



## MILLHOG SERIES: **WART MILLHOG**

- (includes pneumatic & electric motors)
- 90 PSI (6.2 BAR) INLET PRESSURE
- 120/230V AC FOR ELECTRIC MOTORS

DISCONNECT AIR SUPPLY BEFORE SERVICING



UNDERSTAND ALL INSTRUCTIONS BEFORE USING

Factory:  
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Agent:

# ESCO Tool Guarantee

**Guarantee:** The manufacturer guarantees its products to be free from defects in material or workmanship for a period of one year from date of shipment from its factory. Said guarantee will not apply if equipment is used in conditions of service for which it is not recommended. The manufacturer is not responsible for damage to its products through improper use, physical damage, poor operating practice, or normal wear.

If any device is found unsatisfactory under the guarantee, the buyer must notify ESCO Tool in writing and after receipt of shipping instructions, buyer must return it directly to ESCO Tool, 75 October Hill Road, Holliston, MA 01746, USA, shipping charges prepaid. Such equipment will be replaced or put in satisfactory operating condition, free of all charges except transportation. The correction of any factory defect by repair or replacement by the manufacturer shall constitute fulfillment of all obligations to the purchaser. Manufacturer's guarantee is void if unauthorized repairs are made to its products.

Manufacturer shall not be liable for consequential damage in case of failure to meet the conditions of any Guarantee or Shipping Schedule, nor will claims for labor, loss of profit, repairs, or other expenses incidental to replacement be allowed.

No other representations, guarantees or warranties, expressed or implied, are made by the manufacturer in connection with the manufacture and sale of its equipment.

## **Hold Harmless Agreement**

Customer agrees to defend, indemnify and hold ESCO Tool, its owners, agents, officers, and/or employees free and harmless from and against any and all claims, liabilities, losses, costs and out of pocket expenses (including attorney's fees) arising out of, or in connection with the ESCO Tool equipment, its use or transportation, or out of operations conducted by customer, its agents, employees, contractors, representatives, guests or invitees, including, but not limited to, active and/or passive negligence.

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## Instruction for putting into use

### Unpacking

1. Use caution when handling the tool, cutting blades are sharp.

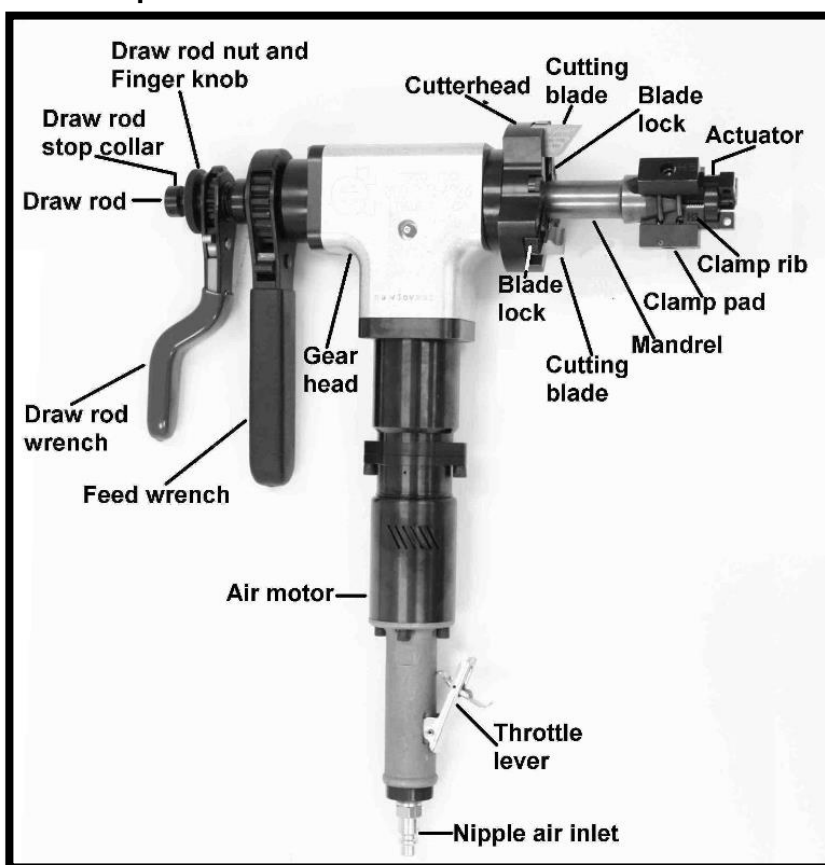
*TYPICALLY THEY ARE PROTECTED, HOWEVER, EXPOSED BLADES CAN CAUSE INJURY.*

2. Clean any excess oil, grease or rust preventive from the surface of the tool.

### Air supply

1. Recommended air pressure, 90 psi (6.2 bar).
2. Recommended air volume, 40 cfm (1133 lt/min.).
3. Clean, moisture free air is essential for trouble free operation.
4. Oil laden operating air should be used. Use a light weight air tool motor oil (s.a.e.10).
5. A hose whip with filter and lubricator is provided with each tool. Be sure air filter is clean and lubricator is full before use. For lubricator adjustment instructions see 4a.
6. For electric motors
  - a. Rated Voltage 230/120v ac
  - b. Power input 1400 w
  - c. Frequency 40-60 Hz

### Illustrated description of function



## Limitation on ambient conditions

1. In damp, moist or humid air, extra precaution must be taken in order to provide the tool with moisture free, oil laden air.
2. In temperatures below 32 degrees Fahrenheit (0 Celsius) a lubricant with antifreeze, such as Marvel Air-Tool Oil , must be used
3. Do not use the electric motor in wet or excessively humid ambient conditions

## List of contents

### Kit contains:

- Motor and gear drive
- Feed mechanism
- Draw rod and wrench assembly
- One or more clamp rib sets
- One or more clamp pad set
- One or more cutterheads
- Hose, 1/2" with filter, lubricator and quick connect couplers
- Allen wrench set
- Carrying case

## Safety precautions

### Precautions and use of personal protective equipment, eye protection

1. Power tools are not insulated for coming into contact with electric power sources.
2. Tool must not be used in an explosive atmosphere.
3. Do not use tool in a manner other than stated. Use other than stated in the instructions is forbidden.
4. For air powered tools, use valved, quick connect couplers to avoid an unrestrained compressed air hose after disconnecting.
5. Use care regarding the drawing in or trapping long hair, loose clothing, etc.
6. Cover all exposed skin before operating. Cutting blades are sharp and produce hot chips. Both can cause injury.
7. Do not connect power source until tool is securely fastened to the inside diameter of a pipe or tube.
8. Use caution when handling, disconnect power source before removing from work, changing blades, performing maintenance or breaking down.
9. Personal protective garments should include but not be limited to.
  - a. Safety glasses
  - b. Work gloves
  - c. Work boots, or shoes
  - d. Protective clothing
  - e. Hearing protection when operator is exposed to long periods of use.
10. Have all nearby persons wear safety glasses with side shields.
  - a. Chips can be hot and sharp. Be careful when clearing from tool.
  - b. Moving and stationary parts can pinch or cause serious injury. Pay extra attention to rotating cutting blades as they can not be adequately guarded.
  - c. During use, machinery may separate, lurch or fall.

## Explanation of symbols



Caution (refer to accompanying documents).



Safety glasses must be worn.



Protective gloves, cutting blades and chips can be hot and sharp.



Work boots, or shoes.



Protective clothing.



Hearing protection.



Pinch points.

## Disclaimer

1. If the equipment is used in a manner not specified by ESCO Tool, the protection provided by the equipment may be impaired.

## Operating ergonomics

1. Tool must be mounted at a reasonable working height.
2. Tool may be used in any orientation.
3. Operator must be in a position not to be injured as the machinery may separate, lurch or fall. Operator must have both feet on a stable platform. Reaching or leaning is not acceptable operating ergonomics.

## Operating instructions

### Identification of operating controls and their use

#### *Feed wrench*

- Axially moves gear head on mandrel.

#### *Draw rod nut*

- Activates draw rod and actuator.

#### *Draw rod*

- Connects the actuator and draw rod nut.
- Turning draw rod nut clockwise pulls actuator towards mandrel and expands clamp ribs and pads.
- Turning draw rod nut counter-clockwise pushes actuator away from mandrel and relaxes clamp ribs and pads.

#### *Draw rod stop collar*

- Prevents draw rod, actuator and clamp rib and pads from becoming separated from mandrel.

#### *Draw rod nut and finger knob*

- In tight areas turning when the draw rod wrench doesn't actuate the draw rod the nut and finger knob when turned clockwise pulls the actuator towards mandrel and expands clamp ribs and pads.

#### *Cutterhead*

- Rotates and holds the tool post.

#### *Tool post*

- Locates cutting blade.

#### *Cutting blade*

- Purpose: to machine end preparations on tube or pipe.
- Consumable item, available in many sizes and configurations.

#### *Blade lock*

- Secures the cutting blade to tool post.

#### *Actuator*

- Holds and aligns the clamp ribs and pads with mandrel.

#### *Clamp ribs / pads*

- Secures tool to tube or pipe inside diameter.
- Come in sets of three.
- Available in many sizes, see accompanying clamp rib chart.

#### *Mandrel*

- Provides torque acceptance for entire tool.
- Allows axial movement of tool.
- Provides point of rotation for cutterhead.

#### *Throttle lever*

- Activates the cutterhead.
- Requires deliberate action by the operator. to Activate the cutterhead.
- Actuating lever starts tool.
- Release of lever stops tool.

#### *Nipple air inlet*

- Accepts valved quick connect coupler for connecting air supply.
- Always disconnect air supply before installing, changing or securing blades, adjusting, moving, or breaking down.

#### *Air motor*

- Provides power to gear head.

#### *Gear head*

- Rotates cutterhead.
- Axially moves on mandrel.

### Selection of proper tooling

#### Clamp rib selection

1. Measure inside diameter of tube or pipe. Or using the outside diameter and minimum wall thickness, calculate the inside diameter.
2. Using the inside diameter and the accompanying clamp rib chart select the proper clamp rib / pad set(s).
3. Please note clamp pads attach to clamp ribs. Clamp ribs can be used without clamp pads.

#### Cutterhead selection

1. Measure the outside diameter of the tube or pipe.
2. Select a cutterhead that either matches the outside diameter or is at least one size larger than the outside diameter.
3. Sizes are: 2-5/8", 3", 3-1/2", 4", 4-1/2".
4. Larger cutterheads may be used, subject to mechanical restrictions.

### **Cutting blade selection**

1. Measure the wall thickness of the tube or pipe.
2. Select a blade that is wider than the wall thickness.
3. Standard sizes are: 1/2", 3/4" and 1". Consult factory for other widths.
4. Cutting blade configuration should be matched to your welding specification.
5. Consult factory for special applications such as: counter boring, seal weld removal, "J" preps, etc.

### **Installation of proper tooling**

#### **Clamp rib installation.**

1. Remove stop collar (H-56A), draw rod wrench (H-54) and pull draw rod assembly from mandrel (H-21).
2. Slide clamp ribs over the draw rod (H-51) with the slotted end of the clamp rib towards the actuator.
3. Insert the clamp rib slots into the slots on the actuator.
4. Inspect springs, replace if stretched or damaged.
5. There are two sets of clamp springs per set of clamp ribs.
6. Reassemble, insert draw rod assembly into mandrel and install the draw rod wrench and stop collar.

#### **Cutterhead removal and installation**

1. Remove stop collar (H-56A), draw rod wrench (H-54) and feed stop (H-57A). Pull draw rod assembly from mandrel (H-21).
2. Using feed wrench, feed mandrel out of tool.
3. Remove (3) cutterhead mounting screws (H-16).
4. Using a soft hammer, tap cutterhead to remove from bearing (H-18).
5. Select the cutterhead you want to install and align cutterhead mounting screw holes up with the drive shaft (H-19).
6. Using the cutterhead mounting screws, evenly tighten. Be sure that the cutterhead seats evenly on the bearing.
7. Reinstall the mandrel, align key way with key (H-25) in the torque acceptor (H-38).
8. Insert draw rod assembly into mandrel and install the feed stop, draw rod wrench and stop collar.

#### **Cutting blade removal and installation**

1. Loosen blade lock screw(s) (H-22), do not remove. If more than one blade lock screw has to be loosened they should be loosened evenly.
2. Cutting blade must be slid to the outside of the cutterhead for removal.
3. Insert new cutting blade from the outside of the cutterhead and align so that the blade fully covers the tube or pipe wall.
4. Be sure to tighten *all* blade lock screws.

### **Mounting the tool to the work**

1. Using the feed wrench extend the mandrel all the way forward (this moves clamp ribs away from cutterhead).
2. Retract the the mandrel two turns of the feed wrench.
3. Insert the clamp rib portion of the tool into the end of tube or pipe.
4. While positioning the cutting blade away, at least 1/4" from the work, tighten the draw rod nut.
5. Be sure cutterhead can rotate freely, without coming into contact with the tube or pipe, when first starting tool.



## Power connection

1. Use the hose supplied with the tool.
2. This hose has a valved quick connect coupler which will hold back all air that is in the supply hose.
  - a. This feature allows the air supply to be safely removed from the tool at any time.
3. Connect the air supply.
4. For electric tools, be sure to connect the tool to a properly grounded outlet and if using an extension cord, be sure that the extension cord is properly sized for the application. Failure to properly size an extension cord can result in personal injury and/or harm to the electric motor

## Operation of tool

1. Engage the throttle lever (or switch) this will activate the tool.
2. Using the feed wrench advance the cutting blade towards the work.
3. Use a steady constant feed creating a continuous chip.
  - a. Using a constant feed allows the heat generated by the cutting action to be removed by the chip. Heat build up is a primary failure mode for cutting tools.
  - b. Engaging a rotating cutting blade with the work surface without feed (rubbing), creates excessive heat build up.
4. When the desired end prep is accomplished, quickly reverse the feed wrench by reversing the directional pawl, and retract the cutting blade from the work.
5. Release the throttle lever (or switch) this will stop the tool.
6. Disconnect the air supply.
7. Release the clamp wrench and remove the tool from the work.

## Tool limits

### Size limits

1. Minimum inside diameter is 1-1/4" with standard mandrel.
  - a. Minimum inside diameter is 3/4" with optional mandrel.
2. Maximum outside diameter is 4-1/2".
3. Maximum wall thickness, 1" with standard tooling.
4. Extremely thin walls may require special tooling to prevent deformation of diameter.

### Material limits

1. Difficult materials may require the following to maximize blade life.
  - a. Lubrication such cutting oils, soluble oils, soapy water, plain water, etc.
  - b. Slow the speed of air motor, using a valve on the air supply.
  - c. Multiple cutting blades to balance the tool.
  - d. Vary feed rate, often times difficult materials respond to a heavy feed.

## Maintenance and servicing

### Regular cleaning and lubrication

1. Hose whip, filter and lubricator
  - a. Inspect filter element by removing nut from end of filter assembly.
  - b. If the filter is dirty or plugged replace it using filter repair kit
  - c. Remove filler plug from lubricator and be sure the adjusting screw is set half way between open and closed.
  - d. Fill lubricator, use a light weight air tool motor oil (s.a.e. 10).
  - e. For electric tools, inspect the cord for damage. If any damage is noted, the cord should be replaced.
2. Gear housing grease.
  - a. There is no grease fitting on rental tools. This is because of the tendency to over grease. Excess grease can back up into the air motor and cause failure.
  - b. A single pump from a grease gun after every two hundred hours of use is sufficient for all tools equipped with a grease fitting.
  - c. Use grease NLGI # 2.
3. Lubrication for storage
  - a. Before putting the tool away, fill air inlet with a liberal amount of air tool oil and actuate motor momentarily. This will distribute oil to internal motor parts, preventing rust build up.
  - b. Wipe tool down using soft cloth removing all dirt, grease, oil and chips.
  - c. Lightly coat tool with rust preventive.

### User service.

1. A qualified air tool technician can provide all service for this machine
  - a. Factory service or assistance is available, contact us at the numbers below.
  - b. Complete drawings and parts lists are provided in section six.
    - i. No special tools are required to perform complete service.

### Servicing by manufacturer or agent.

1. Factory service, return the tool to the factory address listed below.
2. Agent service, if applicable return tool to the agent listed below.
  - a. If unsure of agent contact the factory.

## Clamp rib and pad selector chart



### **"WART" MILLHOG** **CLAMP RIB AND PAD SELECTOR CHART**

MANDREL SIZE	I.D. RANGE (in.)	I.D. RANGE (mm)	I.D. CLAMP RIB SET
<b>OPTIONAL</b> <b>3/4" (19.1mm)</b>	.750 - .905	19.1 - 22.9	G-03
	.875 - 1.030	22.2 - 26.1	G-04
	1.00 - 1.155	25.4 - 29.3	G-05
	1.125 - 1.280	28.6 - 32.5	G-06
<b>OPTIONAL</b> <b>1" (25.5mm)</b>	1.00 - 1.300	25.4 - 33.0	H-0
<b>1 1/4" (31.8mm)</b>	1.250 - 1.600	31.8 - 40.6	H-01
	1.525 - 1.925	38.8 - 48.9	H-02
	1.850 - 2.250	47.0 - 57.1	H-03
	2.175 - 2.575	55.3 - 65.4	H-04
			<b>I.D. CLAMP PADS</b>
	2.500 - 2.900	63.5 - 73.6	H-02 & H-05
	2.825 - 3.225	71.8 - 81.9	H-03 & H-05
	3.150 - 3.550	80.0 - 90.1	H-04 & H-05
	3.475 - 3.875	88.3 - 98.4	H-02 & H-08
	3.800 - 4.200	96.6 - 106.6	H-03 & H-08
	4.125 - 4.525	104.78 - 114.94	H-04 & H-08

Note: As of 2/97, H-02, H-03, and H-04 are all tapped to receive any clamp pad. This allows a greater range from fewer clamp pads. Prior to 2/97 only the H-02 clamp rib was tapped to receive the clamp pads.

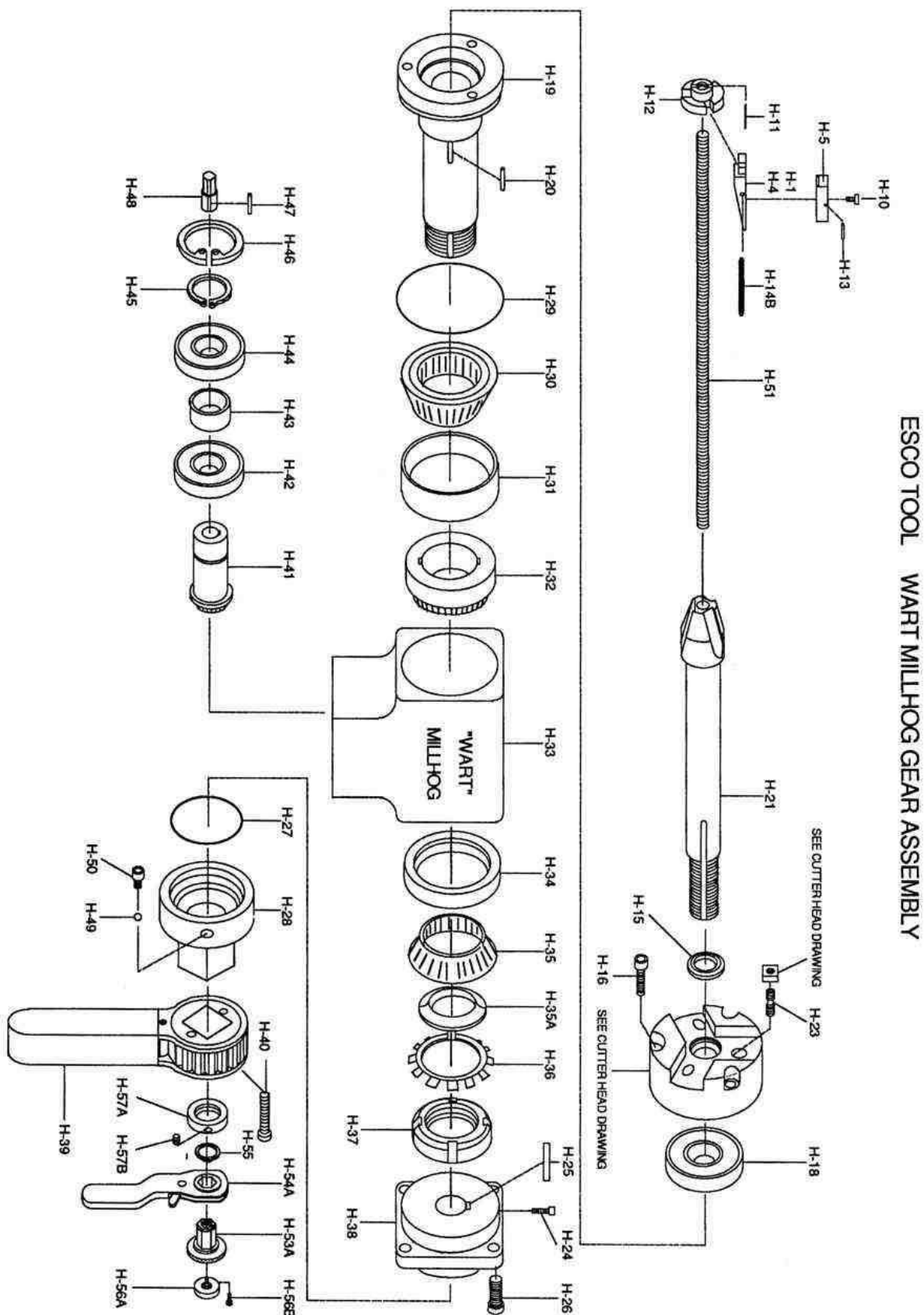
## Parts list and drawings

### Gear assembly

#### "WART" MILLHOG GEAR HEAD ASSEMBLY

<b>PART #</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>DESCRIPTION</b>
H-01	CLAMP RIBS (1.250" - 1.600")	H-34	REAR BEARING RACE
H-02	CLAMP RIBS (1.525" - 1.925")	H-35	REAR TAPERED ROLLER
H-03	CLAMP RIBS (1.850" - 2.250")	H-36	LOCK WASHER
H-04	CLAMP RIBS (2.175" - 2.575")	H-37	LOCK NUT
H-05	CLAMP PADS (2.500" - 2.900")	H-38	TORQUE ACCEPTER
H-06	CLAMP PADS (2.825" - 3.225")	H-39	FEED WRENCH
H-07	CLAMP PADS (3.150" - 3.550")	H-40	FEED WRENCH SCREWS
H-08	CLAMP PADS (3.475" - 3.875")	H-41	DRIVE GEAR
H-09	CLAMP PADS (3.800" - 4.200")	H-42	DRIVE GEAR BEARING
H-10	CLAMP RIB SCREW	H-43	BEARING SPACER
H-11	ACTUATOR ROLL PIN	H-44	DRIVE GEAR BEARING
H-12	ACTUATOR	H-45	DRIVE GEAR SNAP RING
H-13	ROLL PIN	H-46	HOUSING SNAP RING
H-14A	CLAMP RIB SPRING H0	H-47	DRIVE KEY
H-14B	CLAMP RIB SPRING H1-H4	H-48	SHEAR COUPLER
H-15	CUTTERHEAD SEAL	H-49	FEED KNOB BALLS (20 REQ'D)
H-16	CUTTERHEAD MOUNTING SCREW	H-50	BALL RETAINER SCREW
H-18	CUTTERHEAD BEARING	H-51	DRAW ROD
H-19	DRIVE SHAFT	H-52	DRAW ROD NUT SNAP RING
H-20	DRIVE GEAR KEY	H-53A	DRAW ROD NUT & FINGER KNOB
H-21	1.250" MANDREL	H-54A	WRENCH HD DRAW ROD
H-22A	9/16" BLADE LOCK	H-55	DRAW ROD NUT SNAP RING
H-22B	5/8" BLADE LOCK	H-56A	DRAW ROD STOP COLLAR
H-22C	3/4" BLADE LOCK	H-56B	SOCKET HEAD SCREW
H-23	COMBINATION SCREW	H-57A	FEED STOP COLLAR
H-24	TORQUE ACCEPTER KEY SCREW	H-57B	SET SCREW
H-25	TORQUE ACCEPTER KEY	H-58	MOTOR ADAPTER PLATE
H-26	TORQUE ACCEPTER SCREWS	H-59	MOTOR ADAPTER SCREWS
H-27	"O" RING	CH-20	2-5/8" CUTTERHEAD
H-28	FEED KNOB	CH-21	3" CUTTERHEAD
H-29	DRIVE SHAFT "O" RING	CH-22	3-1/2" CUTTERHEAD
H-30	FRONT TAPERED ROLLER BEARING	CH-23	4" CUTTERHEAD
H-31	FRONT BEARING RACE	CH-24	4-1/2" CUTTERHEAD
H-32	DRIVEN GEAR	H-70	AIR MOTOR COMPLETE
H-33	HOUSING		

Gear assembly (cont.)

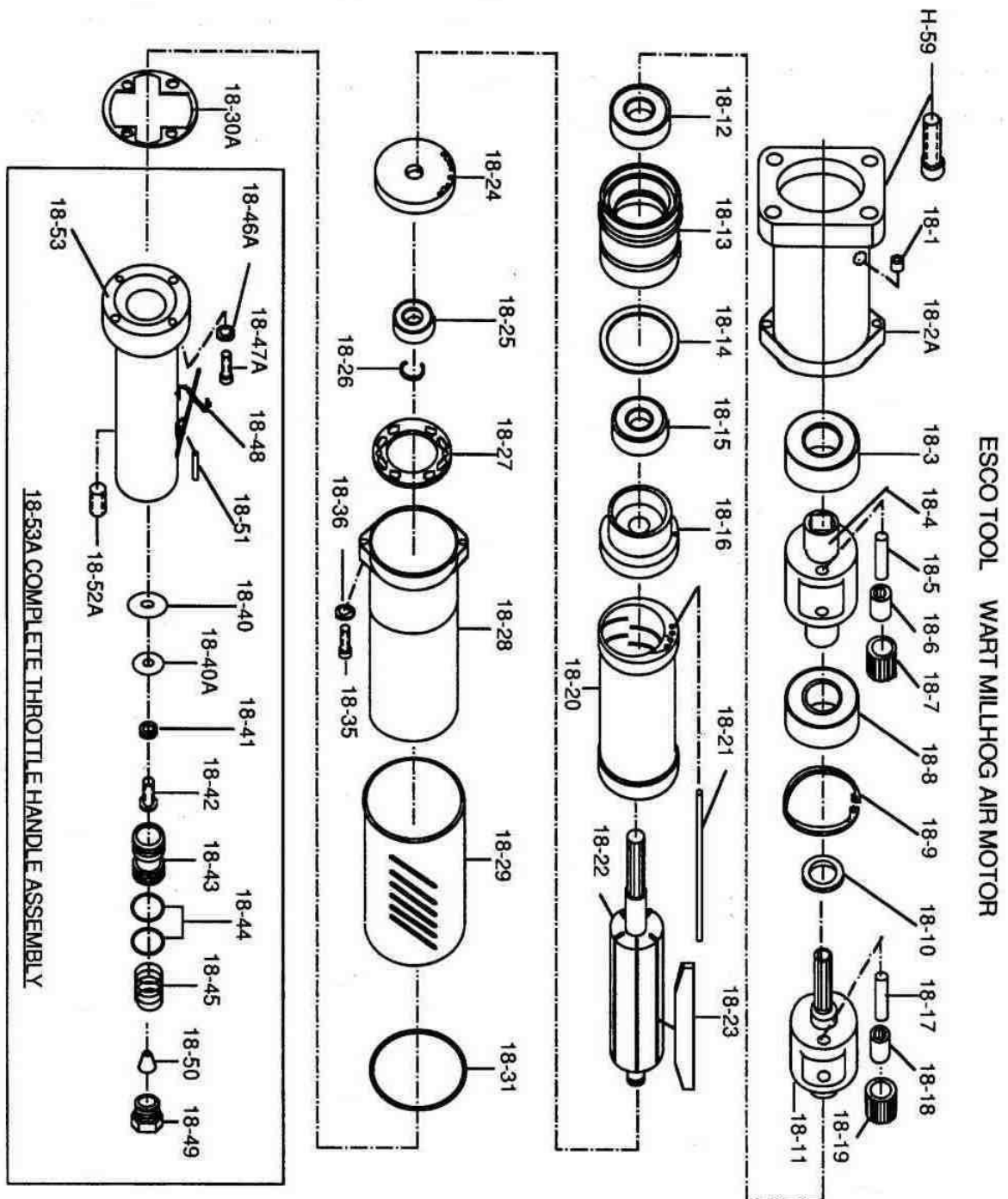


## Air Motor

### "WART" MILLHOG AIR MOTOR PARTS LIST

<u>PART #</u>	<u>DESCRIPTION</u>	<u>PART #</u>	<u>DESCRIPTION</u>
18-01	GREASE FITTING	18-29	EXHAUST DEFLECTOR
18-02A	GEAR HOUSING	18-30	GASKET (OLD STYLE)
18-03	BEARING	18-30A	GASKET
18-04	GEAR SPIDER	18-31	"O" RING
18-05	PIN	18-32	REAR PLATE
18-06	BEARING	18-33	CAP SCREW
18-07	GEAR	18-34	LOCK WASHER
18-08	BEARING	18-35	CAP SCREW
18-09	RETAINER RING	18-36	LOCK WASHER
18-10	SPACER	18-40	SEAL
18-11	GEAR SPIDER	18-40A	WASHER
18-12	BEARING	18-41	LOCK WASHER
18-13	BEARING HOUSING	18-42	BUTTON HEAD SCREW
18-14	GASKET	18-43	AIR VALVE
18-15	BEARING	18-44	"O" RING
18-16	FRONT END PLATE	18-45	SPRING
18-17	PIN	18-46	LOCK WASHER
18-18	BEARING	18-46A	LOCK WASHER
18-19	GEAR	18-47	CAP SCREW
18-20	CYLINDER	18-47A	CAP SCREW
18-21	ALIGNMENT PIN	18-48	THROTTLE LEVER
18-22	ROTOR	18-49	COUPLER
18-23	ROTOR BLADES (5 PER SET)	18-50	SCREEN
18-24	REAR END PLATE	18-51	ROLL PIN
18-25	BEARING	18-52	OIL PLUG
18-26	RETAINER RING	18-52A	OIL PLUG
18-27	GASKET	18-53	THROTTLE HANDLE
18-28	AIR MOTOR HOUSING	18-53A	THROTTLE HANDLE COMPLETE
		18-54	COMPLETE AIRMOTOR
		H-59	MOTOR ADAPTER SCREW

Air motor (cont.)



12/01

## 110V electric motor

### 110V ELECTRIC MOTOR

H110-04	BALL BEARING 8 X 22 X 7	H110-41	CABLE CLIP
H110-05	WASHER	H110-42	BAFFLE
H110-07	ARMATURE COMPLETE, 110V	H110-43	TEMPERATURE SENSOR
H110-08	BALL BEARING, 6 X 19 X 6	H110-45	WARNING LABEL 52 x 22
H110-09	RUBBER BUSHING	H110-46	SHIFT LEVER, COMPLETE
H110-34	FIELD COIL ASSEMBLY, 110V	H110-47	ELECTRONIC UNIT
H110-35	RATING PLATE	H110-48	SWITCH
H110-36	MOTOR HOUSING	H110-49	HOUSING BLACK
H110-37	CARBON BRUSH SET	H110-50	FILLISTER HEAD SCREW
H110-38	BRUSH HOLDER, COMPLETE	H110-51	CABLE SLEEVE
H110-39	HOUSING COVER	H110-52	CABLE w/ UL/CSA SOCKET
H110-40	LABEL (WEP 14-150 QUICK RELEASE)		

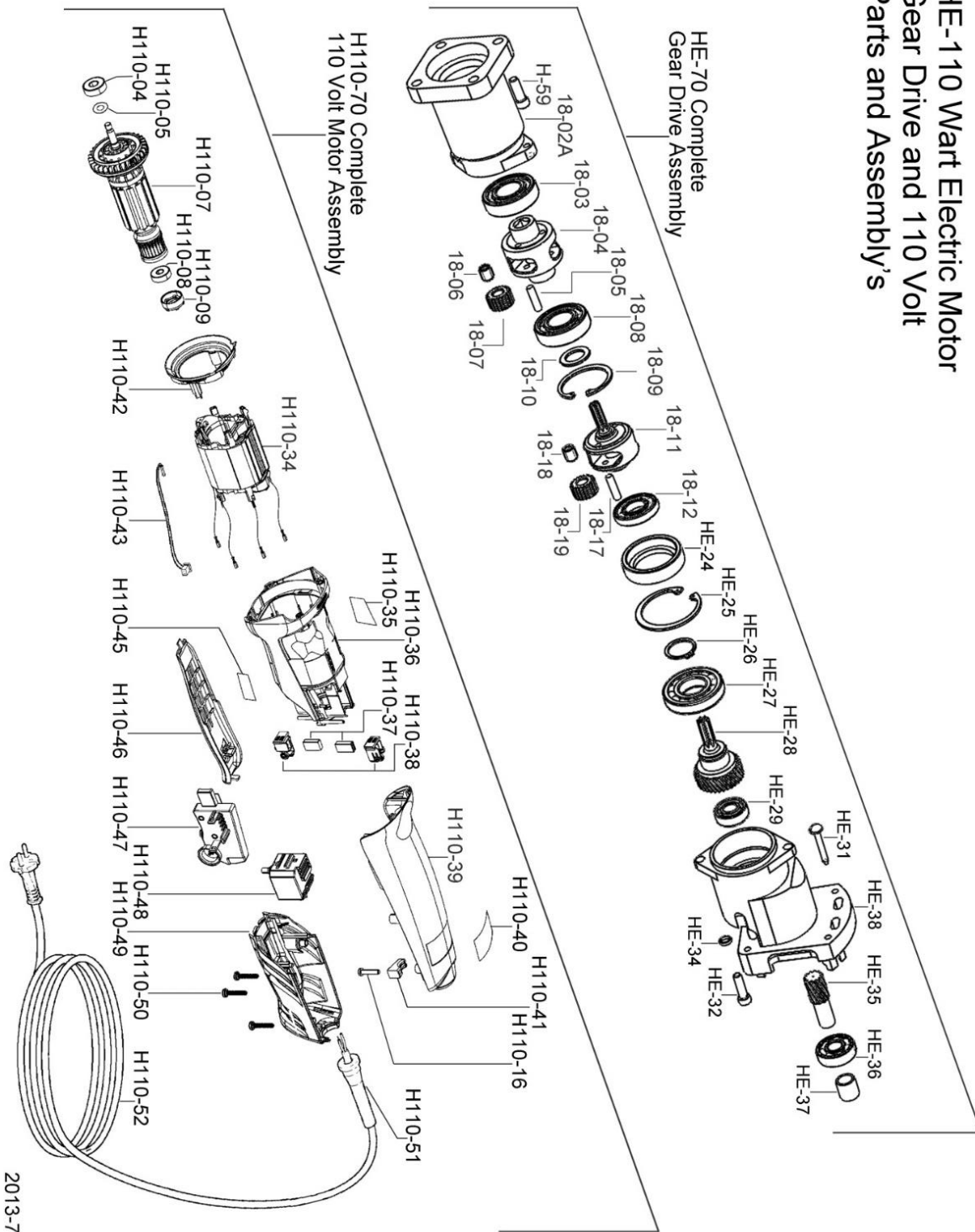
### GEAR DRIVE

H-59	MOTOR ADAPTER SCREWS	18-18	BEARING
18-01	GREASE FITTING	18-19	GEAR
18-02A	GEAR HOUSING	HE-24	RETAINER
18-03	BEARING	HE-25	SNAP RING
18-04	GEAR SPIDER	HE-26	SNAP RING
18-05	PIN	HE-27	BEARING
18-06	BEARING	HE-28	PINION GEAR
18-07	GEAR	HE-29	BEARING
18-08	BEARING	HE-31	FILLISTER HEAD SCREW
18-09	RETAINER RING	HE-32	GEAR CASE SCREW
18-10	SPACER	HE-34	WASHER
18-11	GEAR SPIDER	HE-35	SPIRAL GEAR
18-12	BEARING	HE-36	BEARING
18-17	PIN	HE-37	BUSHING
		HE-38	HOUSING
H110-70	COMPLETE MOTOR, 110V		
HE-70	COMPLETE GEAR DRIVE ASSEMBLY		
HE-110	COMPLETE MOTOR & GEAR CASE ASSEMBLY (110V)		



110V electric motor (cont.)

# HE-110 Wart Electric Motor Gear Drive and 110 Volt Parts and Assembly's



## 220V electric motor

### 220V ELECTRIC MOTOR

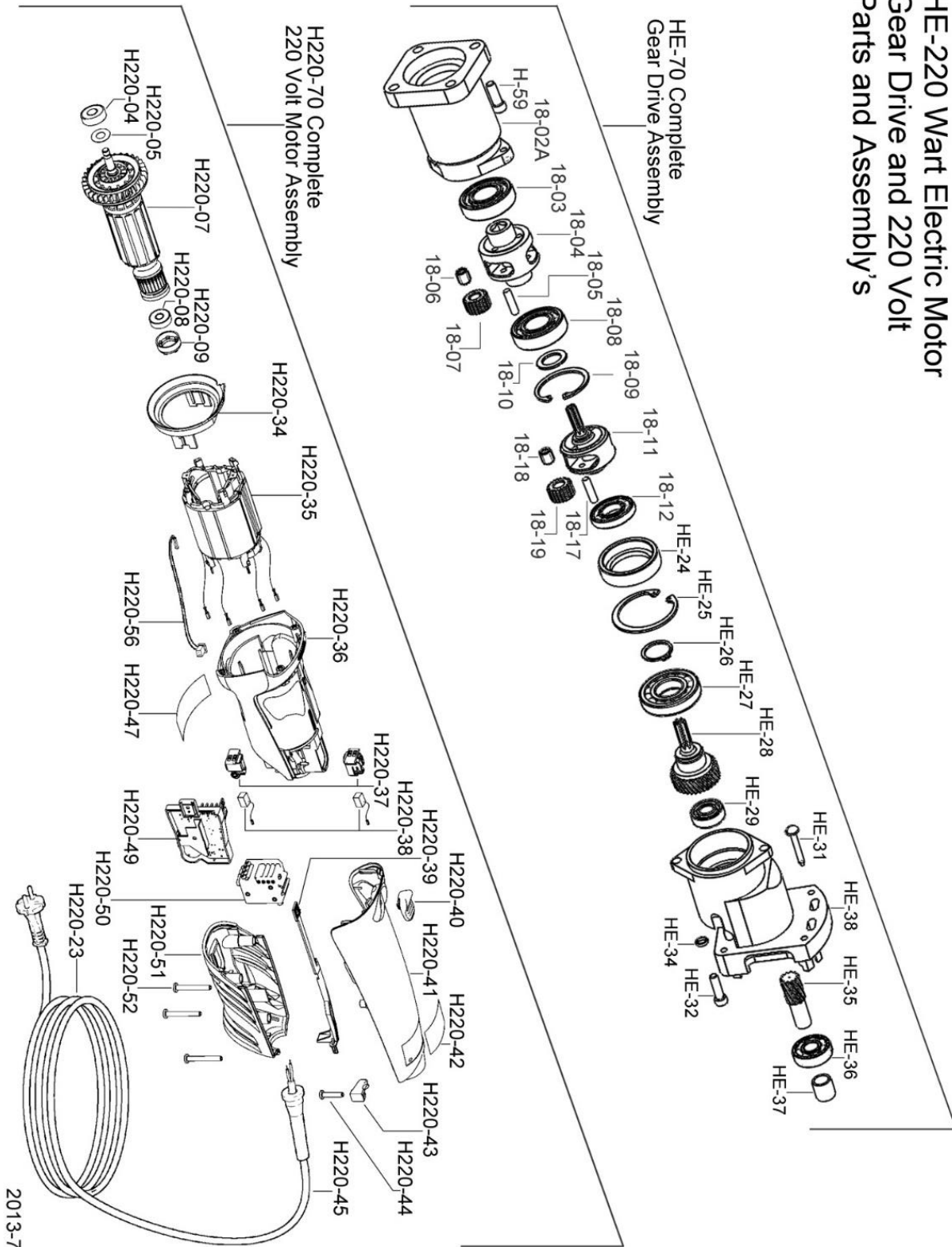
H220-04	BALL BEARING 8 X 22 X 7	H220-41	HOUSING COVER M-LABEL 08 TR 49-52X22 WE 14-125
H220-05	WASHER	H220-42	PLUS
H220-07	ARMATURE COMPLETE, 220V	H220-43	CABLE CLIP
H220-08	BALL BEARING, 6 X 19 X 6	H220-44	SELF TAP FILLISTER HEAD SCREW
H220-09	RUBBER BUSHING	H220-45	CABLE SLEEVE
H220-34	BAFFLE	H220-47	RATING PLATE
H220-35	FIELD COIL ASSEMBLY W. FIELD COIL, 220V	H220-49	ELECTRONIC UNIT, 220V 50-60Hz
H220-36	MOTOR HOUSING	H220-50	SWITCH
H220-37	BRUSH HOLDER COMPL. CUT OUT, 220V	H220-51	HOUSING BLACK
H220-38	CARBON BRUSH SET, 220V	H220-52	FILLISTER HEAD SCREW
H220-39	SWITCH ROD	H220-53	CABLE WITH PLUG
H220-40	SWITCH SLIDE	H220-56	TEMPERATURE SENSOR

### GEAR DRIVE

H-59	MOTOR ADAPTER SCREWS	18-18	BEARING
18-01	GREASE FITTING	18-19	GEAR
18-02A	GEAR HOUSING	HE-24	RETAINER
18-03	BEARING	HE-25	SNAP RING
18-04	GEAR SPIDER	HE-26	SNAP RING
18-05	PIN	HE-27	BEARING
18-06	BEARING	HE-28	PINION GEAR
18-07	GEAR	HE-29	BEARING
18-08	BEARING	HE-31	FILLISTER HEAD SCREW
18-09	RETAINER RING	HE-32	GEAR CASE SCREW
18-10	SPACER	HE-34	WASHER
18-11	GEAR SPIDER	HE-35	SPIRAL GEAR
18-12	BEARING	HE-36	BEARING
18-17	PIN	HE-37	BUSHING
		HE-38	HOUSING
H220-70	COMPLETE MOTOR, 220V		
HE-70	COMPLETE GEAR DRIVE ASSEMBLY		
HE-220	COMPLETE MOTOR & GEAR CASE ASSEMBLY (220V)		

220V electric motor (cont.)

# HE-220 Wart Electric Motor Gear Drive and 220 Volt Parts and Assembly's

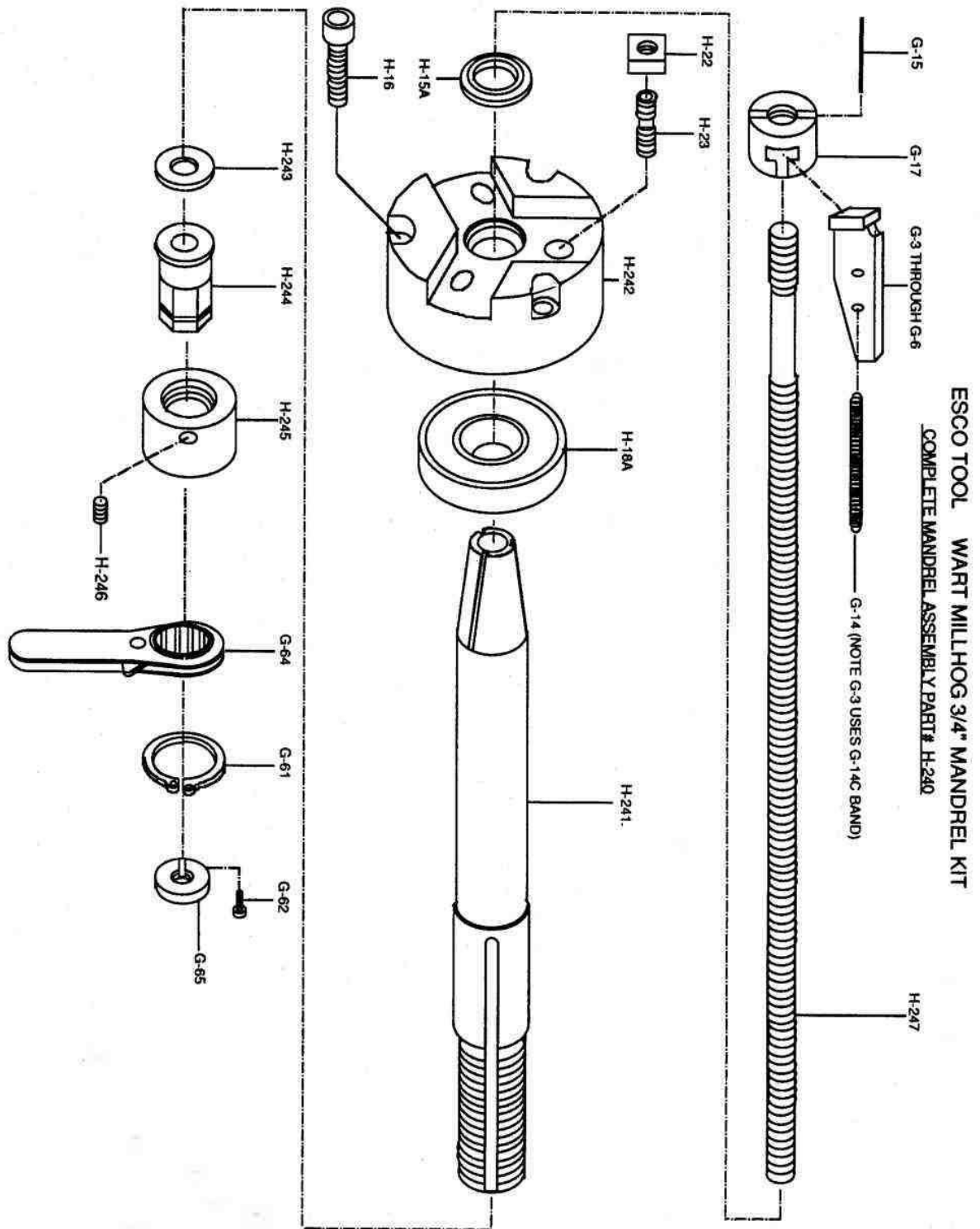


### 3/4" mandrel

#### "WART" MILLHOG 3/4" MANDREL KIT PARTS LIST

<u>PART #</u>	<u>DESCRIPTION</u>	<u>PART #</u>	<u>DESCRIPTION</u>
G-03	CLAMP RIB SET (.750 - .905)	H-15A	CUTTERHEAD SEAL
G-04	CLAMP RIB SET (.875 - 1.030)	H-16	CUTTERHEAD MOUNTING SCREW
G-05	CLAMP RIB SET (1.000 - 1.155)	H-18A	CUTTERHEAD BEARING FOR 3/4" MANDREL
G-06	CLAMP RIB SET (1.125 - 1.280)	H-22C	BLADE LOCK, 3/4"
G-14	CLAMP RIB SPRING FOR G4-G11	H-23	COMBINATION SCREW
G-15	ACTUATOR ROLL PIN	H-241	MANDREL, 3/4"
G-17	ACTUATOR FOR .750 & UP	H-242	CUTTERHEAD 3/4" - 2-5/8"
G-61	SNAP RING	H-243	WASHER
G-62	SCREW	H-244	DRAW NUT
G-63	SET SCREW	H-245	FEED STOP HOUSING
G-64	CLAMP RELEASE WRENCH	H-246	SET SCREW
G-65	DRAW ROD STOP COLLAR	H-247	DRAW ROD FOR 3/4" MANDREL
		H-240	MANDREL KIT COMPLETE, 3/4"

3/4" mandrel (cont.)



12/01

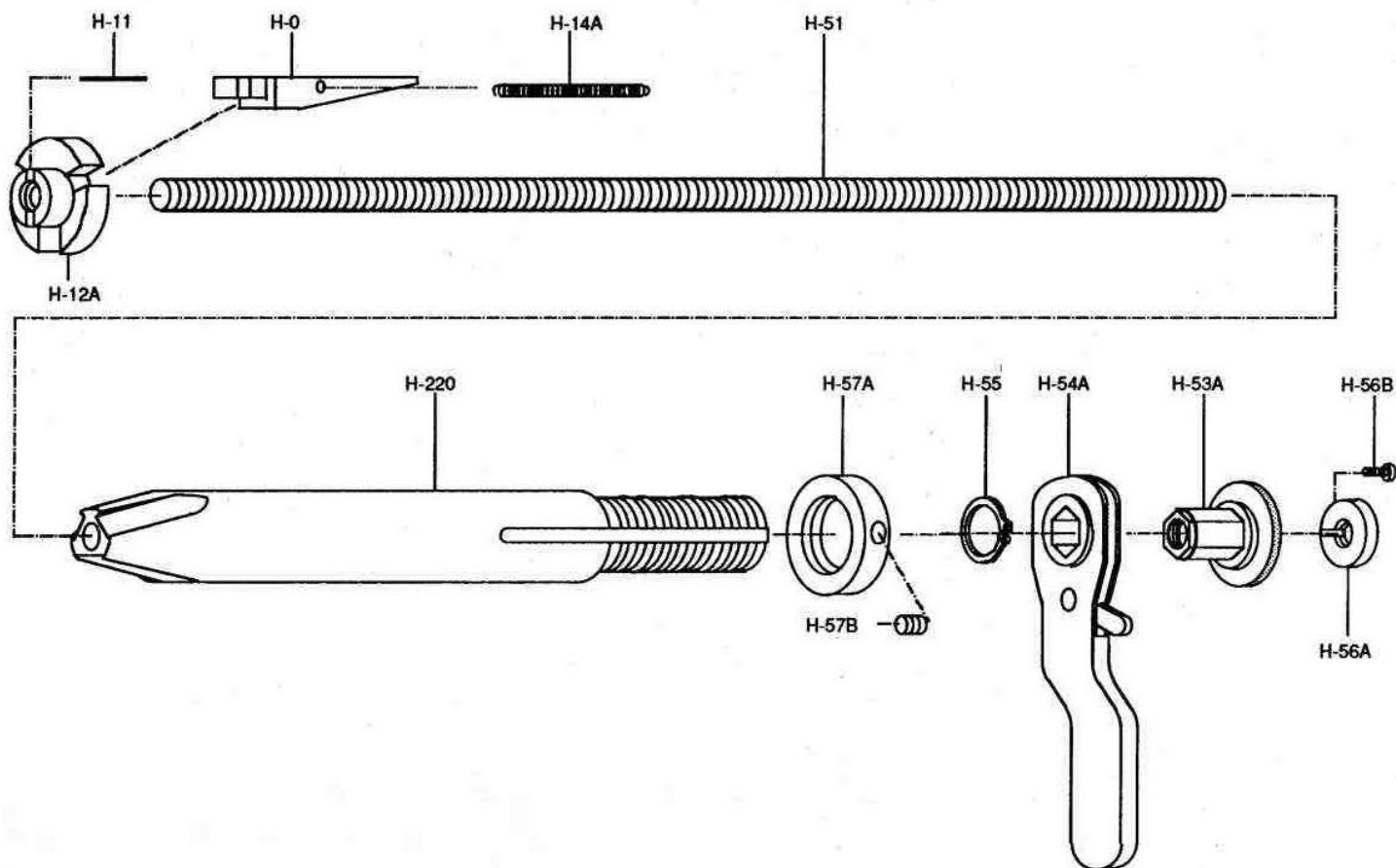
## 1" mandrel

### "WART" MILLHOG 1" MANDREL KIT - PARTS LIST

PART #	DESCRIPTION	PART #	DESCRIPTION
H-00	CLAMP RIB SET (1.000" - 1.250")	H-55	DRAW ROD NUT SNAP RING
H-11	ACTUATOR ROLL PIN	H-56A	DRAW ROD STOP COLLAR
H-12A	ACTUATOR, 1"	H-56B	SOCKET HEAD SCREW
H-14A	CLAMP RIB SPRING H-00	H-57A	FEED STOP COLLAR
H-51	DRAW ROD & STOP COLLAR	H-57B	SET SCREW
H-53A	DRAW ROD NUT & FINGER KNOB	H-220	MANDREL, 1" W/ FEED STOP
H-54A	WRENCH, H.D. DRAW ROD	H-221	MANDREL KIT COMPLETE, 1"

### ESCO TOOL WART MILLHOG 1" MANDREL KIT

#### COMPLETE MANDREL ASSEMBLY PART# H-221



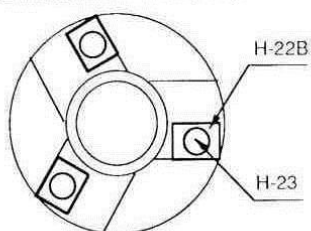
## Cutterheads

### WART" MILLHOG CUTTERHEAD PARTS LIST

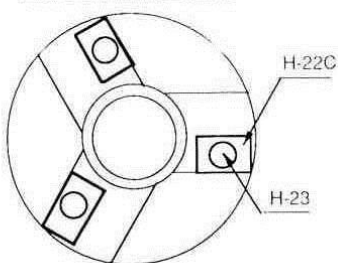
<b>PART #</b>	<b>DESCRIPTION</b>	<b>PART #</b>	<b>DESCRIPTION</b>
CH-20	2-5/8" CUTTERHEAD	H-22A	9/16" BLADE LOCK
CH-21	3" CUTTERHEAD	H-22B	5/8" BLADE LOCK
CH-22	3-1/2" CUTTERHEAD	H-22C	3/4" BLADE LOCK
CH-23	4" CUTTERHEAD	H-23	COMBINATION SCREW
CH-24	4-1/2" CUTTERHEAD	AW-01	ALLEN WRENCH SET (NOT SHOWN)

#### ESCO TOOL CUTTERHEADS FOR THE WART MILLHOG

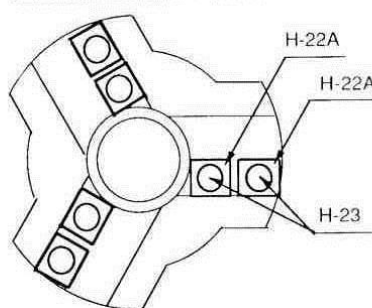
2-5/8" CUTTERHEAD CH-20



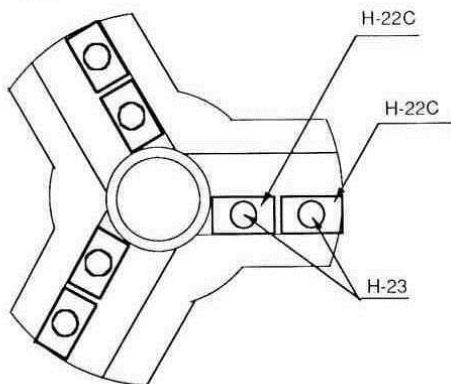
3" CUTTERHEAD CH-21



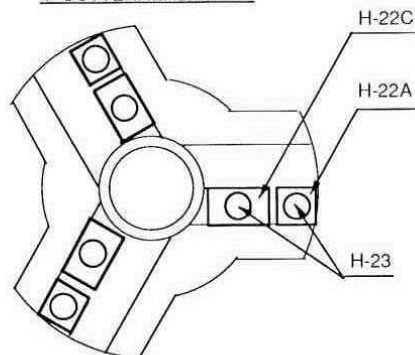
3-1/2" CUTTERHEAD CH-22



4-1/2" CUTTERHEAD CH-24



4" CUTTERHEAD CH-23



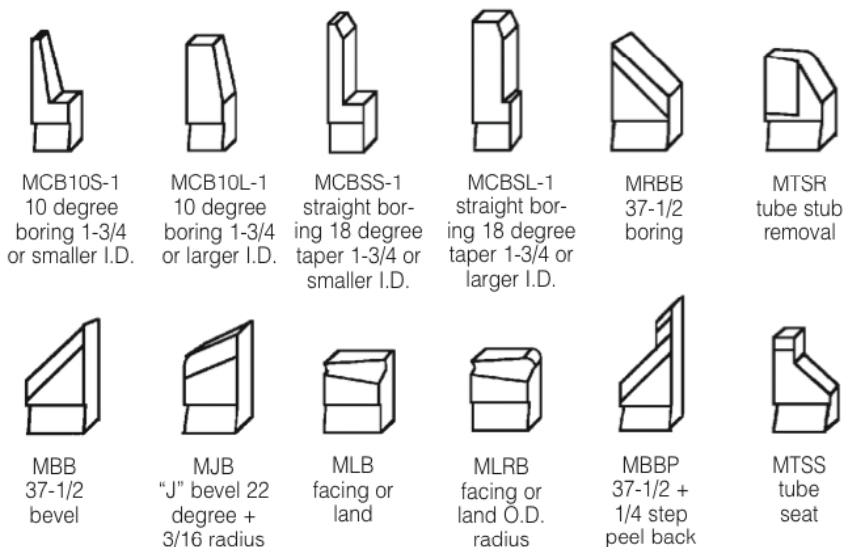
## Blades

MBB-1	BLADE 1/2" BEVEL TIN
MBB-2	BLADE 3/4" BEVEL TIN
MBB-3	BLADE 1" BEVEL TIN
MBBP-1	1/2" 37-1/2 DEG 1/4" PEEL BACK
MBBP-2	3/4" 37-1/2 DEG 1/4" PEEL BACK
MBBP-3	1" 37-1/2 DEG 1/4" PEEL BACK
MCB-1	BLADE,CUSTOM 1/2"CNTR BORE TiN
MCB-2	BLADE,CUSTOM 3/4"CNTR BORE TiN
MCB-3	BLADE,CUSTOM 1"CNTR BORE TiN
MCB10L-1	1/2" 10 DEG BORING >1-3/4"ID
MCB10L-2	3/4" 10 DEG BORING >1-3/4"ID
MCB10L-3	1" 10 DEG BORING > 1-3/4" ID
MCB10S-1	1/2" 10 DEG BORING <1-3/4 ID
MCB10S-2	3/4" 10 DEG BORING <1-3/4 ID
MCB10S-3	1" 10 DEG BORING < 1-3/4" ID
MCBSL-1	1/2" WIDE 3/8"STRAIGHT BORE 18 DEG TAPER
MCBSL-2	3/4" WIDE 3/8"STRAIGHT BORE 18 DEG TAPER
MCBSL-3	1" WIDE 3/8"STRAIGHT BORE 18 DEG TAPER
MCBSS-1	1/2" WIDE 3/8"STRAIGHT BORE 18 DEG TAPER
MCBSS-2	3/4" WIDE 3/8"STRAIGHT BORE 18 DEG TAPER
MCBSS-3	1" WIDE 3/8"STRAIGHT BORE 18 DEG TAPER
MJB-1	1/2" "J" BEVEL 22 DEG+3/16 RADIUS
MJB-2	3/4" "J" BEVEL 22 DEG+3/16 RADIUS
MJB-3	1" "J" BEVEL 22 DEG+3/16 RADIUS
MLB-1	BLADE 1/2" LAND TIN
MLB-2	BLADE 3/4" LAND TIN
MLB-3	BLADE 1" LAND TIN
MLRB-1	1/2" FACING BLADE W/ OD RADIUS
MLRB-2	3/4" FACING BLADE W/ OD RADIUS
MLRB-3	1" FACING BLADE W/ OD RADIUS
MRBB-1	1/2"37-1/2 DEGREE BORING BLADE
MRBB-2	3/4"37-1/2 DEGREE BORING BLADE
MRBB-3	1" 37-1/2 DEGREE BORING BLADE
MTSR-1	BLADE, 1/2" TUBE STUB REMOVAL
MTSR-2	BLADE, 3/4" TUBE STUB REMOVAL
MTSR-3	BLADE, 1" TUBE STUB REMOVAL
MTSS-1	BLADE, 1/2" TUBE SEAT
MTSS-2	BLADE, 3/4" TUBE SEAT
MTSS-3	BLADE, 1" TUBE SEAT

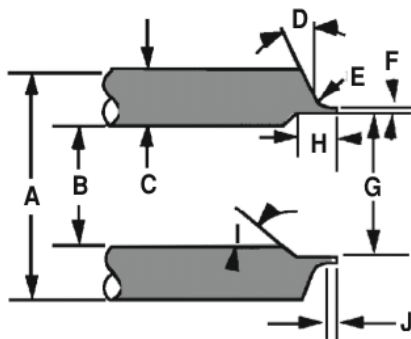


## Blades (cont.)

### Cutter Blades for the Wart, Mini, Prepzilla, Commander, and Dictator MILLHOG®

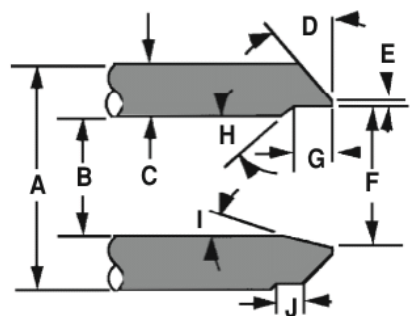


#### Specifications for "J" Prep Custom Blades



		Standard	Your Spec.
A	Tube O.D.	—	
B	Tube I. D.	—	
C	Wall thickness	—	
D	Bevel Angle	22°	
E	Radius	3/16	
F	Land or Face	—	
G	Bore Dia.	—	
H	Bore Depth	3/8	
I	Bore Taper	18°	
J	Nose (Straight)	—	
K	Tapered bore angle instead of straight bore	10°	

#### Specifications for "V" Prep Custom Blades



		Standard	Your Spec.
A	Tube O.D.	—	
B	Tube I. D.	—	
C	Wall thickness	—	
D	Bevel Angle	37-1/2°	
E	Land or Face	—	
F	Bore Dia.	—	
G	Depth of Bore	3/8	
H	Taper Angle	18°	
I	Bore Angle	10°	
J	Peel Back	1/4"	

## Air hose

### HOSE ASSEMBLY PARTS LIST

PART #	DESCRIPTION	PART #	DESCRIPTION
AHW-300	NIPPLE, 3/8" x 3/8"	AHG-309	FILLER PLUG "O" RING
AHW-301	COUPLER	AHG-310	OIL ADJUSTMENT VALVE ASSEMBLY
AHW-302	HOSE BARB, 1/2" x 3/8"	AHG-311	VALVE GASKET
AHW-303	HOSE, 6'	AHG-312	SIGHT DISK AND SEAL
AHW-304	SEAL	AHG-313	SIGHT DISK LOCK NUT
AHW-305	CHICAGO FITTING, 1/2"	AHW-308A	FILTER REPAIR KIT
AHW-306	SAFETY PIN	AHW-309	HOSE BARB, 1/2" x 1/2"
AHW-307A	COMPLETE FILTER & LUBRICATOR ASSY.	AH-201	COMP. HOSE ASSEMBLY
AHG-308	FILLER PLUG		

### ESCO TOOL HOSE ASSEMBLY FOR THE WART MILLHOG

#### COMPLETE ASSEMBLY - PART# AH-201

