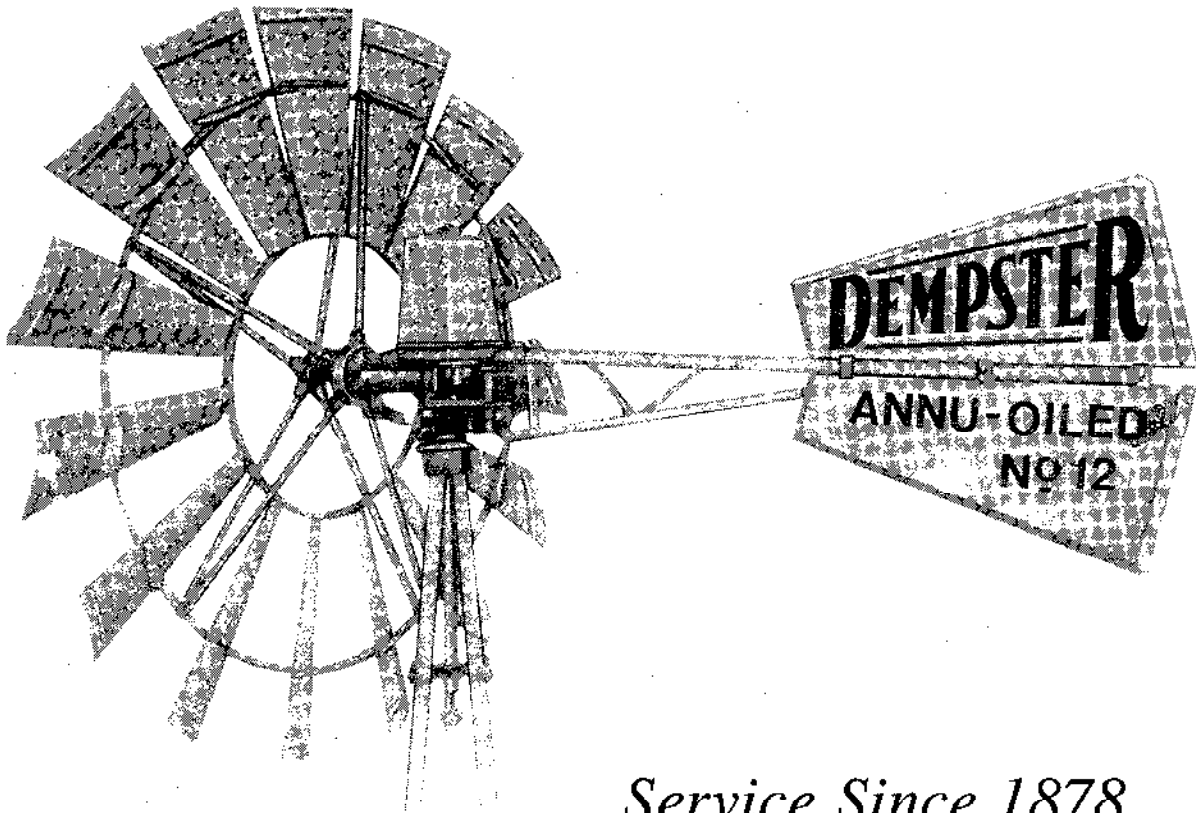




WINDMILL

ASSEMBLY INSTRUCTIONS



6' #12 & #12B

8' #12A & 12B

10' #12 & #12B

PLEASE REMOVE THIS MANUAL AND STUDY THOROUGHLY
BEFORE
PROCEEDING TO UNCRATE YOUR DEMPSTER WINDMILL

DEMPSTER INDUSTRIES INC., BEATRICE, NEBRASKA 68310 (402) 223-4026

Form 2539, Revision 3-8/84

DEMPSTER WINDMILL

WINDMILL INSTALLATION DATA

DATE _____ WELL DEPTH _____

WINDMILL MODEL _____ CYLINDER TYPE & SIZE _____

DEPTH TO WATER _____ DRAW DOWN _____ DEPTH TO CYLINDER _____

TOWER SIZE _____ INSTALLED BY _____

WELL DRILLED BY _____

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WINDMILL LIMITED WARRANTY

DEMPSTER INDUSTRIES INC.
 PO Box 848 711 South 6th St.
 Beatrice, Nebraska 68310
 Toll-Free 1-800-777-0212
 Phone (402) 223-4028

LIMITED WARRANTY

On the Dempster No.12 Annu-Oiled Windmill
 First 4 digits of Date Code = Month & Year of Manufacture

DEMPSTER warrants for twelve (12) months from date of installation or twenty-four (24) months from date of manufacture against defects in material and workmanship, and will repair or replace f.o.b. at an authorized DEMPSTER repair location, any defective parts of the DEMPSTER #12 Windmill, provided:

1. Installation instructions which accompany the windmill are followed precisely.
2. The oil is changed annually using wax-free oil, which pours at -35°F.
3. The hood of the mill engine is kept secured and in proper position.
4. The Windmill has been properly used and maintained.
5. The defective parts are returned to DEMPSTER INDUSTRIES INC.

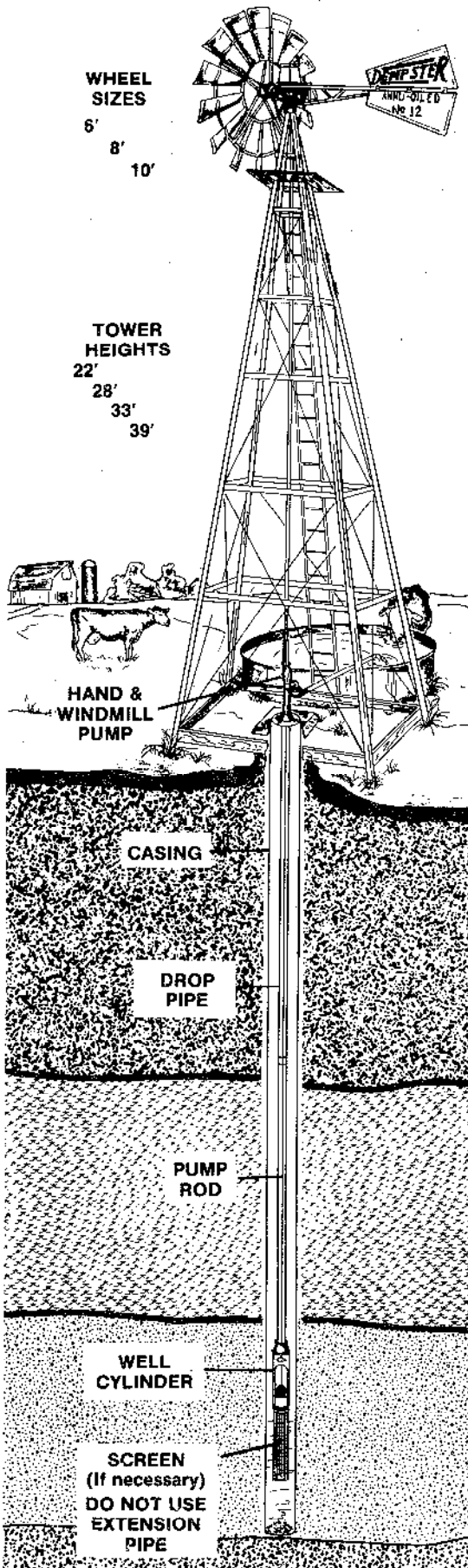
In the event these provisions are not carried out, any resultant damage is not covered by this warranty. No allowance will be made for labor, transportation or other charges incurred in the replacement of the defective part. This warranty shall not apply when the Windmill has been subject to accident, negligence, alteration, abuse, misuse or acts of God. **CONSEQUENTIAL DAMAGES, IF ANY, ARE SPECIFICALLY EXCLUDED FROM THIS WARRANTY.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations may not apply to you.

Any implied warranties which the purchaser may have are limited to the warranty period. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Contact DEMPSTER INDUSTRIES INC. at the address above if you have any questions about the coverage of this warranty or service under this warranty. This warranty gives you specific legal rights; you may also have other rights which vary from state to state.

6-30-84

Dempster Industries Inc. continually strives to improve it's products and must, therefore, reserve the right to make improvements or changes without incurring the obligation to make these changes to windmills and towers previously sold.



LOCATING A WINDMILL INSTALLATION

1. The windmill must be installed **DIRECTLY** OVER the well or water source. It is not intended for pumping from an offset location between the windmill and pump/well.
2. Water depth & availability, terrain, prevailing winds, average wind conditions throughout the year and water usage are all important considerations in the selection of the well site.
3. The windmill wheel must be at least 15 feet above any nearby obstructions - buildings, trees, etc. - within 400 feet, to give the wheel a free flow of wind from all directions. The higher the wheel, the better chance at useable wind - sometimes up to 10% better in an extra 15-25 foot height.

SIZING THE WINDMILL & CYLINDER

1. Use the following chart for mill size, stroke and cylinder size when total lift requirements or elevation (in feet) and gallons per hour (G.P.H.) are known.

PERFORMANCE TABLE

WINDMILL SIZE	STROKE (INCHES)	ELEV. G.P.H.	CYLINDER SIZE (inches)									
			1 1/8	2	2 1/4	2 1/2	2 3/4	3	3 1/4	3 1/2	3 3/4	4
6 FT. #12	5	ELEV.	119	104	82	66	55	46	39	34	29	26
		GPH	115	130	165	204	247	294	345	400	459	522
8 FT. #12A	5 1/2	ELEV.	192	168	133	107	89	74	63	55	47	42
		GPH	126	143	181	224	271	323	379	440	505	574
	7 1/2	ELEV.	140	124	97	79	65	55	47	40	35	31
		GPH	172	196	248	306	370	440	517	600	688	783
10 Ft. #12	5-1/2	GPH	366	323	255	207	171	143	122	105	92	81
	7-1/2	GPH	103	117	148	182	221	263	308	358	410	467
		ELEV.	270	237	188	152	125	105	90	77	67	59
		GPH	140	159	201	248	301	358	420	487	559	636

Delivery performance is based on 15 M.P.H. wind with 32 Strokes per Minute for 6' & 8' Mills— 18-20MPH wind with 26 Strokes per Minute for 10' Mill. If the wind velocity is decreased, the pumping capacity will also be decreased. For example: Less than 15 MPH - 12 MPH wind will produce approximately 80% delivery - 10 MPH wind, approximately 62%. Decrease for the 10' mill from 18 MPH will be in approximately the same proportion.

2. **DO NOT** oversize the cylinder for wheel size. The deeper to water, the smaller the cylinder should be. **REMEMBER: A WINDMILL WITH A SMALL CYLINDER RUNNING, PUMPS MORE WATER THAN ONE WITH A LARGE CYLINDER THAT ISN'T.** The windmill will pump water even in the slightest breeze, with a correctly sized cylinder. If there is no wind for an extended period, disconnect the wood rod and attach the handle to pump water by hand, except in the most extremely deep wells.
3. A windmill pumping system is a positive displacement system and must have an **OPEN DISCHARGE** at all times. Elevated storage is recommended for pressure purposes. (1 foot of elevation = .434 psi pressure).
4. **DO NOT** use a pipe below the cylinder. This will restrict the intake of water and cause excessive loads on the rod, pole and engine. Use only a screen here, if necessary.

DEMPSTER WINDMILL

WINDMILL CRATING



Your Dempster 6', 8' & 10' Windmill is shipped in 4 units — the Engine & Wheel assemblies are in wooden crates, while the Vane & Vane Stem assemblies are in securely wired and banded bundles for convenient, safe handling and storage.

ENGINE

Basic Engine, Bed Plate, Storm Stay, Pullout Arm, bag of fittings including the Ball Bearing assembly, Pump Connection & Pin, Regulating Spring Arm, Pump Rod Coupling, fastener hardware and Installation Instructions.

WHEEL

Wheel Arms, Fans, Plates, Circles, fastener hardware & Instructions.

VANE

Vane, Crossbar(s) as required, fastener hardware and Instructions.

VANE STEM

Vane Stem Assembly, Pullout Lever assembly, Pump Rod assembly and Regulating Spring (with Turnbuckle for 10' mill only). The spring is positioned on the pump rod to fully protect the threads against accidental damage during shipping.

HARDWARE PACKAGING

Fastener hardware is packaged in burlap bags or cartons, accompanied by a check list which specifies the quantity and size of items required to assemble or install the unit and the particular component on which they are used. Keep this packing list handy for reference during assembly. Use a compartment type container to separate and identify appropriate items to verify receipt and to be kept handy during assembly.

TOWER BUNDLING

The Dempster 2" or 2-1/2" Style "B" Tower, for the 6', 8' or 10' Windmill, is bundled by sections, with a complete tower consisting of the appropriate number and lengths of Corner Posts, Girts, Braces, Ladders and the Platform for a specific height. The Tower Anchor Posts, Wood Pump Rod & Guides, Pullout Wire and fastener hardware are included with the tower. Wood Rod Connection and Splices are included with the engine. The various methods of assembly and erection are described in Form 763, which is included with the tower, or is available from any Dempster Branch or the Factory at Beatrice, Nebraska 68310.

PROCEDURE DETERMINATION

There are two basic methods or situations which must be considered before assembling or erecting a windmill. These depend primarily upon the type of equipment accessible on the site. The order of assembly and tower erection will vary, depending upon which method is used. Consider these methods, and the type of equipment available before continuing the assembly procedure. Study this manual thoroughly to more fully understand the complete assembly procedure and become familiar with the components involved.

SITUATION #1.

The Engine is to be replaced in your present tower, a new Dempster Tower is to be assembled and erected (or is to be built from the ground up) and the engine is to be raised to the top of standing tower. (A special replacement mast is available to adapt the 6', 8' & 10' Dempster Windmill to an Aermotor 4-post tower. See page 24, or ask for Form 1802 for further details.)

1. Follow the order of engine assembly outlined in the manual, Steps I through V.
2. Be sure the bed plate and storm stay, or Aermotor mast, are securely attached to the top of the tower legs. See Step VI.
3. Raise the engine to the top of the tower and install, as noted in Step VI.



CAUTION: ALWAYS USE PERSONAL & EQUIPMENT SAFETY PRECAUTIONS WHEN WORKING ON WINDMILLS AND TOWERS.



SITUATION #2.

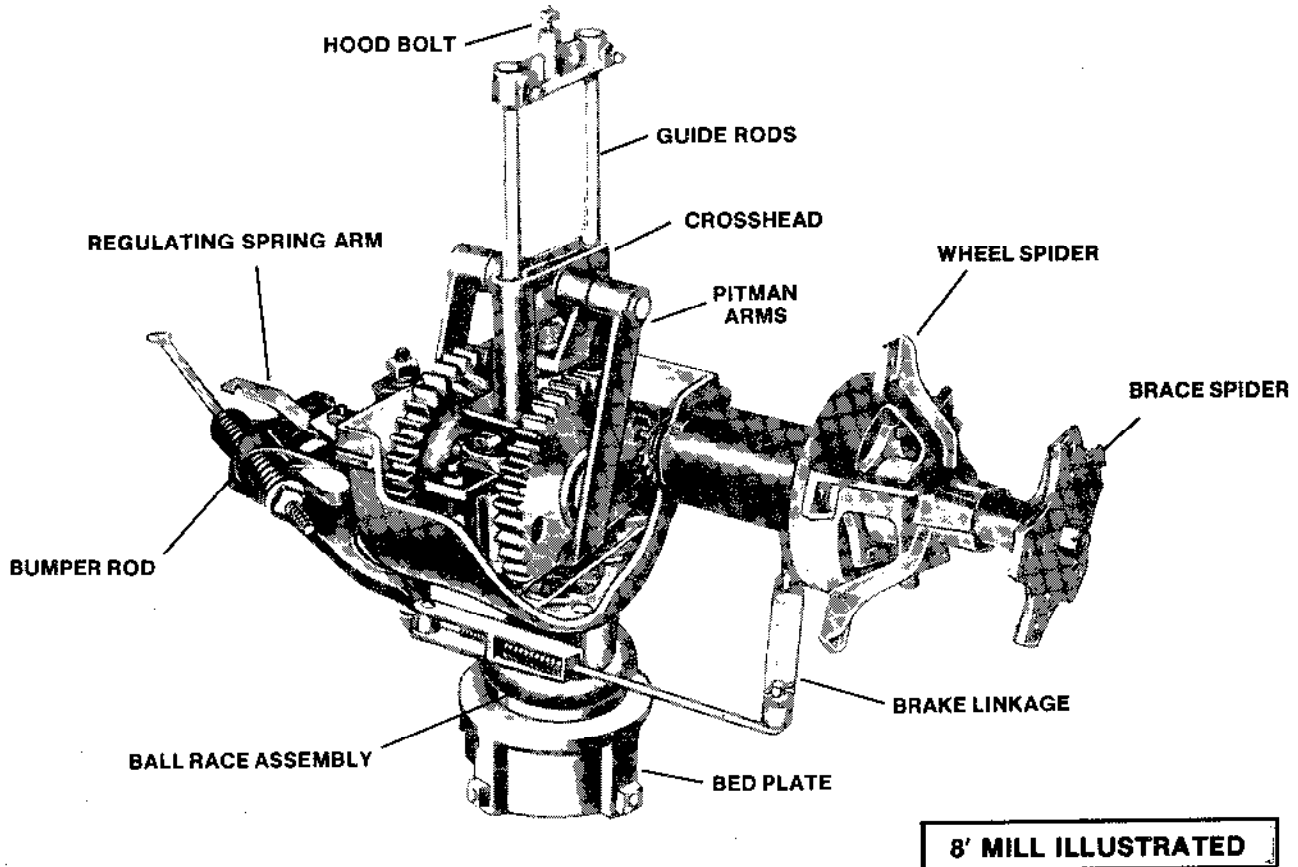
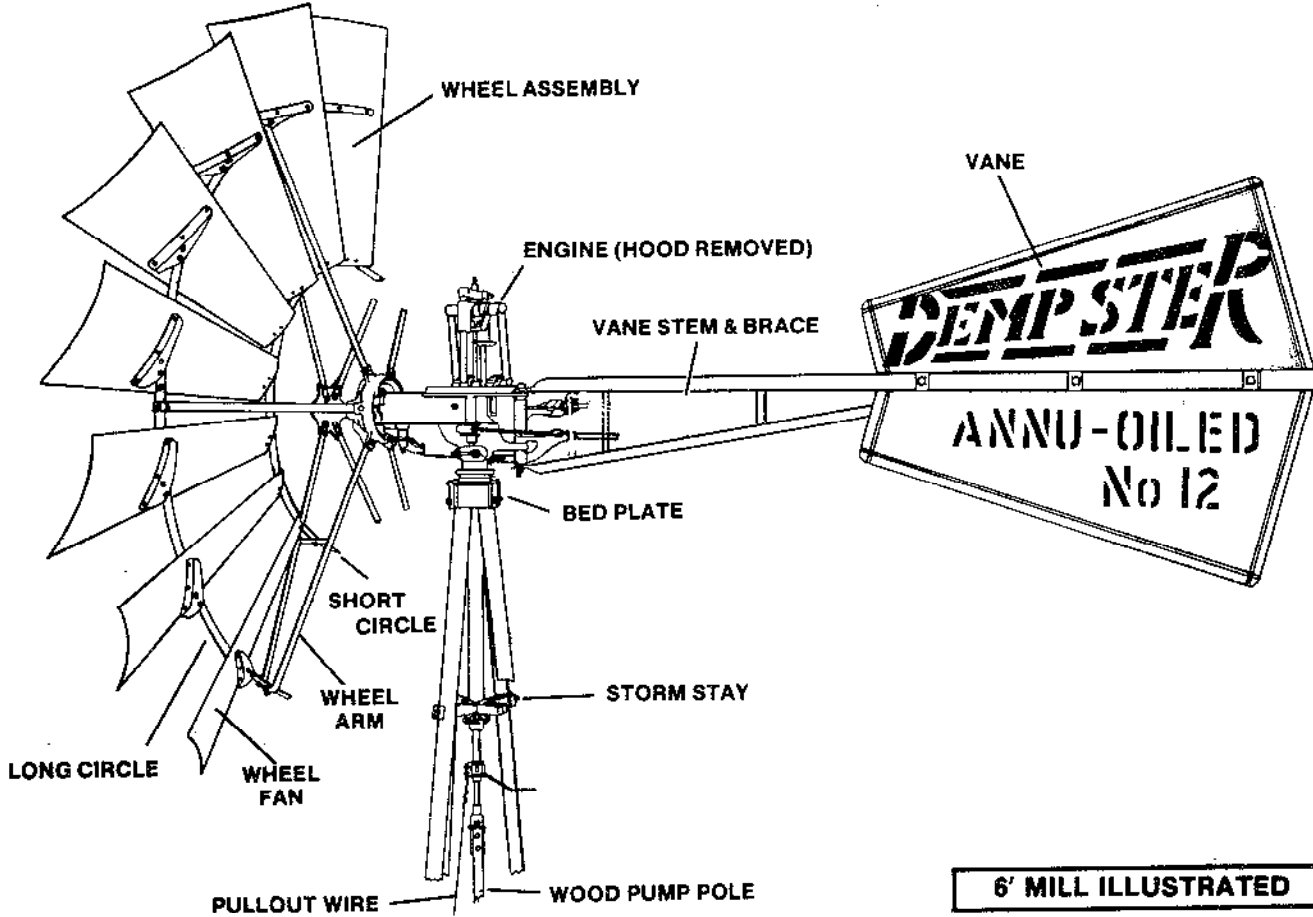
The Tower and Engine are to be completely assembled on the ground, erected with boom equipment, or raised by the "tilt-up" method. The order of assembly will be the same as outlined in the engine assembly procedure, **EXCEPT:**

1. Assemble the tower on supports, as outlined in the Tower instructions.
2. Perform Step I, Pipe Stem Assembly.
3. Go immediately to Step VI. Install the bed plate and storm stay. Mount the engine and pipe stem assembly in the top of the tower.
4. Return to Step II and continue with the engine assembly procedure.
5. Install the wood pump pole, guide rods and pullout assembly.

NOTE: Regardless of the method used to assemble or erect a windmill, it is strongly advised that the engine, vane and wheel be completely assembled on the ground before raising. The **SAFETY** of waiting until the engine is atop the tower before installing these assemblies is questionable, due to wind, small working area, etc.

DEMPSTER WINDMILL

ENGINE COMPONENTS ILLUSTRATIONS



1981/1984 MODIFICATIONS

See Repair Manual Form 2560, Rev. 2 - 9/84 for detailed information.

Beginning in early 1981, the following modifications were phased into the Dempster Windmill design and production. In most cases, components involved are fully interchangeable with, or easily adapted for installation on, previous #12 & #12A Windmills, as noted below.

THE VANE

The "Dempster Diamond" Vane was used during the years 1981 through 1983. In 1984 the long familiar broadened arrowhead designed was reinstated for use on all sizes.

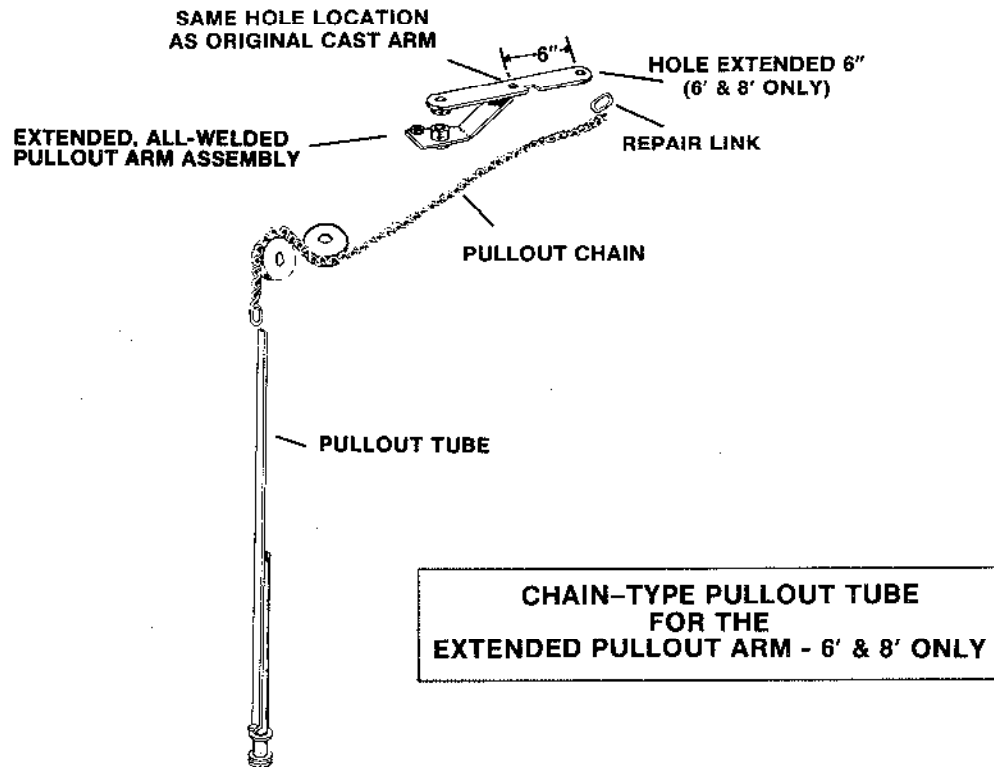
6' VANE STEM ASSEMBLY

This is now an all-welded assembly and requires a new hinge pin assembly - 380 2 0263 (380 3 0644 pin only), which is furnished with the engine.

PULLOUT ARM ASSEMBLY - 6' & 8'

These new all-welded steel assemblies are fully interchangeable with the previous cast iron component. The arm is 6" longer to make it easier to pull the wheel out of the wind. For use on older mills, it will be necessary to add 6" of chain to reach outer hole, or the chain can be attached to the same hole location as provided by the cast iron pullout arm.

NOTE: If outer hole is used, the pullout wire length must be shortened slightly at the wood pullout lever ball for longer length of stroke necessary. **DO NOT MOVE WIRE BAIL!!!**



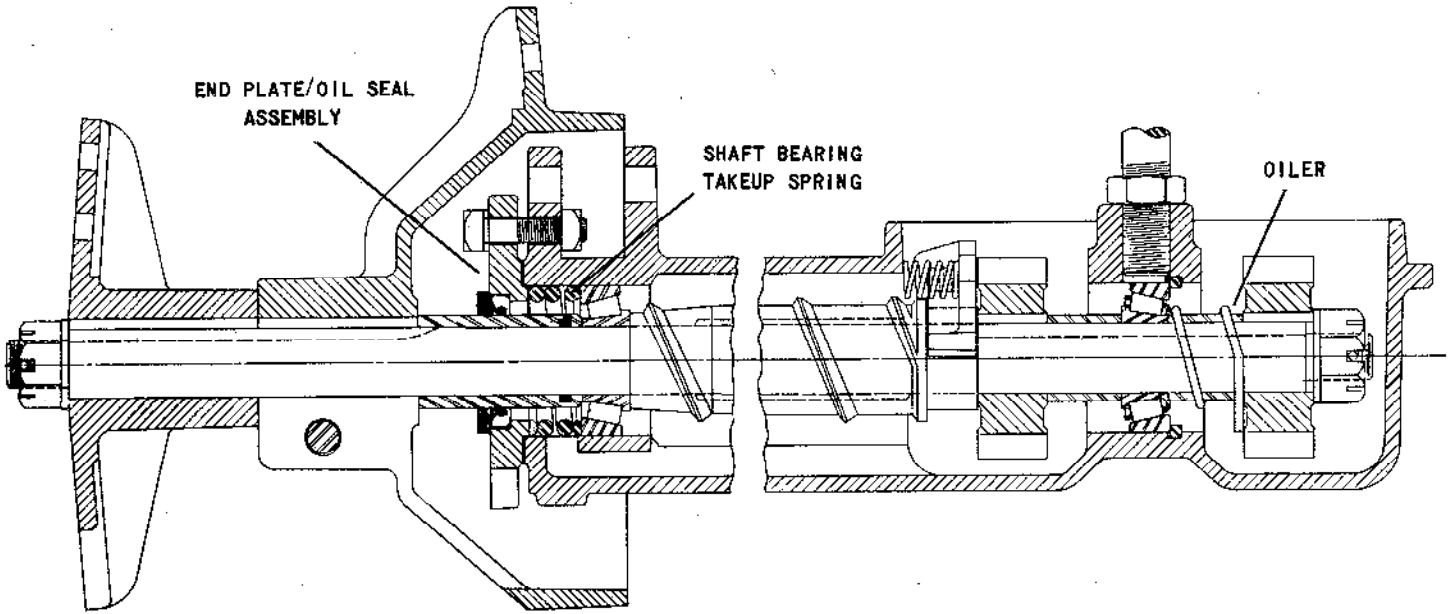
INTERCHANGEABILITY WITH ORIGINAL CHAIN-TYPE PULLOUT TUBES

The new Pullout Tubes with longer chain may be used for repair on older windmills. Simply cut off or drop 6" (8 links) to provide correct length with original cast arm.

DEMPSTER WINDMILL

NEW MODEL NO#12B ASSEMBLY VIEW

Same as #12 & #12A, except for items noted



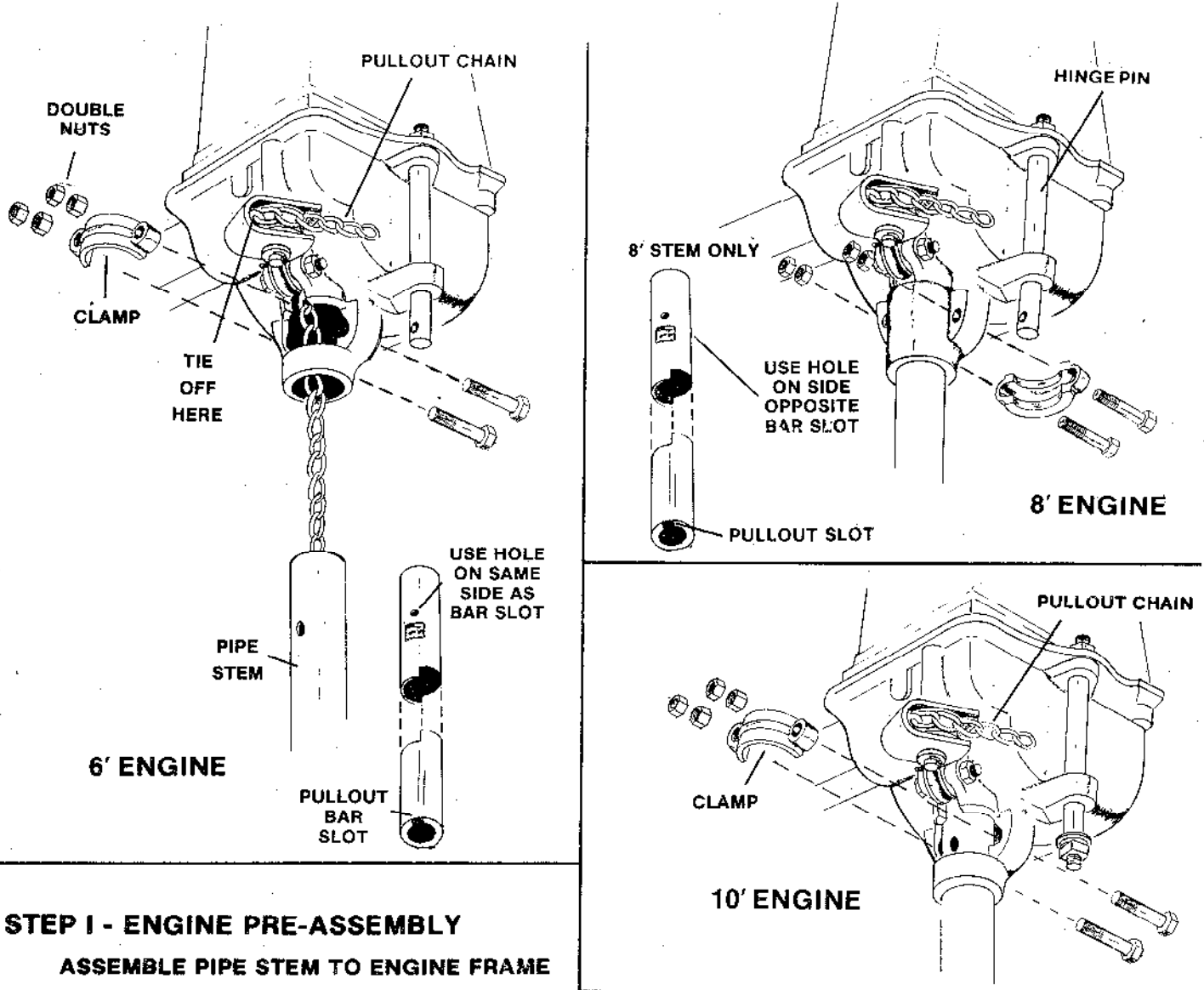
The #12B Series, introduced in mid-1982, designates engines equipped with the Shaft Bearing Takeup Spring group, with modified End plate, and Inboard Bearing Oiler.

The Takeup Spring preloads the shaft bearing set and provides easier, more efficient field service of the shaft assembly. This group **CANNOT** be installed on earlier model engines, as the outboard bearing cone must have a slip-fit bore in the frame.

The Oiler is a spiral to supply additional lubrication to the inboard bearing and **MAY BE** installed on older engine shafts using a comparable spacer.

These two features are using on all sizes of windmill engines.

COMPLETE ENGINE ASSEMBLY



STEP I - ENGINE PRE-ASSEMBLY
ASSEMBLE PIPE STEM TO ENGINE FRAME

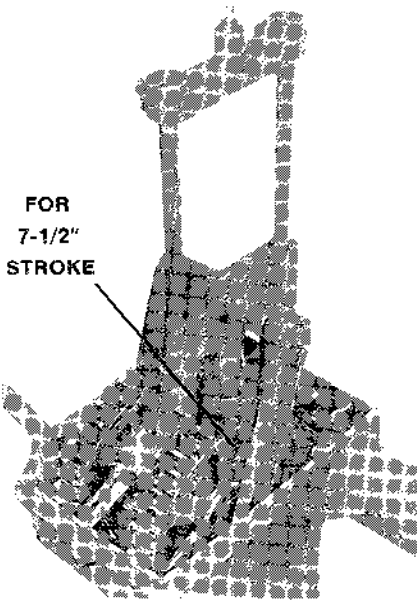
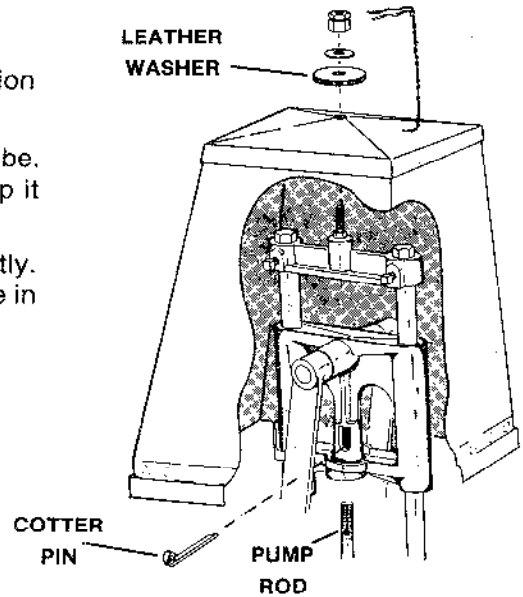
1. Remove the engine & pipe stem from the crate. Detach clamp from engine frame. (6' & 10' is on pulley side - 8' clamp is on side opposite pulleys).
2. **NOTE:** The pipe stem **MUST ALWAYS** be installed with the pullout bar slot aligned with the pulleys to prevent premature wear on the pullout cable or chain by contacting the pump rod. If misaligned, cable/chain will cross pump rod and result in rapid wear.
3. Feed pullout cable or chain through roller sheaves and slide pipe stem into the frame.
4. **6' & 10'** - Align the hole, on **SAME** side of pipe stem as bar slot, in the frame recess. Align the hole in center of opening. Install clamp with the boss (inside clamp) into the pipe stem hole. Insert bolts from the brake linkage side, tighten nuts securely and double nut.
8' ONLY - Align the hole, on **OPPOSITE** side of pipe stem as bar slot, in the frame and lock with clamp and bolts inserted from brake linkage side. Tighten nuts securely and doublenut for security.
5. Tie off pullout cable or chain to pulley shield to prevent it from falling back into the pipe stem during the succeeding assembly procedures.

DEMPSTER WINDMILL

INSTALL THE PUMP ROD & SWIVEL (Shipped with the Vane Stem)

NOTE: Before installing the pump rod, use the connection to mark the holes in the wood pole for the 3/8" holes.

6. Remove the hood and slide the rod up through the pullout tube. Hold the tube down to tighten the cable or chain and keep it from wrapping around or contacting the pump rod.
7. Screw the pump rod into the pump rod carrier threads tightly. Insert the cotter pin through the slot in the carrier and hole in the pump rod to insure security.



STROKE ADJUSTMENT - For 8' & 10' Mills only

8. The engine is assembled with a 5-1/2" stroke (holes nearest the center of the large gears).
9. For the longer 7-1/2" stroke, move the pitman arms to the opposite set of holes (nearest the gear teeth).
10. With the crosshead (carrier) down, check the oil dippers to be sure they both lightly contact the stripping surfaces, as this supplies lubricating oil to the crosshead reservoirs.

Setting the mill on the short stroke decreases capacity by 25%.
 Replace the hood temporarily, until engine installation is complete.

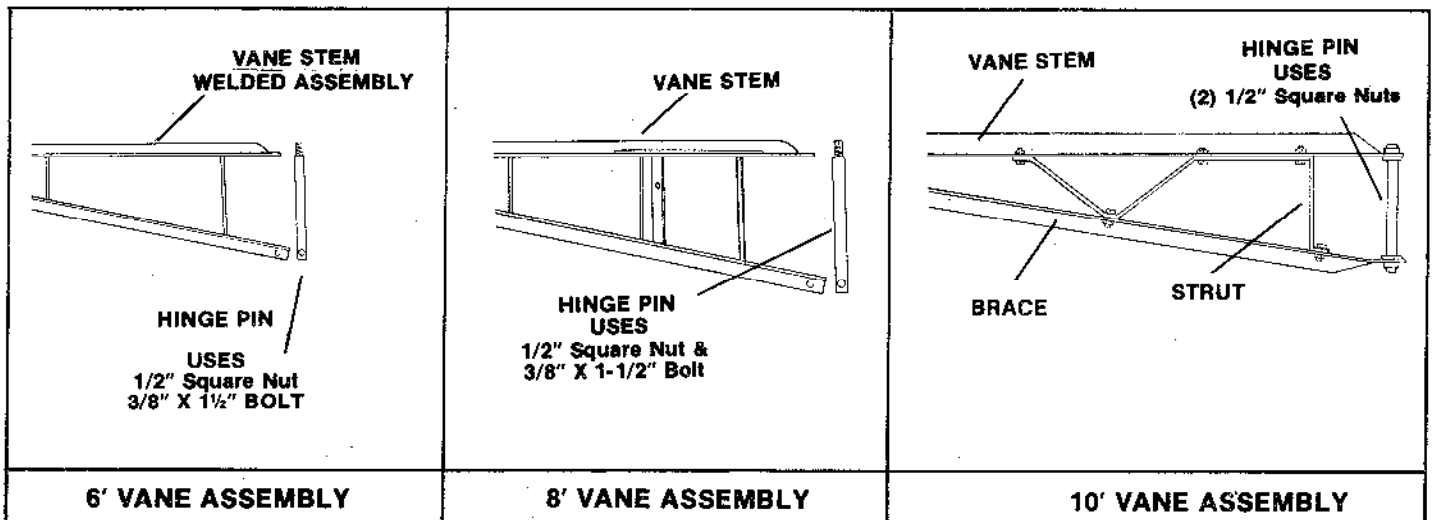
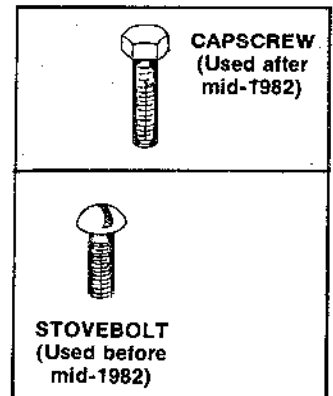
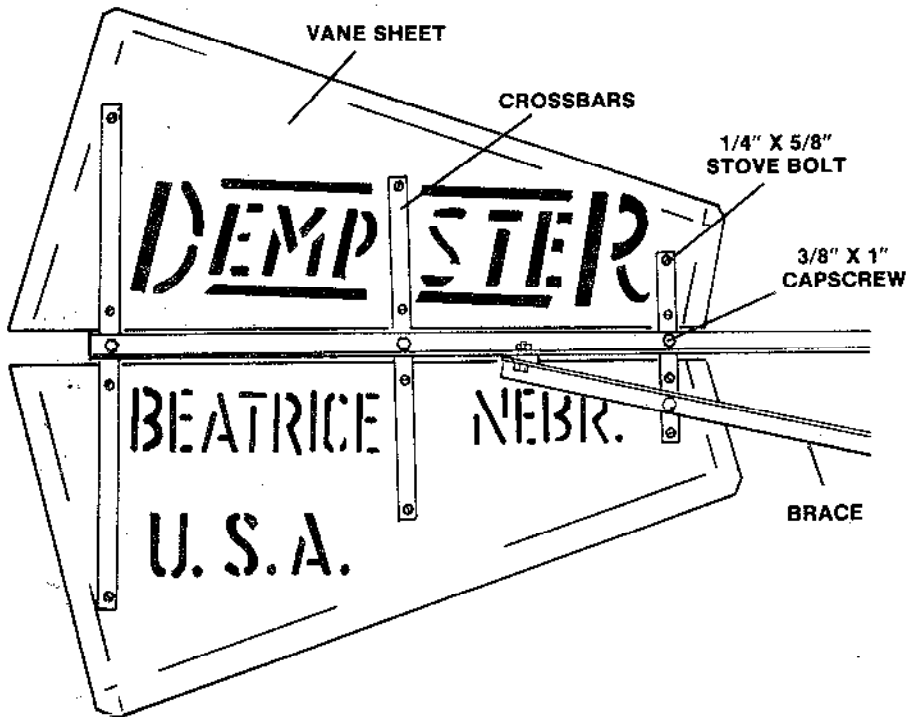
*If tower is being assembled on the ground, go to Step VI.
 Mount engine assembly in tower before proceeding with Steps II to V.*

STEP II - VANE & VANE STEM ASSEMBLY - 6', 8' & 10'

These three vane stem assemblies require the same basic assembly, the only variations being the quantity of crossbars and hardware.

NOTE: Stovebolts (slotted head), lockwashers and nuts were supplied prior to mid-1982. Capscrews (hex head) and self-locking nuts were furnished after this date.

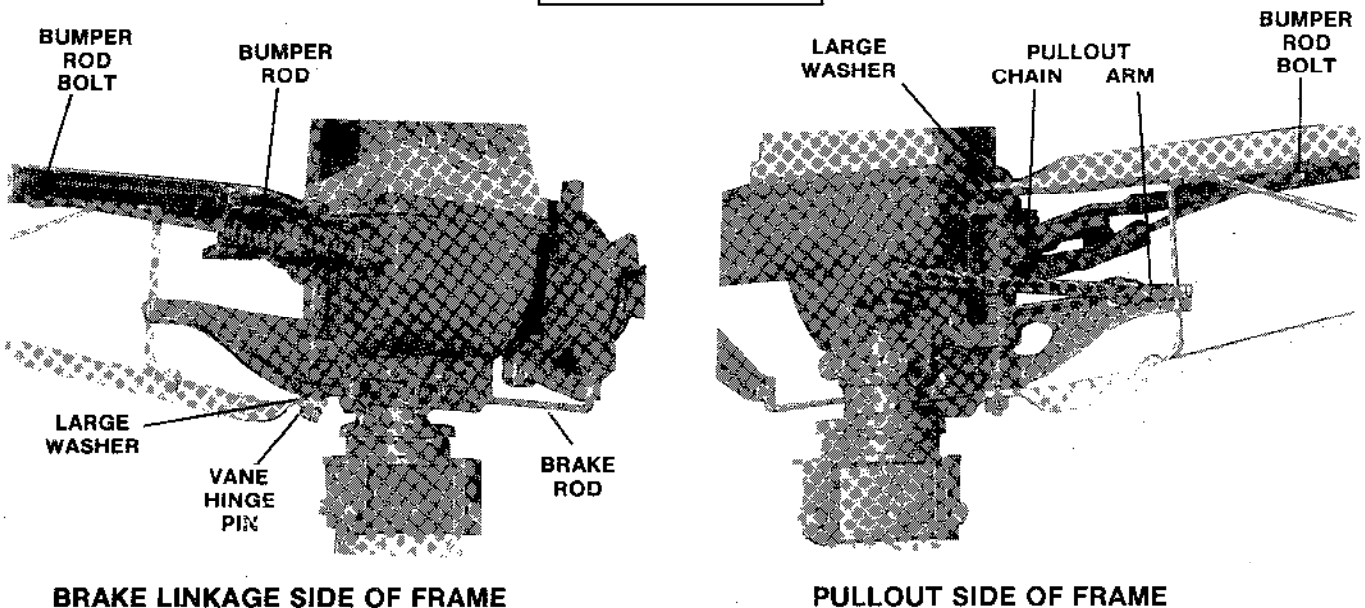
1. Remove the vane sheets and crossbars from the crate.
2. Fasten the crossbar(s) to the vane using appropriate number of 1/4" NC X 5/8" capscrews and locknuts per crossbar. Tighten securely. (Some vanes may still use stovebolts, etc.).
3. Bolt the vane assembly to the vane stem, using four 3/8" X 1" capscrews and locknuts. (10' will use five). Tighten securely.
4. If stovebolts, etc. are used, peen (flatten) ends to provide maximum security. For assembly using the later capscrews and locknuts, this is no longer necessary.



STEP III - INSTALL THE VANE ASSEMBLY ON THE ENGINE FRAME

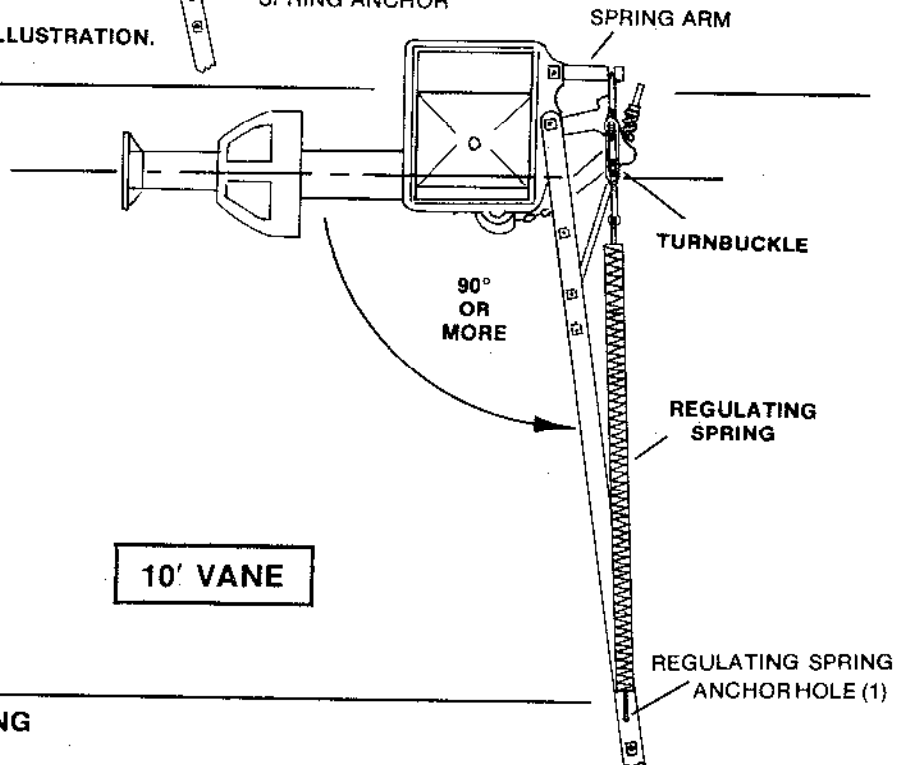
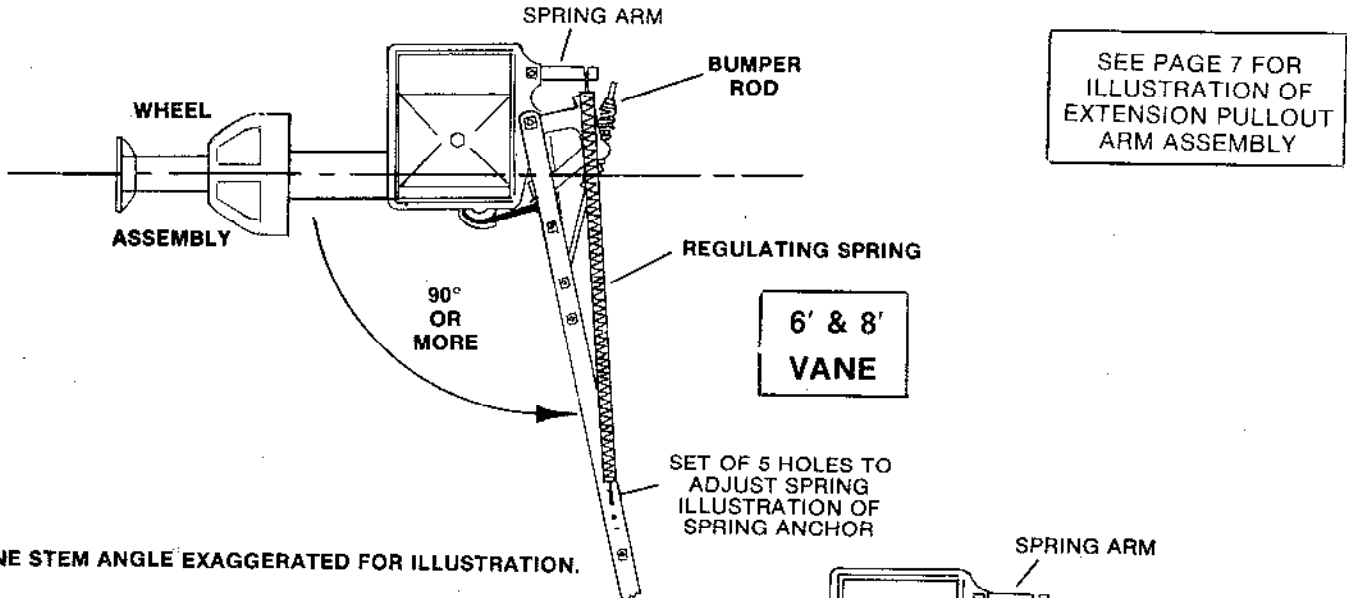
1. Remove the vane hinge pin from the main frame.
2. Attach the bumper casting and pullout arm to the main frame by inserting the vane hinge pin through the lugs in the frame, through the bumper casting and the pullout arm. The figures cast into the bumper casting **MUST BE** on the under side.
3. Be sure the pullout arm assembly is on the correct side of the vane stem strut when you install the vane. It must be on the right as you face the wheel (side closest to the brake lever & bumper spring assembly).
4. **6' & 8' VANES** - Install the 1/2" flatwasher on upper end of pin and hook upper strut over the hinge pin. Position the lower strut against the pin, align the holes and insert the 3/8" X 1-1/2" capscrew with hardware. Tighten securely. Install the 1/2" lockwasher and nut on the upper end of the pin and tighten securely.
5. **10' VANE** - Remove the bolts that hold the vane stem strut to the vane stem and brace to allow the ends to be opened slightly.
6. Place the large flatwashers, one each end, over the small ends of the vane hinge pin.
7. Place the holes in the ends of the vane stem and brace over the small ends of the vane hinge pin and against the washers just positioned on the pin. Place lockwashers and nuts on the ends of the hinge pin and tighten securely. Replace strut hardware & tighten.
8. Bolt the bumper rod to the underside of the vane stem, as shown, using a 3/8" X 1-1/2" capscrew, lockwasher & nut.
9. **6' & 8' PULLOUT CHAIN** - With new Welded Pullout Arm - Attach chain to hole furthest from hinge pin and secure with the repair link furnished. Notch will engage vane brace. Cut tie at pulley shield to free the pullout chain assembly.
10. **10' PULLOUT CHAIN** - Attach the pullout chain to the arm casting with the repair link furnished. Cut the tie at pulley shield to free the pullout and chain.
11. Bolt the regulating spring arm to the bracket on the side of the main frame with the 3/8" X 1-1/2" capscrew, lockwasher and nut.
12. Double check all hardware installed during this step to be sure it is tight.

10' MILL ILLUSTRATED



ADJUSTING THE BUMPER ROD AND SPRING ASSEMBLY

Adjust the nut on the end of the bumper rod, if necessary, so that when the vane stem is moved to the left, (closed, or out-of-the-wind), it is at approximately a 90° angle, or more, to the main frame at the time the bumper spring starts to compress. Never set at less than this 90°-angle - it is better to have it slightly more.



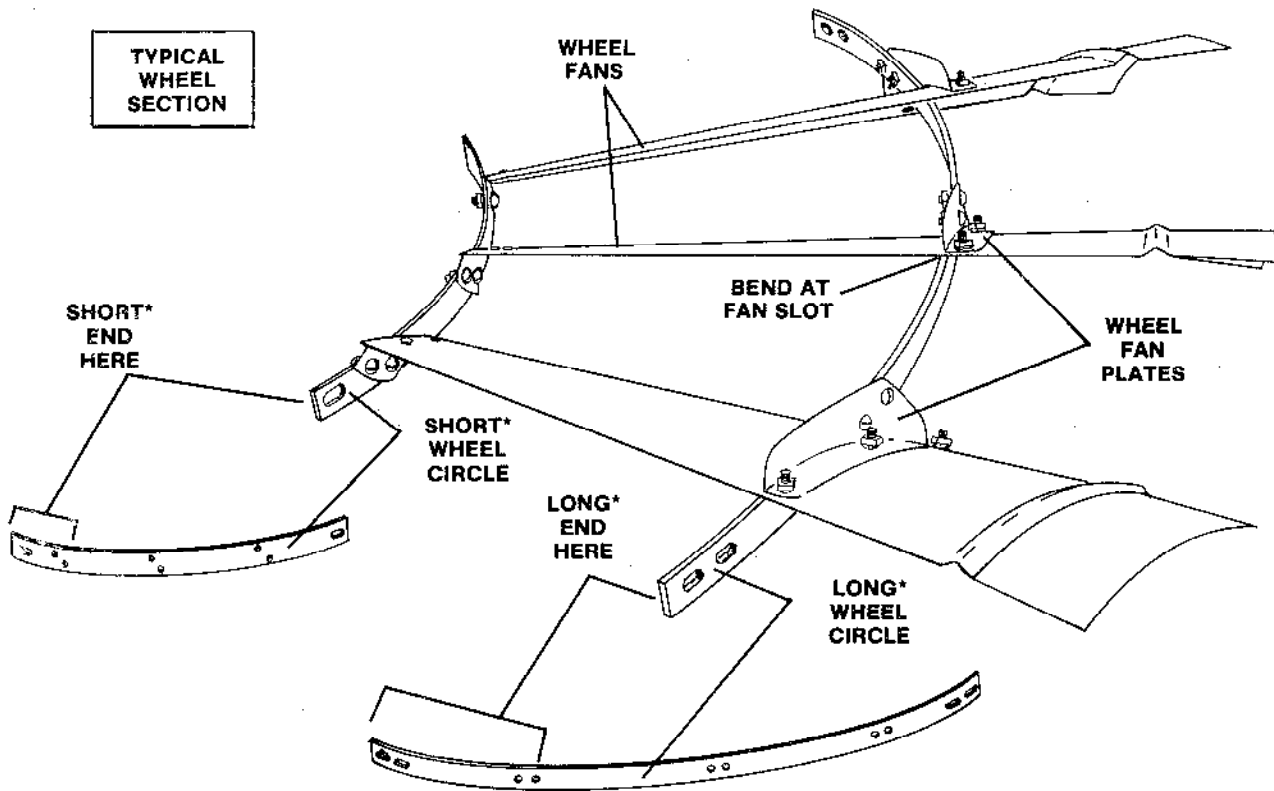
INSTALL THE REGULATING SPRING

6' & 8' - Insert the open hook end of the spring in the center hole in the vane stem. Attach the loop end in the slot of the regulating spring arm. Final adjustment of this spring will be made after the mill and pump installation is operating. See page 22.

10' - Hook spring into single hole in vane stem and install turnbuckle between the spring and arm. Adjust turnbuckle to approximately midway. See page 22 for final adjustment of operating speed.

DEMPSTER WINDMILL

WHEEL SECTION ASSEMBLY



NOTE: Stovebolts (slotted head), lockwashers and nuts were supplied prior to mid-1982. Capscrews (hex head) and Locknuts were used after this time.

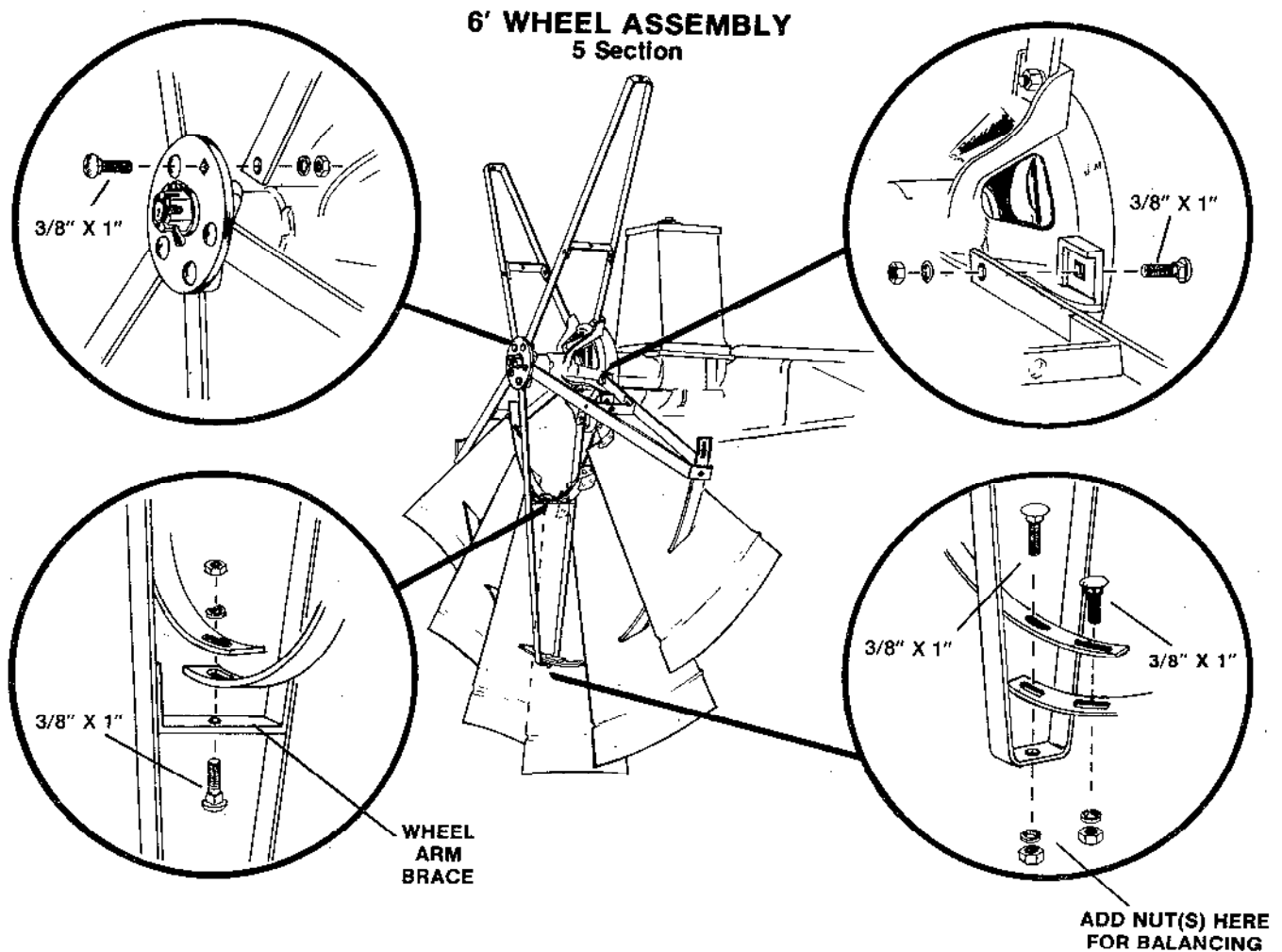
STEP IV - WHEEL SECTION ASSEMBLY (3 Blades per Section)

The assembly of the wheel sections requires the same procedure for all 3 sizes.

1. Remove wheel arms, wheel circles (short & long) and wheel fan plates from the crate.
2. Assemble fan plates to fans, with the bend running along the slot in the fan, using the three $\frac{1}{4}$ " NC X $\frac{5}{8}$ " capscrews and locknuts. (Some wheels may still have stovebolts, etc. as hardware.) See note 6.

NOTE*: Fan holes in wheel circles are off-center, with short and long spacing on opposite ends. Circles **MUST BE ATTACHED** to fans in relative position shown in the illustration drawing above for proper assembly.

3. Assemble short wheel circle to narrow end of fans, using two $\frac{1}{4}$ " X $\frac{5}{8}$ " capscrews and locknuts. (Some wheels may still have stovebolts, etc. as hardware.) See note 6.
4. Assemble long wheel circle to wheel fans by sliding the circle through the slots in the wheel fans and securing with two $\frac{1}{4}$ " NC X $\frac{5}{8}$ " stove bolts, lockwashers and nuts each.
5. Tighten all nuts securely. Rivet or peen (flatten) the ends of the bolts to provide positive security of the wheel assembly.
6. After mid-1982, capscrews and locknuts were used for all wheel, fan and vane components. It will no longer be necessary to peen these bolts, as the nuts will lock securely.



STEP V - ASSEMBLE WHEEL TO ENGINE SPIDERS

1. Bolt the wheel arms to the wheel spider and brace spider with 3/8"NC X 1" carriage bolts, lockwashers and nuts. Do not draw up tight at this time.
2. Install the first section with the wheel circles inside and between the wheel arms. The long circle must rest inside the outer bend in the arms and the short circle inside the wheel arm crossbrace.
3. Fasten the arms and lapped ends of the long wheel circles with 3/8" NC X 1" carriage bolts, lockwashers and nuts.
4. Fasten the lapped ends of the short wheel circles to the wheel arm brace with the 3/8"NC X 1" carriage bolts, lockwashers and nuts.
5. Tighten all bolts in wheel, wheel & brace spiders. Turn the wheel to see if it runs true. If necessary to align wheel, loosen bolts - pull into place - retighten bolts. Rivet or peen (flatten) the ends of the bolts in the wheel spider, brace spider and arms for security.

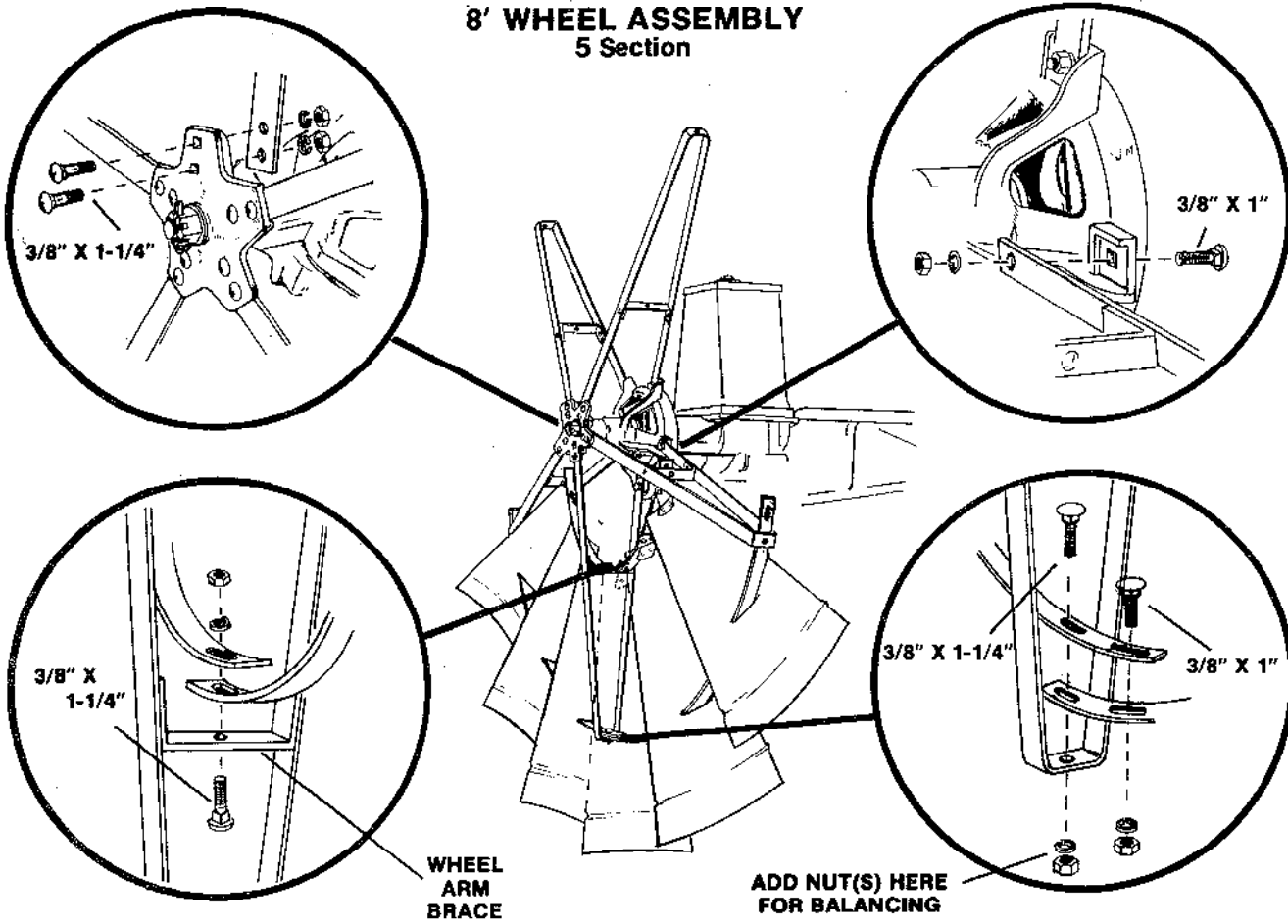
ADJUSTING THE BRAKE ROD AND SPRING

6. Hold the vane stem closed (against the bumper) and try to turn the wheel. The brake should hold wheel securely. If not, remove the cotter key in the brake rod, remove it from the lever and turn into the linkage several turns. Continue to adjust in until brake holds wheel. Replace cotter key securely.

Wheel sections must be within 4 ounces of each other. If not, add one or two nuts to the light wheel section(s) on the long wheel circle bolt(s), as shown in the illustration.

DEMPSTER WINDMILL

8' WHEEL ASSEMBLY 5 Section

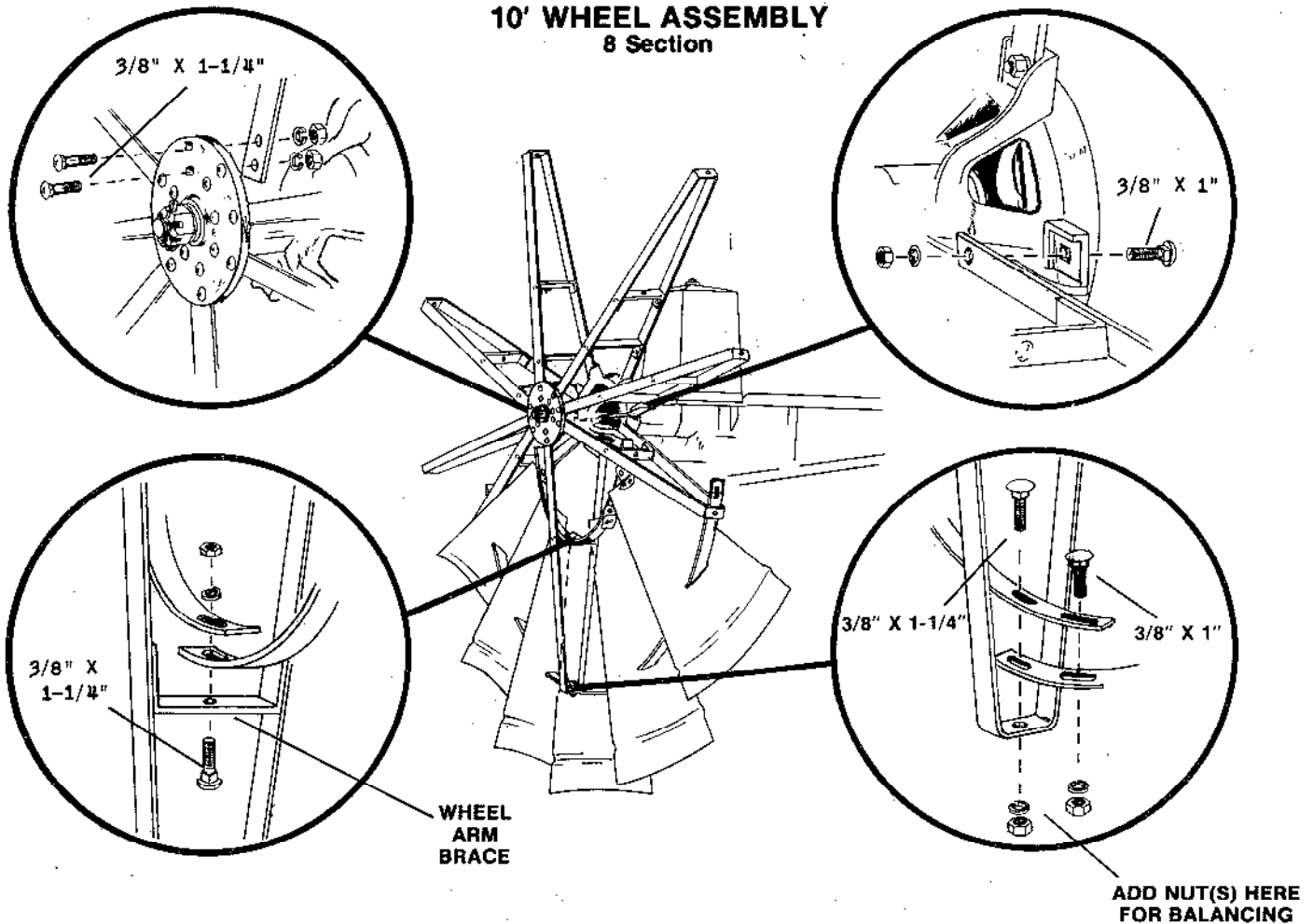


ASSEMBLE WHEEL TO ENGINE SPIDERS

1. Bolt the wheel arms to the wheel spider and brace spider with 3/8"NC X 1" carriage bolts, nuts and lockwashers. *Do not draw up tight at this time.*
2. Install the first section with the wheel circles inside and between the wheel arms. The long wheel circle must rest inside the outer bend in the arms and the short circle inside the wheel arm outer crossbrace. Make all laps in the same direction.
3. Fasten the arms and lapped ends of the long wheel circles with 3/8" X 1-1/4" carriage bolts, lockwashers and nuts. Use 3/8" X 1" carriage bolts in the second holes in the lapped ends next to wheel arms.
4. Fasten the lapped ends of the short wheel circles, all in the same direction, to the wheel arm brace with the 3/8" X 1" carriage bolts, lockwashers and nuts.
5. Tighten all bolts in wheel, wheel & brace spiders. Turn the wheel to see if it runs true. If necessary to align wheel, loosen bolts - pull into place - retighten bolts. Rivet or peen (flatten) the ends of the bolts in the wheel spider, brace spider and arms for security.

Wheel sections must be within 4 ounces of each other. If not, add one or two nuts to the light wheel section(s) on the long wheel circle bolt(s), as shown in the illustration.

10' WHEEL ASSEMBLY
8 Section



ASSEMBLE WHEEL TO ENGINE SPIDERS

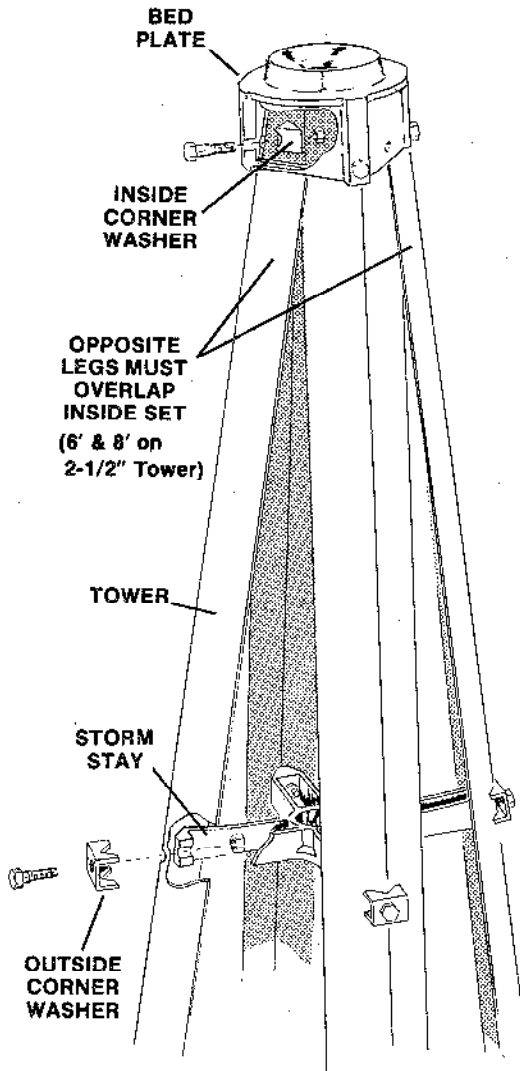
1. Bolt the wheel arms to the wheel spider with 3/8" X 1" carriage bolts and to the brace spider with 3/8" X 1-1/4" carriage bolts. Use lockwashers and nuts on all bolts. Do not draw up tight until the wheel is completely assembled.
2. Install the first section with the wheel circles inside and between the wheel arms. The long wheel circle must rest inside the outer bend in the arms and the short circle inside the wheel arm outer crossbrace. Make all laps in the same direction.
3. Fasten the arms and lapped ends of the long wheel circles with 3/8" X 1-1/4" carriage bolts, lockwashers and nuts. Use 3/8" X 1" carriage bolts in the second holes in the lapped ends next to wheel arms.
4. Fasten the lapped ends of the short wheel circles, all in the same direction, to the wheel arm brace with the 3/8" X 1-1/4" carriage bolts, lockwashers and nuts.
5. Tighten all bolts in wheel, wheel & brace spiders. Turn the wheel to see if it runs true. If necessary to align wheel, loosen bolts - pull into place - retighten bolts. Rivet or peen (flatten) the ends of the bolts in the wheel spider, brace spider and arms for security.

Wheel sections must be within 4 ounces of each other. If not, add one or two nuts to the light wheel section(s) on the long wheel circle bolt(s), as shown in illustration.

DEMPSTER WINDMILL

ENGINE INSTALLATION

STEP VI - INSTALL THE ENGINE ASSEMBLY IN TOWER

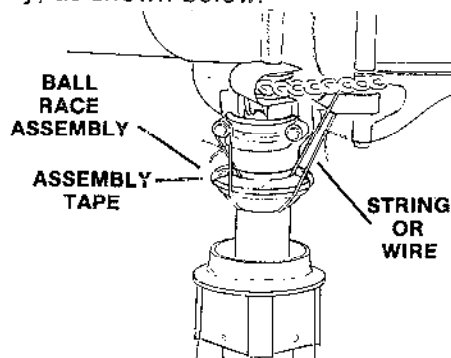


NOTE: 6' & 8' Mills on 2" tower or 10' Mill on a 2-1/2" tower will not have overlap, as shown above. Legs will nest in bedplate without touching one another.

BED PLATE & STORM STAY INSTALLATION

Following steps are relative to installation, either on the ground or on a standing tower.

1. Remove the bed plate & storm stay from the crate. Select the proper bolt bags from the fitting box.
2. Bolt the BED PLATE to the top of the tower, using the 1/2"NC X 2" capscrews, inside corner washers, lockwashers and nuts, as shown.
3. Slide the STORM STAY up into place with the flat side DOWN. Bolt the stay to the tower legs with the 3/8"NC X 2-1/4" capscrews, corner washers, lockwashers and nuts, as shown in illustration.
4. Remove the ball race assembly from the crate. (This assembly is taped together.) Remove the tape and pack the balls & races with grease recommended on maintenance & lubrication page. Tape the assembly together to keep the components from separating.
5. Remove the collar clamp from the bottom of the pipe stem and slide the ball race assembly up the pipe stem, with the flat side on top. Tie in position with heavy string or light wire securely, as shown below.



GROUND LEVEL INSTALLATION WITHOUT VANE AND WHEEL ASSEMBLIES

6. Lower the pipe stem through the bed plate and storm stay. Ball race assembly will rest in the bed plate and under the engine. Remove string or wire from VI-5 before engine is lowered fully into position. *Do not remove assembly tape at this point.*
7. Bolt the collar clamp around the pipe stem, snugly against the bottom of the storm stay. Cut the original assembly tape, VI-4, to free bearing.
8. Bolt the pullout swivel casting around the end of the pullout tube, between the washers already assembled on the tube. Align the small arm (which keeps the pullout tube from following the engine rotation) next to the corner post on which the pullout lever will be mounted.

ENGINE INSTALLATION

INSTALL THE ENGINE ON A STANDING TOWER

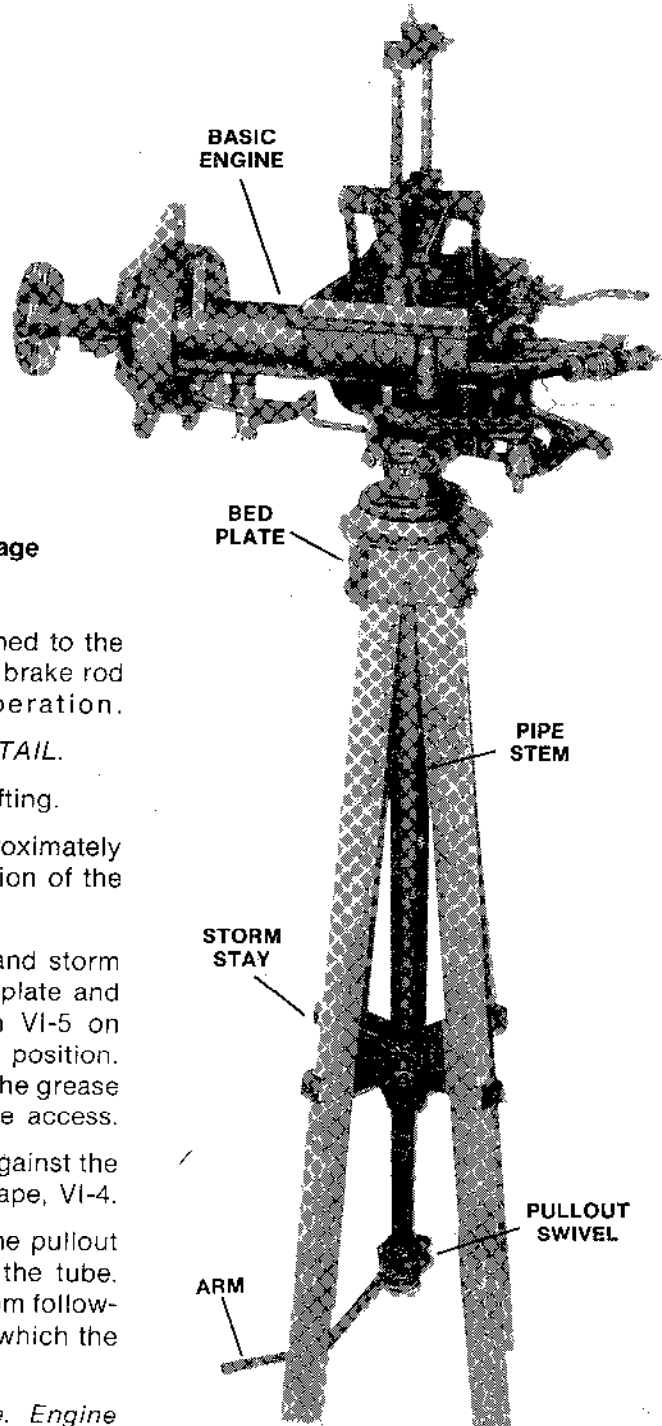


CAUTION:

ALWAYS USE PERSONAL & EQUIPMENT SAFETY PRECAUTIONS WHEN WORKING ON WINDMILLS AND TOWERS.

Install Bed Plate & Storm Stay as noted on opposite page

1. It is recommended that the lift equipment be attached to the main frame in such a manner so that the hood and brake rod assembly are protected during the lift operation.
2. **DO NOT LIFT THE ASSEMBLY BY THE VANE OR TAIL.**
3. Tie the wheel securely or fold vane and tie before lifting.
4. It will be necessary to raise the engine assembly approximately 5 feet higher than the final position, for safe insertion of the pump rod and pipe stem.
5. Lower the pipe stem carefully into the bed plate and storm stay. The ball race assembly will rest in the bed plate and under the engine. Remove string or tape, from VI-5 on opposite page, before engine is lowered fully into position. **DO NOT REMOVE ASSEMBLY TAPE YET.** Locate the grease fitting opposite the brake linkage for easier service access.
6. Bolt the collar clamp around the pipe stem, snugly against the bottom of the storm stay. Cut original assembly tape, VI-4.
7. Bolt the pullout swivel casting around the end of the pullout tube, between the washers already assembled on the tube. Align the small arm (which keeps the pullout tube from following the engine rotation), next to the corner post on which the pullout lever will be installed.
8. *Do not untie the wheel or vane assembly at this time. Engine must be thoroughly oiled before the wheel is allowed to rotate.*



CLOSEUP OF BASIC ENGINE MOUNTING
10' ILLUSTRATED

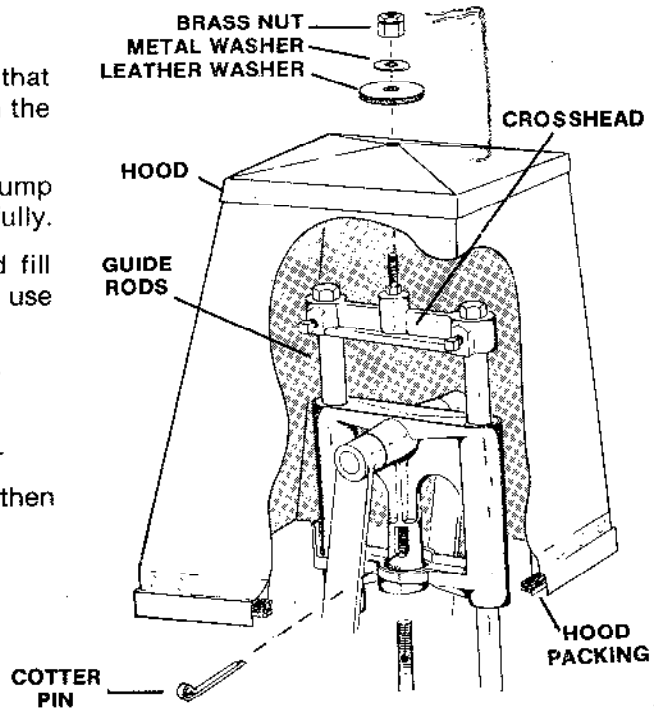
DEMPSTER WINDMILL

STEP VII - ENGINE INSPECTION & LUBRICATION

1. Remove the hood and inspect the packing to see that it has remained in place and is evenly distributed in the flange groove.
2. Double check to see that cotter pin is secured in the pump rod and crosshead opening. Open the cotter pin ends fully.
3. Pour windmill oil on guide rods, in crosshead and fill reservoir with quantity specified in table. **DO NOT** use more than this amount.

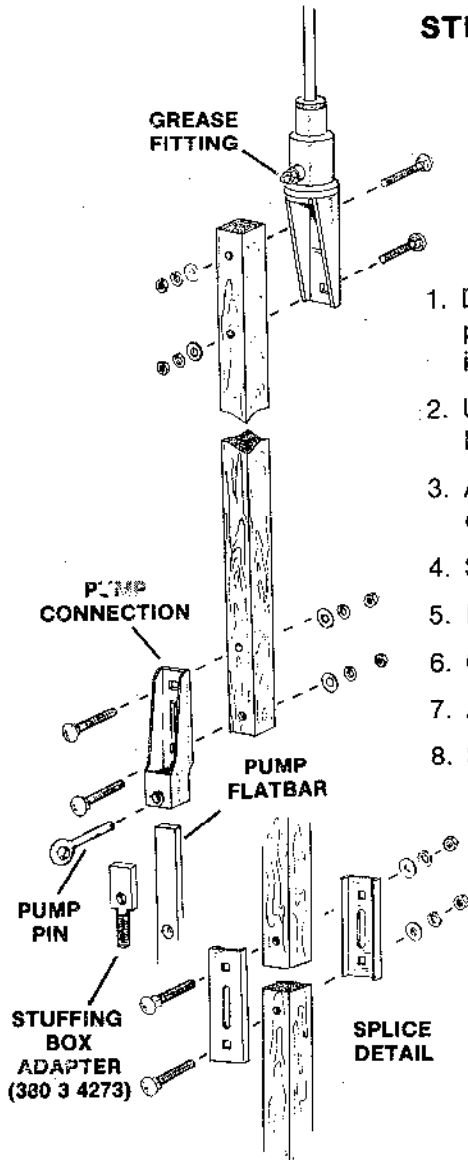
6' MILL = 1 QUART	8' MILL = 2 QUARTS
10' MILL = 3-1/2 QUARTS	

4. Replace hood. Install leather washer on top of hood, then metal washer, then nut. Tighten nut securely.
5. Lubricate swivel fitting with gun grease - Step X-4.



STEP VIII — ATTACH WOOD PUMP POLE

*Wood Pump Pole is furnished with the tower.
Pump Connections are supplied with the engine.*



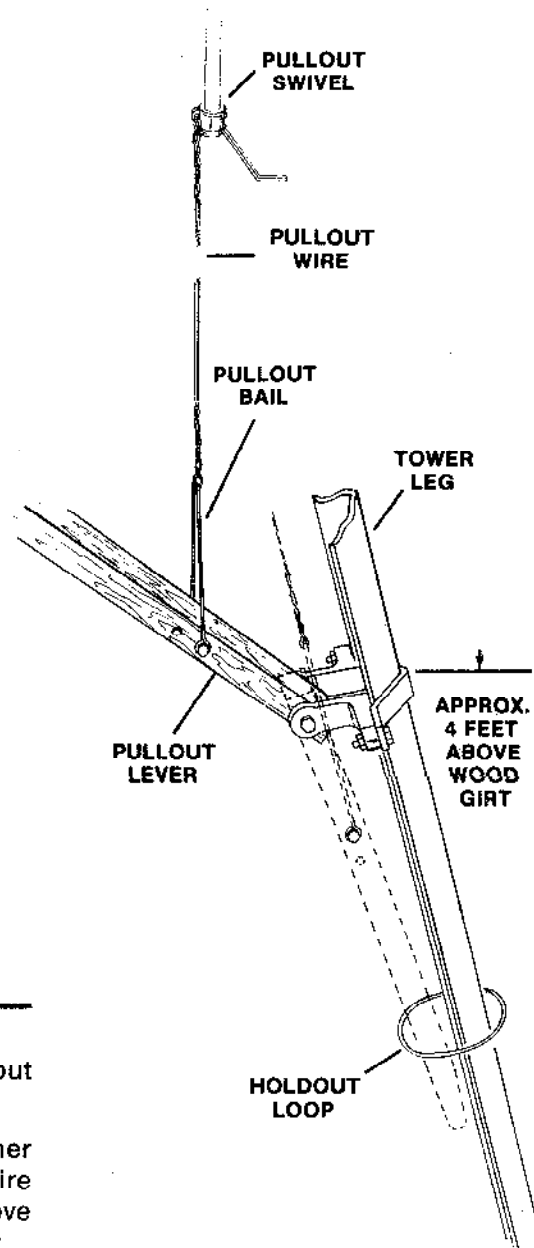
1. Drill the two 3/8" holes in the narrow width of one end of a wood pump pole (1" from the end — 2-3/4" spaced), marked prior to the pump rod installation in Step I.
2. Use the splice iron to mark the rest of the wood pump poles, except the bottom end of the last one, and drill the 3/8" holes.
3. Attach the top pole to the pump rod swivel with the 3/8"NC X 2-1/2" carriage bolts, flat & lock washers and nuts.
4. Splice the remaining lengths of pole, except bottom one.
5. Install the guide rods, as noted in the tower instructions.
6. Complete the well and pump installation so pump is set in place.
7. Attach pump connection to pump flatbar with pump pin.
8. Splice the last wood pump pole into place.
9. Determine the mid-points of the windmill and pump strokes. (The windmill stroke **MUST NOT BE LONGER** than pump stroke).
10. Mark the bolt holes where these points meet and drill 5/16" holes. Cut pole to length and attach with two 5/16" X 2-1/4" carriage bolts and hardware.

STUFFING BOX ADAPTER (380 3 4273): This adapter provides 5/8" rod coupling connection for stuffing box or similar installation. Pole length must be determined by appropriately using instructions 9 & 10.

STEP IX — ATTACH PULLOUT LEVER TO THE TOWER

NOTE: The Pullout Lever is furnished with the Engine.
The Hinge & Clamp are furnished with the Tower.

1. Attach one end of the pullout wire to the lug on the pullout swivel of the engine. Wrap the free end tightly 6—8 turns. Trim excess.
2. Clamp the pullout lever hinge casting (to corner post previously determined), about 4 feet above the wood girt, with 3/8" X 2" capscrews (Tower Fittings).
3. Fasten the pullout lever to the hinge casting with the 3/8" X 3" hinge bolt (with offset hole in the lever **UP**). Hinge bolt is in Tower Fittings.
4. Attach the pullout bail to the hole 7" from the hinge end of the lever. Raise the lever slightly above the horizontal* and secure pullout wire loosely to the bail. Wrap 2-3 turns only. Fold the lever down. There should be slightly added resistance just before the bail goes "over-center". Adjust pullout wire to achieve this. Wrap free end tightly 6-8 turns and trim the excess wire.
5. Use this extra wire to form a holdout loop for the lower end of the lever to prevent accidentally turning the mill on.



***NOTE:** For 6' & 8' Mills with the new cable pullout and extended pullout arm.

It will be necessary to raise the lever higher initially to provide more travel of the pullout wire to operate the extended pullout arm. Do Not move the bail farther out on the lever. Raise the lever.

STEP X - FINAL INSPECTION, LUBRICATION AND ADJUSTMENTS

1. Release the pullout lever to turn the windmill into the wind. Watch to see that all operating components turn or function freely and easily.
2. Fold the pullout lever down to turn windmill out of the wind. Check to see that the wheel is braked to a complete stop and remains still.
3. It will be necessary to complete the entire pumping system - pump, well cylinder, etc. - and operate before checking and regulating, if necessary, the speed of the wheel.
4. Use Texaco Marfax #1 grease, or equivalent, in southern states and #00 Marfax grease, or equivalent, in northern states for lubrication of the grease fittings on the ball race assembly and pump rod swivel.
5. See page 23 for oil type and quantity.

DEMPSTER WINDMILL

ADJUSTING THE SPEED OF THE WINDMILL WHEEL

The speed of the 6' & 8' windmills is regulated by hooking the end of the regulating spring in the various holes provided for this purpose in the vane stem horizontal flange. There are 5 holes.

The speed of the 10' windmill is regulated by adjusting the length of the turnbuckle to add or remove tension of the spring.

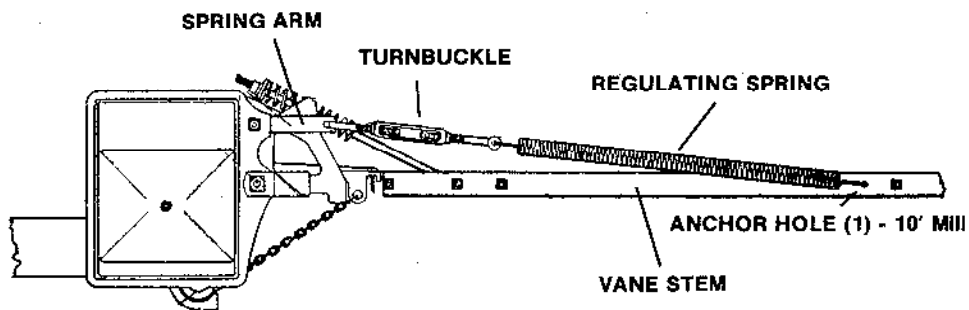
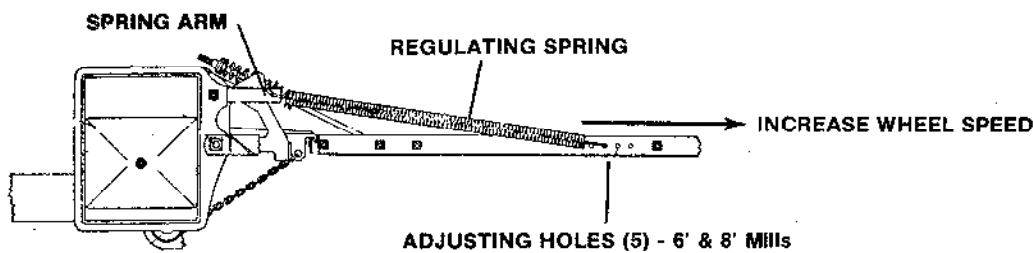
INCREASE tension of spring to **INCREASE** speed of the wheel.

DECREASE tension of spring to **DECREASE** speed of the wheel.

APPROXIMATE MAXIMUM SPEEDS

6' & 8' = 32 Strokes of Pump Rod per Minute

10' = 26 Strokes of Pump Rod per Minute



CAUTION: ALWAYS USE PERSONAL & EQUIPMENT SAFETY PRECAUTIONS WHEN WORKING ON WINDMILLS AND TOWERS.



ANNUAL INSPECTION AND MAINTENANCE PROGRAM

A windmill is a machine, and like any other machine, requires attention as to inspection, lubrication and maintenance. With proper attention, your Dempster Windmill will serve your needs satisfactorily and efficiently for many years.

INSPECTION

Thoroughly inspect the tower, brace wires, girts, ladder, pullout components and all parts of the engine for damaged or broken parts. Replace any worn/damaged items.

OIL AND GREASE RECOMMENDATIONS**WINDMILL OIL**

Dempster Industries recommends the use of Dempster Windmill Oil (available from any Dempster facility), Texaco Capella WF-68 (formerly Capella "B"), or equivalent. This windmill oil is a lightweight, wax-free lubricant, which will tolerate the limited quantity of moisture that collects inside the hood due to temperature and humidity variations.

GREASE FITTING LUBRICANT

Use Texaco Marfax #1 grease, or equivalent, in southern states and #00 Marfax grease, or equivalent, in northern states for ball race assembly and pump rod swivel fittings.

ANNUAL LUBRICATION & MAINTENANCE - Best performed just before cold weather.

1. Remove the hood carefully. Check packing around the flange.
2. Drain oil from the reservoir. Clean interior and visually inspect the working parts.
3. Check the bolts on the pipe stem clamp, split spider hub, wheel, vane stem, wood pump pole, splices and all connections.
4. Pour oil on guide rods, in crosshead and fill reservoir with quantity indicated below.

6 Foot Mill = 1 QUART 8 Foot Mill = 2 QUARTS

10 Foot Mill = 3 QUARTS

DO NOT OVERFILL

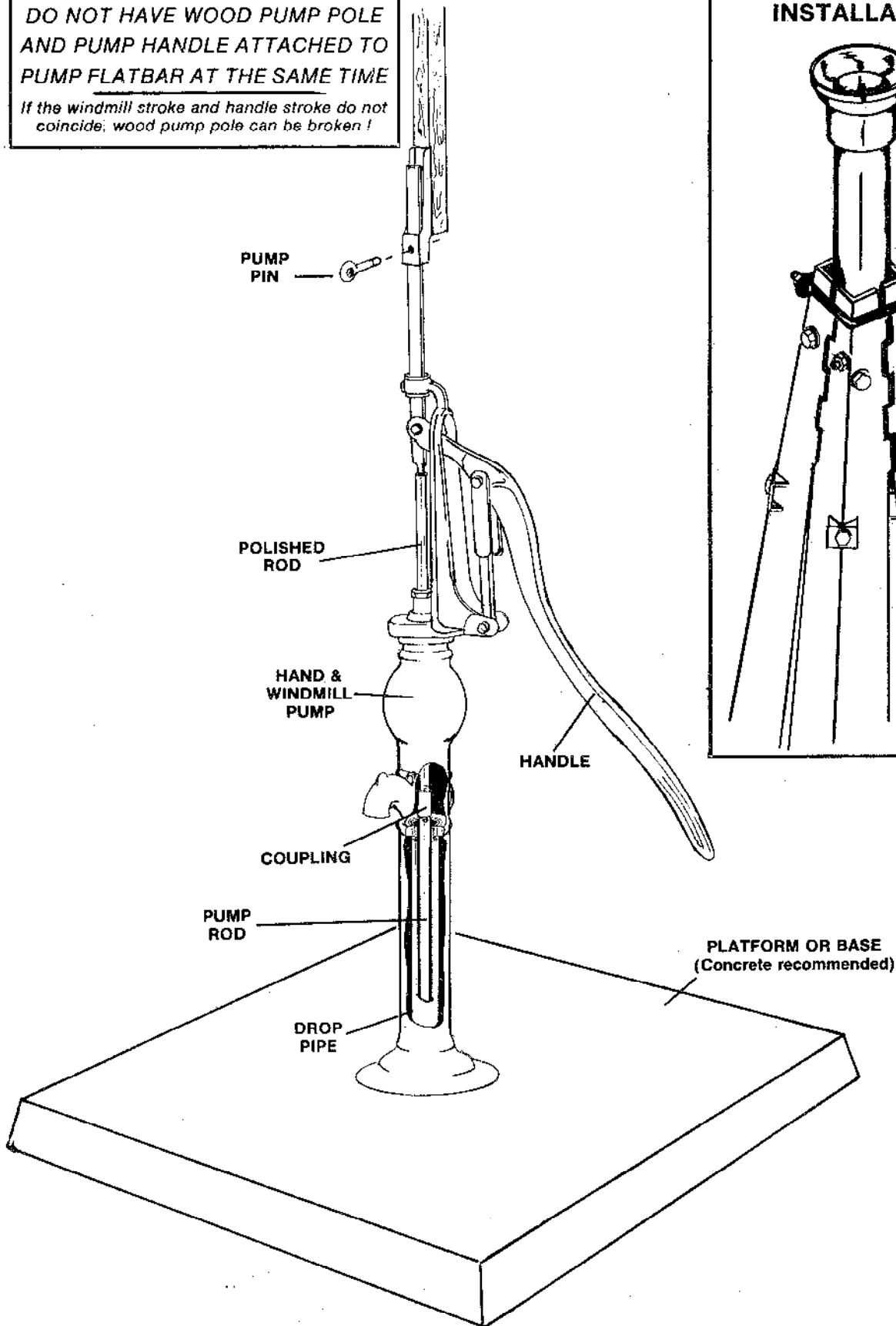
5. Replace hood and tighten hardware securely.
6. Apply oil in the pullout swivel.
7. Apply oil to the two pullout chain sheaves.
8. Apply oil to the vane hinge pin and brake linkage pivot pin.
9. Lubricate the pump rod swivel and ball race assembly.
10. Check brake operation and tighten linkage, if necessary.
11. Check pullout operation and shorten pullout wire slightly, if necessary.
12. Check the operating speed of wheel and adjust, if necessary.

DEMPSTER WINDMILL

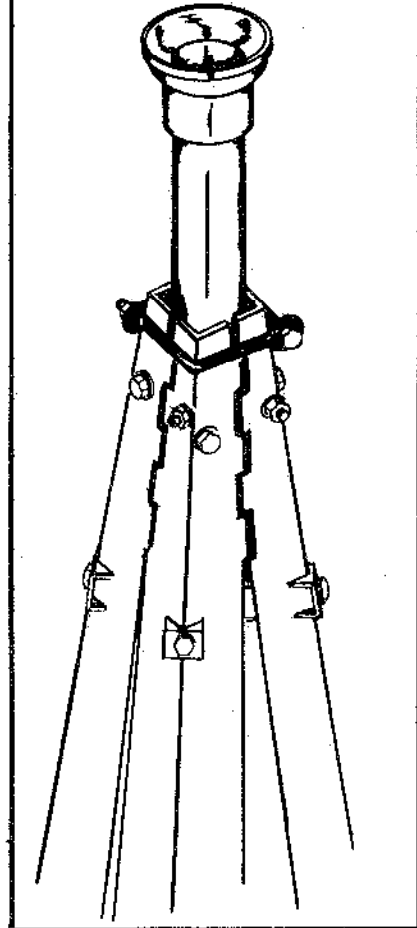
HAND & WINDMILL PUMP INSTALLATION

DO NOT HAVE WOOD PUMP POLE AND PUMP HANDLE ATTACHED TO PUMP FLATBAR AT THE SAME TIME

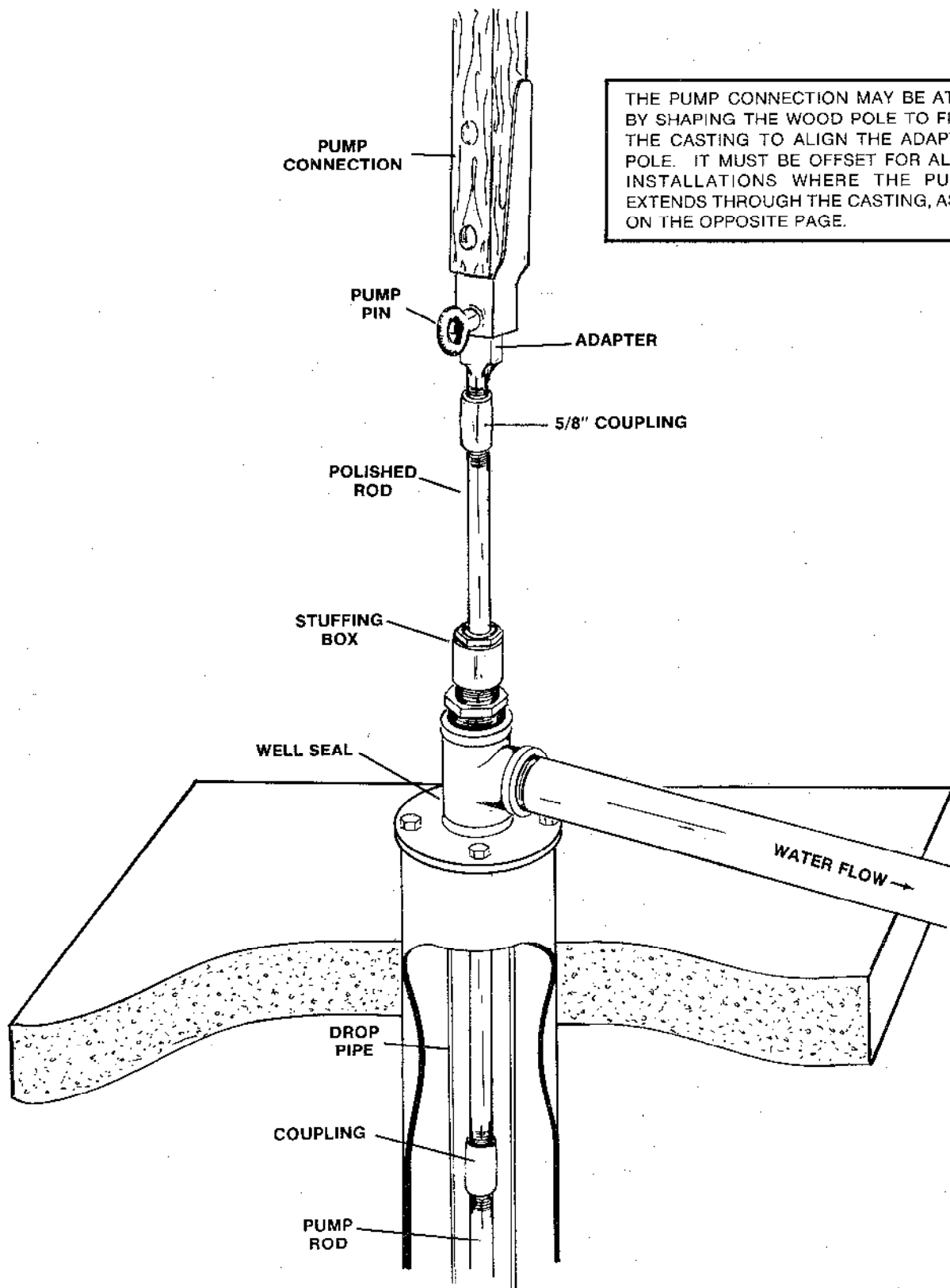
If the windmill stroke and handle stroke do not coincide, wood pump pole can be broken!



AERMOTOR TOWER CONVERSION MAST INSTALLATION



TYPICAL
STUFFING BOX INSTALLATION



THE PUMP CONNECTION MAY BE ATTACHED BY SHAPING THE WOOD POLE TO FIT INSIDE THE CASTING TO ALIGN THE ADAPTER AND POLE. IT MUST BE OFFSET FOR ALL OTHER INSTALLATIONS WHERE THE PUMP BAR EXTENDS THROUGH THE CASTING, AS SHOWN ON THE OPPOSITE PAGE.

DEMPSTER WINDMILL

PROPER INSTALLATION OF WINDMILL PUMPING SYSTEMS

Many times a windmill or pump has been faulted because it was not properly installed. The use of a pipe too small to carry the water at a nominal speed will add a load to the mill equal to many feet of elevation, virtually making a deep well out of a shallow one.

The same is true in pumping into a pressure tank. A pressure of 43 pounds in the tank is equal to an additional 100 feet added to the depth of the well.

When the regulating spring is set for maximum tension, Dempster 6' & 8' Windmills will make about

32 strokes per minute when running at full speed; the 10' will run at 26 strokes per minute; the 12' @ 21 strokes per minute & the 14' @ 18 strokes. The smaller mills will reach this speed in a wind velocity of from 15 to 18 miles per hour and the larger ones in winds from 18 to 20 miles per hour, when loaded according to the table of pumping capacities.

Tension of the regulating spring can be adjusted to increase or decrease the number of strokes per minute your particular windmill installation will require or that the well and delivery dictates.

DO NOT USE TOO LARGE A CYLINDER. REMEMBER! A WINDMILL WITH A SMALL CYLINDER RUNNING, PUMPS MORE WATER THAN ONE WITH A LARGER CYLINDER STANDING STILL.

WINDMILL FACTS

The windmill is specifically designed to pump water and **IS NOT** intended to generate electricity. Note the relatively low brake horse power output of the various wheel sizes through the back-gearred reciprocating conversion necessary to operate the well cylinders and lift water from the ground.

Generating electricity is an entirely different operation, with basically the only common denominator being the use of wind power to perform the function. The water delivered by the windmill is very easily stored for future use. By contrast, the difficulty in the storage of electrical

energy produced that is not immediately used, is the primary and most costly difference between the two technologies. The electrical generating system is much more dependent on a comparatively constant wind velocity, the output speeds must be much greater and more consistent and a relatively greater available horsepower must be achieved to create a practical cost-efficient system.

No practical mechanical conversion has been put forward to convert the water pumping windmill to the generation of electrical energy.

COMPARATIVE POWER OF BACK-GEARED WINDMILL WHEELS

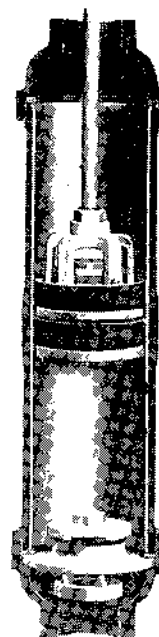
WHEEL SIZE	6 Foot	8 Foot	10 Foot
HORSEPOWER	.191	.34	.53

If the wind velocity is increased or decreased, the power of the windmill will increase or decrease in the ratio of the square of the wind velocity.

MOST COMMONLY USED WELL CYLINDERS

MODEL 81

Peerless Iron, Brass
Lined - Brass Plunger
and Check Valve



SHALLOW TO INTERMEDIATE WELLS

The Dempster Brass-lined cast iron-bodied Model 81 is produced in 2" and 3" diameters and 12" & 16" lengths. It is used with 1-1/4" pipe and 7/16" pump rod. There are 2 cup leathers on the plunger and a weighted check valve in the intake end of the cylinder.

Cylinder service in a well with the Model 81 installed will require pulling the pipe and cylinder from the well to replace any of the leathers or to clear the check valve.

**Model 1610
ALL-BRASS DEEP WELL CYLINDERS**



DEEP WELLS

The Figure 1610 All-Brass deep well cylinders are produced in 1-7/8", 2-1/4" & 2-3/4" diameters and 24" length. They have 3 cup leathers with spool valves (ball valves available on the 1-7/8" size). The well pipe is always larger than the I.D. of the well cylinder, for purpose in following paragraph.

Cylinder service in a well with the Figure 1610 installed will require pulling only the well rod, plunger and check assemblies up through the well pipe for service of the working parts.



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