toggle Swicth	Final	2,020	1,920	100	
25. 1.88	Keyless Pendent Holder Body	Chamf	2,260	2,100	135	25
	Keyless Pendent Holder Cap	Chamf	580	380	175	25
	Botten Holder Base	Chamf	140	125		15
	3Way Cluster with 2Pin Combined Plag Body "		410	373	22	15
	Squire Toggle Swicth Body	Chamf	2,050	2,000		50
	Squire Toggle Swicth Cap	Chamf	1,770	1,720	26	24
	Lamp Socket L.P.A.	Chamf	790	770		20
	NA 51 Handle Dial knob	Chamf	150	150		
	Keyless Pendent Holder	Final	2,000	2,000		
	Squire Toggle Swicth	Final	2,030	1,830	200	

Table AI-1-6-4(6) NO.2 PRODUCTION INSPECTION DEPT.
DAILY PRODUCTION REPORT

	Nomenclature	Oper.	Sub.	Acc.	Lin.	Rej.
26. 1.88	Keyless Pendent Holder Body	Chamf	1,242	1,200		42
	Keyless Pendent Holder Washer	Chamf	1,546	1,500		46
	Bottom Holder Base	Chamf	521	515		
	3Way Cluster with 2Pin Combined Plug Body "		414	414		
	Squre Toggle Swieth Cap	Chamf	1,627	1,600		27
	Lamp Socket Body L 227	Chamf	611	600		11
	Lamp Socket Front Cover	Chamf	914	900		14
	Lamp Socket Lamp Pin Holder	Chamf	719	710		9
	L.T.M. 76 Cap	Chamf	175	175		
	Keyless Pendent Holder	Final	2,000	2,000		
	Square Toggle Swieth	Final	2,020	1,920	100	
27. 1.88	Keyless Pendent Holder Body	Chamf	1,707	1,667		40
	Keyless Pendent Holder Cap	Chamf	799	765		34
	Bottom Holder Base	Chamf	299	295		4
	3Way Cluster with 2Pin Combined Plug Body "		292	285		
	Squre Toggle Swieth Body	Chamf	1,442	1,419		23
	Squre Toggle Swieth Cap	Chamf	1,616	1,600		16
	Lamp Socket Body	Chamf	579	570		9
	Lamp Socket Front Cover	Chamf	373	360		13
	Lamp Socket L.P.A.	Chamf	813	797		16
	Circuit Breaker Movable Frame	Chamf	99	91		8
	L.T.M. 76 Cap	Chamf	400	400		
	NA. 51 Dial Knob	Chamf	206	206		
	Squre Toggle Swieth Handle	Chamf	865	865		
	Keyless Pendent Holder	Chamf	2,000	1,978	22	
	Squre Toggle Swieth	Final	1,000	980		40
	Round Model Cut Out	Final	1,000	1,000		

Table AI-1-6-5(1) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	VIW CARD		TOTAL REJECTED Q'TY
			COMMENCEMENT	COMPLETED		NO	Q'TY	
1	9000	H1480332	50T	11. 2. 86	12. 5. 86	SQUARE NUT	IVSCEA01573.760	
							IVSCEA01522	500
						LEG	IVSCEA01521	4.500
2	9041	H1480341	20T	13. 5. 86	29. 5. 86	SMELLING	IVSCEA00246	370
3	9059	H1480343	20T	28. 4. 86	26. 5. 86	SQUARE NUT	IVSCEA00224	1.212
							IVSCEA00223	1.113
4	532	H1480327	10T	26. 2. 86	13. 5. 86	SMALL TERMINAL	IVSCEA01498	1.000
						LARGE TERMINAL	IVSCEA01499	620
						SMALL PIPE	IVSCEA00108	592
		H1480339	20T	13. 5. 86	14. 7. 86	LARGE TERMINAL	IVSCEA00435	42
						SMALL PIPE	IVSCEA00438	678
						LARGE PIPE	IVSCEA00434	615

Table AI-1-6-5(2) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NO	MODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED Q'TY
				COMMENCEMENT	COMPLETED		NO	Q'TY	
5	533	H1480340	15T	20. 6. 86	29. 9. 86	LARGE TERMINAL	IVSCEA00204	360	360
6	W8011	H1480533	50T	4. 3. 86	8. 5. 86	UPPER FRAME	IVSCEA015383	550	3. 550
						HANDLE METAL	IVSCEA01537	520	520
						COMMON TERMINAL	IVSCEA015352	435	
							IVSCEA00057	330	2, 765
						CONTACT TERMINAL	IVSCEA015364	380	4. 380
7	W1803	H1480328	15T	26. 2. 86	1. 7. 86	CAP TERMINAL	IVSCEA00056	354	354
						BODY TERMINAL	IVSCEA00055	1, 303	1, 303

Table AI-1-6-5(3) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED
			COMMENCEMENT	COMPLETED		NO	Q'TY	
19022	H1480346	50T	1.7.86	30.10.86	SQUARE NUT	IVSCEA00482	648	
						IVSCEA00505	172	
						IVSCEA00919	708	2,528
					LEG	IVSCEA01062	700	2,700
29042	H1480342	50T	19.8.86	15.10.86	SMALL PIPE	IVSCEA00709	245	
						IVSCEA00858	552	
						IVSCEA00960	112	1,509
					SMALL TERMINAL	IVSCEA007102	444	
						IVSCEA00852	800	
						IVSCEA00961	211	3,455
39059 B	H1480344	10T	18.9.86	4.11.86	LARGE LEG	IVSCEA01056	151	151
					VERY LARGE LEG	IVSCEA01054	93	93
					HEXAGON TERMINAL	IVSCEA01055	254	254

Table AI-1-6-5(4) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

MODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	VIW CARD		TOTAL REJECTED
			COMMENCEMENT	COMPLETED		NO.	Q'TY	
19000	H1480345	100T	12.8.86	12.11.86	SQUARE NUT	VSCEA00737	327	
						VSCEA01102	300	627
					SPRING	VSCEA00854	1,500	1,500
29034	H1480354	2T	19.11.86	21.11.86	PIPE	VSCEA01158	116	116
						VSCEA01158	80	80
39065	H1480357	2T	6.11.86	7.11.86	LEAD	VSCEA01081	130	130
					TERMINAL	VSCEA01084	34	34

Table AI-1-6-5 (5) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED Q'TY
			COMMENCEMENT	COMPLETED		NO	Q'TY	
1	9041	H1480347	50,000	11.6.86	29.12.86	SMALL LEG	VSCEA00205	270
	9041	H1480347	50,000	11.6.86	29.12.86	SMALL LEG	VSCEA00443	319
	9041	H1480347	50,000	11.6.86	29.12.86	SMALL LEG	VSCEA00328	567
	9041	H1480347	50,000	11.6.86	29.12.86	SQUARE NUT	VSCEA00206	1,557
	9041	H1480347	50,000	11.6.86	29.12.86	SQUARE NUT	VSCEA00442	461
	9041	H1480347	50,000	11.6.86	29.12.86	SQUARE NUT	VSCEA01372	564
2	9059B	H1480344	10,000	18.9.86	4.11.86	LARGE LEG	VSCEA01056	151
	9059B	H1480344	10,000	18.9.86	4.11.86	HEX. TERMINAL (28.10.86)	VSCEA01055	254
3	W1803	H1480349	50,000	2.7.86	10.12.86	CAP TERMINAL	VSCEA00416	49
	W1803	H1480349	50,000	2.7.86	10.12.86	CAP TERMINAL	VSCEA01044	438
	W1803	H1480349	50,000	2.7.86	10.12.86	CAP TERMINAL	VSCEA01236	103
	W1803	H1480349	50,000	2.7.86	10.12.86	BODY TERMINAL	VSCEA00415	554
	W1803	H1480349	50,000	2.7.86	10.12.86	BODY TERMINAL	VSCEA01043	1,287
	W1803	H1480349	50,000	2.7.86	10.12.86	BODY TERMINAL	VSCEA01237	800
	W1803	H1480349	50,000	2.7.86	10.12.86	CONTACT SPRING	VSCEA01045	67
	W1803	H1480349	50,000	2.7.86	10.12.86	HOLLOW RIVET	VSCEA00414	1,011
	W1803	H1480349	50,000	2.7.86	10.12.86	HOLLOW RIVET	VSCEA01655	450

Table AI-1-6-5(6) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NO	MODEL	MO NO	MO QTY	PRODUCTION DATE		COMPONENT PARTS	VIW CARD		TOTAL REJECTED
				COMMENCEMENT	COMPLETED		NO	QTY	
1	W1011	H1480331	2,900	1. 12. 86	9. 12. 86	SPRING	IVSCEA01190	80	
						RIVET 203.5	IVSCEA01191	80	

Table AI-1-6-5(7) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

MODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED
			COMMENCEMENT	COMPLETED		NO	Q'TY	
1 W3011	H1480359	50T	9. 3. 87	11. 5. 87	UPPER FRAME	IVSCEA01643	300	
			9. 3. 87	29. 4. 87		IVSCEA00087	457	457
					CONTACT TERMINAL	IVSCEA01612	285	285
			9. 3. 87	29. 4. 87	COMMON TERMINAL	IVSCEA00088	298	298

Table AI-1-6-5(8) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NO	MODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	VIW CARD		TOTAL REJECTED QTY
				COMMENCEMENT	COMPLETED		NO	QTY	
1	9059B	H1480365	10T	5.11.86	23.7.87	VERY LARGE LEG	IVSCEA00555	20	20
						LARGE LEG	IVSCEA00556	70	70
						HEX TERMINAL	IVSCEA00557	425	425
2	532	H1480350	20T	6.8.86	24.7.87	SMALL PIPE 28.8.86	IVSCEA00714	510	
						SMALL PIPE 12.9.86	IVSCEA00784	310	
						SMALL PIPE 21.8.87	IVSCEA00715	756	1,576
						LARGE PIPE 28.8.86	IVSCEA00715	58	
						LARGE PIPE 12.9.86	IVSCEA00782	44	102
						SMALL TERMINAL 28.8.86	IVSCEA00715	624	
						SMALL TERMINAL 12.9.86	IVSCEA00785	276	
						SMALL TERMINAL 21.7.87	IVSCEA00558	500	
						SMALL TERMINAL 21.8.87	IVSCEA00713	369	1,769
						LARGE TERMINAL 12.9.86	IVSCEA00787	76	
						LARGE TERMINAL 21.8.87	IVSCEA00714	601	690
3	9042	H1480376	50T	8.5.87	13.7.87	SMALL PIPE	IVSCEA00437	1,050	1,050
						SMALL TERMINAL	IVSCEA00478	1,572	1,572

Table AI-1-6-5(9) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED
			COMMENCEMENT	COMPLETED		NO	Q'TY	
1	9000	H1480362	50T	17.11.86	16.3.87	LEG	IVSCEA01181,152	
							IVSCEA103241,180	2,332
						SPRING	IVSCEA013251,590	1,590
2	9059	H1480366	20T	3.3.87	30.5.87	LARGE TERMINAL	IVSCEA01598	167
						LARGE LEG	IVSCEA01599	49
						SPRING	IVSCEA01600	240
							IVSCEA01601	116
3	W804	H1480338	100T	3.6.86	9.3.87	UPPER FRAME	IVSCEA002074,185	
							IVSCEA008151,262	
							IVSCEA009451,765	
							IVSCEA009251,140	
							IVSCEA010571,301	9,573
						HANDLE	IVSCEA00820	245

Table AI-1-6-5(10) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NO	MODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED
				COMMENCEMENT	COMPLETED		NO	Q'TY	
1	W3011	H1480338	100T	3. 6. 86	9. 3. 87	COMMON TERMINAL	IVSCEA002092	740	
							IVSCEA008112	115	
							IVSCEA01584	232	4,887
						CONTACT TERMINAL	IVSCEA002092	130	
							IVSCEA008121	917	
							IVSCEA01585	400	4,447
						PIVOT	IVSCEA00938	630	630

Table AI-1-6-5(11) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	VIW CARD		TOTAL REJECTED	
			COMMENCEMENT	COMPLETED		NO	Q'TY		
1	9022	H1480348	35T	11. 87	9. 2. 87	LEG	IVSCEA01412	463	463
2	9052	H1480352	30T	2. 12. 86	4. 2. 87	LARGE LEG	IVSCEA01296	34	
							IVSCEA01452	128	157
						SMALL LEG	IVSCEA01298	442	
							IVSCEA01434	494	956
						LARGE TERMINAL	IVSCEA01292	28	
							IVSCEA01457	10	33
						SQUARE NUT	IVSCEA01229	132	
							IVSCEA01438	360	492
3	9058	H1480356	2T	10. 2. 87	18. 2. 87	LEG	IVSCEA01515	100	100
						BAG	IVSCEA01515	150	150
						PIN	IVSCEA01515	50	50

Table AI-1-6-5(12) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	VIW CARD		TOTAL REJECTED	
			COMMENCEMENT	COMPLETED		NO	Q'TY		
1	9000	H1480369	50T	1. 7. 87	6. 10. 87	SQUARE NUT	IVSCEA00580	562	463
						LEG	IVSCEA00581	136	3,136
2	W1803	H1480399	50T	18. 5. 87	24. 9. 87	HOLLOW RIVET	IVSCEA00434	155	
							IVSCEA00864	500	1,655
						CAP TERMINAL	IVSCEA00435	416	1,416
						BODY TERMINAL	IVSCEA00436	1,192	1,192
3	W3011	H1480368	50T	11. 5. 87	9. 9. 87	CONTACT TERMINAL	IVSCEA00228	560	460
4	BS201	H1480334	5T	19. 5. 87	8. 10. 87	LINK	IVSCEA00636	33	
							IVSCEA00722	42	
							IVSCEA01501	76	151

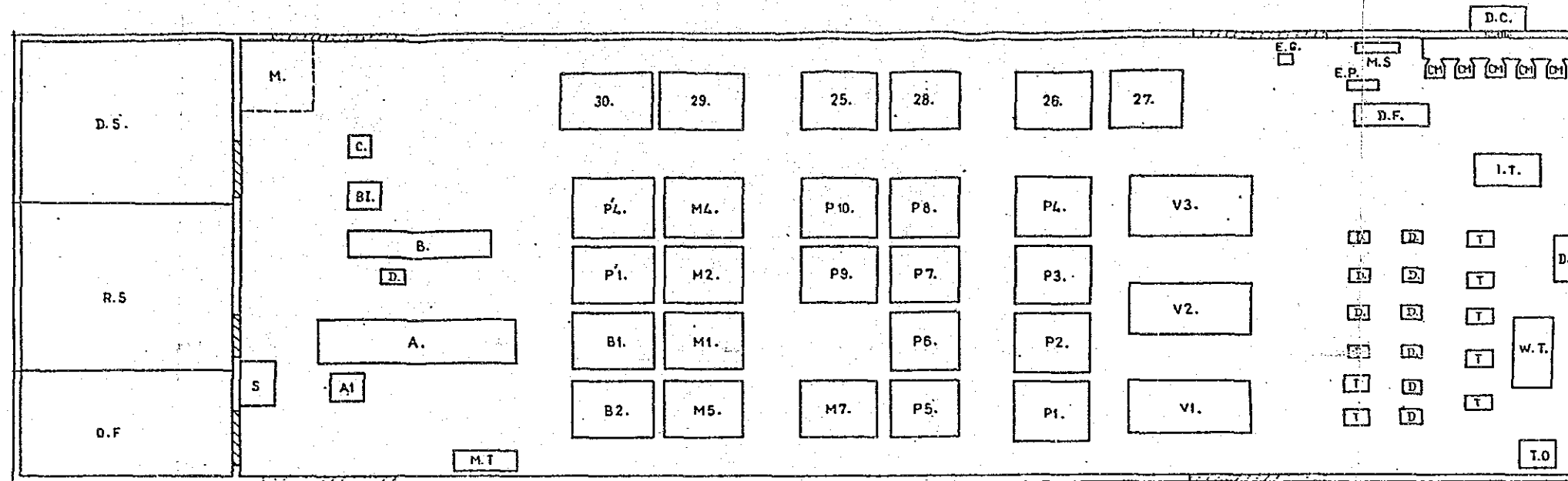
Table AI-1-6-5(13) LIST OF PRODUCTION REJECTS (PROCESS LOSS)

NOMODEL	MO NO	MO Q'TY	PRODUCTION DATE		COMPONENT PARTS	V I W CARD		TOTAL REJECTED	
			COMHENCEMENT	COMPLETED		NO	Q'TY		
4	BS2021	H1480334	5T	9. 5. 86	8. 10. 87	FAN COVER	IVSCEA00874	10	10
						INPUT TERMINAL PLATE	IVSCEA01502	88	
							IVSCEA00637	390	
							IVSCEA00721	30	
						STATIONARY FRAME	IVSCEA01449	42	
							IVSCEA00723	175	
							IVSCEA00735	283	500
						SOLDERLESS TERMINAL	IVSCEA00626	264	
							IVSCEA00719	131	395
5	9034	H1480373	2T	19.10.87	23.10.87	PIPE	IVSCEA01001	400	400

Table AI-1-6-6 MOLD PARTS - PASS AND REJECT -

Sr. No.	Model	Nomenclature	1986-87		Rate of Reject (%)
			Pass	Reject	
1	W-3011	Body	166,104	8,764	5.3
		Cap	158,368	7,932	5.0
		Handle	157,844	2,965	1.9
2	W-1803	Body	48,397	1,858	3.8
		Cap	49,562	2,660	5.4
3	9000	Body	292,270	30,008	10.3
		Cap	177,004	19,716	11.1
		Washer	282,603	5,605	2.0
4	9022	Base	97,629	7,346	7.5
5	9041	Body	73,097	2,703	3.7
		Cap	69,862	4,212	6.0
6	9042	Body	51,154	3,692	7.2
		Cover	48,703	4,707	9.7
7	9059	Body	66,053	8,154	12.3
		Lid	86,357	7,532	8.7
8	9059 B	Body	14,808	1,041	7.0
		Lid	14,036	1,207	8.6
9	532	Body	36,088	2,179	6.0
		Cover	36,539	4,417	12.1
10	533	Body	17,252	923	5.4
		Cover	17,904	1,565	8.7
11	BS-2021	Body	5,959	917	15.4
		Cover	4,708	999	21.2
		Movable Frame	8,881	58	0.7
		Handle (15A)	429	1	0.2
		Handle (20A)	1,724	2	0.1
		Handle (30A)	2,297	2	0.1

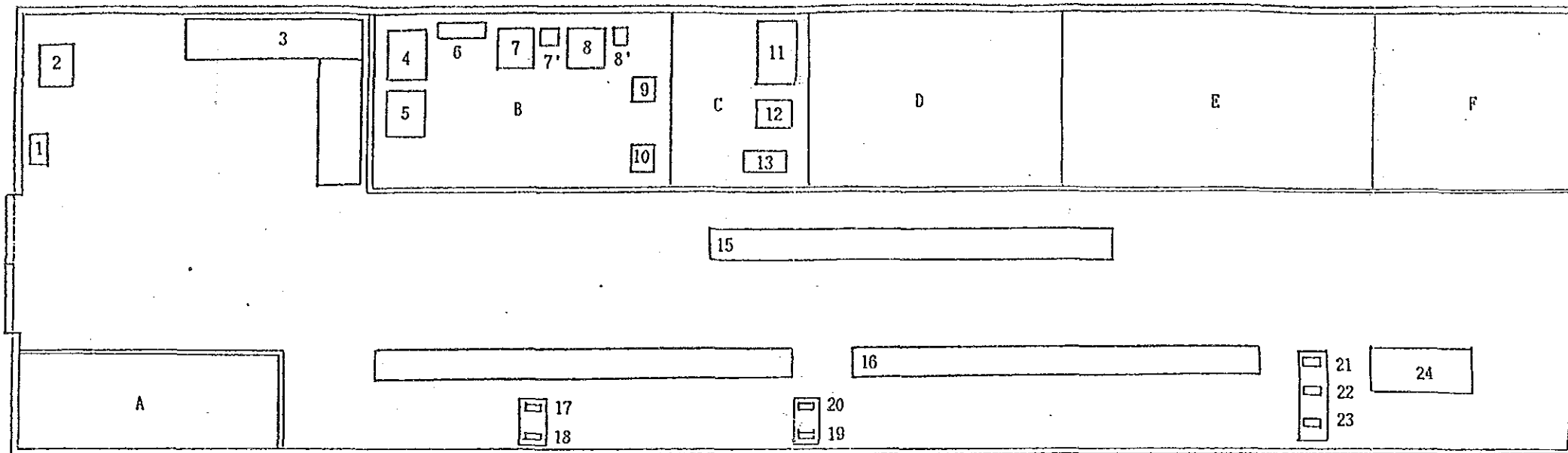
Figure AI-1-6-1 MACHINERY AND EQUIPMENT LAYOUT OF BAKELITE MOLDING SHOP



- | | | | |
|---|---------------|--|--------------------|
| A: INJECTION MOLDING MACHINE N200A | (6,900x1,200) | D.F.: DEFLASHER | (2,000x 800) |
| A1: TEMPERATURE CONTROLLER FOR N200A | (900x 600) | T: TAPPING MACHINE | (750x 420) |
| B: INJECTION MOLDING MACHINE V 15 | (3,940x 970) | D: DRILLING MACHINE | (600x 380) |
| B1: TEMPERATURE CONTROLLER FOR V 15 | (630x 630) | D.C.: DUST COLLECTOR | (1,500x 600) |
| C: CRUSHER | (600x 600) | C.M.: CHAMFERING MACHINE | (500x 500) (5Nos) |
| D: CHAIN BLOCK | (780x 600) | D.Y.: DRYER | (1,200x 800) |
| MT: MAINSWITCH & TRANSFORMER | (2,200x 600) | T.O.: THERMOSTATIC OVEN | (700x 700) |
| S: SHOW CASE | (1,500x1,000) | V.T.: WORKING TABLE | (2,000x1,000) |
| P1 to P10 P'1, P'4, M1, M2, M4, M7, B1, B2, 25 to 30: | | I.T.: INSPECTION TABLE | (1,500x 800) |
| COMPRESSION MOLDING MACHINE 37TON | (1,970x1,600) | M.S.: MAIN SWITCH | (1,200x 400) |
| 29, 30: COMPRESSION MOLDING MACHINE 50TON | (2,430x1,600) | | |
| V1 to V3: | | O.F.: OFFICE | |
| AUTOMATIC COMPRESSION MOLDING PRESS PLASTOMAT V60 | (3,200x1,320) | D.S.: DIE, MACHINERY & EQUIPMENT STORE | |
| E.G.: ELECTRIC GRAINDER | (300x 300) | R.S.: RAW MATERIAL STORE | |
| E.P.: ELECTRIC POLISHER | (800x 200) | M: MAINTENANCE SECTION | |

MACHINERY & EQUIPMENT LAYOUT
FOR
BAKELITE MOLDING PLANT

Figure AI-1-6-2 MACHINERY AND EQUIPMENT LAYOUT OF ELECTRIC ACCESSORIES MANUFACTURING PLANT



- ROOM A. OFFICE
- B. TRIP OUT TESTING ROOM
- C. OVERSHOOT & OVERLOAD TESTING ROOM
- D. RAW MATERIAL STORE
- E. MAIN STORE
- F. HOULD PARTS SUB STORE

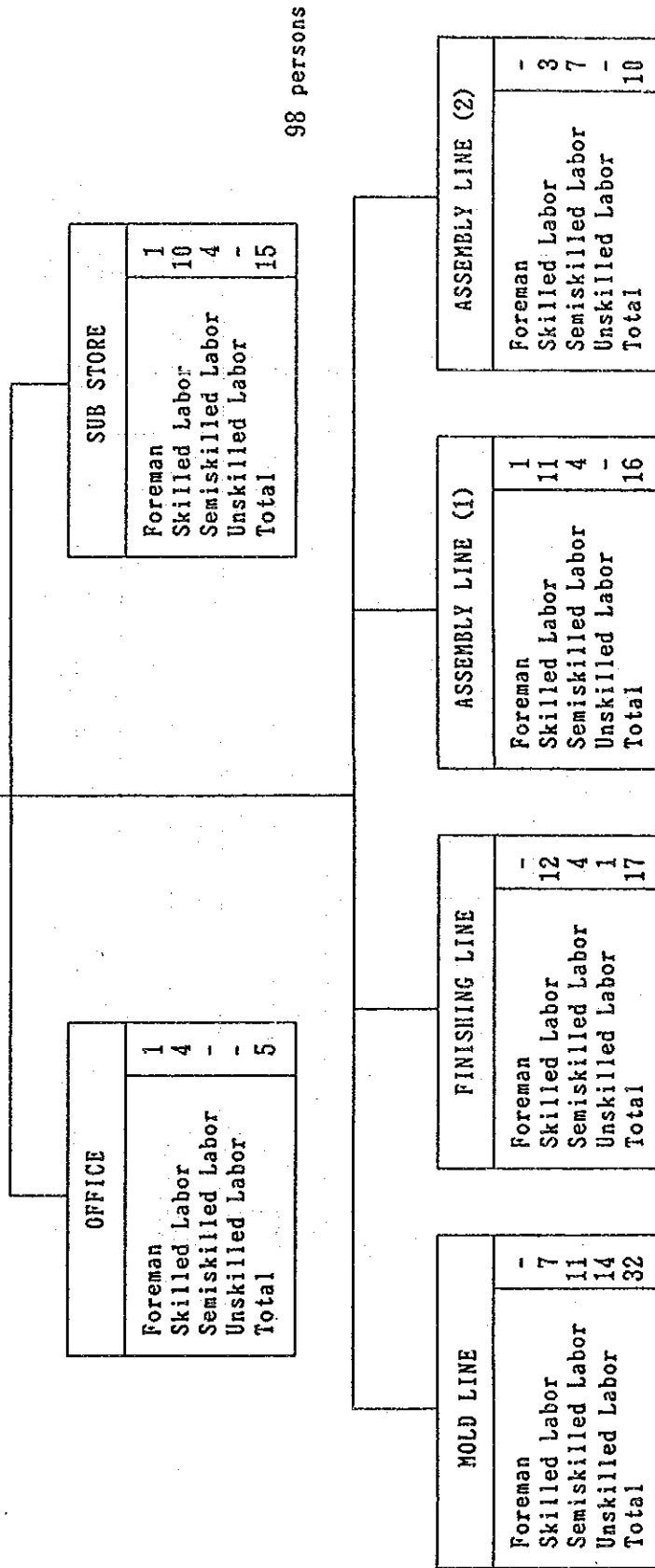
SR.No.	NOMENCATURE	REMARKS
1	MAIN SWITCH BOARD (650x350)	
2	SPOT WELDER (1000x750)	
3	SHOW CASES (1350x940 [5Nos.])	
4	MAKE & BREAK TESTER (1200x800)	
5	TEMPERATURE TESTER (1200x800)	
6	RESISTANCE BOX (1200x350)	
7.7'	TRIP OUT TESTER & REACTOR (800x970 [430x430])	
8.8'	TRIP OUT TESTER & REACTOR (800x970 [430x430])	
9	DIELECTRIC STRENGTH TESTER (450x350)	
10	MECHANICAL LOAD TESTER (450x350)	
11	OVERSHOOTING TESTING EQUIPMENT (1450x970)	
12	OVERLOAD TESTING EQUIPMENT (700x800)	

SR.No.	NOMENCATURE	REMARKS
13	R.L ROAD (1000x600)	
14	CONVEYOR (3600x560)	
15	CONVEYOR (3600x560)	
16	CONVEYOR (3600x560)	
17	DRILLING MACHINE (600x380)	
18	DRILLING MACHINE (600x380)	
19	DRILLING MACHINE (600x380)	
20	TAPPING MACHINE (750x420)	
21	DRILLING MACHINE (650x400)	
22	DRILLING MACHINE (650x400)	
23	DRILLING MACHINE (650x400)	
24	WORKING TABLE (2000x1000)	

MACHINERY AND EQUIPMENT LAYOUT
FOR
ELECTRIC ACCESSORIES MANUFACTURING PLANT

Figure AI-1-6-3 BAKELITE MOLDING SHOP AND ELECTRIC ACCESSORIES MANUFACTURING PLANT

PLANT MANAGER 2
SHOP MANAGER 1



98 persons

Figure AI-1-6-4 ACTUAL AND PLANNED PRODUCTION OF ELECTRIC ACCESSORIES

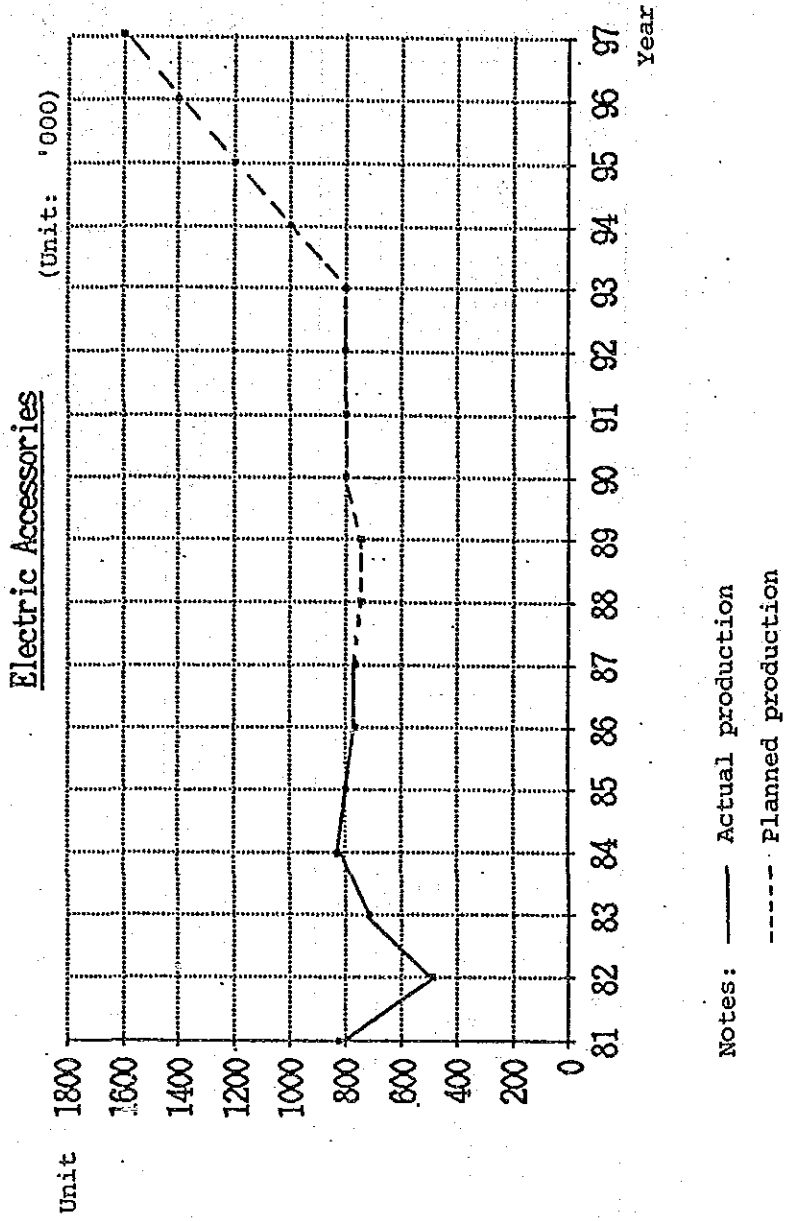


Figure AI-1-6-5(1) ASSEMBLY FLOW CHART OF ELECTRIC ACCESSORIES

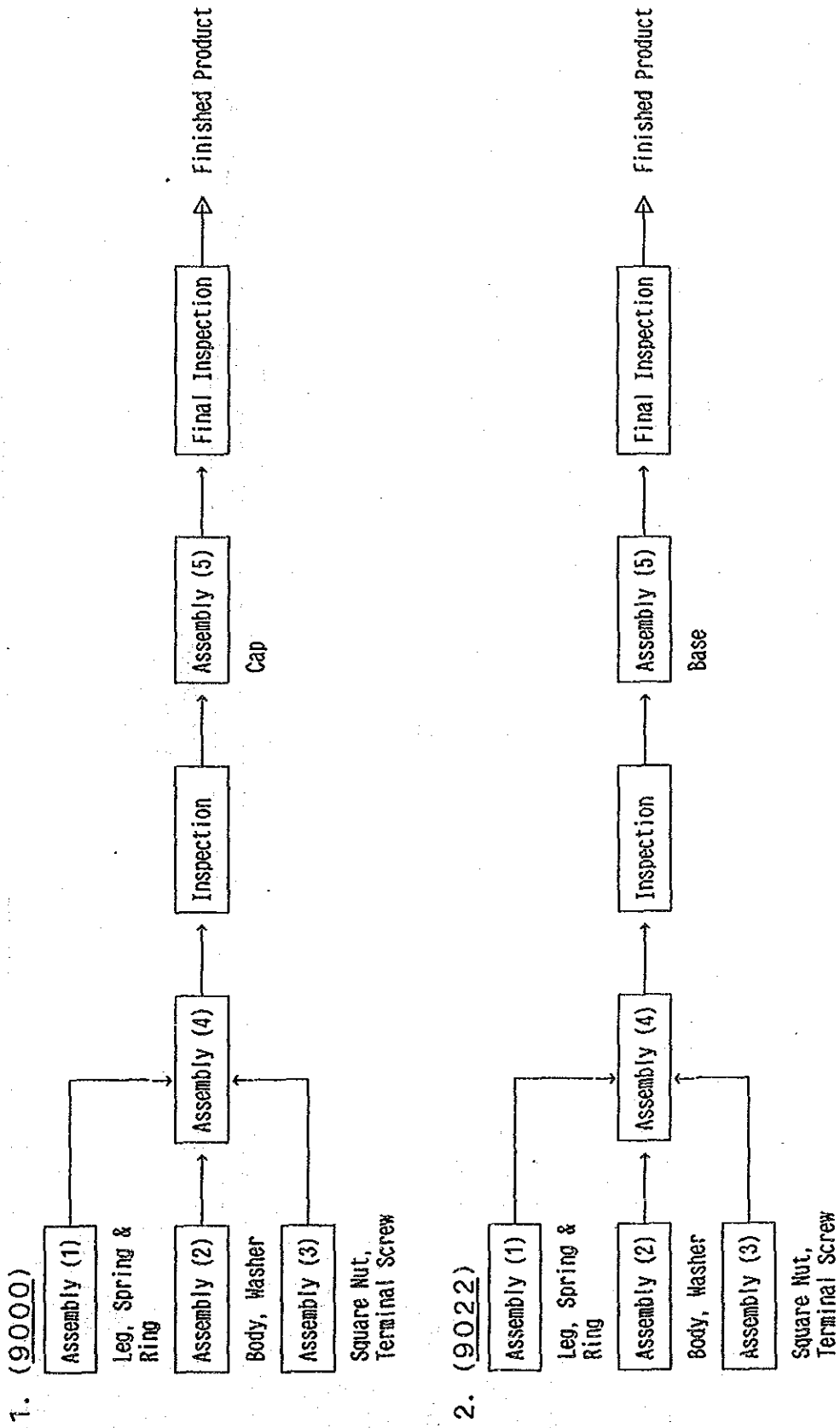


Figure AI-1-6-5(2) ASSEMBLY FLOW CHART OF ELECTRIC ACCESSORIES

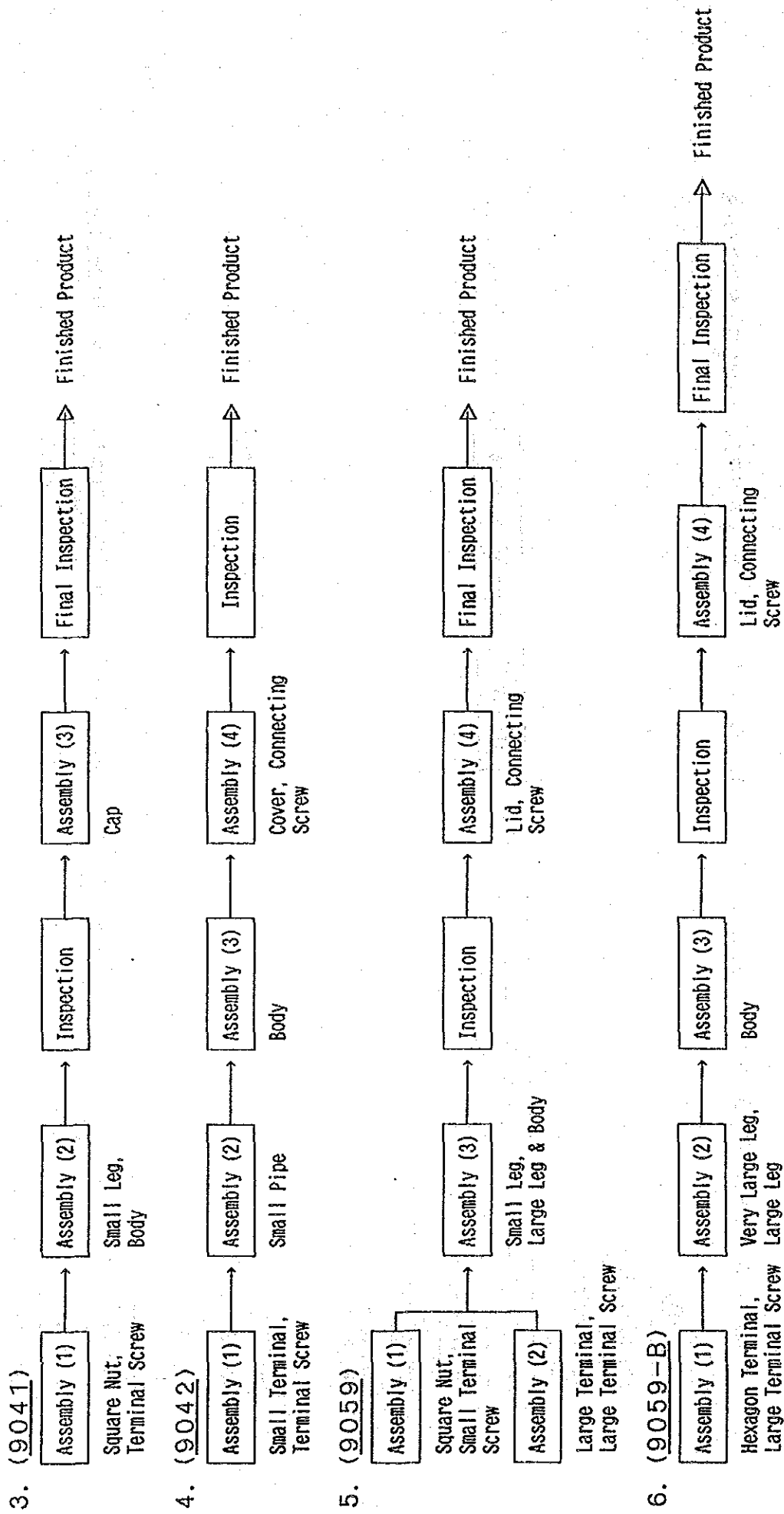
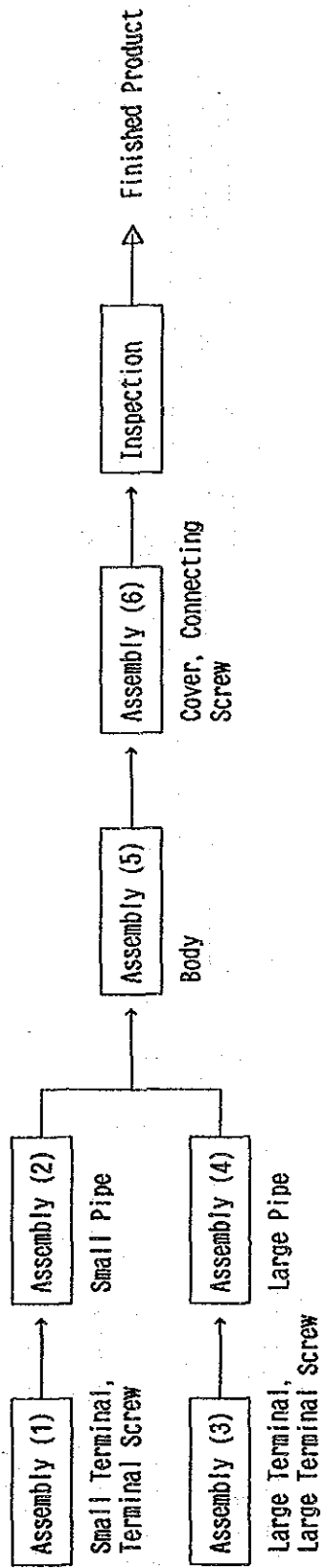


Figure AI-1-6-5(3) ASSEMBLY FLOW CHART OF ELECTRIC ACCESSORIES

7. (532)



8. (533)

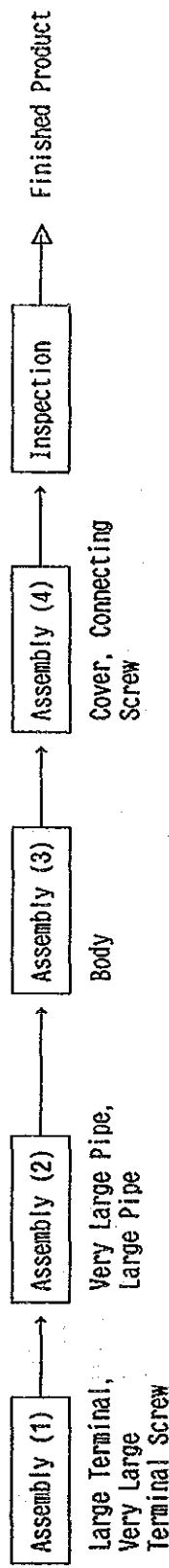


Figure AI-1-6-5(4) ASSEMBLY FLOW CHART OF ELECTRIC ACCESSORIES

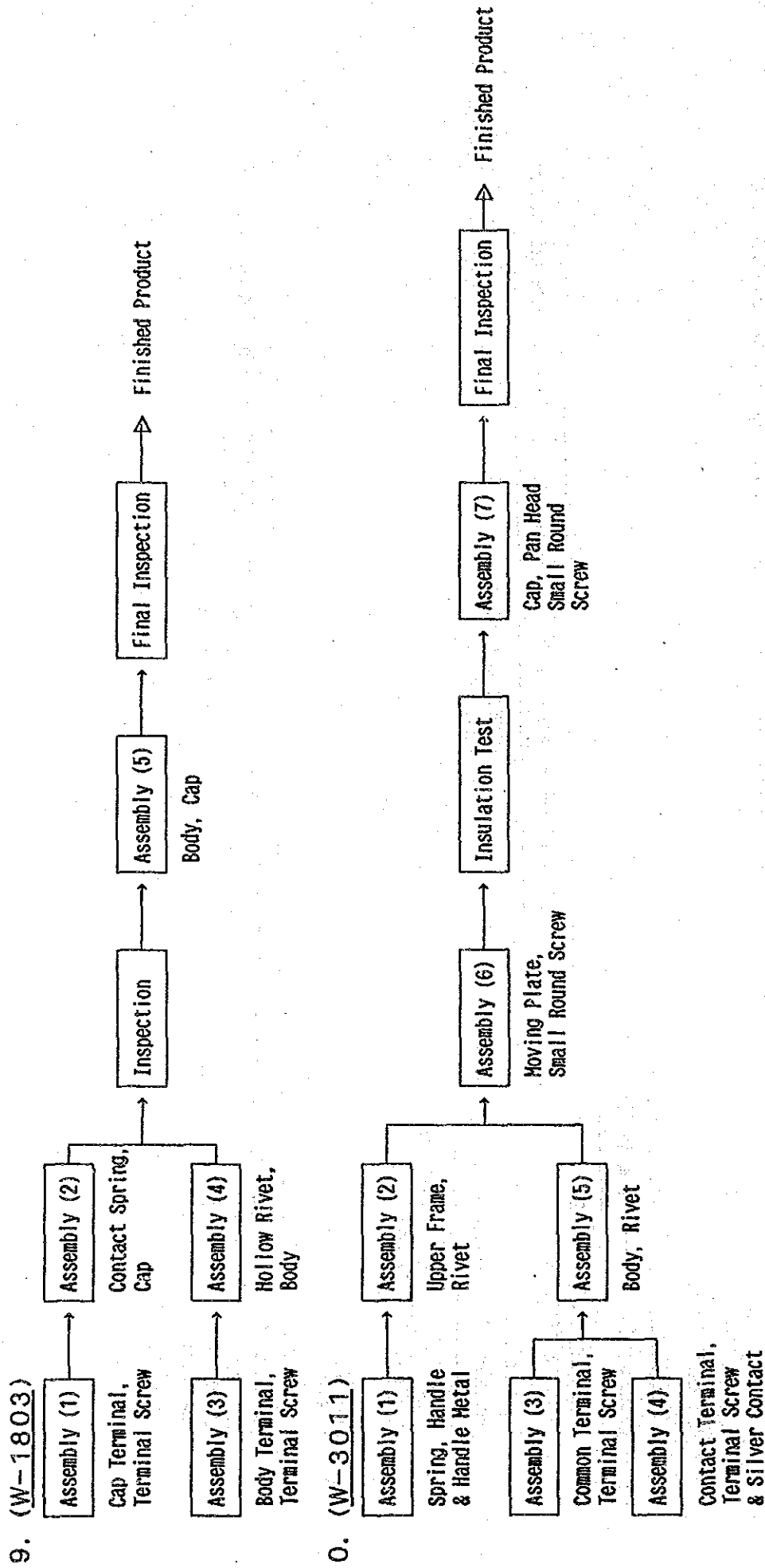
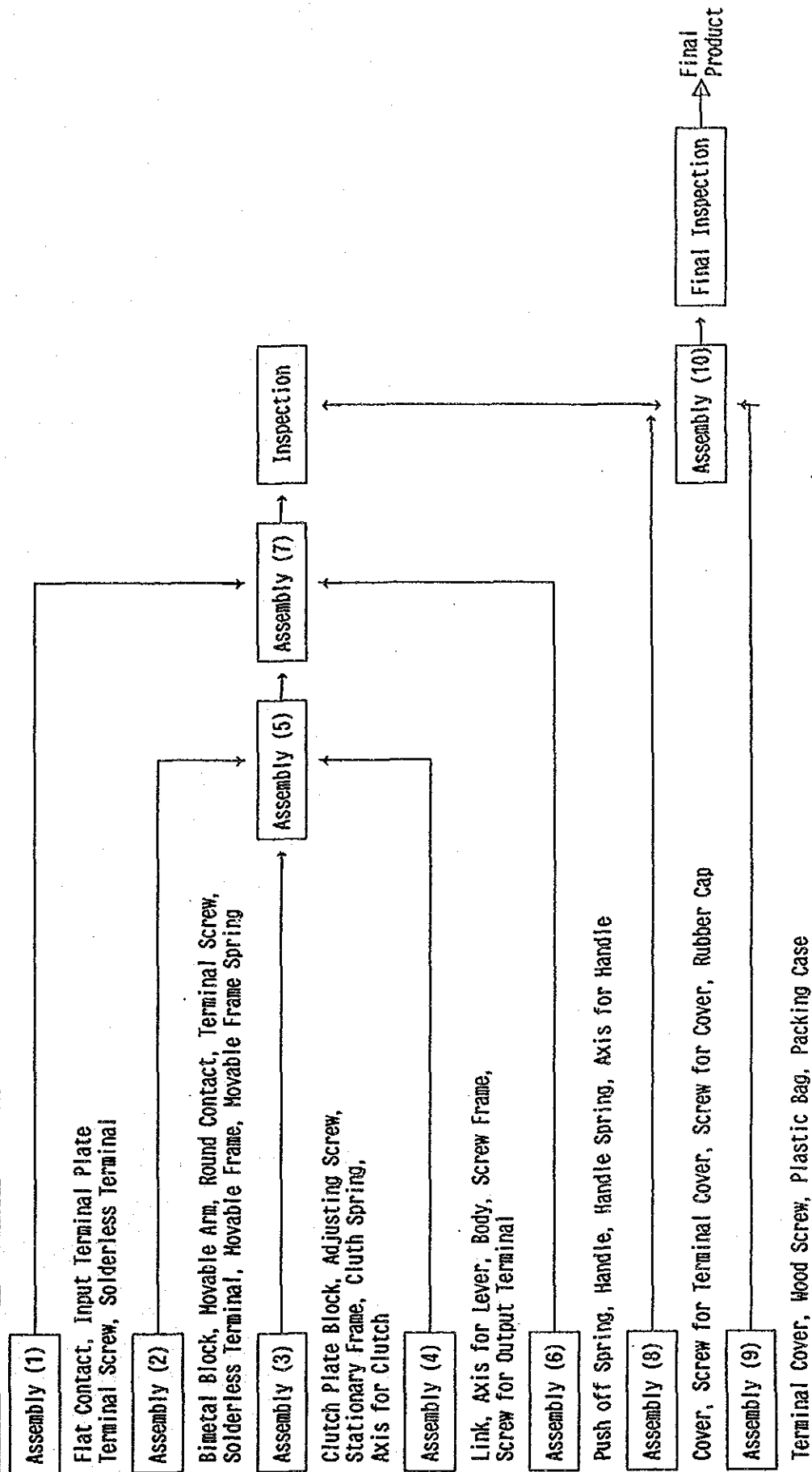


Figure AI-1-6-5(5) ASSEMBLY FLOW CHART OF ELECTRIC ACCESSORIES

11. (BS. 2021) (15A, 20A, 30A)



Chapter 2

AGRICULTURAL MACHINERY

MANUFACTURING FACILITY

Chapter 2 AGRICULTURAL MACHINERY MANUFACTURING FACILITY

2-1 Outline of Production Processes

(1) General outline

Because the iron industry in Burma has remained undeveloped it relies almost completely on imports for raw materials, and auxiliary materials. Further as it almost totally lacks components industries it can not produce bolts, nuts, machine screws, packing, etc. Conditions for the production of manufactured goods are very unfavorable. In particular, agricultural machinery which must meet diverse conditions of regional fields, crops, customs and which involves small scale production of a large variety of types of machine, would seem to be unprofitable. Processing of a varied kind from that of small parts to large parts is involved. Further, when one considers how the number of machine types has gradually increased, one inevitably feels that the flow of processing is not organized even when the parts processing takes place in one factory from start to finish.

There are 30 shops and divisions related to agricultural machinery. Of these the AME No.1 produces an agricultural machinery use generator, and in AME No.1 this is linked up with the engine and the finished product manufactured. There is also a foundry which also serves as a vehicle factory, a forging shop for light vehicle use, a heat treatment shop, etc. The following is a list of the shops concerned in the present evaluation, including the heat treatment shop.

1. Shops producing mainly agricultural machinery

AME No.2, AME No.3, AME No.4, Press and welding, Assembly No.1, and Assembly No.2.

2. Shops producing agricultural tools

Mamootie Forging Shop, Finishing Shop, and Timber Shop.

3. Shops producing mostly hand tools

Hand tools forging shop, and Finishing Shop

4. Other shops related to agricultural machinery and equipment.

A list of the shops investigated in the report is shown in Table AI-2-1-1.

(2) Working equipment and its layout

The following particularities of the working equipment and layout of the individual shops (AME No.2, AME No.3, AME No.4, Press & Welding, Assembly Shops No.1 and 2) which make up the Specialist Factory for Agricultural Machinery can be noted.

1. Each of the shops AME No.2, 3 and 4, mostly for machining processes, have very similar working equipment.
2. Shops AME No.2 and 3 are comprised of specialist machining lines for important main parts (cylinder frame, cylinder head, crankshaft, cam shaft, con rod, pump casing, etc.).
3. A gear processing line is located in AME No.4.
4. AME No.2 has its own press and welding shop apart from the main Press and Welding Shop.
5. The main assembling unit for Engine, Tiller, Pump, and Thresher is Assembly No.1.
6. Assembly Shop No.2 built as the painting shop for metal plates and press components is used only for assembly of crop sprayers and painting of pump accessories for Saudi Arabia.
7. The Press and Welding Shop seems cramped. It is expected this could present a problem in the future for some types of machinery production.

As the shop for electrical machinery, AME No.1 handles machining works, manufacture of electric parts, and air-cooled diesel engine. Further, German and Japanese machinery are mixed together. In particular, re-consideration of the layout relating to the coordination of the electric parts and machined parts of the assembly line is necessary.

Production processes from forging to finishing for mamootie and hand tools are done in separate shops, where completed products are manufactured. As production of each line is on a large scale a decisive quantity production line approach seems advisable. In particular consideration needs to be given to the Mamootie lines including the tiller tractor blade line.

Evaluation was based on the list of working equipment for these shops provided by the No.3 HI. The total quantity of equipment was 956, and excepting the four shops related to mamootie and hand tool lines 861 pieces of equipment either were involved directly or indirectly in production of finished products of agricultural machinery lines. As a result of the present evaluation the following headings for improvement in connection with the working equipment can be given:

1. A thorough line systematization for the main parts of engines and pumps which are comparatively produced on a large quantity basis
2. Expansion of the Press Shop.
3. Full provision for a repair shop. Improvement of the technologies for production and repair.
4. Introduction of new R/D facilities to the R/D (Research and Development Division) of AME No.2
5. Division and re-arrangement of product assembly in the Assembly Shops (more efficient use of Assembly Shop No.2).
6. Intensification of use of compressed air and steam on the Assembly Lines for cleaning.

(3) Organization and personnel

The first point noted in the evaluation was the large number of personnel present in the shops. This was particularly true of the AMEs No.2, 3 and 4 mainly responsible for machining and the Press and Welding Shop. A comparison of the machining and assembling divisions reveals that personnel is larger for the assembling division in general, and hand operations tend to be quicker whereas a certain slowness of hand operations in the machining division is inevitable. Nevertheless, cases of workers just watching on after feeding in were frequent on the machining sections. It is especially necessary to introduce multi-process thinking in areas which have already been line-systematized.

As regards agricultural machinery related production the part machining shops AME No.2, 3, and 4 Press, Welding and Plating Assembly shops No.1 and 2 are included in Production Dept. No.1 of the four production departments of No.3 HI. This section has the largest personnel number (661 employees, 22.6% of total) of No.3 HI. If the related sections of the forging and foundry sections of Production Depts. No.2 and No.4 are added to this the figure is 1,731 being more than half of the production section of No.3 HI (69%).

The planning dept. follows the production Department with 478 employees. However, when compared to other individual sections in the organization this does not seem particularly large. Even within the current personnel numbers it seems possible to increase the efficiency of individual production sections, reduce personnel, and increase investment in the Planning Dept. By these measures the large amount of waste in management can be done away with and improvement of product quality should be obtained. It is especially important to strengthen the Design (11), Inspection (86), and Agricultural machinery R/D (18), sections in this department. This would make possible a greater direction of energies towards the improvement of current machines, the changeover to domestic production, development of new machines, lower costs measures, and increase of quality.

Above all, more attention should be given to the quality of personnel. The training center of HIC is to Engineering High School standards and training of a large number of engineers to this level at least is advisable. There is no Section of the Planning Dept. which is in

charge of Product Engineering. Though each Production Dept. has a technical planning section this aspect needs to be enlarged to allow for more intensive repair, improvement, and renovation of equipment.

Committee meetings on improvement of product quality and changeover to domestic production, or regular consultations should take place to direct energies to the issues of improvement of finished products, changeover to domestic production, and lowering of costs. Regular consultations on the quality of blank materials used in the Forging Shop and Foundry require prompt implementation.

Personnel and equipment in the Planning Dept. are insufficient considering the total number of personnel and facilities of No.3 HI. Leaving aside the personnel aspect office equipment must be strengthened and improved.

Given the current level of workload of Production Dept. No.1 as regards production of agricultural machinery, a substantial reduction of work force is possible, and a considerable increase of production with the current work force is believed possible. However, for this it is necessary to repair and replace superannuated working equipment, and assure training of a skilled work force. Organization of personnel in Production Dept. No.1 is shown in table AI-2-1-2 however excepting the foreman it can be seen that the number of skilled and semiskilled workers is almost the same as that of unskilled workers. Trainee education must be improved much more but most important is the training of the general work force and managerial class.

Further, specialization and line systematization must be undertaken so that unskilled labor can perform operations equally to skilled workers using metallurgical tools and accessories and by strengthening of Product Engineering.

Organizationally it is necessary to create an improvements group of 3-4 members in charge of operation improvements in each shop which would supervise a system for in shop production of the shop's own racks, work benches, and transport vehicles as needed for improvements or regular operations. Improvements should proceed through full time consultation with the operators. These consultations could hopefully be used as the basis to develop quality control circles.

(4) Raw materials and components and their supply performance

Except for foundry parts almost all the raw materials for agricultural machinery production are imported from Japan, though a very small part of the steel for mamootie is domestically produced. Although the degree of parts processing inside No.3 HI is very high, for example 70% in the case of power tillers, the domestic production ratio, including that for raw materials, cannot be increased in chief because of the amount of imported steel. No.3 HI has a very strongly motivated plan for proceeding further with the change to domestic production of agricultural machinery. It should continue hereafter in cooperation with all the individual shops of HIC and proceed using their productive capacity.

Parts processing in No.3 HI involves an extremely large number of processing involving 233 items for the engine and 581 items for the power tiller. However, one aspect of efforts for realizing domestic production is that since the production quantities are small and the processes using general purpose machinery numerous there are a large number of small parts for which production costs are considerably higher than is the case for specialist manufacturers in the industrialized countries.

(5) Equipment capacity and production performance

The production of main products, except for exceptions such as the SV0102KB pump or pickax which are produced in comparatively small quantities, falls below the figures for annual production at the time of original installation.

There were frequent cases in which the production schedule was set well below the equipment capacity.

It is unclear whether this is due to a judgment that the actual productive capacity of equipment has dropped from the time of planning or whether it is due to a reduction in the HIC budget, or because of fall in demand.

Production schedule performance is shown in Tables AI-2-1-3 and AI-2-1-4. As the actual production performance for the pump is approx. 4,000 compared to the scheduled 6,000 it seems that a modification has

been made in the schedule. The production performance of the farm tractor is extremely low even though the schedule was drawn up on the basis of production capacity. The production schedule and performance results for the thresher shows considerable growth. Production for hand tools is below capacity largely due to demand factors, but for agricultural machinery while demand is strong it is capacity which is the problem. The ratio of production capacity compared only to production performance for principal products is 56-64% for engines, 57-67% for pumps, around 5% for crop sprayer, about 60% for generators, 15% for hand tools, 70% for agricultural tools, being the average production output for a period of three years (cf. Table AI-2-1-4).

The main reasons why the production schedule is not fulfilled are as follows:

1. Reduction of equipment capacity due to deterioration.
2. Shortage of raw materials, auxiliary materials and components.
3. Imperfect planning because of the complexity of production process planning.

Table AI-2-1-1 LIST OF SHOPS STUDIED

No.*	Nomenclature	DE	PT	PH	MH	HT	Sp	Pu	Ge
1	3-05 AME Component mfg Shop No.1								x
2	3-17 AME Component mfg Shop No.2	x	x	x			x	x	
3	3-18 Die Making and Repairing Shop	x	x	x	x	x			x
4	3-26 Hand Tool Finishing Shop								
5	3-44 Wood Working Shop	x		x	x	x	x	x	
6	3-03 AME Assembly Shop No.1	x	x	x					x
7	3-25 Hand Tool Forging Shop	x	x	x					x
8	3-31 Mamootie Forging Shop				x				
9	3-12 AME Assembly Shop No.2						x		
10	3-18 AME Component mfg Shop No.3	x	x					x	
11	3-47 AME Component mfg Shop No.4	x	x					x	
12	3-41 Press and Welding Shop	x	x	x			x	x	
13	3-43 Saw Mill	x	x	x			x	x	
14	3-30 Mamootie Finishing Shop				x				
15	3-14 Plating Shop No.1	x	x				x		
16	3-42 Combined Heat Treatment Shop	x	x					x	x
17	3-19 Material Planning Dept. Office & Main Store	x	x	x			x	x	x
18	3-16 Material Store	x	x	x			x	x	x
19	3-50 Transit Store	x	x	x			x	x	x
20	3-28 Store for Paint	x	x	x			x	x	x
21	3-29 Manufacture Component Store	x	x	x			x	x	x
22	3-51 Manufactured Products & Component Shop	x	x	x			x	x	x
23	3-13 Boiler Room	x	x	x			x	x	x
24	3-15 Inspection Room	x	x	x			x	x	x
25	3-04 Painting Shop								
26	3-11 Electric & Service Sec. under Technical Planning Dept.								
27	3-33 Technical Sec. under Technical Planning Dept.								
28	3- Technical Training School								
29	3- Agriculture Research & Development Farm								
30	3- Motor & Transportation Section (M/T)								

Notes: * Bridge No.
 DE: Diesel Engine PT: Power Tiller PH: Power Thresher MH: Mamootie Hoe
 HT: Hand Tools Sp: Sprayer Pu: Pump Ge: Generator

Table AI-2-1-2 PERSONNEL IN PRODUCTION DEPT. NO.1

	Office		AME2		AME3		AME4		P&H		Plating		Ass'y 1		Ass'y 2		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Shop Foreman & Foreman	5	17.2	12	6.4	18	11.3	11	12.5	7	16.7	2	11.1	23	16.3	6	16.7	84	12.3
Skilled Worker & Semiskilled Worker	12	41.4	96	51.3	78	49.0	35	39.8	9	21.4	5	27.8	55	43.6	16	44.4	306	44.7
Unskilled Worker	12	41.4	79	42.2	63	39.7	42	47.7	26	61.9	11	61.1	48	38.1	14	38.9	295	43.0
Total	29	100	187	100	159	100	88	100	42	100	18	100	126	100	36	100	685	100

Table AI-2-1-3 PRODUCTION CAPACITY AND PRODUCTION SCHEDULE

Product	Model	Production Capacity (Yearly)	Production Schedule					
			1984/1985		1985/1986		1986/1987	
			Qty	%	Qty	%	Qty	%
Pump	SC4C	7,000	6,000	85.7	4,000	57.1	4,500	64.3
Power Tiller	KMB200	600	600	100.0	500	83.3	600	100.0
Thresher	ATA45	1,000	200	20.0	200	20.0	500	50.0
Hand Tools	Spanner, Pliers, Driver, Hummer, etc.	546,000	75,000	13.7	78,000	14.3	78,000	14.3
Mamootie	in Three Models	600,000	300,000	50.0	300,000	50.0	400,000	66.7

Table AI-2-1-4 PRODUCTION RECORD OF AGRICULTURAL MACHINERY AND EQUIPMENT

Product	Model	Production Capacity (Yearly)	Production					
			1984/1985		1985/1986		1986/1987	
			Qt'y	%	Qt'y	%	Qt'y	%
Engine	KND5B KND7	8,130 1,230 9,360	3,977 1,225 5,202	48.9 99.6 55.6	4,198 983 5,181	51.6 79.9 55.4	4,915 1,051 5,966	60.5 85.4 63.8
Pump	SC4C SV0102KB Others	7,000 400 7,400	3,700 500 4,200	52.9 125.0 56.7	4,000 625 4,626	57.1 156.3 62.5	4,260 600 4,920	60.9 150.0 66.5
Power Tiller	KHB200	600	393	65.5	190	31.7	270	45.0
Thresher	ATA45	1,000	108	10.8	117	11.7	505	50.5
Rotary Device	FG-1800F	1,600	50	3.1	50	3.1	70	4.4
Total			551	34.4	357	22.3	845	52.8
Pesticide Equipment	H-2 A-8 B-2	5,000 20,000 5,000 30,000	400 325 1,225	8.0 4.1 4.1	- 945 200 1,145	- 4.7 4.0 3.9	400 2,000 - 2,400	8.0 10.0 - 8.0
Generator	BSK120 BSK140	230 230 460	34 200 234	14.8 86.9 50.9	50 120 170	21.7 52.8 36.9	150 181 331	65.2 78.7 71.9
Hand Tools	Spanner, Plier, Driver, Hammer, etc.	546,000	79,922	14.6	84,617	15.5	112,869	20.7
Agricultural Tools	Mamootie Shovel Pick Axe Axe	600,000 34,000 12,000 12,000 658,000	443,230 10,355 3,573 2,100 469,258	73.9 30.4 13.1 17.5 71.3	439,277 6,064 3,277 1,000 449,618	73.2 17.8 27.3 8.3 68.3	357,650 20,383 8,600 140 386,773	59.6 59.9 71.7 1.2 58.8
Total								

2-2 Analysis of Production Processing: Agricultural Machinery

(1) Introduction

Production of agricultural machinery at HIC takes place in No.3HI, except for the supply of parts imported from Japan, and some parts received from certain sections of No.1, 2, and 4 HIs. Cast and forged parts are supplied from No.3 HI Production Dept. No.2 (forged products) and Production Dept. No.4 (forged products). Heat Treatment takes place in Production Dept. No.2 (Combined Heat Treatment Shop). Other processing and assembly takes place in Production Dept. No.1, which is the main manufacturing section for agricultural machinery. Electric generators are produced in Production Department No.3 (AME No.1 Shop), hand tools and agricultural tools are manufactured in Production Dept. No.2 (Heat Treatment, Forging, Finishing, and Mamootie Forging and Finishing). As there is no sub-contractor or its equivalent everything must be internally produced by HIC.

The details of the layout and main operations of each shop are shown in Fig.AI-2-2-1.

(2) Analysis of production processing

Fig.AI-2-2-2 shows the movement inside No.3HI of the main parts making up the finished products. Cast and forged parts are supplied inside the same No.3 HI by transportation between shops.

Heat treatment parts are handled between processing stages in the Heat treatment shop and are machined in the machining shops. Since the layout of the shops in No.3 HI involves considerable distances for conveyance routes of raw materials and products conveyance operations are important problems. Transportation facilities are insufficiently equipped in No.3 HI.

As each of the shops AME No.2, 3 and 4 is equipped with essential working machinery for processing the various products most of these can be finished in the respective shops. Finished products are stored in the Storehouse and are sent together with imported products to assembly No.1, where they are assembled and coated, and sent to the finished products warehouse before dispatch. Except for agricultural machinery (mostly electric generators) processing and assembly takes

place in AME No.1. Assembly of crop sprayers takes place in Assembly No.2.

(3) Flow chart and diagram of processing chains

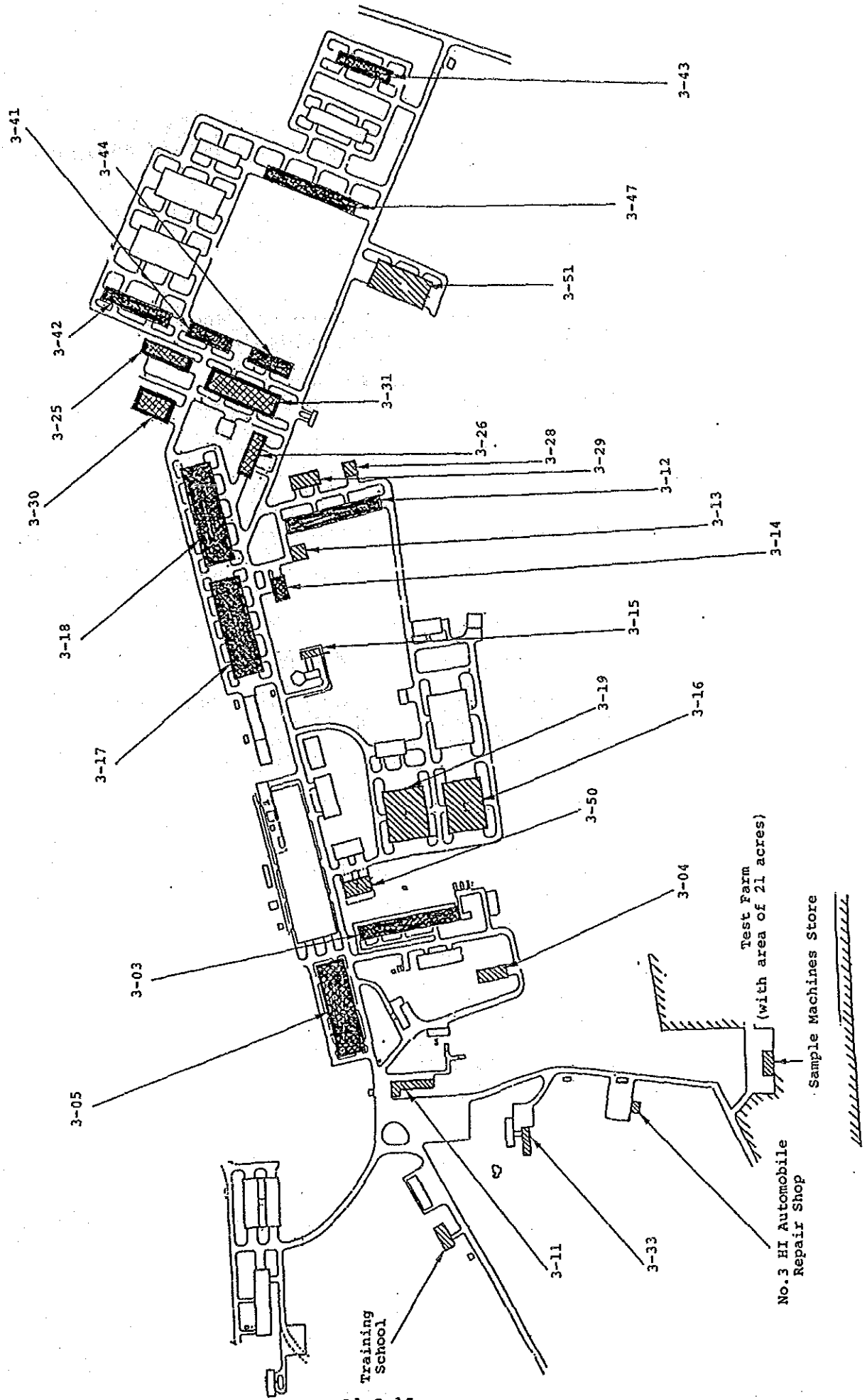
Figs. AI-2-2-2 to AI-2-2-7 are flow charts for main products and the diagram of processing routes. Almost all products are finished in the respective shops. There are acute problems with the roller conveyers in those areas which have been line systematized in particular. In order to complete all processes for cast parts in the foundry the completed shaped blanks only are transported to the machine shop where the next processes are carried out. However, forged parts after forging in the Forgery go through a complicated series of to and fro operations between the heat treatment shop and machine shop. Since conveyance of parts between the shops is involved in the movements (flow) of these parts and completed blanks. It is important that contact be maintained between the shops undertaking the dispatching and receiving operations.

Inside the shop, products tend to pile up around certain equipment and facilities creating production bottlenecks which are likely to cause problems for continuation of processing schedules. For example in the forging of the crankshaft shot blasting has to take place after the heat treatment but as the shot blast in the heat treatment shop does not have sufficient capacity products have to be carried to the shot blast in the foundry and machine processed after treatment there. Not only is the transportation route long, but as products must be processed between 3 production departments this is not very smooth and bottlenecks result.

We can compare the crankshaft and cam shaft of the diesel engine (KND 5B) as representative of the many problems of the flow chart. As the lines for the crankshaft and camshaft are similar the same equipment is used for processing which is in common, and specialist machinery is used for those processes which differ. As a result one would expect the crankshaft and camshaft to have similar flowcharts. However, due to deterioration and breakdown of equipment the crankshaft is processed on the line but the camshaft is taken off the line and are moved about in the AME No.2 shop. The same is true of the idle gear shaft and the pump shaft. A prompt repair of working equipment is advisable. The movement of components inside the shops is done by the

Progress personnel of that shop (AME), and the finished component is carried by the store worker. Transportation of parts handled in other shops such as heat treatment components is done by the AME Progress personnel.

Figure AI-2-2-1 LOCATION OF SHOPS/LINES AND ASSIGNED PROCESSES



Explanatory Notes for

Figure AI-2-2-1 Location of Shops/Lines and Assigned Processes

- | Bldg.
No. | Building |
|--------------|--|
| 3-03 | Agricultural Machinery Assembly Shop No.1 <ul style="list-style-type: none">- Painting and assembly of engine- Painting and assembly of tiller- Painting and assembly of pump- Painting and assembly of thresher |
| 3-04 | Painting Shop |
| 3-05 | Component Manufacturing Shop No.1 <ul style="list-style-type: none">- Machining and assy of generator and fan- Machining and assy of diesel engine parts (West Germany)
(Various parts of generator and fan being mfr'd in the same shop) |
| 3-11 | Electric & Services <ul style="list-style-type: none">- Maintenance of plant equipment |
| 3-12 | Agricultural Machinery Assembly Shop No.2 <ul style="list-style-type: none">- Painting of worked sheet metal- Painting of pump accessories- Assembly of pesticide equipment |
| 3-13 | Boiler house |
| 3-14 | Plating Shop No.1 <ul style="list-style-type: none">- Plating of diesel engine and power tiller components- Plating of hand tools |
| 3-15 | Component Measurement Room |
| 3-16 | Material Store <ul style="list-style-type: none">- Steel plate- Steel bars, steel rods, etc.- Auxiliary materials |

- 3-17 Component Manufacturing Shop No.2
 - Mostly machining of components of engine, pump, tiller and pesticide equipment
 - Dual-purpose machining line for crankshaft and cam shaft
 - Single-purpose machining line for pump casing
 - Press (100ton and under) and welding
 - Centralized grinding line of cutting tools
 - Repair line of equipment
 - Research and development (in a corner)
- 3-18 Component Manufacturing Shop No.3
 - Mostly machining of components of engine and pump
 - Single-purpose machining line for connecting rod
 - Single-purpose machining line for fly wheel
 - Single-purpose machining line for crank case
 - Single-purpose machining line for cylinder liner
 - Single-purpose machining line for cylinder head
 - Forging dies repair and mfrg. line
- 3-19 Main Store
 - Imported components (those have not been converted to domestic production)
- 3-25 Hand Tool Forging Shop
 - Forging of spanners, pliers, hammers, adjustable wrench, etc.
 - Forging of small-sized components for power tiller
- 3-26 Finishing Shop for Hand Tools
 - Machining of hand tools
 - Finishing of hand tools
- 3-28 Paint Store
- 3-29 Manufacture Component Store
- 3-30 Mamootie Heat Treatment and Finishing Shop
 - Hardening, Tempering, Buffing and Painting
- 3-33 Design and Drawing
- 3-41 Press and Welding Shop
 - Press and welding of components of tiller, engine, thresher and pesticide equipment (Large-sized materials such as frame, steering wheel, mud wheel, tank, etc. requiring a forging press of 150ton or larger are worked in No.1 HI)
- 3-42 Combined Heat Treatment Shop
 - Heat Treatment of components of diesel engine, power tiller and pump
 - Heat Treatment of forging dies

- 3-43 Saw Mill
 - Sawing up lumbers for components of pump, thresher, engine, pesticide equipment, hand tools, mamootie, etc.
- 3-44 Wood Working Shop
 - Working wooden components for pump, thresher, engine, pesticide equipment, hand tools, mamootie, etc.
- 3-47 Component Manufacturing Shop No.4
 - Majorly machining of components for power tiller, pump and diesel engine
 - Machining of gears
 - Machining of shafts
 - Machining of casings
- 3-50 Transit Store (Imported component parts)
 - Partial storage of engine and tiller components
 - Standardized parts (V-belt, bearing, etc.)
- 3-51 Manufactured Products and Components Store
 - Storing of all the completed goods

Training School

- Two years incl. of women
- The first year : mainly class room lectures
- The second year: mainly training in plant site

No.3 HI Automobile Repair Shop

Test Farm (with area of 21 acres)

Sample Machines Store

- Tiller, thresher, combine-harvester, reaper, binder, etc.



Main Shops for Engine, Power Tiller, Thresher, Pump and generator



Stores and Other Buildings



Main Shops for Mamootie and Hand Tools

No.: Building No.

Figure AI-2-2-2 DIESEL ENGINE AND POWER TILLER PARTS WORK FLOW CHART (1)

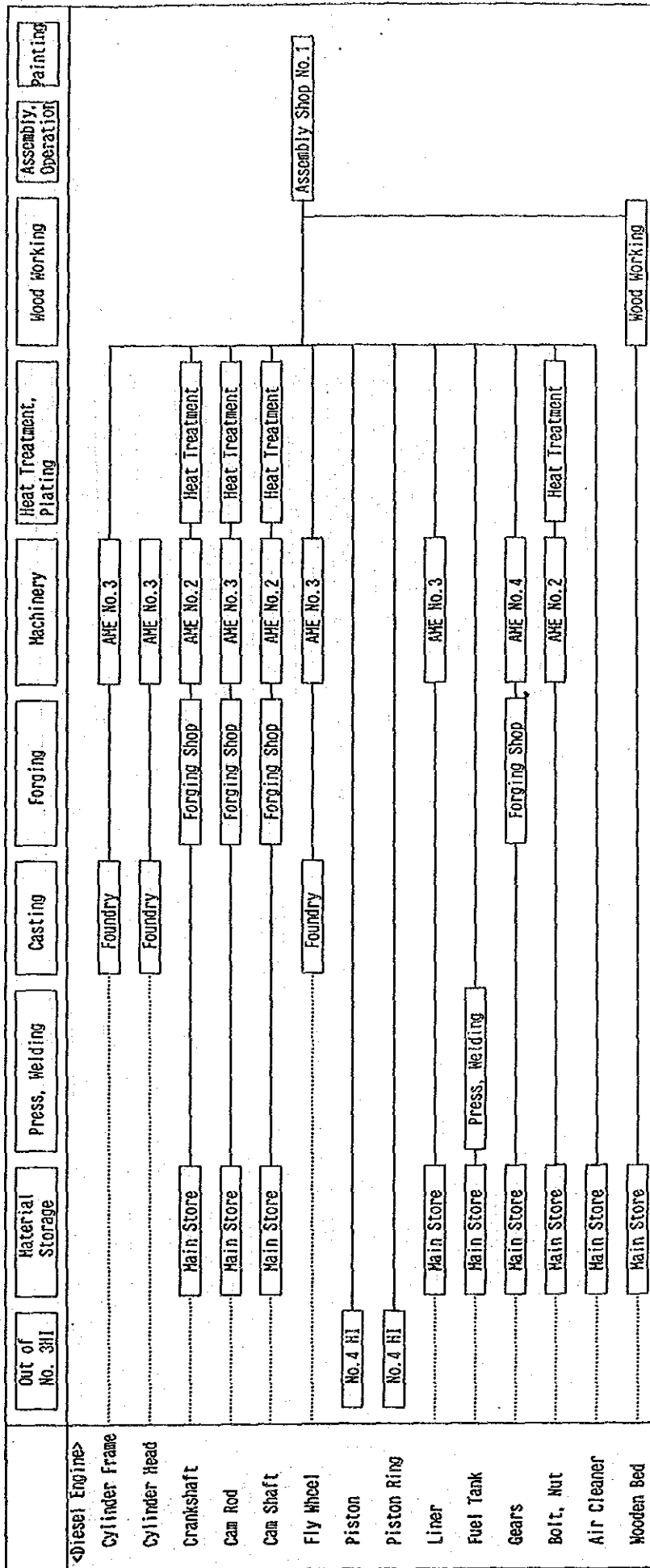


Figure AI-2-2-2 DIESEL ENGINE AND POWER TILLER PARTS WORK FLOW CHART (2)

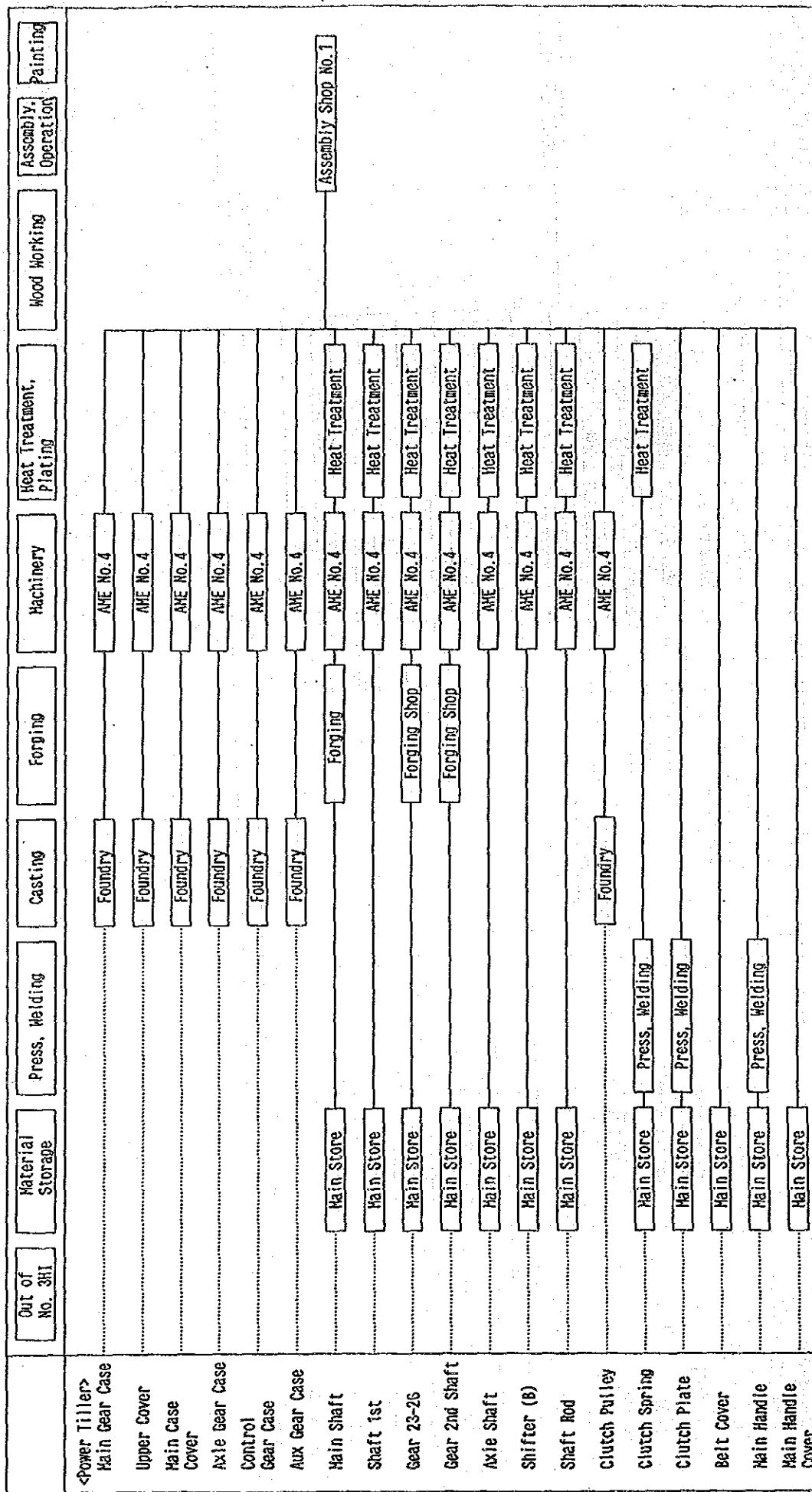


Figure AI-2-2-2 DIESEL ENGINE AND POWER TILLER PARTS WORK FLOW CHART (3)

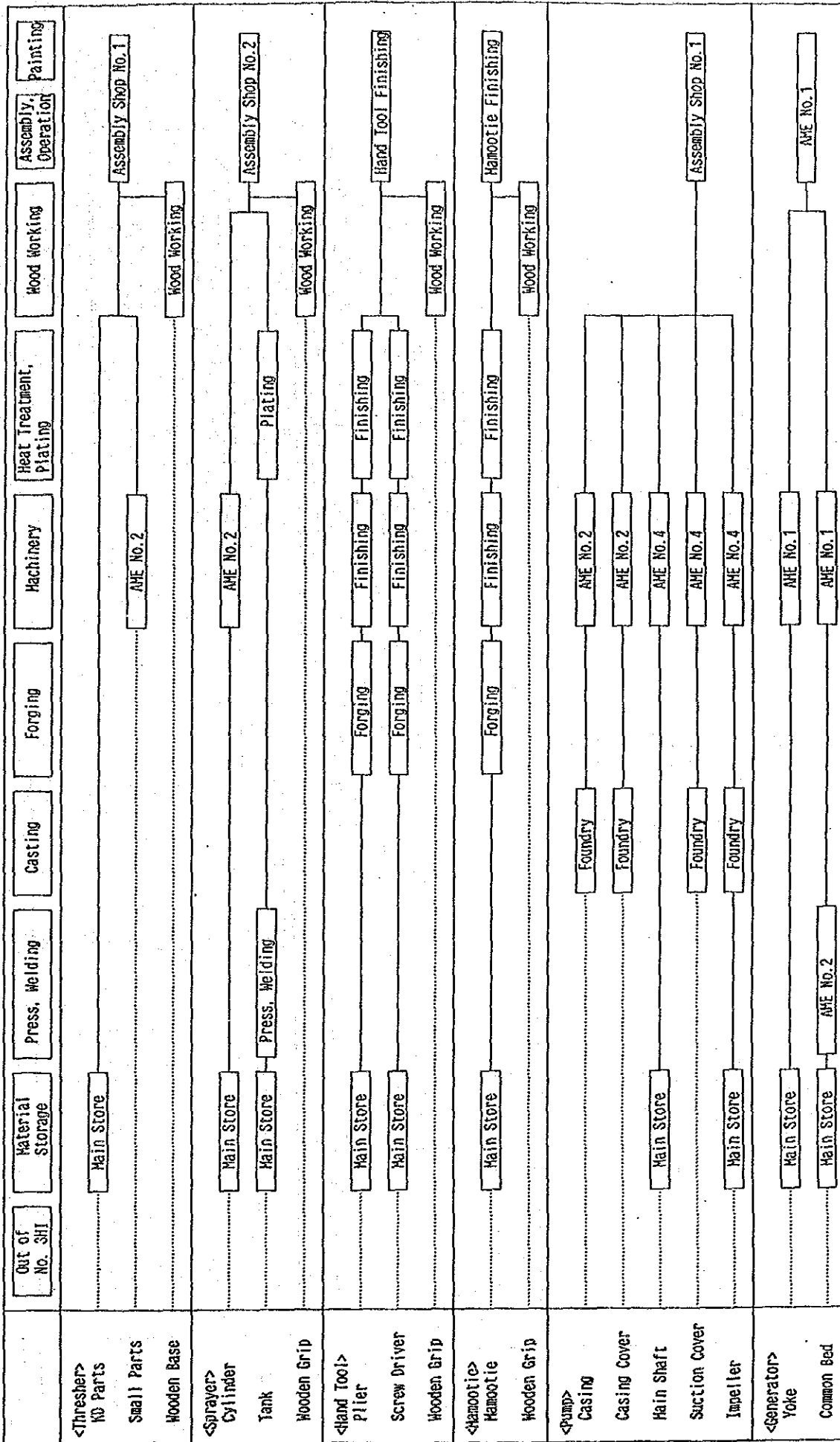


Figure A1-2-2-3 DIESEL ENGINE KND 5B:7 CRANK SHAFT FLOW CHART IN AME II, NO.3 HI

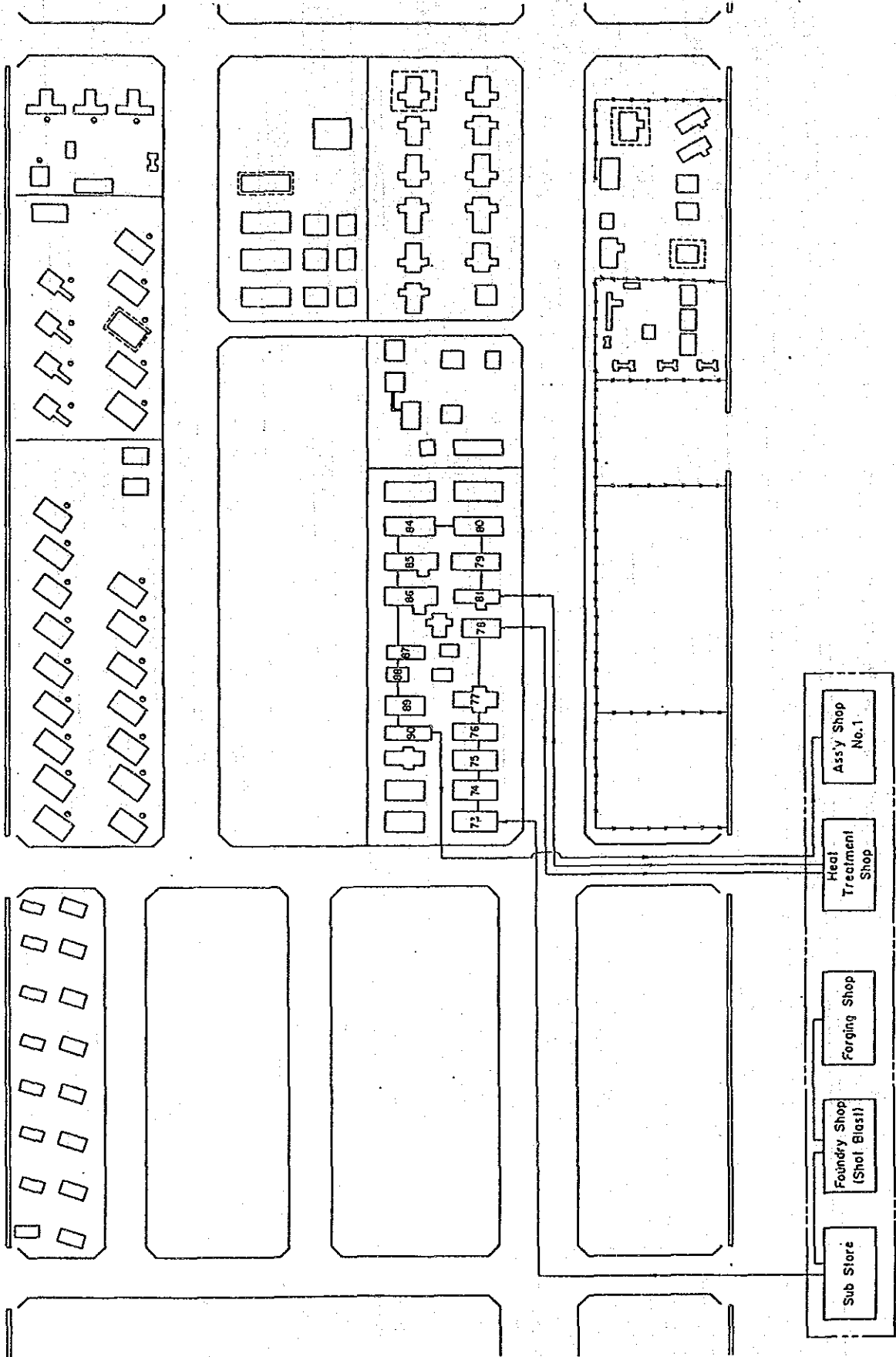


Figure AI-2-2-4 DIESEL ENGINE KND 5B CAM SHAFT FLOW CHART IN AME II, NO.3 HI

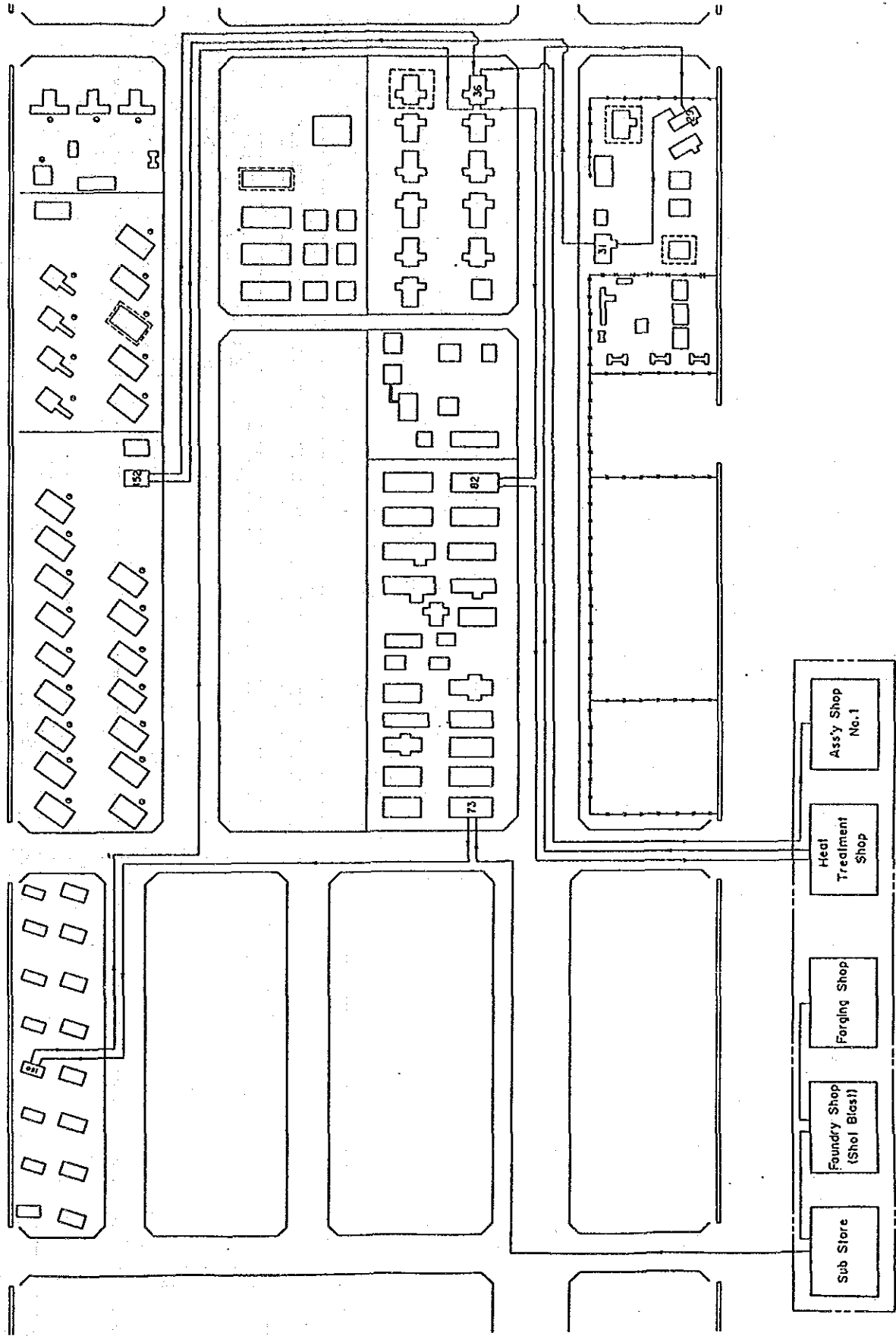


Figure AI-2-2-5 DIESEL ENGINE KND 5B SHAFT FOR IDLE GEAR FLOW CHART, AME II, NO.3 HI

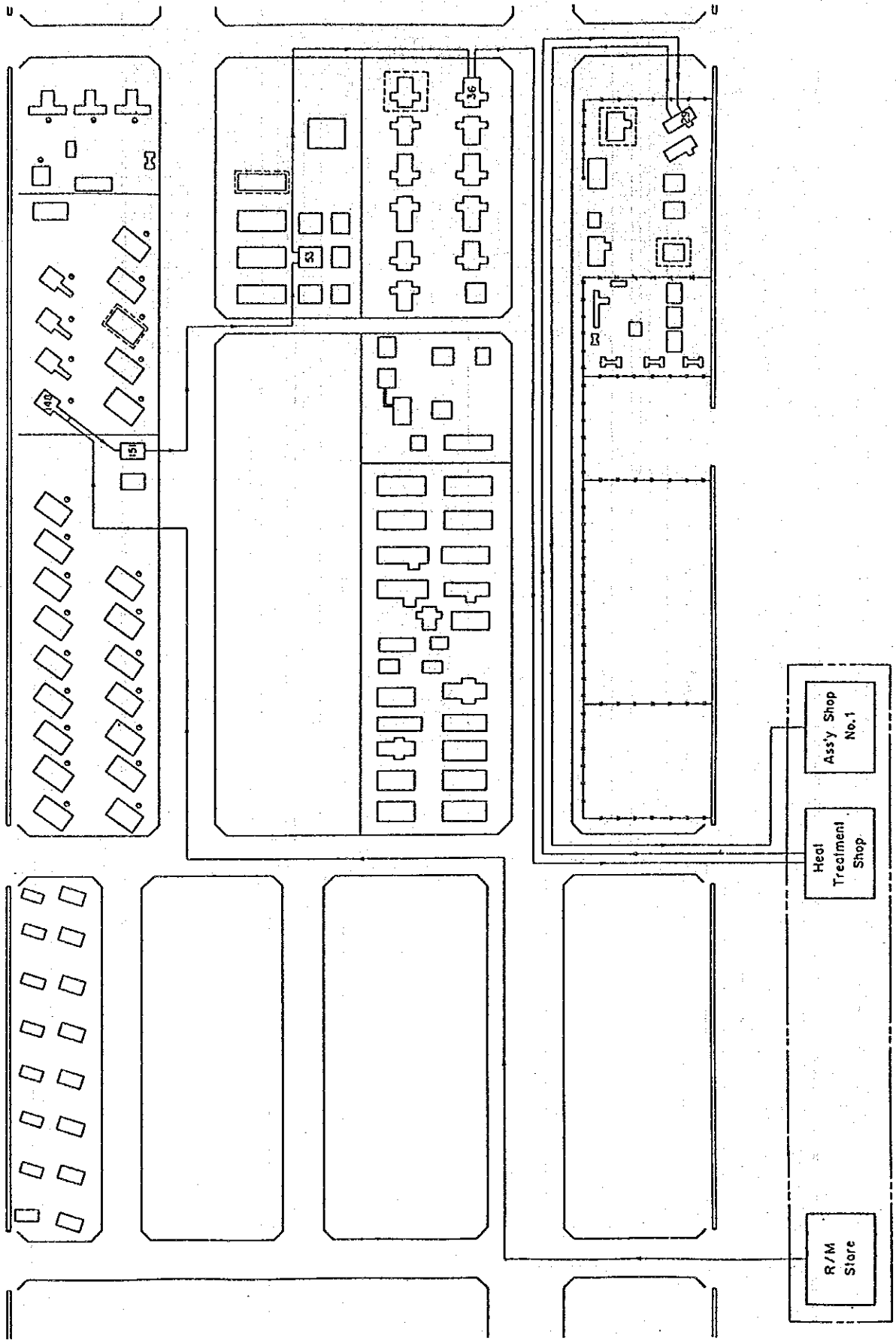


Figure AI-2-2-6 . PUMP SVO 102 KB S.G. SHAFT FLOW CHART IN AME II, NO.3 HI

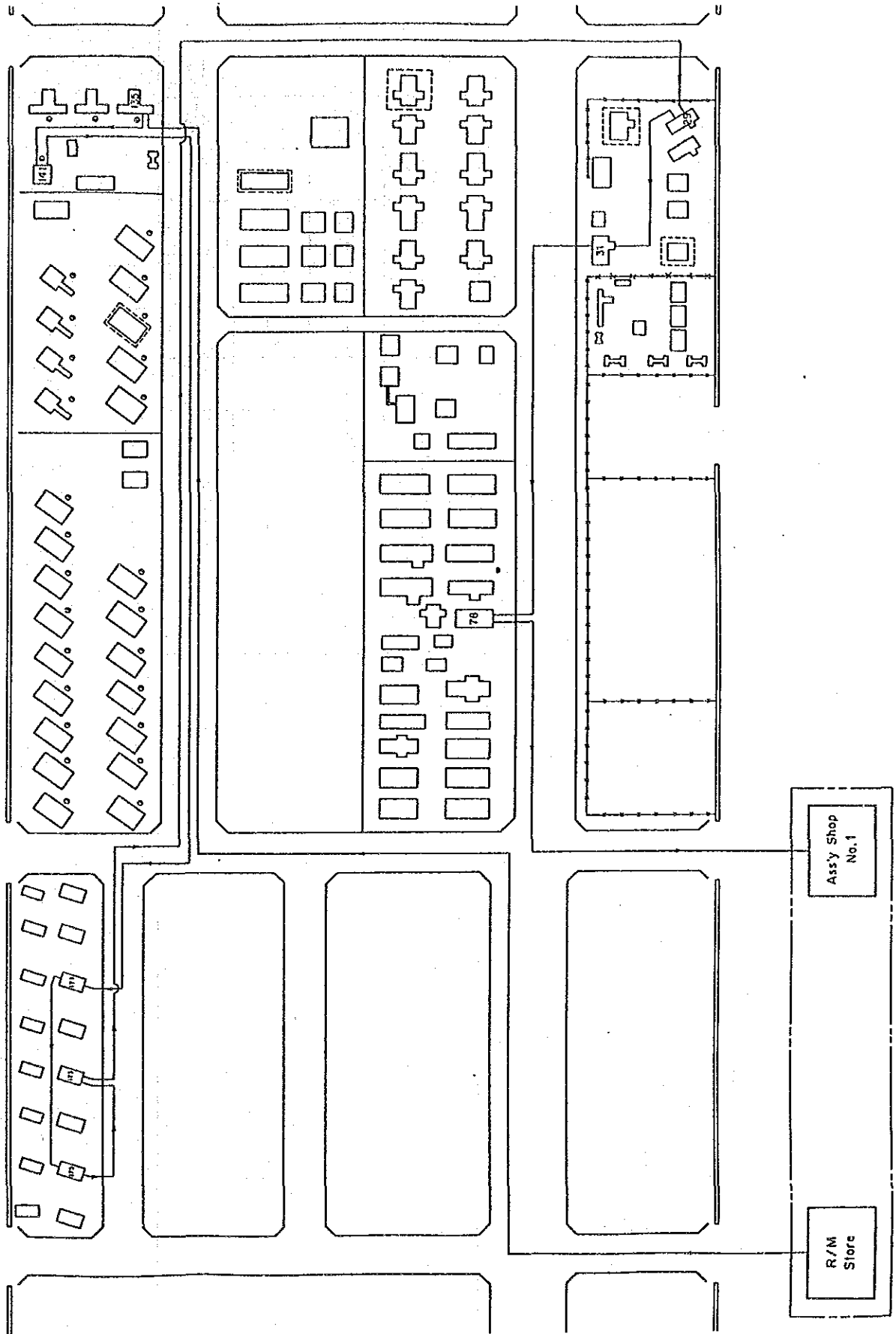


Figure AI-2-2-7 WORK FLOW CHART OF MAJOR COMPONENT PARTS (1)

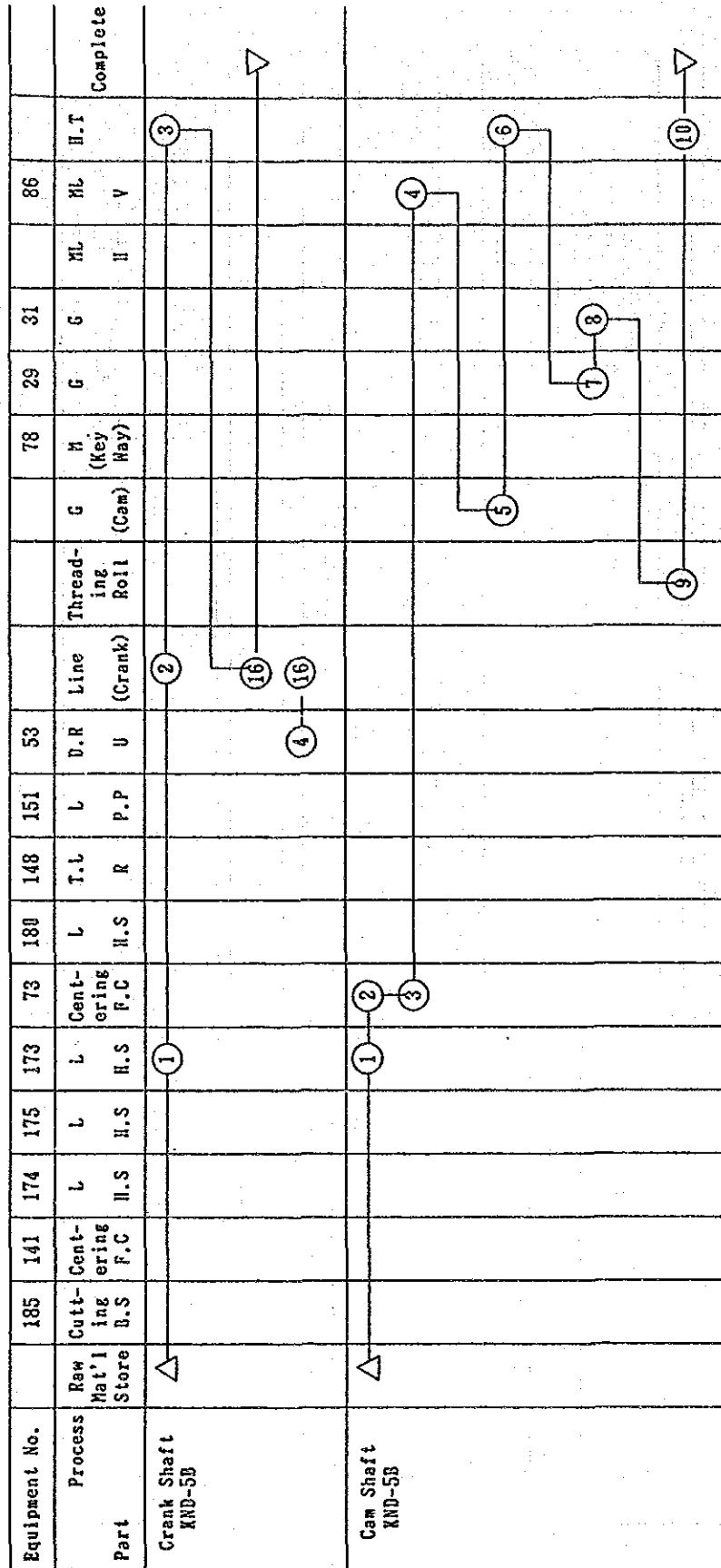


Figure A1-2-2-7 WORK FLOW CHART OF MAJOR COMPONENT PARTS (3)

Equipment No.	185	141	174	175	173	73	180	148	151	53			78	29	31		86		
Process	Cutt- ing B.S	Cent- ering F.C	L H.S	L H.S	L H.S	Cent- ering F.C	L H.S	T.L R	L P.P	D.R U	Line (Crank)	Thread- ing Roll	G (Cam)	M (Key Way)	G	ML H	ML V	H.T	Complete
Shaft Idle Gear KND-7	△							①	②	③				⑥		④	⑤		
C10 Shaft SC-4C	△	①	②	③	④	⑤								⑥	⑦				
S6 Shaft SYO-102XB	△	①	②	③	④	⑤								⑥	⑦				

Figure A1-2-2-7 WORK FLOW CHART OF MAJOR COMPONENT PARTS (5)

Process	Raw Mat'l Store	Cutt- ing 3A	Cutt- ing IA	DR	Cutt- ing AUTO	Cutt- ing LS	Cutt- ing LS	Thread- ing Thr	Bore DR	Grind- ing G	Complete
AME 2	△				①			②	③		△
KND HBBAM Mat'l	△							②			△
SB G14 SS41	△	①						②			△
KND HBBAM	△	①						②			△
SB 812 SS41	△							②			△
KND HBBAM	△							②			△
SB 816 SS41	△		①					②			△
KND HBBAM	△							②			△
SB G28 SS41	△	①						②			△
SC C	△	①						②			△
4C 419 SS41	△	①						②			△
SC C	△	①						②			△
4C 45 SS41	△	①				②		③			△
KND HBBAM	△										△
7 8100 SS41	△										△
AME 3	△	①				③				④	△
KND HBB Mat'l	△				②						△
SB 3000 SS41	△	①				③		④			△
KND HBBAM	△	①				③		④			△
SB 880 SS41	△					③		④			△
KND HBB	△		①			③					△
7 3016 SS41	△	①				③					△
SVO	△				②						△
102 K15 SS41	△					③		④			△
SVO	△		①			③					△
102 S16 SS41	△					③					△
KND HBB	△		①								△
SB 30 SS41	△										△
KND HBB	△	①									△
SB 40	△										△