

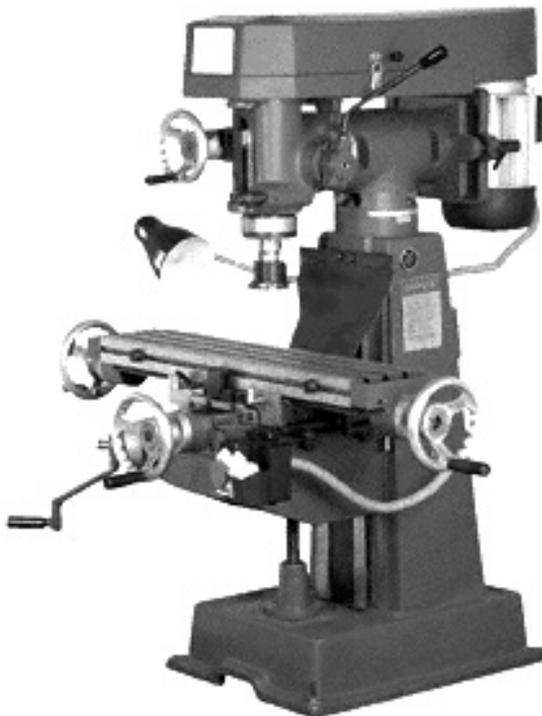
# Owner's Manual & Safety Instructions

**Save This Manual** Keep this manual for the safety warnings and precautions, assembly, operating, inspection, maintenance and cleaning procedures. Write the product's serial number in the back of the manual near the assembly diagram (or month and year of purchase if product has no number). Keep this manual and the receipt in a safe and dry place for future reference.

18e



## VERTICAL BENCH MILLING MACHINE



Visit our website at: <http://www.harborfreight.com>  
Email our technical support at: [productsupport@harborfreight.com](mailto:productsupport@harborfreight.com)

**40939**

When unpacking, make sure that the product is intact and undamaged. If any parts are missing or broken, please call 1-888-866-5797 as soon as possible.

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No portion of this manual or any artwork contained herein may be reproduced in any shape or form without the express written consent of Harbor Freight Tools. Diagrams within this manual may not be drawn proportionally. Due to continuing improvements, actual product may differ slightly from the product described herein. Tools required for assembly and service may not be included.

### **⚠WARNING**

Read this material before using this product. Failure to do so can result in serious injury.  
**SAVE THIS MANUAL.**

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## SPECIFICATIONS

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Electrical Requirements	220 VAC / 60Hz / 10 A
Table Size	6-1/2" x 26"
Long. Travel	15-1/2" Max.
Cross Travel	6" Max.
Vertical Travel	7.68" Max.
T-Slot	1/2" (3)
Spindle Travel	2-3/4"
Lead Screw	1" x 8tpi

Spindle Taper	R8
Swing	13"
Head Tilt	45° L and R
Motor	2 HP, 1720 RPM
Speeds	9 Speeds: 240, 355, 545, 735, 1342, 1425, 1650, 2350, 2885 RPM
Base Dimensions	22" x 16"

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### Features

- This model is a compact vertical milling machine. It is easy to set up. The controls are designed for operator convenience, including dual table hand wheels.
- This machine is practical for technical schools, small parts production, toolrooms, R&D work, maintenance shops, and hobby use.
- This machine is ideally suited for many operations, including conventional milling, compound angle milling, engraving, and jig boring.
- All the Ways are hand finished for perfect bearing alignment. The table is ground for accurate squareness. Castings are high strength material. They are aged for several months, before normalizing and tempering, to minimize deformation.

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## SAVE THIS MANUAL

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You will need the manual for the safety warnings and cautions, assembly instructions, operating procedures, maintenance procedures, trouble shooting, parts list, and diagram. Keep your invoice with this manual. Write the invoice number on the inside of the front cover. Keep both this manual and your invoice in a safe, dry place for future reference.

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## SAFETY WARNING & CAUTIONS

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### WARNING!

**The Warnings, Cautions, and Instructions discussed in this instruction manual cannot cover all possible conditions and situations that may occur. It must be understood by the operator that common sense and caution are factors which cannot be built into this product, but must be supplied by the operator.**

#### READ ALL INSTRUCTIONS BEFORE USING THIS TOOL!

1. KEEP WORK AREA CLEAN. Cluttered areas invite injuries.

2. **OBSERVE WORK AREA CONDITIONS.** Do not use tools in damp, wet, or poorly lit locations. Don't expose to rain. Keep work area well lit. Do not use electrically powered equipment in the presence of flammable gases or liquids.
3. **KEEP CHILDREN AWAY.** Children must never be allowed in the work area. Do not let them handle machines, tools, or equipment.
4. **STORE IDLE EQUIPMENT.** When not in use, tools must be locked up in a dry location to inhibit rust. Always lock up tools and keep out of reach of children.
5. **DO NOT FORCE THE TOOL.** It will do the job better and more safely at the rate for which it was intended. Do not use inappropriate attachments in an attempt to exceed the tool's capacities.
6. **USE THE RIGHT TOOL FOR THE JOB.** Do not use a tool for a purpose for which it was not intended.
7. **DRESS PROPERLY** Do not wear loose clothing or jewelry, as they can be caught in moving parts. Non-skid footwear is recommended. Wear restrictive hair covering to contain long hair. Always wear appropriate work clothing.
8. **USE EYE, EAR AND BREATHING PROTECTION.** Always wear ANSI approved impact safety goggles if you are producing metal filings or wood chips. Wear an ANSI approved dust mask or respirator when working around metal, wood, and chemical dusts and mists. Use ANSI approved ear protection when working in a loud or noisy environment.
9. **DO NOT ABUSE THE POWER CORD.** Protect the power cord from damage, either from impacts, pulling or corrosive materials. Do not yank machine's cord to disconnect it from the receptacle.
10. **DO NOT OVERREACH.** Keep proper footing and balance at all times. Do not reach over or across running machines.
11. **MAINTAIN TOOLS WITH CARE.** Keep tools sharp and clean for better and safer performance. Follow instructions for lubricating and changing accessories. Inspect power cord periodically and, if damaged, have it repaired by an authorized technician. Inspect all hydraulic seals for leaks prior to use. Control handle and power switch must be kept clean, dry, and free from oil and grease at all times.
12. **REMOVE ADJUSTING KEYS AND WRENCHES.** Be sure that keys and adjusting wrenches are removed from the tool or machine work surface before operation.
13. **AVOID UNINTENTIONAL STARTING.** Be sure that you are prepared to begin work before turning the start switch on.
14. **STAY ALERT.** Watch what you are doing. Do not operate this machine when you are tired.

15. DO NOT OPERATE THIS MACHINE WHILE UNDER THE INFLUENCE OF ALCOHOL, DRUGS, OR PRESCRIPTION MEDICINES.
16. CHECK FOR DAMAGED PARTS. Before using any tool, any part that appears damaged should be carefully checked to determine that it will operate properly and perform its intended function. Check for alignment and binding of moving parts, any broken parts or mounting fixtures, and any other condition that may affect proper operation. Any part that is damaged should be properly repaired or replaced by a qualified technician. Do not use the tool if any switch does not turn on and off properly.
17. REPLACEMENT PARTS AND ACCESSORIES. When servicing, use only identical replacement parts intended for use with this tool. Replacement parts are available from Harbor Freight Tools. Use of any other parts will void the warranty.
18. PEOPLE WITH PACEMAKERS should consult their physician(s) before use. Electromagnetic fields in close proximity to heart pacemaker could cause pacemaker interference or pacemaker failure.

### **Special Warnings when using this Vertical Mill**

**Using this Vertical Mill may create special hazards.**

**Take particular care to safeguard yourself and those around you.**

1. **Electrical Safety.** Never operate any tool if there is an electrical hazard. Never operate an electrical tool in wet conditions. Never operate a tool with an improper electrical cord or extension cord. Never operate an electrical tool unless you are plugged into a properly grounded outlet, which supplies 220 Volts at 60 Hz. We recommend you use a circuit which is protected by an appropriate circuit breaker.
2. **Ejected Material.** Use safe practices to avoid injury from ejected material. Because the Milling tools and workpieces turn at high speed, there is a danger of being injured by materials that may be ejected. Always wear ANSI-certified eye protection. Never attempt to machine any if it is not adequately held. Always stand to one side of the plane in which the materials are spinning, to avoid being hit if an is ejected. Never allow bystanders to be in the proximity of the Vertical Mill while in operation.
3. **Entanglement.** Use extreme caution to prevent loose materials from being caught in the machine. Never operate this mill with loose clothing, long hair, jewelry, or other items which may become caught in the tools or workpieces. In case of entanglement, press the OFF switch immediately.

**NOTICE:** No list of warnings can be all inclusive. The operator must supply common sense, and operate this tool in a safe manner.

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## **UNPACKING**

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When unpacking, check to make sure that the is intact and undamaged. If any parts are missing or broken, please call Harbor Freight Tools at the number shown on the cover of this manual as soon as possible.

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## **INSTALLATION**

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1. It is important that the machine be located on a hard, solid, level floor. Find a location that supplies easy access to 220 Volt electrical service. Make sure this machine is located in a well-lighted and well ventilated area. The floor should be resistant to vibration.
2. To set the machine on a solid concrete foundation, it's advisable to apply a little grout to touch up any unevenness in this concrete in order to get a solid foundation at all points.
3. When setting machine on a floor that has any surface irregularities, shims should be used to correct this condition to the greatest extent possible.

### **PRE-LUBRICATION**

1. Thoroughly clean the machine with an appropriate solvent. Do not use gasoline, kerosene or other flammable liquids.
2. Lubricate all the slide ways with S.A.E. #10 and gears with S.A.E. #30 lubricant. Be sure the machine is lubricated properly before starting.

### **LEVELING THIS MACHINE**

Before operation, it is critical to level the work table both lengthwise and crosswise, using a precision level. It will not be possible to maintain accuracy of machined parts if the mill is not properly leveled to start.

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## ELECTRICAL WIRING

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**NOTE:** This machine is designed to operate on 220 Volt / 60 Hz / Single Phase power supply only. This machine is not supplied with a plug. This is because the correct plug will vary depending on the local service.

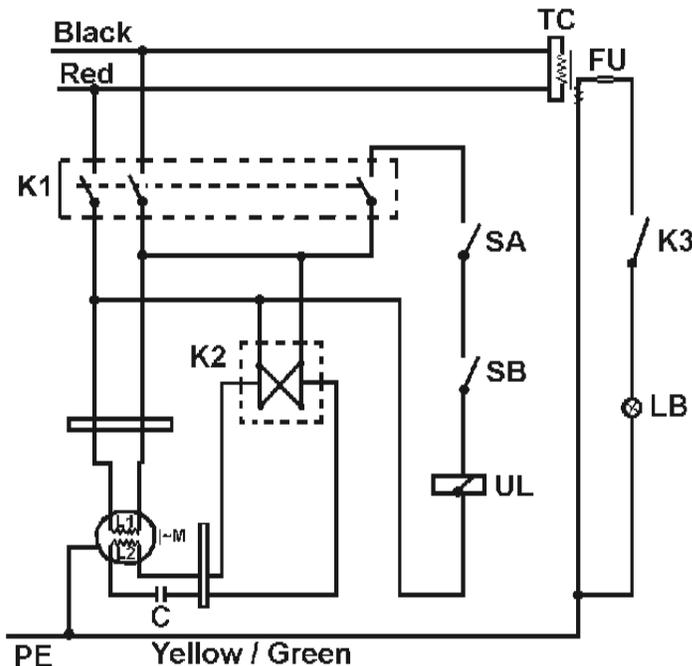
1. The power supply cable enters the Base Column (#74) on the right side. Electrical connections are made within the Terminal Box (#141). This can be accessed by removing the Back Plate (#134).

**WARNING:** Do not attempt to wire this machine yourself. Contact a qualified electrician to install the correct plug, and test your power supply to assure that this machine can be operated safely.

2. The Switch Box (#115) is located on the left side of the column. This box provides an On/Off switch for machine operation. An Accessory Light (#117) is provided on the left side of the machine.

**NOTICE:** 220 Volt systems deliver highly energetic electricity which is capable of causing lethal injury. Do not operate this machine without first obtaining professional installation and safety inspection to prevent operator injury.

### Wiring Diagram



#### WIRING DIAGRAM KEY

- K1: Electric Power Switch
- K2: Spindle Rotation Switch
- K3: Light Switch
- SA, SB: Safety Switches
- UL: Switch Coil
- L1, L2: Motor
- C: Capacitor
- TC: Transformer
- FU: Fuse
- LB: Light Bulb

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## **VERTICAL MILLING MACHINE ADJUSTMENTS OF TABLE FEED TRAVEL**

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### **ADJUSTMENTS OF TABLE FEED TRAVEL**

Table longitudinal and cross feed can be set for any travel distance by adjusting the stop set screws that are located in front of table and at the right side of knee.

### **ADJUSTMENT OF TABLE GIB:**

The table is provided with a full length tapered gib in the saddle with an adjusting screw on each end. To adjust the gib tighten the two screws until a slight drag is felt when moving the table by hand. If the table is not tight enough, loosen the adjusting screw on the small end, and tighten up adjusting screw on the big end. If the feel is too tight, reverse the adjusting procedures.

### **ADJUSTMENT OF SADDLE AND KNEE GIBS:**

To adjust the saddle and knee gibs, use the same method as described above is used.

### **CLAMPING TABLE, SADDLE AND KNEE:**

When milling with longitudinal table feed only, it is advisable to clamp the knee with the column and the saddle with the knee to add rigidity to these members and provide for heavier cuts with a minimum of vibration. The saddle locking lever is located on the left side of the saddle. Apply moderate clamping pressure, as this will hold the saddle sufficiently rigid. The table clamping levers are located in front of saddle and should always be clamped when longitudinal movement is not required. The knee clamping lever is at the left side of knee. Leave this clamped at all times unless the knee is in operation.

### **REMOVING THE TABLE:**

Remove the table as follows: hand wheel, dial holder, then bearing bracket. Turn the lead screw all the way, so that it can be removed. After completing all these steps, the table can be disassembled easily.

### **REMOVING SADDLE:**

Remove as follows: hand wheel, dial holder, then bearing bracket. Turn the leadscrew all the way, loosen set screw on the middle of the saddle, take off the lead screw nut, and draw the saddle gib out. The saddle can then be removed.

## **MOUNTING MOTOR AND SHIFTING BELTS FOR VARIABLE SPEEDS:**

The motor is mounted on a plate hinged to the pulley housing. Release the belt set unit by turning the handle at the side of the motor. Then shift the belts to the proper speed as desired. Then tighten the belt set unit. A speed change chart is attached inside the pulley cover.

## **QUILL LOCK AND VERTICAL FEED:**

The handle at the right lower corner of the head is the quill lock. When vertical feed is not in use, set the handle to lock the quill and make the head more stable. The micrometer depth stop is graduated in inches. By utilizing these simple graduations, it is possible to work very accurately to different depths. A lock nut under the micrometer nut assures that the micrometer nut is secured properly.

## **QUILL CLUTCH OF VERTICAL MILLING HEAD:**

The vertical feed is controlled by a hand wheel at the front of the head and a handle at the right side of the head. When the hand wheel is in use, tighten the clutch lock nut by hand, or loosen it for handle operation. Use the hand wheel for fine feeds, or the handle for fast feeds.

## **VERTICAL HEAD AND TEE ADAPTER:**

The vertical milling head can be tilted 90° on each side by loosening the four locking bolts on the TEE adapter. By loosening the two set bolts on the adapter, the vertical milling head can then be swivelled 120°; tighten the set bolts after swiveling. The motor and milling head must tilt together since the motor and head are suspended on the same pulley housing.

## PLEASE READ THE FOLLOWING CAREFULLY

THE MANUFACTURER AND/OR DISTRIBUTOR HAS PROVIDED THE PARTS LIST AND ASSEMBLY DIAGRAM IN THIS MANUAL AS A REFERENCE TOOL ONLY. NEITHER THE MANUFACTURER OR DISTRIBUTOR MAKES ANY REPRESENTATION OR WARRANTY OF ANY KIND TO THE BUYER THAT HE OR SHE IS QUALIFIED TO MAKE ANY REPAIRS TO THE PRODUCT, OR THAT HE OR SHE IS QUALIFIED TO REPLACE ANY PARTS OF THE PRODUCT. IN FACT, THE MANUFACTURER AND/OR DISTRIBUTOR EXPRESSLY STATES THAT ALL REPAIRS AND PARTS REPLACEMENTS SHOULD BE UNDERTAKEN BY CERTIFIED AND LICENSED TECHNICIANS, AND NOT BY THE BUYER. THE BUYER ASSUMES ALL RISK AND LIABILITY ARISING OUT OF HIS OR HER REPAIRS TO THE ORIGINAL PRODUCT OR REPLACEMENT PARTS THERETO, OR ARISING OUT OF HIS OR HER INSTALLATION OF REPLACEMENT PARTS THERETO.

### **PARTS LIST**

Part	Ref. #	Description
1	IYT-1001	Vertical milling head
2	IYT-1095	Belt housing cover
3	IYT-1005	Quill
4	IYT-1010	S-45-Snap ring
5	IYZ-1007	Spring washer
6	IYT-1002	Vertical spindle
7	IYT-	Cover
8	IYT-1008	Bearing adjusting nut
9	IYT-1009	Spindle sleeve
10	IYT-1016	Pulley locking nut
11	IYT-1018	Spindle pulley
12	IYT-1019	Quill pinion shaft
13	IYT-1047	M5x10 Screw
14	IYT-1036	Clutch worm gear
15	IYT-1039	Clutch
16	IYT-1040	Clutch adjusting nut
17	IYT-1046	Clutch cover
18	IYT-1021	Pinion shaft seat
19	IYT-1032	Ball handles
20	IYT-1028	Hand bar holder seat
21	IYT-1030	Handle bar
22	IYT-1051	Worm shaft
23	IYT-1053	Worm shaft sleeve
24	IYT-1055	Nut for bearing
25	IYT-1056	Dial
26	IYT-1060	Dial positioning screw
27	IYT-1057	Hand wheel
28	IYT-1061	Handle
29	IYT-1048	Quill locking block
30	IYT-1049	Quill locking bolt
31	IYT-1042	Quill stop micro screw
32	IYT-1044	Micrometer nut
33	IYT-1045	Quill micro stop nut
34	IYT-1041	Quill stopper
35	IYT-	8Mx20 Screw
36	IYT	Bolt washer
37	IYT-1014	Draw bar

Part	Ref. #	Description
38	IYT-	e5x15 Rivet
39	IYT-	M5x10 Screw
40	IYT-1089	Pulley cover supporting arm
41	IYT-	M5 Nut
42	IYT-1016	Washer for bearing
43	IYT-1003	7207-Bearing
44	IYT-1003	6007ZZ-Bearing
45	IYT-1006	6206Z-Bearing
46	IYT-1082	Bearing cover
47	IYT-1012	R-75-Snap ring
48	IYT-1011	6009Z-Bearing
49	IYT-1052	Thrust bearing
50	IYT-1037	Spring
51	IYT-1020	Spring
52	IYT-	E-19 Snap ring
53	IYT-1038	M6x15-Bolt
54	IYT-1076	Swivel arm
55	IYT-1075	Swivel stud
56	IYT	R-35 Snap ring
57	IYT-1079	Pulley pivot stud
58	IYT-1080	V-belt pulley
59	IYT-1084	Motor pulley
60	IYT-1067	Motor mounting
61	IYT-1068	Motor suspending pivot
62	IYT-1070	Motor mounting
63	IYT-1072	Motor Set Unit handle
64	IYT-1071	Belt set unit
65	IYT-1071	Belt set unit
66	IYT-1064	Vertical Head Adaptor
67	IYT-1067	10Mx35 Screw
68	IYT-	10M Bolt washer
69	IYT-1102	A35-Vee belt
70	IYT-	10M Nut
71	IYT-1081	6003Z-Bearing
72	IYT-1101	A32-Vee belt
73	IYT-1073	1HP, 4 pole-Motor
74	IYT-2006	Column

## PARTS LIST (CONTINUED)

Part	Ref. #	Description
75	IYT-1073	Table
76	IYT-2062	Table gib
77	IYT-2059	Adjusting screw
78	IYT-2082	Longitudinal bearing bracket
79	IYT-2079	Longitudinal lead screw
80	IYT-2084	Nut for bearing
81	IYT-2080	Longitudinal feed nut
82	IYT-2081	5Mx25 Screw
83	IYT-2087	Dial
84	IYT-2060	Dial positioning screw
85	IYT-2089	Hand wheel
86	IYT-2091	Handle bar
87	IYT-2103	Long travel adjusting screw
88	IYT-2104	Adjusting screw sleeve
89	IYT-2068	Table stopper
90	IYT-2060	Table locking screw
91	IYT-2060	Handle bar
92	IYT-2058	Saddle
93	IYT-2058	Saddle gib
94	IYT-2069	Rubber sheet
95	IYT-2401	Cross lead screw
96	IYT-2037	Cross feed nut
97	IYT-2042	Cross feed bearing bracket
98	IYT-2068	Stop block
99	IYT-2102	Stop block fixture
100	IYT-2103	Cross travel adjusting screw
101	IYT-2104	Adjusting screw sleeve
102	IYT-2015	Knee
103	IYT-2016	Knee gib
104	IYT-2017	Knee locking screw
105	IYT-2019	Gear shaft sleeve
106	IYT-2026	Gear shaft
108	IYT-2029	Elevating handle clutch
109	IYT-2030	Handle arm

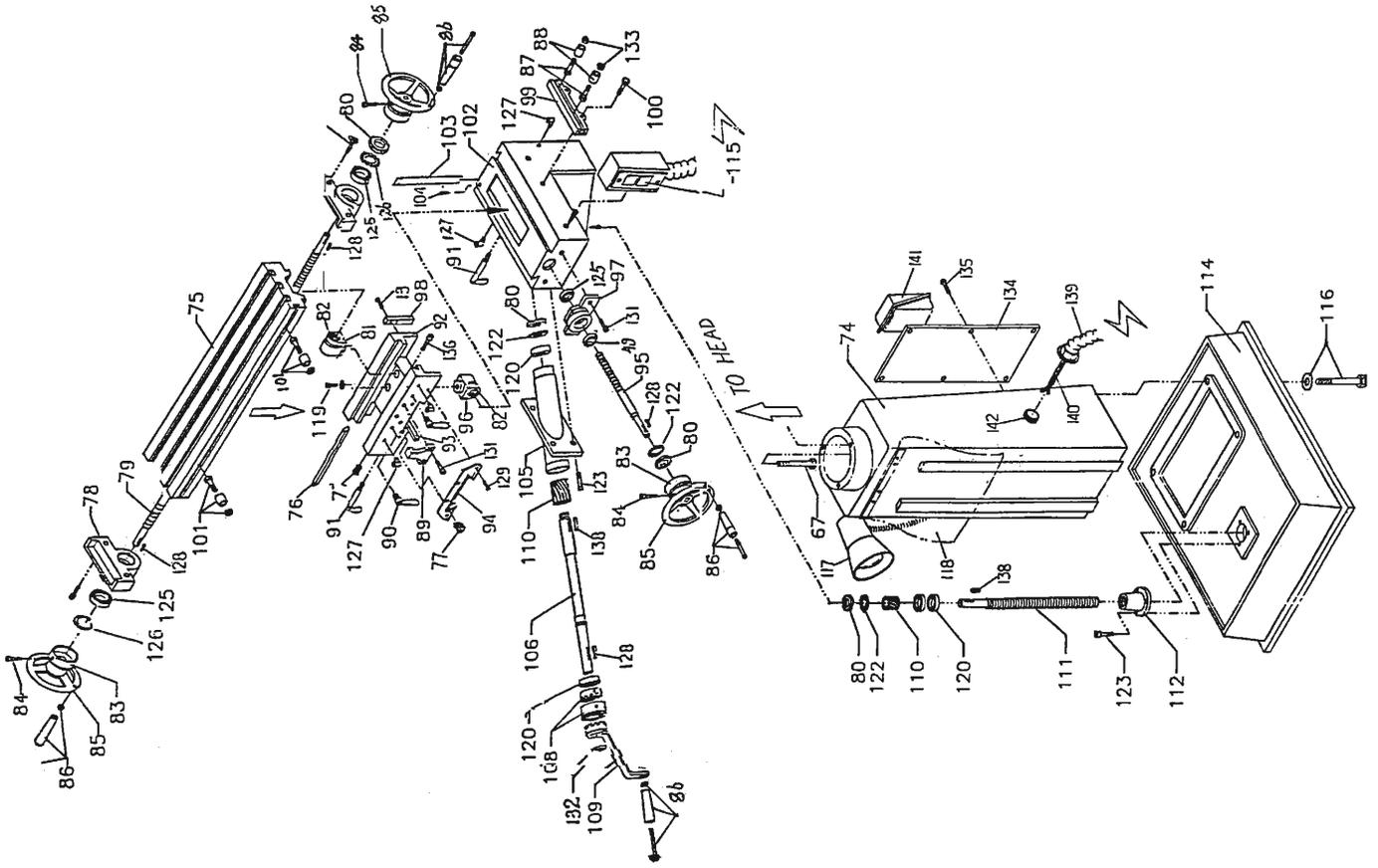
Part	Ref. #	Description
110	IYT-2012	Elevating gear
111	IYT-2009	Elevating lead screw
112	IYT-2007	Elevating lead screw set nut
113	IYT-2059	Chip guard
114	IYT-2001	Base
115	IYT-2089	Switch
116	IYT-2002	1/4"x2" Bolt
117	IYT-2097	Light
118	IYT-2069	Rubber sheet
119	IYT-119	6Mx25 Bolt
120	IYT-2010	6004Z-Bearing
121	IYT-121	6x15 key
122	IYT-2024	Washer
123	IYT-2008	6Mx15 Bolt
124	IYT-124	6Mx35 Bolt
125	IYT-2084	6004Z-Bearing
126	IYT-126	S-18 Snap ring
127	IYT-2018	Oil cup
128	IYT-128	5x5x20 Key
129	IYT-129	M5x10 Bolt
130	IYT-130	6Mx45 Bolt
131	IYT-131	6Mx15 Bolt
132	IYT-132	S-18 Snap ring
133	IYT-133	10M Bolt
134	IYT-134	Back Plate
135	IYT-135	M6x8 Bolt
136		8Mx25 Bolt
137		AW09 Washer
138		7x7x2C Key
139	IYT-139	Iron sheet soft pipe
140	IYT-140	Cable
141	IYT-141	Terminal
142	IYT-142	Pipe head

**Record Product's Serial Number Here:** \_\_\_\_\_

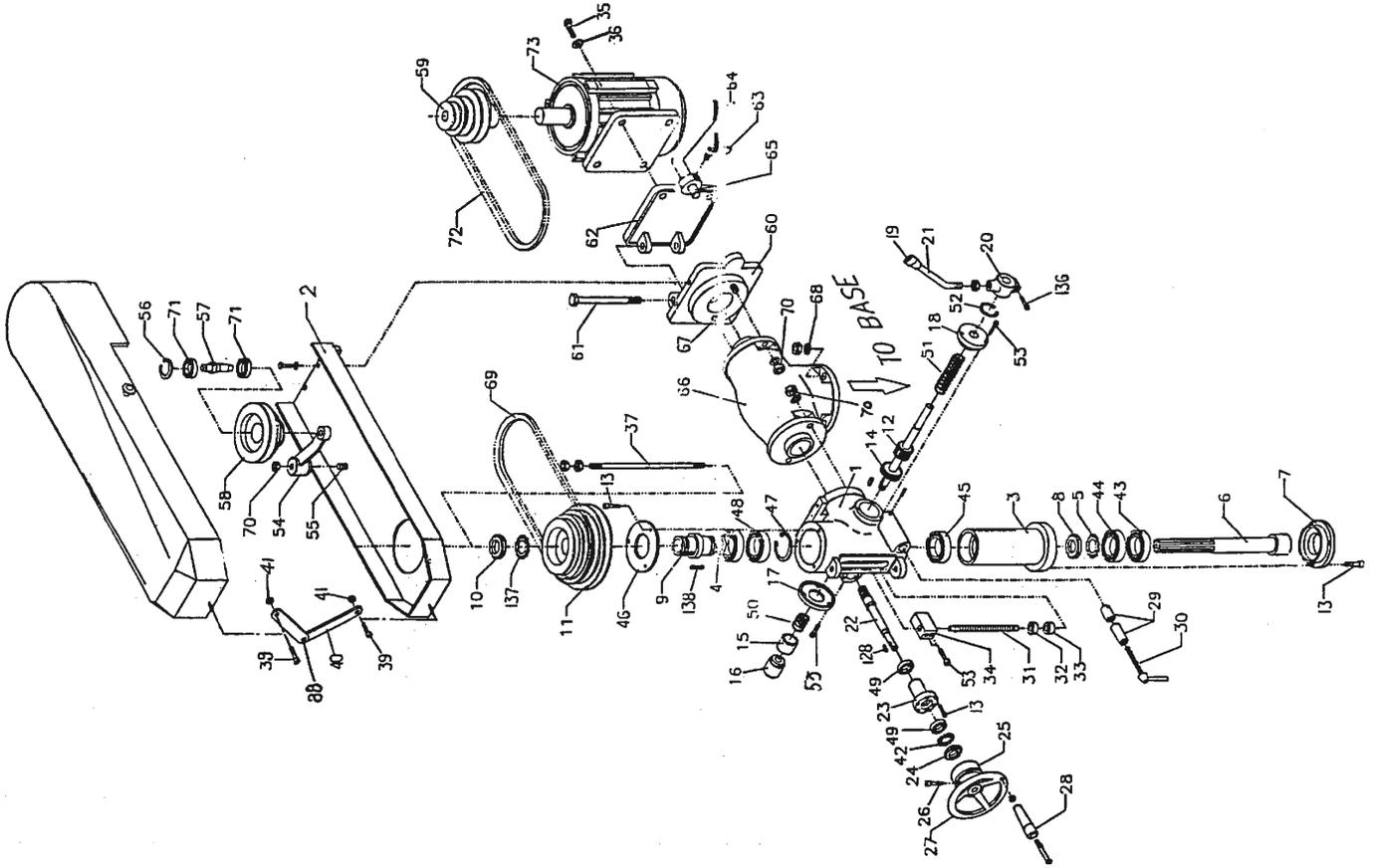
**Note:** If product has no serial number, record month and year of purchase instead.

**Note:** Some parts are listed and shown for illustration purposes only, and are not available individually as replacement parts.

**BASE ASSEMBLY DIAGRAM**



**HEAD ASSEMBLY DIAGRAM**



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## LIMITED 90 DAY WARRANTY

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Harbor Freight Tools Co. makes every effort to assure that its products meet high quality and durability standards, and warrants to the original purchaser that this product is free from defects in materials and workmanship for the period of 90 days from the date of purchase. This warranty does not apply to damage due directly or indirectly, to misuse, abuse, negligence or accidents, repairs or alterations outside our facilities, criminal activity, improper installation, normal wear and tear, or to lack of maintenance. We shall in no event be liable for death, injuries to persons or property, or for incidental, contingent, special or consequential damages arising from the use of our product. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation of exclusion may not apply to you. THIS WARRANTY IS EXPRESSLY IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS.

To take advantage of this warranty, the product or part must be returned to us with transportation charges prepaid. Proof of purchase date and an explanation of the complaint must accompany the merchandise. If our inspection verifies the defect, we will either repair or replace the product at our election or we may elect to refund the purchase price if we cannot readily and quickly provide you with a replacement. We will return repaired products at our expense, but if we determine there is no defect, or that the defect resulted from causes not within the scope of our warranty, then you must bear the cost of returning the product.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

