



Since 1988

“Free Air Windmill” Installation Manual G4 Model (K FAG4)

Saving the planet's water nature's way



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Up to 36 month Limited Warranty on Select Products

Warranty covers all Koenders Water Solutions windmill aeration products* for a period of 12 months and Koenders Water Solutions electric aeration products for a period of 12 months from Date of Purchase, against defects in workmanship or material. The conditions of the Warranty and the extent of the responsibilities of Koenders Water Solutions Inc. under this Warranty are as follows: SEE EXTENDED WARRANTY OPTIONS BELOW FOR UP TO 36 months warranty on select products.

- 1) Koenders Water Solutions Inc. will repair or replace, any part or material deemed to be defective by Koenders Water Solutions Inc., due to quality and/or workmanship, within an 12 month period from the initial purchase date for our windmill aeration systems and 12 month period from the initial purchase date for our electric aeration systems;
- 2) Product returned for Warranty repair must be returned to the address specified by the Manufacturer, and any warranty product sent to the customer will be sent freight prepaid;
- 3) Warranty does not apply to product which has been subject to abuse, neglect, accident or incorrect installation;
- 4) Warranty does not apply to damage resulting from severe weather factors;
* Private Insurance coverage is recommended *
- 5) When a Pressure Release Valve has not been used, warranty coverage may not apply to damages incurred to an Aeration system as a result of blocked line. The use of a Freeze Control Unit is HIGHLY RECOMMENDED in geographical areas where freeze up may be a concern.
- 6) If parts other than genuine Koenders parts are utilized for repair or attached to a Koenders Aeration system, warranty coverage may be void at Koenders option.
- 7) Proof of Date of Purchase is required for warranty service. Since the customer is responsible for assembly, set up and installation, please follow our product installation instructions carefully, to ensure the validity of warranty claims;
- 8) Warranty does not cover supplemental loss or damages arising from failure of the windmill or electric aerator to function properly. Customer must check system regularly to ensure the unit is functioning according to their requirements. Koenders Water Solutions Inc. and its retailers, distributors, dealers and any other partners do not cover loss of fish, wildlife or any other consequential damages as a result of product failure or use.
- 9) If you have any warranty concerns or would like to purchase extended warranty on your products, please contact Koenders Water Solutions Inc. at 877-888-7707 or (306) 721-1495 or visit www.koenderswatersolutions.com

Safety Precautions

- 1) Do Not attempt any service or repairs to the windmill compressor with the blades turning or in any high wind situations;
- Do Not attempt any service or repairs to the electric aerators or open any of our compressor housings while in operation or while the electric cord is plugged in – **UNPLUG BEFORE SERVICE**
- 2) Koenders Water Solutions recommends that all maintenance work on the windmill compressor and blades are done on the ground and not while the windmill head is up on the tower – optional Pivot pair tower hinges are recommended and available to allow easy tilt up – tilt down operation.
- 2) Ensure the blade assembly is secured (even in low winds) when tilting windmill up and down; or when servicing/repairing of the compressor is required. (A gust of wind can suddenly cause the windmill head to turn at any time and cause a potentially dangerous situation for the person trying to do the repairs);
- 3) Do Not allow children to climb, play on or be near the windmill or electric aerators;
- 4) Avoid being near the windmill during thunderstorms.
- 5) Use personal protective gloves and equipment when assembling windmill.
- 6) Koenders Water Solutions Inc. is not responsible in any way for any harm that may be caused during assembly or operation of the windmill or electric aeration systems.

Return Materials Authorization

- A return materials authorization (RMA) number must be obtained prior to returning any product for a warranty concern.
- You can call the KWS warranty department at the following numbers:
 - Toll Free – 1-877-888-7707 or Canada – (306) 721-1495
- Failure to obtain a RMA may result in the product being returned to the customer freight collect.

***Koenders Electric Aeration Systems – LD 1.5, HD 250, HD 450 - come with a 12 month warranty – all other conditions above apply.**

EXTENDED WARRANTY AVAILABLE FOR PURCHASE FROM MANUFACTURER

Koenders Water Solutions Inc – Windmill Aeration Extended Warranty from 12 months to 36 months is available for purchase direct through the manufacturer. Extended warranties must be purchased within 60 days of original product purchase. For purchase and pricing call 1-877-888-7707 or visit www.koenderswatersolutions.com

Single Diaphragm Windmill Aeration Systems – With the purchase of the extended warranty all the above warranty applies for an additional 24 months. With this purchase a Maintenance Repair Kit is included which retails for \$ 69.95 - \$ 79.95 U.S. (these kits replace the component in the compressor that pushes the oxygen into the airline – one of the few parts on the windmill that needs maintenance approximately every 3-5 years – easy maintenance)

Dual Diaphragm Windmill Aeration Systems – With the purchase of the extended warranty all the above warranty applies for an additional 24 months.. With this purchase 2 X Maintenance Repair Kit is included which retails for \$ 69.95 - \$ 79.95 U.S. (these kits replace the component in the compressor that pushes the oxygen into the airline – one of the few parts on the windmill that needs maintenance approximately every 3-5 years – easy maintenance)

Koenders Water Solutions - Electric Aeration Extended Warranty from 12 months to 24 months is available for purchase direct through the manufacturer. Extended warranties must be purchased within 60 days of original product purchase. For purchase and extended warranty pricing call 1-877-888-7707 or visit www.koenderswatersolutions.com

TABLE OF CONTENTS

| Title | | Page |
|--|-------------|-------|
| THE KOENDERS WARRANTY | | 2 |
| THEORY OF OPERATION | | 5 |
| FACTS RE: INSTALLING KOENDERS FREE- AIR WINDMILL | | 5 |
| AIRSTONE AND PIVOT POINTS | | 6 |
| FREEZE CONTROL UNIT | | 7 |
| CONTENTS OF THE FREE-AIR WINDMILL BOXES | | 8-12 |
| TOWER ILLUSTRATIONS | | 13-14 |
| KOENDERS WINDMILL TOWER ASSEMBLY | STEPS 1-8A | 15-18 |
| SPIDERS AND BLADE ASSEMBLY | STEPS 9-12 | 19-20 |
| TAIL AND PIVOT TUBE INSTALLATION | STEPS 13-14 | 23-24 |
| FINAL "ON SITE" ERECTION | STEPS 15 | 25-27 |
| FREQUENTLY ASKED QUESTIONS/TROUBLE SHOOTING | | 28-29 |

Theory of Operation

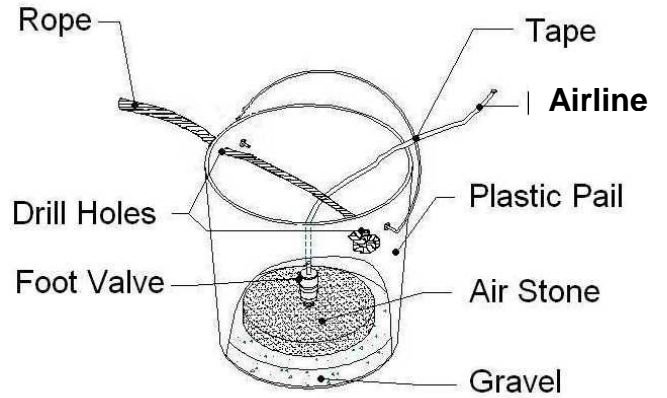
Microscopic bacteria in the water, known as aerobic (oxygen using) bacteria decomposes dead plant material. In doing so, they burn up the supply of oxygen in the water. In essence, they begin choking the water quality out of the pond. When the oxygen is depleted, anaerobic (non-oxygen using) bacteria further decomposes the plant material. This process releases hydrogen sulphide gas as a by-product, which turns the water black and smelly. By using a Koenders Windmills aeration system to add oxygen to the water, you encourage the aerobic decomposition stage to continue and help prevent the anaerobic stage from starting. In the process, your water is maintained in a natural, healthy state - oxygen is a natural cleanser and a key ingredient for quality water.

Facts For Installing Koenders Free Air Windmill

- Be sure to read through this entire Manual before beginning assembly.
- Good wind exposure is critical to successful pond aeration so mount your tower where the wind exposure from all directions is good.
- Anchoring of the windmill tower is very important. Koenders Windmills (KWI) supplies a BASIC anchoring kit with each unit, however, in certain circumstances, such as light soil conditions and high to extreme wind areas, it may be necessary to utilize other anchoring. Concrete pilings, concrete pad or screw-in anchors are some examples. The customer is responsible to anchor the Windmill adequately or consult the appropriate people to do so.
- Koenders Windmills (KWI) suggests that a FREEZE CONTROL UNIT be installed on all windmills that will be operating in cold weather climates. When a windmill is installed where high humidity and freezing conditions occur at the same time, the airline running from the windmill to the water source can become subject to freeze up due to condensation. For more information on the Freeze Control Unit refer to the optional equipment section of this manual (Page 5).
- Please Note! The airline from the pivot tube to the base of the tower MUST be KWI 3/8" I.D. This is necessary because of the way the pivot tube fitting rotates inside of the airline. The correct airline is available through Koenders Windmills This airline is made with a composition of materials that allows the rotation to occur freely, without creating a twisting of the airline or allowing air loss to occur. Do not use hose clamps at this location; this will also cause the airline to twist.
- A Foot Valve [FTV] is supplied with each unit to prevent water from backing up the airline and possibly freezing up. The Foot Valve [FTV] can be used alone or with the Airstone. For more information on the Airstone see page 4 of this manual.
- Included in the Blade & Tail box are two (2) "Danger Thin Ice" decals [DTID]. The Manufacturer **HIGHLY RECOMMENDS** they be placed on both sides of the Tail Fin [TFN] if your windmill is in a geographical area where your pond may be subject to winter freeze-up.
- When adding a 4' extension (increasing tower height from a 12' to a 16', a 16' to a 20', OR A 20' -24'), be sure to loosen the bolts on the bottom 4' section already assembled to ensure all components of the new section align correctly. Go back and tighten all Bolts as outlined in this Installation Manual once extension is completed.
- It is recommended that all original packaging be kept safe for any product returns.
- Koenders Windmills aeration systems may vary depending on Dealer

ABOUT THE AIRSTONE

Using an **Airstone Diffuser** is an excellent way to increase aeration efficiency by as much as 800%. We recommend that the Airstone be installed in a plastic pail (see Optional Equipment) to prevent it from stirring up the mud. We also recommend that you run a nylon rope through two sides of the pail, not the handle (if it is metal it will rust off), so that you can retrieve it at any time. Depending on mineral contents in the water, you may have to clean the Airstone periodically, with Muratic acid (**follow supplier's precautions on use of product**) or by letting it dry out completely and then brush or blow it off.

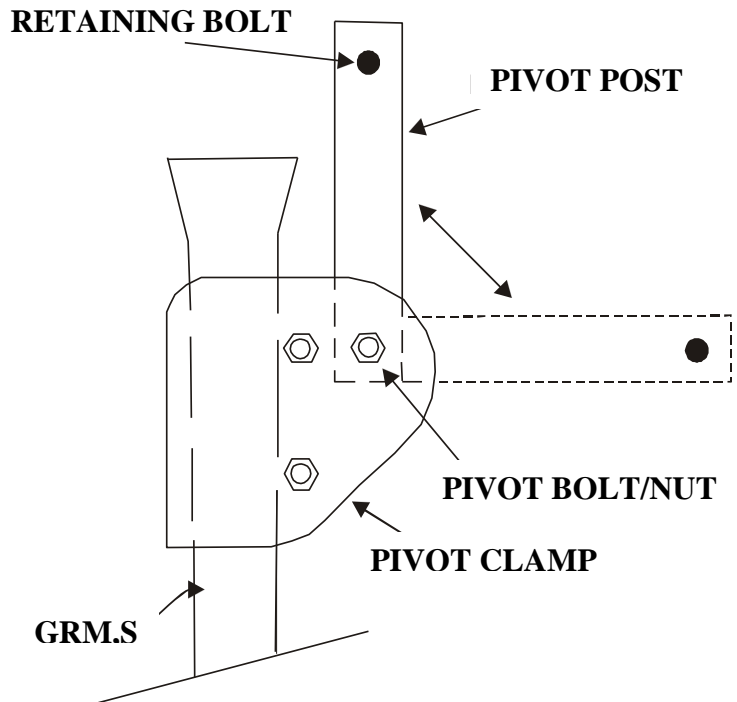


Optional Koenders Windmills equipment includes:

Koenders Freeze Control Unit
Koenders Airstone Housing Bucket c/w 50' Cord
Airstone Marker Duck Decoy
2 models of Air Driven Water Pumps
Weighted Airline
Pivot Points

Contact Your Dealer for More Information

For additional ease of installation, optional **PIVOT POINTS** can be used to erect the Windmill with limited manpower.

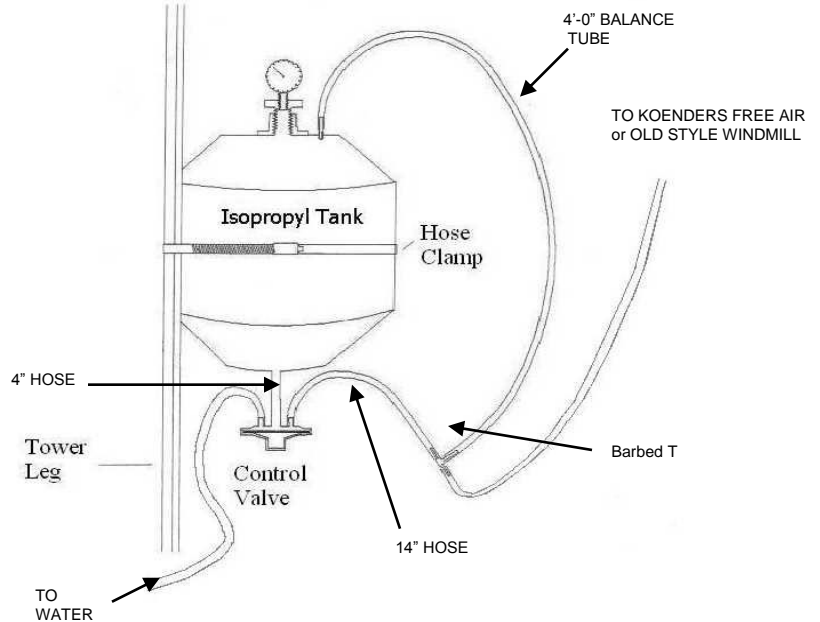


How the Freeze Control Unit Works

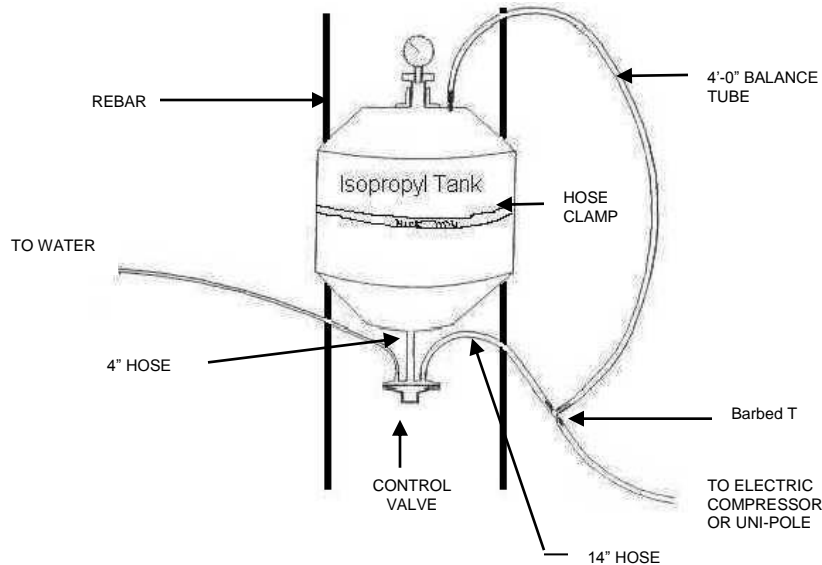
Fill the Isopropyl Tank 1/3 to 2/3 full with 95% - 99% Isopropyl Alcohol (available at most Veterinarian supply stores or through online shopping) (Follow supplier's precautions on use of product)

The *Koenders Aeration system* pumps air into your water source continuously through the airline, oxygenating your water. If an obstruction occurs in your airline due to condensation droplets freezing in the airline, your freeze control system will start to work. When pressure in the airline builds up to approx 17.5 psi, the valve at the bottom of the Freeze Control tank will open and release a small amount of Isopropyl alcohol into the airline, allowing the airline to clear. Once the airline clears the pressure is released allowing the valve to close.

We recommend the Freeze Control Unit be strapped to the tower leg 4'-0" off the ground so you can monitor the gauge and fill the isopropyl tank. It is also recommended to weigh the airline down or use optional weighted airline under water so condensation flows to the airstone and is released.



For the Electric Aerator and the Uni-Pole, the Freeze Control Unit should be strapped to 2 pieces of re-bar, 4' off the ground.



We recommend the Freeze Control Unit be as close to the Electric Aerator or the Uni-Pole as possible.

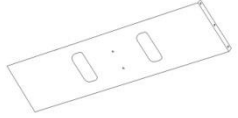
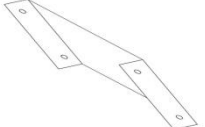
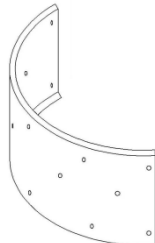



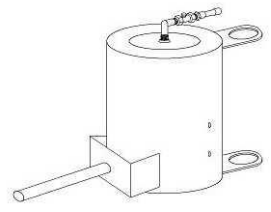
The 4" piece of Airline is to be fitted between the Pressure Release Valve and the Isopropyl Tank.






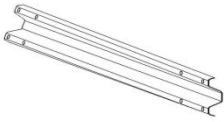

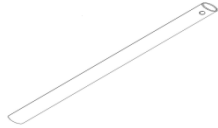
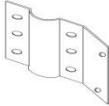
The 14" piece of Airline is to be fitted between the Pressure Release Valve and the barbed T.




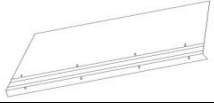


The 4'-0" piece of Airline (the Balance Tube) is to be fitted from the top of the Isopropyl Tank and the barbed T.


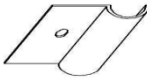

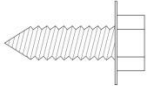


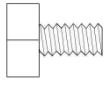
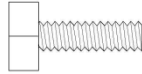
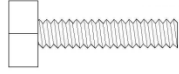
Contents of Koenders Free Air Windmill Boxes

NOTE: Make sure all components and accessories are accounted for before beginning assembly.

| Item Code | Description | Packaged In | Total Quantity In Complete | | | | Comments/Diagram (Diagrams are not to scale) |
|-----------|------------------------|------------------|----------------------------|-----------|-----------|-----------|---|
| | | | 12' Tower | 16' Tower | 20' Tower | 24' Tower | |
| BLD | Blade | Blade & Tail Box | 12 | 12 | 12 | 12 |  |
| BBR | Blade Brace | Blade & Tail Box | 12 | 12 | 12 | 12 |  |
| BSR | Blade Support Rings | Blade & Tail Box | 3 | 3 | 3 | 3 |  |
| DOM | Dome | Blade & Tail Box | 1 | 1 | 1 | 1 |  |
| DTID | Danger Thin Ice Decals | Blade & Tail Box | 2 | 2 | 2 | 2 |  |
| EHB | Elongated Hose Bracket | Blade & Tail Box | 1 | 1 | 1 | 1 |  |
| FAC | Free Air Compressor | Compressor Box | 1 | 1 | 1 | 1 |  |

| Item Code | Description | Packaged In | Total Quantity In Complete | | | | Comments/Diagram (Diagrams are not to scale) |
|-----------|-----------------------------------|-------------------------------------|----------------------------|-----------|-----------|-----------|---|
| | | | 12' Tower | 16' Tower | 20' Tower | 24' Tower | |
| FTV | Foot Valve | Compressor Box | 1 | 1 | 1 | 1 |  |
| GRMS | Ground Rod Mounting Stakes | 8' Tower Box | 3 | 3 | 3 | 3 |  |
| HBB | 3/8" x 3/8" x 90° Brass Hose Barb | Compressor Box | 1 | 1 | 1 | 1 |  |
| LT1 | Leg Top Section – 13 holes | 8' Tower Box | 3 | 3 | 3 | 3 |  |
| LE2 | Leg Extension – 8 holes | 8', 12', 16', 20' & 24' Tower Boxes | 6 | 9 | 12 | 15 |  |
| M23 | 22 3/4" Cross Member | 8' & 20' Tower Boxes | 3 | 3 | 6 | 6 |  |
| M32 | 32" Cross Member | 12' Tower Box | 6 | 6 | 6 | 6 | |
| M41 | 41" Cross Member | 8', 16', 20' & 24' Tower Boxes | 3 | 9 | 15 | 33 | |
| PTW | Pivot Tube Washer | Compressor Box | 1 | 1 | 1 | 1 |  |
| PVT | Pivot Tube | Blade & Tail Box | 1 | 1 | 1 | 1 |  |
| SCBR | Stake Clamp Bracket - Right | Blade & Tail Box | 3 | 3 | 3 | 3 |  |

| Item Code | Description | Packaged In | Total Quantity In Complete | | | | Comments/Diagram (Diagrams are not to scale) |
|----------------------|---|--------------------------------|----------------------------|-----------|-----------|-----------|---|
| | | | 12' Tower | 16' Tower | 20' Tower | 24' Tower | |
| SCBL | Stake Clamp Bracket - Left | Blade & Tail Box | 3 | 3 | 3 | 3 |  |
| SPI | Spider Bracket | Blade & Tail Box | 3 | 3 | 3 | 3 |  |
| TAM | Tail Arm – has one bent end | 8' Tower Box | 2 | 2 | 2 | 2 |  |
| TFN | Tail Fin Half (Top half has Koenders Sticker, Bottom Half has no sticker) | Blade & Tail Box | 2 | 2 | 2 | 2 |  |
| TWT | Tower Top | Compressor Box | 1 | 1 | 1 | 1 |  |
| X15 | 15 7/8" Cross Brace | 20' Tower Box | 0 | 0 | 6 | 6 |  |
| X19 | 19" Cross Brace | 8' & 24' Tower Boxes | 6 | 6 | 6 | 15 | |
| X27 | 27 1/16" Cross Brace | 12' Tower Box | 6 | 6 | 6 | 6 | |
| X29 | 29 1/2" Cross Brace | 8' & 24' Tower Boxes | 3 | 3 | 3 | 6 | |
| X33 | 33 3/4" Cross Brace | 8', 12', 20' & 24' Tower Boxes | 6 | 6 | 9 | 18 | |
| X35 | 35 1/4" Cross Brace | 16' Tower Box | 0 | 6 | 6 | 6 | |
| X38 | 38.5" Cross Brace | 12', 20' & 24' Tower Boxes | 3 | 3 | 6 | 9 | |
| X41 | 41" Cross Brace | 16' Tower Box | 0 | 3 | 3 | 3 | |
| X43 | 43 1/4" Cross Brace | 20' Tower Box | 0 | 0 | 6 | 6 | |
| X45 | 45 1/4" Cross Brace | 16' Tower Box | 0 | 3 | 3 | 3 | |
| Bolt Packages | | | | | | | |
| BTBP | Package #1 (Blade & Tail Bolts) | Blade & Tail Box | 1 | 1 | 1 | 1 | |
| EBP | Package #2 (12' or 16' Extension Bolts) | 12' & 16' Tower Boxes | 1 | 2 | 2 | 2 | |
| 20'EBP | Package #3 (20' Extension Bolts) | 20' Tower Box | 0 | 0 | 1 | 1 | |
| TBP | Package #4 (8' Tower Bolts) | Blade & Tail Box | 1 | 1 | 1 | 1 | |
| 24' EBP | Package #5 (24' Extension Bolts) | 24' Tower Box | 0 | 0 | 0 | 1 | |

| Item Code | Description | Packaged In | Total Quantity In Complete | | | | Comments/Diagram (Diagrams are not to scale) |
|------------------------------|---|---|----------------------------|-----------|-----------|-----------|---|
| | | | 12' Tower | 16' Tower | 20' Tower | 24' Tower | |
| Bolt Package Contents | | | | | | | |
| ABK | Angle Bracket - Used to tighten cross braces | Bolt Packages: [TBP (3), EBP (3), 20'EBP (3), 24' EBP (31)] | 6 | 9 | 12 | 15 |  |
| HBK | Hose Bracket - Used to fasten airline to tower | Bolt Packages: [TBP (3) 24' EBP (1)] | 3 | 3 | 3 | 4 |  |
| DCL | Dome Clips - Used to install dome | Bolt Packages: [BTBP (3)] | 3 | 3 | 3 | 3 |  |
| | 5/16" X 1" Hex head Tapping Screw - For Tower Top Installation (24) | Bolt Packages: [TBP (24)] | 24 | 24 | 24 | 24 |  |
| | 5/16" X 1/2" Grade 5 Bolts - To connect Cross Braces (18), attach eye bolts to cross braces (12), and attach tail arms to compressor (4) | Bolt Packages: [BTBP (4), TBP (6), EBP (6), 20'EBP (12), 24' EBP (18)] | 16 | 22 | 34 | 52 |  |
| | 5/16" Grade 2 Nuts - One Per 5/16" bolt above (34) | Bolt Packages: [BTBP (4), TBP (6), EBP (6), 20'EBP (12), 24'EBP (18)] | 16 | 22 | 34 | 52 |  |
| | 1/4" X 1/2" Grade 5 Bolts - To install elongated hose bracket (1), join cross members (48), install blade braces (24), assemble and install Tail Fin (8), install Hose Clips (3) | Bolt Packages: [BTBP (34), TBP (2), EBP (12), 20'EBP (24)EBP (1)] | 48 | 60 | 84 | 85 |  |
| | 1/4" X 3/4" Grade 5 Bolts - For Section Overlaps (60), stake clamp assembly (18), install blades (36) | Bolt Packages: [BTBP (36), TBP (42), EBP (12), 20'EBP (12), 24' EBP (36)] | 90 | 102 | 114 | 150 |  |
| | 1/4" X 1" Grade 5 Bolts - To tighten Spiders around crankshaft (9) | Bolt Packages: [BTBP (9)] | 9 | 9 | 9 | 9 |  |




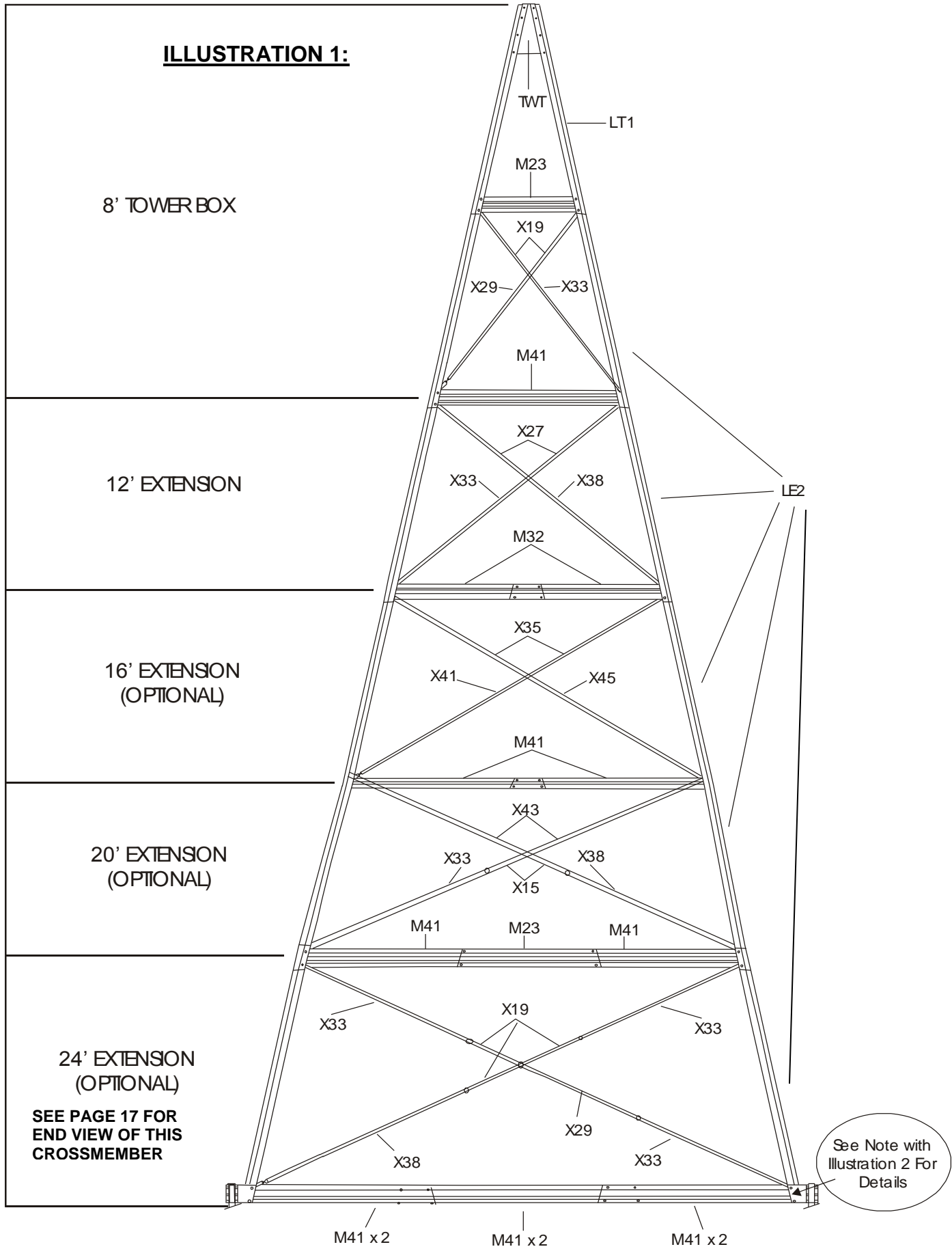
| Item Code | Description | Packaged In | Total Quantity In Complete | | | | Comments/Diagram (Diagrams are not to scale) |
|--|--|---|----------------------------|-----------|-----------|-----------|---|
| | | | 12' Tower | 16' Tower | 20' Tower | 24' Tower | |
| | Eye Bolt - Used to tighten cross braces (12) | Bolt Packages: [TBP (3), EBP (3), 20'EBP (3), 24' EBP (3)] | 6 | 9 | 12 | 15 |  |
| | 1/4" Grade 2 Nuts - Per 1/4" bolt above (219), second nut on each eye bolt (12), dome clips (3) | Bolt Packages: [BTBP (82), TBP (50), EBP (30), 20'EBP (42), 24' EBP (43)] | 162 | 192 | 234 | 277 |  |
| | 1/4" SAE Washers (gold) - For Ground stake clamps (36), blades (36) and dome clips (3) | Bolt Packages: [BTBP (39), TBP (36)] | 75 | 75 | 75 | 75 |  |
| | 1/4" Hardened washers (Silver) - To tighten Spiders around crankshaft (18) | Bolt Packages: [BTBP (18)] | 18 | 18 | 18 | 18 | |
| Standard Accessories (may vary by dealer) | | | | | | | |
| ARL | 100' of 3/8" ID Airline | Master Carton or Accessory Pack | 1 | 1 | 1 | 1 | |
| PRV | Pressure Release Valve | Master Carton or Accessory Pack | 1 | 1 | 1 | 1 | |
| | Airstone | Master Carton or Accessory Pack | 1 | 1 | 1 | 1 | |

ILLUSTRATION 1:



8' TOWER BOX

12' EXTENSION

16' EXTENSION
(OPTIONAL)

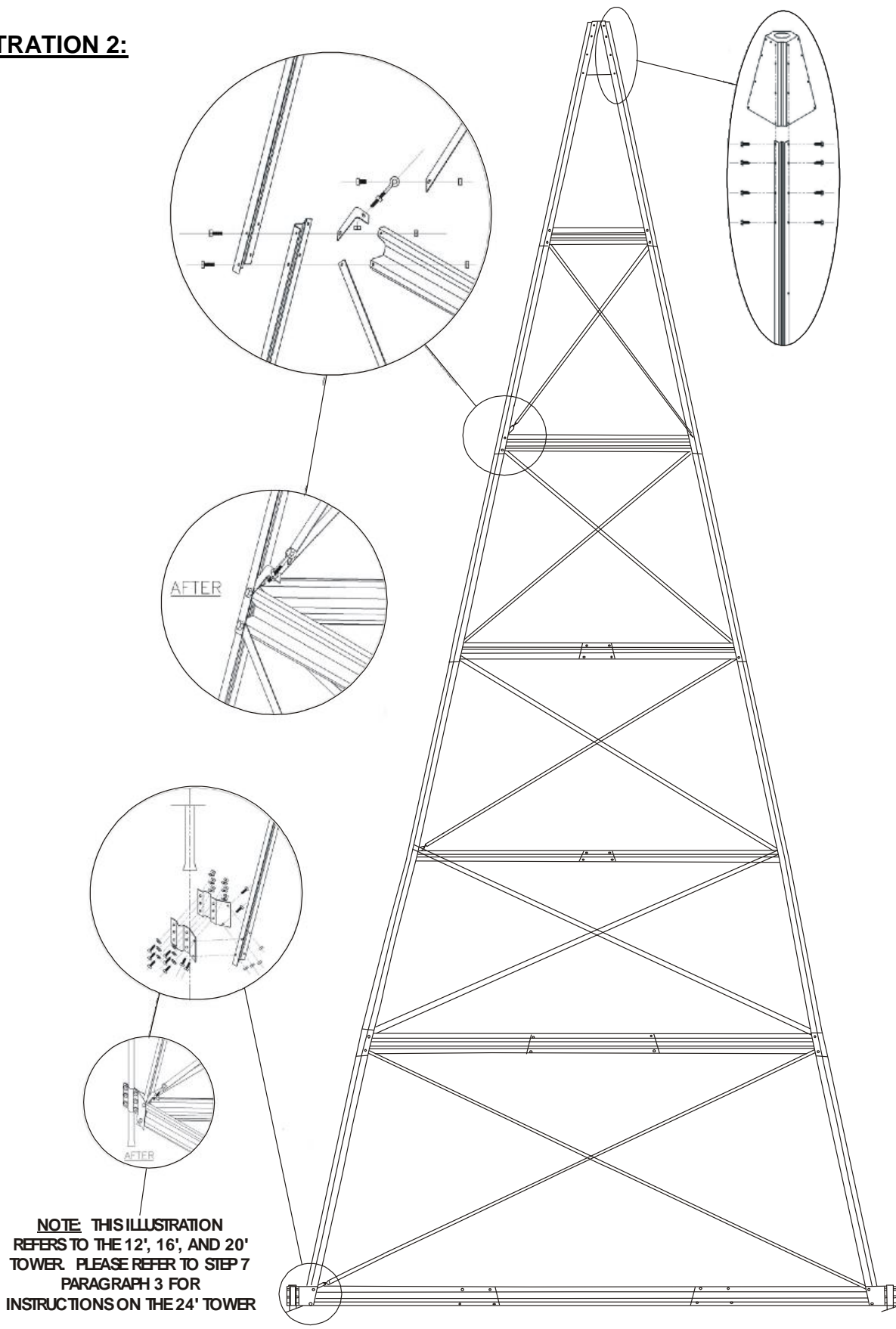
20' EXTENSION
(OPTIONAL)

24' EXTENSION
(OPTIONAL)

SEE PAGE 17 FOR
END VIEW OF THIS
CROSSMEMBER

See Note with
Illustration 2 For
Details

ILLUSTRATION 2:



TOWER ASSEMBLY

IMPORTANT NOTE:

WHEN ASSEMBLING THE TOWER, THERE WILL BE INSTANCES WHICH REQUIRE THE USE OF THE TAPERED PUNCHES TO ALIGN THE HOLES.

THIS IS A DESIGN FEATURE WHICH INCREASES THE OVERALL STRENGTH OF THE TOWER.

THROUGHOUT THE TOWER ASSEMBLY DO NOT COMPLETELY TIGHTEN ANY SCREWS, NUTS OR BOLTS UNTIL TOWER IS COMPLETED UNLESS SPECIFICALLY DIRECTED OTHERWISE.

READ THROUGH ENTIRE MANUAL BEFORE BEGINNING INSTALLATION

TOOLS REQUIRED:

- TWO 7/16" WRENCHES
- NEEDLE NOSE VICE GRIP OR SMALL VICE GRIP
- TWO 1/2" WRENCHES
- GREASE GUN WITH MULTIPURPOSE GREASE
- TWO 1/8" TAPERED ALIGNING PUNCHES
- 1/4" AND/OR 3/8" SOCKET DRIVES

STEP 1 – CROSS BRACE PREASSEMBLY:

1. IN ORDER TO SIMPLIFY THE LATER STEPS OF THE TOWER SET UP YOU SHOULD PRE-ASSEMBLE EACH OF THE CROSS BRACE "X" SECTIONS. AS YOU OPEN EACH TOWER SECTION CARTON REFER TO ILLUSTRATION 1 TO DETERMINE WHICH CROSS BRACES GO WHERE. USE ONE 5/16" X 1/2" BOLT AND ONE 5/16" NUT FOR EACH CROSS BRACE CONNECTION (THERE WILL BE ONE FOR EACH "X" WITH THE EXCEPTION OF THE 20' AND 24' TOWER, WHICH WILL HAVE THREE CONNECTIONS AND 5 CONNECTIONS RESPECTIVELY).

2. INSTALL THE EYE BOLT ONTO EACH OF THE "X" SECTIONS CREATED ABOVE. THE EYE BOLT SHOULD BE INSTALLED ON THE SHORT CROSS BRACE FORMING THE BOTTOM OF THE "X". TO INSTALL THE EYE BOLT INSERT ONE 5/16" X 1/2" BOLT THROUGH THE EYE OF THE EYE BOLT THEN THROUGH THE HOLE IN THE END OF THE CROSS BRACE AS SHOWN IN ILLUSTRATION 2. SECURE THE EYE BOLT WITH ONE 5/16" NUT LEAVING IT LOOSE SO THAT THE EYE BOLT CAN ROTATE.

3. INSTALL ONE 1/4" NUT ONTO EACH EYE BOLT AND TURN IT UNTIL IT REACHES THE TOP OF THE THREADED SECTION OF THE EYE BOLT.

4. INSTALL THE SHORT END OF ONE ANGLE BRACKET [ABK] ONTO EACH OF THE EYE BOLTS USING ONE 1/4" NUT AS SHOWN IN ILLUSTRATION 2. THE NUT ON THE BOTTOM OF THE EYE BOLT SHOULD BE INSTALLED JUST FAR ENOUGH TO ENSURE THAT IT WILL NOT FALL OFF.

WHEN FINISHED THIS STEP YOU SHOULD HAVE THREE IDENTICAL "X" SECTIONS FOR THE 4-8', 8-12', 12-16', 16-20' AND 20'-24' TOWER SECTIONS. IT WILL BE HELPFUL TO SEPARATE EACH 4' SECTION "X" SO THAT THEY ARE NOT MIXED UP LATER. FOR A 12' TOWER THERE SHOULD BE SIX "X" SECTIONS, FOR A 16' TOWER THERE SHOULD BE NINE "X" SECTIONS, FOR A 20' TOWER THERE SHOULD BE TWELVE "X" SECTIONS AND FOR A 24' TOWER THERE SHOULD BE 15 "x" SECTIONS WHEN YOU HAVE FINISHED THIS STEP.

STEP 2 – TOP 4' SECTION:

1. USING THE TWENTY-FOUR 5/16" X 1" HEX HEAD TAPPING SCREWS FROM THE TOWER BOLT PACKAGE [TBP] ATTACH THE THREE TOP LEGS [LT1] TO THE TOWER TOP [TWT] AS SHOWN IN ILLUSTRATION 2. TIGHTEN THE TAPPING SCREWS COMPLETELY. DO NOT OVERTIGHTEN THE TAPPING SCREWS AS DOING SO WILL STRIP THE TOWER TOP.

2. USING ONE 1/4" X 1/2" BOLT AND ONE 1/4" NUT, ATTACH THE ELONGATED HOSE BRACKET [EHB] TO ANY ONE OF THE THREE TOP LEGS [LT1] USING THE HOLE IN THE TOP LEG [LT1] THAT IS JUST BELOW THE TOWER TOP. BOLT THE SHORT ANGLE OF THIS BRACKET TO THE TOWER LEG AND TIGHTEN COMPLETELY.

NOTE:

FROM THIS POINT FORWARD, COMPLETE TOWER LAYING ON ONE SIDE ON A LEVEL SURFACE. USE A DROP CLOTH OR CARDBOARD TO PROTECT THE FINISH IF ASSEMBLING ON ABRASIVE SURFACES.

IMPORTANT NOTES APPLICABLE TO ALL TOWER SECTIONS:

1. MAKE SURE THAT THE ORDER OF INSTALLATION SHOWN IN ILLUSTRATION 2 IS FOLLOWED. FROM OUTSIDE TO INSIDE THE ORDER SHOULD BE AS FOLLOWS:
 1. THE UPPER SECTION LEG
 2. THE LOWER SECTION LEG
 3. THE CROSS BRACE OR ANGLE BRACKET
 4. THE CROSS MEMBER
2. ALWAYS INSTALL THE ANGLE BRACKETS [ABK] ON THE SAME SIDE (LEFT OR RIGHT) THROUGHOUT THE TOWER AND ENSURE THAT THEY ARE ALWAYS TURNED INWARD

3. INSTALL THE 4'-8' SECTION EXTENSION LEGS [LE2] AND THE CROSS MEMBER [M23]. **INSTALL ONLY THE TOP 1/4" X 3/4" BOLTS AT THE 4' LEG OVERLAP – DO NOT INSERT THE BOTTOM BOLTS AT THIS TIME.**

4. REPEAT FOR ALL THREE SIDES.

STEP 3 – 4'-8' SECTION:

1. USING THE BOTTOM 1/4" X 3/4" BOLTS AT THE 4' LEG OVERLAP AND THE X19 CROSS BRACES, INSTALL THE 4'-8' SECTION "X" (PRE-ASSEMBLED IN STEP 1). REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.

2. USING THE TOP 1/4" X 3/4" BOLTS AT THE 8' LEG OVERLAP, INSTALL THE 8'-12' SECTION EXTENSION LEGS [LE2], THE X33 CROSS BRACE ON ONE SIDE, THE ANGLE BRACKET [ABK] (TURNED INWARD) ON THE OPPOSITE SIDE, AND THE CROSS MEMBER [M41]. REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.

3. REPEAT FOR ALL THREE SIDES.

STEP 4 – 8'-12' SECTION:

1. FOR EACH OF THE THREE SIDES OF THE TOWER, ASSEMBLE THE 12' CROSS MEMBER ASSEMBLY [M32, M32] USING FOUR 1/4" X 1/2" BOLTS AND TIGHTEN COMPLETELY.

2. USING THE BOTTOM 1/4" X 3/4" BOLTS AT THE 8' LEG OVERLAP AND THE X27 CROSS BRACES, INSTALL THE 8'-12' SECTION "X" (PRE-ASSEMBLED IN STEP 1). REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.

3. **IF YOU ARE ASSEMBLING A 12' TOWER:** GO TO STEP 8 FOR THE TOWER BASE INSTALLATION INSTRUCTIONS.

4. **IF YOU ARE ASSEMBLING A 16', 20', OR 24' TOWER:** USING THE TOP 1/4" X 3/4" BOLTS AT THE 12' LEG OVERLAP, INSTALL THE 12'-16' SECTION EXTENSION LEGS [LE2], THE X38 CROSS BRACE ON ONE SIDE, THE ANGLE BRACKET [ABK] (TURNED INWARD) ON THE OPPOSITE SIDE, AND THE M32 CROSS MEMBER ASSEMBLY ASSEMBLED IN 1 ABOVE. REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.

5. REPEAT FOR ALL THREE SIDES.

STEP 5 – 12'-16' SECTION:

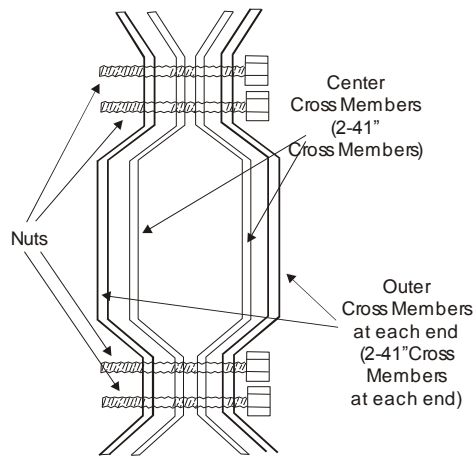
1. FOR EACH OF THE THREE SIDES OF THE TOWER, ASSEMBLE THE 16' CROSS MEMBER ASSEMBLY [M41, M41] USING FOUR 1/4" X 1/2" BOLTS AND TIGHTEN COMPLETELY.
2. USING THE BOTTOM 1/4" X 3/4" BOLTS AT THE 12' LEG OVERLAP AND THE X35 CROSS BRACES, INSTALL THE 12'-16' SECTION "X" (PRE-ASSEMBLED IN STEP 1). REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.
3. **IF YOU ARE ASSEMBLING A 16' TOWER:** GO TO STEP 8 FOR THE TOWER BASE INSTALLATION INSTRUCTIONS.
4. **IF YOU ARE ASSEMBLING A 20' OR 24' WINDMILL:** USING THE TOP 1/4" X 3/4" BOLTS AT THE 16' LEG OVERLAP, INSTALL THE 16'-20' SECTION EXTENSION LEGS [LE2], THE X45 CROSS BRACE ON ONE SIDE, THE ANGLE BRACKET [ABK] (TURNED INWARD) ON THE OPPOSITE SIDE, AND THE M41 CROSS MEMBER ASSEMBLY. REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.
5. REPEAT FOR ALL THREE SIDES.

STEP 6 – 16'-20' SECTION:

1. FOR EACH OF THE THREE SIDES OF THE TOWER, ASSEMBLE THE 20' CROSS MEMBER ASSEMBLY [M41, M23, M41] USING EIGHT 1/4" X 1/2" BOLTS AND TIGHTEN COMPLETELY.
2. USING THE BOTTOM 1/4" X 3/4" BOLTS AT THE 16' LEG OVERLAP AND THE X43 CROSS BRACES, INSTALL THE 16'-20' SECTION "X" (PRE-ASSEMBLED IN STEP 1). REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.
3. **IF YOU ARE ASSEMBLING A 20' TOWER:** GO TO STEP 8 FOR THE TOWER BASE INSTALLATION INSTRUCTIONS.
4. IF YOU ASSEMBLING A 24' WINDMILL: USING THE TOP 1/4" X 3/4" BOLTS AT THE 20' LEG OVERLAP, INSTALL THE 20'-24' SECTION EXTENSION LEGS (LE2), THE X38 CROSS BRACE ON ONE SIDE, THE ANGLE BRACKET (ABK) (TURNED INWARD) ON THE OPPOSITE SIDE, AND THE M41-M23-M41 CROSS MEMBER ASSEMBLY. REFER TO ILLUSTRATION 1 AND 2 FOR DIRECTION.
5. REPEAT FOR ALL THREE SIDES.

STEP 7 – 20' – 24' SECTION:

1. FOR EACH OF THE THREE SIDES OF THE TOWER, ASSEMBLE THE 24' CROSS MEMBER ASSEMBLY (M41 -x 2, M41 - x 2, M41 - x 2). FIRST LAY 2 – 41" CROSS MEMBERS FACE TO FACE, THEN ASSEMBLE TWO MORE M41 CROSS MEMBERS FACE TO FACE ON EACH END OF THE FIRST SET. THIS WILL RESULT IN THE CENTER TWO PIECES TIGHT FACE TO FACE AND THE SETS AT EACH END WILL HAVE A GAP BETWEEN THEM OF APPROXIMATELY 1/4". BOLT THE ASSEMBLY TOGETHER WITH EIGHT 1/4" X 3/4" BOLTS AND TIGHTEN COMPLETELY. REFER TO DRAWING ON PAGE 16.
2. USING THE BOTTOM 1/4" X 3/4" BOLTS AT THE 20' LEG OVERLAP AND THE X33 CROSS BRACES. INSTALL THE 20' – 24' SECTION "X" (PREASSEMBLED IN STEP 1). REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION.
3. WHEN MOUNTING THE CROSSMEMBER AT THE BOTTOM OF THE 24' TOWER SECTION THE PROCEDURE WILL BE THE SAME AS THE REST OF THE TOWER EXCEPT THE OUTER HALF OF THE M41 CROSS MEMBER WILL BE OUTSIDE OF THE GROUND STAKE CLAMPS.
4. REPEAT ALL THREE SIDES.



END VIEW OF 24' TOWER CROSS MEMBER CONSISTING OF 6 - M41 CROSS MEMBER PIECES.

STEP 8 – TOWER BASE:

1. SEPARATE THE STAKE CLAMPS [SCBR, SCBL] INTO THREE SETS OF ONE LEFT [SCBL] AND ONE RIGHT [SCBR] PER SET.
2. INSTALL ONE STAKE CLAMP SET [SCBR & SCBL] AND THE 12', 16', 20' OR 24' CROSS MEMBER ASSEMBLY (ASSEMBLED IN STEP 4,5,6, OR 7 DEPENDING ON YOUR TOWER SIZE) TO THE BOTTOM END OF THE LEG. USE ONLY THE BOTTOM 1/4" X 3/4" BOLT. REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION. REPEAT FOR ALL THREE SIDES. FOR 24' TOWER REFER TO STEP 7 (3).
3. INSERT A 1/4" X 3/4" BOLT THROUGH THE TOP HOLES OF THE GROUND STAKE CLAMP, TOWER LEG, CROSS BRACE OR ANGLE BRACKET AND CROSS MEMBER. REFER TO ILLUSTRATIONS 1 AND 2 FOR DIRECTION. REPEAT FOR ALL THREE SIDES.
4. INSTALL THE SIX 1/4" X 3/4" BOLTS, TWELVE GOLD WASHERS AND SIX NUTS ON EACH SET OF STAKE CLAMPS AS SHOWN IN ILLUSTRATION 2. DO NOT TIGHTEN THESE BOLTS UNTIL THE GROUND ROD MOUNTING STAKES [GRMS] ARE INSTALLED.

STEP 8A – TIGHTEN BOLTS:

1. STARTING AT THE 4'-8' SECTION OVERLAP, TIGHTEN ALL THE BOLTS ATTACHING THE M23 CROSS MEMBERS TO THE TOWER LEGS.
2. TIGHTEN THE CENTRE BOLT OF EACH CROSS BRACE X IN THE 4'-8' SECTION
3. ADJUST ALL THREE CROSS BRACE TENSIONERS (ANGLE BRACKET AND EYE BOLTS) UNTIL CROSS BRACES ARE NO LONGER SLACK. DO NOT OVERTIGHTEN THE EYE BOLTS AS OVERTIGHTENING WILL ONLY STRAIGHTEN THE ANGLE BRACKET. TIGHTEN THE UPPER NUT ON THE EYE BOLT AGAINST THE ANGLE BRACKET TO MAINTAIN PROPER TENSION.
4. REPEAT 1-3 FOR THE REMAINING SECTIONS OF THE TOWER. DO NOT TIGHTEN THE SIX 1/4" X 3/4" BOLTS IN THE STAKE CLAMP SETS AT THIS TIME.

YOU HAVE COMPLETED ASSEMBLING THE TOWER OF YOUR NEW WINDMILL BY KOENDERS!!

HEAD ASSEMBLY:

STEP 9 – BLADE SUPPORT RING AND SPIDER BRACKETS:

NOTE: READ THROUGH ENTIRE HEAD ASSEMBLY SECTION PRIOR TO BEGINNING HEAD ASSEMBLY

1. ALL BOLTS ARE IN PACKAGE NUMBER BTBP IN THE BLADE & TAIL BOX.
2. WHEN ASSEMBLING THE BLADE SUPPORT RINGS [BSR] MAKE SURE THAT ALL BOLTS ARE PUT FROM THE INSIDE OF THE RING OUTWARD, WITH THE THREADS POINTING OUT. THIS WILL ALLOW YOU TO PUT ON THE BLADES [BLD] EASILY WITHOUT REMOVING THE BOLTS AGAIN.
3. THE SAME BOLTS THAT HOLD THE SPIDER BRACKETS [SPI] IN PLACE ALSO HOLD THE BLADES [BLD] ON TO THE OUTSIDE OF THE BLADE SUPPORT RINGS [BSR].
4. DO NOT COMPLETELY TIGHTEN ANY NUTS OR BOLTS UNTIL ALL THE BLADES [BLD] AND BLADE BRACES [BBR] ARE COMPLETE IN THE FOLLOWING STEPS.
5. BEFORE STARTING TO ASSEMBLE THE BLADES [BLD], NOTE THAT ON THE BLADE SUPPORT RING [BSR] THE SPACING FROM THE OUTSIDE EDGE OF THE RING TO THE FIRST HOLE IS 5/8" ON ONE SIDE OF THE RING AND THE SPACING ON THE OTHER SIDE IS 1/2". THE SIDE OF THE RING WITH THE WIDER SPACING IS THE SIDE THAT GOES TO THE FRONT OF THE BLADE [BLD] - ENSURE THAT THE 5/8" SIDE IS FACING UPWARD. (SEE ILLUSTRATION 3)

6. ASSEMBLE THREE BLADE SUPPORT RINGS [BSR] AROUND THE THREE SPIDER BRACKETS [SPI] AS ILLUSTRATED IN STEP 10. MAKE SURE TO HAVE ALL THREE SPIDER BRACKETS [SPI] INSIDE THE BLADE SUPPORT RINGS [BSR].

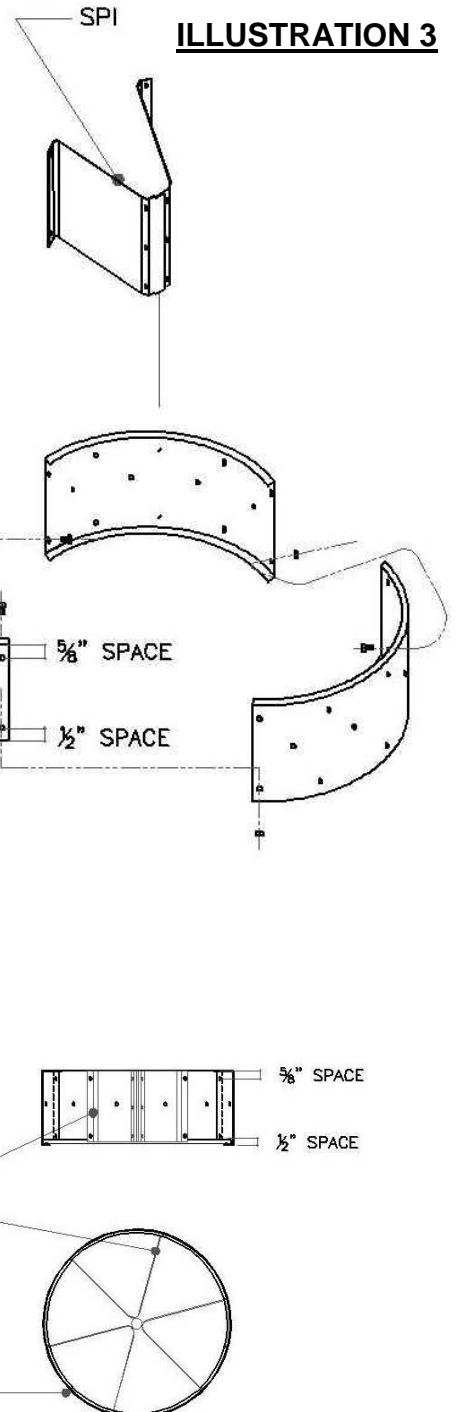
1/4" X 3/4" BOLTS [BTBP],
-This will hold the assembly together until you assemble the BLD on the next step.

BSR

NOTE: THE 'V' IN EACH SPIDER BRACKET [SPI] SHOULD STRADDLE THE SPLICE WHERE THE BLADE SUPPORT RINGS [BSR] ARE BOLTED TOGETHER. REFER TO ILLUSTRATION 3 AND 4.

SPI

BSR SPLICE



STEP 10 – BLADE INSTALLATION:

1. INSTALL ALL TWELVE BLADES [BLD] AS SHOWN IN ILLUSTRATION 4 AND PHOTO 1 BELOW. MAKE SURE THAT ALL BOLTS ARE PUT FROM THE INSIDE OF THE RING OUTWARD, WITH THE THREADS POINTING OUT.

ILLUSTRATION 4

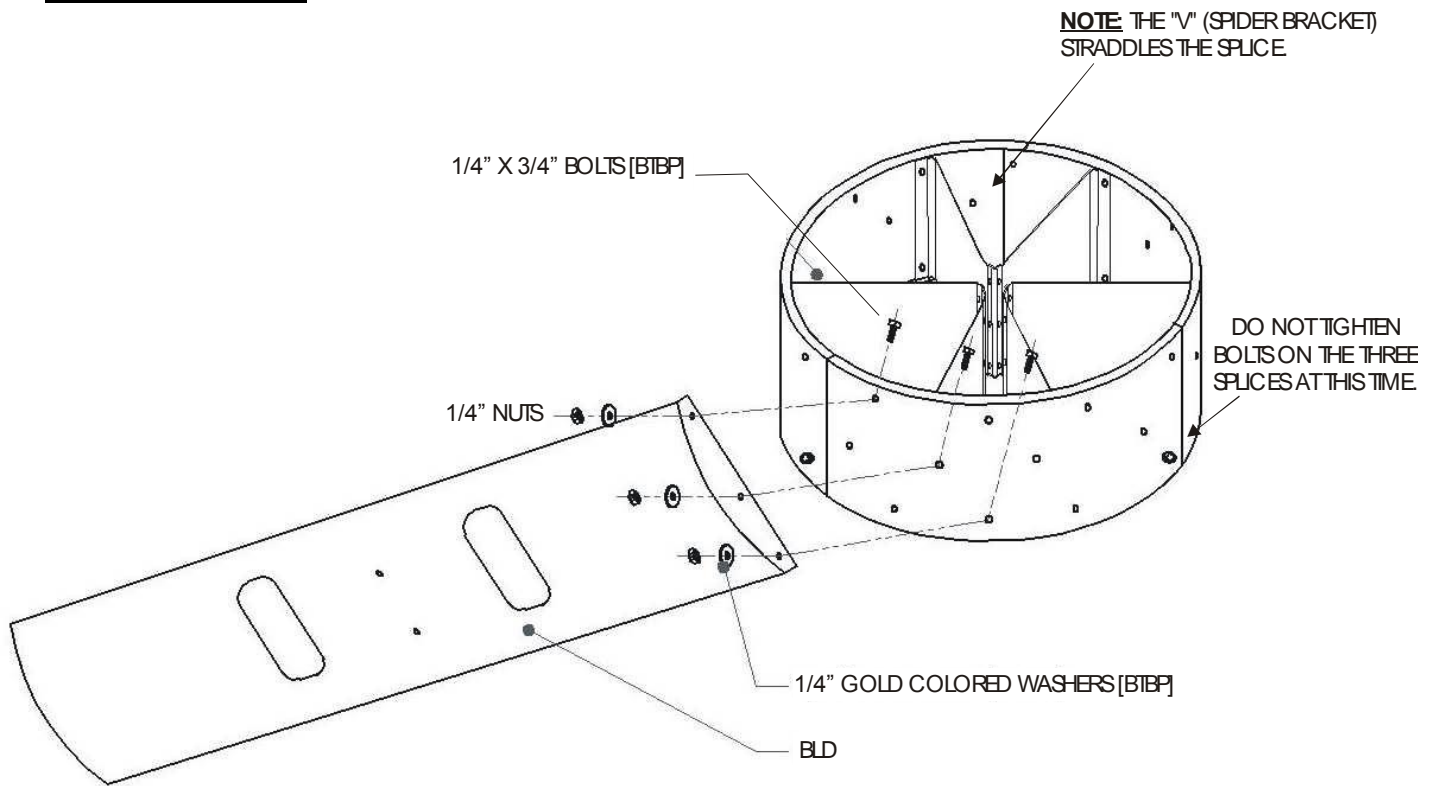


PHOTO 1 - SHOWS THE COMPLETED ASSEMBLY OF THE BLADES [BLD] (FRONT VIEW).

STEP 11 – BLADE BRACE INSTALLATION:

1. INSTALL ALL TWELVE BLADE BRACES [BBR] AS SHOWN IN ILLUSTRATION 5 AND PHOTO 2 BELOW.
2. COMPLETE TIGHTENING OF ALL BOLTS EXCEPT THE BOLTS ON THE THREE SPLICES OF THE BLADE SUPPORT RINGS [BSR].

ILLUSTRATION 5

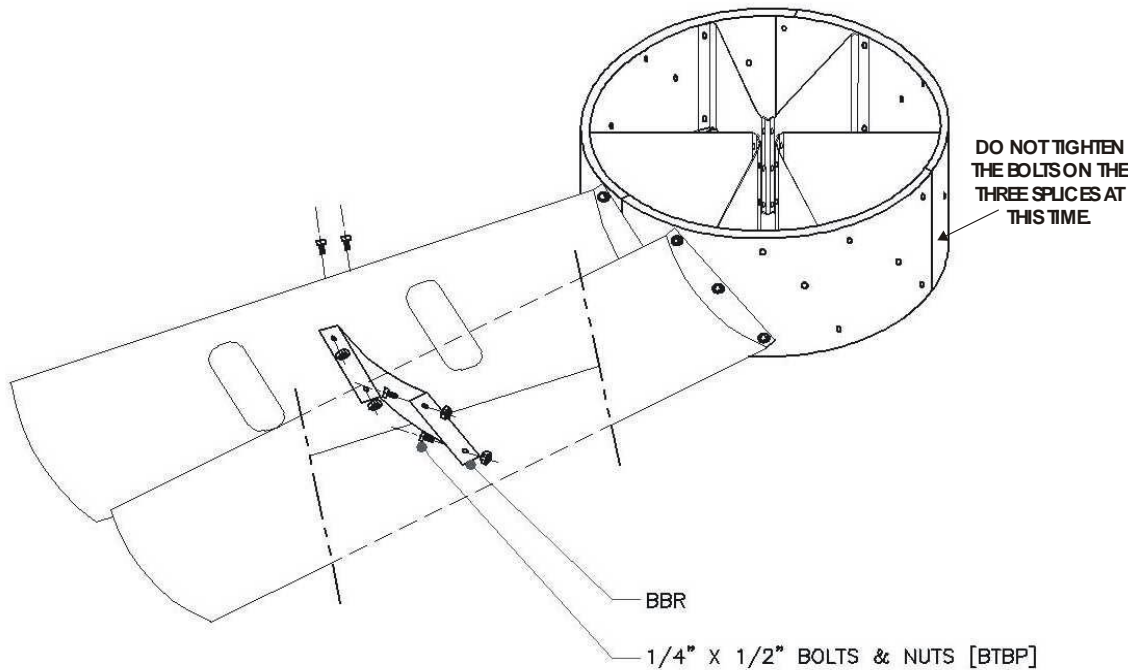
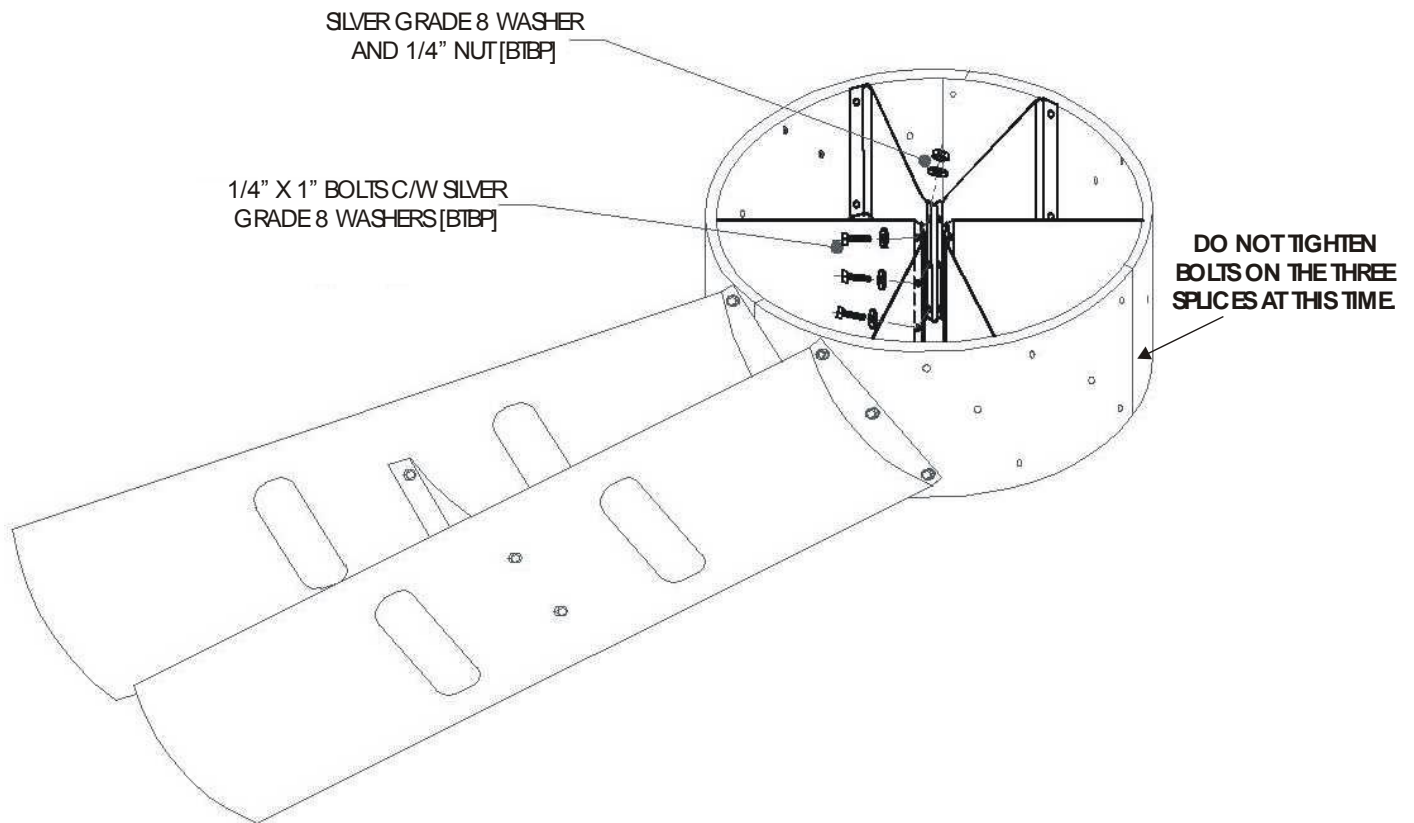


PHOTO 2 - SHOWS THE COMPLETED ASSEMBLY OF THE BLADE BRACES [BBR].

STEP 12 – SPIDER BRACKET BOLTS:

1. INSTALL 1/4" X 1" BOLTS [BTBP] THROUGH THE CENTER OF THE SPIDER BRACKETS [SPI] WHERE THEY FORM A CIRCLE AROUND THE CRANKSHAFT AS SHOWN IN ILLUSTRATION 6 BELOW. BE SURE TO USE THE 18 SILVER WASHERS [BTBP] WHICH ARE GRADE 8, AND PUT ONE ON EACH END OF THE BOLTS [BTBP]. DO NOT TIGHTEN THESE UNTIL THE BLADE ASSEMBLY IS MOUNTED ON THE COMPRESSOR CRANKSHAFT.

ILLUSTRATION 6

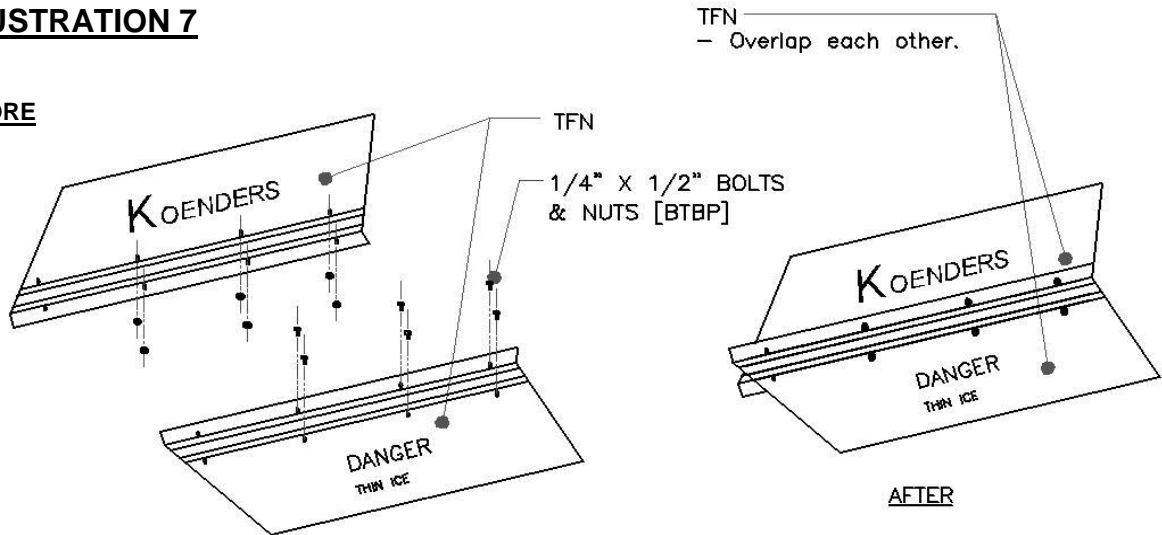


STEP 13 – TAIL PRE-ASSEMBLY:

1. PRE-ASSEMBLE TAIL FINS [TFN] FOR STEP #14.

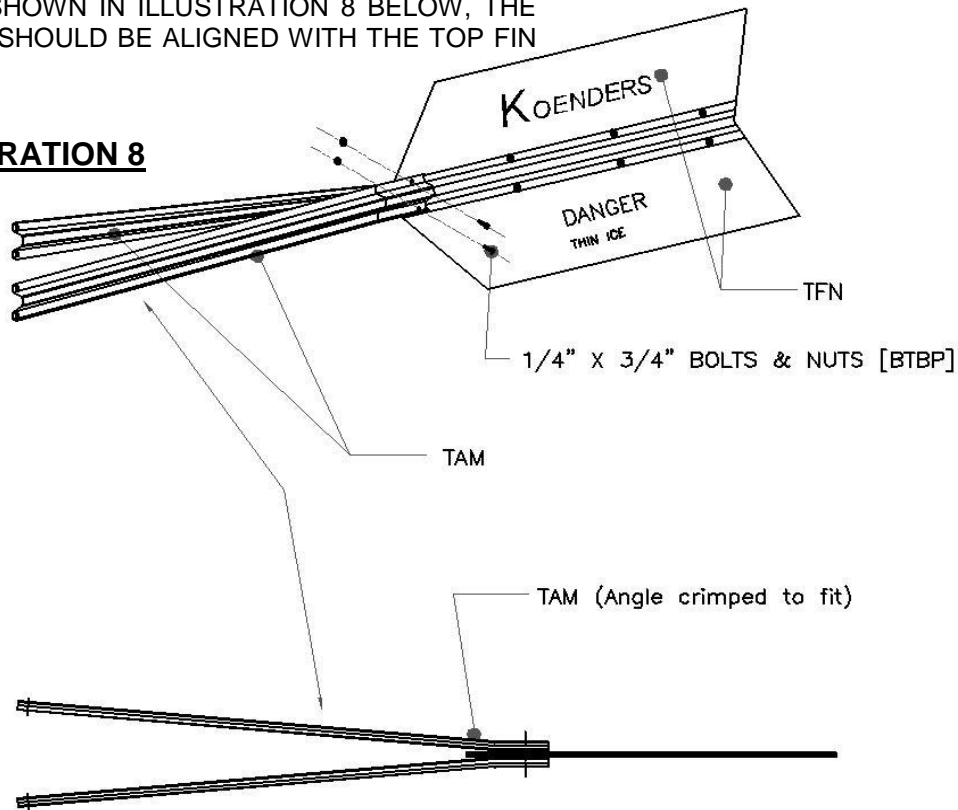
ILLUSTRATION 7

BEFORE



2. COMPLETE AS SHOWN IN ILLUSTRATION 8 BELOW, THE BOTTOM FIN [TFN] SHOULD BE ALIGNED WITH THE TOP FIN [TFN].

ILLUSTRATION 8



STEP 14 – PIVOT TUBE AND TAIL INSTALLATION:

1. REMOVE BACK COVER PLATE [BCP] FROM COMPRESSOR [FAC]. (SEE FIGURE 'A' OF ILLUSTRATION 9)
2. SLIP THE PIVOT TUBE [PVT] THROUGH COMPRESSOR BOTTOM, THROUGH 'U' BOLT CLAMP AND THROUGH THE COMPRESSOR TOP PLATE. ALIGN THE HOLE IN THE PIVOT TUBE [PVT] TO THE COMPRESSOR AIR LINE HOSE. TIGHTEN THE 'U' BOLT CLAMP WITH 5/16" NUTS FROM INSIDE THE COMPRESSOR [FAC] UNTIL PIVOT TUBE [PVT] IS HELD SOLIDLY IN PLACE. SEE FIGURE 'B' OF ILLUSTRATION 9.
3. INSTALL YOUR PREASSEMBLED TAIL ARMS [TAM] AND TAIL FINS [TFN] ONTO THE COMPRESSOR [FAC]. THE TAIL ARMS [TAM] AND TAIL FINS [TFN] ARE ATTACHED TO THE COMPRESSOR BODY USING 5/16"x 1/2" BOLTS [BTBP] AND 5/16" NUTS [BTBP]. TIGHTENING OF THESE NUTS IS DONE FROM THE INSIDE OF THE COMPRESSOR [FAC], THROUGH THE BACK OPENING. (SEE FIGURE 'B' AND 'C' OF ILLUSTRATION 9). AFTER THESE ARE TIGHTENED, REPLACE BACK COVER PLATE [BCP].

ILLUSTRATION 9

Figure A

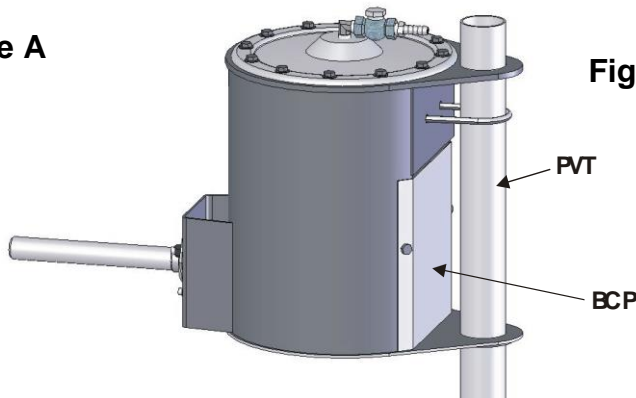


Figure B

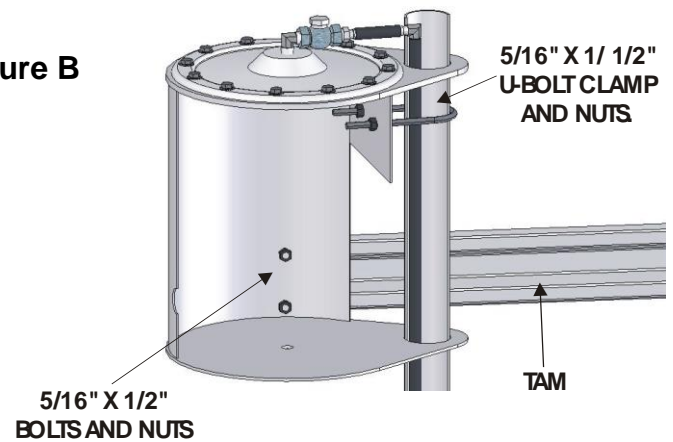
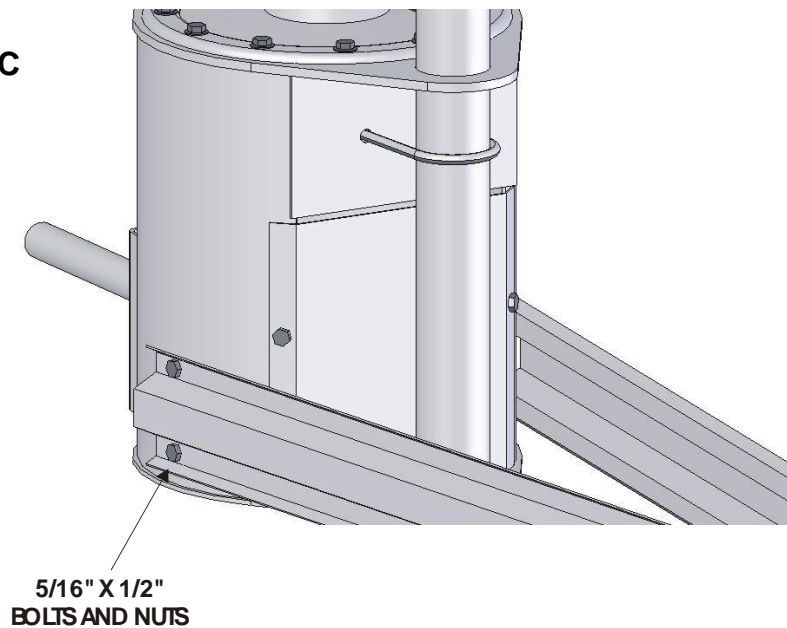


Figure C



STEP 15 – SETUP WINDMILL COMPONENTS:

1. CHOOSE A SITE FOR THE WINDMILL. THE EASIEST WAY TO SET UP YOUR COMPLETED WINDMILL, IF YOU DO NOT HAVE LIFTING EQUIPMENT, IS TO PUT THE COMPRESSOR [FAC] INTO THE TOP OF THE TOWER WHILE THE TOWER TOP END IS RESTING ABOUT 4'-0" OFF THE GROUND. TO DO THIS REFER TO THE "STEPS TO INSTALL THE COMPRESSOR ONTO THE TOWER" AND ILLUSTRATION 11 ON THE FOLLOWING PAGE.

2. INSTALL THE BLADE ASSEMBLY ONTO THE COMPRESSOR CRANKSHAFT AND TIGHTEN THE SPIDER BRACKET BOLTS WHILE THE TOWER IS IN THIS POSITION. **PLEASE NOTE:** TIGHTENING OF THE SPIDER BRACKETS [SPI] AROUND THE CRANKSHAFT IS VERY IMPORTANT. THOROUGHLY TIGHTEN ALL THE BOLTS THROUGH THE SPIDER BRACKETS [SPI] AND REPEAT TIGHTENING ALL THE BOLTS SEVERAL TIMES. TIGHTEN AS EVENLY AS POSSIBLE TO ENSURE THAT THE BLADE RUNS TRUE. WHEN THE SPIDER BRACKETS [SPI] ARE PROPERLY TIGHTENED THERE SHOULD BE NO GAP BETWEEN THE SPIDER BRACKETS [SPI] AROUND THE SHAFT. SEE PHOTO 3 BELOW. IF YOU HAVE A TORQUE WRENCH TO TORQUE THESE BOLTS, THEY ARE TO BE TORQUED TO 96 INCH POUNDS OR 8 FOOT POUNDS. IF THE BOLTS ARE TORQUED CORRECTLY THEY WILL NOT LOOSEN.

3. **AT THIS TIME, TIGHTEN ALL THE BOLTS ON THE THREE SPLICES OF THE BLADE SUPPORT RINGS [BSR].** AFTER THE BLADE ASSEMBLY IS PROPERLY TIGHTENED AROUND THE CRANKSHAFT, INSTALL THE DOME [DOM] ON THE OUTSIDE OF THE BLADE SUPPORT RINGS [BSR]. SECURE WITH THE THREE DOME CLIPS, THREE WASHERS AND THREE 1/4" NUTS. THE DOME CLIPS, WASHERS AND NUTS ARE TO BE INSTALLED ON TOP OF THE EXISTING NUTS & BOLTS CLOSEST TO THE FRONT OF THE BLADE SUPPORT RINGS [BSR], TAKING CARE NOT TO UTILIZE THE BOLTS ON THE SPLICES OF THE BLADE SUPPORT RING [BSR].

ILLUSTRATION 10

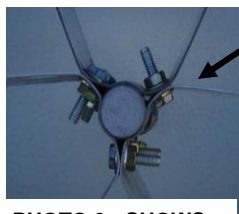


PHOTO 3 - SHOWS SPIDER BRACKETS AROUND CRANKSHAFT

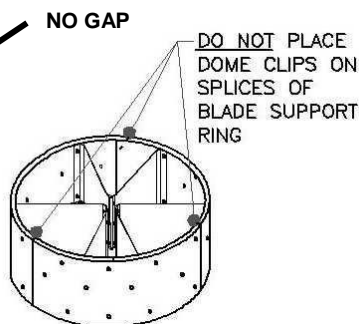


PHOTO 4 - DOME CLIPS (CIRCLED) IN THE CORRECT LOCATION

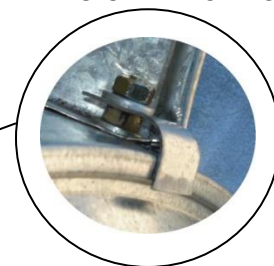


PHOTO 5 - DOME CLIP, WASHER & NUT ON EXISTING BOLT

4. **INSTALLING THE AIRLINE:** PUT A SMALL AMOUNT OF GREASE ON ONE BARB OF THE 3/8"x3/8"x 90° BRASS ELBOW [HBB]. CONNECT THIS END TO THE 3/8" AIRLINE RUNNING TO YOUR POND. AFTER THE BLADE ASSEMBLY, COMPRESSOR [FAC], AND TAIL ARMS [TAM] HAVE BEEN MOUNTED ON THE TOP OF THE TOWER, INSERT THE AIRLINE, WITH THE 3/8"x3/8"x 90° BRASS ELBOW [HBB] ON THE END, UP THROUGH PIVOT TUBE [PVT] AND PUSH THE OTHER END OF THE 90° ELBOW THROUGH 1/2" HOLE IN THE PIVOT TUBE [PVT] SIDEWALL THEN INTO THE 3/8" CONNECTING HOSE COMING FROM THE TOP OF THE COMPRESSOR. SEE FIGURE "A" OF ILLUSTRATION 11 ON THE FOLLOWING PAGE FOR MORE DIRECTION. **IMPORTANT NOTE:** DO NOT USE A HOSE CLAMP ON THE 3/8 X 3/8 X 90° BRASS ELBOW.

5. SECURE THE AIRLINE TO THE TOWER WITH THE HOSE BRACKETS [HBK] AS SHOWN IN ILLUSTRATION 12 ON PAGE 25 OF THIS MANUAL

6. AFTER THE ABOVE PROCEDURES, STAND UP THE COMPLETED UNIT ON THE SITE. BE SURE TO HAVE ENOUGH PEOPLE TO HOLD THE BASE OF THE TOWER AND HELP LIFT UP THE TOWER. THE OPTIONAL PIVOT POINTS ARE HELPFUL FOR THIS STEP. AFTER THE WINDMILL HAS BEEN ERECTED, THE GROUND ROD MOUNTING STAKES [GRMS] CAN BE DRIVEN INTO THE GROUND THROUGH STAKE CLAMP BRACKETS [SCBR, SCBL], LEAVING AT LEAST 2" OF THE GROUND ROD MOUNTING STAKES [GRMS] ABOVE THE STAKE CLAMP BRACKETS [SCBR, SCBL]. LEVEL THE WINDMILL AND TIGHTEN THE CLAMPS.

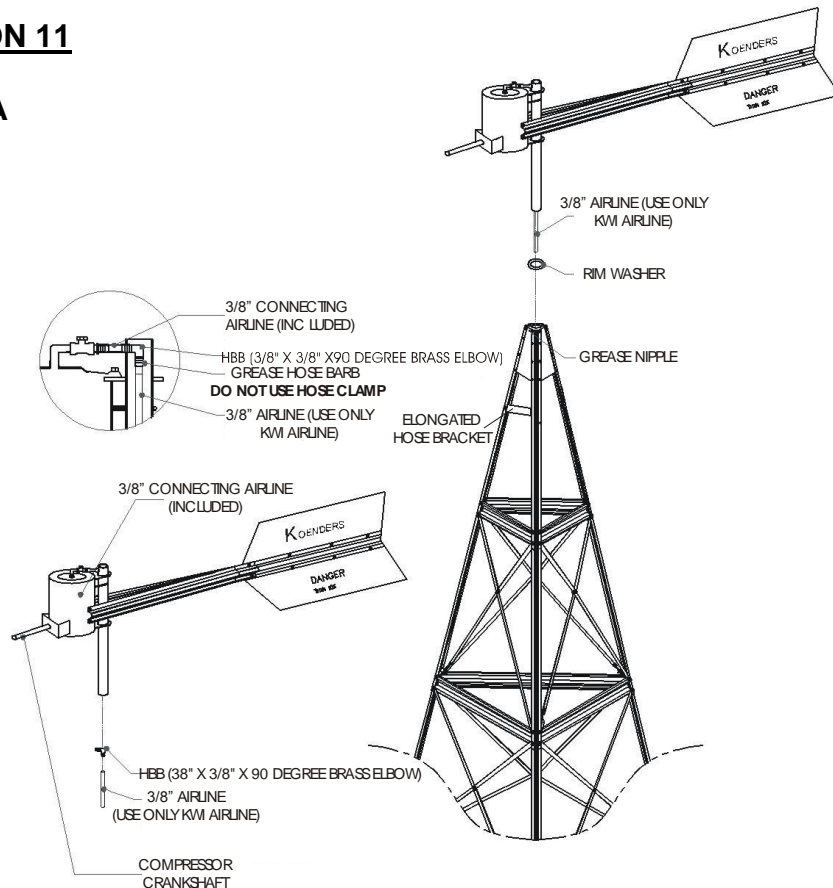
7. PLEASE NOTE!! ANCHORING OF KOENDERS WINDMILL TOWERS. - KOENDERS WINDMILLS WILL NOT DETERMINE SOIL AND WIND CONDITIONS FOR ANY WINDMILL INSTALLATION. THEREFORE, THESE CONDITIONS MUST BE DETERMINED BY THE CUSTOMER. ANCHORING OF THE WINDMILL TOWER IS VERY IMPORTANT. IT IS THE CUSTOMER'S RESPONSIBILITY TO ADEQUATELY ANCHOR THE TOWER. KOENDERS WINDMILLS SUPPLIES A BASIC ANCHORING KIT WITH EACH UNIT. HOWEVER IN CERTAIN CIRCUMSTANCES, SUCH AS LIGHT SOIL CONDITIONS AND HIGH TO EXTREME WIND AREAS, IT MAY BE NECESSARY TO UTILIZE OTHER ANCHORING TECHNIQUES. CONCRETE PILINGS, CONCRETE PAD, OR SCREW IN ANCHORS ARE SOME EXAMPLES. THE CUSTOMER IS RESPONSIBLE TO ANCHOR THE WINDMILL ADEQUATELY OR CONSULT THE APPROPRIATE PEOPLE TO DO SO.

STEPS TO INSTALL THE COMPRESSOR ONTO THE TOWER:

1. GREASE BOTH SIDES OF THE RIM WASHER THEN SLIDE RIM WASHER ONTO PIVOT TUBE [PVT].
2. LIGHTLY GREASE THE PIVOT TUBE THEN INSTALL PIVOT TUBE [PVT] INTO TOWER TOP [TWT], AS SHOWN BELOW.
3. GREASE TOWER TOP [TWT] AND PIVOT TUBE [PVT] AT THE GREASE NIPPLE.
4. REGREASE TOWER TOP [TWT] AND PIVOT TUBE [PVT] ONCE A YEAR.

ILLUSTRATION 11

FIGURE A



DO NOT USE HOSE CLAMP WHERE 3/8" AIRLINE AND 90° X 3/8" BARB CONNECT

HOSE BRACKET INSTALLATION:

1. INSTALL THE HOSE BRACKETS [HBK] AND AIRLINE [ARL] AS SHOWN IN ILLUSTRATION 12 AND PHOTOS 6 AND 7 BELOW.

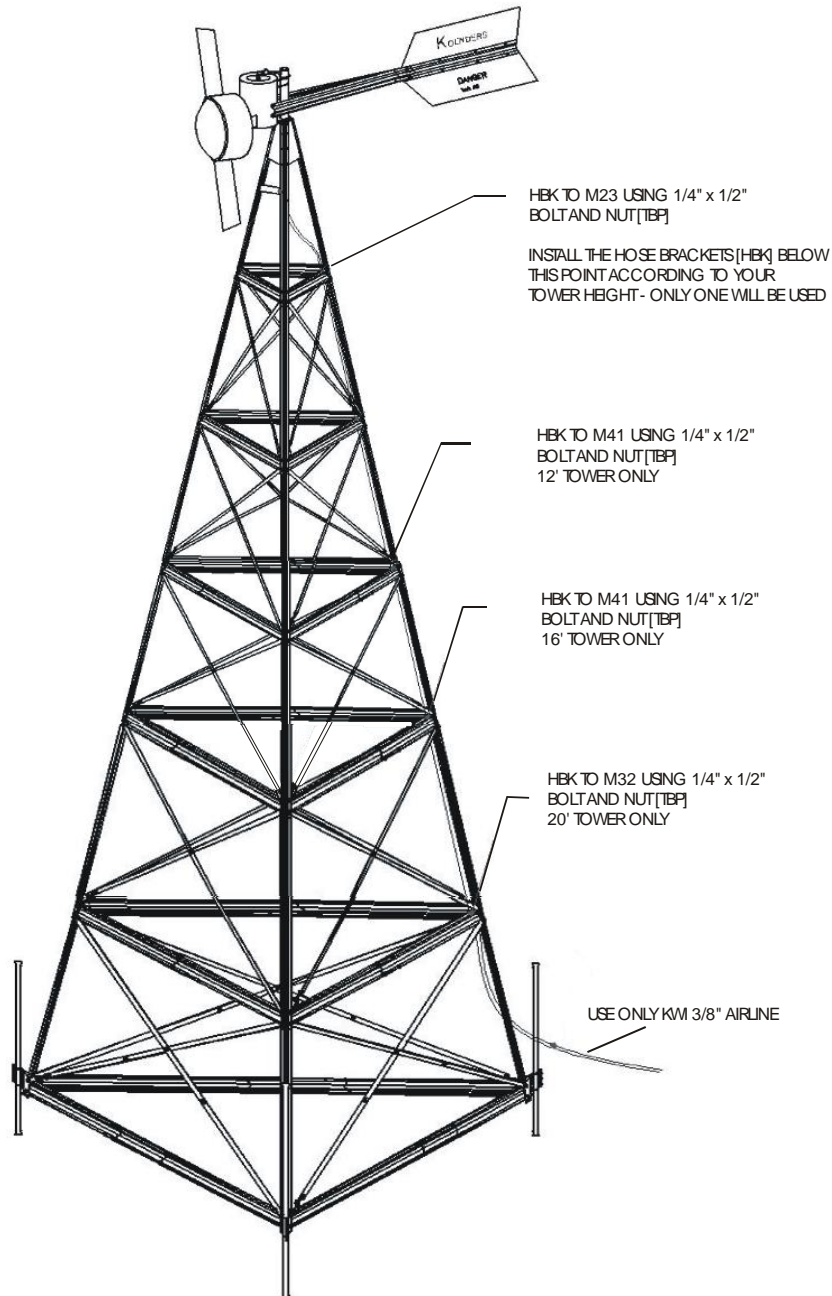
ILLUSTRATION 12



PHOTO 6 – ELONGATED HOSE BRACKET [EHB] AND HOSE BRACKET [HBK] WITH AIRLINE INSTALLED



PHOTO 7 – HOSE BRACKET [HBK] INSTALLED ON M23 WITH AIRLINE INSTALLED (VIEW FROM BOTTOM OF TOWER)



**CONGRATULATIONS!!!
ENJOY YOUR NEW WINDMILL BY KOENDERS.**

Frequently Asked Questions

Q What stops a Koenders windmill from over revving in a strong wind?

A Our windmills turn at a maximum of approximately 300 RPM. RPM is determined by wind speed and a wind of 27mph (40kph) is the speed at which the windmill begins to turn out of the wind. The fan turns out of the wind automatically and begins to slow down. Once the fan has slowed down enough to overcome wind resistance it will return to face the wind.

Q How does water depth relate to airline pressure?

A For every 2.3 feet of water depth when aerating, it takes 1 pound of pressure to push air into the water. Example:

| Water Depth | | Pressure |
|-------------|---|--------------|
| 2.3' | = | 1 pound psi |
| 4.6' | = | 2 pounds psi |
| 6.9' | = | 3 pounds psi |

This continues as water depth increases. Some gauges may not be very accurate in shallower water.

Q How does the Pressure Release Valve work?

A The pressure release valve is designed to release pressure in the event of an air line blockage such as freeze up, contamination or crushing. The valve is factory set to release at approximately 17.5, psi which is well below the maximum pressure that can be produced by the compressor. At this release pressure the valve will work in up to 40' of water.

Q How much pressure does the compressor produce?

A The compressor can produce from 25-30 psi, which is enough pressure to aerate 57'-70' of water. As the water gets deeper, it will also take more wind to turn the fan because of the water pressure. All compressors are factory tested and set for the proper pressure. Changing settings will not result in an increase of air volume and can result in damage to your compressor not covered by warranty.

Q Which is the regular airline and which is weighted airline?

A The hard plastic airline is the regular airline that is connected to the compressor. The thick rubber airline (optional) is the weighted airline and is used in the pond. Weighted airline settles to the bottom of the pond and helps remove condensation as the airline slopes with the bottom of the pond.

Q Where does the elongated hose bracket go?

A The elongated hose bracket is attached to any of the three tower legs in the top 4' of the tower. The end with the bend is attached to a hole in the tower leg and a hose clip is attached to the other end to hold the airline directly below the pivot tube.

Q What is the easiest way to erect the assembled tower?

A A 12' – 20' tower can be raised quite easily by three men. A 24' tower should have 4 men available to erect the tower. The easiest way to erect the tower if you do not have pivot points is to first, set a 3' sawhorse under the cross member about 4' from the top of the tower with the pivot tube already installed in the compressor, slide the compressor with pivot tube into the tower top and hook up the airline. Attach the tail arms and tail fin assembly. Have someone turn the compressor head so that the tail arms are horizontal and held in this position. You can now slide the fan onto the crankshaft until the spider brackets are against the inner bearing race and tighten the 9 – 1" bolts as indicated in the manual. Tighten the bolts at the 3 splices on the blade support ring. Install dome and allow the tail arms to move again to the vertical position. Have two men lift the top end of the tower with 1-2 men securing the bottom end of the tower. The men at the top end lift as they move toward the bottom of the tower. It is quite easy to erect a tower in this manner. Be sure to have someone anchoring the bottom end of the tower. Drive ground stakes into the ground, tighten ground stake clamp bolts. If optional pivot points are being used, refer to instructions included with pivot point hardware for ground stake locations,

Trouble Shooting

1. **I cannot get my windmill to produce air or it will only produce air when the airstone is near the surface of the water.**
 - A. If it is a new windmill, make sure that the fan has been slid on the shaft with the blades facing the right way. Also be sure the 9-1" bolts that clamp the spider brackets to the crankshaft are tight as indicated in your manual or the spider brackets will spin on the crankshaft and will not turn the compressor. If the spider brackets are too loose, they will eventually wear through and fall off. This is not covered by warranty. The 9 – 1" bolts should be torqued to 96 inch pounds or 8 foot pounds.
 - B. Check diaphragm for cracks and inspect check valve under plastic disc that holds the diaphragm for obstruction in the valve. Also check that air passes through valve only in one direction. Be sure to reinstall the valve the same as it was in the plastic disc. There is also a valve on the silver top cover. There are two different kinds. On the G2 it is the same as the one at the diaphragm, G3 and G4 have an external top valve.
 - C. Bearings can also disintegrate and as the balls fall out of the bearing, especially the center bearing, instead of the connecting rod going up to make compression, the crankshaft will be forced downward and little or no air will be produced.
 - D. Make sure that the brass barbed fitting where the airline from the pond is attached to the compressor unit is greased and that no hose clamp has been used as this will twist the airline so tight that no air will get through.
 - E. Make sure no air is leaking from the airline between compressor and pond.
 - F. If windmill is working properly but is making a squeaking noise, open the rear inspection cover and check if the diaphragm mounting plate is rubbing the upper flange of the compressor body. This is caused by the diaphragm being installed off center on the diaphragm mounting plate. Remove top cover, plastic insert disc and center the diaphragm on the diaphragm mounting plate. Reverse this procedure to reassemble.