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Makino a71 PRE-INSTALLATION CHECKLIST – Rev 2/2009

Installation of your new Makino a71 can be smooth and rapid if preparations are made prior to the delivery of your machine. Any questions regarding machine installation should be directed to our service department for clarification. We hope this checklist will aid in a rapid installation of your new machine. ***NOTE: The following must be completed prior to our service technician arriving at your facility to install the new machine.***

- Power Requirements for your machine: 240v/3ph/65kVa** 225Amp (Main Circuit Breaker)
  460v/3ph/65kVa** 125 Amp
  NOTE: **85kVa (including options) See Makino Installation Manual or contact our Service Department for complete information or questions. Machine is a dual-voltage machine and comes with a transformer.
  Proper voltage per machine specifications should be ready at machine site. ***Do NOT power up the machine.***

- Customer should furnish and have available the proper supply and types of lubricants required for machine operation. ***See enclosed Makino Installation Manual for specifics – any questions should be directed to our Service Department at the above locations.***

ITEM	CAPACITY	FLUID TYPE
Coolant	106 Gallons *(may vary with type/size of tank ordered – check Manual for specifics)*	Water Soluble, Synthetic

You will need to have Coolant on hand at the time of installation. Contact our Service Department with any questions.

- Air lines should be routed to the machine location and operational for proper air pressure.

Must have clean, dry air supply with less than 40% relative humidity in line. In-line water trap recommended. 72-116 psi @ 23.9 cfm; we recommend ½" air line hose.

- Machine location should be planned to allow enough room for access panels to be opened and serviced with ease. A minimum of 36" clearance is required around the machine for operator and maintenance access.

- Weight requirements should be checked to insure that the surface below the machine will have sufficient strength for support and stability. The machine must be set on a solid, sound and stable, steel bar-reinforced concrete slab poured directly on the grade. In general, the 6" concrete floor on industrial buildings is suitable for machine placement.

- ***The Makino a71 can be moved with either a forklift or crane***.*** Upon arrival of your machine, uncrate and immediately check for visible damage. ***SEE ATTACHED FOR SHIPPING DIMENSIONS.***

******NOTE: LIFTING EQUIPMENT, ROPES, SHACKLES, LIFTING BARS, LIFTING BEAMS, ETC. ARE OPTIONAL EQUIPMENT AND ARE NOT PROVIDED WITH THE MACHINE. ITEMS MUST BE PURCHASED PRIOR TO MACHINE DELIVERY. CHECK WITH YOUR RIGGER TO SEE IF THEY HAVE ANY OF THESE ITEMS.******

- **Remove as much preservative from the machine as possible without having to power up (tables – slides, pulleys, etc.). We recommend mineral spirits to clean. Apply oil when finished to prevent rust.**

Approximate Machine Shipping Dimensions

(Note – they may vary slightly – we will provide you with a Bill of Lading copy with actual dimensions at time of shipment. Refer to your Makino Installation Manual for exact floor space/layout dimensions/requirements on the Chip Conveyor/Tank and any other optional peripherals purchased with your new machine.)

Makino a71, 40/60-Tool ATC Machine

APPROX SHIP WEIGHTS, MACHINE/ACCESSORIES	APPROXIMATE SHIPPING DIMENSIONS ***(Note: This will vary depending upon the configuration/options ordered.)***
31,526# (machine)	183” L x 116” W x 133" H (machine skidded and packed)
2,205# (60ATC Unit)	111” L x 57” W x 70” H (60ATC Unit Crated)
2,205# (Coolant Tank)	117” L x 92” W x 52” H (Coolant Tank/Chip Conveyor Skidded/Crated)
661# (Accessory Box)	113” L x 44” W x 41” H (Crated/skidded)
882# (Accessory Box)	48” L x 39” W x 70” H (crated)
727# (transformer)	40” L x 39” W x 32” H (skidded – usually ships separately from Makino)
See Makino Installation Manual for floor space/layout dimensions, depending upon your configuration.	

Makino a71, 97/137-Tool ATC Machine

APPROX SHIP WEIGHTS, MACHINE/ACCESSORIES	APPROXIMATE SHIPPING DIMENSIONS **(Note: This will vary depending upon the configuration/options ordered.)**
29,652# (machine)	183” L x 116” W x 133" H (machine skidded and packed)
7,937# (97/137ATC)	105” L x 82” W x 134” H (97/137ATC crated)
800# (ATC Cover)	107” L x 86” W x 98” H (crated)
2,205# (Coolant Tank)	111” L x 57” W x 70” H (Coolant Tank/Chip Conveyor Skidded/Crated)
772# (Air Dryer/Accy)	40” L x 26” W x 91” H (Crated/skidded)
882# (pallets/skidded)	53” L x 31” W x 17” H (crated)
727# (transformer)	40” L x 39” W x 32” H (skidded – usually ships separately from Makino)
See Makino Installation Manual for floor space/layout dimensions, depending upon your configuration.	

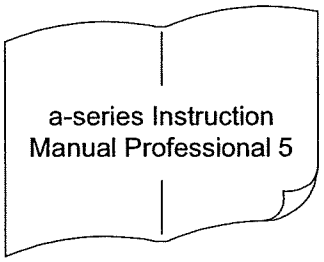
Makino a71, 300-Tool ATC Machine

APPROX SHIP WEIGHTS, MACHINE/ACCESSORIES	APPROXIMATE SHIPPING DIMENSIONS ***(Note: This will vary depending upon the configuration/options ordered.)***
30,093# (machine)	184” L x 116” W x 131" H (machine skidded and packed)
7,937# (300ATC)	105” L x 82” W x 133” H (300ATC crated)
800# (ATC Cover)	107” L x 86” W x 98” H (crated)
1,800# (Coolant Tank)	102” L x 52” W x 64” H (Coolant Tank/Chip Conveyor Skidded/Crated)
700# (Air Dryer/Accy)	96” L x 45” W x 69” H (Crated/skidded)
250# (Accessories)	96” L x 45” W x 69” H (Skid/Crated Box)
750# (pallets/skidded)	48” L x 30” W x 16” H (crated)
727# (transformer)	40” L x 39” W x 32” H (skidded – usually ships separately from Makino)
See Makino Installation Manual for floor space/layout dimensions, depending upon your configuration.	

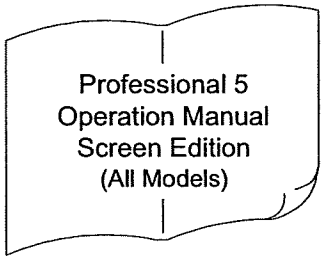
PLEASE FORWARD THIS TO THE APPROPRIATE PERSON. THANK YOU.

MACHINE MODEL	a71
MACHINE SERIAL#	
CONTROL TYPE	**PRO5**
COMPANY NAME	

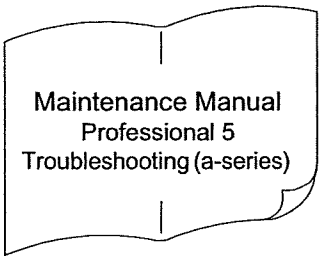
List of Supplied Manuals (Standard)



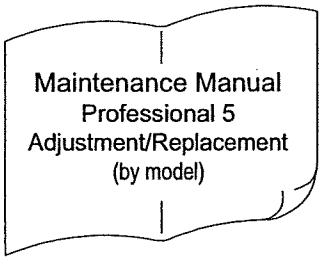
- Machine Operation (Automatic/Manual Operation)
- Tool/Workpiece Restrictions
- Functions
  - Pallet Change
  - Tool Change
  - Tool Monitor
  - GI Control
  - etc.
- Programming
  - Basic Programs
  - Programming Tips
  - M-Codes
  - Program Design Data
  - etc.
- Periodic Maintenance



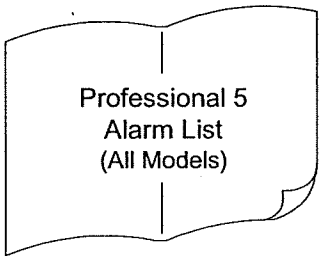
Details on Screens
- Screen Display/Operation
- Program Input/Edit
- Data Input/Edit
- Machine Status Display
- Function ON/OFF
- Parameter Setting Confirmation/Change



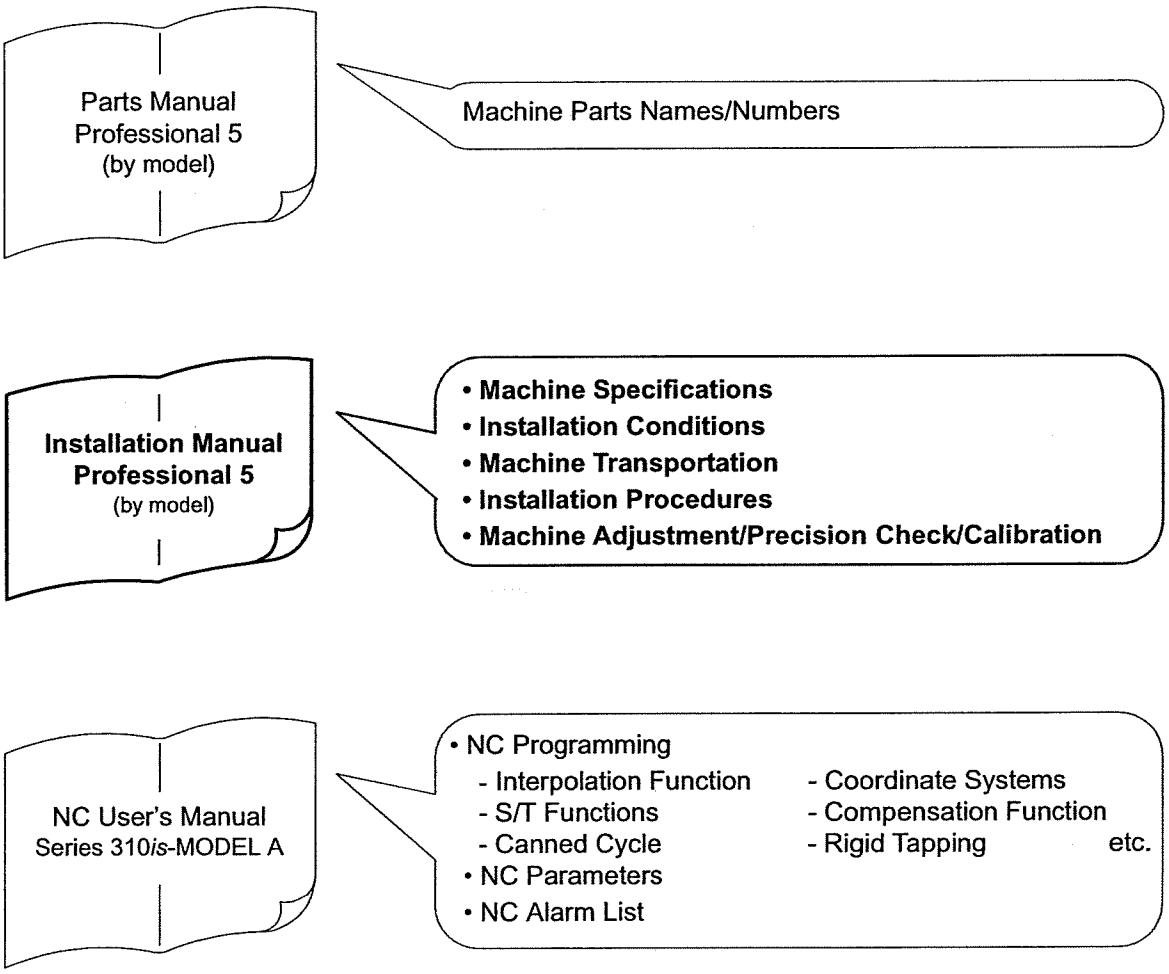
- Recovery from Emergency Stop Condition
- Troubleshooting
- Maintenance Screen Operation
- Signal List
- Flowcharts



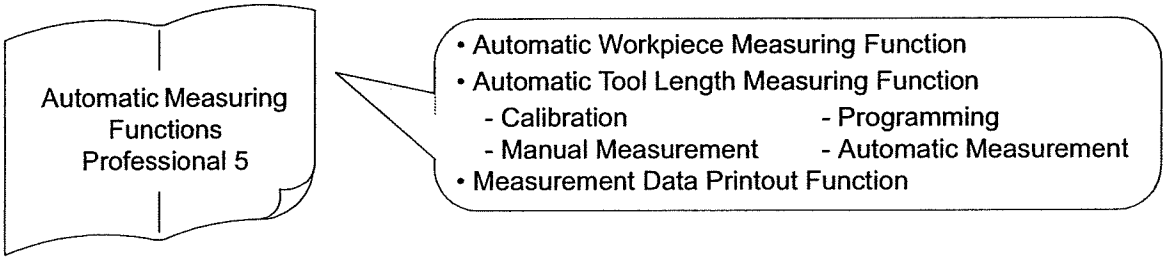
- Adjustment/Replacement
- Special Tools/Jigs
- Hydraulic/Pneumatic Circuit Schematics



List of Machine Alarms/Warnings and Details



Other Manuals (Optional)



Introduction

This manual describes preparations for installation and installation procedure for a71 horizontal machining center.

In the preparation for installation chapter, all information required by the user prior to machine installation is summarized.

In the installation chapter, all information required for actual installation work is summarized. Provide this manual for reference to the service engineer during commissioning and installation work.

This manual has been prepared and complied based on the a71 (standard specifications) available at the time of preparation. Parts numbers and other contents may differ due to changes in specifications and designs following publication. Contact Makino service representatives for updated information.

Note that the figures in this manual may not apply to all the parts of the given product due to specification changes.

⚠ **WARNING**	**- Read this manual thoroughly prior to installing this machine.** **- Heed all safety precautions provided in this manual at all times to ensure the safety of those installing this machine** **- Disregarding specific instructions or precautions included in this manual may lead to serious injury or death.**

IMPORTANT NOTICE

1 Designate specific operators for this machine to ensure optimum machine performance and safety standards are maintained at all times.

2 Keep this manual in a clearly marked location to ensure easy access when necessary

3 Contact the regional MAKINO office or local distributor if this manual is lost or damaged.

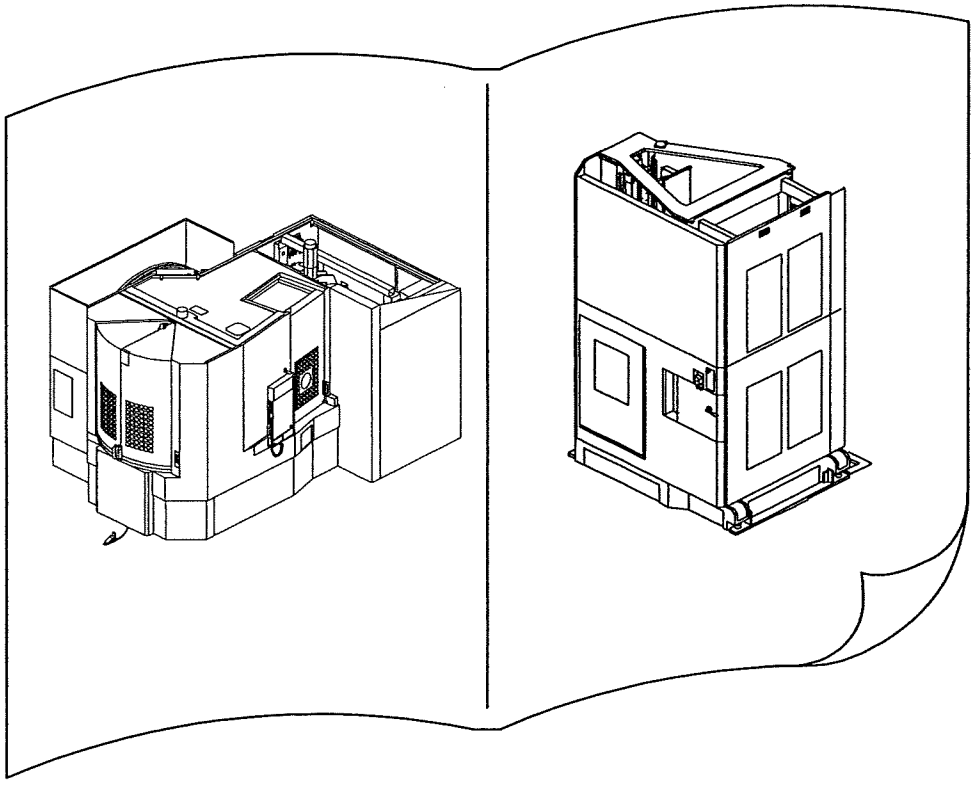
4 Reproduction of this manual in part or in its entirety is prohibited by MAKINO

5 Ensure this manual is included when moving or reselling this machine.

6 All specifications and designs are subject to change without prior to notification.

SYMBOLS IN THIS MANUAL	
☞	Indicates reference items, figures and tables providing further information.

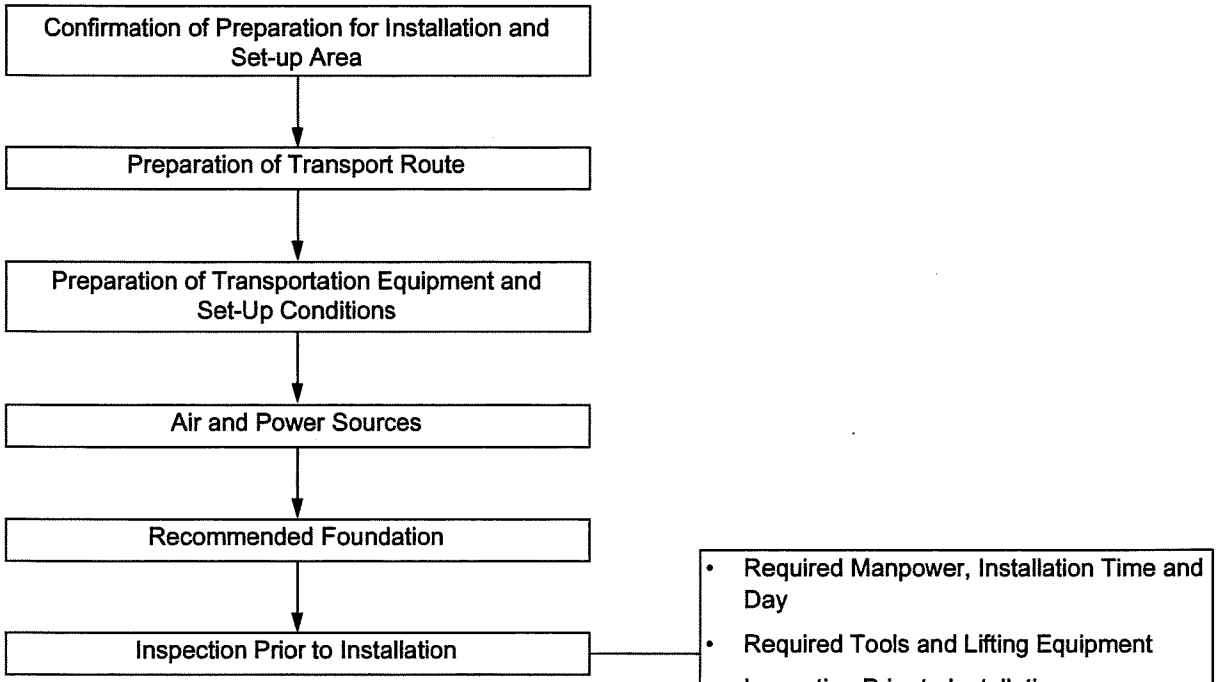
Preparations for Installation and Installation



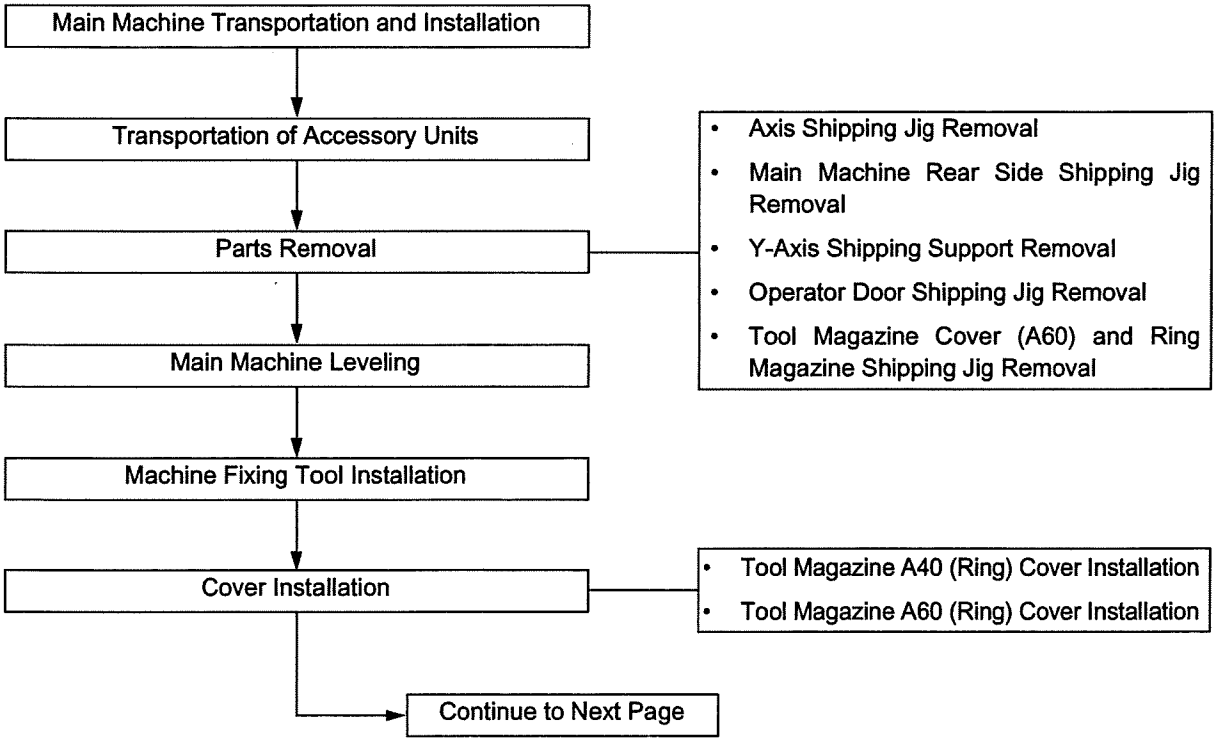
Preparations for Installation and Installation

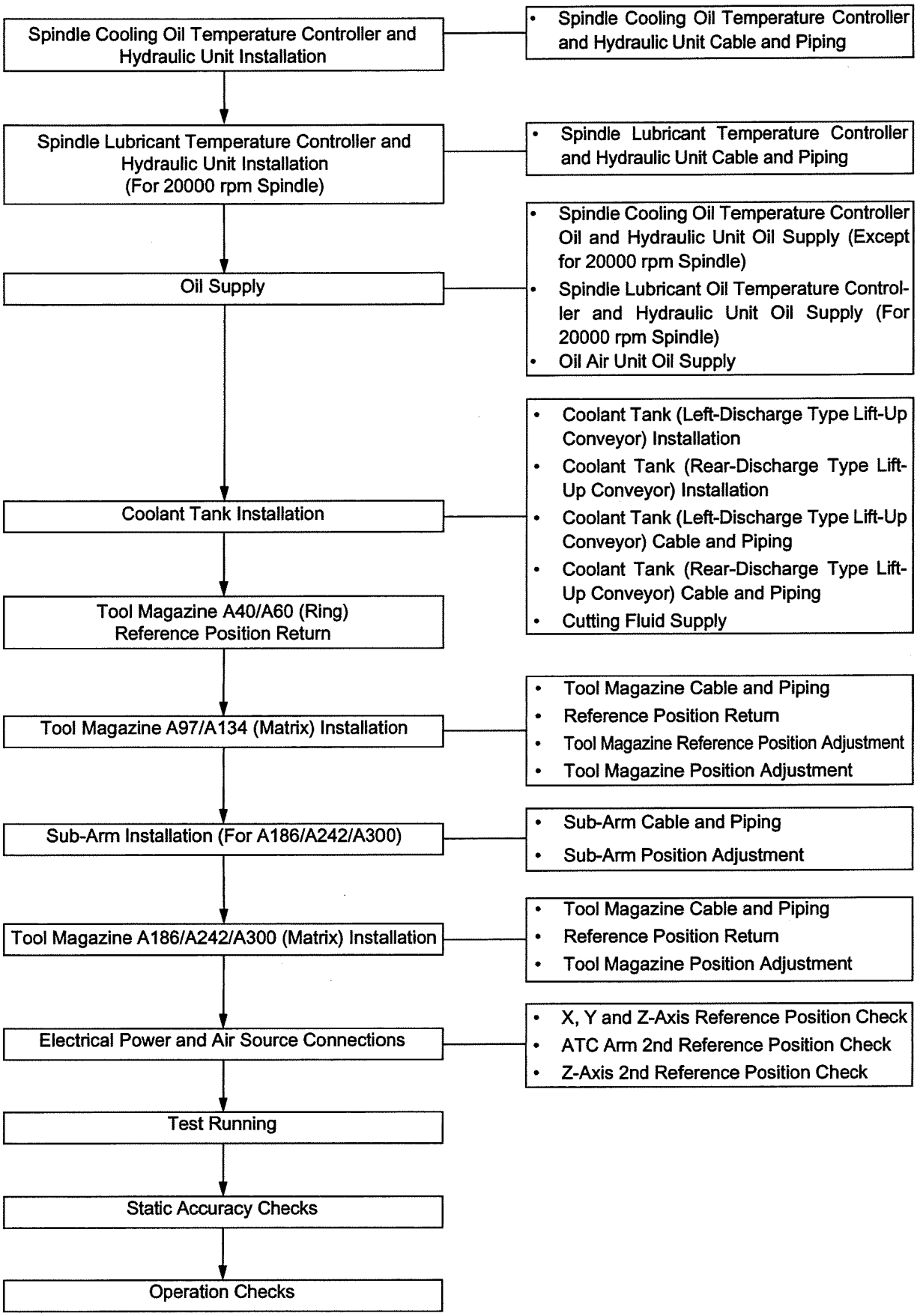
1 Outline

1 Preparations for Installation



2 Installation Procedure




Spindle Cooling Oil Temperature Controller and Hydraulic Unit Installation
• Spindle Cooling Oil Temperature Controller and Hydraulic Unit Cable and Piping
Spindle Lubricant Temperature Controller and Hydraulic Unit Installation (For 20000 rpm Spindle)
• Spindle Lubricant Temperature Controller and Hydraulic Unit Cable and Piping
Oil Supply
• Spindle Cooling Oil Temperature Controller Oil and Hydraulic Unit Oil Supply (Except for 20000 rpm Spindle)
• Spindle Lubricant Oil Temperature Controller and Hydraulic Unit Oil Supply (For 20000 rpm Spindle)
• Oil Air Unit Oil Supply
Coolant Tank Installation
• Coolant Tank (Left-Discharge Type Lift-Up Conveyor) Installation
• Coolant Tank (Rear-Discharge Type Lift-Up Conveyor) Installation
• Coolant Tank (Left-Discharge Type Lift-Up Conveyor) Cable and Piping
• Coolant Tank (Rear-Discharge Type Lift-Up Conveyor) Cable and Piping
• Cutting Fluid Supply
Tool Magazine A40/A60 (Ring) Reference Position Return
Tool Magazine A97/A134 (Matrix) Installation
• Tool Magazine Cable and Piping
• Reference Position Return
• Tool Magazine Reference Position Adjustment
• Tool Magazine Position Adjustment
Sub-Arm Installation (For A186/A242/A300)
• Sub-Arm Cable and Piping
• Sub-Arm Position Adjustment
Tool Magazine A186/A242/A300 (Matrix) Installation
• Tool Magazine Cable and Piping
• Reference Position Return
• Tool Magazine Position Adjustment
Electrical Power and Air Source Connections
• X, Y and Z-Axis Reference Position Check
• ATC Arm 2nd Reference Position Check
• Z-Axis 2nd Reference Position Check
Test Running
Static Accuracy Checks
Operation Checks

2 Preparations for Installation

2.1 Confirmation of Preparations for Installation and Set-Up Area

1 Confirmation of Preparations for Installation

Perform the following preparations to ensure all installation conditions are satisfied prior to machine installation.

Table 2.1 Check Points for Installation Preparation

Check	Items
	Preparation of Foundation
	Preparation of Set-Up Area
	Set-Up Conditions
	Preparation of Transport Route
	Preparation of Transportation Equipment
	Preparation of Electric Source
	Preparation of Air Source
	Preparation of Air Dryer

2 Preparation of Set-Up Area

Confirm space requirements prior to installation. The maintenance area is the maintenance space required after installation. When lifting the machine body using a crane, the total lifting height required is 4637mm. The maintenance area varies depending on the type of tool magazine and conveyor specifications (☞ Table 2.2 Machine Size Shipment Dimensions).

NOTE:

Figures 2.1 to 2.8 show a general view and floor plan for each machine except for the 20000rpm spindle specifications.

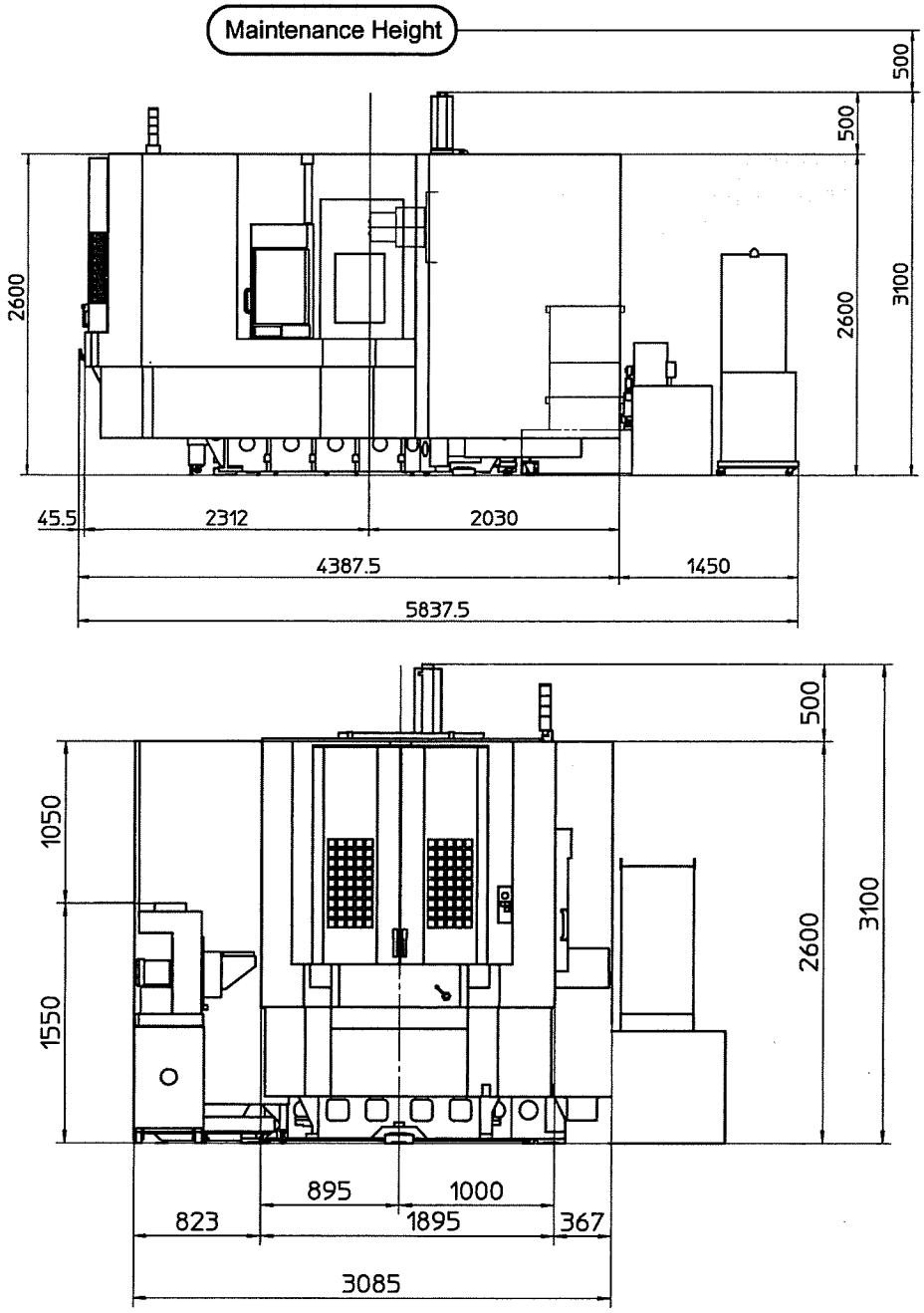


Figure 2.1 Front and Side View of Machine
(Tool Magazine A40 and Left Discharge Lift-Up Conveyor Spec.)

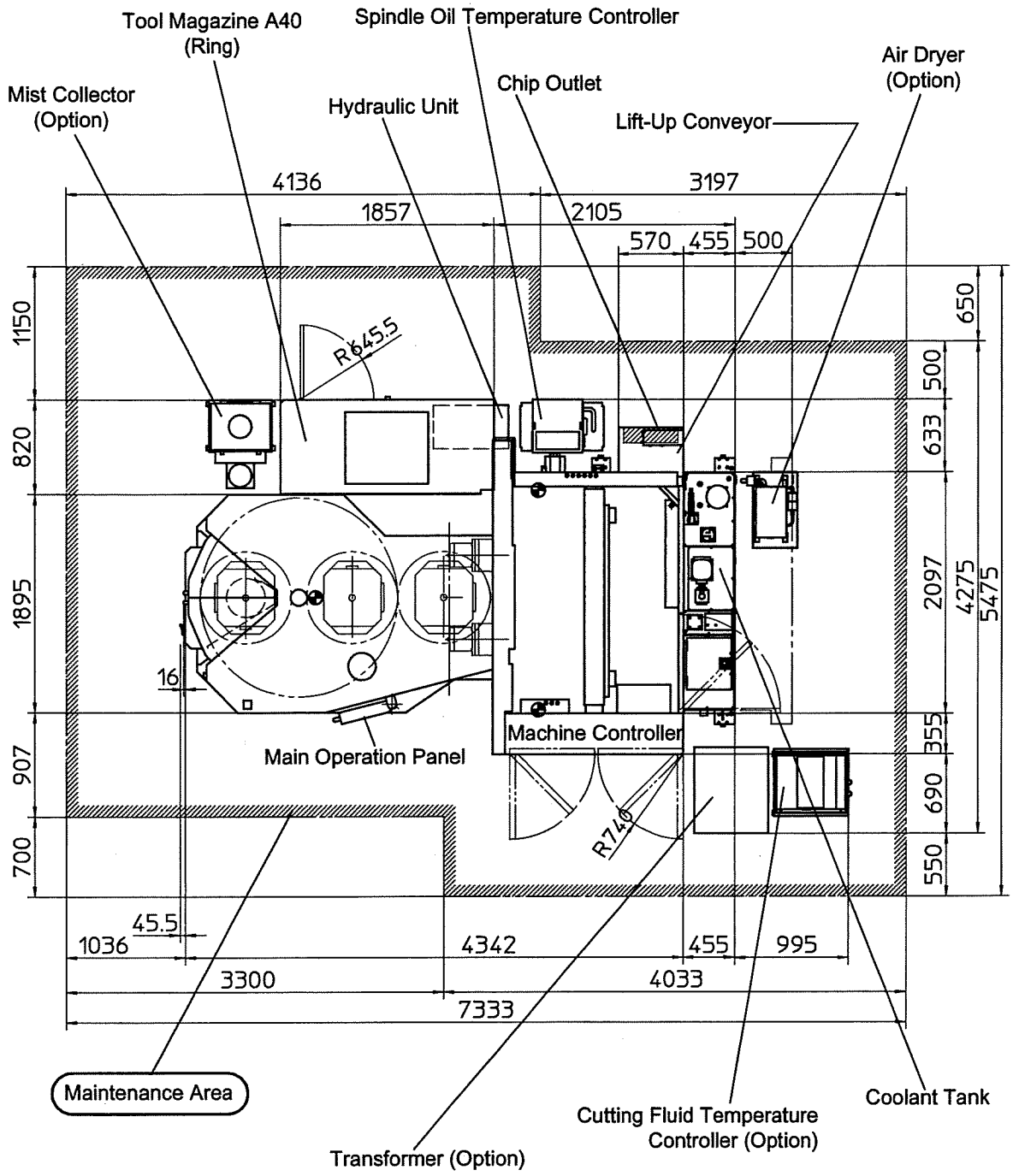


Figure 2.2 Floor Plan of Machine (Tool Magazine A40 and Left Discharge Lift-Up Conveyor Spec.)

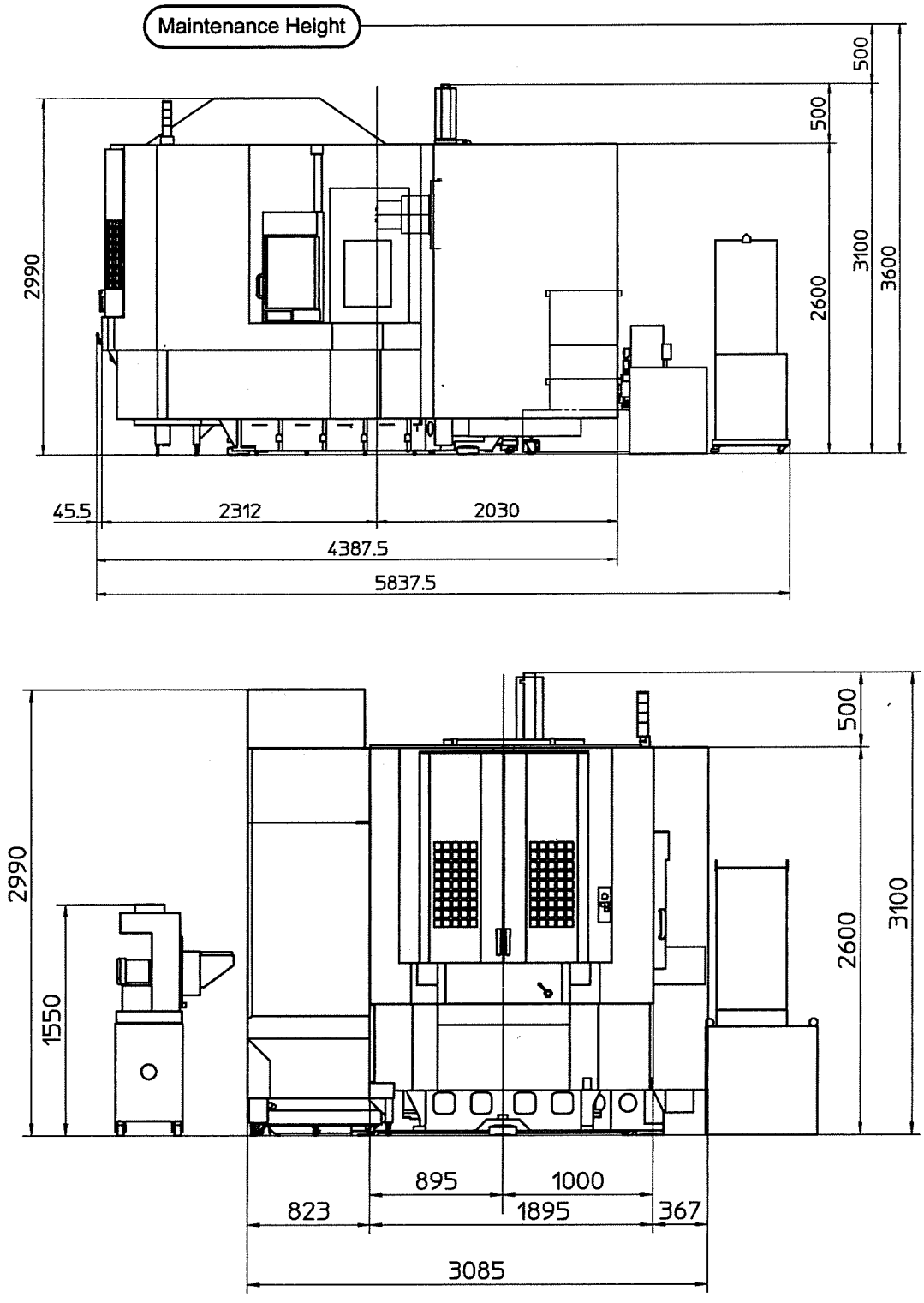


Figure 2.3 Front and Side View of Machine
(Tool Magazine A60 and Left Discharge Lift-Up Conveyor Spec.)

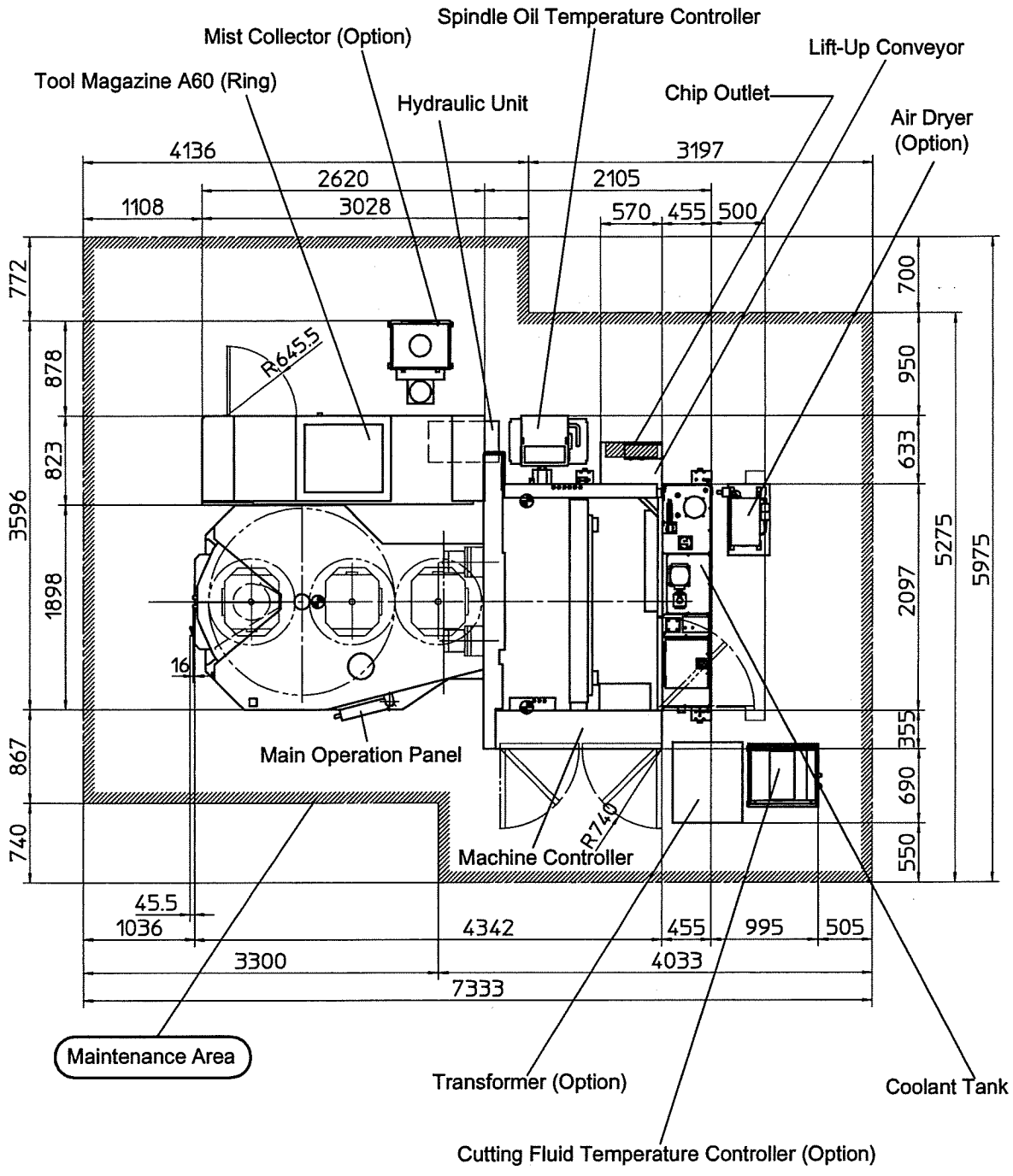


Figure 2.4 Floor Plan of Machine (Tool Magazine A60 and Left Discharge Type Lift-Up Conveyor Spec.)

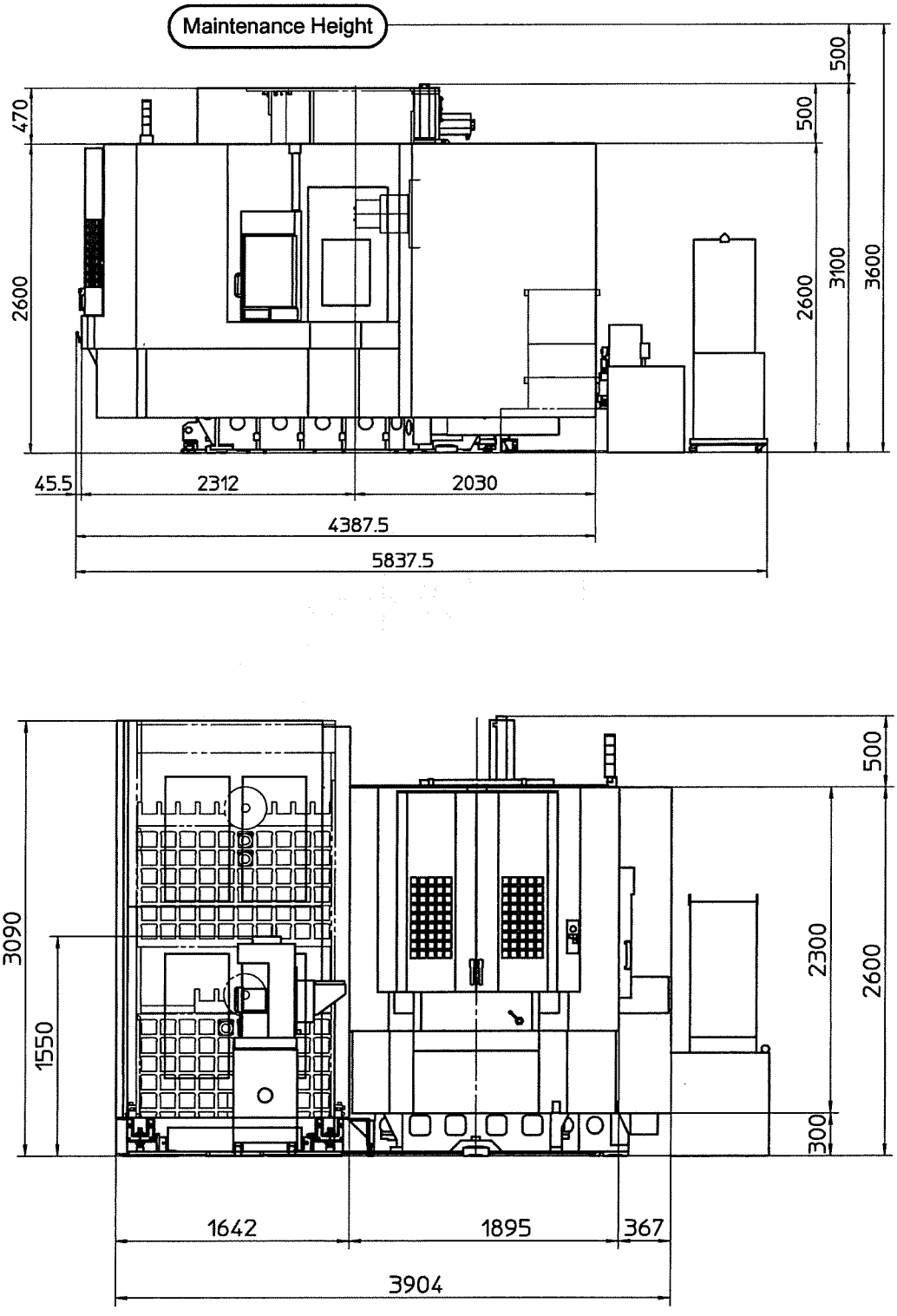


Figure 2.5 Front and Side View of Machine
(Tool Magazine A97/A137 and Left Discharge Lift-Up Conveyor Spec.)

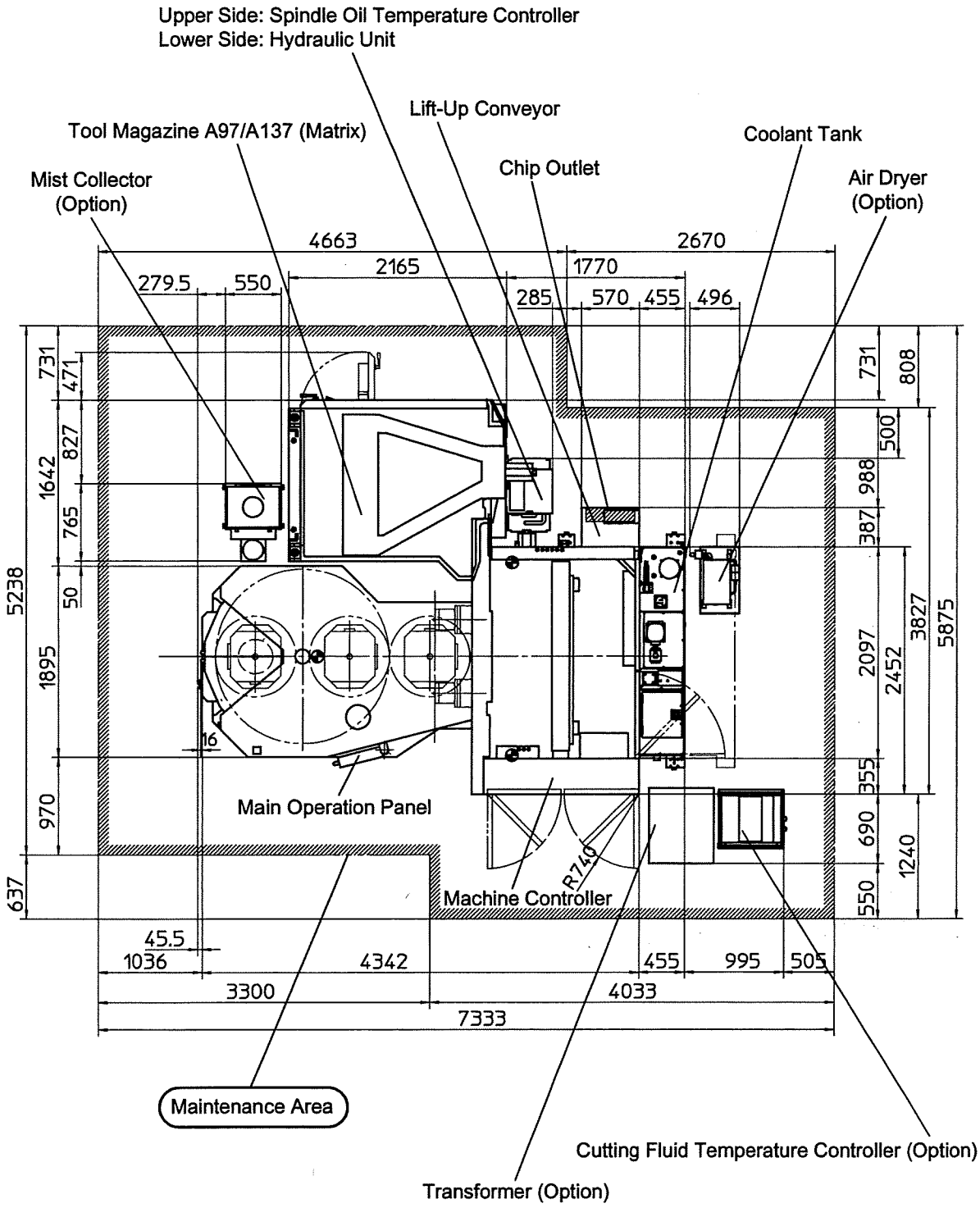


Figure 2.6 Floor Plan of Machine
(Tool Magazine A97/A137 and Left Discharge Lift-Up Conveyor Spec.)

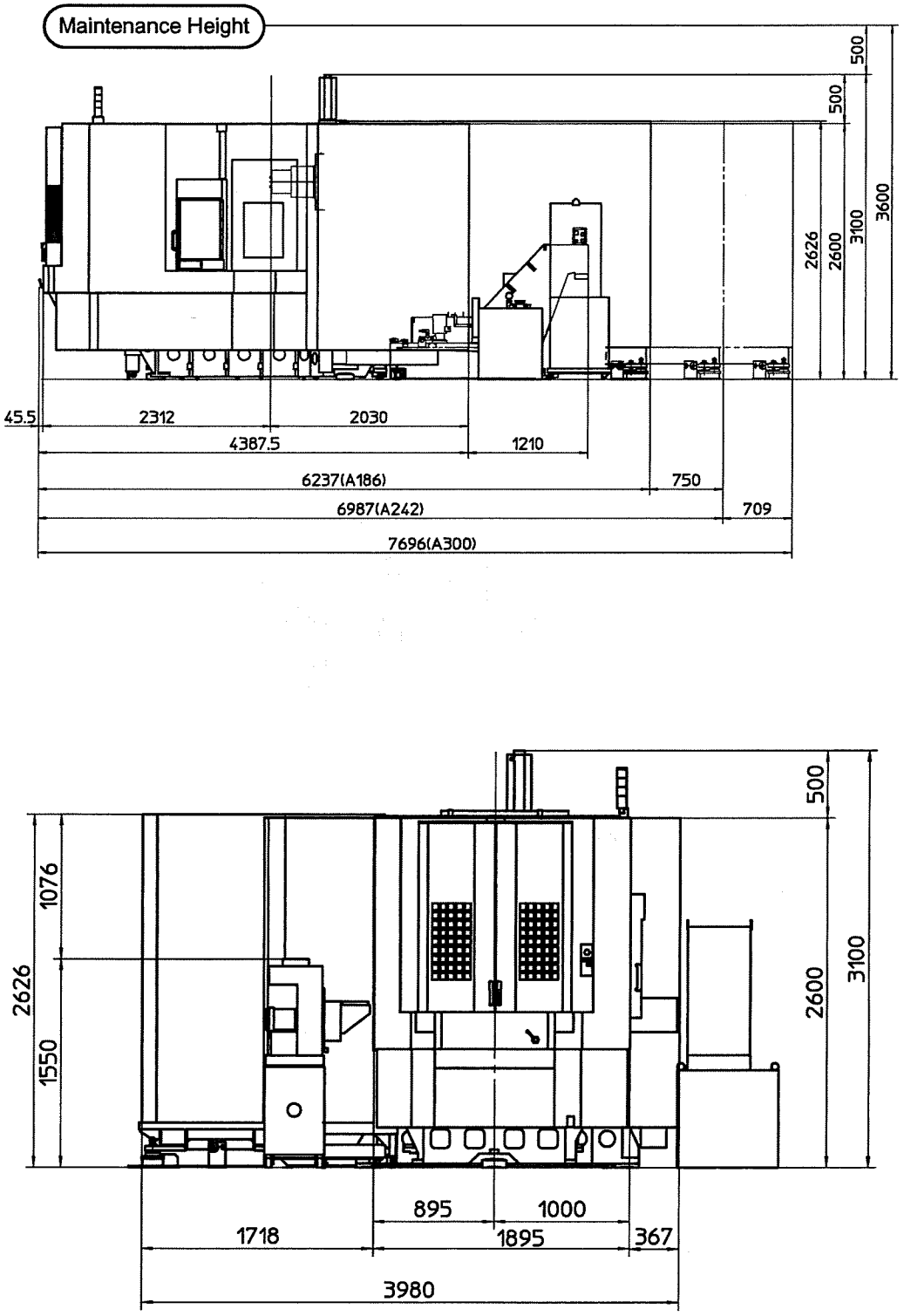


Figure 2.7 Front and Side View of Machine
(Tool Magazine A186/A242/A300 and Rear Discharge Lift-Up Conveyor Spec.)

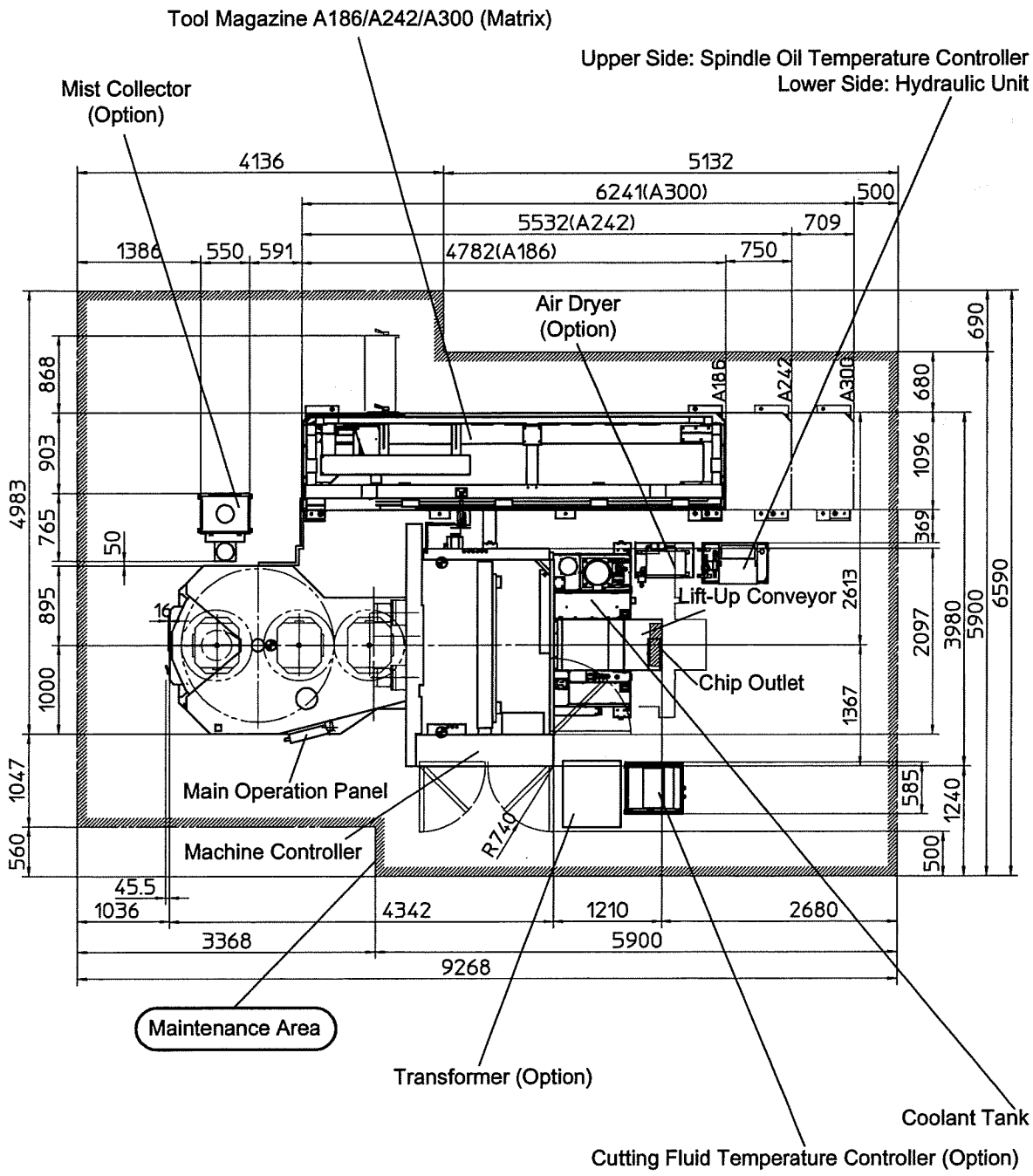


Figure 2.8 Floor Plan of Machine
(Tool Magazine A186/A242/A300 and Rear Discharge Lift-Up Conveyor Spec.)

2.2 Preparation of Transport Route

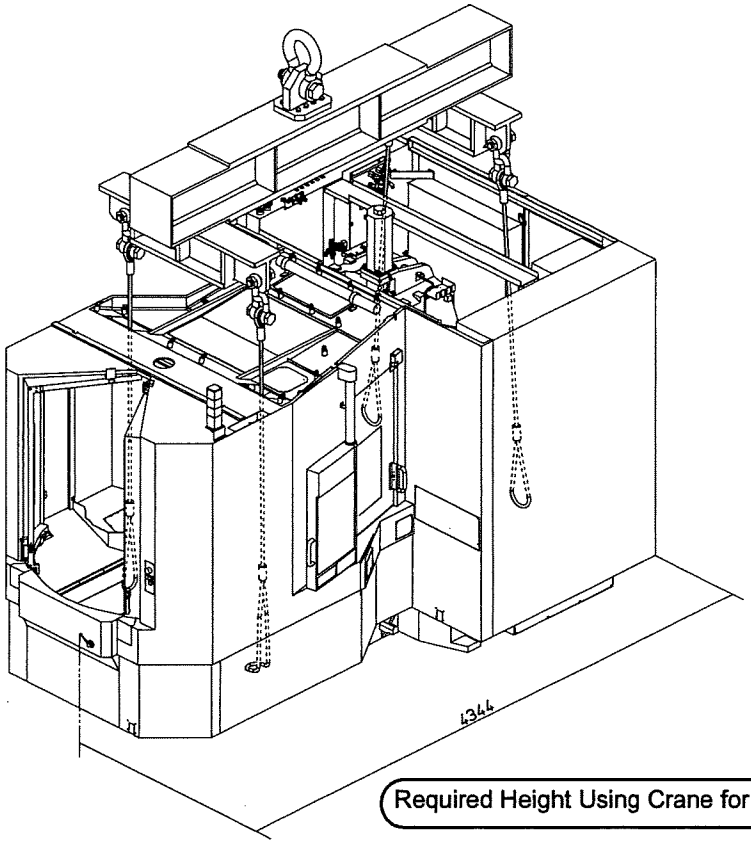
Prepare the machine transport route, referring to the machine size shipment dimensions.

Table 2.2 Machine Size Shipment Dimensions

Item	Height	Height With Lifting Equipment	Width	Depth
Main Machine (Without Tool Magazine)	3070mm	4637mm	2732mm	4344mm
Main Machine (Tool Magazine A40)	3070mm	4637mm	2812mm	4344mm
Main Machine (Tool Magazine A60)	3070mm	4637mm	2732mm	4344mm
Tool Magazine A97	3090mm	3700mm	1835mm	2462mm
Tool Magazine A137	3090mm	4080mm	1835mm	2462mm
Tool Magazine A186	2626mm	5310mm	1096mm	4782mm
Tool Magazine A242	2626mm	5310mm	1096mm	5532mm
Tool Magazine A300	2626mm	5310mm	1096mm	6241mm

NOTE:

When lifting the main machine using a crane, the necessary total height required to provide adequate lifting space is 500mm plus the height with the lifting equipment.



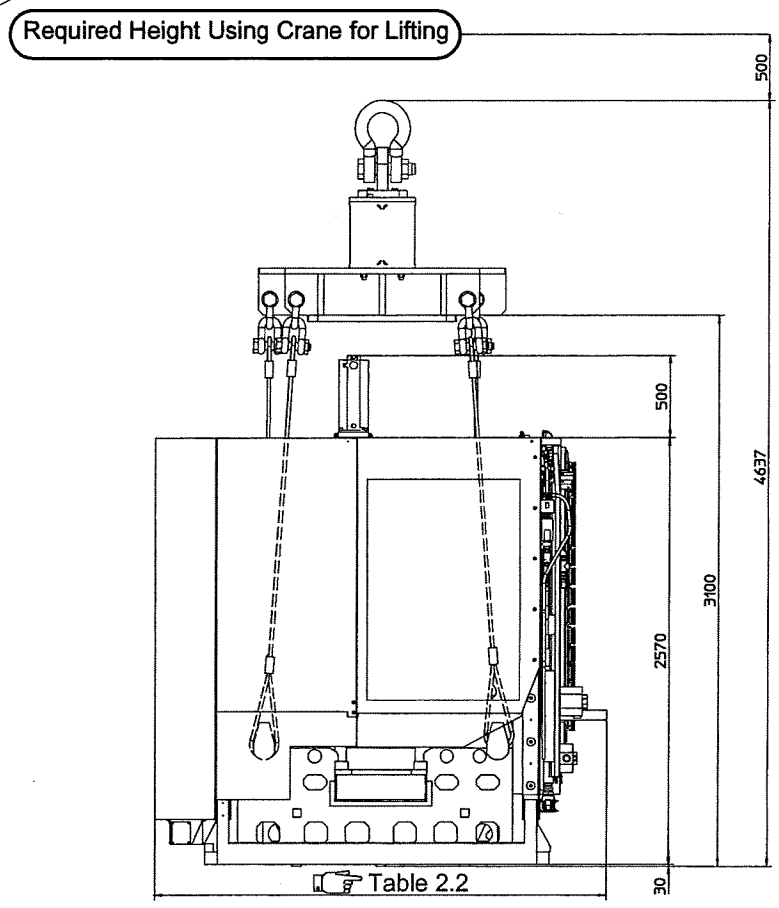
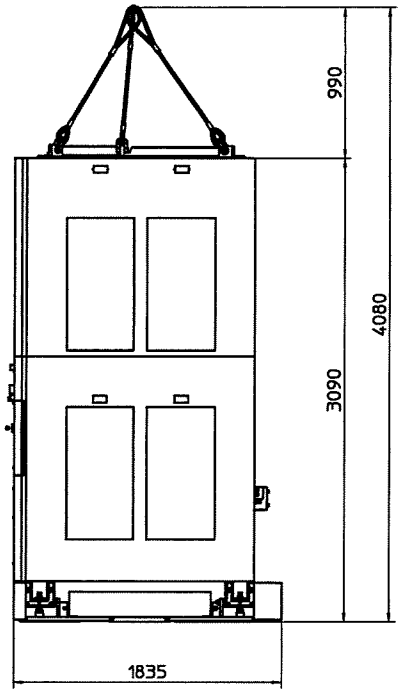
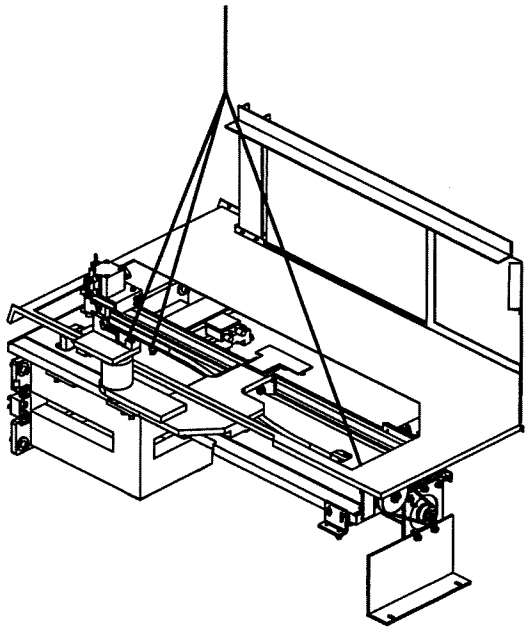


Figure 2.9 Main Machine When Being Transported

Tool Magazine A97/A137 (Matrix)



Sub-Arm (Tool Magazine A186/A242/A300)



Tool Magazine A186/A242/A300 (Matrix)

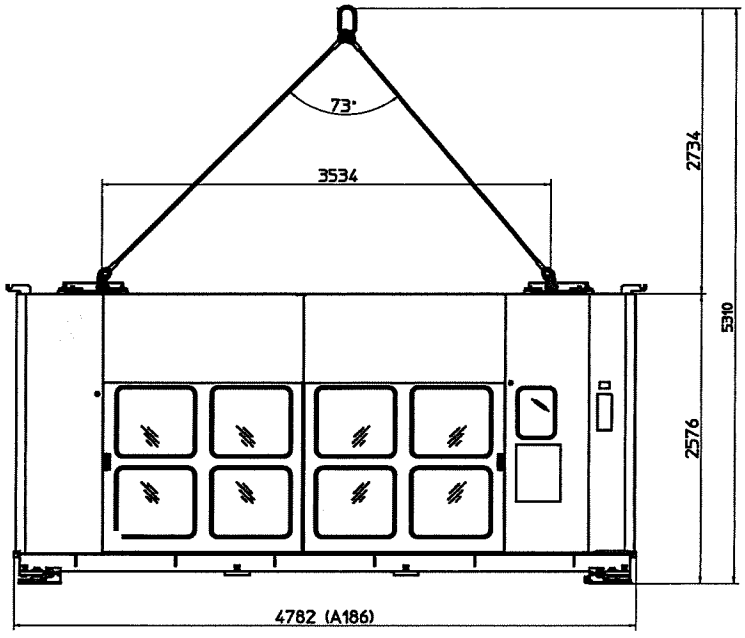
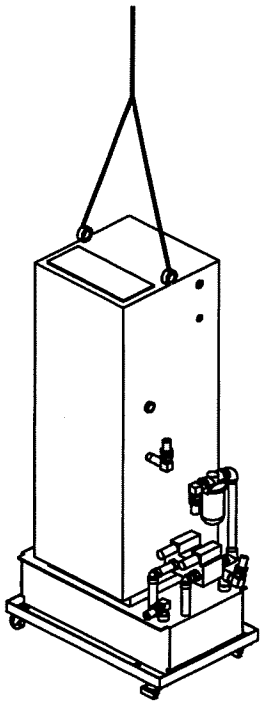
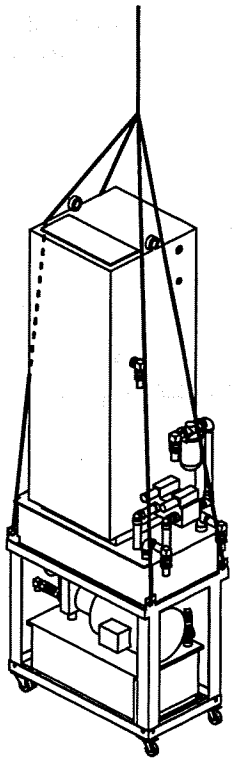


Figure 2.10 Lifting Options and Accessory Units 1

Spindle Cooling Oil Temperature Controller (Tool Magazine A40/A60)



Spindle Cooling Oil Temperature Controller/ Hydraulic Unit (Tool Magazine A97 or Above)



Spindle Lubricant Oil Temperature Controller and Hydraulic Unit (For 20000 rpm Spindle Spec.)

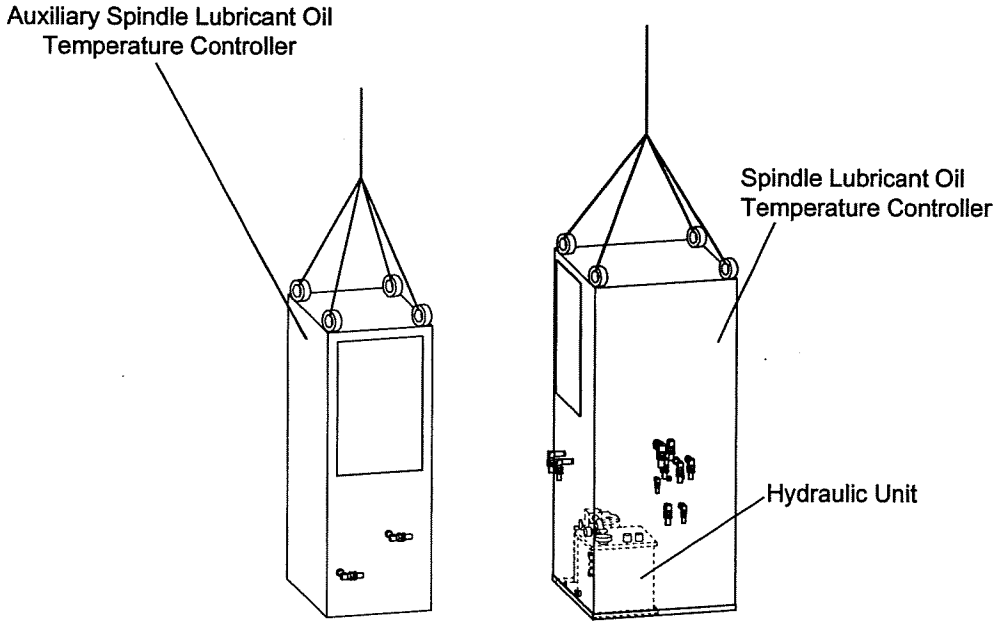
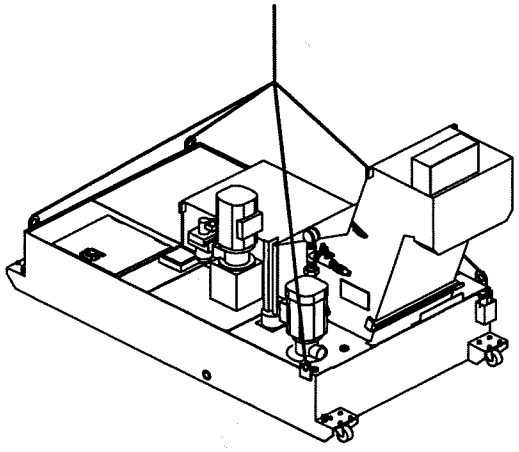


Figure 2.11 Lifting Options and Accessory Units 2

Coolant Tank
(Left Discharge Type Lift-Up Conveyor)



Coolant Tank
(Rear Discharge Type Lift-Up Conveyor)

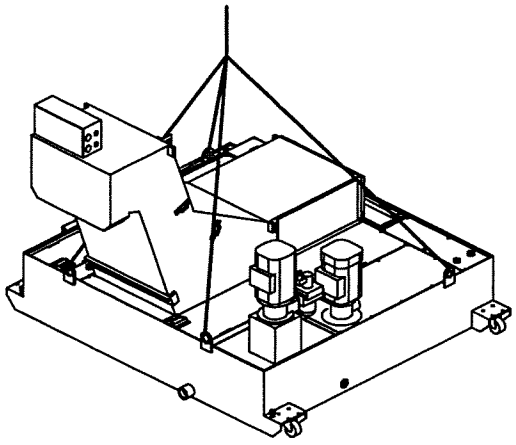


Figure 2.12 Lifting Options and Accessory Units 3

2.3 Preparation of Transportation Equipment

1 Preparation of Transportation Equipment

Prepare equipment such as the crane, fork lift truck, skates, capable of supporting the size and withstanding the weight of the machine prior to machine transportation. If the transportation equipment cannot be prepared, contact Makino service representatives for further assistance.

Table 2.3 Machine Weight When Shipped

Model: Item	Weight
Main Machine (Without Tool Magazine)	12100kg
Main Machine (Tool Magazine A40)	13100kg
Main Machine (Tool Magazine A60)	13400kg
Tool Magazine A97	3200kg
Tool Magazine A137	3200kg
Tool Magazine A186	3900kg
Tool Magazine A242	4000kg
Tool Magazine A300	4500kg
Spindle Cooling Oil Temperature Controller (Except for 20000 rpm Spindle)	200kg
Spindle Lubricant Temperature Controller (For 20000 rpm Spindle)	580kg
Hydraulic Unit (Except for 20000 rpm Spindle)	60kg
Hydraulic Unit (For 20000 rpm Spindle)	200kg
Coolant Tank Left Discharge (Through Spindle 1.5MPa/Without Workpiece Cleaning Gun and Cutting Fluid Temperature Controller: Standard Spec.)	510kg
Coolant Tank Left Discharge (Through Spindle 3.0MPa/Without Workpiece Cleaning Gun and Cutting Fluid Temperature Controller)	560kg
Coolant Tank Left Discharge (Through Spindle 7.0MPa/Without Workpiece Cleaning Gun)	577kg
Coolant Tank Rear Discharge (Through Spindle 1.5MPa/Without Workpiece Cleaning Gun and Cutting Fluid Temperature Controller: Standard Spec.)	610kg
Coolant Tank Rear Discharge (Through Spindle 3.0MPa/Without Workpiece Cleaning Gun and Cutting Fluid Temperature Controller)	660kg
Coolant Tank Rear Discharge (Through Spindle 7.0MPa/Without Workpiece Cleaning Gun)	677kg
* Add 13kg to coolant tank weight listed above when installing a workpiece cleaning gun or cutting fluid temperature controller.	

2 Set-Up Conditions

Confirm the following set-up location and environmental conditions prior to machine set-up.

Table 2.4 Set-Up Conditions

Set-Up Location and Environmental Conditions	
Ambient Temperature	10°C to 40°C (Optimum Temp: 20°C ± 1°C)
Relative Humidity	35% to 70% (No Condensation)
Temperature Fluctuation	Less than 1°C/30 minutes (Range which does not influence machining.)
Well-illuminated	
Free from direct sunlight	
Dust-free	
Available space for storing raw materials, finished workpiece and tools	
Available space for maintenance work	
Adequate space around machine to open doors completely	
Required electrical power sources	
A level foundation strong enough to support the weight of the machine	
Appropriate distance from factory air ducting/inlets (Air Flow)	

2.4 Air and Power Sources

Table 2.5 Air and Power Sources

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Electrical Source</td><td>AC200/220V ± 10%
50/60Hz ± 2%</td></tr>
<tr><td rowspan="2">Maximum Power Consumption</td><td>65.4kVA (standard)</td></tr>
<tr><td>Approx. 85kVA (including options)</td></tr>
<tr><td>Total Power Requirement</td><td>The actual power requirements are shown below:
65.4 x 0.6 = 39.2kVA (standard)
85 x 0.6 = 51kVA (including options)</td></tr>
<tr><td>Circuit Breaker</td><td>225A</td></tr>
<tr><td>Power Cable</td><td>60mm^2 or more (600V insulated cables specified by JIS C3307)
or
38mm^2 or more (600V-flame-retardant poly-flex insulated cables made by HITACHI cable SP39-10021J)</td></tr>
<tr><td>Ground</td><td>Ground resistance 100 Ω</td></tr>
<tr><td>Ground Cable</td><td>30mm^2 or more cross section (600V insulated cables specified by JIS C3307)</td></tr>
<tr><td>Air Source</td><td>• 0.5MPa to 0.8MPa
• 410L/min: ANR (Standard Condition)
• Dew point temperature: -20°C or less
NOTE:
Clean air (free from solvent and iron rust) is required.

Equivalent to the grade ISO2.5.2 specified by ISO8573-1 (equivalent to JIS B 8392-1)
• Max. particles number/1m^3: Below 10 (diameter: 0.001 $<$ x $\leqq$ 0.005mm)
• Max. particles number/1m^3: Below 1000 (diameter: 0.0005 $<$ x $\leqq$ 0.001mm)
• Max. particles number/1m^3: Below 100000 (diameter: 0.0001 $<$ x $\leqq$ 0.0005mm)
• Dew point at max. pressure: Below 7°C (Absolute Pressure: 0.8MPa)
• Max. oil concentration: 0.1mg/m^3 or less
NOTE:
The machine requires the above air quality. The air filter is installed as a standard feature. However, when maintenance of the filters is neglected, filter pollution and damage to the filter may occur in a short period of time. Periodic maintenance must be performed to maintain an optimum air supply.

Required Air Flow (L/min: ANR)
<table>
<tr><th></th><th>Standard</th><th>Using Through Spindle Air Frequently</th><th>With Air Blow</th></tr>
<tr><td>Standard Spec. (without scale)</td><td>410</td><td>600</td><td>660</td></tr>
<tr><td>With Scale</td><td>460</td><td>690</td><td>750</td></tr>
</table></td></tr>
<tr><td>Air Dryer</td><td>Should be ordered except when prepared by customer</td></tr>
<tr><td>Air Filter</td><td>5μm + 0.3μm + water remover</td></tr>
</table>

NOTE:

The air quality varies according to the factory circumstances. The air quality specified by ISO 8573-1 (equivalent to JIS B 8329-1) is only a recommended value. Use a "Particle Counter" to confirm that the air quality values satisfy the required values.

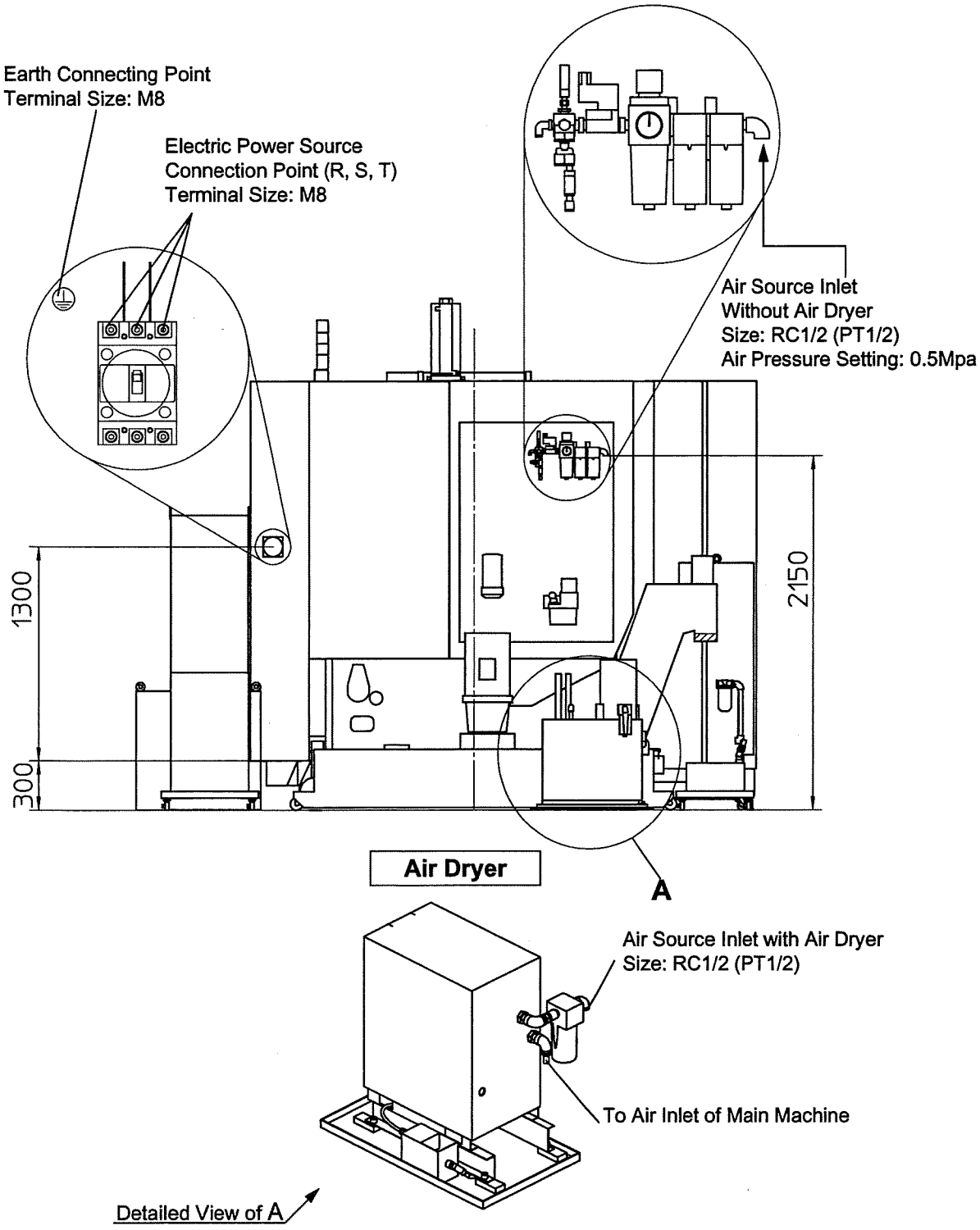


Figure 2.13 Power, Air Intake and Air Piping (with Air Dryer)

2.5 Recommended Foundation

Table 2.6 Flotation Range for Each Specification

Foundation Range	Specifications
A	Main Machine Foundation
B	Insulated Foundation from Surrounding Vibration (Use of small crushed stone is desirable.)
C	Tool Magazine A97/A137 (Matrix) Foundation
D	Tool Magazine A186/A242/A300 (Matrix) Foundation

Table 2.7 Recommended Foundation

No.	Item	Description
1	Ground Resistance	6 ton/m^2
2	Foundation Thickness	350mm
3	Main Machine Support Point "a"	3 points
4	Machine Fixing Tool	3 points
5	Jet Anchor "b" for Main machine	6 points (M16: Jet Anchor)
6	Jet Anchor "c" for Tool Magazine A97/A137	4 points (M16: Jet Anchor)
7	Jet Anchor "d" for Tool Magazine A186/A242/A300	4 points (M16: Jet Anchor)
8	Foundation Iron Bar	ϕ 10mm (Both Vertical and Horizontal)
9	Recommended Concrete	FC180 standard and above
10	Recommended Rubble	Medium or Large Size Crushed Stone
11	Leveling Concrete Thickness	50mm
12	Concrete Weight for Tool Magazine A40/A60	8.8ton
13	Concrete Weight for Tool Magazine A97/A137	9.7ton
14	Concrete Weight for Tool Magazine A186/A242/A300	9.9ton

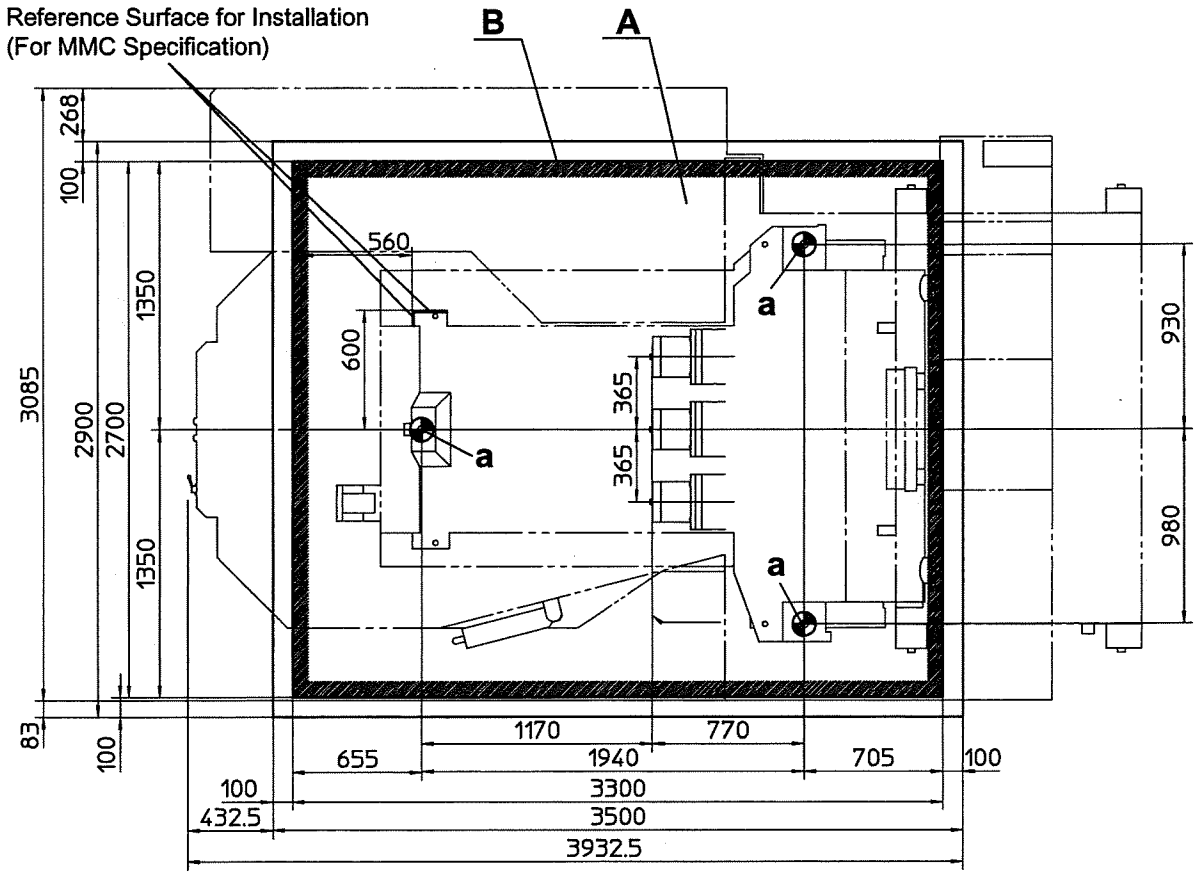
NOTES:

1 Nos. 8 ~ 14 in Table 2.7 are only recommended values.

2 It is necessary to use the machine fixing tools in order to secure the main machine to the floor when installing the options (Matrix Magazine, Pallet Magazine or MMC) (☞ "4.5 Machine Fixing Tool Installation").

3 Dimensions indicated in this foundation drawing are minimum requirements given for good solid installation foundation. The foundation drawings on following pages show only recommended values.

4 As this machine operates at high-speeds, vibration generated by machine operations may affect the surrounding area depending upon the foundation and ground conditions. Consult a professional civil engineer to determine the final foundation dimension requirements as they vary according to the actual ground conditions and possible influence on the surrounding area.



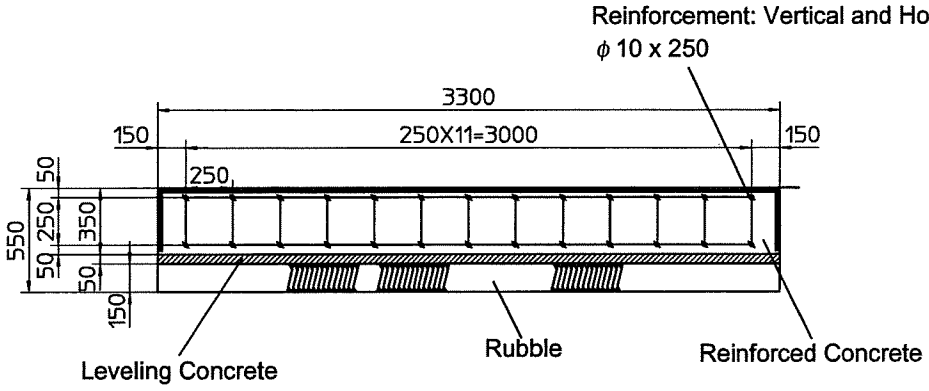
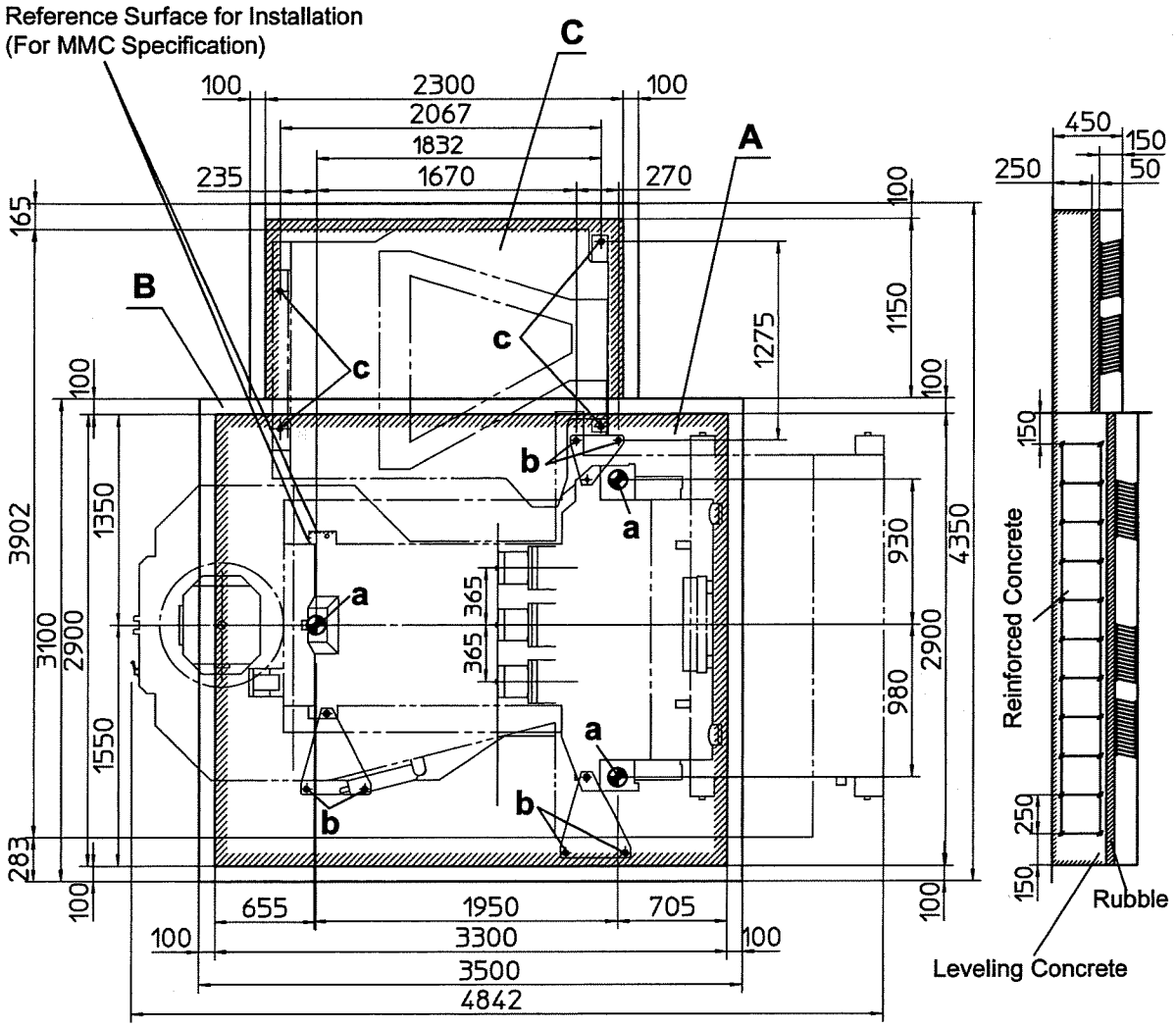


Figure 2.14 Foundation Drawing (Tool Magazine A40/A60 and Left Discharge Lift-Up Conveyor Spec.)



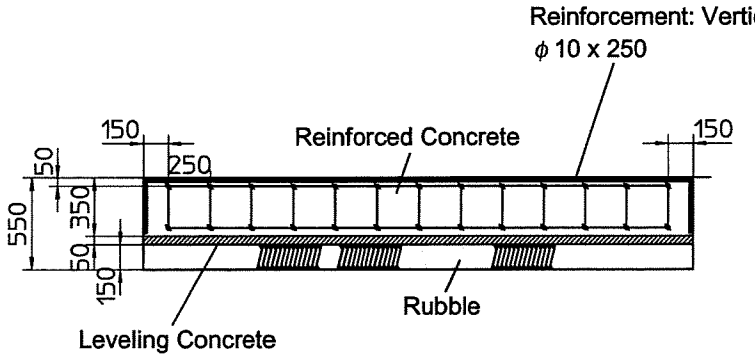
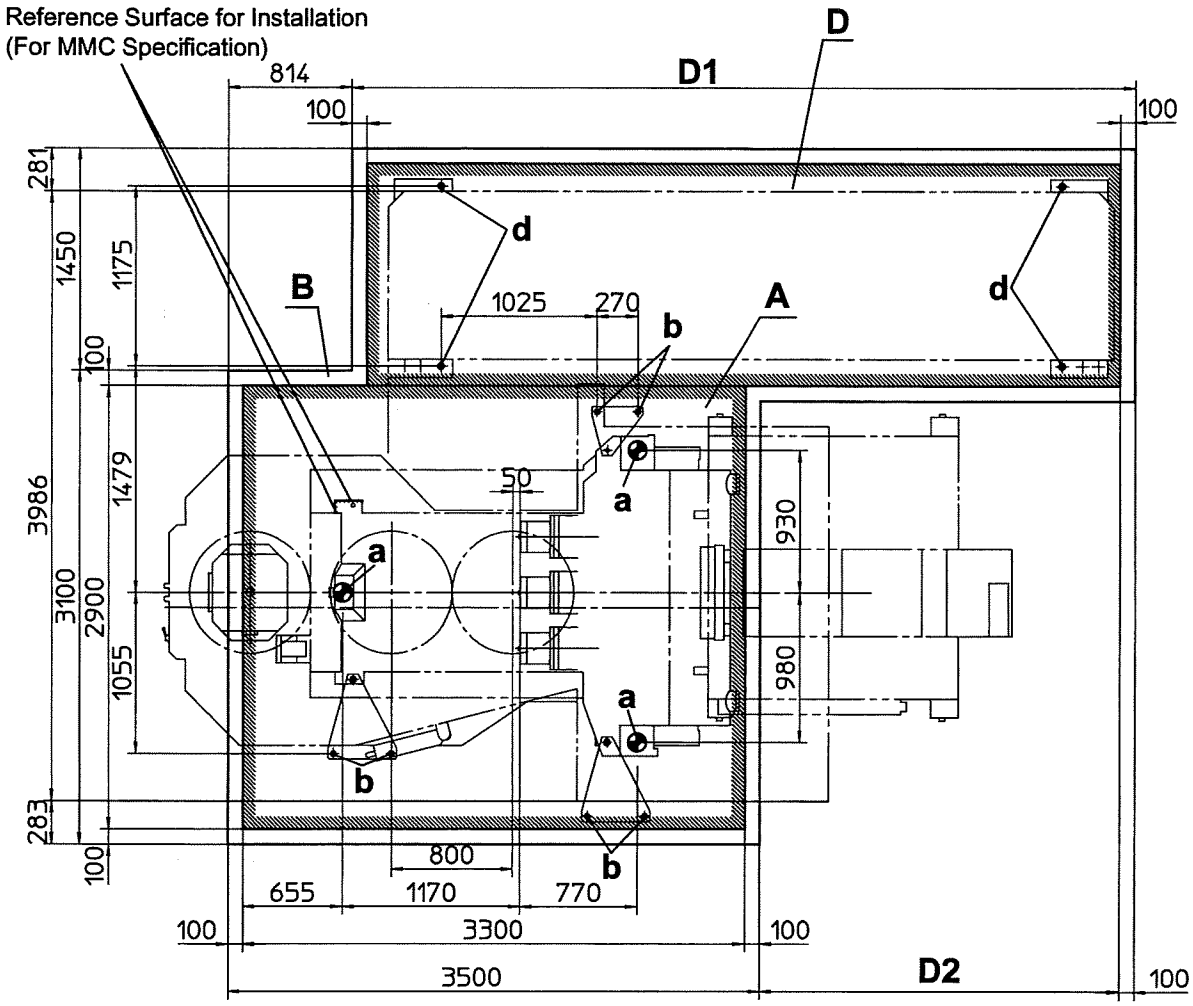


Figure 2.15 Foundation Drawing
(Tool Magazine A97/A137 and Left Discharge Lift-Up Conveyor Spec.)



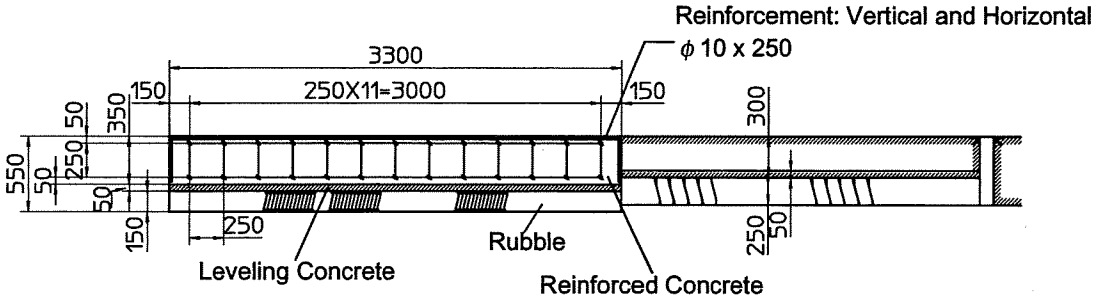


Table 2.8 Tool Magazine Foundation (unit: mm)

	D1	D2
A186	5160	2474
A242	5910	3224
A300	6619	3933

Figure 2.16 Foundation Drawing
(Tool Magazine A186/A242/A300 and Rear Discharge Lift-Up Conveyor Spec.)

3 Installation Outline

3.1 Inspection Prior to Installation

1 Inspection Prior to Installation

Confirm the following points prior to installation work:

- Inspect for any machine damage.
- Check all attachments and accessory units with the shipping and packing check list.

2 Installation Outline

The following table shows the minimum required manpower, time and the number of days for installation of the a71 machine. This work schedule may change for different installation environments and machine options.

Table 3.1 Work Schedule

Work Item	Required Manpower	Required Time (hrs/person)	Required Day (day/person)
Main Machine Installation	1	22	3
Tool Magazine A97 and A137	2	8	1
Tool Magazine A186/A242/A300	2	8	1
Spindle Cooling Oil Temperature Controller and Hydraulic Unit	1	1	1
Spindle Lubricant Oil Temperature Controller and Hydraulic Unit (For 20000 rpm Spindle Spec.)	1	1	1
Coolant Tank Installation	1	4	1
Operation Checks After Installation	1	4	1

3 Required Tools and Lifting Equipment

Table 3.2 Required Tools and Lifting Equipment

Tools To Be Prepared
Supplied Standard With Machines
Crane or Forklift

4 Precautions during Installation

WARNING

- Some installation procedures can only be preformed by moving the machine. Ensure adequate precautions are taken at all times.

A Handling of Heavy Components

a) Unassisted Lifting

Avoid lifting of heavy machine components by one person alone. Lift them with the help of two or more persons according to the circumstances. Use mechanical equipment such as a crane, electrical forklift stacker, pallet trolley, or cart chain block depending on the requirements.

b) Lifting with a Crane

The breakage of rope during the lifting of heavy components can result in the balance of heavy components being lost, and them falling. The falling of heavy components may cause irreparable damage to the components and may result in serious injury or death.

When using a crane for lifting:

- Safety helmets and shoes must be worn at all times.
- All hook and linking tasks required for crane lifting must be performed by only qualified personnel.
- Use the crane within the range of its rated capacity.
- Use specialized tools where prescribed.
- Confirm the weight of the component to be lifted. Then, considering the presumed position of the center of gravity, attach wires guaranteed to carry the weight of the component and lift slowly, keeping the weight as stable as possible.
- Clearly indicate off-limit zones and keep all unauthorized personnel from entering these areas.

c) Forklift Lifting

When using a forklift to carry heavy components there is a danger of the load falling from the forks or overturning the forklift.

When lifting by forklift:

- Safety helmets and shoes must be worn at all times.
- Forklift must always be operated by qualified personnel only.
- Use the forklift within the range of its rated capacity.
- Widen the forks as much as possible to allow the weight to be raised to be stable at as convenient a height as possible.
- Do not attempt to balance an un-balanced load with extra personnel riding on the opposite side of the forklift.
- When lifting a component by forklift, avoid its prohibited area.

B Working at Elevated Locations

Falling from high places can result in serious injury.

When performing tasks at elevated locations:

- Safety helmets and shoes must be worn at all times.
- Use stable steps or a stepladder. Do not stand on a pail, or cans or boxes stacked one on top of the other.
- Extreme care should be taken to avoid slipping on oily surfaces, etc. and ensure stable working positions when performing tasks using both hands freely.
- Use a safety rope when performing tasks on the splashguard.

C Working in Confined Spaces

When working in low or confined spaces, take care to avoid striking your head, shoulders or arms, or catching clothing on protruding machine parts. Proper work attire, safety helmets and shoes must be worn at all times.

D Working in Group

When working in combination, lack of communication when turning ON the main power or operating the machine may result in death due to accidents such as electric shock, falling, or being caught between moving parts.

Thus, before operating the machine:

- Confirm the location and tasks being performed by other personnel and give a clearly audible warning when starting to operate the machine.
- Display clearly work description warnings and signs in front of the crane operation panel, the main power switch and the main operation panel etc. so that the content of work can be understood.

4 Main Machine Installation

4.1 Main Machine Transportation and Installation

WARNING

- Keep the machine level.
- Lift no higher than necessary.
- Prevent impact with nearby objects.
- Do not remove the axis shipping jig.
- All procedures are to be performed in pairs, and clear communication maintained at all times, to ensure operator safety.

Parts To Be Prepared (Option)

a) Tool Magazine A40/A60

Name	Part No.	Q'ty
Front Rope (Operator Door Side)	28M74B2001	1
Front Rope (Tool Magazine Side)	28M74B2002	1
Rear Rope (Operator Door Side)	28M74B2003	1
Rear Rope (Tool Magazine Side)	28M74B2004	1
Beam (1)	29M74A2005=3	1
Beam (2)	20M74A201=1	1
Beam (3)	29M74B2001	1
Shackle	Z259B6400000	4
Hook	J2M322A111C	1

b) Tool Magazine A97 or Above

Name	Part No.	Q'ty
Front Rope (Operator Door Side)	28M74B2005	1
Front Rope (Tool Magazine Side)	28M74B2006	1
Rear Rope (Operator Door Side)	28M74B2007	1
Rear Rope (Tool Magazine Side)	28M74B2008	1
Beam (1)	29M74A2005=3	1
Beam (2)	20M74A201=1	1
Beam (3)	29M74B2001	1
Shackle	Z259B6400000	4
Hook	J2M322A111C	1

Parts To Be Prepared

Name	Part No.	Q'ty
Measurement: Precision Level	-	2
Part: Leveling Base (Supplied with Machine)	13M30B209	3
Part: Flat Point Set Screw (Supplied with Machine)	Z272A1112030	3
Part: Leveling Bolt (Supplied with Machine)	13M30B424	3
Part: Protective Metal (Supplied with Machine)	13M30B703=1	3

For details on the parts listed above, ☞ "4.4 Main Machine Leveling".

1 Main Machine Transportation and Installation Procedure

(☞ Figures 4.1 and 4.2)

1) Lift the assembled lifting equipment using a crane, and move it near the main machine.
2) Insert the two front ropes [2] from the two top covers [3] into the main machine.
3) Insert the two front ropes into the two covers on machining chamber to mount the ropes to the beds [4] and [5].
4) Mount the two rear ropes [1] to the machine bed at rear side.
5) Place each of the three leveling bases on each of the three machine support points [6] on the foundation.
6) Lift the machine carefully using a crane and place it on the foundation shown in Figure 4.2.
7) Confirm the height between the floor and the main machine is 30mm (☞ Figure 2.9).
8) After removing all shipping jigs, level the main machine (☞ "4.3 Parts Removal" and "4.4 Main Machine Leveling").
9) Before installing the optional units (tool magazine A97/A137/A186/A242/A300, pallet magazine or MMC), secure the main machine and ground (concrete) with the six anchor bolts (☞ "4.5 Machine Fixing Tool Installation").

This completes the main machine transportation and installation procedure.

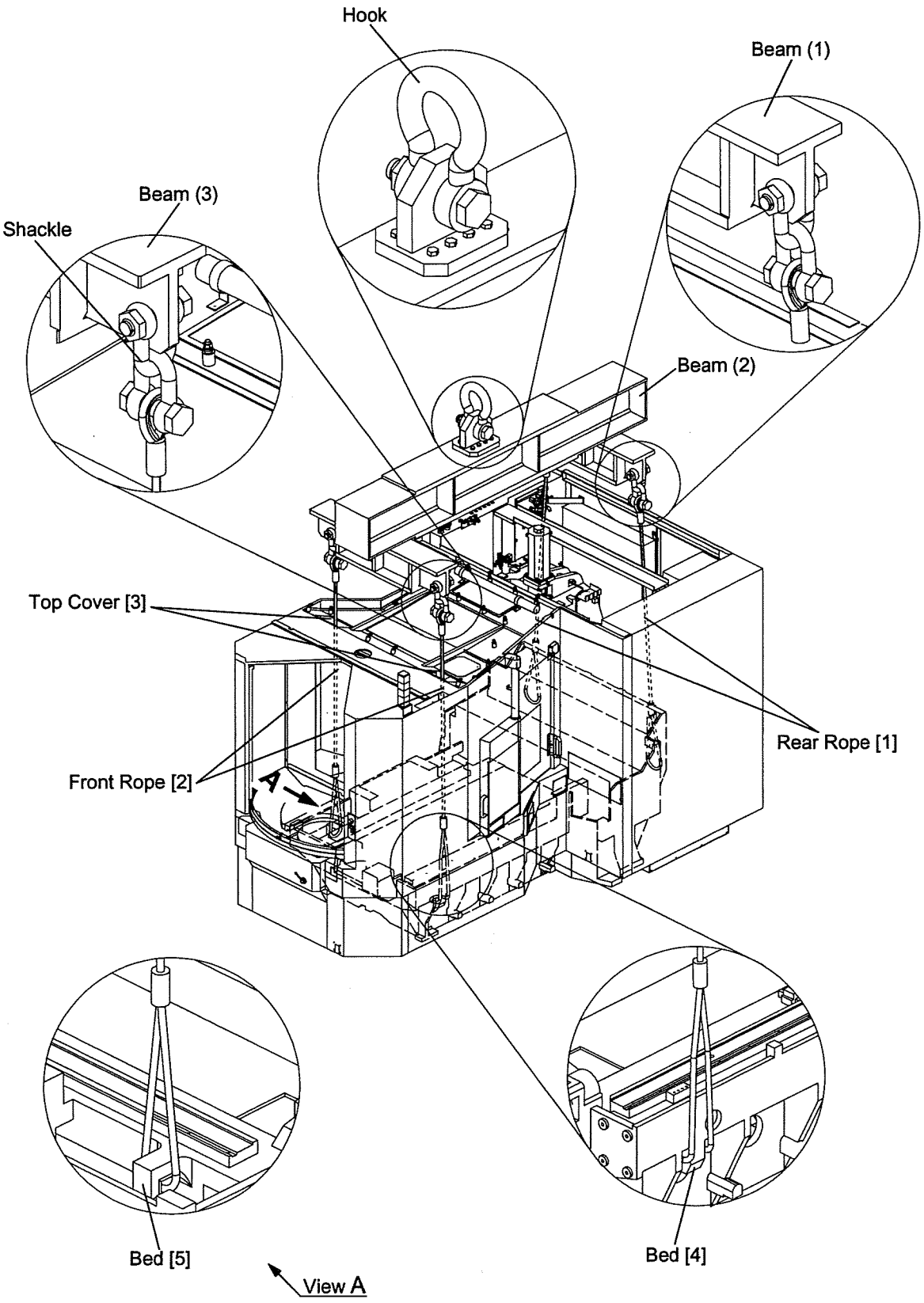


Figure 4.1 Lifting of Main Machine

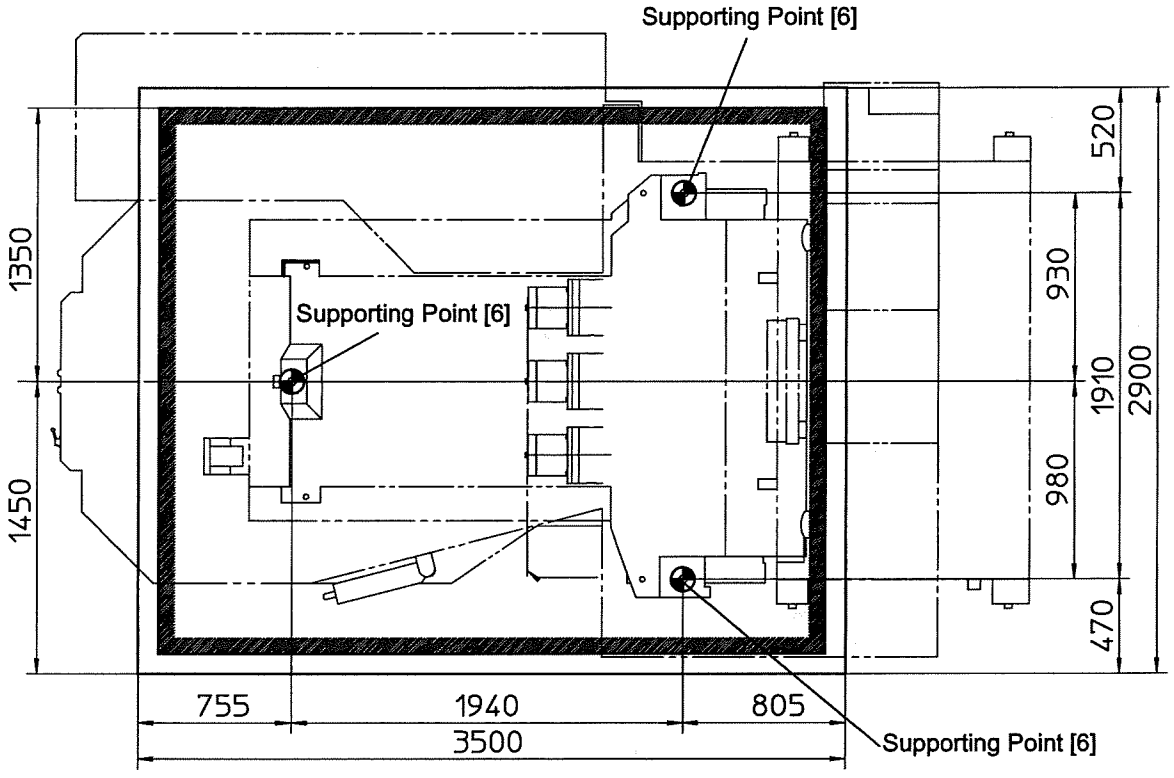


Figure 4.2 Main Machine Installation

2 Lifting Equipment Removal Procedure

(☞ Figures 4.1 and 4.3)

1) When the main machine is placed on the foundation as specified, reverse the mounting lifting equipment and main machine installation procedure in steps 1) ~ 4) to remove the lifting equipment.
2) Lift the assembled lifting equipment using a crane to put it outside of the main machine.
   - Ensure to prevent the front rope from hitting the window on the ceiling of machining chamber.
   - Ensure to prevent the rear rope from hitting the parts inside of the column room.
3) Mount the two center trough covers [8].
   - Apply silicon to the cover to avoid coolant leakage.
4) Replace the two top covers [7].

This completes the lifting equipment removal procedure.

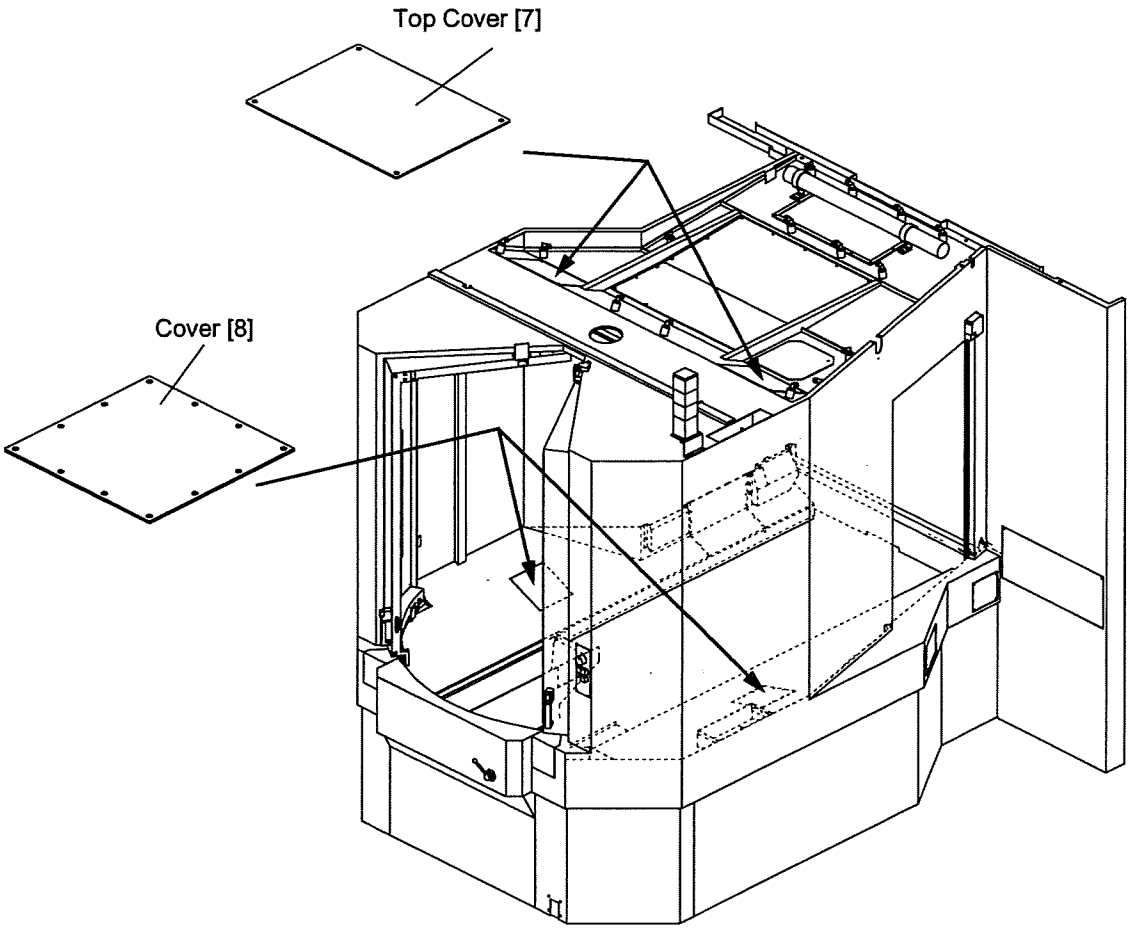


Figure 4.3 Cover Installation

4.2 Transportation of Accessory Units

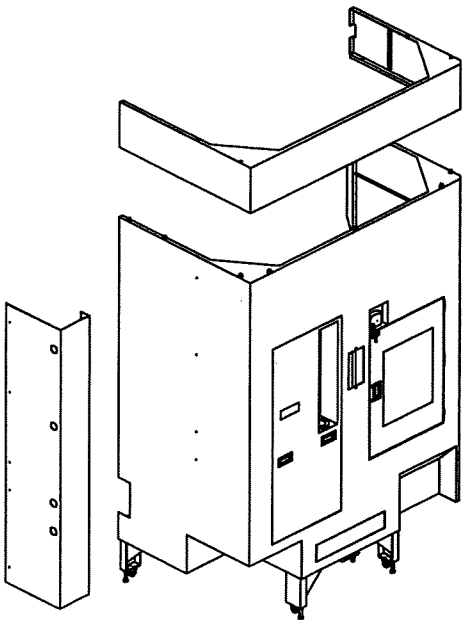
1 After completing the installation of the main machine, move the following accessory units near the machine.

- Tool Magazine Cover and Side Cover (Tool Magazine A40)
- Tool Magazine Cover and Side Cover (Tool Magazine A60)
- Oil Pan (For Tool Magazine)
- Spindle Cooling Oil Temperature Controller (Except for 20000 rpm Spindle)
- Hydraulic Unit (Except for 20000 rpm Spindle)
- Spindle Lubricant Temperature Controller and Hydraulic Unit (For 20000 rpm Spindle)
- Coolant Tank
- Tool Magazine A97/A137 (Option)
- Tool Magazine A186/A242/A300 (Option)
- Sub-Arm (For Tool Magazine A186, A242 and A300)

2 After moving all accessory units, confirm the following points.

- Inspect the machine for any damage.
- Check all attachments and accessory parts with the shipping checklist.

Tool Magazine A40 Cover



Tool Magazine A60 Cover

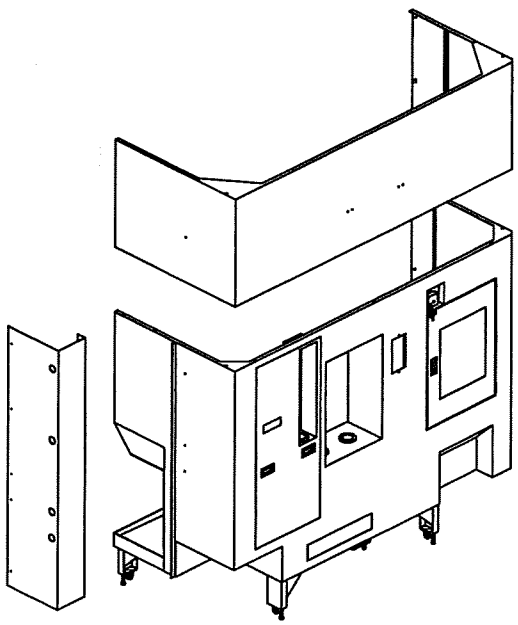
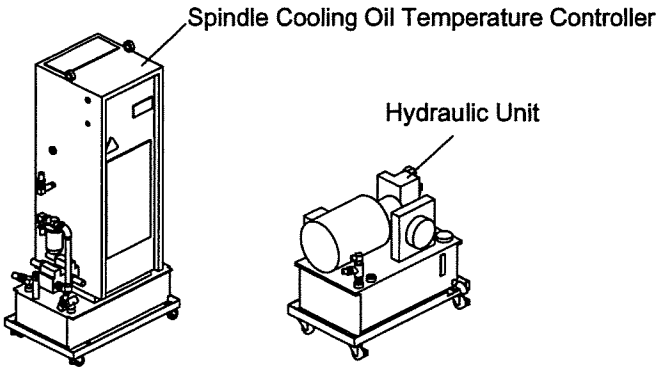
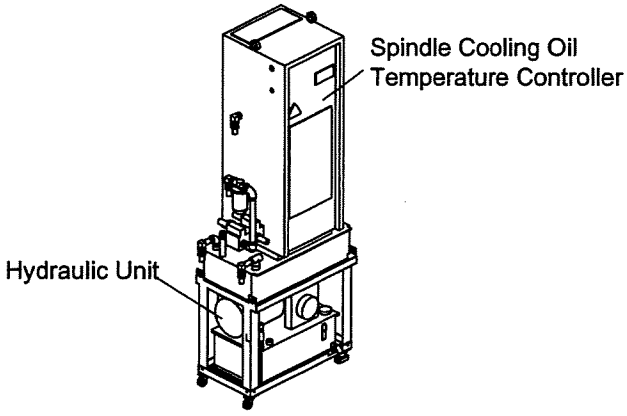


Figure 4.4 Accessory Units 1

Spindle Cooling Oil Temperature Controller and Hydraulic Unit (For Ring Magazine)



Spindle Cooling Oil Temperature Controller and Hydraulic Unit (For Matrix Magazine)



Spindle Lubricant Temperature Controller and Hydraulic Unit (For 20000rpm Spindle)

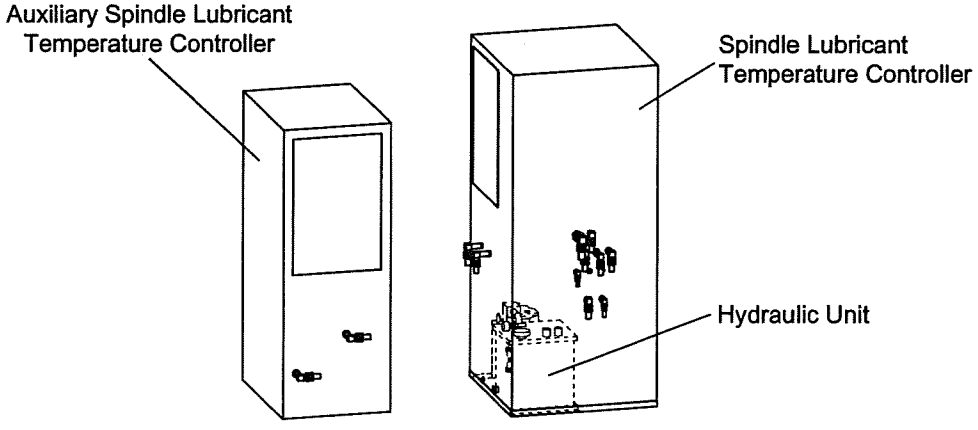
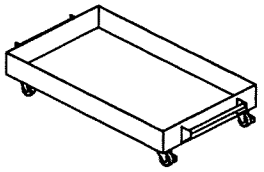
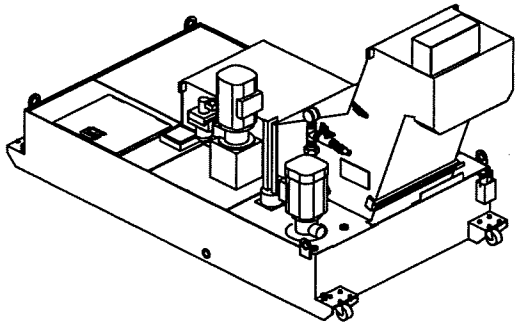


Figure 4.5 Accessory Unit 2

Oil Pan (For Tool Magazine)



Coolant Tank (Left Discharge Type Lift-Up Conveyor)



Coolant Tank (Rear Discharge Type Lift-Up Conveyor)

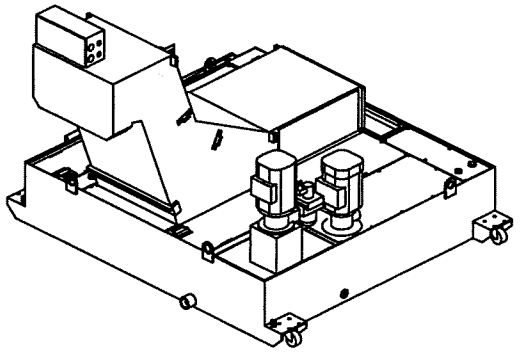
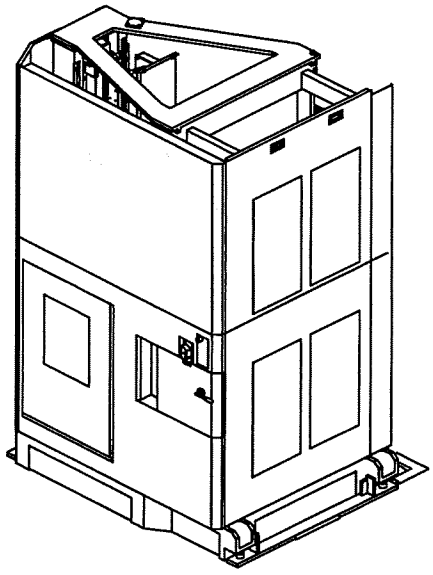
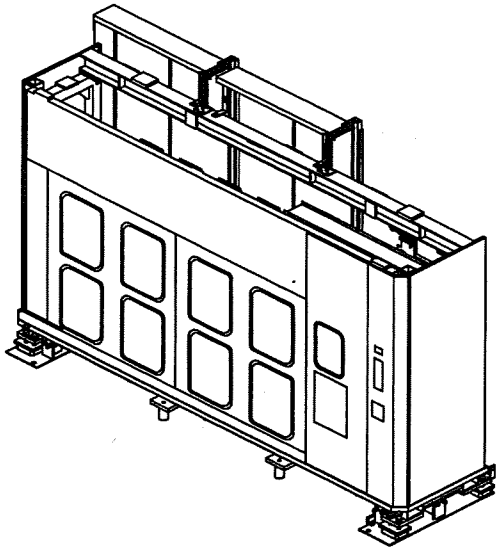


Figure 4.6 Accessory Unit 3

Tool Magazine A97/A134
(Matrix: Option)



Tool Magazine A186/A242/A300
(Matrix: Option)



Sub-Arm
(For Tool Magazine A186 or above)

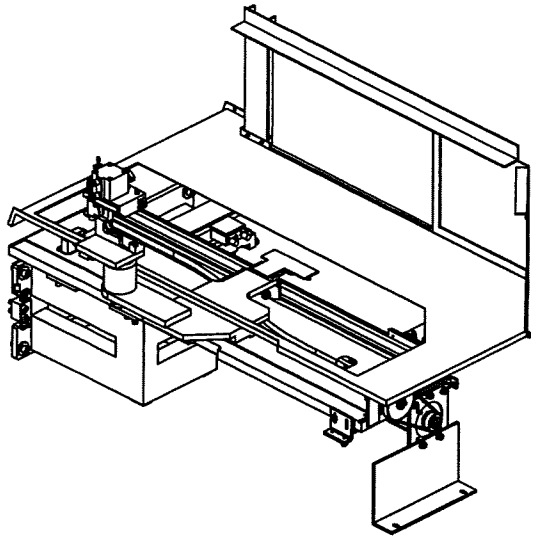


Figure 4.7 Accessory Unit 4

4.3 Parts Removal

4.3.1 Axis Shipping Jig Removal

WARNING

- Exercise extreme caution as entry into the machine area is necessary in order to perform the procedures in this section.

1 X, Y and Z-Axis Shipping Jig Removal Procedure

1) Remove the six socket head cap screws [2] to remove the X-axis shipping jig [1].
2) Remove the four socket head cap screws [4] to remove the Y-axis shipping jig [3].
3) Remove the six socket head cap screws [5] to remove the Z-axis shipping jig [6].
4) After removing all shipping jigs and when the machine axes can be moved, perform reference position return for each axis (X, Y- and Z-axis) and confirm the reference position (☞ "9 Axis Reference and 2nd Reference Position Check").

This completes the X, Y and Z-axis shipping jig removal procedure.

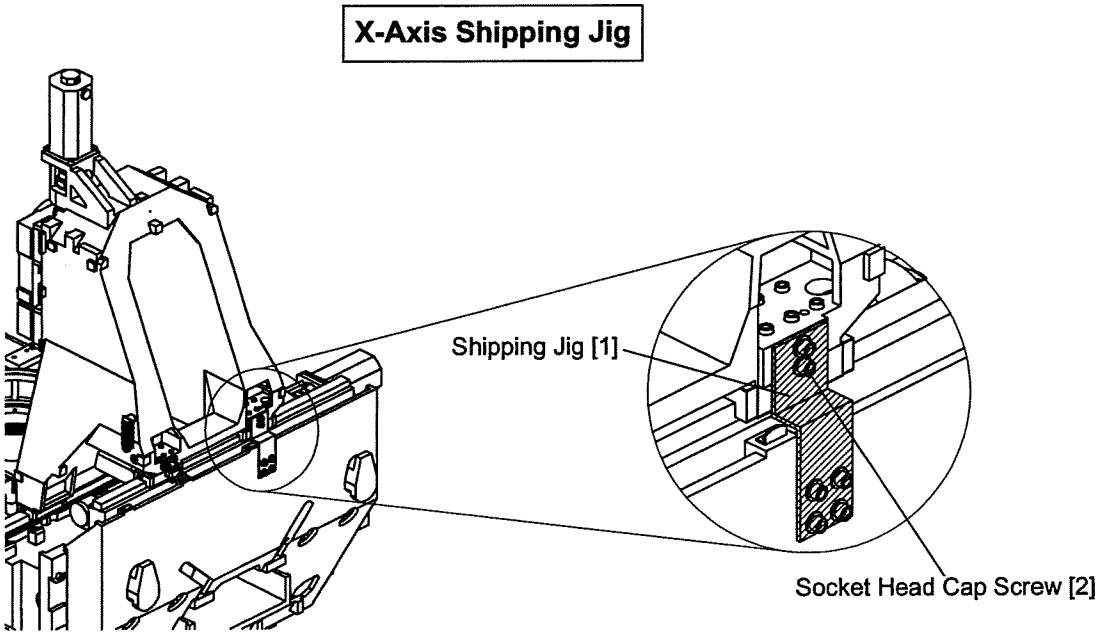


Figure 4.8 X-Axis Shipping Jig Removal