

Rick
503



Bolt 3" Long

MASSEY-FERGUSON

Pete Lawson

NO. 31

REAR MOUNTED MOWER

H J Davis



Owner's Manual



Massey-Ferguson Inc.
DETROIT, MICHIGAN

*78000 1 unit of
75000 - 550 P.T. R.*



Take Your Time

IS TIME SO IMPORTANT THAT YOU'LL FORGET TO SHUT OFF AN IMPLEMENT WHEN IT HAS TO BE OILED OR ADJUSTED? FARM ACCIDENTS ARE CAUSED BY CARELESSNESS AND LACK OF THOUGHT. NEXT TIME YOU'RE TEMPTED TO HURRY, THINK OF US. WE ALL FEEL THAT ACCIDENTS WON'T HAPPEN TO US, BUT THEY DO, NO MATTER HOW MUCH WE WISH THEY DIDN'T.

FARM EQUIPMENT MANUFACTURERS PLAN SAFETY AND EFFICIENCY INTO THE MACHINERY YOU OPERATE. THEIR PLANNING, YES, EVEN OUR OWN PERSONAL PLANS, WON'T MEAN A THING IF YOU ACT CARELESSLY. THE MACHINE YOU ARE OPERATING IS ONLY AS SAFE AS THE MAN WHO OPERATES IT. NO MATTER WHAT WE SAY OR DO THE BEST SAFETY DEVICE IS YOU, REMEMBER, TAKE TIME TO BE SAFE.



NATIONAL SAFETY COUNCIL

*We are pleased
to add your name*

to our list of owners of this new Massey-Ferguson machine. We hope that it will give you the utmost satisfaction in your field work.

This machine is one of a full line of farm and industrial machinery manufactured by Massey-Ferguson, including the great tractor line with the genuine Ferguson system and the world-famous Massey-Harris line of self-propelled combines.

The world-wide preference for Massey-Ferguson products is the result of internationally recognized leadership in engineering, plus precision of manufacture, in every one of our 17 factories in Canada, United States, Great Britain, France, Germany, Australia and South Africa.

We are proud of the wonderful reputation earned by the products of these factories for efficiency and dependability.

Your dealer who serves you is one of over 10,000 business men in the great M-F dealer organization who are pledged to uphold the Massey-Ferguson tradition of service to customers.



Massey-Ferguson Inc.

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SERIAL NUMBER PLATE

Each Massey-Ferguson Implement is identified by means of an implement serial number and model number. These numbers are permanently recorded on the serial number plate. It is of the utmost importance that you refer to these numbers when ordering parts, accessories or requesting service. Adherence to this policy will ensure prompt service and will eliminate confusion and time consuming delays.

Periodic Maintenance

Proper maintenance, including periodic inspection and regular lubrication is essential to the long life and trouble-free operation of your new Massey-Ferguson Mower. This section of your manual is devoted entirely to maintenance and should be referred to when regular servicing is performed.

LUBRICATION

Care should be taken when handling all lubricants. Open containers collect dirt which may damage the lubricated parts. Always wipe off grease fittings and filler plugs before lubrication to prevent the entrance of dirt.

The components listed in this section should be lubricated regularly at the periods indicated.

There are 14 pressure grease fittings on the No. 31 Mower (including two on the PTO shaft). The position of these fittings is indicated in Figs. 1 and 2.

The following table indicates the periods at which lubrication should be carried out:

Pressure Grease Fittings—8 Hours

Lubricate fittings 7 to 14* after each 8 hour operating period. Lubricate fitting No. 8 every two or three hours in extremely dry, dusty, or extremely wet conditions.

PTO Shaft—3 times per season

Approximately three times during the operating season, the two halves of the PTO shaft should

be slipped apart and the square inner shafts lubricated thoroughly with light grease or a heavy lubricating oil.

Drive Unit—As Specified

The drive unit should be lubricated according to the instructions on the plate attached to the top inside surface of the drive unit. A facsimile of this plate is shown at Fig. 3. Avoid excessive lubrication of the sealed bearings in this unit. Excessive grease in these bearings may overload them causing overheating, plus breakage of the seals and eventually leading to the bearings running dry. One or two pressure strokes of the grease gun at the intervals indicated on the lubrication plate (Fig. 3) are all that are required.

NOTE: When pressure lubricating all components apart from the drive unit and the fitting on the drive shaft housing (No. 14 in illustrations), pump in grease until fresh grease is forced out around the part; this procedure will flush out the

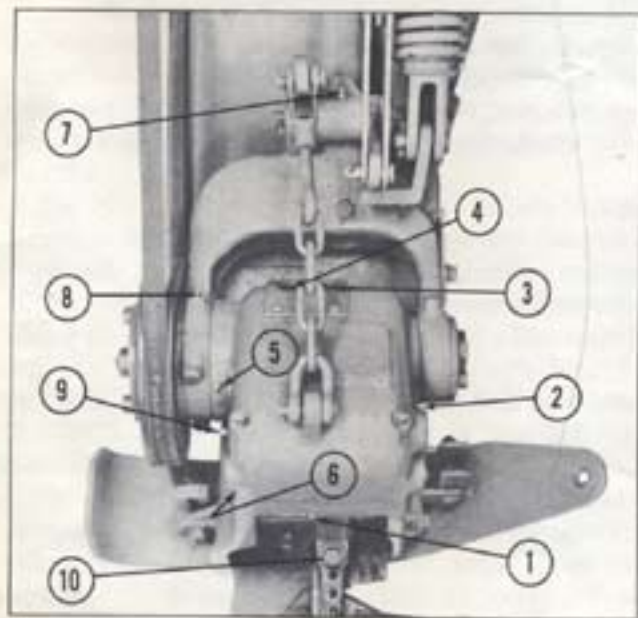


Fig. 1 Lubrication Points

1 thru 6, Lubricate according to decal.
7 thru 9, Lubricate 8 hour periods.
10, Knife head lubrication point (below bolt indicated). 8 hour periods.

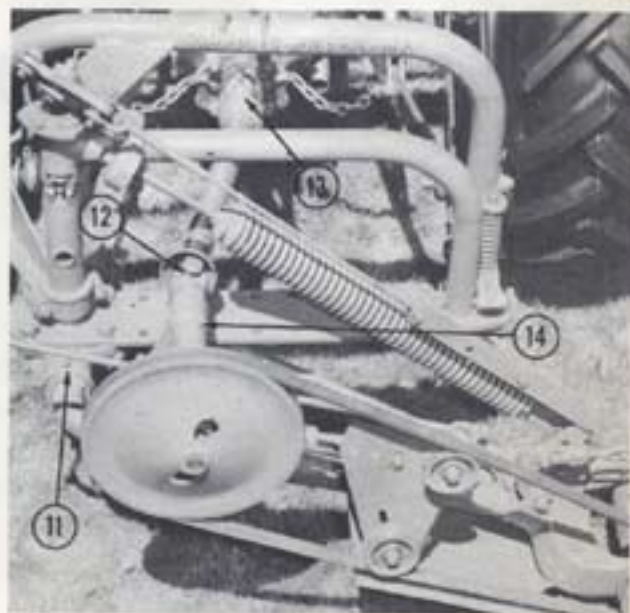


Fig. 2 Lubrication Points

11 thru 14, Lubricate 8 hour periods.

*For No. 14 fitting refer to "Note" and paragraph which follows at the end of "Drive Unit" heading.

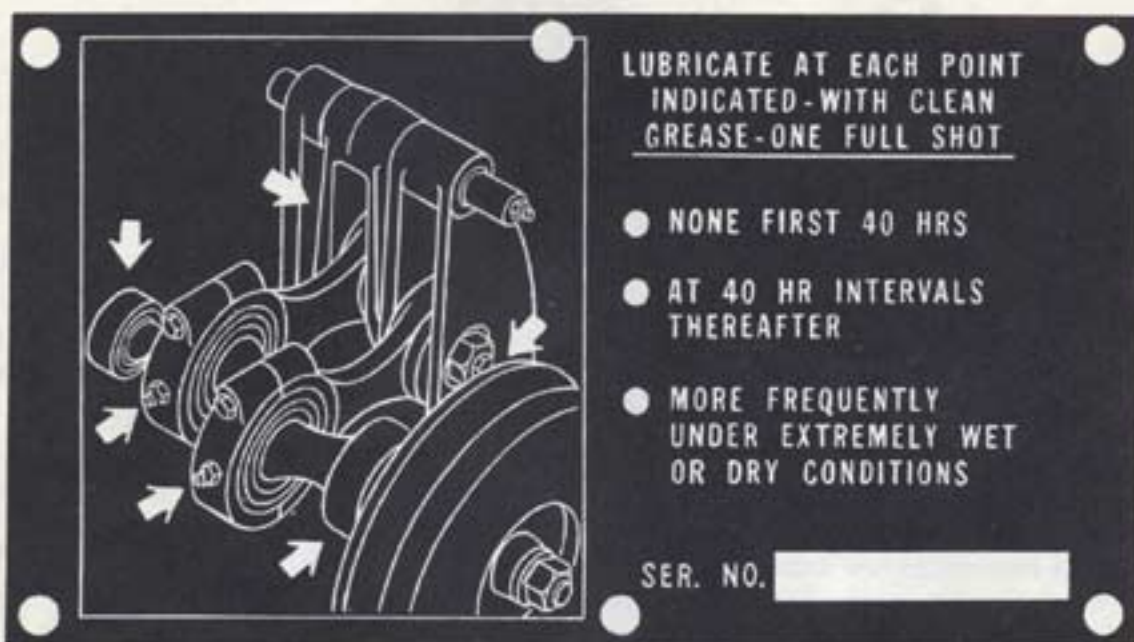


Fig. 3 Lubrication Decal, Dyna-Balance Unit

used grease which may contain abrasive dirt.

The drive unit grease fittings are indicated at No.'s 1 through 6 inclusive, in Fig. 1. The grease fitting indicated at No. 14 (Fig. 2) should be lubricated at 8 hour intervals but always sparingly.

Lift Linkage Pivot Pins—Seasonal

At the beginning of the season, the lift linkage pivot pins should be lightly oiled; also at any time after the machine has stood out in the rain for a prolonged period.

Cutter Bar—Seasonal

At the end of each season the cutter bar, knife, and shoes should be coated with grease or heavy

oil as instructed under "Mower Storage", page 27.

Cutter Bar—Pre-delivery

Oil the knife liberally at the knife clips and wear plates on a new machine prior to first operation.

NOTE: Do not lubricate clips, or knife and cutter bar during operation as particles of dirt and grit tend to adhere to the lubricated surface and thus act as an abrasive compound. An exception to this may be made in the case of knife removal. Oiling of the knife will aid in its removal; this is explained under the "Knife Replacement" heading, page 24.

Operation

The "like new" performance of the new Massey-Ferguson No. 31 mower can be perpetuated if the operator follows a few basic rules and operating principles; the observance of a few reasonable precautions will extend considerably the overall life of the machine.

Periodic maintenance and adjustment throughout the lifetime of the mower will play an important part in the amount of trouble-free service which may be expected; also, as the operator becomes more familiar with the normal adjustments in relation to conditions encountered, he can ensure a smooth, efficient, mowing operation. Thus, the ultimate mower life will be extended, eliminating unnecessary "down time" and an uneconomical operation. Study the suggestions in this section carefully; they were compiled expressly to aid the operator in obtaining all the performance that was designed and built into the No. 31 Mower.

DESCRIPTION

The No. 31 Rear Mounted Mower is a high performance, long life, high speed mower utilizing a modern "Dyna-Balance" drive unit. This type of drive has many desirable features that do not exist in the more common pitman drive type mower. Notable among these is the very low level of vibration and the high speed running characteristics. The No. 31 Mower is the ideal implement for the custom operator or the farmer who has a large acreage to mow. It is well suited to areas of uneven terrain such as mountain foothills, terraced fields, border irrigated areas etc. This mower will operate satisfactorily at 6 MPH in most conditions and up to 9 MPH in moderate easy cutting conditions provided the terrain is suitable.

The No. 31 Mower has a very desirable variable sheave feature; this provides the optimum knife speed for the crop being mowed as well as providing more variations in tractor PTO speed. This feature of the mower eliminates the need for alternate sheave sizes and corresponding belt lengths.

The No. 31 Mower is designed to attach to the "three point hitch" of the Ferguson and Massey-Ferguson line of tractors, and many other makes of tractors that have a similar hitch arrangement. Using the three point hitch method of attachment provides a very convenient and secure attachment. One stabilizer bar is used at the right link position. The PTO drive shaft is secured in position by means of a single thumb lock device.

The No. 31 Mower, together with its companion model No. 32 Pitman Drive Mower are unique in the industry, in that both types of mower with their different types of knife drive, use the same basic frame unit. This common frame unit consists of a main frame, which attaches to the upper and lower tractor linkage, a

swinging frame and safety release mechanism. The swinging frame is attached to the main frame by a sturdy hinge at one side and the safety release unit at the other.

The mower may be assembled to three different width settings in order to suit any tractor wheel width between 52 and 76 inches. On all current Massey-Ferguson tractors with power adjusted wheels the wide tread setting can be used with the wheel discs dished inward or outward. After initial assembly and adjustment of the mower, it can be attached and detached quite rapidly with the cutter bar in either the vertical or horizontal position.

The cutter bar is protected by a very efficient "safety release" (or break back) mechanism consisting of a spring loaded latch and roller which is much more dependable than the conventional



Fig. 4 Operating with No. 31 Mower and TO 35 Tractor

latch on sloping surfaces. A chain limits the backward travel of the cutter bar and frame when the safety release functions, thus preventing excessive lengthening of the PTO shaft and acute angles of the universal joints.

To suit varying mowing conditions a number of components have been placed in the "optional" category, thereby enabling the customer to purchase a machine which will suit his exact requirements. Two knives are provided with the original machine, these come in heavy duty and standard, serrated and plain varieties. Guards, PTO shafts, and hitch pins also come under the "Optional Equipment" heading; these items are all explained in detail commencing under the lower heading on this page.

The precision built cutter bar is of conventional design with knife, knife guards, ledger plates, and knife clips easily replaced. The cutter bar section is of rectangular design to provide extra rigidity and strength.

The bar is raised simply and efficiently by means of the hydrallever; this allows it to be raised quickly to avoid obstructions without "whipping" the bar. In transport position the bar is carried vertically. When transporting in the field the cutter bar, when fully raised, will ride with its inner end from 15 to 20 inches clear of the ground and its outer end from 25 to 30 inches. The long, low rate counterbalance spring allows the cutter bar to float evenly over uneven terrain without skipping in the low spots or digging in at the high spots. With the counterbalance spring adjusted for minimum ground pressure, the bar will float over rocks and stones with the minimum of damage.

The No. 31 Mower was designed and produced for the discriminating owner. Shipping, warehousing, adjustments and maintenance have been carefully considered in order that the factory, branch house, and dealer may give the most efficient service to the customer.

PRE-OPERATING INFORMATION

A pre-operative check of the tractor wheel tread settings, mower width, guards, and adjustments is necessary to ensure that no delay will be experienced when the mowing season arrives. The type of crop or grass to be mowed will decide the optional knives to be used.

OPTIONAL EQUIPMENT AND ACCESSORIES

The items listed in this section are either optional pieces required to complete the full assembly of the basic mower, or are accessory items, de-

signed and developed to facilitate the mowing operation under varying conditions.

The use of one or more of these items may be well suited to your particular operation, and may assist in making your work easier and more profitable.

Any of these items may be purchased through your local Massey-Ferguson Dealer, who will be pleased to render any assistance required regarding their installation and usage.

Cutter Bars

Both the 6' and 7' cutter bars are available for use with the No. 31 Mower. The desired length should be stipulated when the mower is ordered. For correct setting, refer to the "Adjustments" section, pages 15 and 16.

Knives

Both plain and underserrated edge knives are available as optional equipment, these in turn are divided into heavy duty and standard categories. The type of material to be mowed will be the governing factor in deciding which type of knife to use. Generally, for heavy duty with coarse materials, underserrated edge knives should be used. These knives will give the optimum in long service and will not need frequent sharpening. With fine materials such as June grass and various fescues it will be necessary to use plain knives as the serrated knives would tend to clog. Where fairly extensive and varied mowing operations are to be carried out, it is suggested that the operator have both types on hand. The knife changing operation is very simple and can be carried out in a few minutes. This operation and instructions on knife sharpening and the removal of knife sections is explained in the "Servicing" section of this manual, page 24.

Guards

Both are standard (in malleable iron or forged steel) and heavy duty (malleable iron) guards are available as optional equipment. It is advised that in extremely rocky conditions, or where trash or other foreign material may be encountered, that the heavy duty guards together with heavy knives be used. For normal operations and average mowing conditions, the standard (malleable) guards with light or heavy knives will give satisfactory results.

For fine tough grass conditions such as blue grass, prairie hay, etc., the forged steel guards with lightweight smooth sections are recommended. The forged steel guards are more slender and smoother thus giving better penetration of the crop.

In conditions where mud plugging under the guards is prevalent, the clipped wing guards are recommended.

Local conditions will of course dictate the choice of guard to be used. Your local Massey-Ferguson Dealer will be happy to assist you in this matter. For adjustment or alignment of guards see "Guards and Ledger Plates", page 25. For further information on the various types and usages of guards, the Ferguson manual "Mower Guards" is available.

Hitch Pins

Both the $\frac{7}{8}$ and the $1\frac{1}{8}$ inch diameter hitch pins are available to suit tractor link ball joints from both the No. 1 and No. 2 Category hitches.

NOTE: Ferguson and Massey-Ferguson model tractors prior to the MF 65 use two $\frac{7}{8}$ inch diameter hitch pins of different lengths. The short pin fits on the left of the mower and the long one on the right (looking from the rear). MF 65 and later models use either $\frac{7}{8}$ or $1\frac{1}{8}$ inch dia. pins according to the size of the link ball joints. The short pins are used on both sides.

POSITION STOP KIT (ACCESSORY)

Many older model tractors still in service at the moment are not equipped with a position control hydrallever. Although the draft control lever on these older models may be used to raise and lower the mower, it is not possible to return to the same position with this type of control, each time the mower is raised and lowered.

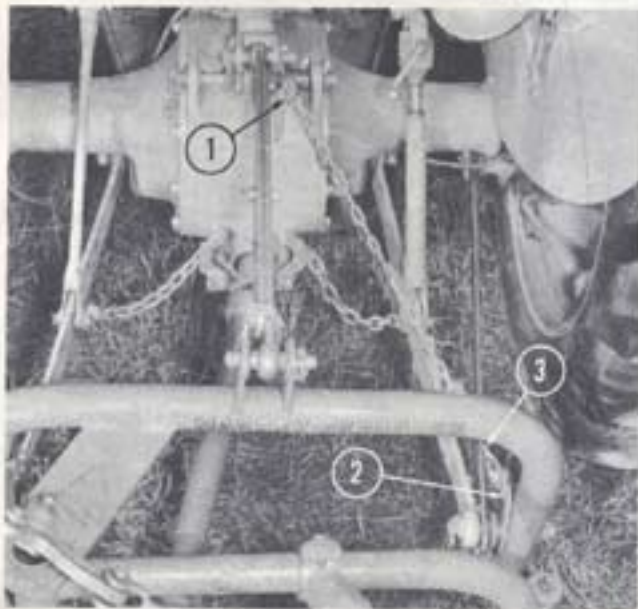


Fig. 5 Position Kit Installed

1. Keyhole bracket.
2. Lower bracket attachment
3. Eyebolt adjustment

In order that the No. 31 Mower can be used with these older models, there is available the accessory position stop chain kit. This chain will ensure that the mower will return to the same positive operating position after each time it has been raised.

The chain has a keyhole bracket at one end; this attaches to the jointed hitch pin in the rear of the tractor center housing (see No. 1, Fig. 5). The lower end of the chain fastens to the right hitch pin by means of a bracket attachment similar to that on the mower check chain. This lower bracket attachment point also has an eyebolt and clevis fitting to provide for fine adjustment. To attach the lower connection, the hitch pin must first be removed and then replaced in position with the lower bracket (on the chain eyebolt) fitted over the pin between the pin shoulder and the mower frame (No. 2, Fig. 5).

The upper part of the chain assembly provides the adjustment between mowing positions and transport position. To carry out any change in the mower position, the operator merely needs to reach down to the free end of the upper chain, raise the mower by means of the draft control lever to take the weight off the chain and then reposition the chain at the required position in the keyhole bracket.

Finer adjustment in position to give the proper hitch height in operating position or maximum lift in transport position is carried out by means of the eyebolt and clevis at the lower chain attachment point. To manipulate this lower adjustment the mower should be raised to take the weight off the chain, the chain taken out of the slot in the keyhole bracket and turned either clockwise or counterclockwise as required to rotate the clevis on the eyebolt. A certain amount of trial and error will, of course, be inevitable. The chain should be replaced in the keyhole slot and the mower lowered to operating position when the adjustment has been carried out to the operator's satisfaction.

PTO Drive Shaft Sleeve Adapter

The PTO shaft supplied with the No. 31 Mower is $32\frac{3}{8}$ inches in length and is designed to be used with the standard $1\frac{3}{8}$ inch diameter tractor PTO shaft. If an older type tractor with a $1\frac{1}{8}$ inch diameter PTO shaft is to be used, a suitable adapter may be purchased from your local Massey-Ferguson Dealer. This is known as a "PTO Sleeve Adapter" and will allow the mower PTO shaft to be coupled to the $1\frac{1}{8}$ inch dia. tractor PTO shaft.



Fig. 6 Heavy Duty Inner Shoe

Heavy Duty Inner Shoe (Accessory)

When the mower is used in heavy abrasive soils and certain other adverse mowing conditions, excessive wear of the inner shoe may take place. Where such conditions are encountered, the heavy duty inner shoe should be used as an alternative to the standard shoe. The heavy duty shoe (illustrated in Fig. 6) is a mower accessory; it has a 7 inch cross section and is of extremely rugged construction.

PREPARING THE TRACTOR

Before the No. 31 Mower can be mounted on



Fig. 7 Stabilizer Bracket Installed

the tractor it will be necessary to install a right hand stabilizer bar and bracket. Mount the bracket under the axle, using the fender attachment bolts, as shown in Fig. 7. Have the stabilizer bar available for installation as detailed in the "Attaching" section of this manual. With some types of tractor the length of the top link will have to be adjusted prior to attachment to the mower. The following table gives the correct top link length for current and non-current Massey-Harris, Ferguson and Massey-Ferguson Tractors. Link measurement should be made from center to center of the ball joints.

Tractor	Top Link Length
TO 20, 30 & 35	25"
Standard Clearance F 40, MH 50 & MF 50	25"
High Clearance F 40, MH 50 & MF 50	29 $\frac{1}{4}$ "
Standard Clearance MF 65 (use top hole in tractor control beam)	26"
High Clearance MF 65 (use lower hole in tractor control beam)	29 $\frac{3}{8}$ "
Standard Clearance MF 85 (use top hole in tractor attachment housing)	29 $\frac{7}{8}$ "
High Clearance MF 85 (use top hole in tractor attachment housing)	25 $\frac{3}{4}$ "

PREPARING THE MOWER

Width Adjustment

The No. 31 Mower is adjustable to suit tractor wheel settings of 52 to 56 inches, 62 to 66 inches, and 72 to 76 inches. The adjustment procedure is outlined as follows:

1. The mower should be detached from the tractor and should be standing on two blocks which are positioned under the four main base plate bolts. The cutter bar should be down.
2. Slacken off the tension on the counterbalance spring by means of the adjusting bolt and remove the two bolts holding the spring support bracket (No. 1, Fig. 8.) Remove the two halves of this support bracket, and drive out the roll pin which locates the bracket on the lift frame.
3. Remove the lift cable trunnions from their retaining links (No. 2, Fig. 8) by removing the four $\frac{3}{16}$ inch cotter pins.
4. Remove the nuts and washers from the four base plate bolts. The lift frame can now be lifted clear of the mower and repositioned on the four base plate bolts at the required position. The diagram, Fig. 9 shows correct bolt holes to use

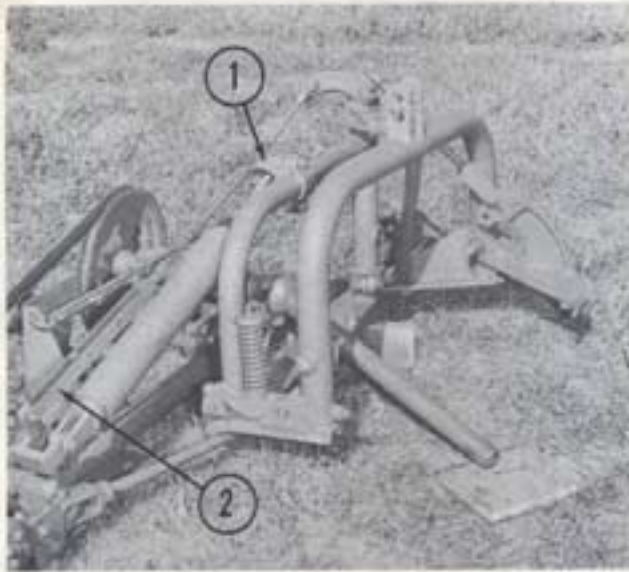


Fig. 8 Preparing for Width Adjustment
 1. Spring support bracket 2. Lift cable links

for the 52-56 inch setting the 62 to 66 inch and the 72-76 inch setting. This diagram, and the accompanying table also gives information on the correct positioning of the roll pin and the lift link trunnions.

5. The four base plate bolts, should now be refitted with their nuts and washers. If the adjustment has been made to the narrowest setting, it will be seen that the bolt in the forward left hand corner is for the moment inaccessible. The other three bolts should first have their nuts and washers screwed down loosely. The block under the head of the fourth bolt should now be moved to the side so that this bolt may be partially withdrawn; it will now be comparatively simple to fit the nut and washer to this bolt. Pull forward on the right end of the frame while holding the end of the drag bar rearward to take up the slack in the bolt holes. The bolts should now be tightened

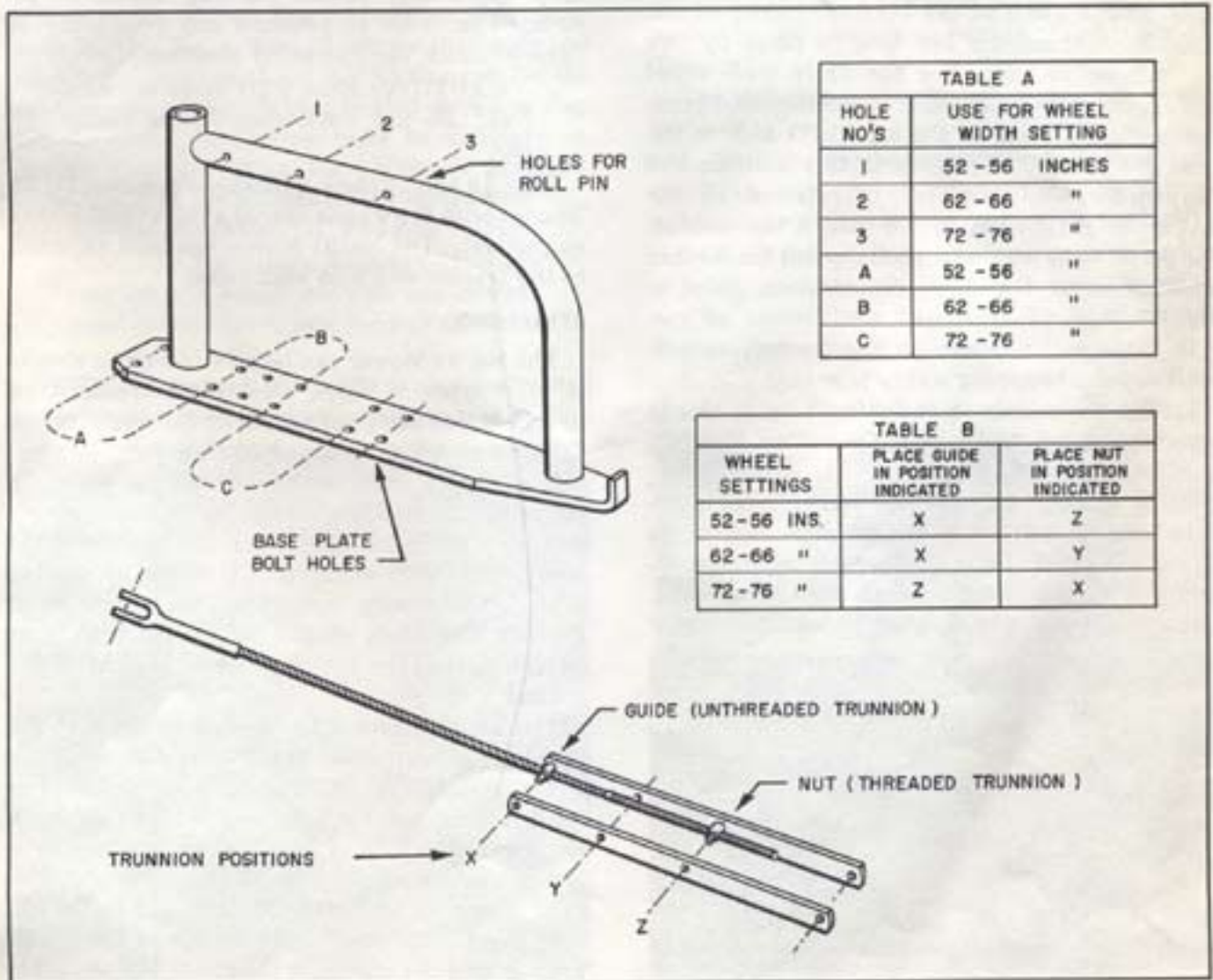


Fig. 9 Width Adjustment Diagram

down to 125-150 ft. lbs. torque which is equivalent to a strong pull on an 18" wrench.

6. The roll pin which locates the spring support bracket should be now refitted to the upper lift frame member. Use the hole on the far left for the narrow (52 to 56 inch) wheel setting (looking from the rear), and the hole on the far right for the wide (72 to 76 inch) wheel setting. The center hole is for the 62 to 66 inch setting (refer to diagram). Refit the two halves of the support bracket, tighten or slacken off the spring tension adjustment as necessary to fit the spring in the new position.

7. The lift cable should now be refitted to its retaining links. Take notice of the two trunnions provided, one is threaded and one is non-threaded. In the diagram, Fig. 9, the trunnions are shown in the correct position for a 52 to 56 inch wheel setting. The non-threaded trunnion is fitted at the top (left) of the links and used as a guide, while the threaded trunnion is used to retain the cable, and is fitted at the bottom (right) of the links. Both trunnions are held in place by two $\frac{3}{32}$ inch cotter pins. For the 72-76 inch wheel setting, the cable is attached to the threaded trunnion, which is fitted at the top (left) hole in the links. No guide is necessary in this position and the non-threaded trunnion is retained in the bottom (right) position for use when needed. For the 62 to 66 inch wheel setting and for further information on the above adjustments, refer to Fig. 9.

10. Attach the mower to the tractor, as outlined under "Attaching", this page.

11. Set the mower to operating height; this is explained under "Adjusting Operating Height", page 10.

12. It will now be necessary to check the counterbalance spring length and to reset the length of the lift cable. Before either of these are attempted, the gag linkage length must be checked. First adjust the gag linkage as outlined under



Fig. 10 Tractor Wheels Set at 52 Inches

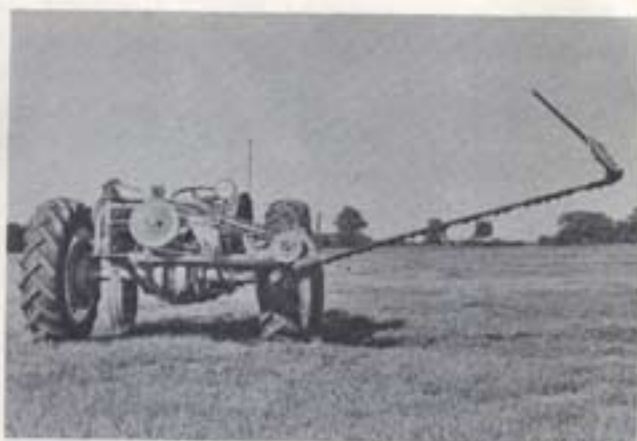


Fig. 11 Tractor Wheels Set at 72 Inches

"Gag Linkage Adjustment", page 15. Secondly, check the counterbalance spring length as outlined under "Counterbalance Spring", page 16. Thirdly, reset the lift cable length as described under "Lift Arm Adjustment", page 15. Remember to keep the tractor engine running whenever instructed in order to preclude any possibility of "droop" from the operating position.

CAUTION: Have PTO drive in "neutral." Do not work close to the cutter bar.

Figs. 10 and 11 show a Massey-Ferguson TO 35 Tractor with the wheels spaced at 52 and 72 inches respectively. The No. 31 Mower has been adjusted to the tractor width in each case.

ATTACHING

The No. 31 Mower can be attached quite simply to most types of three point hitch tractors, although it was designed primarily for use with the TO 35 and MF 50, 65 and 85 Tractors.

The mower may be hitched either with the cutter bar up or down, whichever is most convenient. It is suggested that prior to attachment the mower is held in an upright position by placing a block transversely under the base frame as in Fig. 13. The block should not be too high, just enough to level the frame and hold it clear of the ground.

The lift arm should be checked to see that the lift arm rod is attached to the correct position. As will be seen in Fig. 12 three holes are provided in the lift arm; the lift arm rod is attached by a clevis pin which is in turn locked in place by a $\frac{3}{32}$ inch cotter pin. In Fig. 12 the clevis pin (No. 2) is shown attaching the lift arm rod to the top hole, this hole is used for all models of the TO 35 Tractor and the standard clearance MF 50 Tractor. No. 3, Fig. 12, shows the hole to use for all

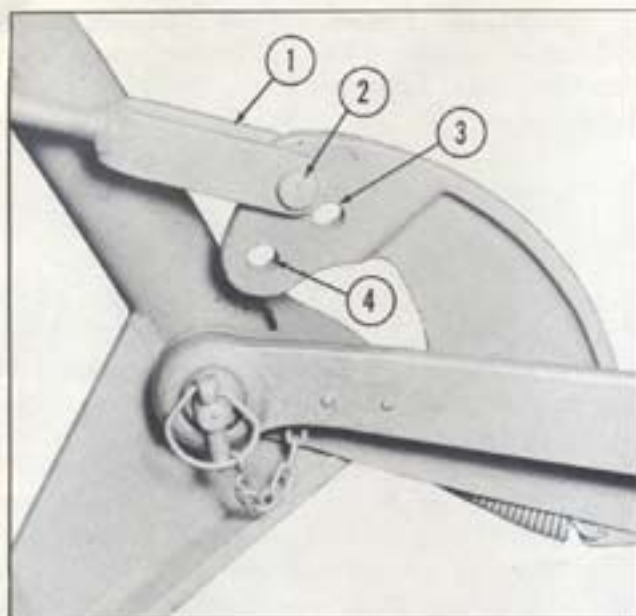


Fig. 12 Use Correct Hole in Lift Arm
1 thru 4. See text

models of the MF 65 Tractor and the high clearance MF 50, No. 4, Fig. 12, shows the hole to be used for all models of the MF 85 Tractor. On the reverse side of the lift arm to that shown in Fig. 12, the three positioning holes have letters indented alongside them for reference purposes. Hole No. 2, in the illustration is designated "A", hole No. 3 is designated "B" and hole No. 4 is "C".

NOTE: For information as to the correct lift arm hole to use with non-current (and current) tractors, refer to the table on page 30.

In Fig. 12 the tractor left link is shown attached to the mower in order that relationship of the lift



Fig. 13 Attaching Left Link

arm to the left link may be more easily understood.

When a tractor other than one of the models mentioned above is to be used, your local Massey-Ferguson Dealer should be consulted regarding the above adjustment point.

Throughout this manual, the mower is illustrated hitched to a No. 1 Category hitch tractor ($\frac{7}{8}$ " dia. hitch pins). If the tractor to be used is equipped with large ($1\frac{1}{8}$ " dia. ball ends, the pins on the mower should be replaced with $1\frac{1}{8}$ " dia. hitch pins, unless these are already fitted. This will provide for a modified No. 2 Category hitch.

No alteration will be needed to the top hitch bracket as two holes are already provided, the upper hole should be used for the No. 1 Category hitch ($\frac{3}{8}$ inch diameter hitch pin) and the lower hole for the No. 2 Category hitch (1 inch diameter hitch pin).

One stabilizer bar should be used, this is fitted to the right link. The stabilizer bracket should already have been installed to the tractor as detailed in the previous section "Preparing the Tractor".

The following attachment procedure is suggested:

1. Back the tractor to the mower. Raise or lower the links with the hydrallever, so that they are adjacent to the mower hitch points.
2. Push the left link onto the left hitch pin (see Fig. 13) and lock with the linch pin. The mower can be moved back and forth by hand slightly, if the two points do not exactly line up.
3. See that the bracket on the safety release check chain is installed on the right hitch link



Fig. 14 Attaching Right Link

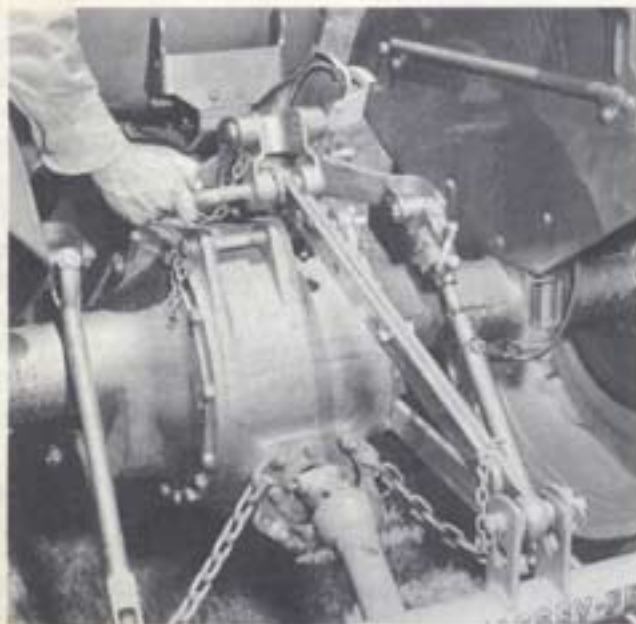


Fig. 15 Attaching Top Link

pin. This bracket should be installed completely over the shoulder of the link pin otherwise there will not be room to install the right link and the stabilizer bar.

4. If using a TO 20, 30, or 35, or a MF 50 tractor, install the stabilizer bar on the right hitch pin. The front of the bar should not be connected yet and should be rested on the ground.

Install the right link onto the link pin, (see Fig. 14) and lock with the attached lynch pin. It may be necessary to rock the tractor back and forth, or rock the mower by hand a little to provide alignment.

6. Remove the cap from the tractor PTO drive shaft. Slide the mower PTO coupler onto the shaft. The buttons on the coupler should be depressed as it is slipped over the PTO shaft and released into the groove on the shaft. Slide the coupler back and forward a little until the button clicks home in the groove on the shaft. The tractor PTO should be in "neutral" during this operation, as it may be necessary to rotate the shaft by hand slightly in order to align the splines.

7. The top link may now be connected; the length should already have been adjusted according to the table on Page 6. The link may be attached either by leaving the forward end attached to the tractor, and rocking the mower back and forth in order to attach the rear end; or by attaching the link to the mower top hitch point with the forward end left free and then mounting the tractor and driving back and forth gently, at the same time slipping the link pin into the for-

ward connection (as in Fig. 15). If the cutter bar is upright, the former method may be advantageous as the cutter bar can be used to rock the top hitch point back and forth, providing plenty of leverage.

CAUTION: If the cutter bar is to be handled do NOT hold the forward edge. Do NOT get between the upright cutter bar and the tractor wheel.

Lock forward and rear connections of top link with the attached hitch pins.

8. If the stabilizer bar has been connected to the right hitch pin as in Step 4 (small model tractors), the front end of the bar should now be attached to the pin on the stabilizer bracket. Probably the best way to do this is to first raise the mower by means of the hydrallever; the bar may then be easily maneuvered onto the hitch pin as the mower will "float" easily on the three point linkage.

CAUTION: Before starting the tractor engine, check that the gear shift and PTO drive selector are in "NEUTRAL".

If using a MF 65 or 85 tractor, the adjustable stabilizer bar may be fitted with the mower either in the raised or lowered position. It is suggested, however, that the bar be first connected at the forward end and the rear end connected to the pin on the right link while the mower is raised, particularly if the bar has already been attached several times, this will save re-adjusting the length of the bar any more than is necessary.

When the mower has been attached to a MF 65 or 85 tractor for the first time, it will be necessary to adjust the right hand stabilizer bar length so that it holds the mower main frame square with the tractor. This can best be checked by setting a square against the front side of the main frame and the tractor top link. The stabilizer bar should then be adjusted until the main frame and top link are at 90° to each other.

The attachment is now complete. The mower should now be adjusted to correct operating height as detailed in the following section.

Adjusting Operating Height

To ensure that the mower is leveled and set at the correct operating height the following procedure should be adopted:

1. With the cutter bar in the operating position, raise the mower with the hydrallever until the left hand hitch pin is 19½ to 20 inches off the ground, this is illustrated in Fig. 16., which shows the measurement being taken from the rear of the



Fig. 16 Adjusting Operating Height—Left Side

hitch pin. Keep the tractor engine running until the operating height has been set, this will preclude any possibility of "droop" during this setting.

CAUTION: Have PTO drive in "Neutral." Do not work close to the cutter bar!

2. Using the hand crank on the right hand lift link, set the right hand hitch pin also to 19½ to 20 inches off the ground; measure this distance the same way as with the left link, see Fig. 17.

3. Attach the locking clip to the hand crank lever (Fig. 18). This will preclude any chance of

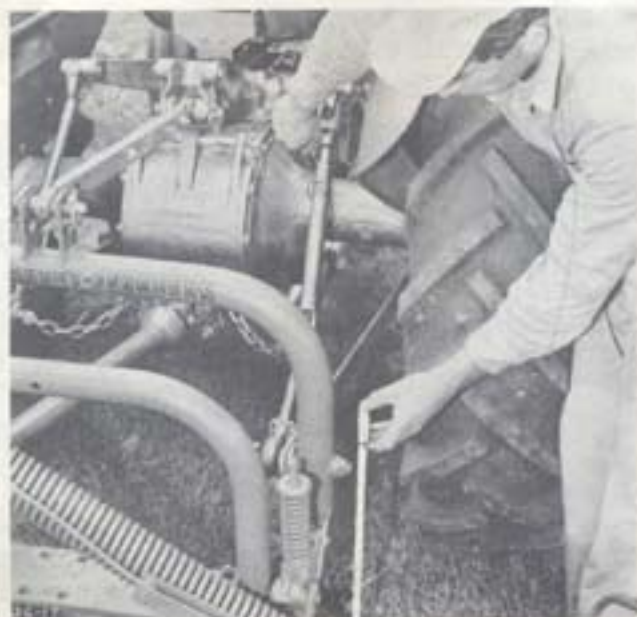


Fig. 17 Adjusting Operating Height—Right Side

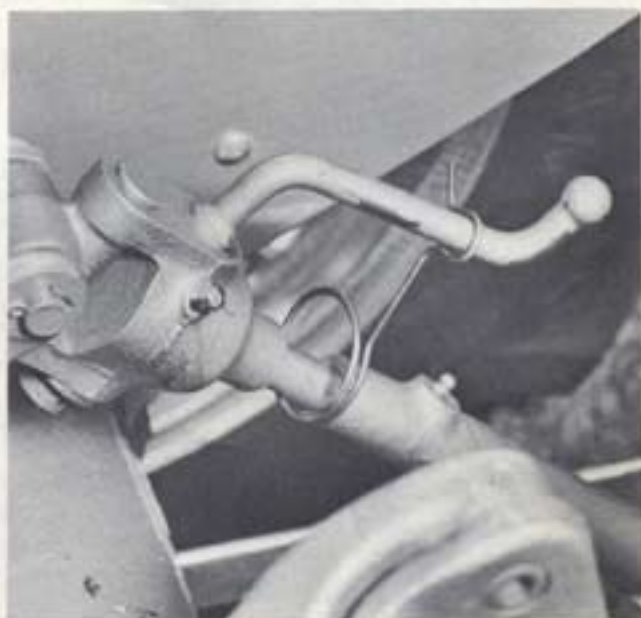


Fig. 18 Locking Clip on Crank Lever

the lever turning during operation, and altering the mower setting.

4. Set the knurled nut beneath the hydral lever up close to the lever and screw tight. This will ensure that the mower returns to the same spot after it has been raised and transported.

OPERATING INFORMATION

When entering the field, start the knife running and lower the cutter bar to cutting position while it is still clear of the standing crop; this will give the knife time to pick up speed without clogging.

Form the habit of looking out over the right front tractor wheel and watching for obstructions such as rocks or stumps which are in the path of the cutter bar. When an obstruction is seen, depress the clutch pedal immediately and close the throttle. Approach the obstruction slowly, raising the cutter bar with the hydral lever so that it will pass over without damage. When a solid object is struck by the cutter bar, the safety release will help to guard the mower against damage. Damage to the mower may result, of course, if the operator does not immediately stop the forward motion of the tractor when an obstruction is hit, (see Fig. 19). The action of the safety release gives the operator time to act, but does not eliminate the necessity for him to be constantly alert to avoid striking objects with the cutter bar.

When opening a field, that is, making the first cut or round, it is usually the best procedure to drive so that the tractor is next to the fence, or field border, with the cutter bar extending in to-



Fig. 19 Cutter Bar "Breaking Back"

ward the center of the field. Steer the tractor so as to leave a strip of uncut crop the width of the cutter bar, (see Fig. 20). On this round, watch the ground in front of the tractor for stones or other trash which is often present around field margins. After a complete pass around the field as described above, reverse direction and cut the unmowed strip from which the dangerous obstructions were cleared the first time around, see Fig. 21.

The tractor should be driven so that the inner shoe is just as close as possible to the unmowed crop without leaving an uncut strip. If the inner end of the cutter bar is run through hay which has previously been cut, it may clog up. Probably



Fig. 20 Opening a Field



Fig. 21 Second Time Round

the best means of guiding the tractor in the field is to set the front wheels at the same width as the rear wheels; the operator can then sight on the right front wheel, which should be run alongside the unmowed crop, this will automatically place the mower in the correct cutting position, see Fig. 21.

With a little practice, perfectly square corners may be turned without stopping, backing or circling. When approaching the corner, slow down and drive straight out until the edge of the standing crop is even with the forward edge of the rear wheel. At this moment, step on the right wheel brake and turn the front wheels to the right, see Fig. 22. The tractor will pivot on the right rear wheel, the end of the cutter bar will swing back and be in position to start straight down the second side of the field.



Fig. 22 Turning a Square Corner

FINISHING A FIELD

The cutter bar can be raised by the hydrallever so that it rides at a set distance above the ground. This feature is particularly useful when finishing a field where the last swath to be cut is narrower than the full width of the cutter bar. If an attempt is made to cut this narrow strip with the cutter bar riding on the ground as it normally does, the adjoining swath which has previously been cut will usually plug up the knife. With the hydrallever, raise the cutter bar to the desired height. Drive cautiously when the mower is in this position, to avoid excessive whipping of the knife.

Safety Release (Break Back)

When the mower leaves the factory the safety release, or "break back" as it is sometimes termed, is set with quite a light tension on the spring. If the cutter bar breaks back too easily in operation without hitting any real obstruction (it may do this on encountering coarse, heavy crops, etc.), the spring tension should be adjusted as explained in the "Adjustments" section, page 14.

Mowing Speeds

Proper mowing speeds depend on the roughness of the ground and type and density of the crop to be mowed. The means of obtaining the proper speed is through the use of the forward gear speeds and PTO speeds. As a general rule use the higher gear speeds for extremely light, easy cutting and the lower tractor gear speeds for heavy, tough cutting. Increasing the tractor engine speed directly increases the ground speed and knife speed. Therefore, when cutting heavy material, it is necessary to increase the knife speed in relation to the ground speed by changing to a lower speed gear.

The mower should always be operated in "engine speed" PTO, and the tractor may be operated at speeds up to 9 mph. Read the following section "Variable Speed Sheave" for more detailed information.

Variable Speed Sheave

The variable speed sheave provides the optimum knife speed for the crop being mowed as well as providing more variations in tractor PTO speed. The operator who wants to utilize a lower engine speed can do so by adjusting the sheave to its smallest effective diameter. In the other extreme, an operator who wants to get increased ground speed by a high engine speed can adjust the sheave to its largest effective diameter and

thereby keep the knife speed within safe limits. This feature of the mower eliminates the need for alternate sheave sizes and corresponding belt lengths.

Refer to the sheave instruction plate attached to the sheave assembly (see Fig. 23) for the maximum PTO speed for any sheave setting. Under normal mowing conditions a lower PTO speed can, and should be used. A satisfactory adjustment for average mowing conditions is one which will result in a crankshaft speed of 950 to 1000 RPM for mowing speeds up to 6 mph, and 950 to 1100 RPM for speeds of 6 to 9 mph.

With Massey-Ferguson Tractors, the following table will be of aid in choosing the proper engine speed for various sheave settings, (in average mowing conditions).

Engine RPM	PTO RPM	No. of Shims Between Flanges	Mower Crankshaft Speed
1270	455	5	970
1360	485	4	970
1440	515	3	970
1550	550	2	980
1620	580	1	980
1760	630	0	1010

The above table will also apply to other types of tractors, with exception of the engine RPM column.

When mowing under extremely difficult conditions such as dense fine grass, it may be necessary to operate the knife faster. Do not, however, exceed the speeds given on the sheave instruction plate or 1170 RPM of the drive unit crankshaft.

To adjust the sheave size, refer to page 14, "Adjustments" section.

Mowing Capacity

A quick "rule of thumb" determination of mowing capacity can be made by using the formula: Width of cut in feet x speed of tractor in MPH = acres mowed per 10 hour day.

The width of cut with the No. 31 mower will be either 6 feet or 7 feet depending on the cutter bar used.

Assuming that a 7 foot cutter bar is used, and the tractor is being operated at 4.5 mph, the acres mowed per 10 hour day should be 31.5. This, of course, is only an approximation and the number of acres mowed will depend on such variables as terrain, type of crop, crop density, and experience of the operator etc.

ADJUSTMENTS

Certain adjustments are necessary when setting up a new machine or when a machine has been stored for a period of time. Also, some adjustments must be made from time to time during operation of the mower in order to meet changing field conditions, different crops, and slight wear-in of the mower parts.

Adjusting Sheave Diameter

The sheave adjustment is made by disassembling the variable speed sheave and moving the shims. [The more shims between the flanges of the sheave, the smaller the effective diameter, and consequently, the higher the knife speed.]

The two sections of the sheave are held together by means of three cap screws (see Fig. 23). Shims taken from between the flanges should be retained under the heads of the cap screws (see No. 1, Fig. 23) this will take up the surplus length of the cap screws and retain the shims for use when needed.

In the event that the outer flange cannot be removed by hand after removing the three cap screws, insert two of the screws into the tapped holes in the outer flange and use them as a puller to remove the flange.

Safety Release

The No. 31 Mower is equipped with a very efficient safety release (break-back) feature. When the cutter bar strikes an obstruction this device allows the cutter bar to swing backward

and so prevents damage to the cutter bar and other parts of the mower and possibly to the tractor as well, see Figs. 19 and 24.

When the mower is received from the factory the tension on the safety release spring will be quite light, and the cutter bar may tend to break back fairly easily in the field. For normal mowing conditions the thread on the spring adjusting bolt should be exposed for about one inch above the adjusting nut. However, if the cutter bar is breaking back too easily, the operator should gradually increase the tension on the safety release spring during the first few hours of operation; this is accomplished by tightening down the hex nut, No. 1, Fig. 24. The adjusting nut should gradually be screwed down until the cutter bar will break back only upon contact with an object heavy enough to cause mower damage. It is safe to turn the nut down to the limit of the threads on the spring adjustment bolt without danger of locking up the safety release to make it inoperative.

During normal operation, after the safety release feature has been adjusted satisfactorily, it is to be expected that an occasional obstruction will be encountered and that the safety release will operate. When the safety release has operated and the cutter bar "breaks back", disengage the PTO drive, and back the tractor with the cutter bar resting on the ground; the cutter bar will now pivot forward and automatically reset into operating position. Raise the cutter bar and

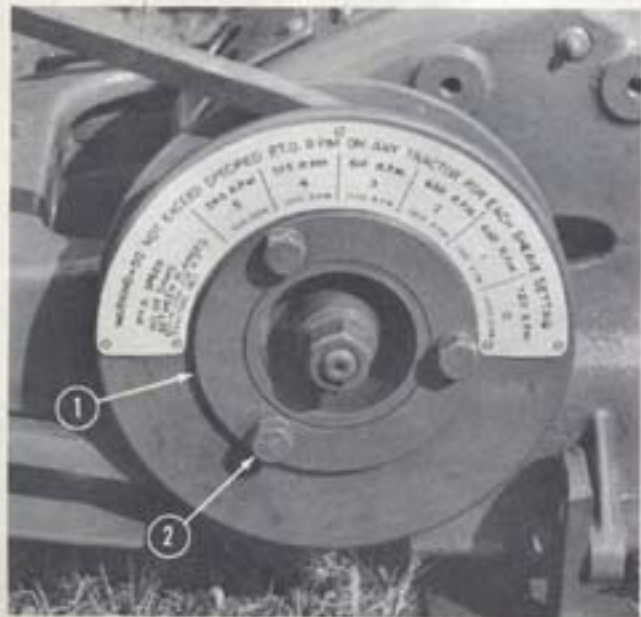


Fig. 23 Sheave Instruction Plate
1. Shims
2. Cap screws



Fig. 24 Safety Release Feature
1. Adjusting nut



Fig. 25 Checking Gag Linkage

1. Gag linkage 2. Clevis pins

stop the tractor engine. Inspect the knife and the cutter bar for any possible damage; clear away any obstruction in the cutter bar sections. Make sure that the swing frame is properly resealed in the safety release latch before proceeding.

In the event that the safety release seems to function prematurely in heavy mowing, or at high speed on rough ground with the safety release adjustment at its maximum setting, one or more of the following probable causes exist:

1. Dull knife; 2. Worn ledger plates; 3. Wear plates worn; 4. Hold down clips worn or improperly adjusted; 5. Knife speed too slow for ground speed; 6. Forward speed too fast for ground conditions. The safety release is the protection for the cutter bar and frame members and should not be modified.

Cutter Bar Flotation

Gag Linkage Adjustment

The gag linkage, see Fig. 25, is one of the components governing inner and outer shoe flotation. The adjustment setting may be quickly checked in the following manner:

NOTE: Make this check (and any adjustment necessary) prior to checking or adjusting the lift arm setting.

1. Set the mower at operating height. Leave the tractor engine running to eliminate any possibility of the mower "drooping."

CAUTION: Set the PTO drive in "neutral." Do not work around the cutter bar.

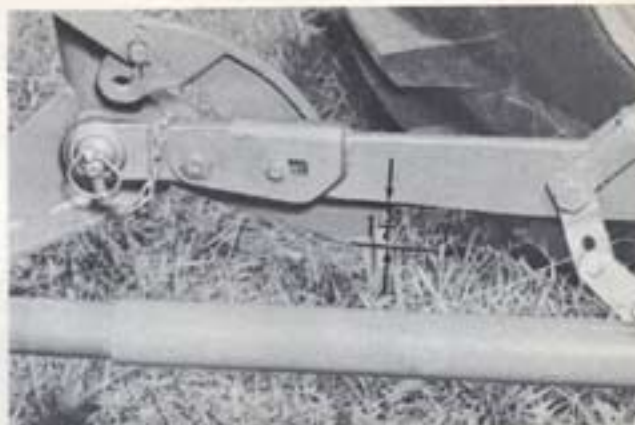


Fig. 26 Lift Arm Position

2. Take a Massey-Ferguson plow wrench and place the small end between the drag bar and the gag link retaining bracket (bellcrank). This operation is illustrated in Fig. 25. The wrench should just fit snugly between these two points, which should have approximately $\frac{3}{8}$ inch clearance. If a MF plow wrench is not available, any suitable object of $\frac{3}{8}$ inch thickness may be used.

3. If the linkage is in need of adjustment, remove the clevis pin at either of the extreme ends of the linkage (No. 2, Fig. 25) and screw the threaded eye bolt through the clevis in the required direction until the clearance is set as described in Step 1. Remember to lock the clevis pin, which was removed, with a cotter pin on completing the adjustment.

Lift Arm Adjustment

With the mower in operating position the distance between the rear lug on the lift arm and the tractor left link should be approximately $1\frac{3}{4}$ inches at all times. The position to measure this dimension is shown in Fig. 26. A quick field check of this adjustment may be made by placing the small end of a Massey-Ferguson plow wrench in the gap between the link and the lift arm. It should fit in quite easily with around $\frac{1}{8}$ inch clearance.

NOTE: When taking this measurement and carrying out any adjustment necessary, the tractor engine should be running to preclude any possibility of "droop."

CAUTION: PTO drive must be in "Neutral." Do not work around the cutter bar!

If the clearance does not conform to the above dimension, adjustment should be carried out as follows:

1. Remove the clevis pin (No. 1, Fig. 27) at

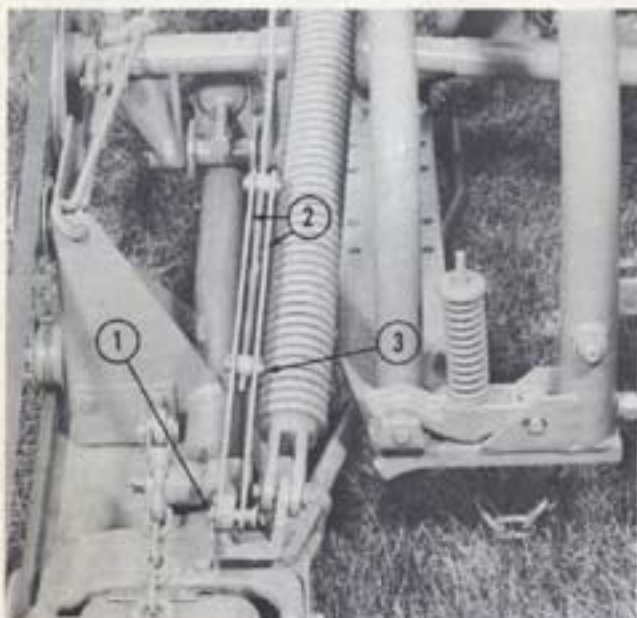


Fig. 27 Lift Link Adjustment

1. Clevis pin 2. Links
3. Threaded trunnion

taching the lift cable retaining links (No. 2, Fig. 27) to the retaining arm.

2. Screw the links either clockwise or counterclockwise, so that the trunnion (No. 3, Fig. 27) retaining the lift cable is screwed in the direction required to make adjustment.

3. When the correct clearance of $1\frac{3}{4}$ inches has been attained, replace the clevis pin and lock with a cotter pin.

Counterbalance Spring

The counterbalance spring, see Fig. 28, is the

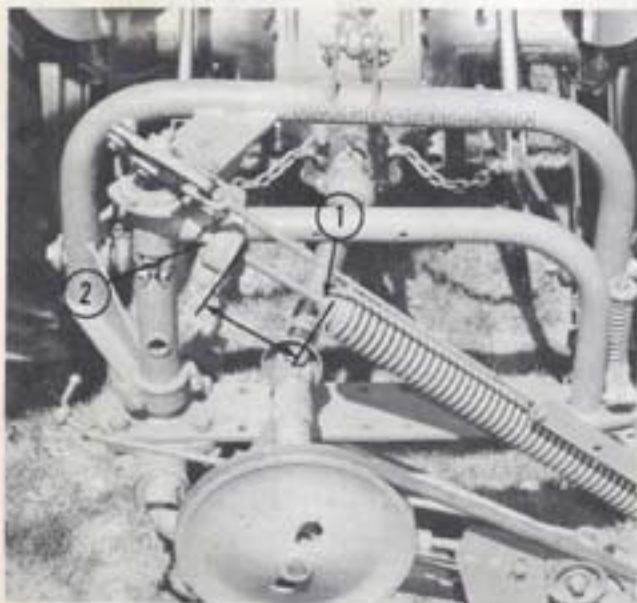


Fig. 28 Counterbalance Spring Adjustment

1. Lock nut 2. Adjusting bolt

main component governing the flotation of the inner and outer shoes. Generally, there is no need to make any separate flotation adjustment to the shoes providing that the counterbalance spring is properly adjusted.

It is recommended that the top of the threaded spring plug be set from 3 to 4 inches below the lower edge of the spring support for a 7' cutter bar, and from 4 to 5 inches for a 6' cutter bar. This dimension should be measured as indicated in Fig. 28.

Set the mower to operating height and switch off the tractor engine prior to checking the measurement.

If adjustment is necessary, this can be made very simply by loosening the lock nut (No. 1, Fig. 28) and turning the bolt (No. 2, Fig. 28) in the required direction. Tighten the lock nut down when the adjustment is completed.

NOTE: When working on extremely rocky or stony ground, it is permissible to decrease the above dimensions by approximately 1 inch in order to decrease the weight on the cutter bar; and thus increase the guard life.

Inner and Outer Shoe Adjustment

Both shoes are easily adjustable; under ideal conditions the shoes should be raised thereby lowering the cutter bar. Under severe trashy conditions the shoes should be set down as low as possible, thus raising the cutter bar up out of the trash. The shoes should always be set at equal heights.



Fig. 29 Inner Shoe Adjustment

1. Carriage head bolts

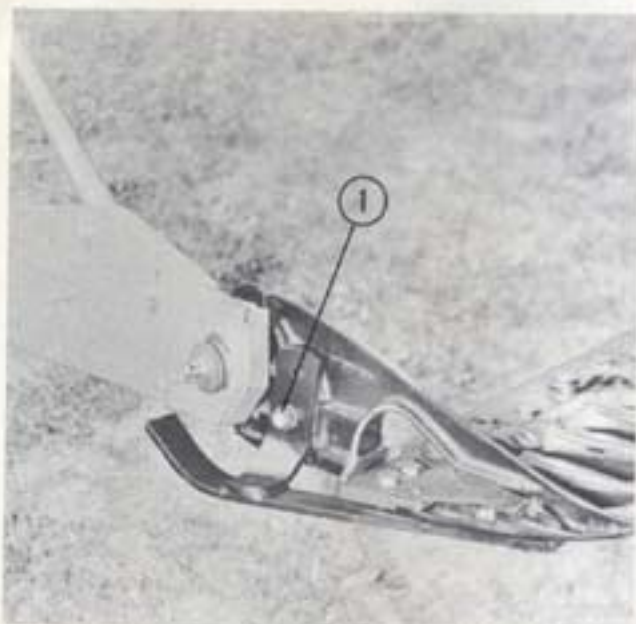


Fig. 30 Outer Shoe Adjustment
1. Adjusting bolt and nut

To adjust the inner shoe, loosen the two carriage head bolts (No. 1, Fig. 29) and reposition up or down as required, utilizing the three holes at the front and the slotted hole at the rear. Retighten bolts securely after repositioning the shoe.

To adjust the outer shoe, remove the nut and bolt (No. 1, Fig. 30) and reposition the shoe up and down utilizing the two holes in the shoe attachment bracket and the three holes in the outer shoe casting. Replace the nut and bolts and tighten securely.

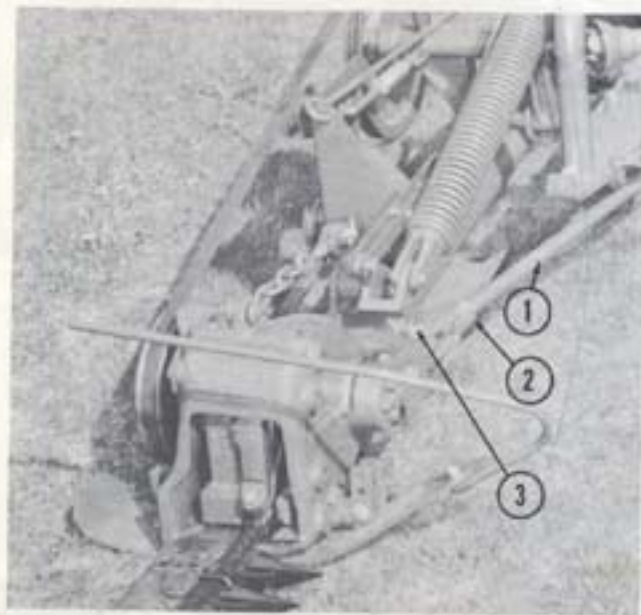


Fig. 31 Pull Bar Adjustment
1. Pull bar 2. Lock nut
3. Clevis pin

Pull Bar Adjustment

The length of the pull bar should be adjusted so that the drag bar is parallel to the swinging frame when all slack at both ends of the pull bar mounting is taken up. To set this adjustment correctly, adjust the length by slackening the lock nut (No. 2, Fig. 31), removing the clevis pin (No. 3, Fig. 31) and turning the clevis in the direction required to enable the clevis pin to be slipped into the clevis and drag bar mounting hole easily. When this setting has been achieved, shorten the pull bar by turning the clevis down the bar one half turn then replace the clevis pin and lock in place with a cotter pin. Screw the lock nut back against the clevis. The adjustment is now complete.

Knife Register

There is no register adjustment on this mower. All the drive parts and the cutter bar are made to a degree of precision which makes register adjustment unnecessary.

Lead Adjustment

When the No. 31 Mower leaves the factory, the lead adjustment has been preset and will not require further attention. However, after the mower has been operated in the field for a season or more, a certain amount of wear and loosening of parts may have taken place, which could cause the cutter bar to "lag" a little, and thus diminish the lead. For this reason an easy method of lead adjustment is provided. There are several accepted methods of checking the lead, the following method is suggested, however, as it has been used many times and found to be both practical and accurate for "on the farm" usage.

1. Drive the tractor to a clear level area.
2. Drive two stakes into the ground to the left and right of the tractor as illustrated in the diagram (Fig. 32).
3. The stakes ("A" and "B") should have a length of stout cord or wire stretched tautly between them and tied firmly to each stake. This cord (or wire) should run under the tractor and just gently touch the leading edge of both tires; it should be perfectly straight for its entire length. This can be ascertained by sighting down the length of the cord. The tractor or stakes should be repositioned slightly if necessary in order to position them as accurately as possible.

4. Take a measurement from the inner *front edge* of the cutter bar to the cord as indicated at "C" in the diagram. Take another measurement

from the outer *front edge* of the cutter bar to the cord, as indicated at "D" in the diagram.

If a 7' cutter bar is being used, the outer measurement ("D") should be from 3 to 5 inches less than the inner measurement ("C"). If a 6' cutter bar is being used, measurement "D" should be from 2½ to 4 inches less than measurement "C."

If the measurements fall within the above limits the lead setting is correct and no adjustment will be needed. If the measurements do not fall within the limits, adjustment should be carried out as detailed below.

5. The cutter bar lead adjustment is taken up at the attachment point of the safety release latch (Fig. 33). To increase the cutter bar lead, slacken off the hex nut (No. 1, Fig. 33) tap the bolt (No. 2, Fig. 33) rearward and slide out one or two of the slotted shims (No. 3, Fig. 33). Retighten the nut and recheck the lead measurement. Continue to remove shims until the correct meas-

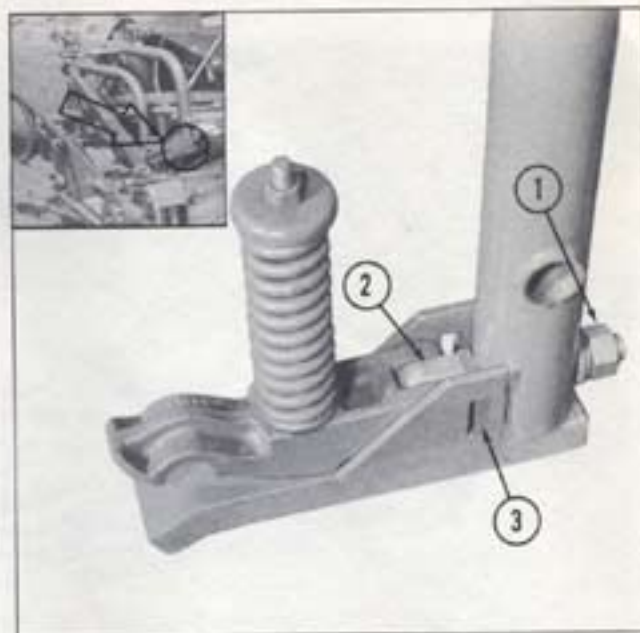


Fig. 33 Lead Adjustment

1. Hex nut 2. Eye bolt
3. Slotted shims

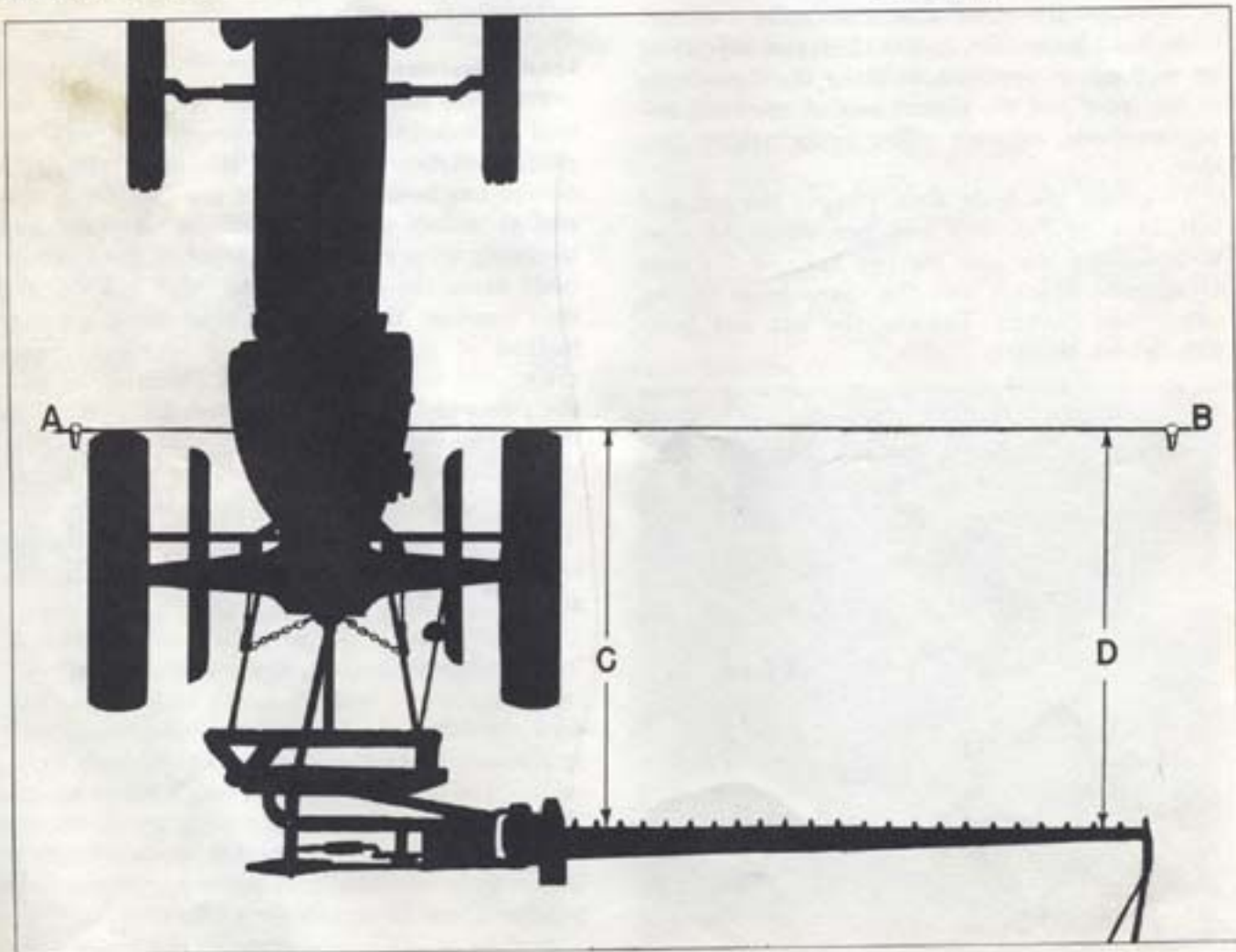


Fig. 32 Checking Cutter Bar Lead

urement is reached, tighten the hex nut securely when the adjustment is complete.

NOTE: It is obvious that if shims were added instead of removed, as in Step 5, that the cutter bar lead could be diminished instead of increased. This adjustment, however, is very unlikely to be needed.

Belt Tension Adjustment

To adjust the drive belt tension, proceed as follows:

1. Move both idler pulleys (Fig. 34) so that they do not touch the belt.

2. Tighten the belt by means of the belt adjustment turnbuckle (Fig. 35) which pivots the drive shaft housing about its pivot pin. Tighten the turnbuckle until the belt is tight enough so that about 20 lbs. thumb pressure will deflect the belt $\frac{3}{4}$ inch to 1 inch, (at a point midway between the pulleys).

3. Adjust the idler pulleys to give approximately $\frac{1}{8}$ " interference with the belt.

NOTE: Do not over tension the belt or idlers; This will result in greater bearing loads and shorter belt life. Conversely, under tensioning will result in beltwhip which will also reduce belt life.

There are three holes in the idler pulley mounting bracket for attaching the belt hook end of the turnbuckle. Any one of these holes may be used, but no more than $1\frac{1}{2}$ inches of thread on the belt hook should be exposed. The

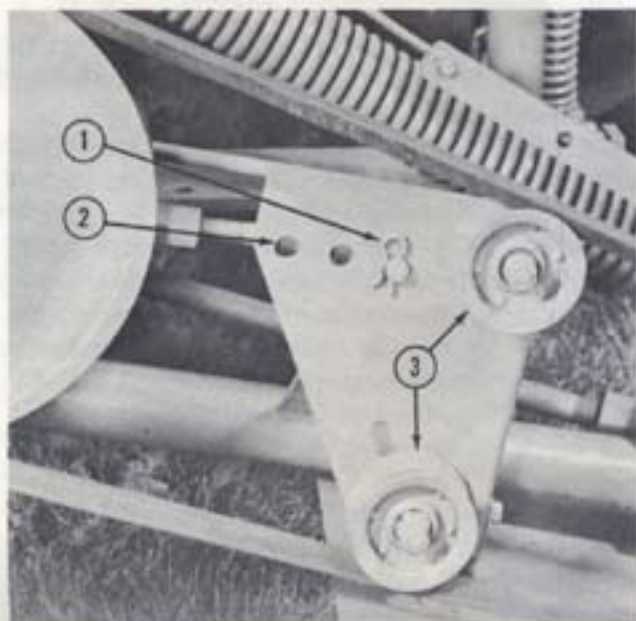


Fig. 34 Belt Idler Pulleys

1. Hair pin 2. Idler pulleys 3. Adjustment holes

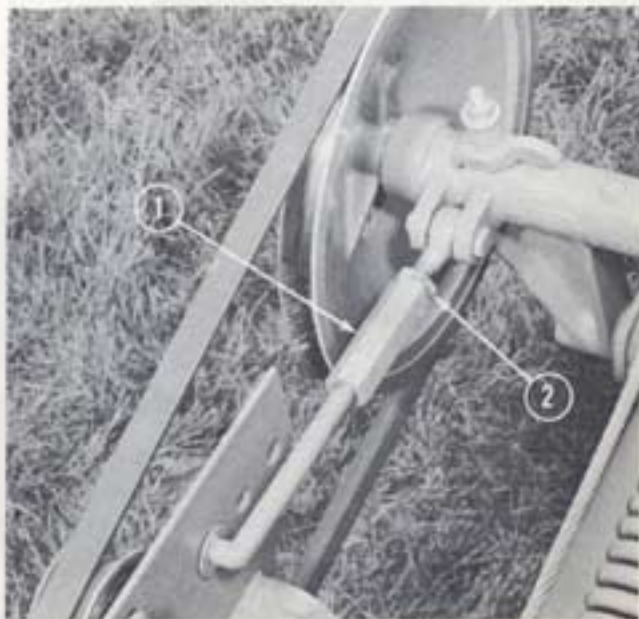


Fig. 35 Belt Adjustment

1. Turnbuckle 2. Lock nut

three holes are provided (Fig. 34) in order to reduce the distance of thread adjustment necessary. When the proper belt tension is achieved, secure the lock nut tightly up against the turnbuckle and insert the hair pin (No. 1, Fig. 34) in the hook end of the turnbuckle assembly.

Swathboard and Stick

The main function of the swathboard and stick is to move the mowed crop to the left of the swath, away from the uncut crop, and thus leave a clear path for the inner shoe the next time around.

The swathboard is spring loaded, a feature which considerably increases its life and durability, as it will "give" upon striking an obstacle and immediately resume its former position when clear.

The swathboard and stick are particularly useful in down crops, the stick position may be varied fore and aft, and up and down according to whichever of the attachment holes are used, see Fig. 36. Generally, the stick should be adjusted high for a tall standing crop and low for a short crop; this, however, is subject to the many vagaries of local conditions and the most advantageous position will be arrived at after a certain amount of experimenting in the field. In severely tangled crops it is often an advantage to fit two grass sticks to the swathboard.

The tension of the swathboard mounting spring should be set so that the board will deflect easily upon meeting an obstruction, but should be tight enough, however, to prevent the board from mov-

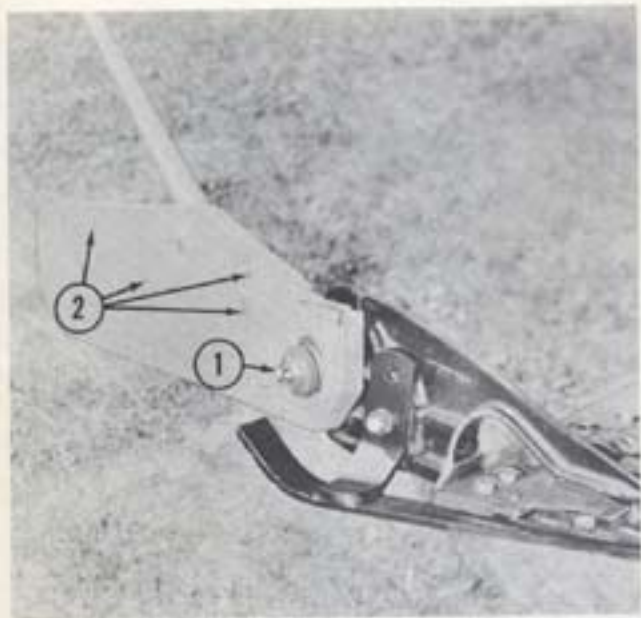


Fig. 36 Swathboard and Stick

1. Tension adjusting nut 2. Alternate stick positions

ing out of position or "flopping" when the mower is being transported. The hex nut (No. 1, Fig. 36) is used to adjust the tension of the swathboard mounting spring.

Tilt Adjustment

The tilt setting of the cutter bar can be easily reset or adjusted by means of the cam adjustment, illustrated in Fig. 37. To make adjustment slacken the nut (No. 2, Fig. 37) and turn the bolt head (No. 1, Fig. 37) attached to the cam; this will cause the forward edge of the cutter bar to

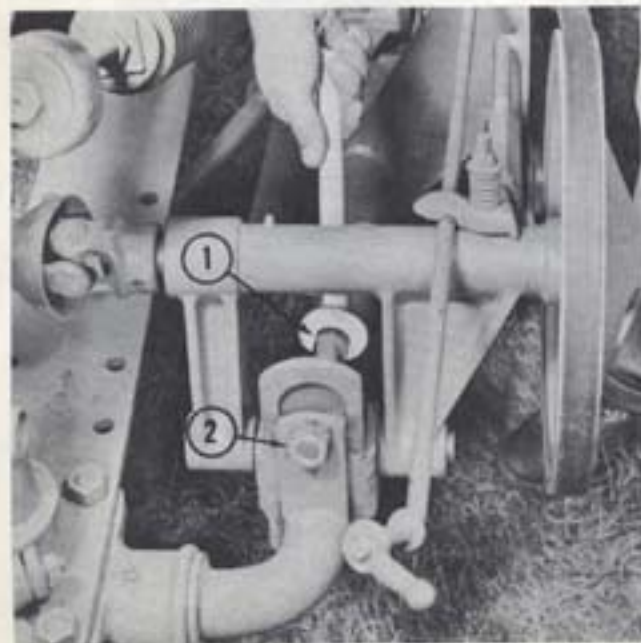


Fig. 37 Tilt Adjustment

1. Bolt head 2. Nut



Fig. 38 Eccentric Adjustment

tilt up and down. When the desired setting is reached, lock the bar at this position by re-tightening the nut (No. 2) securely.

Generally, the cutter bar should be approximately horizontal; in down crops, however, it will be necessary to tilt the bar downward and in rough or stony conditions it may be desirable to tilt the bar upward. The cutter bar has a total range of 14°; that is, 7° above and 7° below horizontal.

Swinging Frame Eccentric Adjustment

This adjustment was built into the frame of the No. 31 Mower to assist in primary alignment at the factory. When the mower is shipped from the factory, this adjustment has already been set and will probably not need to be touched again in the lifetime of the mower. It is foreseen however, that in odd circumstances such as a major servicing overhaul, this adjustment may be interfered with; the following information is, therefore, included in this section of the manual.

The swinging frame eccentric adjustment is provided in the upright tube member of the left swing frame. Movement of the eccentric is accomplished by turning the slotted shoulder bushing with a "C" type spanner as shown in Fig. 38. This slotted bushing is locked in position by a lock screw which must be replaced after adjustment.

The eccentric adjustment should only be moved if the operator experiences difficulty in resetting the swing frame back into the operating position after the safety release has been operated. If resetting difficulty occurs, the following pro-

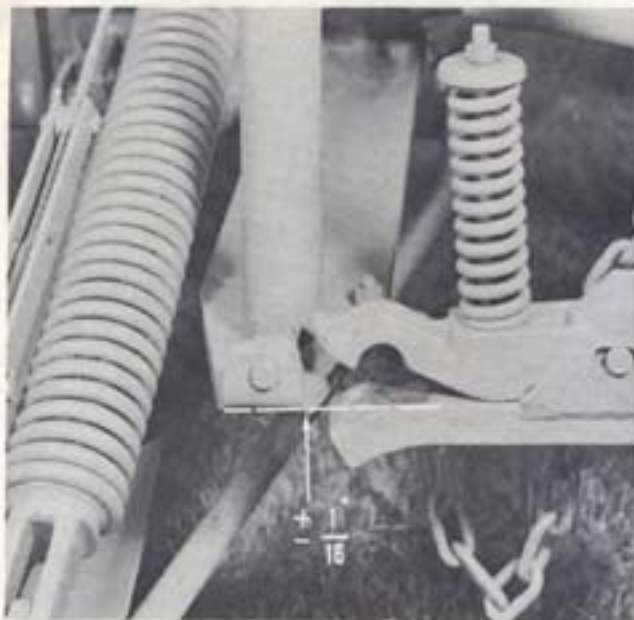


Fig. 39 Aligning Safety Release

cedure should be adopted:

1. Raise the mower to the field transport position. (Illustrated Fig. 41).
2. Disengage the PTO shaft. Stop the tractor engine.
3. With the cutter bar in the "break back" position, move the cutter bar and frame forward as if to re-engage in the safety release catch (Fig. 39).
4. The flat underside member of the swing frame should be $\frac{1}{16}$ " above to $\frac{1}{16}$ " below the top surface of the safety release "U" beam, as illustrated in Fig. 39.
5. If the above measurement is exceeded, remove the locking screw from the eccentric cap; slowly rotate the cap with a "C" spanner.
6. As the cap is rotated, (In either direction) the measurement point on the swing frame will move up and down. When the correct (plus or minus $\frac{1}{16}$ ") measurement is reached, move the nearest slot in the eccentric cap to line up with the lock screw hole. Replace the lock screw.
7. The swing frame should now reset easily in the operating position. The mower may now be lowered and the mowing operation continued.

Transport Positions

When transporting the mower over the road, or from one field to another:

1. Raise the mower completely with the hydraulic lever.
2. Disengage the PTO drive.
3. Dismount the tractor and raise the cutter



Fig. 40 Road Transport Position

bar to vertical position; lock in place with the cutter bar support rod.

WARNING: Do not hold the cutter bar at the knife guards when raising or lowering manually. The drive unit pulley may rotate, moving the knife, and serious injury to the fingers may result. Always lift or lower the cutter bar by holding the rear edge of the bar.

The road transport position, as described above, is illustrated in Fig. 40. For field transport position, which is used when mowing from one fairly open part of a field to another, or for finishing a field, it is unnecessary to raise the cutter bar to the vertical position. This position is illustrated in Fig. 41.

CAUTION: Always shift the PTO lever to "neutral" before raising the cutter bar for road transportation.

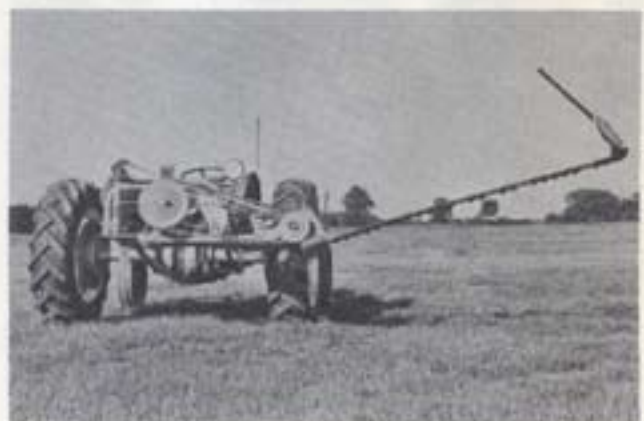


Fig. 41 Field Transport Position

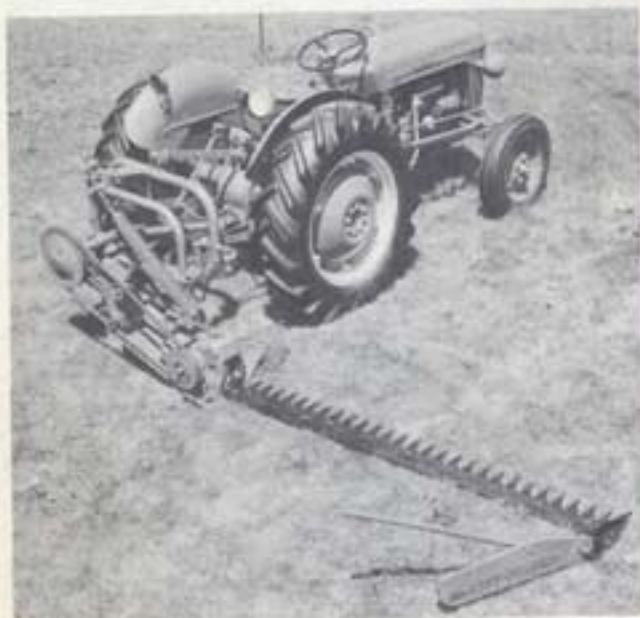


Fig. 42 Operating Position

Operating Position

The correct operating position is attained after the pre-operative settings "Operating Height" and "Cutter Bar Flotation", have been attended to; these are explained on pages 10 and 15.

When the mower is in the field and ready for operation, the cutter bar should be lowered to the horizontal position and the cutter bar support rod hooked into its retaining clip. It is suggested that the hand nut on the end of this support rod be carried in the operator's pocket, or in the tractor tool box when not in use. Experience has shown that these nuts are frequently lost in the



Fig. 43 Detaching Left Link

field; usually, through not being screwed tightly down the threads on the rod and so working off while operating over rough terrain. Fig. 42 shows a No. 31 Mower in operating position attached to a Massey-Ferguson TO 35 Tractor.

DETACHING

The detaching operation is quite simple and may be carried out with the cutter bar in either the vertical or horizontal position. When the mower is to be detached for storage or in some sheltered place, it may be advantageous to have the cutter bar in the vertical position; it will take less space this way and the bare metal surfaces of the cutter bar assembly are more easily protected. (If mower is to be stored, refer to "Mower Storage," page 27.

The tractor should be driven to a clear suitable area, and the mower lowered onto a supporting block, this block should be just high enough to hold the mower "square" when detached from the tractor as in Fig. 43.

The following detaching procedure is suggested:

1. With tractor "out of gear", engine running, PTO drive in "Neutral", dismount and remove the linch pin from the forward stabilizer bar connection. With one hand gently move the hydralver up and down so that the stabilizer bar may be pulled off the link pin. Replace linch pin in link pin.
2. Switch "off" tractor engine. Disconnect the PTO shaft by depressing the locking button and pulling the shaft rearward.



Fig. 44 Detaching Right Link

3. Remove linch pin, disconnect left link (see Fig. 43).

4. Remove linch pin, disconnect right link and stabilizer bar (Fig. 44).

5. Remove linch pin at the rear top link connection and disconnect the top link.

6. Replace all linch pins in their retaining brackets or (as with the MF 65 Tractor) in the link stay anchor pins.

NOTE: Make sure that the mower is blocked up evenly and securely, particularly if the cutter bar is in the vertical position.

The detaching operation is now complete and the tractor may be driven away.

Operating Difficulties

The following section lists the most common difficulties that are known to be encountered during mowing operations. It should be stressed, however, that preventive maintenance, as outlined in other sections of this manual will virtually preclude the possibility of encountering any of these difficulties during normal and average mowing operations.

A. Excessive Side Draft

This is a good indication of misalignment and

wear. The following points should be checked:

1. Dull, or improperly sharpened knife.
2. Worn knife clips and wear plates.
3. Bent guards.
4. Improper adjustment of knife guides.
5. Improper lubrication.
6. Insufficient amount of lead in cutter bar.
7. Bent knife.
8. Worn ledger plates.

B. Knife Breaking

Usually caused by worn or loose parts. Check the following points:

1. Worn knife clips.
2. Worn guides.
3. Guards out of line.
4. Loose sections.
5. Worn knife head.
6. Misalignment of cutter bar.

C. Ragged Cutting

Usually caused by one or more of the following:

1. Damaged or dull knife.
2. Guards out of line.
3. Worn or broken guard plates.
4. Loose sections.
5. Uneven shoe adjustment.

11778 *Large caps in A, C, D*

Servicing

While we recommend that major overhauls, replacements, and adjustments be carried out by your local Massey-Ferguson Dealer whenever possible, preventive maintenance regarding general upkeep on the part of the owner is considered advisable. For this reason the following material has been compiled to assist you in carrying out mower servicing.

Knife Replacement

To remove a knife, either for replacement or repair, the cutter bar may either be flat on the ground (as in Fig. 45) or blocked up. Raising the cutter bar off the ground will give easier access to the knife, although if this method is used the operator must be careful to block both ends of the cutter bar up so that it is supported evenly and the knife is not bowed.

NOTE: If the knife is well oiled and run for a few minutes before removal the job will be considerably easier. Under certain conditions of plant sap or insect build up, it is sometimes advisable to soak the cutter bar with water or kerosene to facilitate knife removal.

1. If the cutter bar is to be blocked up, raise it slightly higher than the blocks and lower it gently onto them; otherwise, lower the bar completely on a flat, clear piece of ground.

2. Place the PTO drive in "neutral." Tractor engine should be switched "off."

3. Unscrew the single bolt which attaches the knife to the center lever of the drive unit; before the bolt is completely removed, tap the head with a hammer to unseat the tapered plug.

4. Rotate the pulley by hand until the center lever is at its innermost position. The knife is now free to slide out of the cutter bar; if it is

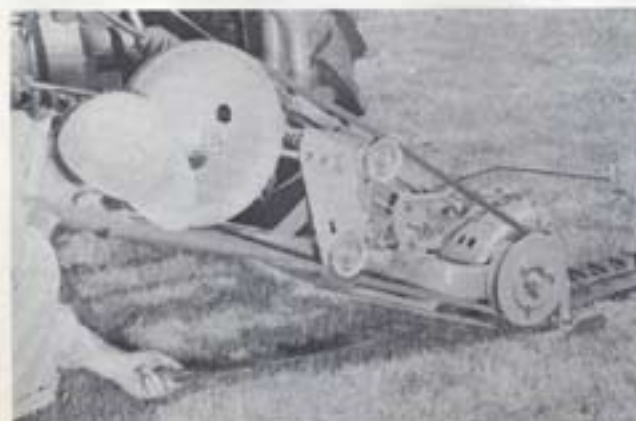


Fig. 45 Knife Replacement

sticking slightly, tap at the outer end with a hammer and punch until it is free enough to slide out by hand.

5. The replacement knife can now be slipped into the end of the cutter bar; (Fig. 45) when it is fully home, with the tapered plug engaged in the center lever, the retaining bolt should be replaced and screwed down tightly.

6. Remove the blocks (if used) from under the cutter bar. The operation is now complete.

Knife Sharpening

The knife should be straight and sharp, with the sections firmly riveted. Care should be taken in sharpening the sections to maintain the original shape and bevel. Replace all worn and broken sections. Fig. 46 shows knife sections properly and improperly sharpened.

Removal of Knife Sections

Remove knife sections by shearing the retaining rivets, see Fig. 47. Place the knife in a vise, allowing the knife back to rest on vise jaw. Strike the section directly above the rivets with a heavy hammer, the section will move down, shearing the rivets. The rivet heads may then be driven out easily with punch.

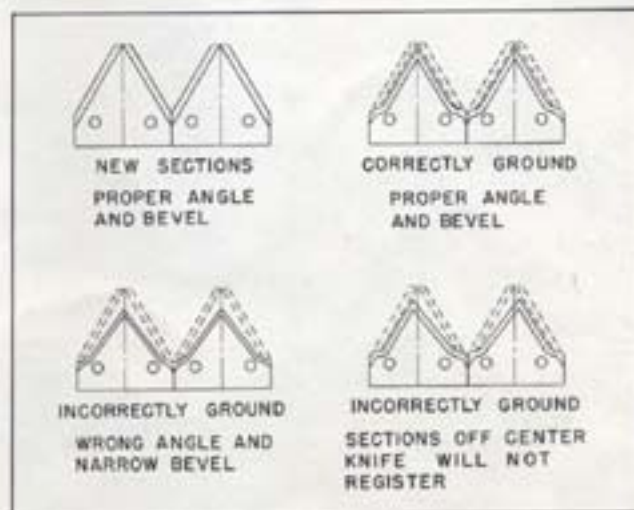


Fig. 46 Knife Sharpening

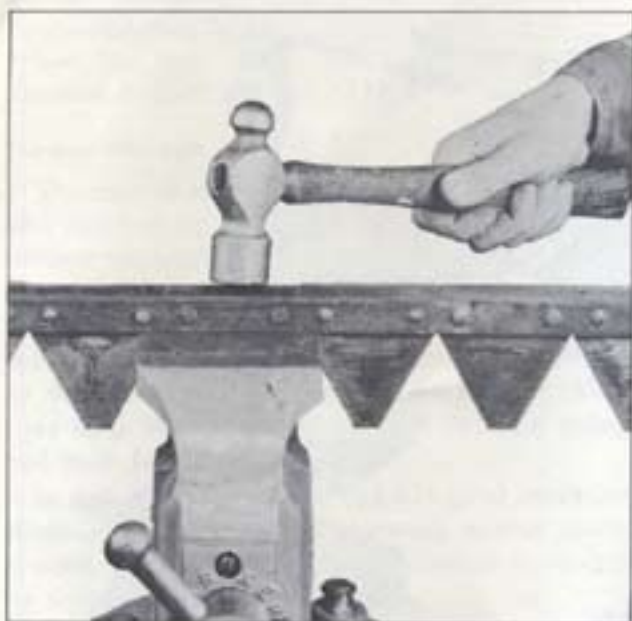


Fig. 47 Removing Knife Sections

NOTE: Before new sections are riveted to the knife, check the knife back for straightness by laying it on a flat surface. All twists or bends should be straightened before attaching the new sections.

Use a regular rivet set when re-riveting in order to shape the heads and securely set the rivets. Recheck the knife for straightness after riveting the new sections.

Wear Plates

The wear plates, see Fig. 48 and No. 5, Fig. 49, should be adjusted to prevent looseness of the knife back. If the wear plates are set ahead, the clearance between the tips of the sections and the guards should be checked so that the sections do not strike the guards. It is essential that the wear plates are in alignment to give the knife-back a straight bearing along its entire length.

Knife Clips

Knife clips (Fig. 48 and No. 4, Fig. 49) should not be set until after the guards are aligned. Knife clips hold the knife sections to the ledger plates, but they must permit the knife to operate without binding. Adjust the clips to allow approximately .010 inch clearance between the front and rear knife section and the clips. Care must be taken when this adjustment is made, to be sure that the entire flat parts of the clip hold the section down. If binding occurs, check to see if the binding area is at the front or rear of the clip and then bend the clip up accordingly. After

setting the clips, move the knife in the cutter bar by hand; the knife should be free.

The clips can be set lower by driving them down with a hammer. Remove the knife from under the clips when making this adjustment.

Guards and Ledger Plates

To assure clean cutting, the point of the sections see Fig. 48, must be aligned with the ledger plates on all guards and both inner and outer shoes.

To check guard alignment, first be sure the cutter bar is properly seated in the inner shoe or drive unit and that the attaching bolts are securely tightened. Line up the first guard with the inner shoe or drive unit ledger plate. This can best be checked with a small straight edge. Then line up the outer guard with the outer shoe ledger plate. After getting the two end guards properly aligned, sight down the cutter bar and line up the remaining guards. The guards can best be lined up by bending them with a heavy (4 to 8 lb.) hammer. To bend the guards, strike them a sharp blow at the heavy section just ahead of the ledger plate. Use a short swing of the hammer to maintain accuracy. Be careful not to bend the guard lips down. Bent lips will cause binding and choking. The guard bolts should be tightened before, and again after, checking and aligning the guard.

All worn ledger plates, as well as badly bent or broken guards, should be replaced. Blunt guards should be repointed by filing.

Replacing Ledger Plates

Ledger plates should be replaced as soon as the serrated edges are worn smooth. Dull ledger

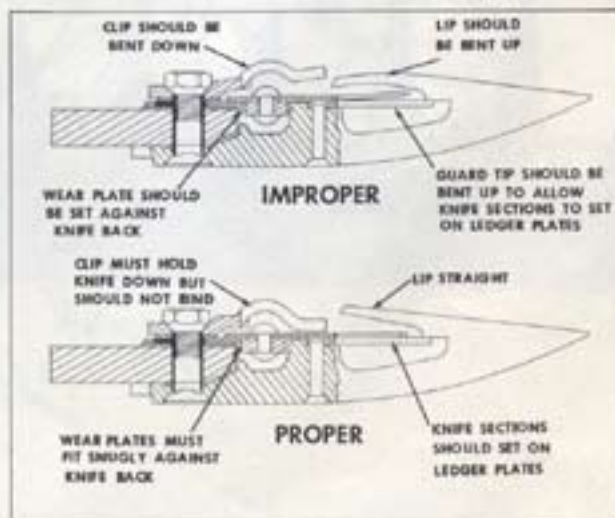


Fig. 48 Cross Section of Knife and Cutter Bar

plates cause ragged cutting and excessive draft.

The ledger plates may be replaced while the guards are on the cutter bar, or the guards may be removed, as desired.

To remove a ledger plate, loosen the retaining rivet by driving it downward through the guard, with a $\frac{3}{16}$ inch punch. After loosening the rivet, drive it out of the guard with a $\frac{3}{16}$ inch pin punch. When driving the rivet out place a solid support (vise, anvil, etc.) under the guard to prevent bending or distortion, see Fig. 50.

Before replacing a ledger plate, it may be advisable to countersink the rivet hole on the underside of the guard with a $\frac{3}{16}$ inch drill. This permits a more satisfactory seat for the rivet head.

Place the ledger plate in position. Insert the rivet through the ledger plate and down through the guard, and place the solid support against the rivet head. The other end is peened to form a head in the countersunk face of the guard. Make certain that the rivet is firmly seated in the guard before peening the rivet. Use a suitable punch to form a head on the rivet. Clamp the guard in a vise and chisel or file off the excess



Fig. 50 Replacing Ledger Plates

head of the rivet, making it even with the face of the ledger plate.

Drive Belt Replacement

No disassembly is required to remove or install a drive belt. The tension should be com-

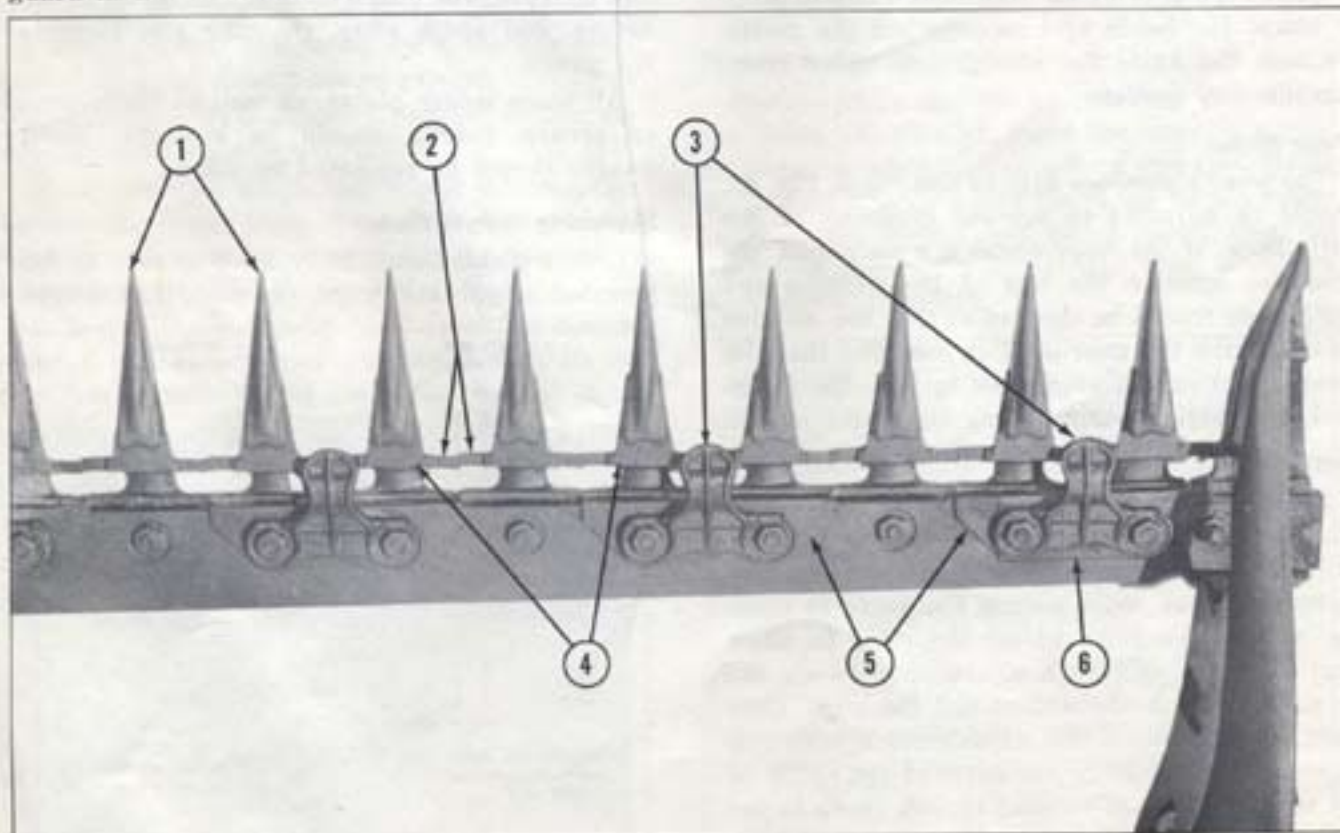


Fig. 49 Cutter Bar Nomenclature

1. Guards
2. Guard wings

3. Knife clips
4. Ledger plates

5. Wear plates
6. Wear plate shims

pletely slackened off by means of the turnbuckle so the belt may be easily removed from the sheaves. When the new belt is installed, refer to "Belt Tension Adjustment," page 19, for correct setting.

Mower Storage

The mower should be removed from the tractor and blocked up in a suitable place where it is neither exposed to weather or livestock. The cutter bar will be easier to protect and the machine will take up less space if the cutter bar is in the vertical position. Place blocks under the mower as described in the "Detaching" section. Make sure that the mower is blocked up in a secure and safe fashion.

In order for the mower to be in good operating condition when the next mowing season comes around, it is advised that the following procedure be adopted.

1. Replace all worn and broken parts, or order

them from your local Massey-Ferguson Dealer, so that they may be replaced in good time for next season's operations.

2. Remove all foreign material from the cutter bars, etc.

3. Remove the knife and clean thoroughly.

4. Remove rust from knife and other bare surfaces with a wire brush or sandpaper.

5. Cover knife, cutter bar and shoes and other bare metal surfaces with a coating of heavy oil or grease.

6. Remove all other rust spots and repaint with a good grade enamel paint.

NOTE: The correct enamel paint, in the desired color, is available in handy spray packs from your local Massey-Ferguson Dealer.

7. Slacken off all tension on the drive belt.

8. Lubricate entire machine as outlined under "Lubrication", page 1.



Assembly Instructions

The Massey-Ferguson No. 31 Dyna-Balance Mower is shipped from the factory in the following bundles or sub-assemblies.

- *1. Cutter bar assembly with two knives.
2. PTO drive shaft.
3. Drive sheave (pulley) and "V" belt.
- *4. Hitch pins.
5. Drag bar and drive unit assembly.
6. Frame unit.

The parts indicated with an asterisk (*) are items of optional equipment; these are described in detail under the heading "Optional Equipment", page 4. The desired type of these optional items should be specified when the mower is ordered.

The following steps should be taken to complete the assembly:

1. Take the drag bar and drive assembly unit and place on blocks as in Fig. 51. The support rod for the cutter bar (Figs. 51 and 52) should be inserted in the belt idler support as illustrated, and the open eye end closed either by leverage or by a few taps from a hammer (6 lb. or heavier).

2. Attach the drive shaft housing (No. 4, Fig. 52) by means of the 1" dia. steel pin (No. 8, Fig. 52) this is locked in place by means of a groove pin.

3. Attach the drag bar elbow (No. 6, Fig. 52), and the frame mounting bracket (No. 7, Fig. 52) to the drag bar, this is attached by means of the $\frac{5}{8}$ " tilt adjustment bolt and nut (No. 5, Fig. 52).

4. Attach the pull bar assembly (No. 9, Fig. 52) as illustrated. Use one clevis pin and two cotter pins.*

5. Attach the drive sheave to the housing at the end of the drag bar as illustrated in Fig. 52. This is attached to the drive shaft (No. 2, Fig. 52), by means of a woodruff key, flatwasher, and nut (No. 2, Fig. 53). The belt tensioner (turnbuckle assembly) is attached to the drive shaft housing by means of a clevis pin and cotter pin, (see No. 3, Fig. 52).

6. The cranked end of the turnbuckle assem-



Fig. 51 Commencing Assembly

1. Cutter bar support rod

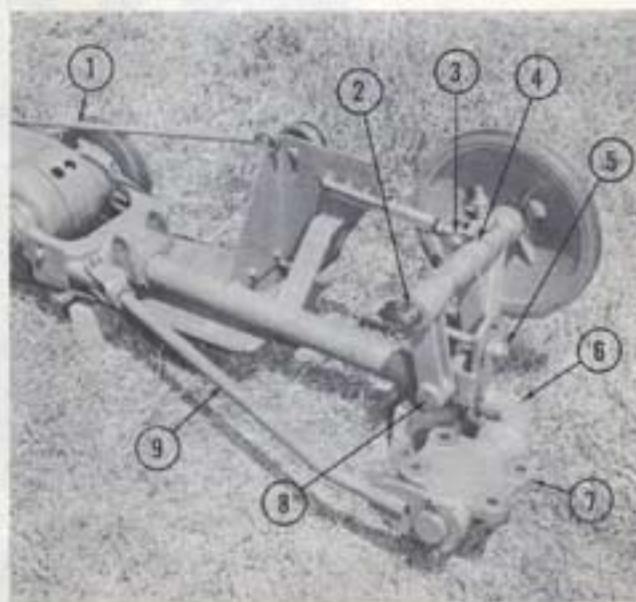


Fig. 52 Second Stage of Assembly

- | | |
|------------------------|---------------------------------|
| 1. Support rod | 5. Tilt adjustment bolt and nut |
| 2. Drive shaft | 6. Drag bar elbow |
| 3. Clevis pin | 7. Frame mounting bracket |
| 4. Drive shaft housing | 8. 1" dia. pin |
| 9. Pull bar | |

*Refer to "Pull Bar Adjustment" page 17

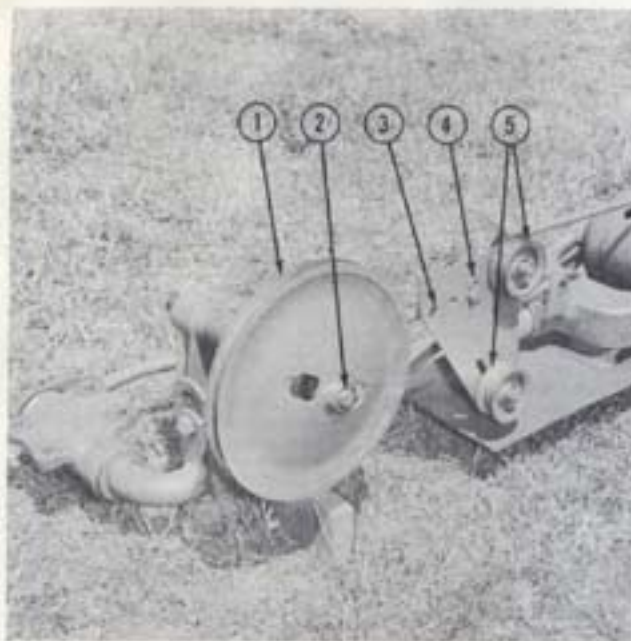


Fig. 53 Third Stage of Assembly

- | | |
|------------------------|---------------------|
| 1. Drive sheave | 3. Adjustment holes |
| 2. Flat washer and nut | 4. Hair pin |
| 5. Belt idler pulleys | |

bly is placed in one of the three holes in the idler pulley mounting bracket. It is suggested that the hole at the far right (looking from the rear) is used for a start as in Fig. 53. After the belt is installed the operator should check this point by reference to "Belt Tension Adjustment", page 19. The end of the turnbuckle assembly, which is placed through the hole, is locked in place by means of a hair pin (Fig. 53).

7. Attach the bellcrank type bracket to the drag bar assembly using a $\frac{3}{4}$ x $5\frac{1}{2}$ " steel pin (No. 2,



Fig. 54 Fourth Stage of Assembly

- | | | |
|----------------|--------------|---|
| 1. Gag linkage | 2. Bellcrank | 3. $\frac{3}{4}$ x $5\frac{1}{2}$ " pin |
|----------------|--------------|---|

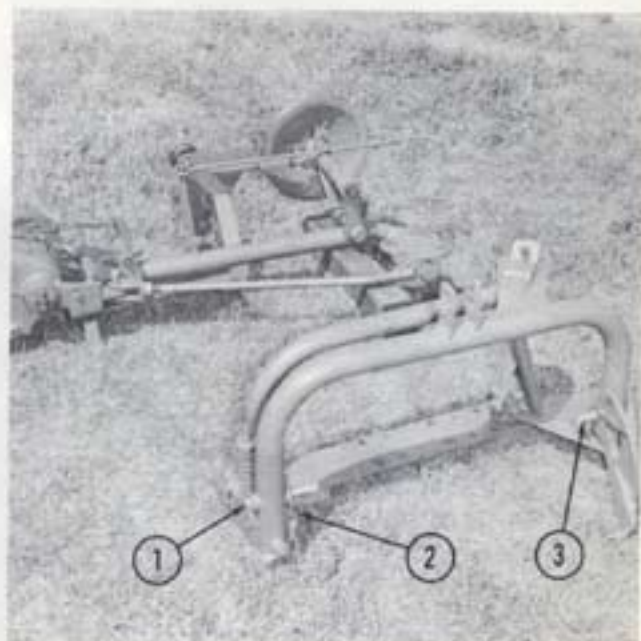


Fig. 55 Fifth Stage of Assembly

- | | |
|--------------------|----------------|
| 1. Right hitch pin | 2. Check chain |
| 3. Left hitch pin | |

Fig. 54), held in place by means of two cotter pins.

The dyna-balance gag linkage chain (No. 1, Fig. 54) should now be connected to the rear arm on the bellcrank by means of the clevis and threaded eyebolt and $\frac{5}{8}$ " clevis pin and cotter pin. The outer end of the chain is attached to the dyna-balance unit by means of a shackle, a $\frac{1}{2}$ x 2" clevis pin and cotter pin as illustrated.

8. Take the frame group and attach the lift arm by means of the left hitch pin (No. 3, Fig. 55).^{*} Attach the right hitch pin and safety release check chain Nos. 1 and 2, Fig. 55.

9. Place the four $\frac{5}{8}$ " bolts through the base casting with their heads downward, hold them in position by placing two short blocks beneath their heads as in Fig. 56. Lower the frame group onto the bolts, with the bolts inserted through the appropriate holes for the wheel width spacing of the tractor to be used. In Fig. 56 the bolts are positioned for a tread setting of 72-76 inches. For a clearer illustration, and also details pertaining to the 52-56 and 62-66 inch wheel settings, refer to the diagram Fig. 9 in the "Mower Width Adjustment" section. Place lockwashers and nuts on the base bolts and tighten them down to 125-150 ft. lbs. torque, which is equivalent to a strong pull on an 18" wrench.

10. Attach the PTO shaft to the drive shaft (Fig. 56) by means of a woodruff key and drive pin.

11. Insert the $\frac{1}{2}$ " roll pin (which locates the

^{*}Refer to "Hitch Pins" page 5.

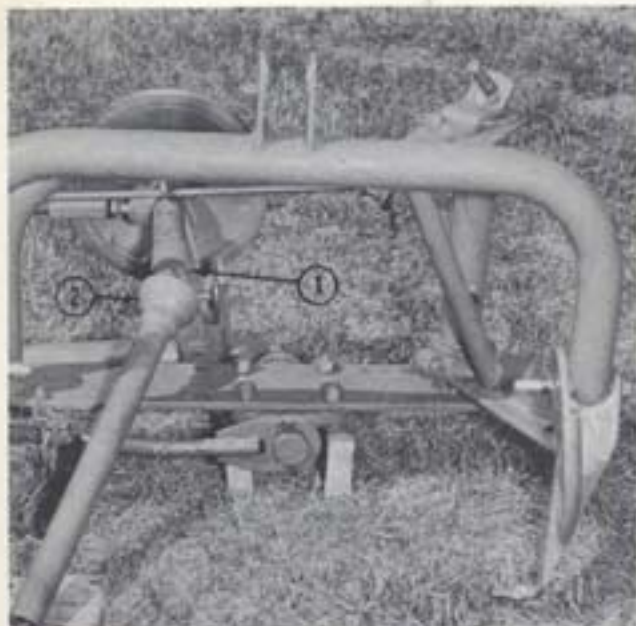


Fig. 56 Sixth Stage of Assembly
 1. Drive pin 2. PTO shaft



Fig. 58 Bracket for Counterbalance Spring
 1. Rear portion of bracket

spring support bracket) into the upper frame group. Use the position indicated at No. 1, Fig. 57 for a 72-76 inch wheel setting. Use the hole at the far left for a 52-56" wheel setting and the center hole for a 62-66" wheel setting.

12. Attach the bracket for the counterbalance spring. First tap the larger part of the bracket onto the roll pin (No. 1, Fig. 58) then attach the small, forward part of the bracket by means of the two cap screws provided.

13. Attach the lift cable assembly (No. 1, Fig. 59) to the stud welded to the bracket at the left

rear of the lift frame (No. 2, Fig. 57). Use the nut, plain washer, and lockwasher provided. Attach the forward clevis end (No. 2, Fig. 59) to the appropriate hole in the lift arm assembly by means of a clevis pin and lock with a cotter pin. The clevis pin (No. 3, Fig. 59) is attached in the correct position for all models of the TO 35 Tractor and for the standard clearance MF 50 Tractor. Use the hole No. 4 for all models of the MF 65 Tractor and the high clearance MF 50. Use hole No. 5 for all models of the MF 85 Tractor.

NOTE: The holes in the lift arm are marked with the letters A, B, and C indented on the outside of the arm (the reverse side to that shown in Fig. 59).

The following table gives the correct hole to use for current and non-current Massey-Harris, Ferguson and Massey-Ferguson Tractors.

Tractor	Hole in Lift Arm
TO 20, 30 and 35	(A) <i>no 2 hole top hole</i>
Standard Clearance Models F 40, MH 50 and MF 50	A
High Clearance Models F 40, MH 50 and MF 50	B
Standard and High Clearance Models of MF 65	B
Standard and High Clearance Models of MF 85	C



Fig. 57 Roll Pin Inserted
 1. Roll pin 2. Lift assembly stud

The rear right end of the lift cable attaches by means of trunnions and lift links (No. 6, Fig. 59) to the center arm on the bellcrank (No. 7, Fig. 59). Two trunnions are provided; one is threaded

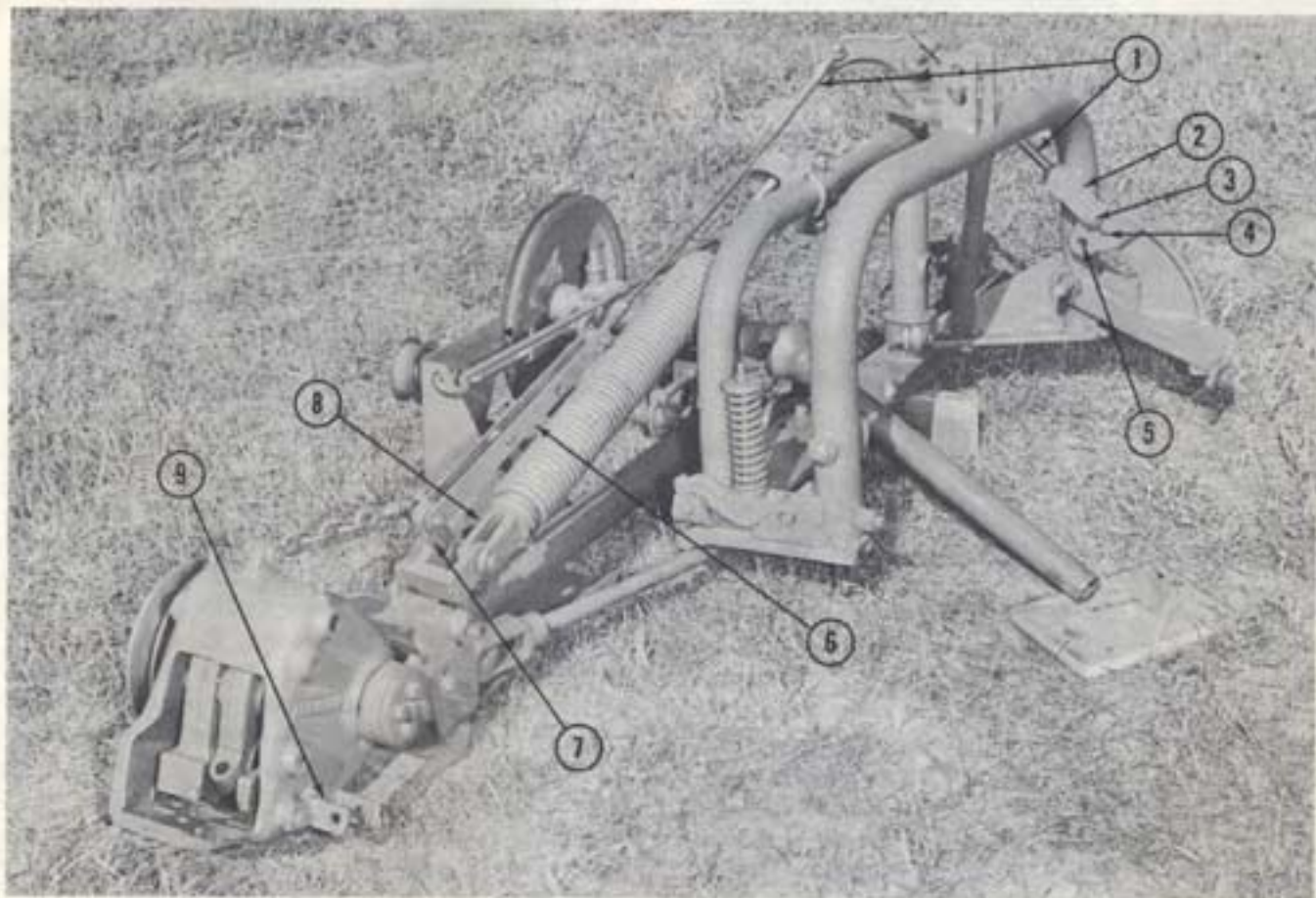


Fig. 59 Installation of Lift Assembly

1. Lift assembly
2. Clevis
3. Clevis pin

4. Alternate hole. See text
5. Alternate hole. See text
6. Lift links

7. Center arm on bellcrank
8. Clevis on counterbalance spring
9. Forward inner shoe bracket

and one is non-threaded. Fig. 59 shows the link assembly with the trunnions in the correct position for the 72 inch wheel setting. In the 72 inch wheel setting position, the threaded trunnion is placed with the cable attached, in the holes at the far left of the link (looking from the rear). The non-threaded trunnion is retained in the holes at the far right. For the 52 inch spacing the non-threaded trunnion is first slipped onto the cable and then placed in the holes at the far left of the links where it is used as a guide. The cable is attached to the threaded trunnion which is placed in the far right position in the links. For further information and for details of the 62-66 inch tread width position, refer to the diagram Fig. 9.

14. Attach the clevis end of the counterbalance spring to the forward arm of the mounting bracket (bellcrank): use a clevis pin and cotter pin (No. 8, Fig. 59). Take the long $\frac{5}{8}$ inch adjusting bolt and with the cup washer and "jam" nut mounted on the shank, place it through the mounting bracket and screw it into the counterbalance

spring until the cup washer is just held snugly in the seat of the bracket.

15. At this stage of assembly the mower may

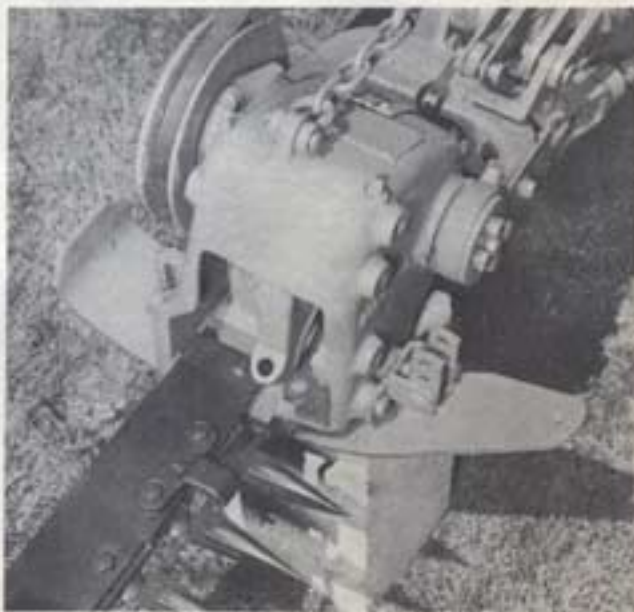


Fig. 60 Cutter Bar and Inner Shoe Installed

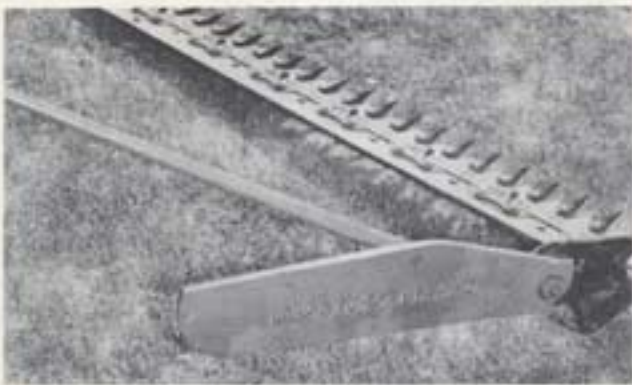


Fig. 61 Swathboard and Stick Assembled on Outer Shoe

be attached to the tractor as instructed under the "Attaching" heading, page 8. Before this is attempted, check to see that the tractor has been prepared as outlined under "Preparing the Tractor", page 6.

To complete the assembly, the drive belt, cutter bar, swathboard, knife and shoes need to be attached. It is suggested that these components are installed after the mower is attached to the tractor; this will expedite the assembly procedure. However, the mower may be completely assembled while detached if the operator so desires.

16. To complete the mower assembly: Raise the mower by means of the hydrallever, if attached to the tractor, otherwise, block up the drive

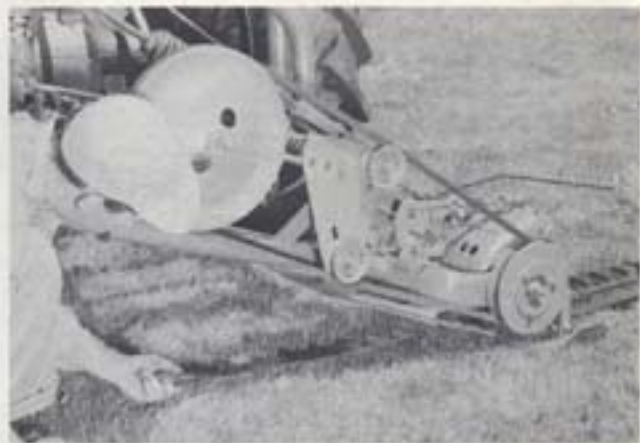


Fig. 63 Inserting Knife

unit to obtain access to the cutter bar attachment holes. Attach the cutter bar as shown in Fig. 60, using the three special $\frac{5}{8} \times 1$ " bolts. It can be a one man operation if the gag linkage is disconnected and the outer shoe of the cutter bar is resting on the ground. If two men are available it will be easier to have one man supporting the cutter bar from the outer end and maneuvering it so that the other operator can install the bolts. The three mounting bolts should be tightened to approximately 150 ft. lbs. torque, which is equivalent to a strong pull on a wrench with an 18 inch handle.

17. With the drive unit clear of the ground,

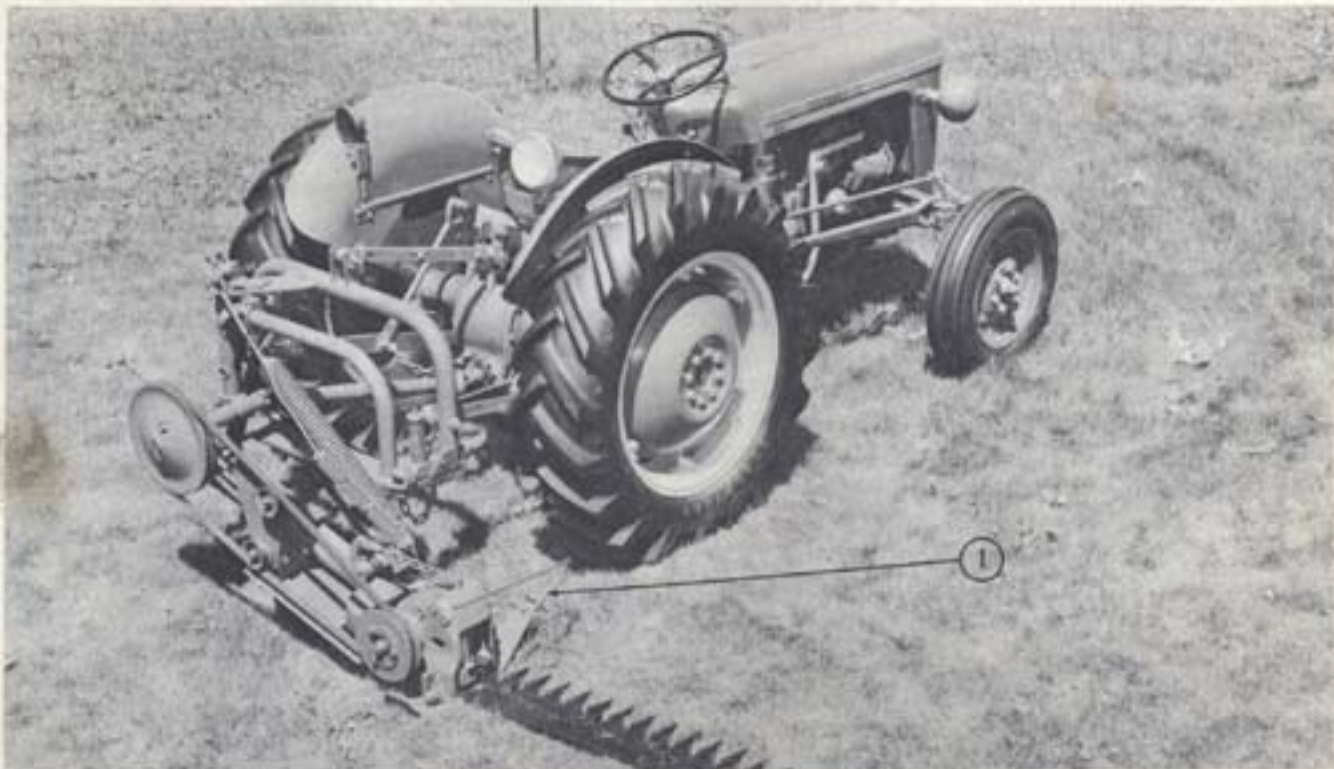


Fig. 62 Complete Assembly
1. Cross rod

attach the inner shoe using two carriage bolts and nuts, and a spacer between the two uprights on the forward bracket. (Fig. 60).

18. Install the grass rod (No. 1, Fig 62) using the carriage head bolt, nut and lock washer provided. Insert the bolt from beneath the shoe with the grass rod between the bolt head and the shoe.

19. When shipped, the outer shoe will already be attached to the cutter bar by means of cone nuts. Take the swathboard and attach it to the outer shoe, using the carriage head bolt, tension spring, plain washer and castellated nut as in Fig. 61. Tighten down on the nut until the swathboard cannot "droop" of its own weight, but can still spring outward if struck a light blow (on the inside of the board). Lock the castellated nut by means of a $\frac{3}{32}$ inch cotter pin.

20. Insert the grass stick into the guide on the swathboard. Lock in place by means of the carriage bolt and nut provided.

21. Slide the knife into the cutter bar (Fig. 63)

and attach it to the center lever in the drive unit by means of the $\frac{1}{16}$ x $\frac{3}{8}$ " hex head cap screw and heavy flat washer provided. To provide ease of installation, rotate the belt pulley by hand until the center lever is at its innermost position.

22. The drive belt may now be installed. With the adjusting turnbuckle positioned to allow the drive sheave to move as far as possible to the right, the belt may be easily placed in position over the sheaves.

Fig. 62 shows the belt installed and the fully assembled mower attached to a TO 35 Tractor. Before the mower is operated in the field the following pre-operative settings should be attended to:

"Belt Tension Adjustment", page 19. "Adjusting Operating Height", page 10. "Cutter Bar Flotation", page 15. Further field adjustments may be necessary; these are explained under the headings "Operating Information" and "Adjustments" commencing page 11.

*Recognize it
admit it
learn from it
forget it* } *a mistake
can be
profitable
if you.*

Specifications

Weight	550 lb.
Max. Ground Speed	9 M.P.H.
Max. Crankshaft Speed	1170 R.P.M.
Capacity	6 Acres per hour
Cutter Bar Length	6 or 7 ft.
Cutter Bar Tilt Angle	7°
Inboard Lift	20 inches
Outboard Lift	30 inches
Knife Stroke	3 inches
Storage space	
(Narrow Tread)	3 x 5 feet
(Wide Tread)	3 x 6 feet

*Belt
 Runners for cycle head
 90 oil 2 galon
 in 2 months*



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 *Billings, Mont.
 Columbus, Ohio
 Charlotte, N.C.
 Dallas, Tex.
 Denver, Col.
 Des Moines, Iowa
 Fargo, N.D.
 Indianapolis, Ind.
 Jackson, Miss.
 *Jacksonville, Fla.
 Kansas City, Kan.
 Lansing, Mich.

*Los Angeles, Cal.
 Memphis, Tenn.
 Minneapolis, Minn.
 Nashville, Tenn.
 Oklahoma City, Okla.
 Omaha, Neb.
 *Phoenix, Ariz.
 Pocatello, Id.
 Portland, Ore.
 Racine, Wisc.
 Springfield, Ill.
 *Springfield, Mass.
 *Spokane, Wash.
 Stockton, Cal.
 *St. Louis, Mo.
 Syracuse, N.Y.

*Sub-branches