Comet Windmills Australia Pty Ltd
Erecting Instructions Mill Head
8-14ft C Pattern

Read carefully through these instructions and study the illustrations on page 6 make yourself familiar with all the parts.
When referring to any parts of the mill or when ordering duplicates always use the names given on these instructions and mention the size and serial number of the mill. The latter are stamped on the side of the main casting oilwell.
GUARANTEE: OUR GUARANTEE HOLDS GOOD ONLY IF THE MILL AND TOWER HAVE BEEN RERCTED IN ACCORDANCE WITH OUR PRINTED INSTRUCTIONS AND THE TOWER IS PLUM. WE CANNONT GUARANTEE A COMET MILL WHICH HAS BEEN ERECTED ON ANOTHER MAKE OF TOWER.

1. TOWER CAP AND TURNTABLE. If the Comet Tower has been erected dead plumb in accordance with our erecting instructions the tower cap ball race will be level. To make sure that the tower cap is dead level place steel balls in position (two each on opposite sides) Put a sprit level on the balls across the diameter of the opening and test for level in different positions THIS IS MOST IMPORTANT because the mill weight and pumping load are taken on the ball race and if it is not level the mill will not govern properly. it may be necessary to remove the highest leg or legs to file them on top or to chisel a little of the corresponding pads inside the tower cap casting in order that the load is evenly distributed on each of the four legs. Oil the ball races then place the steel balls and top part of turntable in position and temporarily tie them to tower cap with thin wire the numbers of balls required for the turntables are 29 for 8-10ft and 38 12-14ft mills which are one less than the number necessary to fill the ball races. The wiring is to prevent any steel balls being dislodged. It is important that the bearings have full number balls.
2. BOTTOM GUIDE: before bolting bottom guide in 8/14ft mill towers, blot the roller guide underneath it, using the two pull out guide rods with lock washers and nuts underneath -fig 12. Temporarily remove equalising bar from chains and slip pull out collars over guide rods, passing the two chains down through bottom guide and roller guide. Replace equalising bar, closing its ends. Lightly blot the guide assembly in position after inserting the two guide rods up into holes in tower cap. The bevelled end of outer collar goes below the side of tower cap where latch spring is fixed-fig 12. Lift the collars to accurately level the bottom guide with spirit level on its top machined face, and tighten all nuts on lock washers. Grease bottom guide. After screwing the nut well on the setscrew, put it through the hole in latch spring and screw it into tapped hole in tower cap. Firmly tighten the screw point on to guide rod, and lock it securely with nut fig-12 see that the sides of spring are vertical and top end of latch falls freely towards tower. Screw grease filled cup into bottom guide and grease bevelled surfaces of outer collar and latch guide rods and holes for chains in roller guide. Oil latch pin and guide rollers and put a little oil around and between the already greased inner outer collars.

3. LIFTING TACKLE: For 8ft and 10ft mills use a 5 in double pulley block on top of derrick with a single 5 in block below and about 150ft in 5/8 dia. (2 circumference) manila rope for up to 30ft high towers and 40ft extra for every 10ft increase in height. For the 12ft and 14ft mills use ½ inch dia. Manilla rope if the 5/8-inch dia. Rope is not in good condition.
4. DERRICK: A stock length (about 20ft) of 2-inch pipe would make a suitable derrick although 2 1/2-inch pipe would be preferable for 12ft and 14ft mills. Shape a short piece of timber to hammer into top end to take a tightly would rope sling for the block. Fix the sling and block and tackle to top of derrick. Rise derrick to rest on platform near tower leg above a platform steel rail. Pack out with timber from top of tower a few inches to provide clearance for getting the mill head into position. Securely lash the derrick to tower. Test tackle and sling by hoisting the mill head about a foot above ground.
5. HOISTING UP MILL HEAD: Bolt the pull-out bracket to side of main casting (behind fig12 view) After first removing the toe nuts from long stay bolt put screwed end through the hole under main casting near bottom of vane hinge rod screw on one nut the put bolt through lug on pull out bracket. Lightly screwing the end nut up a little more than fingers tight. Tightly screw inside nut against lug to act as a locknut. Fix a sling under the crank and under driving shaft front bearing so that when mill head is suspended the mastpipe will be fairly vertical. Hoist mill head to platform remove stop bar from end of mastpipe hoist again and gently lower mastpipe through turntable tower cap inner collar with key in keyway and then into bottom guide stopping about an inch before head rests on turntable. Remove tying wires from turntable being very careful not to lose any steal balls and set it so that oilwell is at side od main casting-fig12 then lower head. Replace steel stop bar at bottom of master pipe carefully tightening the cap screws with lock washers under their heads. The holes are off centre in the stop bar so that by revering it the clearance between it and underside of bottom guide can be adjusted. Slowly rotate mill head around tower cap to see that stop bar dose not rub on bottom guide. The clearance should be about 1/16 inch do not grease the mastpipe for inner collar.
6. GUIDE BAR: Put the guide bar up between rollers guide casting so that the wide flat faces of the bar are in line (parallel) with the bolts in rollers fig12 and blot top end of guide bar in between the two halves of swivel which is hanging just below mastpipe. See the guide bar is vertical and in centre of roller guide casting.
7. VANE: Bolt the vane frame together seeing that angle steel bars are straight and spring buffer id on bottom member. Bolt vane sheet to flat side of frame with square steel spacer washes between sheet and upper angle steel member to make sheets vertical and without any twist. Screw oil cup in top end of vane hinge rod and pass rod down through top vane casting tension casting governor spring and bottom vane casting fig12
8. HOISTING UP VANE: Give the derrick a good lean outward in the opposite direction from which the wind (if any) is blowing. Fix a sling to vane frame a little further out that halfway between vane hinge rod and vane sheet so that when suspended the vane will hag fairly horizontally. The sling must be twisted around both bottom and top vane angles to prevent slipping and twisting. Hoist vane up to mill head. Oil the holes in top and bottom vane castings and oil under boss of bottom one. Put end of vane hinge rod in hole in

main casting and securely fix top end of rod with “U” clip, washers and four nuts two of which are locknuts. Make sure that the bend in the “U” clips fits the groove cut in back of hinge so that oil holes’ points forward towards the wheel. The groove locates the oil hole and slow prevents the rod lifting.

9. TOP PULLOUT CHAIN: Thread a string or thin wire down over the chain roller in the side of main casting and temporarily attach it to top link of single pull out chain fastened by “S” hook to inner collar. Lift top end of chain over roller and tread it around the roller in pull out bracket. Check that it is not twisted. Pull chain several times to make sure that it moves freely over its rollers and that the pullout collars move freely up and down the mastpipe. Connect chain to “S” hook on bottom vane casting and close “S” hook carefully by twisting with a monkey wrench or use a hammer.
10. GOVERNOR SPRING: Take two nuts and washers off hooked tension bolt and put it through hold near top of main casting and through tension casting fig12. Put on plain washer carefully screw up one nut until spring buffer stud is about 1/8 inch away from the stop end of protruding arm od main casting. Screw on second nut against the first nut to lock it temporarily.

    IMPORTANT NOTE: A nut dies not go against both the front and back of tension casting. Both nuts must be together on back of casting. It will be necessary to readjust the tension after the lower pullout chains are attached to pullout wire.
11. PULLOUT GEAR: Straighten pullout wire to remove all bends and kinks. Connect the two pullout chains with the equalising bar closing its ends. Equalising bar is prevented from fouling the mill rod by the check chain attached to the plate. Attach chain plate to tower leg furthest away from longer pullout chain. On blot at second rail below bottom guide and in best position to provide sufficient mill rod clearance. Check chain is connected to the equalising bar by threading top end of pullout wire through both the top link of chain and hole in equalising bar, securely twisting the wire around itself a few times. Straighten wire loop a little. When the mill is let fully into the wind the outer collar must rise a little (about 1/8inch) above the latch. It then falls back and rests on the latch which it should overlap by about 1/4inch the weight of the pullout collars chain and wire are then supported on the latch so that the governing will be sensitive. After the pullout lever is connected (see paragraph 12) again adjust the governor spring tension to see that the buffer stud is 1/8inch away from the stop on main casing (see para. 10). A slight extra effort on the pullout lever will force the latch and spring outwards and allow the collars to slide down the mastpipe when the mill is pulled out of the wind. The length of the top pullout chain is such that the inner collar should be above the bottom guide about ¾ inch to 1 inch when the mill is pulled right out.
12. PULLOUT LEVER: Bolt the pullout lever bracket (with the pullout lever) about 4ft above the ground to the inside of tower leg to which the check chain plate is connected. Raise pull-out lever in its top positon supporting it with the stop pin and securely connect the straightened pull-out wire. Now pull mill out of wind and if the buffer stud in vane casting dose not contract the stop at end of pull-out bracket casting bolted to side of main casting, then lower the bracket for pull-out lever a little further down leg to save shorting the pull-out wire. If buffer stud is not hard against the pull-out bracket casting the mill may continue to work when it is pulled out and that is bad.

IMPORTANT: When the mill is working the weight of the raised pull-out lever must be supported by its stop pin and not be allowed to hang on the wire. Because the automatic governor prevents damage in storms it is safer not to pill the mill out of the wind. On no account leave the mill half pulled out

13. WOOD MILL ROD: Bolt the wood mill rod between connecting straps on guide bar fig12. It will be easier to accurately mark and drill the top end of the mill rod before fitting the guide bar (see para6) when mills rod (and pump rods if any) are all connected the bottom of pump plunger must be not less than 2 inch above the bottom valve cage. Top measure correct length of mill rod, rotate the mill until crank is at bottom stroke, then raise the pump rods to get necessary clearance before marking and cutting mill rod. if sails happen to be on the wheel select a calm day for this job. When two or more lengths of mill rod are used be sure they are in alignment after bolting fishplate connections.
14. GUIDE FOR WOOD MILL ROD: The mill rod should be straight and guided at no more than 10ft intervals at which distance tower rails have two holes for bolting the hardwood guide rails at 10 inches' centres. For each guide select four pines boards (not hardwood) two of the boards are nailed or bolted to the two hardwood guide rails and the other two are placed across them. The clearance all-round the mill rod should be about 1/16inch where the mill rod passes through the guide scrape off the paint and grease both.
15. WHEELS ARMS AND RIMS: The shorter portion of the wheel arm goes nearest the tower (at right angles to the shaft). Lightly bolt wheel arms to hub casting and bolt rims to arms taking great care that the rims all lap the same way that is one end over and the other end under the adjacent rims. The outer rims must be bolted on the outside ends of wheel arms and the inner rims on the inside faces (nearest to driving shaft) of the steel brackets (cross bars) in the arms fig13. Insert the bolts from the insides of rims and put a lock washer under every nut. Leave bolted a little more than finger tight until all arms and rims are on and the wheel frame is being trued up. NOTE: When bolting on the arms (and the sails later) put one on one side and then one on the opposite side of shaft so that they will tend to balance. To true up wheel frames, spin it around to see how it runs off a corner of the tower. By pulling the ends of the arms in or out as required the wheel must be made to run very true when the blots are tightened. It is better to have the ends of arms pulled in towards the tower legs than pushed out. Now again tighten up all the bolts in the wheel frame making sure that a lock washer is on every one of them and that the arms to hub blots are tight.
16. BALANCE WEIGHTS: Correct balancing is very important; an incorrectly balanced mill will not start in the frequent light breezes is its pumping capacity may be reduced by up to 50%. When the mill is working the pump rods are going on the pumping stroke the balance weights must be going downwards. The balance weights should be set so that they balance the weight of the working parts rods and pumping plunger which move up and down and also the water pressure on the plunger when the wheel is not moving. Therefore, it is far better to fix the balance weights after pump and rods are connected and before the sails are on. Rotate the wheel until crankpin is at top of stroke then lightly bolt balance weight to back portions (tower side) of the two bottom wheel arms. The correct setting can be determined by rotating the wheel until the crankpin is halfway on the downstroke (at 9oclock position when looking at the back wheel). Move balance weighted in towards shaft

until the loads just start to move the crankpin downwards and mark their positions on arms. Move crankpin back to 9oclock position and gradually move weights away from driving shaft until the slightest upward movement of the crankpin is noticed and mark arms again. Now securely blot on balance weights five inches further out than midway between the sets of marks on each wheel arm. NOTE: If a screwed stuffing box is fitted to the pump or discharged tee unscrew that gland nut and loosen and oil the packing before attempting to balance the mill.

17. SAILS AND SAIL BRACKETS: Bolt the sail brackets to the sails while on the ground with the blot heads on the front of sails and then hoist or carry up and blot to the rims fig13. The sail brackets must rest on the inside curved faces of the rims I.e. the faces nearest to the wheel hub and the bolt heads on the sail brackets. Before tightening the nuts press each sail and bracket back against the blots. All the same galvanised bolts must have a galvanised lock washer under the nuts. NOTE: All comet mills turn in a clockwise direction when looking at front of wheel.
18. DUST COVER: Figs 14 and 15 show how the weatherproof dust cover encloses the three working parts of these comet mills. To fit the dust cover, remove the wing nut and hex locking nut from ends of clamping rods. Also remove hinge pin. Place the side without oilwell over left-hand side of support arm flange on main casting (looking from rear) push clamping rod through hole in cover and screw on locking nut tightly with the fingers, keeping the clamping rod level at the same time pressing the dust cover hard against the casting and screw the inside nut outwards against inside cover. By inserting the hinge pin attach the other side of cover which holds the extra oilwell for oiling the crosshead ect. Close it over the clamping rod avoiding damage to syphon wicks) and tighten with wing nut fi 15. At the same time forcing it hard up against the casting. After seeing that both sides above the cover are fitting snugly, gently hammer the edges of the sides to a closer fit against the support arm flanges. Now open the hinged side and again check that the clamping rod is firm and level the carefully hammer the hook firmly on to the casting flange fig14. Remove hex. Locking nut from the other side to see if inside back nut requires adjustment in or out then firmly screw on the locking nut again.
19. TIGHTEN EVERY NUT ONCE AGAIN!
20. OLIING: Check that all oil wells and oil holes and tubes are clean. Remove galvanised iron auxiliary oilwell from main casting and the oil level cap screw from side of main casting and pour Comet windmill oil supplied in the main oilwell fill auxiliary until it comes out of oil level hole replace cap screw with washers and auxiliary oilwell. Fill auxiliary oilwell all other oilwells including on in dust cover and oil cup on the vane hinge rod. Oil level should be about ¼ inch below tops of oil tunes and oil holes pour a little oil down the inside of mastpipe and on to crosshead. It is important that syphon wicks are placed in their proper positions, it will be noticed that each wick has a tag to indicate its position in the mill. Remove tags before inserting their wicks. Insert syphon wicks with the wire end down the oil tubes or oil holes. The wick wires are correctly bent to allow their longer ends to protrude a fraction below bottoms of oilwells. Do not alter their shapes.

NOTE: after the mill has been working for a few hours and pulled out of the wind a few times examine the position of the vane to see if the tension on the governor spring needs any further adjustment see pars. (10 and 11)
IMPORTANT NOTE: The syphon wick oiling system is used on Comet mills, the wicks consist of a thin wire of a definite length and shape to which are attached two strands of a high quality wool. The wool strands must not be twisted around the wire nor their number per wick increased. As the wicks are filters they supply only clean oil to the bearings. After a very long time they may become clogged to the extent that the syphoning rate may be slowed down. Then it is only necessary to wash the wicks in kerosene or petrol also mop out any of the old oil in the oilwells and clean with some kerosene.
The quality and type of oil are important, the best oil is high grade machinery oil, consisting of a combination of paraffinic and naphthalene bases. Moto engine oils are not so satisfactory because they contain additives which affect the syphoning rate. Never use engine sump oil.
Comet Windmill Oil supplied with the mill is specially selected for the syphon wick lubrication system. Comet summer oil should be used in districts where the average of minimum temperatures does not go below about 50 degrees faranhight, for more than several days at a time. If it dies use comet winter oil during the winter months. Check mill oil supply every few months when loosened bolts should be attended to (on any make of mill) to avoid damage this is important!

GIVE THESE INSTUCTIONS TO THE OWNER OR MANAGER WHEN THE PLANT IS RERCTED AND PASSED.