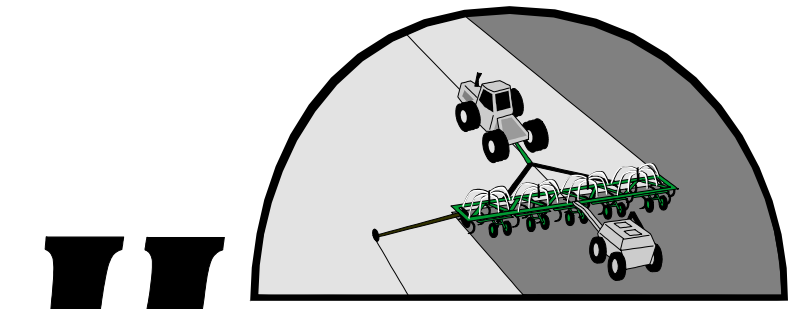


HAUKAAS

FIELD MARKERS

OWNERS MANUAL

MODELS
136/246/286

011

DEALER NAME:_____

DATE OF PURCHASE:_____

MARKER SER#'S:_____L _____R _____

MARKER MODEL #:_____

MARKERS INSTALLED BY:_____

THIS MANUAL SHOULD ACCOMPANY YOUR HAUKAAS SIDE ARM MARKERS AT ALL TIMES!

TABLE OF CONTENTS

FORWARD

Haukaas Mfg. Ltd. would like to take this opportunity to thank-you for purchasing a SIDE ARM Field Marker.

This manual is published as a guide and service reference to assist you, the owner of the SIDE ARM Field Marker, in obtaining satisfactory operating performance.

In order to achieve the best performance, it is necessary that the unit be treated with reasonable care, and that the inspection, operating and maintenance procedures contained in this manual be followed closely.

To get best results, it is recommended that you discuss unusual or specific operating conditions with the dealer. You should request recommendations regarding optional equipment that will protect your unit and extend its working life. All service and maintenance should be performed by qualified personnel.

This manual should be considered as part of the machine and should be delivered to the new owner if the machine is sold or operated by a person other than the original purchaser.

Most farm accidents, like industrial, home and highway accidents, are caused by the failure of some individuals to observe simple and fundamental safety rules or precautions. For this reason farm accidents, just as any other type of accident, can be prevented by recognising the causes of accidents and doing something about them before an accident occurs.

Regardless of the care used in the design and construction of farm equipment, there are many points that cannot be completely safeguarded without interfering with accessibility and efficient operation.

A careful operator is the best insurance against an accident.

The complete observance of one simple rule would prevent many thousand serious injuries each year. That rule is: "**NEVER ATTEMPT TO CLEAN, OIL, OR ADJUST MACHINE WHILE IT IS IN MOTION.**"

Before attempting to operate your new marker, read this owner's manual and all the decals on the marker. You should also familiarise yourself with the machine.

HAUKAAS WARRANTY POLICY

HAUKAAS (The seller) warrants to the original purchaser that the unit sold is free from defects in materials and workmanship. This warranty is the sole warranty of the seller and all other warranties, express or implied, are hereby excluded.

1) BASIC WARRANTY REPAIR PERIOD AND PROCEDURES.
HAUKAAS warrants all new serial numbered SIDE ARM field markers covered by this agreement, when properly assembled and adjusted, to be free from defects in material and workmanship under normal use and service for which intended, for a period of 1 year (12 months) from the date of delivery. Within this time period HAUKAAS will repair or replace, at its option, without charge for parts or labour to the retail purchaser, any defective part of the equipment. Notice of warranty claim must be given within the given warranty period.

To make a warranty claim, the retail dealer must contact HAUKAAS at which time they will be given a warranty claim number. Without this claim number no warranty items will be issued. Any warranty work done before contacting HAUKAAS may be void. Once the claim number has been received and all the proper forms have been filled out completely then and only then will the warranty items be sent out or reimbursements made.

HAUKAAS will only reimburse dealers for labour and parts. If a dealer purchases warranty parts for the markers, from an outside supplier, they will only be reimbursed for the amount of the parts listed on the HAUKAAS price list. If the dealer so chooses HAUKAAS will replace the parts used as a means of payment.

2) **EXCEPTIONS TO THIS WARRANTY.**
a) Repair and maintenance, not related to defects, is not covered by this warranty. This warranty does not cover conditions resulting from misuse, negligence, accident or lack of performance of required maintenance.
b) Damage caused by improper mounting of the marker is not covered by this warranty. The markers must be mounted as outlined in the instruction manual for the warranty to be valid.
c) HAUKAAS reserves the right to continually improve its equipment, and reserves the right to change products or specifications at any time without notice or obligation.

3) **OWNERS OBLIGATION**
a) It is the responsibility of the owner, at the owner's expense, to transport the markers to the place of purchase or alternately to reimburse the dealer for any travel or transportation expense involved in fulfilling this warranty.
b) It is the responsibility of the owner to read, understand and practice the maintenance, safety, and operational guidelines set out in this manual.

INSTALLATION INSTRUCTIONS

NOTE: On the serial # plate of the markers you will find a small letter L (left) or R (right) imprinted. The right or left side of an implement is determined by standing behind the implement looking forward.

Step #1

Before installing markers!
Install mounting brackets, any special kits, and do any modifications to the implement that may be required to mount the Haukaas Markers at this time.
Specific mounting bracket instructions for your particular implement will be supplied for you along with the markers.

Step #2

Markers still in crate:
a) Remove the steel brace or wood 2x4 which is holding the front end of the markers together.
b) Cut the steel bands that holds the markers in the crate. Also cut the bands that are holding the disc assemblies to the marker.
DO NOT CUT THE BANDING THAT HOLDS THE MARKER ITSELF TOGETHER!
To keep the marker from folding out while moving and mounting, leave it banded. This banding should not be cut until just before hydraulic hoses are run. Failure to remove the banding at this time will result in damage to the marker.

Step #3

Pick up and position the marker:
On the left hand marker are 2 lifting places. One is a diamond-shaped hole in the cylinder push bracket on the large tube. The other is a n unpainted metal clip bolted to the top inside carriage bolt of the second stage arm.

Use a length of chain between the two lifting clips to lift and place the marker. Make sure the chain is securely fastened to the forklift so that the marker cannot slip from side to side or come right off.

When lifting the marker out of the crate it works best to lift the marker straight up and out of the crate before allowing it to tip over level. This may take some help to hold it upright.

Step #4

The marker can now be fitted onto its proper place on the implement. After the left marker is mounted, remove the lifting clip and use it on the right hand marker.

NOTE: Cultivators and airdrills even of the same make and models are not always the same. Some on site modifications may be necessary to the mounting brackets and/or implement to insure a proper fit. **It will be the responsibility of the installer to make sure that the markers will not interfere with the functions of the implement in any way.**

Step #5

After the markers are mounted tighten all U-bolts securely. If the U-bolts are not tight the marker will want to whip when being used in the field. After the first 20 hours of use retighten all U-bolts.

Step #6

Attach the disc assembly to the **BOTTOM SIDE** of the third stage arm with the disc guard on top using the 1/2x1-3/4" carriage bolts.

On certain implements the disc blade may come in contact with parts on the drill when the marker is folded in. This can be overcome in most cases by removing the third stage arm, flipping it over and reinstalling it. The bracket welded on the end of the third stage arm has an offset which allows for some adjustment.

The angle of the disc blade can be adjusted by loosening the 1/2" carriage bolts. Adjust the disc angle to the degree that a legible mark is made and that there is just enough resistance to keep the marker from bouncing back and forth.

Step #7

Remove steel band from marker!! Failure to do so will cause damage!
Route the hydraulic hoses and install sequencing valve (if required) at this time. The sequencing valve should be located in the approximate location of where the left side of the implements hitch attaches to its center frame. In the hose package, information is given as to which hoses go where.

Step #8

IMPORTANT: Before extending marker.

MAKE SURE that all moving parts of the implement have **adequate travel space** with the implement both in the ground and raised out of the ground. It is also important at this time to make sure that the marker clears all obstructions (shanks, hoses, etc.) when the marker is folded in and extended out. **Have someone watching!**

Step #9

Extend the marker.

Step #10

Loosen the set screws on the second stage arm (2-1/2x2-1/2" tube) and extend the third stage arm (2x2" tube) out to its proper length.
NOTE: We recommend that the excess 2x2" tube which is not being used, (behind the last set screw) be cut off to reduce the weight of the marker.
NOTE: On some Model 136 markers going on smaller width implements you will be required to cut at least 24" off the inside end of the third stage arm in order to make the marker go small enough.

When re-tightening the set screws make sure that the third stage arm is properly seated inside the second stage arm. (After the first day of use re-tighten)

Step #11

With the marker extended out to its proper length place a bathroom scale under the disc. By adjusting the eye bolts on the counter balance springs, place about 50lbs of weight on the disc. (This is a good place to start. You may want, in some conditions, to increase the weight to get a better mark.)

Step #12

IMPORTANT! Retract the marker slowly!
Adjust the second stage arm so that it fits to the high side of the cradle (in between the 3" wheels) when it is folded in. To make an adjustment loosen the 1/2" carriage bolts at the elbow and "over lift" the arm up to about the center of the top wheel. Re-tighten the carriage bolts. The second stage arm should then drop down to fit in between the (2) 3" wheels.

Step #13

Fold up the implement. **Have someone watching!** Take great care in folding up your implement into transport for the first time. Make sure the markers do not come in contact with any obstructions or with each other. We suggest that for the first time folding into transport only bring up one wing at a time.
Do everything SLOWLY! If you have a five section implement watch out for your manifold towers. You may want to block the wing the first time you fold just to make sure that you will have enough clearance. Some five fold implements have what we call "the point of no return" when folding for transport. It is at this point when the wing lift cylinders stop pulling and start pushing and unless you are careful the wing may continue to fold without you being able to stop it.

When one wing is fully folded have a look to make sure that none of the marker is past the half way mark. If everything looks good then fold the implement into transport.

Step #14

When the markers are completely mounted check all bolts for being tight. Re-install grease zirks and add grease. (see diagram page 13) Use the supplied can of paint to do any touch ups that are required.

NOTE TO THE INSTALLER: Please make these instructions available to the operator of the drill. The suggestions and adjustment information will be needed at a later date.

ADJUSTMENT INFORMATION

NOTE: It is important that all of the adjustments on the marker are maintained at all times. The adjustments are as follows.
1. The speed of the markers as noted below.
2. The cable tension as noted below.
3. The second stage arm must ride high in between the 3" wheels. To adjust there are 4 or 8 bolts at the elbow where the second stage arm attaches to the sprocket assembly. (see pg 9)
4. The single 3" wheel on the large tapered tube must ride high and inside its cage on the marker sub-frame. To adjust height there are 4 bolts where the main frame attaches to the

sub-frame. (see pg 11) To bring the wheel farther into the cage the 4 bolts where the cylinder attaches to the main frame will need to be adjusted. (see pg 9)
5. The weight of the marker on the disc blade can be adjusted with the eye bolts attached to the springs. 50 lbs is a good place to start.

MARKER FOLDING SPEED

The speed of the markers folding in and out not only effect the cables but also everything else with the markers. If when folding the markers in, the second stage arm hits the rubber bumper on the large tapered tube so hard that it bounces back out of the 3" wheels before finally coming into position, the markers are moving too fast. We recommend 10 to 12 seconds to fold the markers in on our models 136, 246, 286.

The speed of the marker is regulated by an orifice fitting located on the elbow at the base port end of the cylinder. To speed up the markers you can turn the oil flow from the tractor up, or drill out the orifice to 1/16". If a Shoemaker Sequencing valve (gold in colour) is being used the orifices are to be removed and the speed of the marker is to be regulated by the flow screws on the valve.

CABLES (See pg. 10)

After a period of time the cables on the SIDE ARM will stretch and require adjustment. Inside each marker there are two cables. When the marker is folded up the cable on the inside towards the implement is referred to as the inside cable. The other cable is referred to as the outside cable. It is normal when the marker is completely extended or retracted to have one cable inside the tube tight and the other cable somewhat relaxed. A cable should never be so loose that it could fall out of the groove of the large pulley.

The purpose of the inside cable is to extend and hold out the second stage arm when the marker is folding out. If you have problems with the 5/16 x 2" shear bolt breaking on this cable, it could be one of four things:
1) Markers extending too fast
2) The inside cable is being tightened to tight
3) Cable is too loose allowing marker to bounce back and forth
4) Backing the implement up with the marker extended.

To check for proper tension on the inside cable do the following. With the tractor hydraulics, extend the marker fully. By hand, pull the disc assembly forward. By doing this you will open a gap between the angle iron assembly of the second stage arm and the back stop on the large tapered tube. It will depend on the length of your marker how much force will be required to open the gap. However, in general terms it should take effort on your part to open the gap. If the inside cable is too tight the shear bolt will let go. (Stand clear of cable ends).

To tighten the inside cable you will have to retract the marker. Only in this position will the inside cable become loose enough to adjust. Extend the marker and check again. If the inside cable is too loose the marker disc may bounce back and forth while marking.

The outside cables purpose is to retract and hold the second stage arm against the rubber bumper. If you have problems with the 5/16 x 2" shear bolt on this cable, breaking, it is probably one of following things:

1) Markers retracting too fast
2) The outside cable is being over-tightened
3) Can be the result of the hydraulic cylinder retracting prematurely or not having the marker fully extended while marking in the field.
4) Stopping the marker as it is folding out and folding it back in a severe motion.
5) Too much weight on the disc blade may cause shear bolts to break when beginning to fold markers up.
6) The half-link plates that attach the cable to roller chain may over time oblong their 5/16" holes resulting in only one end of the shear bolt holding.

To check for proper tension on the outside cable; with the tractor hydraulics, retract the marker fully. Grab the second stage arm of the marker near the two 3" wheels. Begin to pull the arm out of its holder. Depending on the size of marker, with proper adjustment this should take 30-40lbs of pressure to achieve. If the outside cable is to tight the shear bolt will let go. (Stand clear of cable ends).

When Cables have had to be replaced for any reason follow the following steps for proper adjustment:

Step #1:

a) Begin adjustments with marker in the retracted position.
b) Place marked tooth of sprocket between 2nd & 3rd roller of the #80 roller chain.
c) Place both cable adjusting bolts in the holder.
d) Tighten the outside cable bolt finger tight.
e) Tighten inside cable adjusting bolt until 2nd stage arm pulls away from rubber bumper.
f) Extend marker and tighten outside cable bolt finger tight.

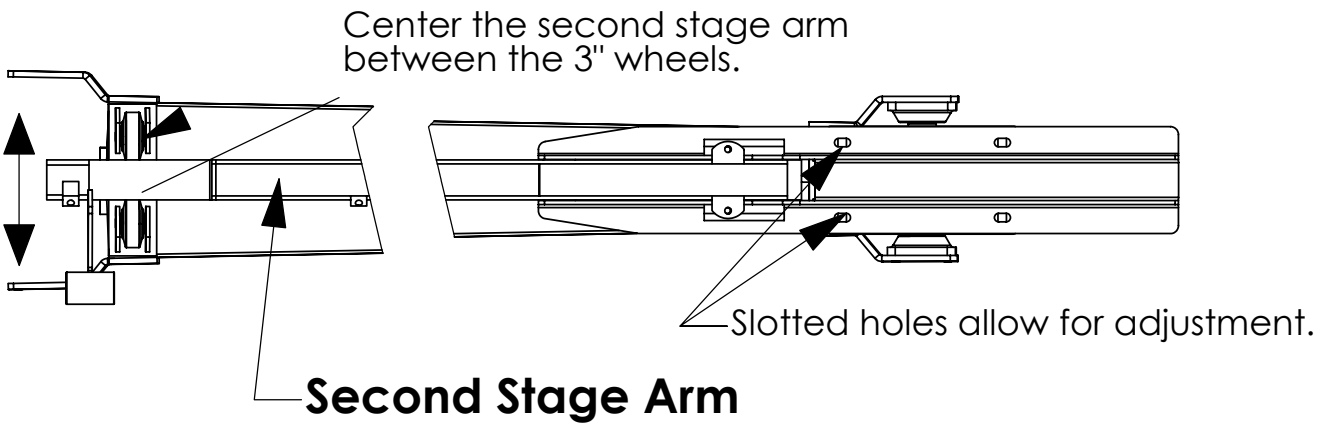
Step #2:

a) Retract the marker; it should take approximately 30 lbs of pull to move the 2nd stage arm away from the rubber bumper. To adjust: extend marker part way out (until cable is loose) and adjust the outside cable bolt. Recheck.
b) Extend marker SLOWLY! At the exact moment the rear of the 2nd stage arm touches the stop on the large tube, make a mark on the ground at the location of the disc. When the hydraulic cylinder is fully extended the disc should still move another 12 to 14 inches ahead of that mark.
To adjust: retract marker part way in (until cable is loose) and adjust the inside cable bolt. Recheck.

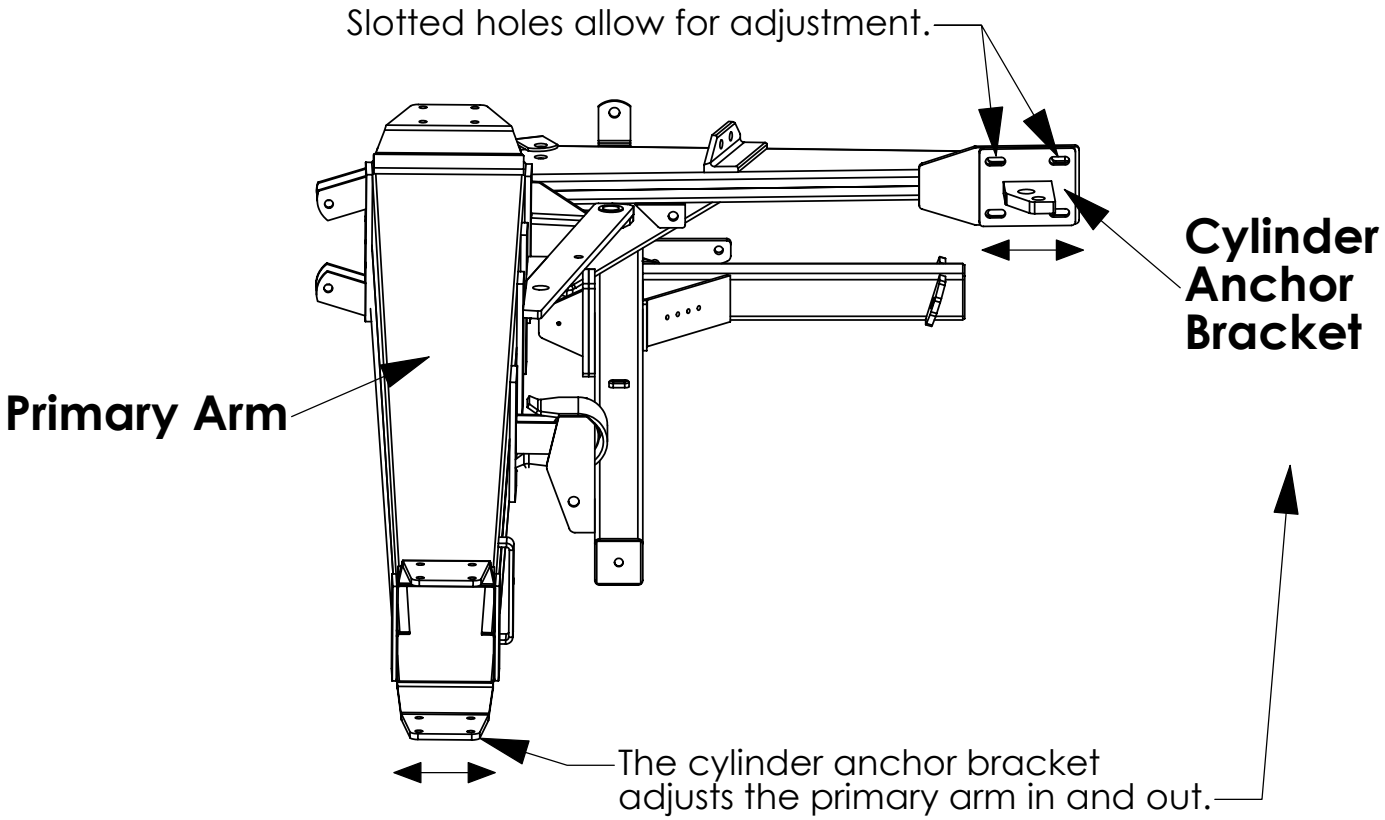
NOTE: Step #2 will have to be repeated a few times.

When the cable adjustments are completed one cable will be tight while the other may be somewhat loose (and vice versa). This is normal.

Second Stage Arm Height Adjustment

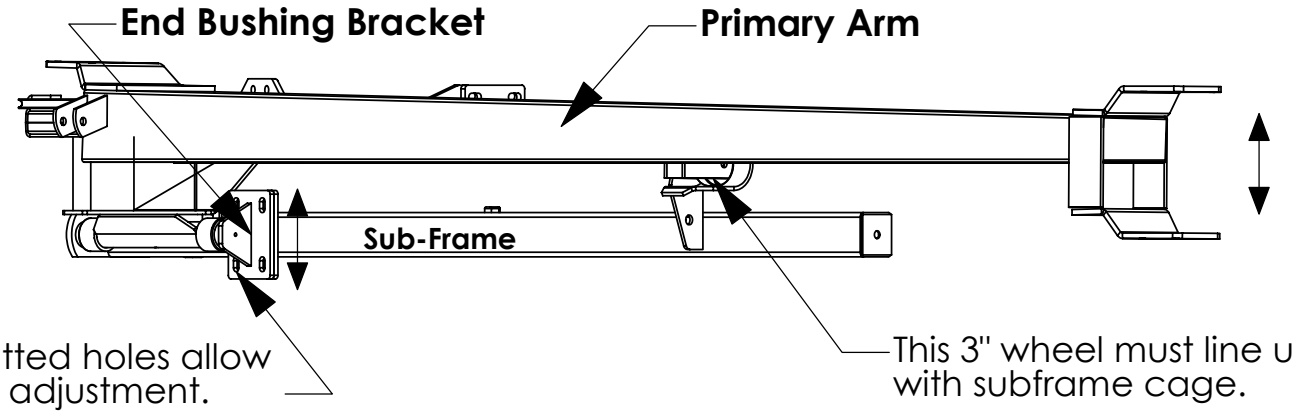


Primary Arm In and Out Adjustment

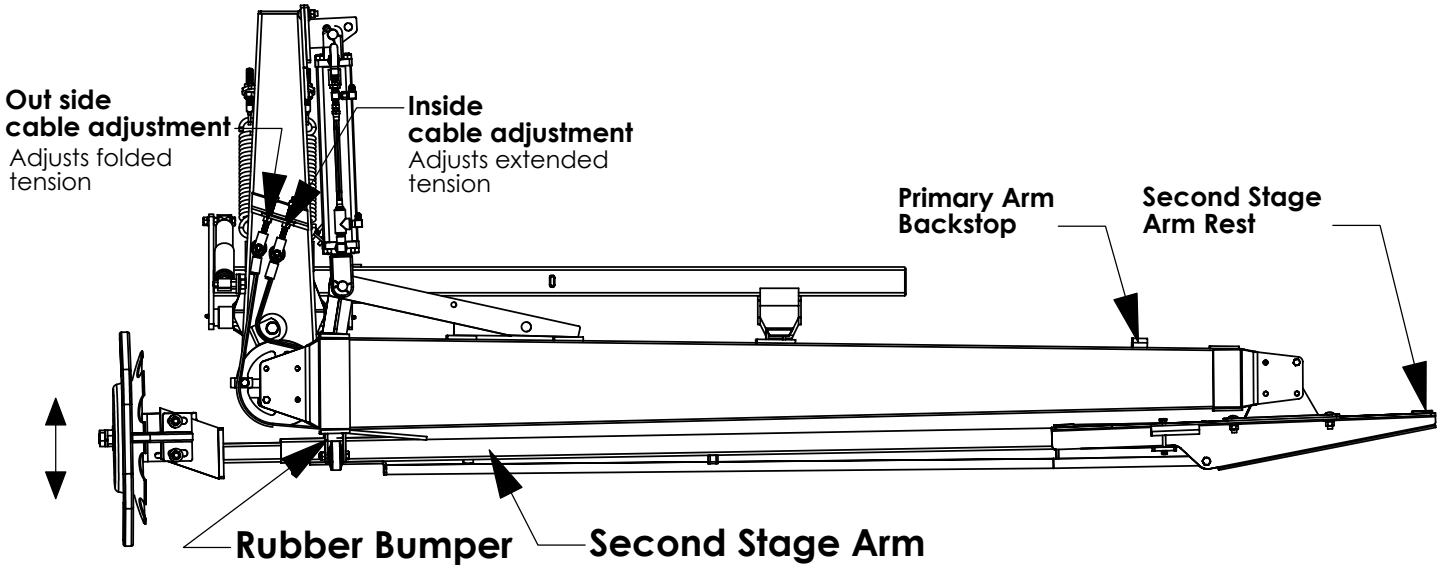


It is VERY IMPORTANT that the primary arm's 3" wheel is held in the wheel cage when folded in. If for some reason this comes out of adjustment Fix Immediately!

Primary Arm Up and Down Adjustment



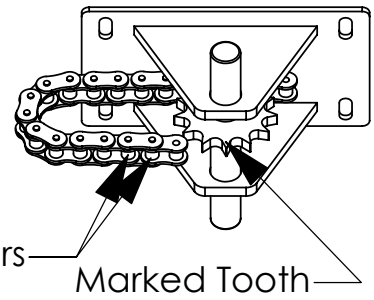
Cable Adjustments



Note: When tightening cable tension - marker may have to be fold in or out a little to allow the cable to relax enough to be adjusted.

Timing Roller Chain

With the marker folded - place the marked tooth between the 2nd & 3rd roller of chain.



OPERATING PROCEDURES

1. Read all decals affixed to the marker before operating.
2. The HAUKAAS SIDE ARM comes with its own hydraulic oil flow shut off valve (ball valve) for your safety. (see pg. 16) Closing the ball valve before folding the implement for transport will eliminate the possibility of accidental opening of the marker during transport.
A) On three fold implements accidental opening during transport may result in having the marker come in contact with overhead power lines.
B) On five folds, opening of the markers in the transport position will result in extensive damage to the SIDE ARM and also to the implement! It has been known for markers to creep open when left overnight in the transport position. To prevent this the ball valve must be shut off.
3. **Before even going to the field**:
Set the sensitivity of the hydraulic control (on the tractor) that operates the markers. On the newer tractors it is a simple adjustment to regulate the détente pressure setting so that when the operator pushes the hydraulic lever ahead to extend the marker, the lever will stay in the forward position without being held until the marker is fully extended and returns to the neutral position without assistance. With the lever staying in the forward or back position without having to be held, the operator is free to complete the rest of the procedures that are required when coming to the end of the field. (i.e. Raise the implement out of the ground, disengage the land wheel, etc.)

Every operator will after time develop his own system or procedure of operating the markers in the field. The following are some of our recommendations:
A) It is our opinion that adjusting the marker length so that the disc marks to the center of the tractor on the next pass is best.
B) A helpful aid to your markers is to place a pinstripe down the center of your tractor hood. The pinstripe will help you line up your tractor easier and keep it lined up.
C) When you come to the end of the field bring the marker in just as you begin to turn. The marker will always be to the inside of the turn and if done right the marking disc will almost pivot in one spot and then raise into position.
D) Don't make a practice of retracting the marker on extremely rough ground. The last 25% of the markers travel to the closed position is not cushioned by the counter balance springs. Severe stress is placed on the marker in such conditions and the second stage arm may have trouble lining up to enter in between the two wheels.
E) Never fold the markers out while turning! The marker on the outside of a turn is moving quickly through rough head lands. We strongly suggest being fully around the corner of the end of the field before extending the marker. Folding the markers out while turning on the rough head lands will cause damage to the markers!
F) If the implement is sliding sideways when working in hills it works very well if the operator instead of lining up with center of hood looks back and lines up the center shank of the implement on the mark.
G) On extremely hilly conditions or on land with drainage ditches caution must be used not to "top out" the marker. The marker can be over elevated and damage to the marker will result.

TROUBLE SHOOTING

- If you are having trouble **getting a legible mark** try adjusting the angle of the blade along with adding more weight. More weight can be added to your blade by adjusting the counter balance springs on the main frame of the marker. Depending on your implement and the size of the marker, different size springs are available from your dealer.

- If you are having problems with your **marker bouncing back and forth** in the field you will need to check the angle on your disc blade. Having too much angle on your blade will cause this problem. Adjust your blade to have just enough resistance against it to keep it from bouncing.

- If you are having problems **getting enough weight on the disc** you may want to try other springs that are available from your dealer.

- After some use the **cables may stretch** and need to be tightened. (See pg. 7&10)

- Any **cable shear bolt problems** are generally a result of the hydraulic cylinder not being fully extended in the working position.

- If your **second stage arm begins to "creep" out of its holder** while you are driving down the field it could be one of two things. This could be a hydraulic problem meaning that your valve is not holding properly and it is letting the marker creep out. It could also be a cable adjustment problem. Your outside cable must be tight enough to hold this arm in place when the cylinder is fully retracted. This problem is extremely hard on the markers and must be dealt with. If this continues on a regular basis contact your dealer as soon as possible.

- If the second stage arm **shear bolts (5/16 x 3-1/2") are breaking** it could be:
    a) Too much weight on the marking disc.
    b) Too much angle on the disc blade or the disc assembly was improperly installed . (It must be attached to the bottom of the third stage arm.)
    c) The inside cable may be too loose.

- If the **disc angle keeps coming out of adjustment,** make sure you have a flat washer and a lockwasher over the slotted holes on the disc guard. You can also place a small amount of dirt between the disc assembly and the third stage to help hold it in place.

DAILY MAINTENANCE

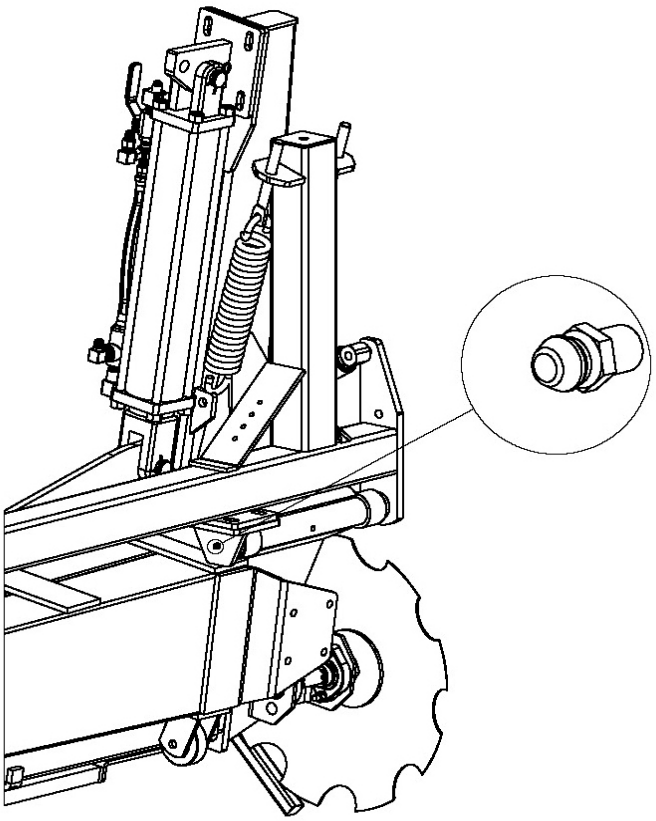
A small amount of daily maintenance will add years of life to your SIDE ARM markers.

1. Grease the grease points. (2 on the small markers and 8 on the large.)
2. Visual check of the marker in general.
    - Cable tension
    - Second stage arm riding high in its cradle between the 3" wheels. (see pg. 9)
    - Check that no bolts are working loose

YEARLY MAINTENANCE

A small amount of yearly maintenance will add years of life to your SIDE ARM markers. (The best time to do this is just before you put the implement away for the season.)

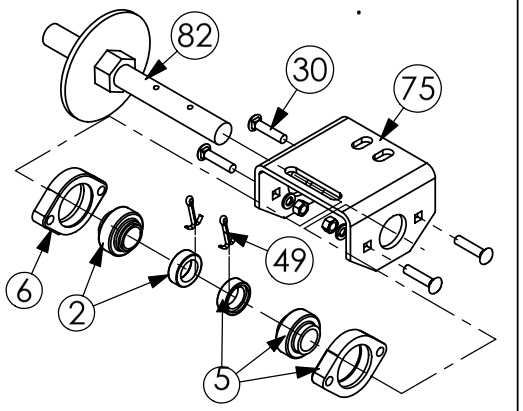
- Look entire marker over for any breakage or extensive wear.
- Make sure the single wheel of the primary arm is lining up properly with its cradle on the sub-frame. (see pictures)
- Make sure the second stage arm is riding high in its cradle between the 3" wheels. (pg. 9)
- Oil the roller chain.
- Remove shear bolts on the second stage arm and open. Grease the tube top and bottom the prevent rusting shut.
- Paint up all the scratch marks.



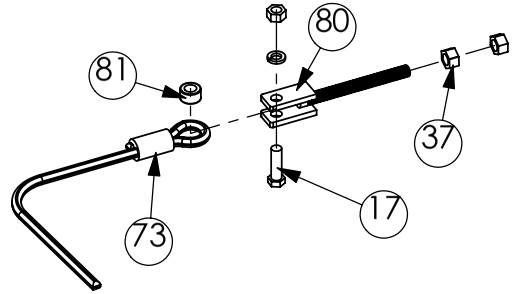
The grease zirks from this location have been removed for shipping. Please re-install and grease.

SA-9034 - disc assembly WITH 18' blade & depth gauge

SA-9041 - disc assmbly WITHOUT 18" blade & depth gauge



DISC BRACKET ASSEMBLY DETAIL



CABLE DETAIL MAIN FRAME END

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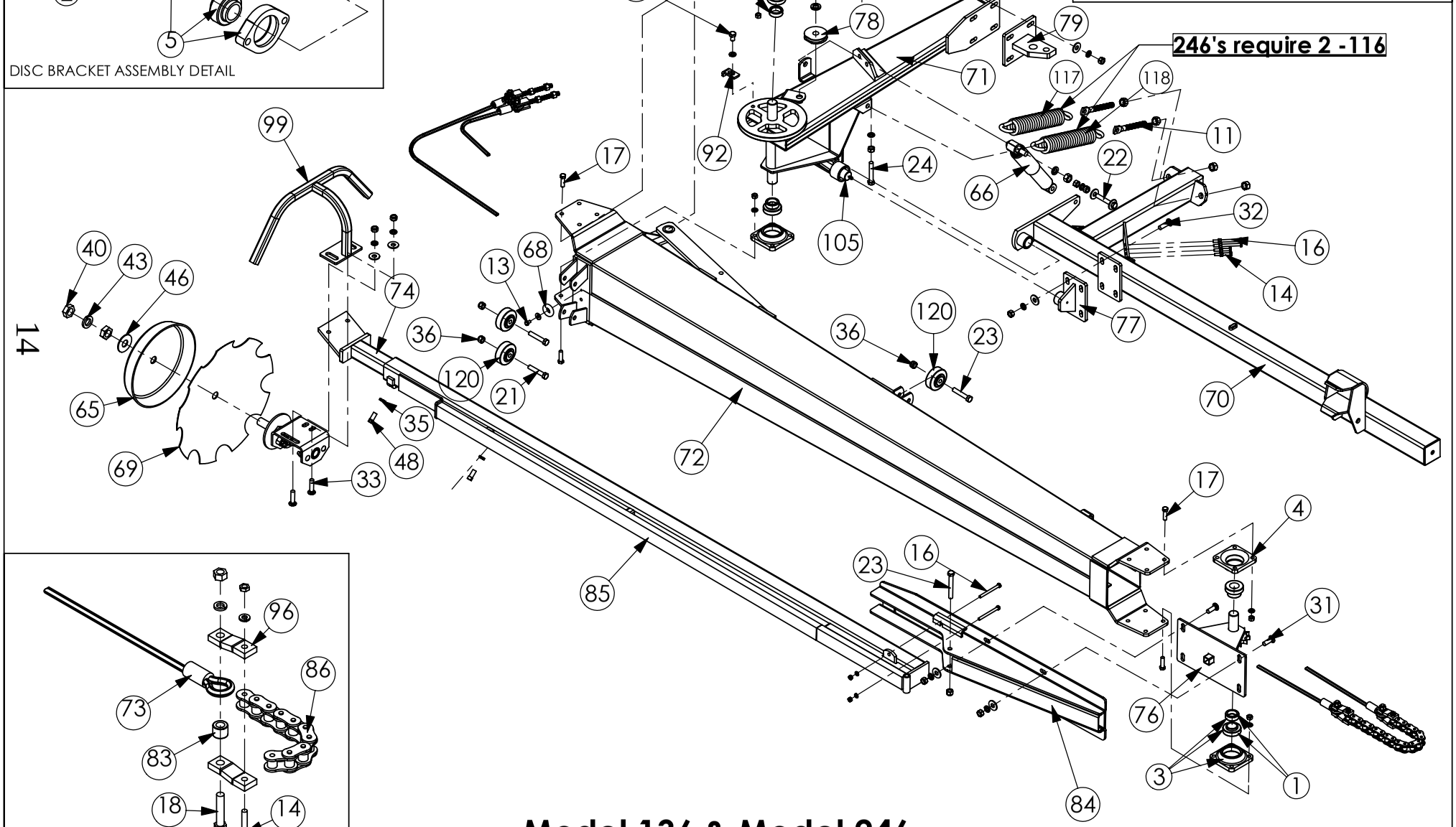
246's require 2 -116



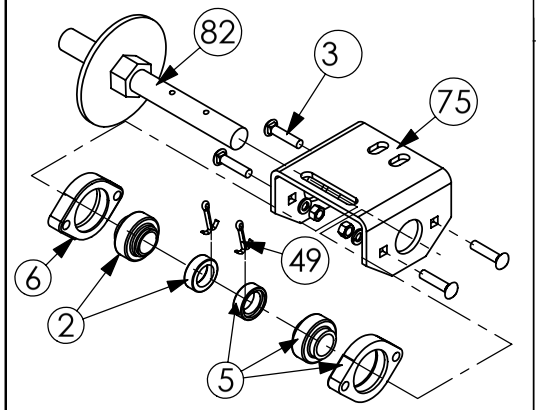
14

CABLE DETAIL SPROCKET END

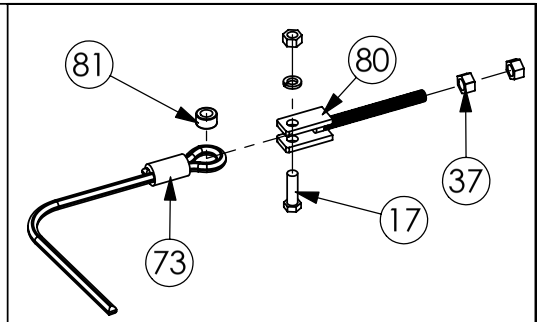
Model 136 & Model 246

SA-9034 - disc assembly WITH 18' blade & depth gauge

SA-9041 - disc assembly WITHOUT 18" blade & depth gauge



DISC BRACKET ASSEMBLY DETAIL



CABLE DETAIL MAIN FRAME END

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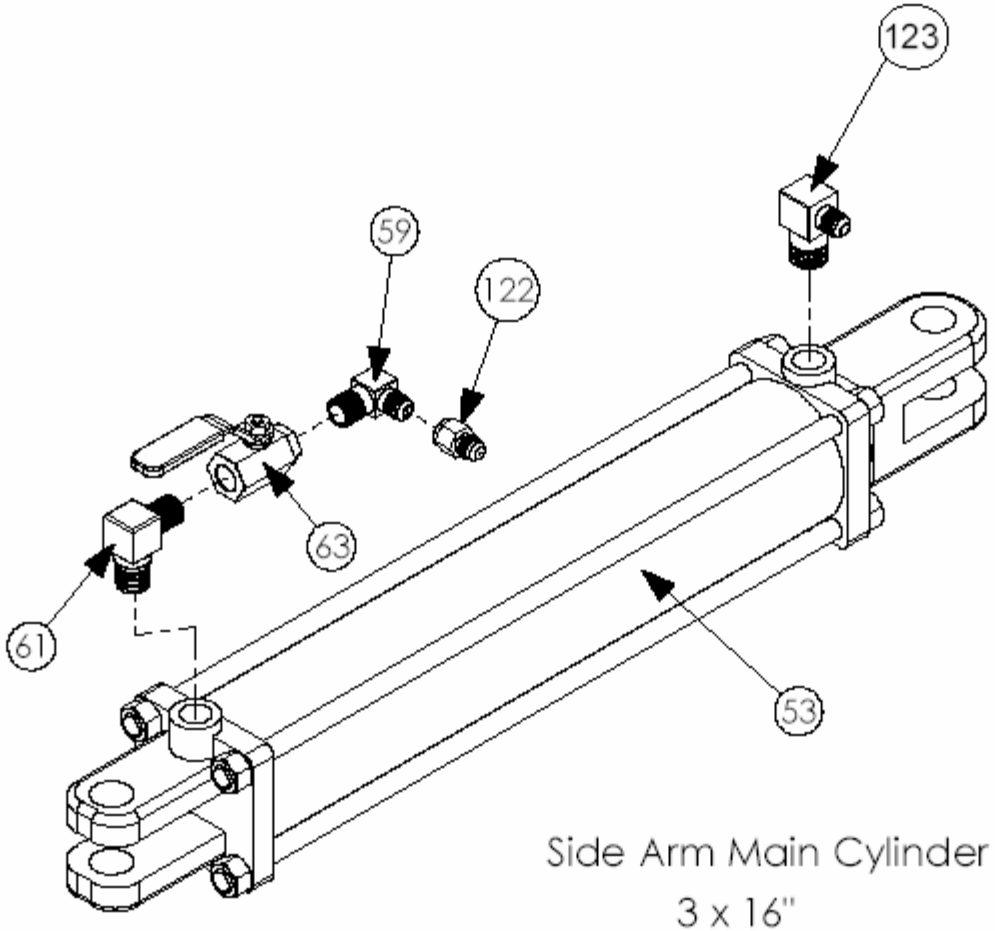
CABLE DETAIL SPROCKET END

Model 286



Side Arm Main Cylinder
3 x 16"

S/N 14844 & UP

HAUKAAS FIELD MARKERS

THE FOLLOWING PARTS CORRESPOND WITH THE DRAWINGS ON THE PREVIOUS PAGES

Drw #	Part #	Description
1	~~BRG-2207~~	~~1-1/4" BEARING with LOCKING COLLAR~~ DISCONTINUED, USE BRG 2450
2	~~BRG-2209~~	~~1" BEARING with LOCKING COLLAR (for 2 BOLT)~~ DISCONTINUED USE BRG-2476
3	BRG-2450	1-1/4" BEARING & HOUSING COMPLETE
4	~~BRG-2463~~	~~1-1/4" BEARING HOUSING ONLY~~ DISCONTINUED, USE BRG 2450
5	BRG-2476	1" BEARING & HOUSING COMPLETE (2 BLT)
6	~~BRG-2486~~	~~1" BEARING HOUSING ONLY (2 BLT)~~ DISCONTINUED USE BRG-2476
7	BRG-2866	1" BEARING HOUSING ONLY (4 BOLT)
8	BRG-2867	1" BEARING with LOCKING COLLAR (for 4 BOLT)
9	FNS-02290	5/8" U-BOLT FOR 4x4" SQ. TUBE
10	FNS-02357	1/2" U-BOLT FOR 3x3" SQ. TUBE
11	FNS-02392	5/8-11x6" I-BOLT (4" THREAD)
12	FNS-02531	3/8"x16x3/8"SETSCREW
13	FNS-110B5PC	5/16 x 1/2" GR. 5 HEX BOLT
14	FNS-112-5PC	5/16x2" GR. 5 SHEAR BOLT
15	FNS-112-8PC	5/16x2" GR. 8 HEX BOLT
16	FNS-113B5PC	5/16x3-1/2" GR. 5 SHEAR BOLT
17	FNS-131B5PC	7/16x1-1/2" GR. 5 HES BOLT
18	FNS-132-5PC	7/16x2" GR. 5 HEX BOLT PLT
19	FNS-140C5PC	1/2 x 3/4" GR. 5 HEX BOLT
20	FNS-141-5PC	1/2 x 1" GR. 5 HEX BOLT
21	FNS-142C5PC	1/2x2-3/4" GR. 5 HEX BOLT
22	FNS-143-5PC	1/2 x 3" GR. 5 HEX BOLT
23	FNS-143C8PC	1/2x3-3/4" GR. 8 HEX BOLT
24	FNS-144B5PC	1/2x4-1/2" STOP BOLT
25	FNS-165B5PC	5/8x5-1/2" GR. 5 HEX BOLT
26	FNS-172-5PC	3/4 x 2" GR. 5 HEX BOLT
27	FNS-172C5PC	3/4x2-3/4" GR. 5 HEX BOLT
28	FNS-195B5PC	1" x 5-1/2" GR. 5 HEX BOLT
29	FNS-197-5PC	1" x 7" GR. 5 HEX BOLT
30	FNS-221B5PC	3/8x1-1/2" GR. 5 CARRIAGE BOLT
31	FNS-241A5PC	1/2x1-1/4" GR. 5 CARRIAGE BOLT
32	FNS-241B5PC	1/2x1-1/2" GR. 5 CARRIAGE BOLT
33	FNS-241C5PC	1/2x1-3/4" GR. 5 CARRIAGE BOLT
34	FNS-3685PC	5/8"x8"NC GR. 5 SPADE BLT
35	FNS-54JPC	1/2"- 13 NC JAM NUT
36	FNS-54LPC	1/2"- 13 NC NYLON LOCKNUT
37	FNS-54RPC	1/2"-13 NC HEX NUT
38	FNS-57LPC	3/4"- NC NYLON LOCKNUT
39	FNS-57SPC	3/4"-10 STOVER NUT
40	FNS-59JPC	1" - 8 JAM NUT PLT
41	FNS-59RPC	1"-8 HEX NUT PLT
42	FNS-59SPC	1"-8 STOVER NUT PL
43	FNS-69RP	1" LOCK WASHER PLT
44	FNS-74RP	1/2" FLAT WASHER PLT
45	FNS-79NP	1" FLAT WASHER SAE
46	FNS-79RP	1" FLAT WASHER PLT
47	FNS-82CC	3/8x3/4" SQ HD SET SCREW
48	FNS-8A41BPC	1/2 x1-1/2"SQ HD SET SCREW
49	FNS-8CB-1BP	3/16 x 1-1/2 COTTER-PIN
50	FNS-96SLN	5/8" STOVER LOCK NUT

HAUKAAS FIELD MARKERS

THE FOLLOWING PARTS CORRESPOND WITH THE DRAWINGS ON THE PREVIOUS PAGES

51	HP-9JF026	1/4"HOSEx26" 9/16" FEMALE JIC
52	HP-9JF032	1/4"HOSEx32" 9/16" FEMALE JIC
53	HYD-2937	HYDRAULIC CYLINDER 662321
54	HYD-2515	9/16"JIC MxFxF TEE
55	HYD-2516	1/4"MALE NPT->9/16"MALE JIC 90 DEG ELBOW
56	HYD-2528	CYLINDER PIN KIT
57	HYD-2888	½"MALE NPT->3/8"FEMALE NPT 90 DEG ELBOW
58	HYD-2890	1-1/2"x4" HYDRAULIC CYLINDER (3000PSI)
59	HYD-25010606	9/16" 18 MJIC to 3/8" MNPT 90 DEG
60	HYD-2892	3/8"MALE NPT->#6MALE JIC TEE
61	HYD-2893	½"MALE NPT->3/8"MALE NPT 90 DEG ELBOW
62	HYD-2894	1/4"x11-1/2" HOSE 1/4"MALE NPT->#6FEMALE JIC 9/16"-18
63	HYD-2895	3/8" BALL VALVE
64	HYD-2896	PILOT OPERATED CHECK VALVE
65	MIS-2192	NYLON DEPTH GAUGE
66	MIS-2195	SHOCK ABSORBER
67	MIS-2325	GF641 GREASE ZIRK
68	MIS-2362	RUBBER BUMPER PAD
69	MIS-2526	18" NOTCHED DISC BLADE
70	SA-8051L	SMALL SUB-FRAME LEFT 136,246,286
70	SA-8051R	SMALL SUB-FRAME RIGHT 136,246,286
71	SA-8052L	SMALL MAIN FRAME LEFT 136,246,286
71	SA-8052R	SMALL MAIN FRAME RIGHT 136,246,286
72	SA-8053/136L	PRIMARY ARM 136 LEFT
72	SA-8053/136R	PRIMARY ARM 136 RIGHT
72	SA-8053/246L	PRIMARY ARM 246 LEFT
72	SA-8053/246R	PRIMARY ARM 246 RIGHT
72	SA-8053/286L	PRIMARY ARM 286 LEFT
72	SA-8053/286R	PRIMARY ARM 286 RIGHT
73	SA-8054/136	136 CABLE 88" OVERALL
73	SA-8054/246	246 CABLE 112" OVERALL
73	SA-8054/286	286 CABLE 124" OVERALL
73	SA-8054/356	356 CABLE 134" OVERALL
73	SA-8054/466	466 CABLE 158" OVERALL
74	SA-8055	THIRD STAGE ARM
75	SA-8056	DISC ASSEMBLY BRACKET
76	SA-8057	SMALL SPROCKET ASSEMBLY (4 HOLE) 136,246
77	SA-8065	END BUSHING BRACKET ASSEMBLY
78	SA-8066	3" CABLE PULLEY
79	SA-8067	HYDRAULIC CYLINDER ANCHOR BRACKET
80	SA-8069	CABLE CLEVIS BOLTS
81	SA-8082	CABLE/CLEVIS BUSHING (1/2")
82	SA-8084	DISC AXLE
83	SA-8085	1/2 LINK BUSHING 11/16"
84	SA-8086	SMALL ANGLE IRON ASSEMBLY (4 HOLE) 136,246
85	SA-8087/136	136 2ND STAGE ARM TUBE ASSEMBLY
85	SA-8087/246	246 2ND STAGE ARM TUBE ASSEMBLY
85	SA-8087/286	286 2ND STAGE ARM TUBE ASSEMBLY
86	CHN-2537	#80 ROLLER CHAIN (18 PINS-20" LONG)
87	SA-8104/356L	PRIMARY ARM 356 LEFT
87	SA-8104/356R	PRIMARY ARM 356 RIGHT
87	SA-8104/466L	PRIMARY ARM 466 LEFT
87	SA-8104/466R	PRIMARY ARM 466 RIGHT

HAUKAAS FIELD MARKERS

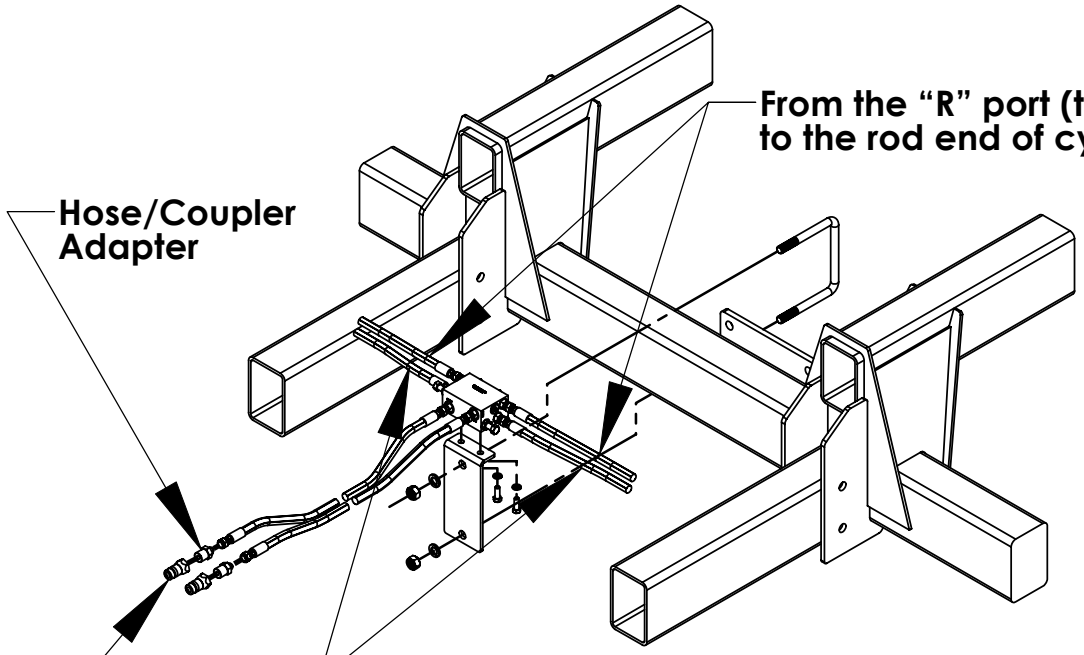
THE FOLLOWING PARTS CORRESPOND WITH THE DRAWINGS ON THE PREVIOUS PAGES

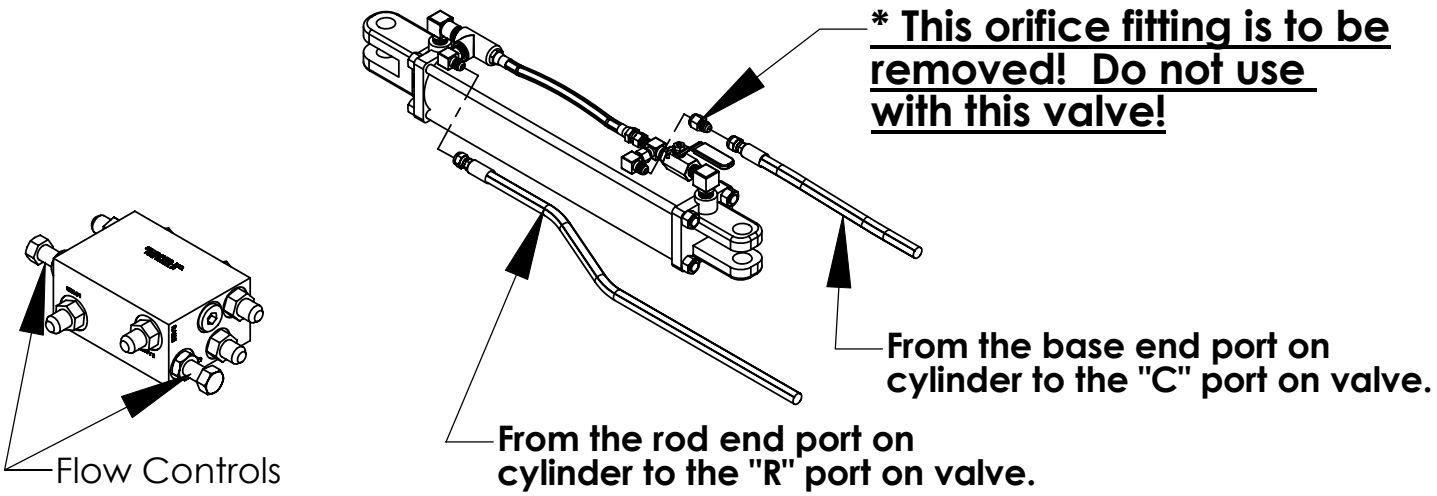
88	SA-8109L	END BUSHING BRACKET ASSEMBLY LEFT
88	SA-8109R	END BUSHING BRACKET ASSEMBLY RIGHT
89	SA-8118/356	356 2ND STAGE ARM TUBE ASSEMBLY
89	SA-8118/466	466 2ND STAGE ARM TUBE ASSEMBLY
90	SA-8182	STABILIZER SPRING ANCHOR RING
91	SA-8183	STABILIZER SPRING LIFT BOLT/BUSHING
92	SA-8184	CABLE CLIP
93	SA-8195	LG ANGLE IRON ASSEMBLY (8 HOLE)
94	SA-8196	LG SPROCKET ASSEMBLY (8 HOLE)
95	SA-8218	3/8 EXTNDED 1/2 LINK 356/466 no hdwe (2 links/pk)
96	SA-8219	3/8" HALF LINK 136-286 no hdware (2 links/pk)
97	SA-8221	STABILIZER ARM PIVOT ASSEMBLY
98	SA-8222	TUBE LOCK LATCH 136 TO 286
99	SA-8223	1" SQUARE TUBE DISC GUARD
100	SA-8224	AUTO-LOCK LATCH
101	SA-8335	SM ANGLE IRON ASSEMBLY (8 HOLE) 286
102	SA-8336	SM SPROCKET ASSEMBLYY (8 HOLE) 286
103	SA-8337L	466 MAIN FRAME LEFT
103	SA-8337R	466 MAIN FRAME RIGHT
104	SA-8338L	LARGE SUB-FRAME LEFT
104	SA-8338R	LARGE SUB-FRAME RIGHT
105	SA-8339	MAIN FRAME SHAFT (1-1/4" COLD ROLLED 14" LONG)
106	SA-8340	STABILIZER ARM ASSEMBLY
107	SA-8381	SL-HYD LIFT BRACKET 466
108	SA-8385	TUBE LOCK LATCH 356,466
109	~~SA-8400~~	~~8x1.25x8MM SET SCREW 3/64" ORIFICE~~ REPLACED BY # 122 BELOW
110	SA-8417L	SM STABILIZER TUBE ARM LEFT ASSEMBLY
110	SA-8417R	SM STABILIZER TUBE ARM RIGHT ASSEMBLY
111	SA-8418	SM STABILIZER WEB ARM ASSEMBLY
112	SA-8419L	SM STAB ARM PEDESTAL 286 LEFT
112	SA-8419R	SM STAB ARM PEDESTAL 286 RIGHT
113	SA-8420	SM STABILIZER ARM SPRING/ANCHOR ASSEMBLY
114	SA-8421	SM STABILIZER CENTRE PIN ASSEMBLY
115	SA-8422	STAB/I-BOLT HOLDER
116	SPR-2173	LARGE CB SPRING
117	SPR-2315	SMALL CB SPRING
118	SPR-2395	MEDIUM CB SPRING
119	SPR-2498	X-LARGE CB SPRING
120	WHL-2172	3" NYLON WHEEL
121	HYD-65000606	9/16 MJ - 9/16 FJS 90 DEG SWIVEL
122	HYD-24060606.047	ORIFICE IN 9/16 JIC F-M ADAPTER
123	HYD-2494	9/16#6JICM-1/2#8 NPTM 90 2501-0608

Reference Chart for Springs

Part #		Model 136	Model 246	Model 286	Model 356	Model 466	Overall Length (in)	Wire Dia (in)	Active Coils
SPR-2315	SM	**1**					**13 7/8**	**.362**	**27**
SPR-2395	MED	**1**		**1**			**13**	**.406**	**23.5**
SPR-2173	LG		**2**	**2**	**3**	**1**	**13 1/8**	**.437**	**21.5**
SPR-2498	X-LG					**2**	**13 1/4**	**.500**	**18.5**
SPR-2394	**Weight Equalizer Spring WEK**								

MARKER - HOSE & VALVE INSTRUCTIONS



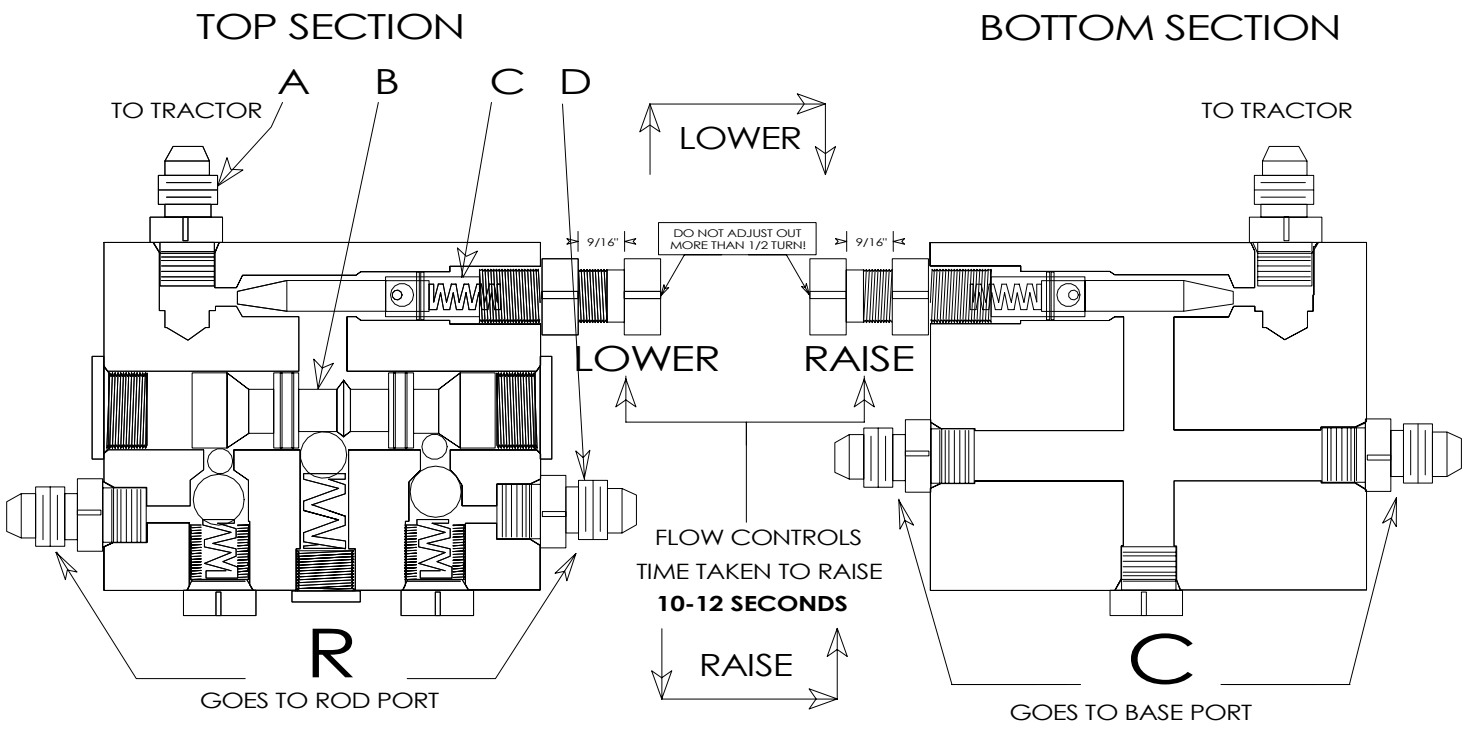


* - The orfice may reduce the oil flow to much and may not allow the valve to cycle as it should. Remove the orfice and control the folding speed with the flow controls on valve.

It works best to have lots of oil flow to the valve and reduce the speed with the valve adjustment bolts. These adjustment bolts are needle valves. If you close them to much the valve will not cycle. If you open themto much so that the bolt comes out of the valve the seals may become damaged and leaking will occur.

MARKER SEQUENCING VALVE

IMPORTANT! THE ORIFICE FITTING AT BASE END OF CYLINDER SHOULD BE REMOVED WHEN USING THIS VALVE.



The following are the instructions for plumbing the sequencing valve with the SIDE ARM Field Markers.

On the valve you will find stamped: R and C. Plumb the valve in as follows:

Front Ports - Connects to the hydraulics on tractor.

Port C -Connects to the BASE end port on the hydraulic cylinder. (Ball valve side)

Port R -Connects to the ROD end port on the cylinder. (Check-valve side)

From the valve there will be two hoses running to the tractor and two hoses running to each marker. (6 hoses in all)

We recommend 3/8" hose be used. Use 9/16" JIC female ends.
Note: Warranty is void if Teflon tape is used.
Note: The fine threaded bolts on the valve then can be adjusted to regulate the speed of the markers. It is possible to slow the oil flow down too much with this adjustment which will cause the valve not to sequence. Do not screw flow adjustment all the way out of valve body as damage to seals may result.

Parts List for Sequencing Valve:
Item A - 9/16" JIC Straight Connector - HYD-2510
Item B - Spool - HYD-2509
Item C - Adjustment Assembly (Flow) - HYD-2508
Item D - Special C Fitting x 9/16" JIC - HYD-2481
Item E - Seal, Spring and Ball Kit - HYD-2507

Haukaas Marker - Shoemaker Sequencing Valve

What does it do?
The Sequencing valve allows the operator to operate both the left and right marker independently of each other using only one hydraulic remote from the tractor.

Normal Position.
At the start of the sequence both markers will be retracted (or folded in) on the drill in the normal start position.

Extending the marker.
By pushing the hydraulic remote lever forward one marker will fully extend. When the marker has fully extended the hydraulic lever in the tractor cab should "kick out" of the detent and return to the center position.

Retracting the marker.
To retract the marker pull the hydraulic remote lever back as you normally would and the marker will retract back to the folded (or up) position.

How does it work?
When the marker retracts the reversed oil flow will automatically cause the spool inside the sequencing valve to shift. With the spool now shifted the next time the hydraulic lever is pushed forward the oil flow will be redirected to the opposite marker. The sequencing valve will cycle itself each time a marker retracts.

When the hydraulic lever in the tractor is pushed forward a marker will extend. Which marker extends will be determined by where the spool is located in the sequencing valve. Each marker will have "it's turn", first one and then the other. Only one marker will move at a time.

Having both markers out at the same time.
It is possible to have both markers out at the same time. Having both markers out works well when separating fields i.e. cutting a 160 acre field into two 80 acre fields. The one mark will be for the next pass and the other mark will be there for seeding the next 80 acre field.
To extend both markers:

a) Fully extend one marker
b) Pull back on the hydraulic lever only slightly (for a moment) to allow sequencing valve to shift.
c) Push hydraulic lever forward and the marker on the opposite side will extend as well.
d) To retract markers pull back on hydraulic lever and both will come in at the same time.

Retracting the marker to miss an obstruction.
When encountering obstruction such as a power pole you will have to:

a) Fully retract the marker
b) Slightly extend the marker on the opposite side (the shorter the distance out the marker moves the better)
c) Retract that marker, which will cycle the sequencing valve
d) Push the hydraulic lever ahead and extend the marker first retracted.

Trouble Shooting

The most common problem we hear of is when the sequencing valve is first plumbed in and ***when the hydraulic lever is pushed forward both markers will extend and when the lever is pulled back only one marker will retract.*** If this is happening you have hooked the hoses up backwards. Reverse hoses from R port and C port on both sides of the valve.

Take your time tracing the hydraulic hoses from the marker to the valve. For any initial start up hydraulic problem check to make sure the hoses are hooked up right.
To have valve problems is not common. It is a simple valve with a long service record. Most problems with the valve originate else where.

When the valve is first plumbed in, the hoses seem to pressure up. You can see them moving but the markers will not extend. It may happen only on one side. This can be caused by an air lock in the valve. Simply bleed off the air at the valve to fix. Another problem that can cause the same symptoms as above is a faulty Pioneer Coupler connecting the valve to the tractor. To fix replace the coupler.

A marker which is to be fully retracted starts to extend on its own as you seed down the field. This typically happens when the sequencing valve is used in conjunction with a selector valve to allow for the wings and the markers to operate from the same hydraulic remote. What happens is that if the sequencing valve is not kept under pressure at all times the spool within the valve can "float around" inside. An old selector valve or one of poor quality will allow seeping from the markers to the wings resulting in loss of pressure. Pressure loss is the problem. As a result the spool will shift allowing the marker that is extended (in use) to retract slightly causing the retracted marker to extend. Note: a slightly extended marker may cause the shear bolts that attach the cables to the roller chain to shear. A slightly extended marker is very hard on itself. If the second stage arm is not kept between the 2 – 3" wheels that hold it folded up it will cause damage to the markers. **Correct this IMMEDIATELY!**

The sequencing valve is not cycling and only one of the markers will extend after the hydraulic oil has warmed up. When the oil is cold early in the morning it works fine. This is caused by not enough oil flow from the tractor to the sequencing valve. The sequencing valve requires oil flow in order to cycle. To fix increase the oil flow from the tractor and reduce the speed of the markers at the sequencing valve using the flow control adjustments.

The sequencing valve is not cycling and only one of the markers will extend. It used to work fine but now it does not. Contamination is the most likely problem. There are two small orifices in the spool within the sequencing valve. One of them may become plugged or the spool itself may even become lodged and cause the valve not to cycle. The valve will need to be cleaned. Have someone that is familiar with hydraulic valves clean the valve. You will see on the sequencing valve diagram that it contains small steel balls and springs. Be careful not to lose them.

When a marker is fully extended the retracted marker on the opposite side of the drill will move out slightly as well. If this takes place after the initial set up where there is air in the lines being exhausted there may be a problem with one of the ball checks not seating properly in the sequencing valve. To fix determine what ball check is not seating properly (left or right side). Once this has been determined remove the appropriate rear plug which holds the spring and ball check giving the problem. Remove the spring and the **SMALL ball** and reinstall the large ball. Using a large flat nosed punch give the large ball a good tap to re-seat the check. Make sure you remove the small ball first or you will cause damage with the hammer and punch. Reinstall ball checks, spring and plug as per normal (check with sequencing valve diagram).