

OVERHAULING INSTRUCTIONS

FOR

WORTHINGTON

**30" FAIRWAY & BLITZER
MOWER UNITS**

ISSUED SEPTEMBER 1957

Worthington Mower Company
STROUDSBURG, PENNSYLVANIA

CODE 18-C

PART NO. D-391

MOWER OVERHAULING INSTRUCTIONS

IMPORTANT

The Worthington 30" Cutting Unit is a precision built mower that requires careful handling when subjected to major overhaul. The following instructions are supplied as a reference for proper procedure in disassembly, inspection, repair and assembly.

For your convenience in repairing Worthington Mowers, and to establish proper alignment which will insure continued satisfactory performance of your units, an assembly bench with a complete set of tools is available at absolute cost from the Worthington Mower Company, Stroudsburg, Pennsylvania. Refer to page 6 for complete details.

DISMANTLING AND INSPECTION

- 1 — Place unit in assembly bench or support unit by the main axle.
- 2 — Remove Ground Wheels. **Handle carefully** to avoid nicks or scratches on machined surfaces where oil seals contact wheel hubs. **These surfaces must be smooth, otherwise new seals will leak.**
- 3 — Remove gear case covers. Inspect for warpage, check condition of wheel hub oil seal — replace if worn.
- 4 — Remove main gears. Check condition of teeth and pawl lugs.
- 5 — Remove ground wheel cylinders. Inspect bearing and races — inspect cylinders for wear.
- 6 — Remove pawl wheel assemblies. Inspect pawls for wear and freedom of movement in pawl wheel. Inspect ground wheel cylinder studs for security of mounting and for wear.
- 7 — Remove intermediate gears. Inspect teeth for wear. **Inspect bearing sleeves and bearings.** Inspect intermediate gear studs for security of mounting and for wear.
- 8 — Remove fly-knife shaft pinions. Inspect teeth for wear.
- 9 — Remove roller assembly. (Fairway Units) or skid assembly (Blitzer Units). Inspect roller for freedom of rotation and bearing play. Check oil seals, replace if worn (Fairway Units). Inspect skid for straightness and wear, (Blitzer Units).
- 10 — Remove bed knife adjusting assemblies. Inspect handles for wear, friction clips for tension, compression springs for **tension and equal length**, and adjusting screws for wear or damaged tee head.
- 11 — Remove bed knife backing studs and bed knife backing assembly. Inspect studs and bushings for wear, bed knife for wear and backing for warpage. **(No play should exist between studs and bushings.)**
- 12 — Remove gear housings. Inspect main axle pads for burrs and foreign matter. Check fly-knife bearing fit in housing. Check fly-knife shaft oil seals — replace if worn.

check clutch action for tension which **must be firm to increase tension, insert another washer under spring**, or replace spring. Inspect cover gasket surface for nicks or scratches — if present, use of two gaskets will usually prevent grease leakage.

- 13 — Inspect fly-knife reel assembly. **Handle carefully** to avoid nicks or scratches on machine surfaces where fly-knife seals contact shaft. **These surfaces must be smooth, otherwise new seals will leak.** See that **all welds are secure.**
- 14 — Inspect Fly-knife Bearings. Hold inner race between thumb and finger of one hand and outer race between thumb and finger of opposite hand. **If any play exists between races or balls, bearing must be replaced.** Also, check for free rotation.

CLEANING PARTS

Bearings and grease seals should be cleaned thoroughly in either kerosene or fuel oil. **Caution: Do not use solvent type cleaners.** It will dry out grease seals and remove all the lubricant from bearings, resulting in damage to both.

All Worthington 30" Bed Knife Steels are factory ground to finish tolerances as close as possible. However, a **NEW BED KNIFE STEEL**, after being properly assembled to a **NEW or USED BED KNIFE BACKING**, **MUST ALWAYS BE RE-GROUND OR LAPPED IN** to insure continuous satisfactory performance.

SPECIAL NOTICE

- 1 — Proper method of installing a **NEW BED KNIFE STEEL** to a **NEW OR USED** Bed Knife Backing.

(a) Be sure **SURFACE** of Bed Knife Backing is **CLEAN AND SMOOTH.**

(b) Check Bed Knife Backing for twist or warpage. (Allowable maximum warpage .030 from parallel.)

(c) Inspect Bed Knife Backing Bushings and Studs for wear. **NO PLAY SHOULD EXIST BETWEEN STUDS AND BUSHINGS.** Replace if necessary.

(d) Place Backing in vise and attach new Bed Knife Steel with all seven screws and nuts — **BUT ONLY FINGER-TIGHT.**

(e) **LIGHTLY TAP EDGE OF LIP OF BED KNIFE STEEL** over **ENTIRE LENGTH TO INSURE ALIGNMENT** of steel to backing.

(f) **TIGHTEN** all seven screws and nuts **SECURELY.**

- 2 — Proper method of grinding a new Bed Knife Steel after proper assembly (see paragraph 1) to a **NEW OR USED** Bed Knife Backing.

(a) Follow instructions under "11 — **BED KNIFE GRINDING**" on page 2 of Grinding Instructions, part No. D-373.

(Continued on Page 3)

INSTRUCTIONS (Continued)

ASSUMING THAT ALL DEFECTS HAVE BEEN REPAIRED AND WORN PARTS REPLACED, PROCEED WITH ASSEMBLY AS FOLLOWS: —

- 1 — Install the Fly-Knife Shaft Washers and Oil Seals in the Gear Housings — making sure the lip of oil seal faces **opposite** the reel and that they are properly seated in the recess of the gear housings. Use Tool #TL—123.
- 2 — Place the Main Axle Assembly in the proper position on the assembly bench—**CAUTION**—Check Main Axle and Gear Housing and remove any existing nicks or burrs on the pads.

NOTE: Do Not secure the hold down clamps on assembly bench until the gear housings have been attached.

- 3 — Attach one end of the Main Axle Assembly to either the Right or Left Hand Gear Housing with the (4) $\frac{1}{2}$ - 13 x 1" Main Axle Pad cap screws but **DO NO TIGHTEN** securely, just enough to hold Main Axle and Housing in position. (See Instruction #9.)
- 4 — Place a strip of cellophane (or Seal Service Tool #TL—122) around one end of the fly-knife shaft, coat with light grease and install the fly-knife reel in its proper position in the gear housing.
CAUTION: Support free end of reel until instruction #5 is completed. Use extreme caution when inserting the fly-knife shaft into the shaft seal in gear housing to **avoid damage** to the seal.
- 5 — Follow the same procedure as in instruction #4 for installing the opposite Gear Housing on Shaft. Bolt Main Axle to Pad of housing as in instruction #3. Insert positioning pin in the locating hole to support tail of Housings.
- 6 — Install Fly-Knife Shaft bearings with the **open side** of bearing **toward** the gear housing oil reservoir or **inside** of the housings. The bearings should be started evenly in the recess of Gear Housings **BY THUMB PRESSURE** and properly seated with Tool TL — 121 or a sleeve to serve its purpose.
- 7 — Install Bed-Knife Backing Assembly. Lubricate backing studs and install. Tighten backing stud nuts securely. Use Tool #TL - 334. After tightening, the **Bed-Knife Backing Assembly must Pivot Freely**.
- 8 — Install the fly-knife pinion keys or Woodruff keys on each end of the fly-knife shaft and assemble fly-knife pinions. Use Tool #TL—121. Tap freely in place and install the shakeproof washers and nuts and tighten securely. Use Tool #TL—334.

SPECIAL NOTICE: Before proceeding further, read carefully the following instructions on grinding.

To insure continuous satisfactory cutting efficiency in the Worthington 30" Mower there are six (6) important basic factors that must be followed when grinding the Reel and Bed Knife Steel, viz.:

1 — The **REEL** must be ground to a **PERFECT CYLINDER** and **ROTATE** on its Bearings **WITHOUT ANY SIDE** or **UP-AND-DOWN MOTION**.

2 — The **FORWARD EDGE**, as well as the **HORIZONTAL SURFACE** of the **LIP** on the **BED KNIFE STEEL**, must be **GROUND PERFECTLY STRAIGHT**.

3 — **BOTH VERTICAL AND HORIZONTAL FINISHED GROUND SURFACES MUST MEASURE THE SAME FROM BOTH ENDS OF THE BED KNIFE STEEL TO THE CENTER OF THE BED KNIFE BACKING JOURNALS.**

4 — There must be **NO UP-AND-DOWN MOTION** in the Bed Knife Backing **JOURNALS, STUDS OR BUSHINGS** in final assembly.

5 — In final assembly, the **CUTTING EDGE** of the Bed Knife Steel **MUST CONTACT REEL BLADES EVENLY** over its **ENTIRE LENGTH**. **CAUTION: THIS MUST BE DONE WITHOUT ANY TWISTING OR DISTORTION OF THE BED KNIFE BACKING ASSEMBLY.**

6 — **BOTH ENDS OF THE BED KNIFE BACKING ASSEMBLY MUST BE ADJUSTED EVENLY TO THE REEL BLADES AT ALL TIMES.**

Bed knife steels must be ground or lapped-in when installed. Be sure surface of bed knife backing is perfectly clean and smooth before installing a new bed knife steel. Steels should be ground on any accurate horizontal stone grinder. They should be "sparked out" with a very slight undercut toward the cutting edge. (Up to $2\frac{1}{2}^\circ$). Fly-Knife reels should be cylindrically ground on a Landis (or equivalent) grinder. Reel must be supported by the fly-knife shaft bearings.

Due to the lack of a cylinder grinder, a perfectly satisfactory grind can be obtained with a Peerless (or similar) grinder. It is recommended that "backing off" be held to a minimum. Grinding on this type of machine should be done after completing step 1 through 12 inclusive. It will be necessary to disregard the paper cutting test in steps 10 and 13 until after fly-knife reel is ground.

To secure a parallel grind on the Peerless (or equivalent) type grinder, the bed knife must be adjusted so that it is parallel with the fly-knife reel axle. This can be done by adjusting the bed knife steel so that equal measurements are obtained between the fly-knife reel shaft and each end of the cutting edge of the bed knife steel. Index the grinder on bed knife steel and grind fly-knives until all knives "spark-out".

(Continued on Page 4)

INSTRUCTIONS (Continued)

REPLACE UNIT IN ASSEMBLY BENCH AND CONTINUE ASSEMBLY, FOLLOWING STEPS 14 THROUGH 30 IN THE ASSEMBLY INSTRUCTIONS.

- 9 — Check cutting qualities of the mower by raising the bed-knife backing assembly to contact the fly-knife reel **BY USING HAND PRESSURE**. If mower cuts paper along its entire cutting edge, it is ready for further assembly. **Tighten** all of the main axle pad cap screws. (Use Tool #TL — 334). Secure Axle Hold Down Clamps. See Instruction #2.
- 10 — Install bed knife backing adjusting assemblies. Pack adjusting handles with Winter Grade Chassis Lubricant before installing.
CAUTION: Be sure no lubricant is present where adjusting handles rest on gear housings.
- 11 — When adjusting the bed knife steel to meet the fly-knife reel, **BE SURE BOTH ADJUSTING SCREWS ARE DRAWN UP EVENLY**.
- 12 — Lightly tap along the bottom of the bed knife backing assembly with a rubber or wood mallet to seat the adjusting screws to the bed knife backing. Readjust and check mower's ability to cut paper along its entire length of bed knife.
- 13 — Pack all four ground wheel cylinder bearings with Winter Grade Chassis Lubricant.
- 14 — Install the two inner bearings on the ground wheel studs with the taper to the outside.
- 15 — Install pawls in the pawl wheels. Pawls must be inserted so that the **LONG EXTENSION** of the **PAWL HEAD** is **TO THE OUTSIDE**. The **Pawl Pin** must be installed so that the **COTTER PIN** is on the **OUTSIDE** of the pawl wheel.
- 16 — Place pawl wheel assembly over the ground wheel stud and engage the clutch fork in the groove on the inner side of the pawl wheel.
- 17 — Place ground wheel cylinder over the ground wheel stud and slide through pawl wheel, with the **THREADED END** of the **CYLINDER** to the **OUTSIDE**.
- 18 — Install the remaining ground wheel cylinder bearings with the taper to the inside. Tighten ground wheel cylinder lock nuts sufficiently to remove all end play from the ground wheel cylinder while still maintaining a freely rotating cylinder. Secure nuts with cotter pins. (Use Tool #TL-334)
- 19 — Install bearing sleeves in the Intermediate gears.
- 20 — Install Intermediate gear bearings and Int. gears. (Use Tool #TL — 124).
- 21 — Install main gear (Pawls must always be placed so that they **POINT** in the **FORWARD DIRECTION** of the **GROUND WHEEL ROTATION**).
- 22 — Use Permatex #2 or shellac to coat gasket surfaces on **GEAR HOUSINGS AND GEAR HOUSING COVERS**. Install gasket and gear housing cover. **TIGHTEN COVER SCREWS SECURELY**.

- 23 — Lubricate ground wheel oil seal in covers with light engine oil before assembling wheels.
- 24 — Install ground wheels, using extreme caution so as not to injure the ground wheel oil seals.
- 25 — Fill ground wheel hub caps with Winter Grade Chassis Lubricant — Install hub caps and tighten securely. (Use Tool #TL — 117.)
- 26 — Install the hub cap lock bolts and lock wires.
NOTE: After the first ten (10) hours of operation the hub caps should be removed and the ground wheel cylinder checked for end play. Make any necessary adjustment so that all end play is eliminated and that the cylinder revolves freely. Replace the Hub Cap and tighten securely. Be sure to replace the lock screw and lock wire. **This procedure is recommended after every 100 hours of operation.**
- 27 — Refer to Page 5 and Plate #3 for Roller Instructions for Assembling and Lubrication.
- 28 — Install NEW rubber bushings in roller brackets.
- 29 — Install Roller and Bracket Assembly as follows: After Instruction #28 has been completed, with the roller bracket bolts loose, slide the roller brackets in place at the rear of the unit housing and bolt to housing with the (2) 1/2 - 13 x 1 1/2 cap screw and 1/2 - 13 square nut. Select the desired height of cut on Height Adjustment Chart A or B in this Manual or the height adjustment card supplied with the unit. Center the roller assembly between the roller brackets and rubber bushing and tighten roller bracket lock bolts.

LUBRICATION

GEAR HOUSING

ALL NEW and OVERHAULED Worthington 30" Units **MUST** BE PROPERLY LUBRICATED before they are placed in operation.

TYPE OF LUBRICANT:

The following types of lubricants are recommended:

Texaco Marfax 00 — Mobilgrease #1 OR EQUAL

30 — Remove grease filler plugs in each gear housing. USE 1 PINT (1 lb.) in each gear housing. Insert lubricant through filler plug (O) on top of housings using a suction type grease gun. **RELACE ALL PLUGS.**

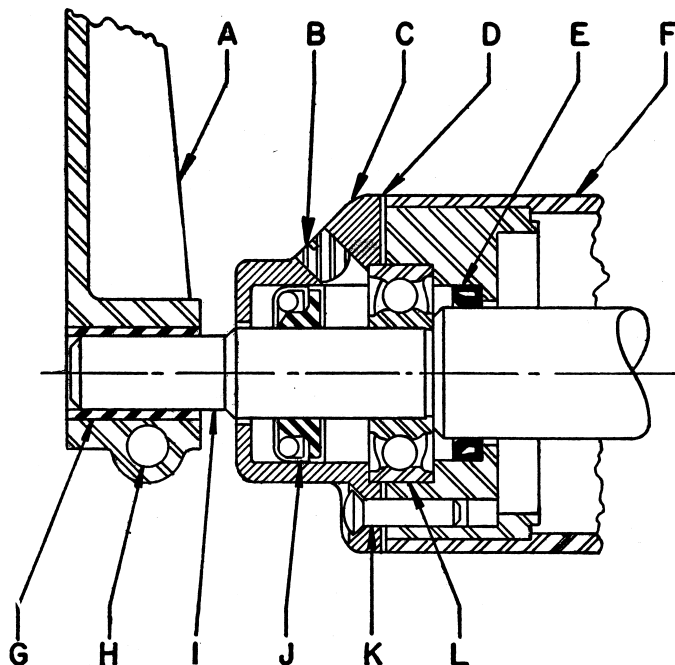
In using the above types of lubricant one filling will be sufficient for a full mowing season and no further checking or addition of lubricant is required except in cases of breakage or leaks that might occur due to faulty seals or gaskets.

IMPORTANT

All previous information regarding lubrication found in Repair Parts Manuals, Literature, Instruction Tags, Service Bulletins or on the mowers themselves, **MUST** be disregarded unless said information agrees with the above recommendations.

(Continued on page 5)

ROLLER ASSEMBLY INSTRUCTION



30" Units, Serial No. D-25585 and up, use the D-274-51 Roller Assembly. This Roller Assembly incorporates Oil Seals, D-235-48, back of the ball bearings used in each end of this Roller. Special tools, #TL - 1943-A and TL - 1943-B are recommended to install these Seals.

To Assemble Roller proceed as follows:

- 1 — Secure Roller Tube in vertical position.
- 2 — Insert Roller Shaft through Roller Tube so that shaft protrudes 2 $\frac{5}{8}$ " above face of Roller End. Hold shaft in position by resting lower end of shaft on block of wood. z
- 3 — Place Seal over Tool #TL - 1943-A with lip of Seal (E) away from shoulder of tool. Slide tool over end of Roller Shaft.
- 4 — Place Tool #TL-1943-B over TL-1943-A and seat Seal by lightly tapping TL-1943-B.
- 5 — Pack recess between seal (E) with OUTBOARD MOTOR GEAR BOX GREASE BEFORE INSTALLATION OF BEARING (L).
- 6 — Install Bearing (L), Gasket (D), and Roller End Cap (C) containing Seal (J).
- 7 — Turn Roller end for end.
- 8 — Install one (1) pint S.A.E. #250 Lubricant in Roller Tube (F). This will protect the inside component parts of the Roller from corrosion and rust which develops through condensation caused by temperature changes.
- 9 — Repeat operations 3 to 6 inclusive.
- 10 — BE SURE TO FILL BOTH ENDS OF ROLLER WITH A GOOD GRADE OF OUTBOARD MOTOR GEAR BOX GREASE, THROUGH FILLER PLUGS (B). REPEAT EVERY 25 HOURS OF OPERATION.

CAUTION

DO NOT APPLY GREASE UNDER PRESSURE.

DO NOT USE ANY GREASE CONTAINING GRAPHITE.

Compliance with instructions noted above will INSURE LONGER LIFE of the ROLLER ASSEMBLY.

HEIGHT SETTING CHART FOR ROLLER BRACKETS

[A] Off-Set

HOLE NO. IN BRACKET	HOLE NO. IN HOUSING	HEIGHT OF CUT		
		STEEL WHEEL	4.00 x 12 TIRES	4.00 x 9 TIRES
8	2	3/8	13/16	
7	1	1/2	1	
6	1	5/8	1 1/8	1/4
7	2	13/16	1 1/4	7/16
6	2	1	1 3/8	5/8
7	3	1 1/8	1 1/2	3/4
5	2	1 1/4	1-11/16	15/16
4	2	1-7/16	1-13/16	1-1/16
5	3	1 5/8	2	1 1/8
4	3	1 3/4	2 1/8	1 3/8
3	2	1 7/8	2-5/16	1 1/2
2	1	2	2 1/2	1-11/16
3	3	2-3/16	2 5/8	1-13/16
2	2	2-5/16	2 3/4	2
1	1	2 1/2	2-15/16	2-3/16
1	2	2-13/16	3 1/4	2 1/2
1	3	3 1/8	3-9/16	2 3/4

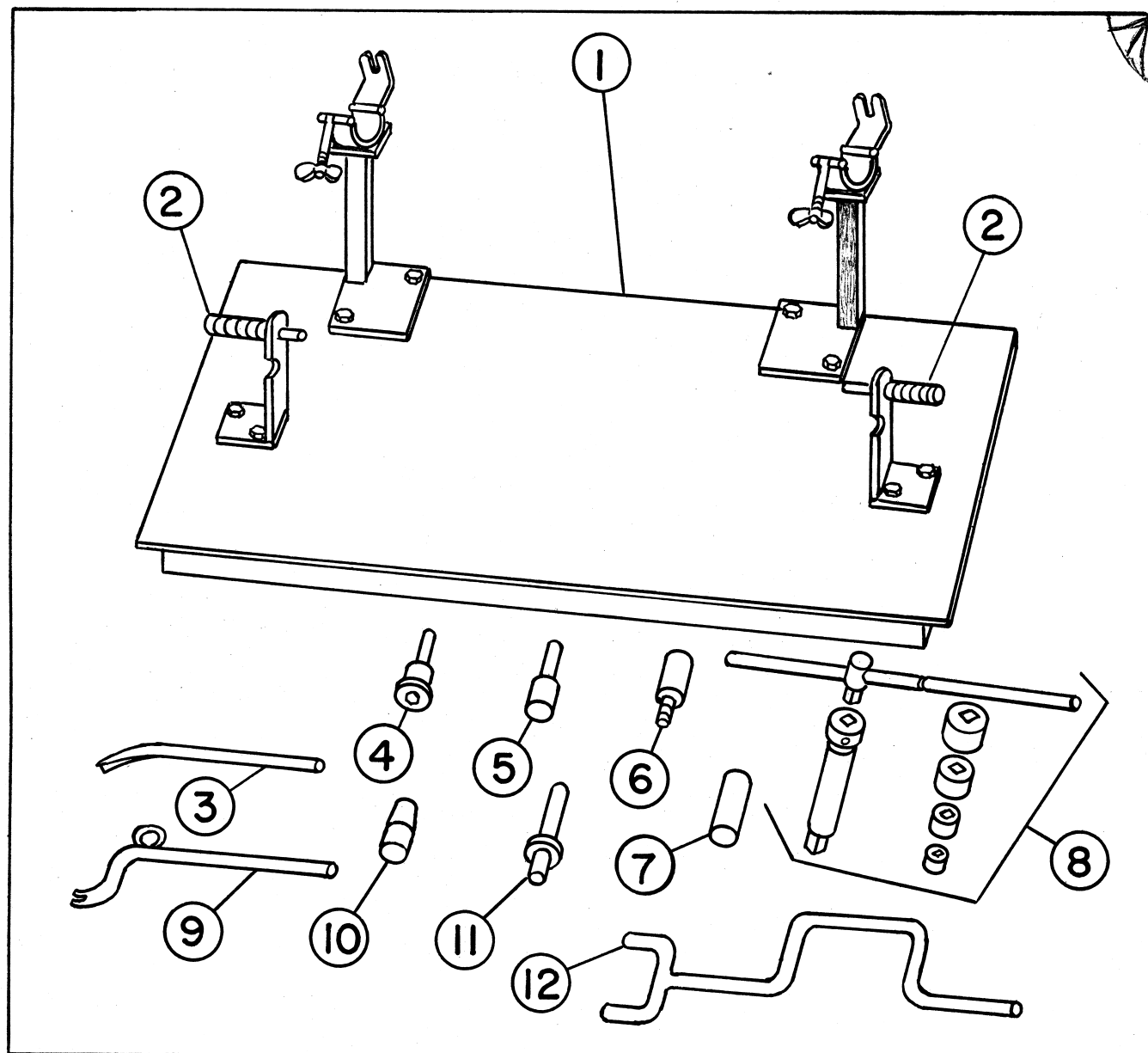
[B] Straight

HOLE NO. IN BRACKET	HOLE NO. IN HOUSING	HEIGHT OF CUT		
		STEEL WHEEL	4.00 x 12 TIRES	4.00 x 9 TIRES
6	1	5/16	13/16	
5	1	1/2	15/16	1/4
6	2	11/16	1 1/8	3/8
4	1	7/8	1 1/4	9/16
3	1	1	1-9/16	11/16
5	3	1-3/16	1 5/8	13/16
3	2	1-5/16	1 3/4	1
2	1	1 1/2	1-15/16	1-3/16
3	3	1-11/16	2-1/16	1 3/8
2	2	1 7/8	2 1/4	1-9/16
1	1	2-1/16	2 1/2	1 3/4
2	3	2-3/16	2-9/16	1-15/16
1	2	2 3/8 -	2-15/16	2 1/8
1	3	2 3/4	3 1/8	2 3/8

CAUTION

Be sure that bolts in Both ends of Roller Assembly
are in corresponding holes in brackets and housing
and that the Air Pressure in all tires is 35 lbs.

ASSEMBLY BENCH & SERVICE TOOLS



ASSEMBLY, BENCH & SERVICE TOOLS PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	TL-100	Assembly Bench, less Tools (Includes 2 of Ref. 2)	*7	TL-1943B	Roller Shaft Seal Seater
2	TL-114	Gear Housing Positioning Pins	8	TL-334	Socket Wrench & Handle Sets (Replaces TL-117 and TL-225)
3	TL-118	Fly Knife Pinion Bar	9	TL-119	Clutch Spring Bar
4	TL-121	Fly Knife Pinion Driver	10	TL-122	Fly Knife Shaft Seal Sleeve
5	TL-123	Fly Knife Shaft Seal Seater	11	TL-124	Intermediate Gear Sleeve Driver
*6	TL-1943A	Roller Shaft Seal Adapter	12	TL-120	Adjusting Handle Removal Bar

* Sold in Set Only

NOTE: No orders can be filled unless part number and serial number of equipment is given.