

Quackenbush®

15QGDA, 15QGDAB, 158QGDA, 158QGDAB, 158QGDAV & 158QGDABV S150B & S275B POSITIVE FEED DRILLS



NORTH AMERICA

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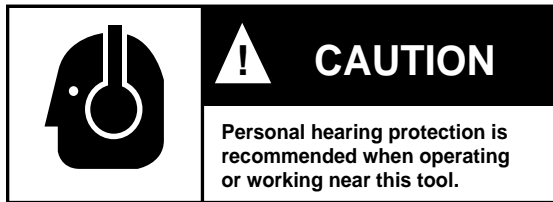
Safety Recommendations

For your safety and the safety of others, read and understand the safety recommendations and operating instructions before operating any drill motor.

Always wear protective equipment:



For additional information on eye and face protection, refer to Federal OSHA Regulations, 29 Code of Federal Regulations, Section 1910.133., Eye and Face Protection, and American National Standards Institute, ANSI Z87.1, Occupational and Educational Eye and Face Protection. Z87.1 is available from the American National Standards Institute, Inc. 11 West 42nd Street, New York, NY 10036.



Hearing protectors are required in high noise areas, 85 dBA or greater. The operation of other tools and equipment in the area, reflective surfaces, process noises and resonant structures can substantially contribute to, and increase the noise level in the area. For additional information on hearing protection, refer to Federal OSHA Regulations, 29 Code of Federal Regulations, Section 1910.95, Occupational Noise Exposure, and American National Standards Institute, ANSI S12.6, Hearing Protectors.



Follow good machine shop practices. Rotating shafts and moving components entangle and entrap, and may result in serious injuries. Never wear long hair, loose-fitting clothes, gloves, ties, or jewelry when working with or near a drill of any type.

Quackenbush drills are designed to operate on 90psig (6.2 bar) maximum air pressure using the proper hose. Excessive air pressure increases the loads and stresses on tool parts and drills,

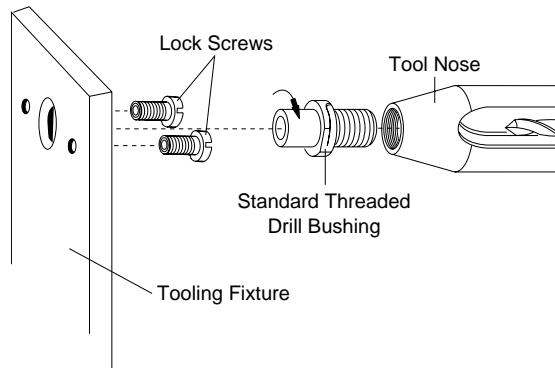
and may result in breakage. The installation of a filter-regulator-lubricator in the air supply line ahead of the tool is highly recommended.



- Before the tool is connected to the air supply, the throttle should be checked for proper operation (i.e., throttle valve moves freely and returns to closed position).
- Before removing a tool from service or changing drill bits, make sure the air line is shut off and drained of air. This will prevent the tool from operating if the throttle is accidentally engaged.
- Cutting tools used with these drill motors are sharp. Handle them carefully to avoid injury.

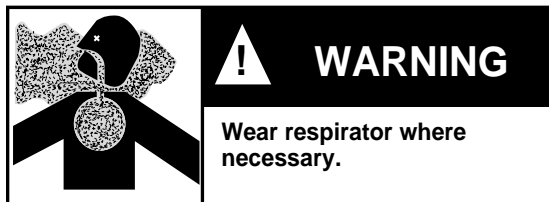


Before mounting any positive feed drill, check the lock screws in the tooling fixture and drill bushing. Make sure both are in good condition and securely tightened.



Positive feed drills can exert high torques and high thrust loads. If failure of the lock screws or drill bushing occurs, the drill may suddenly spin and back away from the drill fixture.

Always remove chuck key or drill drift before operating tool.



Drilling or other use of this tool may produce hazardous fumes and/or dust. To avoid adverse health effects utilize adequate ventilation and/or a respirator. Read the material safety data sheet of any cutting fluids or materials involved in the drilling process.



Some non-ferrus metal chips (or dusts) are combustible. Examples: Aluminum, magnesium, Titanium, and Zirconium. See the material safety data sheets for combustibility of materials drilled. Never collect spark generating material with combustible material. Examples: Collecting both steel and aluminum or steel and titanium.

Safety Recommendations



Failure to do so can result in serious injuries from slipping on oily surfaces.

Nose pieces usually used with these drills are generally slotted for visibility and access to chuck and cutter.



Quackenbush drills are often used with lubricant or cooling systems which must be properly maintained to avoid leakage.

Keep fingers and hands away from slots in the tool nose at all times. Rapid spindle retraction occurs automatically on most models after drilling cycle and can be activated manually even with the air supply disconnected on some models.

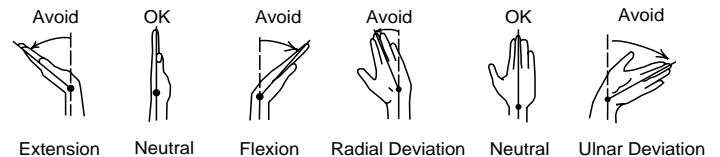
CAUTION Due to the multitude and variety of tooling applications, the User's Methods Engineering, Standard Tooling Engineering, and/or Safety Engineering Departments, etc., must consider any hazards that may be associated with each specific application of this product and provide adequate operator protection from inadvertent contact with any moving components.

Some individuals are susceptible to disorders of the hands and arms when exposed to vibration and/or tasks which involve repetitive work motions. Those individuals predisposed to vasculatory or circulatory problems may be particularly susceptible. Cumulative trauma disorders such as carpal tunnel syndrome and tendinitis can be caused or aggravated by repetitious, forceful exertions of the hands and arms. These disorders develop gradually over periods of weeks, months, and years. Tasks should be performed in such a manner that the wrists are maintained in a neutral position, which is not flexed, hyperextended, or turned side to side. Stressful postures should be avoided and can be controlled through tool selection and work location.

Any tool operator should be aware of the following warning signs and symptoms so that a problem can be addressed before it becomes a debilitating injury. Any user suffering from prolonged symptoms of tingling, numbness, blanching of fingers, clumsiness or weakened grip, inability to hold objects, nocturnal pain in the hand, or any other disorder of the shoulders, arms, wrists, or fingers should notify their employer so that a review of what steps might be taken to prevent further occurrences. These steps might include but are not limited to, repositioning the workpiece or redesigning the workstation, reassigning tool users to other jobs, rotating jobs, changing worker pace, and/or changing the type of tool used so as to minimize stress on the operator. Some tasks may require more than one type of tool to obtain the optimum operator/ tool/ task relationship.

The following recommendations will help reduce or moderate the effects of repetitive work motions. The operator of any drill should:

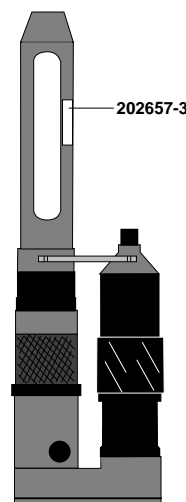
- Use a minimum hand grip force consistent with proper control and safe operation
- Keep body and hands warm and dry
- Avoid anything that inhibits blood circulation
 - Smoking Tobacco
 - Cold Temperatures
 - Certain Drugs



- Avoid awkward postures
- Keep wrists as straight as possible
- Interrupt work, activities, or rotate jobs to provide periods free from repetitive work motions.

Safety Labels

The safety labels found on these tools are an essential part of this product. Labels should not be removed. Labels should be checked periodically for legibility. Replace safety labels when missing or when the information can no longer be read. Safety labels should always be placed on any tool nose before installing on tool. Replacement labels can be ordered using number below.



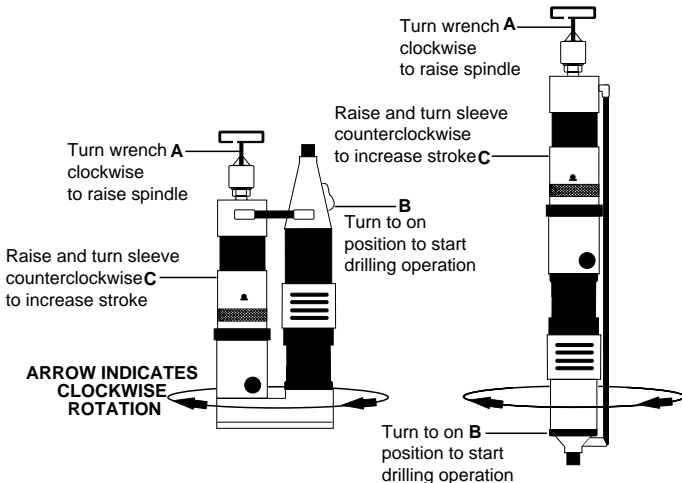
OPERATING INSTRUCTIONS

The 15 & 158-150 & 275 are designed to operate on 90 psig air pressure using a 3/8" I.D. hose up to 8' in length. If additional length is required, a 1/2" I.D. or larger hose should be connected to the 3/8" hose.

When the **B** throttle valve is turned to the on position, the drill and feed cycle will begin. At the end of the feed stroke, the spindle will automatically return to its starting position.

The tool's starting position is set by the adjustment plug located in the spindle. The **A** "T" wrench 614190, is used to make this adjustment.

The tool's forward stroke is set by the **C** stop adjustment collar.



LUBRICATION

An automatic in-line filter-lubricator is recommended as it increases tool life and keeps the tool in sustained operation. The in-line lubricator should be regularly checked and filled with a good grade of 10W machine oil. Proper adjustment of the in-line lubricator is performed by placing a sheet of paper next to the exhaust ports and holding the throttle open approximately 30 seconds. The lubricator is properly set when a very light stain of oil collects on the paper. Excessive amounts of oil should be avoided.

STORAGE

In the event that it becomes necessary to store the tool for an extended period of time (overnight, weekend, etc.), it should receive a generous amount of lubrication at that time and again when returned to service. The tool should be stored in a clean and dry environment.

SERVICE INSTRUCTIONS

DISASSEMBLY—DRILL HEAD

To remove the drill head, remove the air line and clamp the cross shaft housing in a soft-jawed vise. Unscrew (the #15 power unit has left-hand threads) and remove the power unit. On piggyback units, the gear housing should be unscrewed from the drill head at this time. Disassembly instructions for the gear housing are shown on the pages for the respective gear housing.

Unscrew the tool nose (left-hand threads), the chuck, and chuck adaptor, 621992, being careful not to damage the extension spindle. This will allow the bearing retainer 619692, to be removed (left-hand threads). NOTE: As there is spring pressure against this part, care should be taken to avoid losing associated parts. The cylinder 619691, and the piston 617034, may now be slipped off the front of the shaft housing.

Removing the three screws 617331, and keys 863365, will allow the stop adjustment collar to be unscrewed (left-hand threads). The return stop 617327, and pawls 619684, will allow the stop collar to be slipped off the shaft housing. This allows the half-nuts to be removed. Unscrewing the shaft housing will allow the lead screw with attached components to be removed. Remove the retainer ring 843791, and press the lead screw driver out of the gearbody 619117.

Remove the two retainer rings, and the two plugs from the cross shaft housing. Press the cross shaft out of the side with the larger opening. Using good standard disassembly procedures, the various assemblies can be broken down for inspection and replacement of worn parts.

REASSEMBLY—DRILL HEAD

The drill head is reassembled in the reverse order of disassembly. All parts should be thoroughly cleaned and inspected for damage or wear. Damaged or worn parts should be replaced. Bearings which feel rough or have excessive endplay should be replaced. As the drill head is reassembled, apply a generous amount of "Lubriplate 907" grease, or equivalent, to all the gears and bearings.

During reassembly of the cross shaft, place the worm wheel over the long end of the cross shaft with the hub covering the hexagon portion of the shaft. Place the worm wheel spacer over the shaft with the slot aligned with the pin hole and insert the pin. Apply grease to the holes in the cross shaft and install the steel balls. Holding the cross shaft with the worm wheel to the right of the clutch, press the clutch spring over the hub of the worm wheel, engaging the steel balls with the holes in the clutch spring. NOTE: The clutch spring must wrap on the hub away from you with respect to the holes in the spring. NOTE: Wrapping the spring in the opposite direction will decrease the holding power of the clutch. When installing the pinion and shaft assembly, do not press on the pinion and shaft 619119.

Insert the retainer ring 844975, in the gear body with the open section toward the pinion 619119, for clearance of the pinion. "Lubriplate 907" grease, or equivalent, should be packed in and around the lead screw to aid in cushioning the retract cycle.

DISASSEMBLY—#15 POWER UNIT

To disassemble the gear train on the 160 RPM and 250 RPM power units, clamp the motor housing lightly in a soft-jawed vise. Using a wrench on the flats of the rear gear case 613733, unscrew it from the motor housing. The first reduction gear spider will remain with the motor and can be slipped out at this time. Clamp the flats of the rear gear case lightly in the vise, and with a suitable wrench, unscrew the front gear case 613361 (left-hand threads). The second reduction gear spider 613587, may now be removed from the front of the rear gear case. Clamp the flats of the front gear case 613361, lightly in the vise and with a strap wrench, unscrew the adapter 613550 (left-hand threads). Rest the rear face of the adapter on the vise jaws and tap the third reduction spider 613553, out of the spider bearing 843615. The idler gears may be removed from the three gear spiders by removing the spider bearing with a bearing puller and driving the idler gear pins out the rear of the spiders. Pinion gear 864239, which is used in the 250 RPM gear train, can then be removed from the first reduction spider.

To disassemble the gear train on the 400 RPM, 800 RPM, and the 1400 RPM power units, clamp the motor housing lightly in a soft-jawed vise and unscrew the gear case 613733. The first reduction spider may now be slipped off the front of the motor.

Clamp the gear case in the vise and using a strap wrench, unscrew the adapter 613544 (left-hand threads). Rest the rear face of the adapter on the vise jaws and tap the second reduction spider out of the bearing 843615. After removing the spider bearing with a suitable bearing puller, the idler gears may be removed by driving the idler gear pins out the rear of the two spiders. Pinion gear 864239, which is used in the 1400 RPM gear train, can then be removed from the first reduction spider.

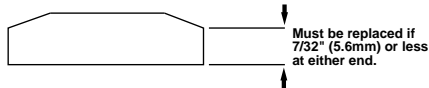
The gear train on the 2000 RPM and 3000 RPM power units is disassembled by unscrewing the gear case 611534, from the motor housing. Press the spider out of the rear of the gear case.

To remove the motor unit from the motor housing, hold the rotor shaft in a soft-jawed vise and slip the motor unit out of the motor housing. Using a soft-faced mallet, tap the rotor out of the front rotor bearing 844772. The front bearing plate 864235, cylinder 864236, and four rotor blades 864234, may now be removed. Remove the rotor bearing retainer 812231, and the rotor spacers from the rear of the rotor. Rest the front face of the rear bearing plate 864232, on top of the vise jaws and with a suitable driver, tap the rotor out of the rear rotor bearing 847095.

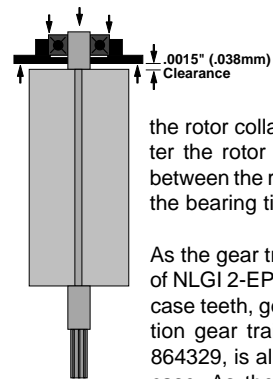
To disassemble the motor housing, remove the throttle ring retainer 613059. This will allow the throttle ring 613263, to be removed. Unscrew the throttle valve cap 613060, and remove the throttle valve spring 613058, throttle valve ball 844077, and throttle pin 613062, will allow the air inlet screen 613066, to be removed for inspection and cleaning.

REASSEMBLY—#15 POWER UNIT

The power unit is reassembled in the reverse order of disassembly. All parts should be thoroughly cleaned and inspected for damage or wear. Damaged or worn parts should be replaced. Bearings which feel rough or have excessive endplay should be replaced. Rotor blades which measure less than 7/32" (5.6mm) at either end should be replaced.



When assembling the motor, a clearance of .0015" desired between the front face of the rear bearing plate and the rear face of the rotor.



If the rotor rubs the face of the rear bearing plate, it indicates that the rotor collar is too short and must be replaced. If clearance is more than .0015", sand the square face of the rotor collar until the desired clearance is obtained. After the rotor collar has been fitted, install rotor spacers between the retainer ring and the rear rotor bearing to keep the bearing tight against the rotor collar.

As the gear train is assembled, apply a generous amount of NLGI 2-EP grease or equivalent to all of the gears, gear case teeth, gear spider, and bearings. On the triple reduction gear train, be sure that the notch in the ring gear 864329, is aligned with the ring gear pin in the front gear case. As the gear train is assembled to the motor and motor housing, make sure that the teeth on the rotor mesh properly with those in the gear spider.

After the power unit is assembled, place a few drops of 10W machine oil in the air inlet bushing before attaching the air hose. This will insure immediate lubrication of all parts as soon as the air is applied.

DISASSEMBLY—#158 STRAIGHT POWER UNIT

Clamp the power unit in a vertical position in a soft-jawed vise on the flats of the motor housing 613275. Unscrew and remove the drill head adapter 617113. This will allow the internal gear 613285, to be unscrewed. The planet cage and attached components may now be removed from the rear of the internal gear.

On power units equipped with a double reduction, the internal gear and housing 617369, may now be unscrewed from the motor housing. The planet cage and attached components may now be removed from the rear of the internal gear and housing.

To remove the motor unit invert the tool and loosen the handle nut 613283, and remove the handle assembly. The complete motor can now be gently slipped out of the rear of the motor housing. Clamp the rotor shaft lightly in the vise and unscrew the governor assembly (left-hand threads). This will allow the rear bearing plate 613241, cylinder 613225, rotor 613234, and rotor blades to be removed.

On units equipped with the pinion gear 617609, it will have to be unscrewed before the rotor shaft can be removed from the front rotor bearing. When removing the bearing retainer nut 613294, remember that it has left-hand threads.

To disassemble the handle, remove the retainer ring 812231, and gently push the throttle valve out of the bushing.

REASSEMBLY—#158 STRAIGHT POWER UNIT

The power unit is reassembled in the reverse order of disassembly. Wash all parts thoroughly in a solvent and inspect for wear or damage before reassembly. Bearings which show excessive looseness or roughness should be replaced. During reassembly, all parts should receive a generous coating of NLGI 2-EP grease or equivalent. If rotor blades are worn as much as 1/16" below the rotor surface, they should be replaced. NOTE: The beveled edge of the blade is the trailing edge. The rotor 613234, and the cylinder 613225, should have the "R" to the rear to insure correct rotation.



When installing the sleeve 613242, the exhaust holes should be to the rear of the unit. As the internal gear and components are assembled, the tang end of the planet pins must be toward the front of the planet cage so the planet cage washer will lock then in place.

After the tool is assembled, place a few drops of 10W machine oil in the air inlet before attaching the air hose. This will insure immediate lubrication of all parts as soon as the air is applied.

DISASSEMBLY—#158 PIGGYBACK POWER UNIT

To disassemble the motor unit, clamp it in a vertical position in a soft-jawed vise on the flats of the motor housing 613275, and unscrew the internal gear 613285, from the housing. The planet cage 613284, with attached components can be removed through the rear of the internal gear. Using a suitable bearing puller, the rear planet bearing 613281, can be removed. Clamp the planet cage in a vise and unscrew the motor gear (left-hand threads), and remove the front planet bearing 864471, and planet cage washer 613278. This will allow the planet pins 613279, and planet wheels 613280, to be removed for inspection. To remove the motor unit, invert the tool, loosen the handle nut 613283, and remove the handle assembly 611233. The complete motor can now be gently slipped out through the rear of the motor housing. Clamp the exposed end of the rotor shaft lightly in a soft-jawed vise and unscrew the governor (left hand threads). NOTE: The governor should not be disassembled as it may be ordered as a subassembly only. The rear bearing plate 613241, cylinder 613225, rotor 613234, and rotor blades can now be removed. Remove the rotor shaft 843274. When removing the rotor bearing retainer 613294, from the front bearing plate, remember that it has LEFT-HAND THREADS.

To disassemble the handle, remove the snap ring 812231 and gently push the throttle valve out of the bushing. Unscrew the swivel nut for cleaning and inspection of the screen.

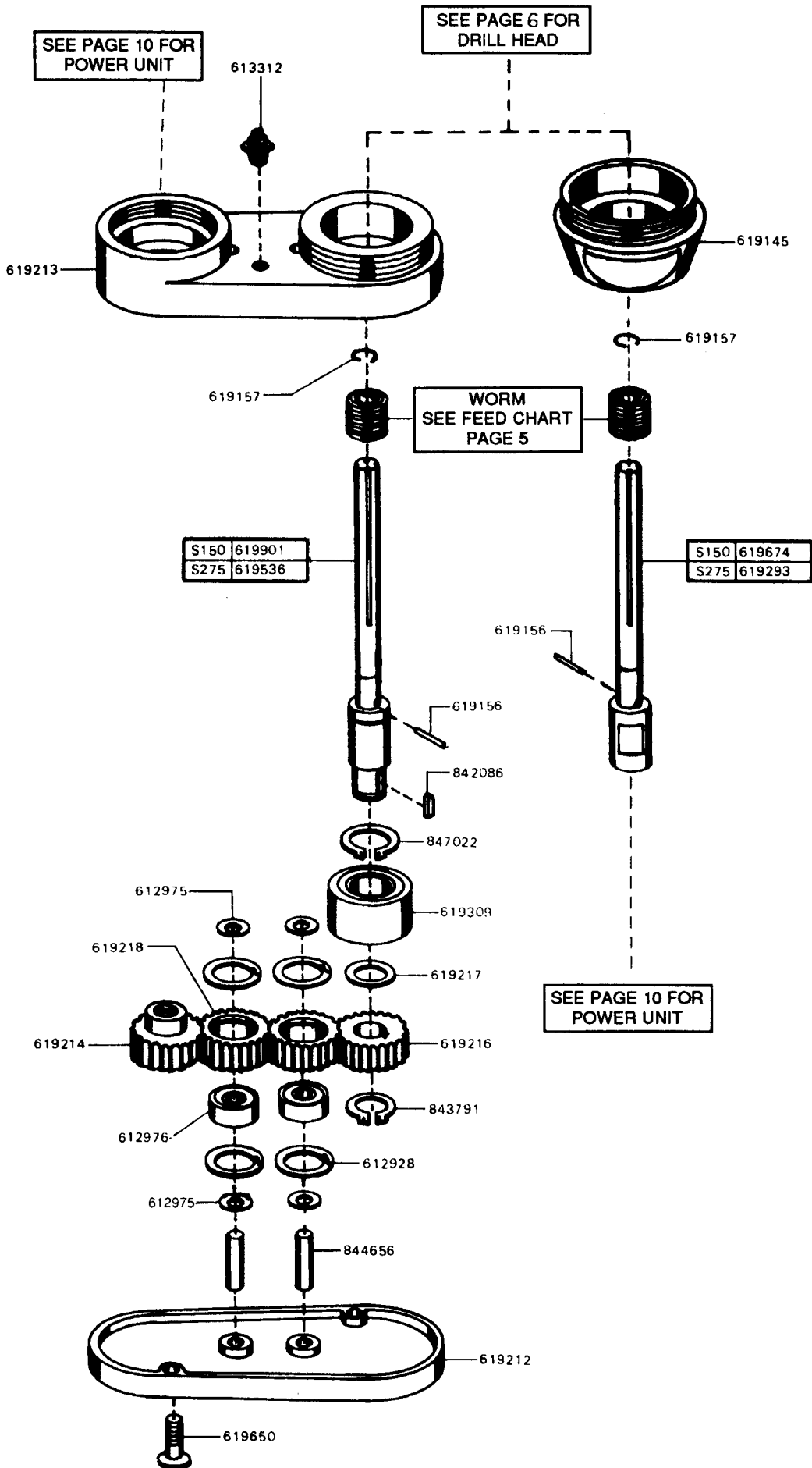
REASSEMBLY—#158 PIGGYBACK POWER UNIT

The power unit is reassembled in the reverse order of disassembly. Wash all parts thoroughly in a solvent and inspect for wear and damage before reassembly. During reassembly, all parts should receive a generous coating of NLGI 2-EP grease or equivalent. If rotor blades are worn as much 1/16" below the rotor surface, they should be replaced. NOTE: The beveled edge of the blade is the trailing edge. The rotor 613234, and the cylinder 613225, should have the "L" to the rear to insure correct rotation. As the internal gear and components are reassembled, the tang end of the planet pins must be toward the front of the planet cage so the planet cage washer will lock them in place.

#15 & #158 MODEL 150 & 275 DRILL HEADS

PART NO.	NAME OF PART	MODEL	QUANTITY	
			S150	S275
614190	Adjustment Wrench		1	1
614927	Thrust Rod		1	-
614928	Thrust Rod		-	1
614929	3/8" Drill Chuck		1	1
614930	Adjustment Plug		1	1
617034	Piston		1	1
617325	Index Collar		1	1
617326	Stop Collar		1	-
617327	Return Stop		1	1
617328	Stop Adjustment Collar		1	-
617331	Screw		3	3
617333	Stop Collar		-	1
617334	Stop Adjustment Collar		-	1
617337	Spring Separator		1	1
619016	Retainer Ring		1	1
619117	Gear Body		1	1
619118	Plug (Large)		1	1
619119	Pinion & Shaft		1	1
619120	Plug (Small)		1	1
619123	Spur Gear Spacer		1	1
619130	Spacer		1	1
619141	Spur Gear		1	1
619150	Helical Gear		2	2
619154	Helical Gear Pin		2	2
619162	Needle Bearing		2	2
619167	Grease Seal (Front)		1	1
619198	Clutch Spring		1	1
619199	Cross Shaft		1	1
619205	Spacer		1	1
619300	Spindle Return Spring		1	1
619401	Lead Screw Driver Key		2	2
619663	Lead Screw Driver		1	-
619666	Pawl		2	2
619667	Plunger		2	2
619670	Thrust Washer		1	1
619675	Shaft Housing		1	-
619677	Spring		2	2
619678	Retract Cushion Spring		1	1
619680	Stop Collar Return Spring		1	1
619681	Spring		1	1
619684	Screw		1	1
619685	Plunger Spring		2	2
619691	Cylinder		1	1
619692	Bearing Retainer		1	1
619702	"O"-Ring 2/16" x 2/4"		1	1
619703	"O"-Ring 1/8" x 13/16"		1	1
619945	Lead Screw Driver		-	1
619949	Cylinder Spacer		-	1
619950	Shaft Housing		-	1
621992	Chuck Adapter		1	1
627332	Spacer		1	1
627333	Retainer Ring		2	2
627334	S150 Extension Spindle		1	-
627335	S275 Extension Spindle		-	1
812165	Pin		2	2
842086	Gear Key		2	2
842517	Ball Bearing		2	2
843791	Retainer Ring		2	2
844265	Steel Ball (1/8")		5	5
844568	Retainer Ring		2	2
844833	Ball Bearing		1	1
844975	Retainer Ring		2	2
863365	Key		3	3
863459	Needle Bearing		1	1
863582	Ball Bearing		2	2
867388	Clutch Pin		2	2
882209	Air Line Fitting		1	1
882407	Air Line (Specify Length)		1	1
884125	Pin		-	2

#15 PIGGYBACK GEARING & DRIVE SHAFT



**PARTS LIST #15 PIGGYBACK GEARING
AND
DRIVE SHAFTS**

PART NO.	NAME OF PART	QTY .
612928	Bearing Retainer Ring	4
612975	Grip Ring	4
612976	Idler Gear Bearing	2
613312	Grease Fltting	1
619145	Motor Adapter	1
619156	Worm Pin	1
619157	Worm Retainer Ring	1
619212	Gear Housing Cover	1
619213	Gear Housing	1
619214	Motor Gear	1
619216	Drive Shaft Gear	1
619217	Gear Spacer	1
619218	Idler Gear	2
619293	S275 Drive Shaft (Straight Models)	1
619309	Drive Shaft Bearing	1
619536	S275 Drive Shaft (Piggyback Models)	1
619650	Cover Screw	2
619674	S150 Drive Shaft (Straight Models)	1
619901	S150 Drive Shaft (Piggyback Models)	1
842086	Gear Key	1
843791	Gear Retainer Ring	1
844656	Idler Gear Pin	2
847022	Bearing Retainer Ring	1

**DISASSEMBLY INSTRUCTIONS
#15 PIGGYBACK GEAR HOUSING**

Unscrew the two (2) cover screws and remove the gear housing cover. Remove the two (2) idler gears and press the drive shaft assembly out of the gear housing, Removing the two (2) retainer rings from the drive shaft will allow the bearing, gear spacer, gear and gear key to be removed from the drive shaft.

**REASSEMBLY INSTRUCTIONS
#15 PIGGYBACK GEAR HOUSING**

Wash all parts in a solvent and inspect for damage or wear. When installing the drive shaft assembly, the drive shaft bearing should be pressed into the gear housing until it is flush with the top of the gear housing. Before installing the gear housing cover, all bearings and gears should receive a generous amount of "Lubriplate 907" grease, or equivalent.

PARTS LIST — #15 POWER UNITS

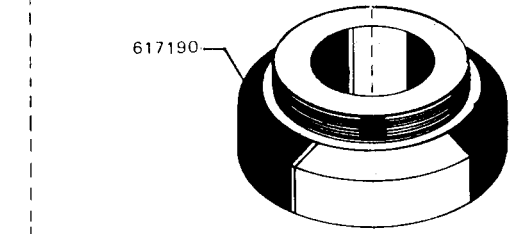
PART NO.	NAME OF PART	RPM	QUANTITY						
			160	250	400	800	1400	2000	3000
611104	Backhead (Incl 613063, 812165)		1	1	1	1	1	1	1
611534	Gear Case		-	-	-	-	-	1	1
612983	Exhaust Screen		1	1	1	1	1	1	1
613058	Throttle Valve Spring		1	1	1	1	1	1	1
613059	Throttle Ring Retainer		1	1	1	1	1	1	1
613060	Throttle Valve Cap		1	1	1	1	1	1	1
613063	Throttle Pin Bushing		1	1	1	1	1	1	1
613066	Air Inlet Screen		1	1	1	1	1	1	1
613226	Motor Housing		1	1	1	1	1	1	1
613227	Bearing Cap		1	1	1	1	1	1	1
613263	Throttle Ring		1	1	1	1	1	1	1
613264	Throttle Pin		1	1	1	1	1	1	1
613361	Gear Case (Incl. 613363, 864964)		1	1	-	-	-	-	-
613363	Ring Gear Pin		1	1	-	-	-	-	-
613544	Adapter		-	-	1	1	1	1	1
613550	Adapter		1	1	-	-	-	-	-
613551	Spider		-	-	-	1	1	-	-
613553	Spider		1	1	1	-	-	-	-
613587	Spider		1	1	-	-	-	-	-
613596	Spider		-	-	-	-	-	-	1
613733	Gear Case		1	1	1	1	1	-	-
617409	Piggyback Swivel Retainer		1	1	1	1	1	1	1
617754	"O"-Ring 2" x 2-1/8"		1	1	1	1	1	1	1
619990	Spider		-	-	-	-	-	1	-
621065	Exhaust Deflector (Incl 612983, 617754)		1	1	1	1	1	1	1
624119	Straight Air Inlet Bushing		1	1	1	1	1	1	1
625560	Piggyback Swivel Bushing		1	1	1	1	1	1	1
625561	Piggyback Air Inlet Swivel		1	1	1	1	1	1	1
631254	Piggyback Swivel Assembly		1	1	1	1	1	1	1
812164	Cylinder Pin		1	1	1	1	1	1	1
812165	Throttle Stop Pin		1	1	1	1	1	1	1
812231	Rotor Bearing Retainer		1	1	1	1	1	1	1
843589	Grease Fitting		1	1	1	1	1	1	1
843615	Spider Bearing		1	1	1	1	1	1	1
843913	Rotor Collar		1	1	1	1	1	1	1
844077	Steel Ball		1	1	1	1	1	1	1
844081	Gear Pin		-	2	-	-	2	-	-
844310	"O"-Ring 7/16" x 5/8"		1	1	1	1	1	1	1
844364	Bearing Retainer Ring		1	1	1	1	1	1	1
844772	Front Rotor Bearing		1	1	1	1	1	1	1
844773	Spider Bearing		2	2	1	1	1	-	-
844774	Gear Bearing		2	-	2	2	-	2	2
844799	Gear Pin		6	4	4	4	2	2	2
847095	Rear Rotor Bearing		1	1	1	1	1	1	1
847146	Gear Bushing		4	4	2	2	2	-	-
847147	Spider Bearing		1	1	1	1	1	1	1
847183	Gear Bushing		-	2	-	-	2	-	-
864232	Rear Bearing Plate		1	1	1	1	1	1	1
864234	Rotor Blade		4	4	4	4	4	4	4
864235	Front Bearing Plate		1	1	1	1	1	1	1
864236	Cylinder		1	1	1	1	1	1	1
864237	Idler Gear (Incl. 847183)		-	2	-	-	2	-	-
864238	Spider		-	1	-	-	1	-	-
864239	Rotor Pinion		-	1	-	-	1	-	-
864240	Gear Case Snap Ring		1	1	1	1	1	-	-
864241	Idler Gear (Incl. 847146)		2	2	-	2	2	-	-
864329	Ring Gear		1	1	-	-	-	-	-
864337	Rotor		1	1	-	1	1	-	1
864340	Idler Gear (Incl. 844774)		2	-	-	2	-	-	2
864341	Spider		1	-	-	1	-	-	-
864376	Idler Gear (Incl. 844774)		-	-	2	-	-	2	-
864659	Spider		-	-	1	-	-	-	-
864660	Rotor		-	-	1	-	-	1	-
864730	Rotor Spacer (.001")		*	*	*	*	*	*	*
864731	Potor Spacer (.002")		*	*	*	*	*	*	*
864732	Rotor Spacer (.005")		*	*	*	*	*	*	*
864964	Grease Fitting		1	1	-	-	-	-	-
881658	Idler Gear (Incl. 847146)		2	2	2	-	-	-	-
882209	Air Line Fitting		1	1	1	1	1	1	1

*Number of spacers required is variable.

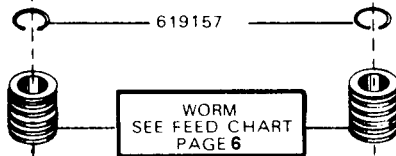
#158 PIGGYBACK GEARING AND DRIVE SHAFTS

SEE PAGE 12 FOR
POWER UNITS

SEE PAGE 6 FOR
DRILL HEAD



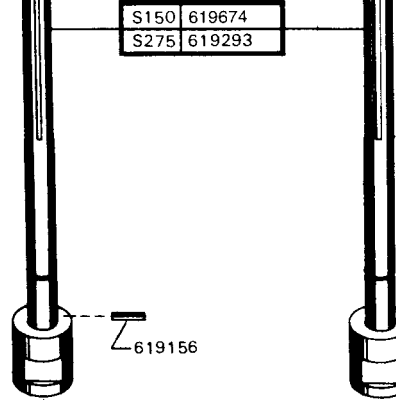
617190



WORM
SEE FEED CHART
PAGE 6



S150 619674
S275 619293



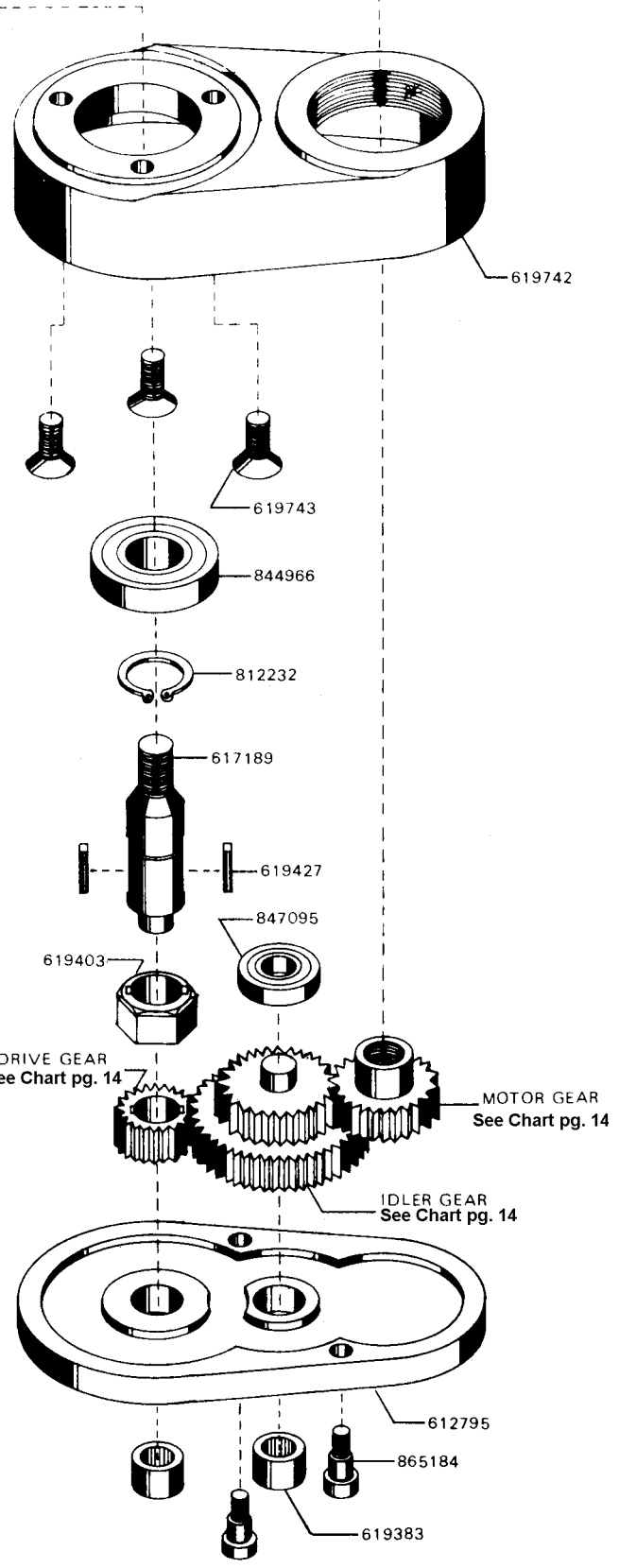
619156

619156

SEE PAGE 15 FOR
POWER UNITS



HEAVY DUTY GEAR COVER
55-135 RPM



619742

619743

844966

812232

617189

619427

847095

619403

DRIVE GEAR
See Chart pg. 14

MOTOR GEAR
See Chart pg. 14

IDLER GEAR
See Chart pg. 14

612795

865184

619383

PARTS LIST — #158 PIGGYBACK GEARING AND DRIVE SHAFTS

PART NO.	NAME OF PART	QTY.	PART NO.	NAME OF PART	QTY.
612795	Gear Housing Cover	1	619427	Drive Gear Key	2
615752	Heavy Duty Gear Cover	1	619674	S150 Drive Shaft	1
617189	Drive Shaft Adapter	1	619742	Gear Housing	1
617190	Gear Housing Adapter	1	619743	Housing Adapter Screw	3
619156	Worm Pin	1	812232	Retainer Ring	1
619157	Worm Retainer Ring	1	844966	Ball Bearing	1
619293	S275 Drive Shaft	1	847095	Idler Gear Ball Bearing	1
619383	Housing Cover Needle Bearing	2	865184	Housing Cover Screw	2
619403	Gear Spacer	1			

DISASSEMBLY INSTRUCTIONS #158 PIGGYBACK GEAR HOUSING

Unscrew the two (2) housing cover screws and remove the gear housing cover. Remove the idler gear, drive gear, gear spacer and drive gear keys from the housing assembly. The drive shaft assembly may now be pressed out the rear of the gear housing. If the drive shaft and drive shaft adapter need to be disassembled, install the drive gear keys and gear spacer onto the drive shaft adapter and unscrew the drive shaft.

REASSEMBLY INSTRUCTIONS #158 PIGGYBACK GEAR HOUSING

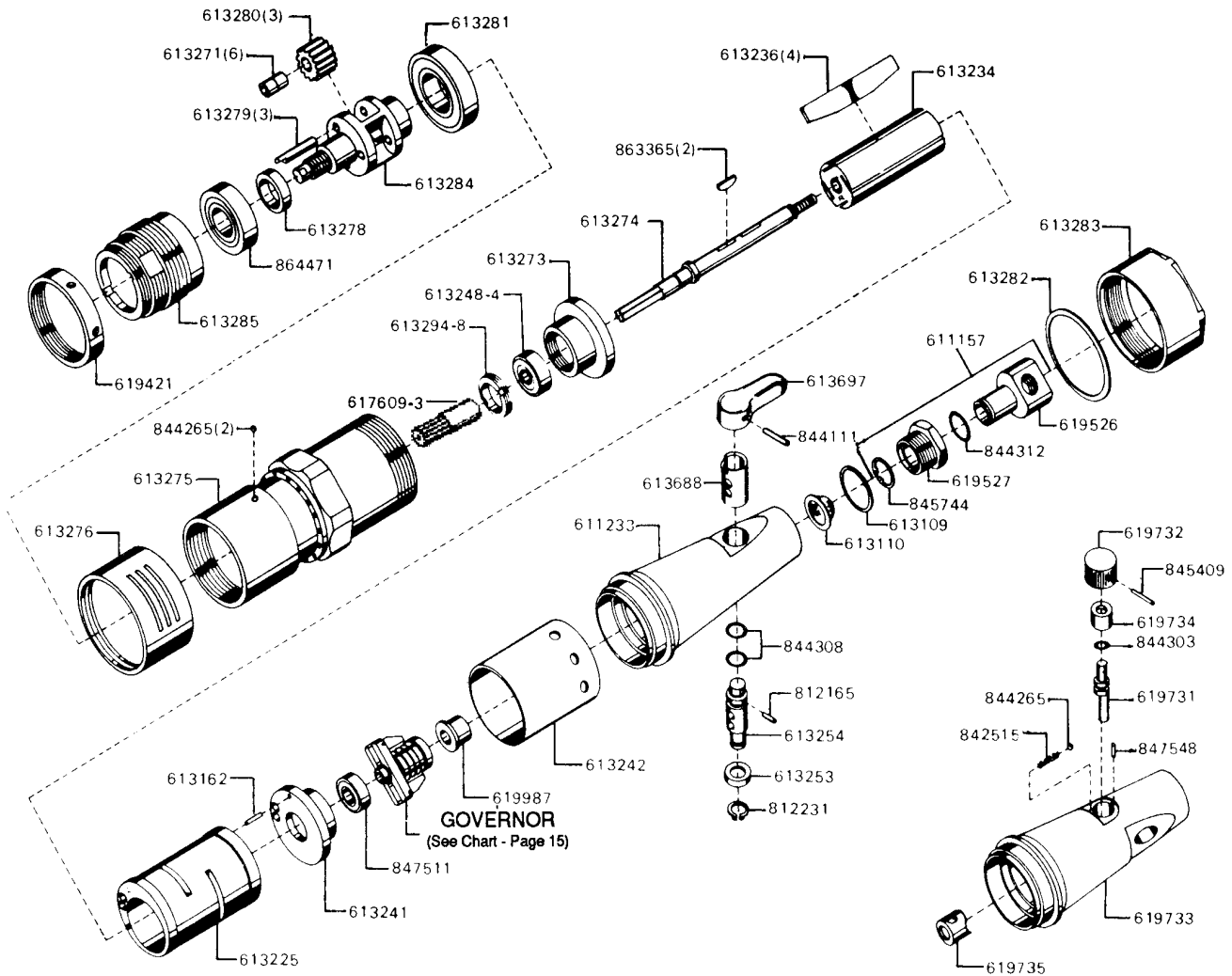
Wash all parts in a solvent and inspect for damage or wear. If the housing cover needle bearings are replaced, they should be pressed in from the rear of the cover. Before installing the gear housing cover, all bearings and gears should receive a generous amount of "Lubriplate T-517" grease or equivalent.

#158 SPINDLE SPEEDS

R.P.M.	GOVERNOR	MOTOR GEAR	IDLER GEAR (inc's gear pin)	SPINDLE gear
3440 2870 2100 1740 1460	611236 611237 611238 611239 611240	619604 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">POWER UNIT</div> 30T	619603 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">25T</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">40T</div>	619436 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">SPACER 619403</div> 25T
1100 900 660 540 450	611236 611237 611238 611239 611240	619434 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">POWER UNIT</div> 15T	619439 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">40T</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">20T</div>	619436 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">25T</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">SPACER 619403</div>
640 535 400 320 265	611236 611237 611238 611239 611240	619434 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">POWER UNIT</div> 15T	619961 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">40T</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">32T</div>	619960 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">SPACER 619403</div> 33T
310* 250* 185* 150* 125*	611236 611237 611238 611239 611240	619434 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">POWER UNIT</div> 15T	619439 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">40T</div> <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">20T</div>	619438 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">SPACER 619403</div> 45T
135* 110* 95* 80* 55*	611236 611237 611238 611239 611240	617567 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">POWER UNIT</div> 12T	617557 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">32T</div>	617563 <div style="border: 1px solid black; padding: 2px; display: inline-block; text-align: left;">20T</div>

* CAUTION: Usable for surface speed only (SFM), not for high torque.

#158 PIGGYBACK POWER UNITS



PARTS LIST — #158 PIGGYBACK POWER UNITS

PART NO.	NAME OF PART	QTY.	PART NO.	NAME OF PART	QTY.
611157	Swivel Assembly (Incl. 619526)		617398(V)	Handle (Incl. 613688, 842515)	
	619527-5. 844312-9. 845744)	1		844265, 847548)	1
613109	Gasket	1	617608	Rotor Shaft	1
613110	Screen	1	617609	Pinion Gear	1
613162	Cylinder Pin	1	619421	Lock Nut	1
613225	Cylinder	1	619526	Swivel	1
613234	Rotor	1	619527	Swivel Bushing	1
613236	Rotor Blade	4	619731 (V)	Governor Jet Cam	1
613241	Rear Bearing Plate	1	619732 (V)	Knob	1
613242	Exhaust Sleeve	1	619734 (V)	Cam Bushing	4
613248	Front Rotor Bearing	1	619735 (V)	Governor Jet	1
613253	Throttle Valve Washer	1	619987	Governor Jet	1
613254	Throttle Valve (Incl. 812165)	1	812165	Throttle Valve Stop Pin	1
613271	Planet Gear Bearing	6	812231	Throttle Valve Retainer Ring	1
613273	Front Bearing Plate	1	842515 (V)	Spring	1
613275	Motor Housing	1	843618	Rotor Bearing Retainer Ring	1
613278	Planet Cage Washer	1	844111	Trigger Pin	1
613279	Planet Gear Pin	3	844265	Steel Ball (1/8")	
613280	Planet Gear	3		(Variable speed requires 3)	2
613281	Planet Cage Bearing	1	844303 (V)	"O"-Ring 3/16" x 5/16"	1
613282	Clamp Ring	1	844308	"O"-Ring 3/8" x 9/16"	2
613283	Handle Nut	1	844312	"O"-Ring 5/8" x 13/16"	1
613284	Planet Cage	1	845409 (V)	Knob Pin	1
613285	Internal Gear	1	845744	Swivel Retainer Ring	1
613294	Rotor Bearing Retainer	1	847511	Rear Rotor Bearing	1
613688	Throttle Valve Bushing	1	847548 (V)	Knob Stop Pin	1
613697	Trigger	1	863365	Rotor Shaft Key	2
615391	Exhaust Deflector	1	864471	Planet Cage Bearing	1
615466	Muffler Screen	1	882209	Air Line Fitting	1
615467	Muffler Screen	1			
617397	Handle (Incl. 613688, 619987)	1			

NOTE: (V) Variable speed units only.

PARTS LIST — #158 STRAIGHT POWER UNITS

PART NO.	DESCRIPTION	RPM RANGES	QUANTITY				
			95 135 165 190 245	175 215 265 380 445	350 420 525 700 850	750 900 1100 1500 1800	1450 1745 2175 2900 3600
613102	Inlet Bushing		1	1	1	1	1
613109	Gasket		1	1	1	1	1
613110	Air Screen		1	1	1	1	1
613162	Cylinder Pin		1	1	1	1	1
613225	Cylinder		1	1	1	1	1
613234	Rotor		1	1	1	1	1
613236	Rotor Blade		4	4	4	4	4
613241	Rear Bearing Plate		1	1	1	1	1
613242	Sleeve		1	1	1	1	1
613248	Front Rotor Bearing		1	1	1	1	1
613253	Throttle Valve Washer		1	1	1	1	1
613254	Throttle Valve (incl. 812165)		1	1	1	1	1
613271	Planet Wheel Bearing		12	12	12	6	6
613273	Front Bearing Plate		1	1	1	1	1
613274	Rotor Shaft		1	1	-	1	-
613275	Motor Housing		1	1	1	1	1
613278	Planet Cage Washer		2	1	-	1	-
613279	Planet Wheel Pin		6	6	6	3	3
613280	Planet Wheel		6	3	-	3	-
613281	Planet Cage Bearing		2	2	2	1	1
613282	Clamp Ring		1	1	1	1	1
613283	Handle Nut		1	1	1	1	1
613285	Internal Gear		1	1	1	1	1
613294	Bearing Retainer Nut		1	1	1	1	1
613688	Bushing		1	1	1	1	1
613697	Trigger		1	1	1	1	1
613828	Name Plate		1	1	1	1	1
615391	Exhaust Deflector		1	1	1	1	1
615466	Muffler Screen		1	1	1	1	1
615467	Muffler Screen		1	1	1	1	1
617113	Drill Head Adapter		1	1	1	1	1
617305	Planet Wheel		-	3	6	-	3
617367	Planet Cage		-	1	-	-	-
617368	Planet Cage		-	1	1	-	1
617369	Internal Gear and Housing		1	1	1	-	-
617370	Planet Cage Washer		-	1	2	-	1
617397	Handle (incl. 613688, 619987)		1	1	1	1	1
617398(V)	Handle (incl. 613688, 842515, 844265, 847548)		1	1	1	1	1
617608	Rotor Shaft		1	-	1	-	1
617609	Pinion Gear		-	-	1	-	1
617610	Planet Cage		-	-	1	-	-
617644	Planet Cage		1	-	-	-	-
617728	Planet Cage		1	-	-	1	-
619731(V)	Governor Jet Cam		1	1	1	1	-
619732(V)	Knob		1	1	1	1	1
619734(V)	Cam Bushing		1	1	1	1	1
619735(V)	Governor Jet		1	1	1	1	1
619987	Governor Jet		1	1	1	1	1
812165	Pin		1	1	1	1	1
812231	Retainer Ring		1	1	1	1	1
834228	Driver Screw		2	2	2	2	2
842515(V)	Spring		-	1	1	1	1
843618	Shaft Retainer Ring		1	1	-	1	-
844111	Trigger Pin		1	1	1	1	1
844265	Steel Ball (1/8") - Variable Speed Requires 3		2	2	2	2	2
844303(V)	"O"-Ring 3/16" x 5/16"		1	1	1	1	1
844308	"O"-Ring 3/8" x 9/16"		2	2	2	2	2
845409(V)	Knob Pin		1	1	1	1	1
847511	Rear Rotor Bearing		1	1	1	1	1
847548(V)	Pin		-	1	1	1	1
863365	Rotor Key		2	2	2	2	2
864471	Planet Cage Bearing		2	2	2	1	1
	Air Fitting		1	1	1	1	1

NOTE: (V) — Variable Speed Units Only.

GOVERNOR CHART

Governor	611236	611237	611238	611239	611240
Power Unit	245	190	165	135	95
R.P.M.	445	380	265	215	175
	850	700	525	420	350
	1,800	1,500	1,100	900	750
	3,600	2,900	2,175	1,745	1,450
Rotor Shaft					
R.P.M.	15,000	12,000	9,000	7,200	6,000

**ALL VARIABLE
SPEED TOOL
REQUIRE THE
611240-3
GOVERNOR.**



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