

#9-5 Development and Production of Self-priming Pump for Export
- No. 3 HI: AME Shop -

(1) Objectives and Outline of the Plan

In the No.3 HI the local production of the SC4C four inch pump device and the SVO 102BK is being undertaken, however since these pumps require priming the demand for these especially for export is not increasing.

Therefore, HIC has had a plan for several years for the development of a self-priming pump and has already copied a sample three inch self-priming pump (PV03") and undertaken casting with wooden molds, machine processing and completed assembly. Also, 15 sets of samples of a two inch self-priming pump (PV02") have been purchased and domestic production is being considered.

Production of these self priming pumps for domestic and export uses will involve:

1. The installation of a specialist pmp processing line
2. As installation location the space vacated after the transfer of the metal molds repair shop of No.3 HI AME III can be used.
3. Production items and scheduled production output

Items	Scheduled Output
A. self priming pump PV02"	2,000 sets per year
B. self priming pump PV03"	1,000 sets per year

(2) Details of the Plan

Refer to Attached Table 2-1.

(3) Estimated Capital Requirement

1) Required Facilities

The details of the equipment and devices required in the present plan are shown in the Attached Table 3-1.

2) Estimated Capital Required

This is shown in the Attached Table 3-2.

(4) Expected Effects of the Plan

1) Savings of Foreign Currency

Export possibilities for the self priming pump are high, and if exported the foreign capital secured by export of one item is estimated at 12,920 yen (provided this is with an annual production of 3,000 items).

	Amount of foreign capital required at time of implementation of present plan (yen per item)	Foreign capital to be earned in case of Export (yen per item)
Costs for parts	3,000	26,700
Costs of raw materials	-	-
Shipping freight and insurance	230	2,080
Sub-total	3,230	28,780
Working equipment costs	12,640	-
Total	15,870	28,780

Note: The working equipment costs are for those additional costs incurred by the present plan only. Details are shown in the Attached Table 3-3. Annual production for the 2" model 2,000 sets and for the 3" model 1,000 sets.

2) Reduction in Production Costs Achieved

A comparison of production costs of one item at present and after implementation of the present plan is as follows:

		(unit: yen per item)	
Production Costs after Implementation of the Present Plan		In the Case of Exports	
Variable costs	4,470	CIF price	28,780
Fixed costs	18,760		
Sub-total	23,230	Import duty	5,760
Mark-up	700		
Excise tax	4,790	Unloading, etc.	300
Total	28,720	Total	34,840

Therefore, an economical price compared to that of imports is possible.

3) Period for Recovery of Foreign Exchange Invested

If the index for investment results is taken to be,

$$(A) / (B) \times (C)$$

where,

(A) = Required amount of foreign capital investment (432,000,000 yen)

(B) = Amount of foreign currency saved on one item (12,910 yen)

(C) = Annual production output (3,000 sets)

then this is 11.2 in the case of the present plan and compared to the amount of foreign exchange investment the amount of foreign exchange earning is small. Total production of self priming pump is 3,000 units per annum.

(4) Recommendations on the Implementation of the Plan

1. The major target of present plan is foreign exchange earning through export. However, if the plan has little significance in terms of export, the model change is regarded as that for meeting the needs of the domestic market. If such is the case, since the required equipment investment is large in order to reduce costs either use of the existing equipment should be attempted or intro-

duction should be timed to coincide with the period chosen for the replacement of the pump set production equipment.

2. It is planned to install a line in the area vacated after the transfer of the metal molds repair shop in No.3 HI and if this transfer is delayed alternative locations must be considered.

Attached Table 2-1 CONTENTS OF THE PROJECT FOR PROVISION OF DEVELOPMENT AND PRODUCTION
OF SELF-PRIMING PUMP FOR EXPORT AT NO.3 HI

Place of installation Item	No.3 HI
Building	The space on the site from where the die repair shop of No.3 HI AME III has been relocated will be used. Required area: 20 m x 40 m = 800 m ²
Outline of machinery & equipment	<p>Imported machinery Locally procured machinery & equipment</p> <p>1) Machining facilities 1) Casting facilities Existing 1) Casting dies Newly made</p> <p>2) Processing jigs 2) Assembling facilities ones will 2) Assembling</p> <p>3) Inspection equipment 3) Painting facilities be used. jigs</p> <p>4) Inspection jigs</p>
Technical data (materials) and technical guidance	<p>Technical data (materials) Technical guidance</p> <p>1) Machining facilities 1) Guidance on installation, operation and : 6 man-months</p> <p>2) Assembly manual adjustment of induced machinery and equipment</p> <p>3) Inspection manual</p> <p>4) Drawings</p>
Major component parts and materials	<p>Imported</p> <p>1) Ball bearing 2) O-ring 3) Packing 4) Plug</p>
Operating cost	1) Power 110 kW
Required operating manpower	21 persons
Remark	

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 9-5(1) Self Priming Pump Production
- No.3 HI: @ AME Project Plants -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Machine tools & auxiliary machine for casing		
1 1	Bed type vertical milling machine	Set	1
1 2	Facing & boring machine (special)	Set	1
1 3	Upright drilling machine	Set	2
1 4	Radial drilling machine	Set	1
2	Jigs & fixtures		
2 1	Angle head	Set	1
2 2	Jigs for milling	Set	6
2 3	Jigs for turning	Set	2
2 4	Jigs for drilling & tapping	Set	4
2 5	Multiple spindle head	Set	4
2 6	Jigs for drilling & tapping	Set	6
3	M/C tools & auxiliary M/C for casing cover (for 2 in. dia.)		
3 1	Facing & boring machine (special)	Set	1
3 2	Upright drilling machine	Set	1
4	Jigs & fixtures		
4 1	Jigs for drilling & tapping	Set	2
5	M/C tools & auxiliary M/C for casing cover (for 3 in. dia.)		
5 1	Vertical automatic lathe	Set	1
5 2	Radial drilling machine	Set	1
6	Jigs & fixtures		
6 1	Jigs for drilling & tapping	Set	2
7	Machine tools & auxiliary machine for suction cover		
7 1	Engine lathe	Set	1
7 2	Upright drilling machine	Set	1
7 3	Vertical milling machine	Set	1
8	Jigs & fixtures		
8 1	Jigs for milling	Set	2
8 2	Multiple spindle head & jigs	Set	4
8 3	Jigs for drilling & tapping	Set	2

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 9-5(2) Self Priming Pump Production
- No.3 HI: @ AME Project Plants -

No	Items	Unit	No.
9	Machine tools & auxiliary machine for impeller		
9 1	Automatic lathe	Set	1
9 2	Upright drilling machine	Set	1
9 3	Broaching machine	Set	1
10	Jigs & fixtures		
10 1	Jigs for slotting	Set	2
10 2	Jigs for drilling & tapping	Set	1
11	Machine tools & auxiliary machine for bearing cover		
11 1	Engine lathe	Set	1
11 2	Upright drilling machine	Set	1
12	Jigs & fixtures		
12 1	Jigs for drilling	Set	3
13	Machine tools & auxiliary machine for shaft		
13 1	Automatic cut-off machine	Set	1
13 2	Duplex head milling & centering machine	Set	1
13 3	Lathe with copying attachment	Set	1
13 4	Automatic keyway milling machine	Set	1
13 5	Cylindrical grinding machine	Set	1
14	Jigs & fixtures		
14 1	Templates for copying	Set	2
15	M/C tools & auxiliary m/c for bearing case (for 3 in. dia.)		
15 1	Automatic lathe	Set	1
15 2	Upright drilling machine	Set	1
16	Jigs & fixtures		
16 1	Jigs for drilling & tapping	Set	2
17	Machine tools & auxiliary machine for hand cover		
17 1	Vertical milling machine	Set	1
17 2	Upright drilling machine	Set	1

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 9-5(3) Self Priming Pump Production
- No.3 HI: @ AME Project Plants -

No	Items	Unit	No.
18	Jigs & fixtures		
18 1	Jigs for milling	Set	2
18 2	Jigs for drilling & tapping	Set	2
19	M/C tools & auxiliary m/c for side liner (for 3 in. dia.)		
19 1	Automatic lathe	Set	1
19 2	Upright drilling machine	Set	1
20	Jigs & fixtures		
20 1	Jigs for drilling	Set	1
21	Machine tools & auxiliary machine for "quality assurance"		
21 1	Vertical balancing machine	Set	1
21 2	Drilling machine for balancing	Set	1
21 3	Booster pump for hydraulic pressure test	Set	1
22	Jigs & fixtures		
22 1	Jigs for balancing test	Set	1
22 2	Blind flange	Set	2
23	Machine tools & auxiliary machine for "performance test"		
23 1	Electro magnetic flowmeter (nominal size:80mm)	Set	1
23 2	Electro magnetic flowmeter (nominal size:50mm)	Set	1
23 3	Electric equipment for pump performance test	Set	1
23 4	Surface plate	Set	1
23 5	Measuring instruments for pump performance test	Set	1

Attached Table 3-2: REQUIRED INVESTMENT (#9-5)

(Unit: million yen)

Items	Investment		
	Foreign	Local	Total
1 Bldg & Land			
A Land	-	0.0	0.0
B 1 Building	0.0	0.0	0.0
2 Freight & Insurance	0.0	-	0.0
Sub-total	0.0	0.0	0.0
3 Import Duty	-	0.0	0.0
4 Unloading	-	0.0	0.0
Building Total	0.0	0.0	0.0
Bldg & Land Total	0.0	0.0	0.0
2 1 Imported M/E (FOB)	390.0	-	390.0
2 Freight & Insurance	31.2	-	31.2
Sub-total	421.2	-	421.2
3 Import Duty	-	63.2	63.2
4 Unloading	-	5.9	5.9
5 Installation Cost	-	1.7	1.7
Imported M/E Total	421.2	70.8	492.0
3 Local M/E	-	0.0	0.0
4 Other Costs			
A License Fee	0.0	-	0.0
B Eng Fee	10.8	-	10.8
C Software	0.0	-	0.0
D Interest	0.0	-	0.0
Other Costs Total	10.8	-	10.8
Total Investment	432.0	70.8	502.8

Attached Table 3-3: PRODUCTION COST STATEMENT (#9-5)

Items	Unit	No.	Annual Cost (million Yen)			Component (%)
			F/C	L/C	Total	
1 CP/RM						
A Imported CP/RM (FOB)			80.0	-	80.0	51
Freight & Insurance			6.4	-	6.4	4
Import Duty			-	13.0	13.0	8
Unloading			-	1.2	1.2	1
Sub-total			86.4	14.2	100.6	64
B Local CP/RM			-	0.0	0.0	0
CP/RM Total			86.4	14.2	100.6	64
2 Utilities			0.0	1.0	1.0	1
Variable Cost			86.4	15.2	101.6	64
3 Depreciation			25.3	8.4	33.7	21
4 Amortization			0.0	-	0.0	0
5 Maintenance			12.6	2.1	14.7	9
6 Design Fee			0.0	-	0.0	0
7 Labor			-	3.1	3.1	2
8 Overhead			-	3.9	3.9	2
9 Admin. Cost			-	0.9	0.9	1
Fixed Cost			37.9	18.4	56.3	36
Annual Cost			124.3	33.6	157.9	100
Unit P. Cost					52633.3	
10 Mark-up					15.8	
11 Excise Tax					105.3	
Ex-fact. Cost					52754.4	

#9-6 Production of a Low Tension Panel

- No.5 HI -

(1) Objectives and Outline of the Plan

In Burma there is a large demand in small scale factories and in rural areas for the low tension panels which are accessory to the distribution transformer. Production of these low tension panels is done at the Engineering Factory No.1 of HIC Rangoon on a production to order basis on receipt of orders from the Public electric Corporation and other corporations. The panels are designed individually in response to the orders received and a certain number of imported parts attached.

The Engineering Factory No.1 currently produces hundreds of steel library racks per annum and is thought to have the necessary technical skills for production of the angles and case of the low tension panel. However, the following defects were noted in the finished steel cabinets:

1. Bending processes not accurate
2. Defects in the stopping processes
3. Unattractive spot welding
4. Painting is only with hand sprayer and sloppy

The Engineering Factory No.1 possesses the following equipment which were all installed in the pre-war period and are considerably worn.

1. Press	65 tons	1
2. Press	70 tons	1
3. Press	150 tons (water pressure)	1
4. Press brake	8 feet (damaged dies)	1
5. Shearing machine	8 feet	1
6. Welding machine	Hand type (spot)	1
7. Bending machine	6 feet	1
8. Welding machine	Gas	1
9. Spray gun	Hand type	1

In order to undertake production in response to the above situation the present plan is for the installation of low tension panel production equipment in No.5 HI.

(2) Details of the Plan

The present plan is for introduction of equipment for collective production of the panel, panel frame and supporting frame without the cabinet and housing together with provisions for existing facilities.

Introduction of processing equipment with a production capacity of 350-400 panels per year is planned (press brake, shearing machine, punching machine, punching press, etc.).

Since an automatic punching press is costly and not yet standardised a hand type press which has an indicator of position has been selected. Further, painting equipment has been excluded since this will be shared with the painting equipment of No.5 HI used for transformer processing.

(3) Estimated Capital Requirement

1) Required Facilities

The details of equipment and devices required in the present plan are shown in the attached Table 3-1.

2) Estimated Capital Requirement

The estimated amount of capital required is shown in the attached Table 3-2.

(4) Expected Effects of the Plan

1) Saving of Foreign Exchange

Compared with a case of import, the saving on the required amount of foreign exchange can be expected 133,100 yen per unit. (With an annual production of 350 units)

	Foreign Exchange Required at Implementation of Plan (yen per unit)	Amount of Foreign Exchange Required at Present (yen per unit)
Cost of parts	-	310,000
Raw Material Costs	120,000	-
Freight & Insurance	9,714	25,100
Sub-total	129,714	335,100
Working equipment costs	72,289	-
TOTAL	202,000	335,100

Note: The working equipment costs are only for the additional costs incurred by this plan. For details of the above items refer to the Attached Table 3-3.

2) Reduction in Production Costs Achieved

A comparison of production costs for one item at present and after the implementation of the present plan is as follows:

(Unit: yen per unit)

	Production Costs After Implementation of the Plan	Present Production Costs (in 1987)
Imported CP/RM costs		
FOB price	120,000	310,000
Freight & insurance	9,714	25,100
Sub-total	129,714	335,100
Local CP/RM costs	-	-
Depreciation	52,000	-
Utility costs	-	-
Labor costs	-	-
Overheads	6,571	-
Admin. costs	2,286	-
Other costs	53,429	50,300
Sub-total	114,286	50,300
Mark-up, profit	7,320	-
Excise tax	75,396	-
TOTAL	326,716	385,400

Therefore, with the implementation of the present plan, a reduction in production costs can be anticipated 58,684 yen per unit.

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 9-6 Low-tension Panel Production
- No.5 HI -

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Dmstc prd'n:low-tension panel		
1 1	Press brake	Set	1
1 2	V. type press die	Set	1
1 3	Mechanical shear	Set	1
1 4	Corner shearing machine	Set	1
1 5	Punching m/c for angle and channel	Set	1
1 6	Punching press duplicator	Set	1
1 7	Press die for punching press duplicator	Set	5
1 8	Drilling machine	Set	1
1 9	Table lifter	Set	1
110	CO2 welding machine	Set	2
111	Gas welding machine	Set	1
112	Grinding machine	Set	1
113	Shelf for angle and channels	Set	1
114	Shelf for steel plates	Set	1
115	Carrier	Set	1
116	Handy type grinder 180	Set	3
117	Handy type grinder 100	Set	3
118	Surface plate 22x1,500x1,600	Set	1
119	Hole saw 13 o	Set	3
120	Electric drilling m/c	Set	1
121	Tools (adjustable spanner and others)	Set	1
122	Tool box	Set	1
123	Jigs and templates	Set	1
124	Others	Lot	1

Attached Table 3-2: REQUIRED INVESTMENT (#9-6)

(Unit: million yen)

Items	Investment		
	Foreign	Local	Total
1 Bldg & Land			
A Land	-	0.0	0.0
B 1 Building	0.0	0.0	0.0
2 Freight & Insurance	0.0	-	0.0
Sub-total	0.0	0.0	0.0
3 Import Duty	-	0.0	0.0
4 Unloading	-	0.0	0.0
Building Total	0.0	0.0	0.0
Bldg & Land Total	0.0	0.0	0.0
2 1 Imported M/E (FOB)	212.9	-	212.9
2 Freight & Insurance	17.1	-	17.1
Sub-total	230.0	-	230.0
3 Import Duty	-	34.5	34.5
4 Unloading	-	3.2	3.2
5 Installation Cost	-	5.1	5.1
Imported M/E Total	230.0	42.8	272.8
3 Local M/E	-	0.0	0.0
4 Other Costs			
A License Fee	0.0	-	0.0
B Eng Fee	10.8	-	10.8
C Software	0.0	-	0.0
D Interest	0.0	-	0.0
Other Costs Total	10.8	-	10.8
Total Investment	240.8	42.8	283.6

Attached Table 3-3: PRODUCTION COST STATEMENT (#9-6)

Items	Unit	No.	Annual Cost (million Yen)			Component (%)
			F/C	L/C	Total	
1 CP/RM						
A Imported CP/RM (FOB)			42.0	-	42.0	49
Freight & Insurance			3.4	-	3.4	4
Import Duty			-	6.8	6.8	8
Unloading			-	0.6	0.6	1
Sub-total			45.4	7.4	52.8	62
B Local CP/RM			-	0.0	0.0	0
CP/RM Total			45.4	7.4	52.8	62
2 Utilities			0.0	0.0	0.0	0
Variable Cost			45.4	7.4	52.8	62
3 Depreciation			15.3	2.9	18.2	21
4 Amortization			2.2	-	2.2	3
5 Maintenance			6.9	1.3	8.2	10
6 Design Fee			0.9	-	0.9	1
7 Labor			-	0.0	0.0	0
8 Overhead			-	2.3	2.3	3
9 Admin. Cost			-	0.8	0.8	1
Fixed Cost			25.3	7.3	32.6	38
Annual Cost			70.7	14.7	85.4	100
Unit P. Cost					244000.0	
10 Mark-up					7320.0	
11 Excise Tax					75396.0	
Ex-fact. Cost					326716.0	

#10-1 Establishment of the Product Development System

(1) Objectives and Outline of the Plan

The specifications of the most of the current products were introduced from Japan. Of course the needs local were examined in details before introducing them, but as a matter of fact some of these products are not fitting perfectly the current needs in view of the changes occurred subsequently on the market. Furthermore, from the standpoint of the manufacture there are products susceptible of simplification and improvement so as to give room to the utilization of domestic resources. The plan for Establishment of Product Development System has the object of promoting the development of indigenous technology by fostering design capability aimed at improving the said points, providing technical documentation, equipping facilities for trial manufacture and tests, and thereby realizing the improvement and development of products. Facilities for trial manufacture and tests of various kinds and organization for systematic planning and implementation of these activities are required in this connection. The establishment of the Product Development Center, which will function as kernel of the said activities, is planned with the object of giving HIC room to equip and strengthen its organization at each stage of work aimed at realizing the said goals.

(2) Details of the Plan

The Plan is divided into 3 phases, i.e., Phase 1 = Preliminary Preparation and Arrangement, Phase 2 - Preliminary Development and Technical Training and Phase 3 - Development which includes new product development.

- 1) In Phase 1, various information indicating the standards and characteristics of HIC products will be prepared and both inspection and analysis systems will be established for the proper understanding of the quality and performance of the materials, parts and products actually used which will constitute an important basis for the future improvement of parts. For the time being, however, the items to be inspected and the types of tests to be conducted should be clearly

determined for examination of the quality and performance of domestically produced parts and materials. In addition, a system should be established whereby test data is properly reported for analysis purposes and the analysis results are fed back to the production processes. The planned contents of Phase 1 are as follows:

a) Provision of Equipment

Among basic testing equipment, a tensile/bending tester, hardness tester, metallurgical microscope and measuring instruments, all of which will provide basic data, will be required.

b) Consolidation of Organization

1. Until the time when the provision of testing and research equipment has been completed, the various testing and measuring instruments currently available at each HI should be listed and classified so that they can be used as required.
2. Those responsible for R & D should prepare a detailed plan covering objectives, methods, research contents and items, etc., referring to academic papers, etc., on R & D items.
3. Research themes should be found within the scope of the available equipment.

(Example)

- Relationship between analysis results on the composition of molten minerals and microstructure as well as the results of strength and other tests using test pieces.
- Relationship between analysis results on heat treated materials and the hardness, structure and strength determined by the heat treatment conditions.
- Relationship between materials subject to such surface treatment as painting or plating and the coating strength and weatherability, etc., determined by the treatment conditions.

c) Information Arrangement

1. All records relating to actually conducted R & D, testing and measurement, regardless of these being successful or not, should be properly maintained and classified for future reference purposes.
2. All available academic papers and reference materials, etc., including standards and guidelines, should be collected and classified for future reference purposes.
3. Information on product trends, technical trends and demand trends in both the domestic and overseas markets should be collected and classified for future reference purposes.
4. The HIC should obtain as many foreign product drawings and bills of materials and as much technical and design data as possible while also preparing the HIC's own design/drawing standards, drawing specifications, standards for materials to be used, standards for bills of materials, criteria for standard parts and other necessary standards.

d) Staff Training

1. Experts on testing equipment will be trained for each HI and those responsible for R & D should maintain a close relationship with these experts in view of enlisting their cooperation and utilizing their practical techniques for the successful achievement of research objectives.
 2. In the course of the Project's implementation, technical know-how on all aspects from design to production should be acquired with the cooperation of the dispatched technical advisors.
- 2) In Phase 2, such developmental efforts as design alteration, trial manufacture, performance testing and improvements should be conducted for those HIC products requiring partial improvement. In addition, the following techniques should be acquired.

1. Decision on parts specifications
2. Design and drawing based on parts specifications

Those responsible for R & D should firstly have an overall image of the product to be produced and should then proceed to the design/drawing stage after a decision has been made on the parts specifications. Specifications must clearly indicate all quality characteristics of the parts in question, including stress concentration avoidance, improved fatigue resistance and points to note in processing, etc., by means of designation of the materials to be used, heat treatment designation, introduction of processing standards, surface finishing instructions and tolerance instructions, etc. Those items indicated in the specifications should also be given on the drawings. Technical know-how for this development stage cannot be acquired overnight and must instead be learnt by accumulating technical experience over a long period.

a) Provision of Equipment

In order that the design stage can commence following the determination of specifications, knowledge on the actual conditions of use will be required. Since tests and research on a certain product should be conducted to see if the product meets the required conditions of use, the provision of basic testing equipment and measuring instruments will be necessary.

b) Consolidation of Organization

1. With the cooperation of the dispatched technical advisors, the drawings of foreign products in the HIC's possession should be rearranged as the HIC's own drawings so that production can be conducted based on these new drawings.
2. A system should be established whereby strength, durability and performance test on actual products are conducted. The cooperation of the dispatched technical advisors should be enlisted for the development of testing and research.
3. Those parts failing to satisfy users should be obtained so that studies on and analysis of the causes of dissatisfaction can be

conducted on all aspects, from materials to the conditions of use, by reproduction of the situations in which user complaints occurred.

c) Information Arrangement

1. Since data obtained through participation in the tests is required for decisions on parts specifications, all data must be stored regardless of the tests being successful or not for future reference purposes.
2. Data required for testing and research purposes should be collected from the data obtained by the laboratories of the HIs and should be classified.
3. Technical information obtained from the technical advisors should be recorded and classified. In addition, as many technical exchanges as possible should be conducted with these advisors in order to acquire the maximum information.

d) Staff Training

1. The maximum transfer of technical know-how should be achieved through the implementation of testing and research based on independent plans made with the cooperation of the technical advisors.
 2. Phenomena encountered in the course of testing and research should always be viewed critically and the causal relationship should be clarified.
 3. Those drawings of foreign products currently in the possession of the HIC should be examined in detail and rearranged as the HIC's own drawings. The technical advisors should be consulted in the course of their examination in regard to any items written on them.
- 3) In Phase 3, technologies relating to product development should be selected from various technologies, the learning of which is the purpose of the Project, by the newly established Product Development Center in view of the future development of new products.

a) Provision of Equipment

Basic test facilities is necessary to be installed with the object of confirming the physical properties and the quality of parts aimed at promoting the domestic production and the quality improvement of domestically-manufactured products. Demonstration test facilities is also necessary to be installed with the object of confirming the quality and the characteristics of products submitted to model change and products developed anew.

The existing test facilities and the facilities installed during Phases 1 and 2 will be used as much as possible for the sake of the aforementioned basic tests and demonstration tests, and the unfulfilled facilities will be installed. The demonstration test facilities matching each product will be equipped at each HIC plant corresponding to the product in question, but they will be under the control of the Product Development Center. The basic test facilities will be equipped in the Product Development Center installed in the head office area, and will provide technical support to the various HIC as well.

Besides the test facilities a technical department will be established in the Product Development Center with the object of centralizing technical information. It will take charge of the collection, control and storage of technical materials, bibliography, standards and the like issued inside and outside HIC and abroad, and will play the role of technical service center of HIC.

As a general rule the existing facilities will be used for trial manufacture.

The followings are the facilities installed during the Phases 1 through 3.

1. Basic Test Equipment

- ° Tension & bending test machine
- ° Hardness test machine
- ° Impact test machine

- ° Fatigue test machine
- ° Durability test machine
- ° Abrasion test machine
- ° Metallurgical microscope
- ° Scanning electron microscope

2. Demonstration Test Facilities

- ° Vehicle Development Facilities:
 - Exhaust gas analysis & test facilities
 - Vehicle maintenance equipment
 - Measuring instruments
 - Model construction facilities
- ° Agricultural machinery Development Facilities:
 - Design equipment
 - Trial manufacture facilities
 - Measuring instruments
 - Building, wiring, piping
 - Sample product
- ° Large-sized Vehicle Test Facilities:
 - Weighing balance (front & rear axle weight, wheel weight)
- ° Pump Test Facilities:
 - Test tank
 - Wiring & piping
 - Measuring instruments & weir
 - Driving motor
- ° Electric Motor Test Facilities:
 - DC power meter
 - Axle torque meter
 - Operation & instrumentation panel
 - M-G set

b) Technical Information Arrangement

The followings are the technical informations to be collected and arranged during the Phases 1 through 3.

1. Technical Information

- ° Overseas bibliographical information
- ° Publications of international technical & scientific societies, bibliography, papers (Automobile Engineering Associations, Electric Engineering Association, Agricultural machinery Engineering Associations, Mechanical Engineering Associations, etc.)
- ° Overseas standards (ISO, IEC, JIS)
- ° Documentation of other domestic companies
- ° Internal technical documentation

2. Storage of Technical Documentation

- ° Construction of a new store
- ° Formulation of a numbering system to sort out technical documentation

c) Consolidation of Organization

The Product Development Center will be established with the following functions (Attached Figure 2-1).

1. Collection of technical information (data and reference materials).
2. Research, design and test manufacture for the improvement/modification of product design specifications (Development, design and test manufacture of new products will also be conducted in the future).
3. Performance testing of new products, analysis of test results, judgement of product quality and application of analysis results to production processes.
4. Quality inspection of domestically produced materials and externally ordered parts and their application testing.

5. Product design to initiate the commercial production of the above-mentioned trial products.

The Product Development Center will provide a company-wide service and will be established at the site of the Head-quarters. Attached Figure 2-1 is an example of the organization of the Center. This organization will be responsible for the product design and development of new products. The design of such items as press molds, cutting tools, jigs, tools and gauges, etc., related to production activities will be done by the Production Engineering Center (refer to #3-5).

For the local application of agricultural machineries, field test is indispensable. For this purpose, it is necessary to establish an organization which is in charge of plan and execute the field test programs at the experimental farm at No.3 HI.

(3) Estimated Capital Requirement

1) Required Facilities

machinery and equipment required for the plan is indicated in Attached Table 3-1.

2) Estimated Capital Requirement

The estimated capital requirement for the plan is as indicated in Attached Table 3-2.

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 10-1(1) Establishment of product development system

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Expansion of building (5,000m2)	Set	1
2	Imported M/E		
	LV test equipment & model manufacturing facilities		
1 1	Exhaust gas analyser & other testing equipment	Set	1
1 2	Vehicle maintenance kit	Set	1
1 3	Measureing instrument	Set	1
1 4	Model making facility	Set	1

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 10-1(2) Establishment of Product Development System
- @HIC -

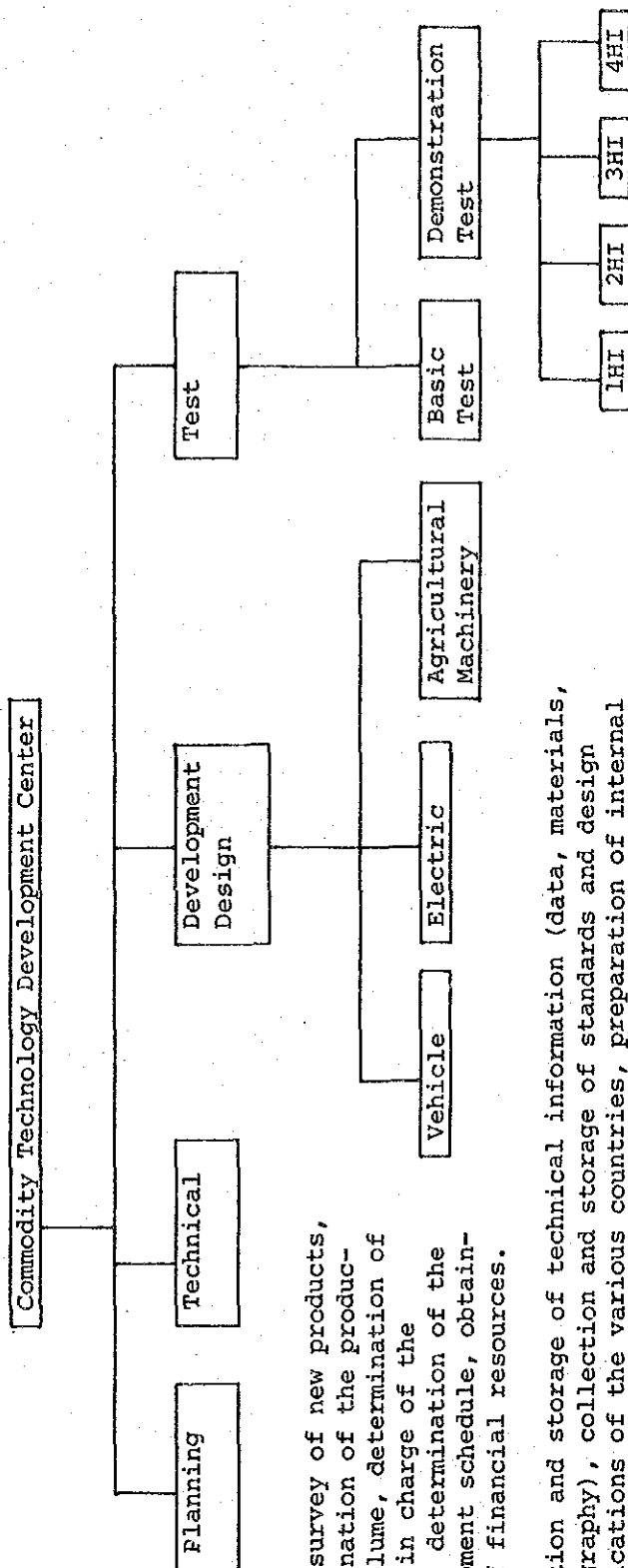
No	Items	Unit	No.
2	Major machines & equipment		
2 1	Equipment for design room (drafting board, copying m/c, etc.)	Lot	1
2 2	Equipment for testing room		
2 2 1	Bench type drilling M/C	Set	1
2 2 2	Electric bench grinder	Set	1
2 2 3	Cutting grinder	Set	1
2 2 4	Arc welding M/C	Set	1
2 2 5	Gas welding M/C	Set	1
2 2 6	Washing Equipment	Set	1
2 2 7	Suspension crane (W=5m, L=10m)	Set	6
2 2 8	Hydraulic jack	Set	4
2 2 9	Cast iron surface plate	Set	1
2 2 10	Air compressor	Set	1
2 2 11	Parts shelf	Set	6
2 2 12	Aluminium bridge	Set	1
2 2 13	Truck (2 ton)	Set	1
2 2 14	Inspection equipment (tachometer, thermometer, etc.)	Lot	1
2 2 15	Measuring instrument & hand tool	Lot	1
2 3	Machinery & equipment for trial manufacturing shop		
2 4	Sample machine	Set	150
2 4 1	Power tiller	Set	50
2 4 2	Power thresher	Set	50
2 4 3	Reaper	Set	50
2 5	Others		
2 5 1	Wiring & piping material	Lot	1

Attached Table 3-2: REQUIRED INVESTMENT (#10-1)

(Unit: million yen)

Items	Investment		
	Foreign	Local	Total
1 Bldg & Land			
A Land	-	0.0	0.0
B 1 Building	338.4	471.7	810.1
2 Freight & Insurance	27.1	-	27.1
Sub-total	365.5	471.7	837.2
3 Import Duty	-	54.8	54.8
4 Unloading	-	5.1	5.1
Building Total	365.5	531.6	897.1
Bldg & Land Total	365.5	531.6	897.1
2 1 Imported M/E (FOB)	832.9	-	832.9
2 Freight & Insurance	66.6	-	66.6
Sub-total	899.5	-	899.5
3 Import Duty	-	134.9	134.9
4 Unloading	-	12.6	12.6
5 Installation Cost	-	27.8	27.8
Imported M/E Total	899.5	175.3	1074.8
3 Local M/E	-	0.0	0.0
4 Other Costs			
A License Fee	0.0	-	0.0
B Eng Fee	1900.8	-	1900.8
C Software	68.6	-	68.6
D Interest	0.0	-	0.0
Other Costs Total	1969.4	-	1969.4
Total Investment	3234.4	1006.9	3941.3

Attached Figure 2-1 ORGANIZATION PLAN OF THE COMMODITY DEVELOPMENT TECHNOLOGY CENTER



Planning:

Market survey of new products, determination of the production volume, determination of the HI in charge of the matter, determination of the development schedule, obtainment of financial resources.

Technical:

Collection and storage of technical information (data, materials, bibliography), collection and storage of standards and design specifications of the various countries, preparation of internal standards of the company.

Development Design:

Improvement design and development design of commodities of various kinds, analysis of quality assurance (FMEA, etc.) test data, feed back of test results to the design, design for lot production, formulation of test methods.

Basic Test:

Quality inspection and application test of local materials and parts supplied by local subcontractors.

Demonstration Test:

Demonstration tests of improved products and developed products.

#11-1 Establishment of a Production Control System at HIC

(1) Outline of Objectives and Planning

HIC has plans to proceed with the local production of parts and spare parts, expand the production output of existing products and promote the development of model changes and new products. In conjunction with this diversification of production it is inevitable that an increasing complexity will result as the level and span of production control expands. In the results of the present diagnosis study of the plants a large number of problems relating to production control were evident. These can be divided into problems relating to production scheduling, control of delivery dates and daily agendas, materials management, quality control and equipment management.

In order to improve the current situation improve the efficiency of the existing plants and improve the investment results of this modernization plan it is necessary to undertake the improvement and formation of the production system.

The improvement of the following seven sub-systems whose result is expected to be significant in the light of the present diagnosis of the plants is included in the present production system plan.

The improvement of the various sub systems together with the formation of new specifications is to be carried out in the following steps. In the initial step existing problems of the current system are to be isolated, defined and concrete counter measures proposed. Provision for standards and various documents followed by improvements are to be carried out. In the next step a model plant is to be set up and the improved system to be introduced and tested, so that refinements can be added and final installation of the system undertaken. With regard to introduction of the systems this should be done in order of urgency as far as possible and possible confusion during introduction avoided and a gradual establishment of lines planned.

Once the firm establishment of the systems in the model plant has been verified the this step proceedings can be begun once improvements and re-consideration considered necessary at this point have been carried out should these seem necessary. In the final step application to

other plant that is development on a total HI level is to be undertaken.

In this way the production systems will not be decided beforehand but considered after the individual situation of each HI has been ascertained the appropriate system profile will be decided and the establishment of lines will be realized while undertaking corrections in the system application to ensure that the most appropriate system for HIC is achieved. Below is an outline of the individual systems. Further, a list of priority measures of each system in order to correct existing problems have been inserted also (ref. to Attached Fig. 1-1).

1) Production Scheduling System

The co-ordination of the production scheduling on a level of the entire company and the standardization of the operating loads must be undertaken and a system for annual, monthly and daily production schedules incorporating inventory data be established. Also feedback must be firmly established for occasions when the schedule is changed, and a system for directing production activities of the various sections in accordance with the latest production schedules.

Priority of implementation measures;

1. Set up allotment production schedules of all the final assembly lines divided according to the machine types. Each individual shop is to set up monthly, weekly and daily schedules on the basis of these.
2. Place a blackboard with monthly, weekly and daily schedules up for all to see.

2) Procurement Control System

A system controlling dispatch of orders for the raw materials and component parts needed for production, and managing delivery dates is to be set up on the basis of production schedules. Systems are to be set up individually for imported goods, domestically supplied goods and internally produced goods.

There are to be in conjunction with measures for auxiliary materials and spare parts.

Priority of implementation measures ;

1. Control of delivery dates; draw up a list indicating the order of priority for the orders and the delivery dates, and undertake supervision of delivery from 7 to 10 days prior to the delivery date.

2. Take data regarding delayed deliveries divided by dispatch dates for orders and by parts.

(This information is to be used as feedback for the following time of order dispatch).

3) System for Control of the Daily Agenda

Set up a system to take account of daily production performances , collect data regarding these, and in the case of discrepancies with the schedules arising adjust the following day's schedule to take account of this.

It is important to put the control of the production performance into a visible form and so methods implemented should accord with this.

Priority of implementation measures ;

1. Progress control

Undertake control using bar charts to indicate schedules, performances and discrepancies in a visible form.

2. In principle process the schedule on the day concerned.

4) Material Control Systems

Decide on the method for placing , placement location, quantities, and listing of parts for articles and arrange so that goods first stored in the warehouse are first sent out through the formation of a system of clarifying the stock quantities, feedback, and statistical methodology which will serve as procedures for ensuring appropriate stocks and stock keeping.

Priority of implementation measures ;

1. Control of goods on hand

Undertake color control of stocks on hand in order to accurately confirm location and quantities and ensure first in first out.

2. Make wooden palettes for in shop conveyance and storage, and undertake control of palettes.

3. Produce storage racks in the warehouse and undertake palette control.

5) Quality Control System

It is most effective to first begin by reducing the reject rate, and then undertake an improvement in product quality afterwards. A system is to be set up through the classification of product quality data , accumulation of data, and data analysis is to be carried out and measures to prevent re-occurrence to be proceeded with systematically.

Priority of implementation measures (to prevent re-occurrence)

1. Cases of rusting or bomb damage which require attention must always be reported to the quality control section.

2. The quality control section shall always confirm the product in question.

3. The quality control section shall analyze reject statistics and causes of rejects and provide data for prevention of their re-occurrence.

6) Equipment Control System

Preventative Maintenance must be strengthened through breakdown statistics (including production loss), equipment use records, maintenance aspects and maintenance schedules and a equipment control system set up.

Priority of implementation measures (daily inspection)

1. Make up a pre-operational check list for each machine and have operators test this.
2. Confirmation and guidance of the check list by the shop managers
3. Ensure that breakdown statistics and equipment use records are kept without fail.

7) Information Control System

In conjunction with the setting up of system no. 6 outlined above; a system to include the reconsideration of the present slips and ledgers, their annulment, amalgamation and new issue. Further, provision for office equipment needed as auxiliary functions to the installation of the above systems is to be carried out.

(2) Details of the Plan

It is necessary to provide for the standards and documents and also set up the rules in order to form the production system. Further, it is necessary to provide the control documentation needed for implementation.

Next the standards and documentation which must be provided for each system are to be shown but these must be kept to a strict minimum required and provided as necessary.

Also the strengthening of office equipment is to be undertaken.

(2)-1 Standards and documentation to be provided at the Time of planning Systems

Re-consideration of existing standards and documentation is to be followed by creation of those deficient.

1) Relating to the Production Scheduling System

- a) Standards for drawing up production Schedule
- b) Tables for production capacity
- c) Operational loading tables
- d) Stock inventory data

- 2) Relating to Procurement Control Systems
 - a) Procurement standards (order procedures, delivery control etc.)
 - b) Basic unit master
 - c) Table for the unit price of parts
- 3) Relating to Daily Agenda Control System
 - a) Standards for the assembly , collection and reporting of performance data.
 - b) Visually accessible management
- 4) Relating to material control systems
 - a) standards of document at storage
 - b) conveyance standards
 - c) Standards for warehouse entry and exit
 - d) master for goods in stock
 - e) stock keeping standards
- 5) Relating to Quality Control
 - a) Standards of quality control (standards to prevent re-occurrence, judgment standards)
 - b) Operational standards
 - c) Table for handling inconveniences

6) Relating to Equipment management systems

- a) Preventative maintenance standards
- b) Equipment lists
- c) Tables of equipment records

7) Relating to Information Control Systems

- a) code system standards
- b) Tables for the code systems
- c) Standards for the management of slips and ledgers (and their flow)
- d) Formatted paper for Slips and ledgers, and data .

(2)-2 Control documentation required during Implementation of the Systems

1) Relating to the Production Schedule System

- a) Tables for annual production schedules
- b) Tables for monthly production schedules
- c) Tables for weekly production schedules
- d) Tables for daily production schedules
- e) Performance tables

2) Relating to Supply Procurement Systems

- a) Table of orders
- b) Table for Delivery period management (table of delivery performance, list of unreceived goods)
- c) Stock Inventory Table

3) Relating to Materials Management Control System

- a) Tables for the management of stock
- b) Table for the inspections carried out

4) Relating to Quality Control

- a) Tables of inspection results
- b) Tables for handling of inconveniences
- c) Table of statistics for inconveniences handled
- d) Table for prevention of re-occurrence

5) Relating to Equipment management systems

- a) maintenance schedule tables
- b) lists of repair achievements
- c) Tables of breakdown statistics
- d) tables of spare parts in stock

(2)-3 Strengthening of Office Equipment

In order to raise further the results of the production system the strengthening of office equipment and information facilities is to be undertaken.

- 1. Copy machine
- 2. Microfilm equipment
- 3. word processor equipment
- 4. desk computer
- 5. automatic printer

(2)-4 Computerization of the Production System

Computerization has the largest result when undertaken in those areas in which the quantity of information is large and which necessitate a large number of personnel. For example, management of deliveries, stock control, equipment management and reject statistics.

In particular, it is a necessary prerequisite to a computerization of production control systems to first establish and firmly integrate production control systems. Therefore, the computerization of these will take place much later but it is necessary to keep their eventual computerization in mind.

It is also very important to undertake the training of system engineers in preparation for this computerization.

(3) Estimated Capital Requirement

1) Required Facilities

The details of the equipment considered necessary to the present plan is listed in section (2)-3).

2) Estimated Capital Requirement

The estimated capital requirement is shown in the attached table 3-2.

3) Expected Effects

It is difficult to assess quantitatively the effects of the production systems but these will not only considerably raise the productivity but are also expected to increase management and morale and are expected to have far reaching effects difficult to measure. The effects to be anticipated following the introduction of the present plan are as follows ;

a) Realization of production schedules

b) increase in the equipment operating rates

- c) reduction in the amount of intermediate parts in progress
- d) reduction of the number of rejects in storage
- e) reduction in the reject rate
- f) reduction in the equipment breakdown rate
- g) reduction in delays of delivery
- h) others

(4) Implementation plan

1. Important points of implementation

1) The Program for Introduction

The improvement of the production system is an essential measure which involves the conversion of part of the managerial functioning of the HIC to a modernized organizational form.

The setting up of specialist projects , presided autonomously by HIC as responsible for promotional activities and development of projects on a general company level is required during implementation. The span of the project is extremely wide and since it will probably prove difficult to implement simultaneously throughout the company introduction in phases is considered most effective.

The following is proposed as a suitable scheme for the development process

a) First Phase

Establish the current situation for each of the proposed seven production systems and discover any problems. A survey of the existence of standards and the various types of data must be made. The managers of each shop are to be in charge of discovering any problems and project members for all of the shops to be carried out.

b) Second Phase

Adjustment of the original production system plans with counter measures to the problems discovered in the first phase is to be carried out and the systems organized. The following operations are to be carried out with each system;

- i) making of standards
- ii) making of management documents
- iii) making of the forms for the slips, ledgers and data.
- iv) making of the rules
- v) codification of the systems

c) The third phase

Select No. 1 HI to be a model shop and undertake the introduction of production systems for all of the products (parts) which are produced there . Begin with the daily agenda management system, quality control system and the equipment management system which are expected to produce significant results. After this move on to the development of the remaining four systems. In this case begin the introduction of the systems in the production sections or shops of the other shops related to the products of No. 1 HI.

The following are to be observed in relation to the systems

- i) rigorous observance of rules
- ii) the making and use of management documents and data
- iii) collection methods for data
- iv) compulsory reporting

A preparatory period for the implementation of each system is to be taken and during this period the introduction of the above measures to be given priority in implementation carried out after which the main work will be begun.

d) Phase Four

Once implementation in No.1 HI is completed the development laterally to other shops is to be carried out.

2) Project Organization

- a) Specialist projects for the four departmental groups are to be formed and directly placed under the presidency (Attached Figure 4-1). This system is to be used for processes from the discovery of problems with the present situation up to the organization of production systems incorporating counter measures to these. The introduction to each shop is to receive the orders of the presidency and a project team under the shop manager as member in charge of implementation is to undertake the introduction of the system. (Refer to Attached Figure 4-2)
- b) Place an administration office to ensure the smooth running of the above.

3) Project Members

- a) One member from each system and group of the Head office and each factory is to be selected and it is advisable to choose members responsible for different products and of differing job type.
- b) Choose the most appropriate candidates throughout the entire company to become chairmen of the departmental groups.
- c) In order for the administration office to ensure the smooth running of each of the departmental assemblies it will have the responsibility to adjust affairs on a general company basis and so should be chosen from the whole company.

4) Running of the Projects

- a) Each of the chairmen of the departmental groups should act as counterpart and undertake the formation of the systems under the direction of a foreign adviser. In the case of the introduction to No.1 HI this will be done under the direction of each adviser but in the case of the lateral development to the other shops this will be done under the direction of each of the departmental chairmen.

- b) Exchange of information between the groups is essential and so regular meetings should be arranged.
- c) Everything is to be decided under the approval of the presidency.

2. Schedule

The schedule including the training to be carried out in conjunction with the introduction of the production control systems is shown in the following.

Attached table 4-1 schedule for the introduction of the production control systems.

Attached table 4-2 detailed schedule up to 6th year of introduction.

(5) Recommendations for the Implementation of the Plans

1. Education

The details and those personnel concerned by the training education to be undertaken in conjunction with the introduction of the production systems are to be carried out in the following order.

1) Planning phase

a) Executive training

In order to ensure the understanding of the production systems and awareness of their necessity among personnel of higher than shop manager status.

b) Education for the Project Members

In order to assure an understanding of the concrete details and awareness of the functions of the production systems among all members.

2) Implementation phase

a) Training for Managerial staff of the Head office and shops

Carry out teaching of an understanding of the production systems and training in management methods together with assuring an awareness of the function of the managers

b) Shop supervisor training

Training education for shop supervisors to be changed in accordance with needs. During implementation stages the training is to be implemented in the production systems set up by the project teams.

2. Others

a) It is important to keep the eventual computerization of the production systems in mind for the realization of these later.

b) It is more efficient to set up a computerization project with project members once the objectives of the introduction of the production systems have been achieved.

Attached Table 3-1 LIST OF REQUIRED FACILITIES

#: 11-1 Establishment of Production Control System

No	Items	Unit	No.
1	Bldg & Land		
A	Land		
B	Bldg		
2	Imported M/E		
1	Text books for education		
1 1	For production control	Lot	1
1 2	For computer system	Lot	1
2	Office equipment		
2 1	Copy machines (S typex40sets/M typex5sets/L typex5sets)	Lot	1
2 2	Micro film system	Lot	1
2 3	Wordprocessor (portable typex38sets/stationary typex11sets)	Lot	1
2 4	Computer (personalx44sets/CAD systemx5sets, etc.)	Lot	1
2 5	Auto printing machine	Set	10
2 6	Technical literatures (JIS, ISO, handbooks, etc.)	Lot	1
2 7	Ancillary equipment	Lot	1

Attached Table 3-2: REQUIRED INVESTMENT (#11-1)

(Unit: million yen)

Items	Investment		
	Foreign	Local	Total
1 Bldg & Land			
A Land	-	0.0	0.0
B 1 Building	0.0	0.0	0.0
2 Freight & Insurance	0.0	-	0.0
Sub-total	0.0	0.0	0.0
3 Import Duty	-	0.0	0.0
4 Unloading	-	0.0	0.0
Building Total	0.0	0.0	0.0
Bldg & Land Total	0.0	0.0	0.0
2 1 Imported M/E (FOB)	532.8	-	532.8
2 Freight & Insurance	41.6	-	41.6
Sub-total	574.4	-	574.4
3 Import Duty	-	86.2	86.2
4 Unloading	-	7.5	7.5
5 Installation Cost	-	18.0	18.0
Imported M/E Total	574.4	111.7	686.1
3 Local M/E	-	0.0	0.0
4 Other Costs			
A License Fee	0.0	-	0.0
B Eng Fee	0.0	-	0.0
C Software	160.0	-	160.0
D Interest	0.0	-	0.0
Other Costs Total	160.0	-	160.0
Total Investment	734.4	111.7	846.1

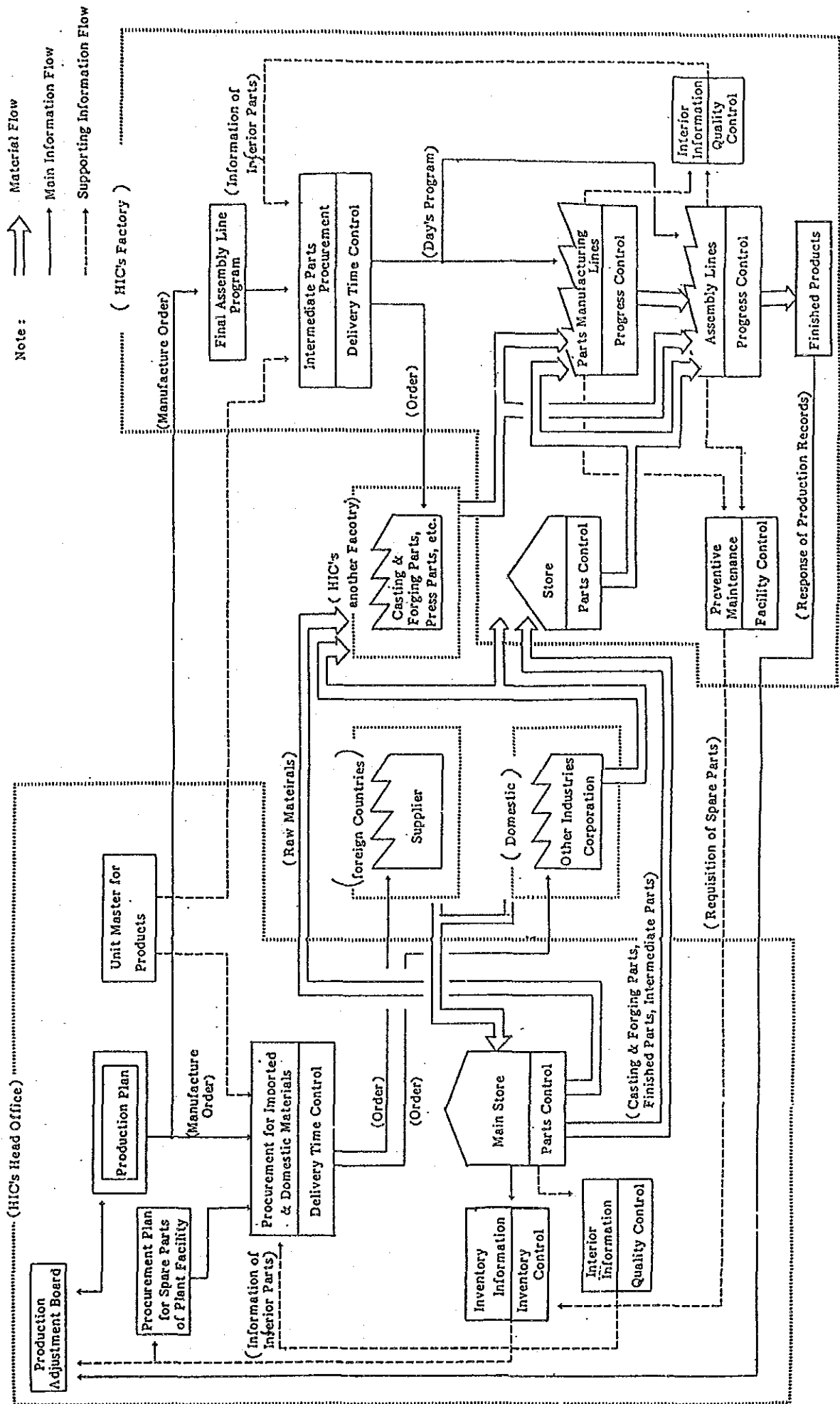
Attached Table 4-1 INTRODUCTION SCHEDULE OF PRODUCTION CONTROL SYSTEM

	Year	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
	No. of advisors for system computerization				5 persons			3 persons		1 person	
									3 persons		
Education	1. Staff education 2. PJ member education 3. Manager education 4. Supervisor education	<div></div> <div></div>		<div></div> <div></div>							
Plan	1. Identification of problems 2. Improvements for these problems and system development	<div></div> <div></div>									
Implementation	Model factory (No.1 HI) 1. System introduction, phase I 2. System introduction, phase II Other factories (No.2 HI ... No.6 HI) 1. System introduction, phase I 2. System introduction, phase II	(Daily schedule, quality control, equipment) (Plan, purchase, material, information)									
Computerization	1. Preparation for computerization 2. Computerization										

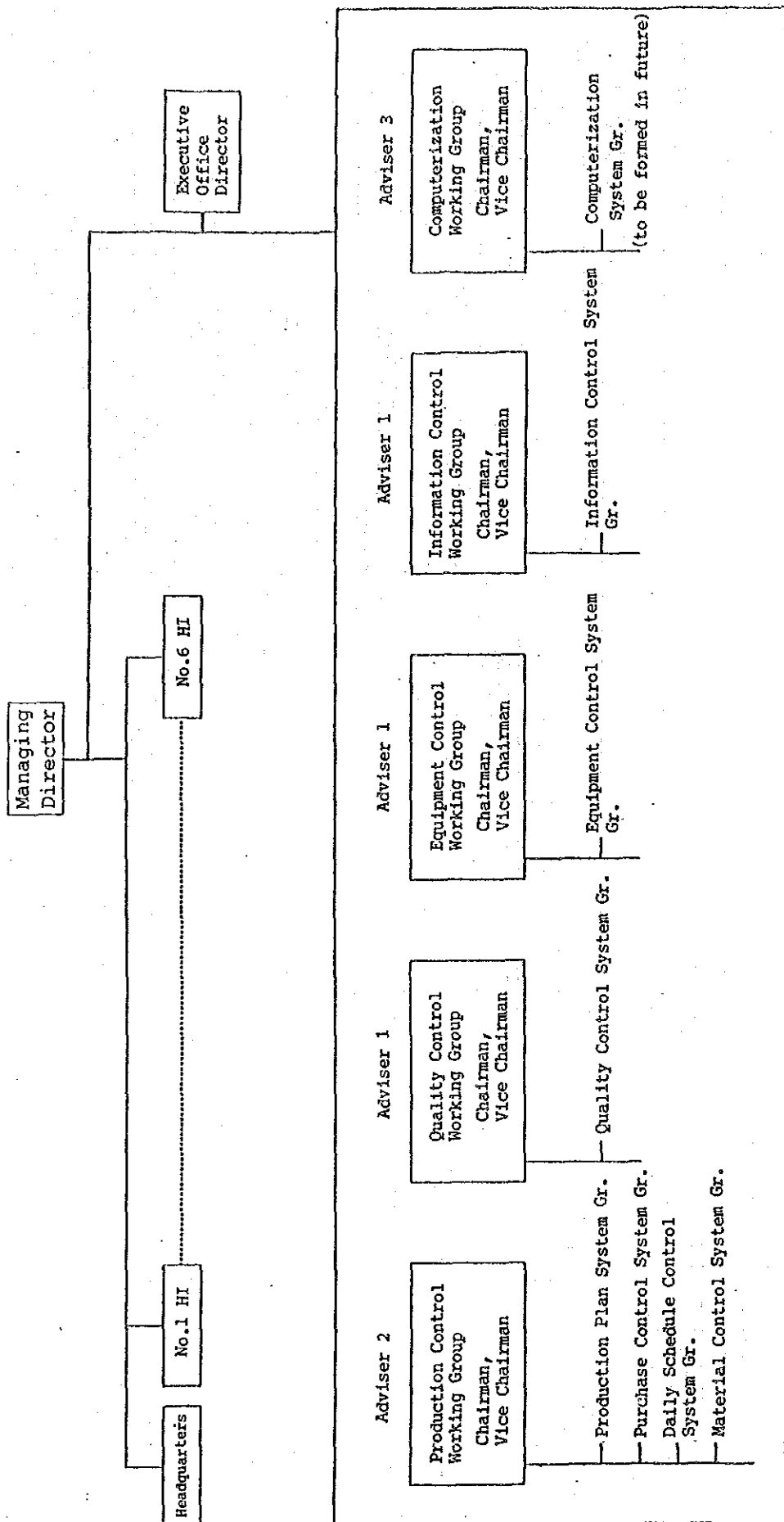
Attached Table 4-2 DETAILED SCHEDULE FOR ESTABLISHMENT OF PRODUCTION
CONTROL SYSTEM UP TO 6TH YEAR OF SYSTEM INTRODUCTION

	Year	1st	2nd	3rd	4th	5th	6th
P l a n	1. Identification of problems 1) Identification of problems for each system 2) Check for availability of standards 3) Check for availability of data 2. Improvement measures and system development 1) Preparations of standards 2) Preparation of control materials 3) Preparation of slips 4) Preparation of data sheets 5) Establishment of rules 6) Finalization of system in written form	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>				
	Implementation			<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>	<div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div> <div></div>		
	1. Model factory (No.1 HI) 1) System introduction, phase I (Daily schedule, quality control, equipment control systems) a) Understanding of system i) Through understanding of rules ii) Methods for preparation and use of control materials iii) Through understanding of method for data collection iv) Through understanding of obligation to report b) Implementation of systems 1) Implementation of priority measures for each system ii) Full-scale implementation 2) System introduction, phase II (Production planning, purchase control, material control, report control systems) same as model factory					<div></div>	
	2. Other factories same as model factory 1) System introduction, phase I 2) System introduction, phase II						<div></div> <div></div> <div></div> <div></div> <div></div> <div></div>

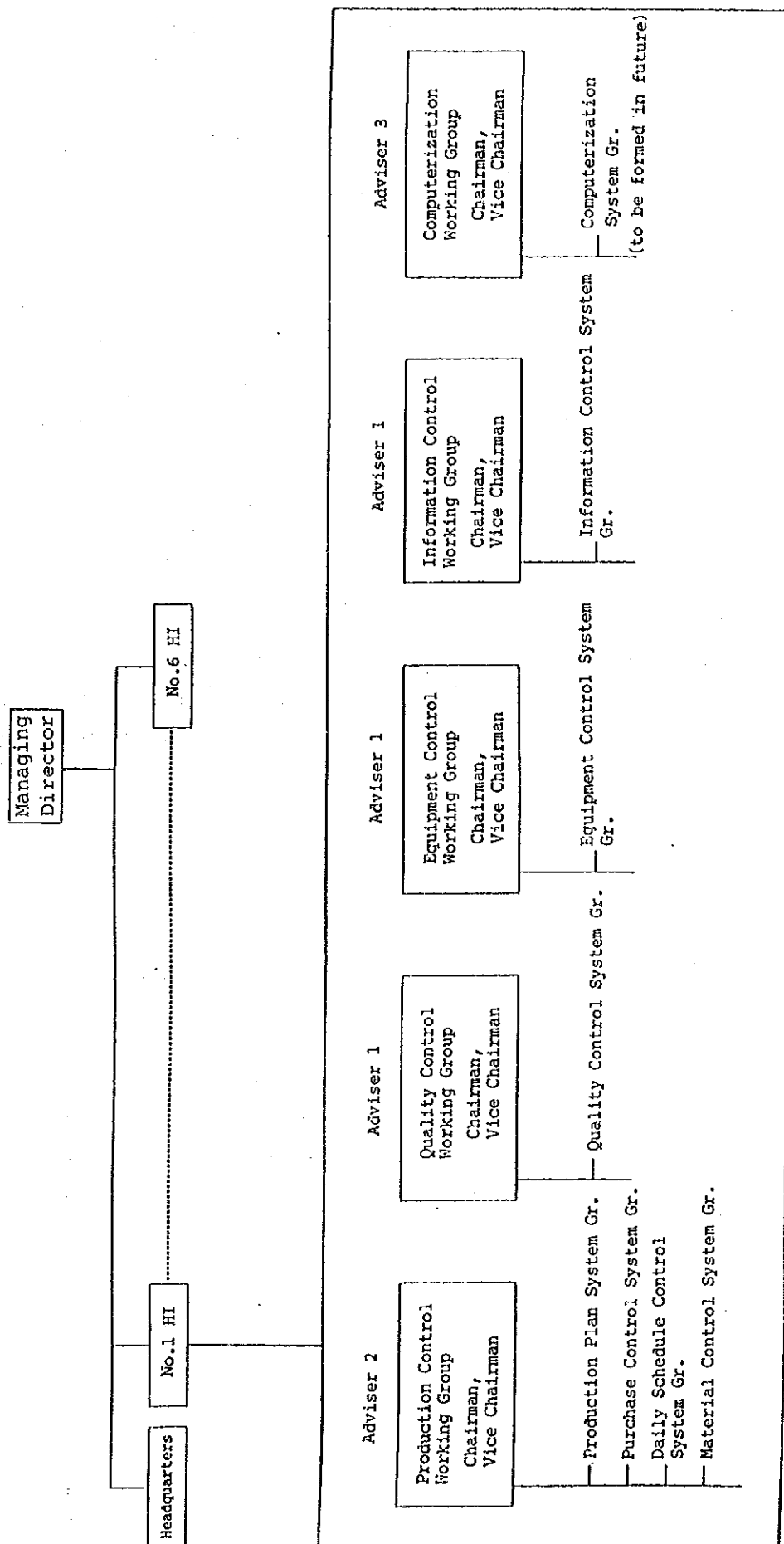
Attached Figure 1-1 OUTLINE OF PRODUCTION CONTROL SYSTEM



Attached Figure 4-1 PROJECT ORGANIZATION FOR ESTABLISHMENT OF PRODUCTION CONTROL SYSTEM (PLANNING STAGE)



Attached Figure 4-2 PROJECT ORGANIZATION FOR ESTABLISHMENT OF PRODUCTION CONTROL SYSTEM (IMPLEMENTATION STAGE)



#11-2 General Training Program as a Basis of the Renovation

(1) Objectives and Outline of the Plan

1) Current Position

1. Management Ability

Because managers are required to accomplish results through their subordinates, it is desirable that managers maintain the subordinates' levels of knowledge, skill and ability as high as possible. For this purpose, the managers must fully understand details of managerial work and manage their work places.

However, the present situation shows that there is much to be desired in discipline, will to work, motivation for improvements of work, aspiration, etc., among employees.

This is because no sufficient education has been given to managers in fundamentals of management techniques including control over workers, job allocation, communications with subordinates, and motivation to them.

2. Supervisory Ability

Supervisors are assigned to the production front to manage and supervise workers on the front line. They are very important as a link between the lowest end of the field organization and the center of the top management.

However, due to lack of education and training to supervisors in supervisory work, they do not fully understand supervisory work. As a result, efforts are not fully made to smoothly conduct production activities by motivating their subordinates and making the most of their ability.

3. Management Techniques

Education is not fully given in management techniques for production control. Consequently, problems are often seen to crop up at the production front in a wide range of areas including quality, delivery and security.

4. Technical Skill

Employees recruited for technical jobs are assigned to production fronts after given training at a technical training center and training at I.T.C.

After assignment, their technical level is improved mainly through OJT.

However, this OJT does not fully accomplish its intended objects because instructors lack sufficient qualifications to develop training programs, or techniques for giving subordinates proper instructions. Consequently, subordinates' technical level will not rise and the scope of their work will remain not expanded. They will eventually begin to feel their work is not worth while and to consider changing jobs.

There is a chronicle shortage of skilled workers because of lack of opportunities for refresher training courses in technical skills including OJT and OFF JT.

5. Technical Capability

Employees in engineering field have virtually no opportunities to improve their technical level after they are employed, except for a few examples of dispatch to overseas for technical training. As a result, there is no sufficient accumulation of technology to perform production engineering or product development.

6. Safety Control

Safety comes before everything else. However, no control with emphasis on safety has been exercised. Consciousness of safety control has not infiltrated into the minds of all the employees.

This is because no organization responsible for promotion of safety operations exists nor are safety control standards established. Operations and work environment leading to potential danger or unsafe conditions are noticeable at the factory.

2) Necessity of Plan

Managerial officers and many employees are expected to participate in the modernization plan and promote it according to their respective role.

Higher levels of management ability, technical capability and skills than before will be required to introduce this plan and have it deeply rooted. This is because the plan calls for introduction of new equipment and machines as well as new control systems, particularly production control systems.

Assessment was made of HIC's present levels of management and supervisory capability, technical capability and skills. The results indicate the need to give education and training to its employees in the field where their improved ability is indispensable, thereby securing personnel for promotion of the modernization plan.

3) Outline of Plan by Item

Assessment of HIC's present status shows that, to promote the modernization plan, HIC must improve management and supervisory ability of managers and supervisors, skill levels of skilled workers, and technical capability of engineers, and further to infiltrate the consciousness of safety control into the minds of employees in general. It is desirable that these skill and technical levels be raised uniformly throughout HIC. For this purpose, education should be efficiently organized and given by working out its contents and schedule to attain the intended object.

Education and training should be given for following specific purposes:

1. To improve management ability
2. To improve supervisory ability

3. To acquire management techniques
4. To improve and strengthen training programs for skills
5. To improve technical level of leading members of the company
6. To thoroughly enforce safety control

(2) Details of the Plan

1) Contents of Education for Improvement of Management Ability

1. Foundation of Management

a) Definition of management

- Position of managers
- Role of managers
- Managers' mental attitude

b) Management and Organization

- Requirements indispensable to an organization
- Principles in operation of an organization
- Responsibility and authority
- Line and staff

2. Management of Work

a) 5 Functions of Management

b) Plan

- Target, policy and plan
- Implementation plan
- Points to be heeded when making a plan

c) Organizing (assignment)

- Conditions that should be taken into account when giving assignment
- Points to be heeded when giving assignment

d) Instructions

- Points to be heeded when giving instructions
- Instructions and motivation

- e) Adjustment
 - Adjustment by integration
 - Method for adjustments with other work places
- 3. Improvement of work
 - a) Improvements and role of managers
 - b) Identification of problems and procedures for improvement
 - c) Conditioning for introduction of improvements
 - Resistance to change
 - Overcoming resistance
- 4. Understanding of Human Behavior
 - a) Various human images
 - Human images in scientific management method
 - Human images in the theory of human relations
 - Human images in behavioral sciences
 - b) Method for motivation
 - The way of thinking for motivation
 - Method for motivation
- 5. Creation of Good Work Place
 - a) Creation of good work place
 - Definition of good work place
 - Points for creation of good work place
 - b) Communications at work place
 - Promotion of communications
 - Counseling mind

c) Leadership to influence work place

- Definition of leadership
- Effective leadership
- 4 functions of leadership
- Development of leadership

6. Training of Subordinates

a) Basics of training of subordinates

- Objects of training of subordinates
- Objects and method of OJT

b) How to develop training plan

- Target for training and training plan
- Key to training plan is method by which work assignment is given
- How to give instructions on work in progress
- Method for evaluation of training
- Creation of opportunities for education other than through work

2) Contents of Training for Improvement of Supervisory Ability

1. Supervisor's Basic Attitude

- a) Responsibility of supervisor
- b) Supervisor as a member of organization

2. Method for Effective Execution of Work

- a) Method for making plan for execution of work
- b) Method for giving orders
- c) Methods for studying work and keeping records on execution of work
- d) Work standards
- e) Method for making reports
- f) Method for adjustment

3. Management of Work

- a) Supervisors work
- b) Method for maintaining quality
- c) Method for reducing cost
- d) Method for smoothly executing work
- e) Methods for placing, handling and selecting goods
- f) Correct work control

4. Safety and Sanitary Control

- a) Basic principles of safety and sanitary control
- b) Safety control
- c) Sanitary control

5. Training of Subordinates

- a) Responsibility of training
- b) Principle of learning
- c) Training plan
- d) Work training
- e) How to talk and discuss
- f) Guidance to new workers
- g) Self-education of supervisors

6. Control of Duty Service

- a) Control of duty service
- b) Office regulations and control of procedural work
- c) Appropriate placement
- d) Evaluation of subordinates' ability and performance
- e) Discipline at work place

7. Human Relations

- a) Foundation of human relations
- b) Processing of problems at work place
- c) Frustration and measures against it
- d) How to make use of basic desires
- e) How to avoid misunderstanding and difference in view
- f) Handling of groups
- g) Self-control of supervisors

3) Learning of Control Techniques

1. Production Planning
2. Purchase control
3. Daily Schedule Control
4. Material Control
5. Quality Control
6. Equipment Control
7. Information Control

4) Improvement and Strengthening of Skill Training

1. Curriculum of Technical Training Center (Addition)

- Practical training in basic handling and operation of equipment and machines
- Practical training in basic machining work or finish
- Practical training in daily inspection and maintenance of equipment and machines
- Product quality, safety education and cleaning and inspection
- Basic knowledge of products manufactured at factory

Following machines should be installed exclusively for use as teaching materials at technical training center:

Drilling machines, lathes, milling machines, presses, welding machines, grinders, tools for manual finish work (saws, files, scrapers, etc.) and sequence systems including electric, hydraulic and pneumatic

The requirements for these machines may be filled with machines which have become obsolete or are idling at factories. Textbooks for training should be distributed to all the trainees. Before completion of the 2-year training course, assignment should be given to them to fabricate a cart or a similar product in commemoration of their graduation.

2. Curriculum of Refresher Training Course for Leading Skilled Personnel

- Factory management

Safety and sanitary control

Production control

Quality control

Cleaning and inspection

Approaches to solution of problems

Basic knowledge of products manufactured at factory

- Skills commonly required

Metal material, cleaning method, repair techniques, etc.

- practical training in operation, disassembly and reassembly of factory products

3. Education and Training for Introduction of Equipment and Machines

Refer to Chapter 4 for various education and training programs for introduction of new equipment and machines under the modernization plan.

5) Curriculum for Improvement of Technical Level of Leading Members of the Company

Specialized technical education should be given to graduates of I.T.C. (Industrial Training Center) and staff members in engineering field who have been in service for 3 to 6 years.

The target technical level should be set to the level of graduates of 4-year colleges and education should be given in specialized subjects such as metal material and mechanical dynamics with the objective to training personnel for assignment to production engineering or product development.

Mathematics (differential and integral)

Metal material

Electricity

Physics
Thermal dynamics
Mechanical dynamics
Fluid dynamics
Design drawings

6) Contents of Safety and Sanitary Education

1. Basics of Safety and Sanitary Control

- Importance of safety and sanitary control
- Relations of safety and sanitary control with production
- Each individual person's role in safety and sanitary control

2. Safety Control

- Relations between accidents and injuries
- Safety records and classification of injuries
- How accidents involving injuries will occur
- Method for preventive safety control
- Method for processing of accidents involving injuries

3. Sanitary Control

- Outline of sanitary control
- Method for preventive sanitary control
- Emergency measures
- Main points of care in convalescence

(3) Estimated Capital Requirement and Expected Effect of the Plan

1) Estimated Capital Requirement

1. Number of Hours for Training Course

Contents of Education	Hours
Improvement of management ability	30H
Basics of management	(4)
Management of work	(5)
Improvement of work	(3)
Understanding of human behavior	(8)
Creation of productive work place	(6)
Training of subordinates	(4)
Improvement of supervisory ability	62H
Basic attitude of supervisor	(4)
Method for effective execution of work	(10)
Management of work	(10)
Safety and sanitary control	(8)
Training of subordinates	(12)
Management of duty service	(8)
Human relations	(10)
Improvement of control techniques	28H
Production plan	(4)
Purchase control	(4)
Daily schedule control	(4)
Material control	(4)
Quality control	(4)
Equipment control	(4)
Information control	(4)
Improvement and strengthening of skill training	30H
Factory management	(30)

Contents of Education	Hours
Improvement of technical level of leading staff members	1,240H
Mathematics (differential and integral)	(120)
Metal material	(120)
Electricity	(120)
Physics	(120)
Thermal dynamics	(120)
Mechanical dynamics	(120)
Fluid dynamics	(120)
Design drawings	(400)
Safety and sanitary control	16H
Basics of safety and sanitary control	(6)
Safety control	(6)
Sanitary control	(4)

2. Estimated Capital Requirement

Contents of Education	Adviser	Materials (yen)
Improvement of management ability	18 man-months	4 million
Improvement of supervisory ability	18 man-months	3 million
Safety and sanitary control	12 man-months	3 million

2) Expected Effect of the Plan

1. Education for Improvement of Management ability

A manager is defined as a person who is expected to accomplish results through work by his subordinates. In other words, whether the manager's performance is high or low will depend greatly on subordinates' morale, desires to improve their work, and desire for self-improvement, in addition to their knowledge and technical capability.

Education for improvement of management ability will deepen managers' understanding of management work and enable them to take

practical action. This will motivate their subordinates to take more aggressive attitude toward work. All this will greatly contribute to introduction and firm establishment of the modernization plan.

2. Improvement of Supervisory Ability

Supervisors serve on the front line in the production field of the management and supervisory layers of the organization and assume an important role as a link between the lowest end of the field organization and the center of the top management.

Education for improvement of supervisory ability will clarify to supervisors their own responsibility and authority as well as their position in the organization. As a result, supervisors can perform their supervisory work with confidence. This will ensure smooth production activities.

3. Improvement of Control Techniques

production activities will smoothly be carried out because employees at each organization level understand and put into practice factory control techniques including production control.

Though production activities, the attitude to maintain discipline, consideration to others, desires to exercise ingenuity and originality and the sense of accomplishment will develop among employees.

4. Improvement of Skills

The change in the technical training center's curriculum will enable trainees to acquire more skills and expertise. The effect of practical training can be increased by further supplementing teaching aids for practical training. Provision of technical education to leading staff members will solve the problem of their arrested progress and expand the scope of their technical capability. Since this increases their interest in work, they will develop the sense of belonging.

5. Improvement of Technical Capability

Provision of technical education to leading staff members will also result in cultivation of personnel for production engineering and product development. This will contribute to reduction of defects in production activities which are often pointed out in factory management.

6. Safety and Sanitary Education

Control system with safety first under the principle that safety comes before anything else will be established and the consciousness of safety control will be infiltrated into the minds of all employees. Consequently, safe work environment will be assured with respect for human life, safe work and improved facilities, etc.

(4) Implementation Plan

Attached Table 2-1 shows the implementation schedule for each of education and training programs. Education in control techniques will be given under the schedule for introduction of the production control systems as one of the items for #11-1 streamlining of office work for production control (#11-1 Attached Tables 4-1 and 4-2). For further details, refer to this schedule.

Of the education and training programs, both education for improvement of management ability and training for improvement of supervisory ability will be given by taking following steps:

First, outside specialists will assess the present status of HIC. Based on this assessment, they will develop the curriculum for education and training courses and prepare textbooks accordingly.

Then, education and training will be given with the objective to training in-house trainers who will educate managers and train supervisors at HIC. HIC's trainers thus trained will then give education and training to HIC's managers and supervisors.

Training for improvement of skill level will be conducted mainly by HIC's training division because this training mainly consists of

improving teaching aids at the technical training center and providing refresher courses to leading skilled workers.

Education for improvement of technical level will be given as a one year course by inviting lecturers from universities in Burma. Each course will be limited to 30 to 40 persons and given under a full-time system.

As for safety and sanitary control, outside specialists will be asked to form a safety control organization, prepare safety control standards and textbooks and train in-house trainers. These trainers will then be responsible for safe and sanitary education at each factory.

Attached Table 2-1 EDUCATION AND TRAINING SCHEDULE

Item for education/training	Trainee	Course Schedule				
		1st year		2nd year		3rd year
Improvement of management ability	Managers	Understand present status	Prepare curriculum and textbooks	Train trainers	Education for course 1 for course 2	
Improvement of supervisory ability	Foremen	Understand present status	Prepare curriculum and textbooks	Train trainers	Education for course 1 for course 2	
Improvement of skill level	Trainees for technical skill leading skilled workers				Improve teaching aids and equipment at Training Center	Train leading skilled workers
Improvement of technical level	Leading skilled workers					Prepare curriculum
Safety and sanitary control	Managers Foremen Workers	Prepare safety control standards and safety control organization	Train trainers	Training		Education for course 1 trainees

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