



Hilomast

Telescopic Masts

OPERATING INSTRUCTIONS
PNEUMATIC MASTS
& ACCESSORIES
MKII RANGE

Issue 3



South Midlands Communications

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IMPORTANT INFORMATION



Before using the mast carefully read the operating instructions herein.



DO NOT use the mast unless it is fully extended.



DO NOT drive vehicle with the mast extended (ensure isolating magnetic switch is installed)



DO NOT attempt to rotate the mast unless fitted with a rotating system.
(NRB/229R)



Beware of overhead cables.



DO NOT exceed 30p.s.i maximum mast pressure
(Ensure safety relief – valve is installed)



Only use Superfluid and Kilfrost as recommended by SMC/Hilomast LLC.



DO NOT operate the mast

- Outside of the operating temperature range -30°C to +70°C
- At wind speeds or payloads in excess of those recommended

Note that the warranty will be invalidated in the event that:

- ❖ Specified oils and lubricants are not used, or
- ❖ Recommended service intervals are not maintained, or
- ❖ The mast is operated only partially pressured or extended
- ❖ The mast is operated within a moving vehicle or trailer, or
- ❖ Maximum working pressures, loading or wind loading are exceeded, or
- ❖ The mast is operated at temperatures outside the recommended range, or
- ❖ Non-accredited installation, or service work is undertaken, or
- ❖ SMC or Hilomast LLC supplied spares are not used, or
- ❖ The installation and operating instructions are not adhered to.

NO LIABILITY WILL BE ACCEPTED FOR DAMAGE OR INJURY CAUSED BY THE MAST CONTACTING POWER LINES OR BY ACTIONS OUTSIDE OF THOSE RECOMMENDED BY SMC/HILOMAST LLC.

MASTS

GENERAL INFORMATION

Telescopic masts are considered to be temporary structures and should not be expected to withstand all weather conditions indefinitely. The table on page 4 specifies the wind speed that each mast will withstand. For wind speeds in excess of those stated it is essential for the life of the mast and the safety of the operating personnel, to retract the mast.

Pneumatic masts operate at low pressures, normally between 1kg/cm and 1.75kg/cm (14 and 25p.s.i.)

DO NOT operate at pressures above those recommended for the type of mast in use. The mast may not only be severely damaged but injury could occur to personnel. Any mast requiring higher air pressures or utilising compressor equipment not supplied by the mast supplier/manufacturer should be referred back to us for consideration and advice.

Since telescopic masts are essentially composed of sliding sections, care should be taken to keep them clean and lubricated (see Maintenance section).

Hilomast pneumatic telescopic masts are constructed from heat-treated aluminium alloy tubing. Each tube is fitted with a piston that incorporates a neoprene lip seal and a PTFE slide ring. The upper end of each tube is fitted with a guide collar that also incorporates a PTFE slide ring. Attached to the upper side of each collar there is a locking collar fitted and clamped by means of a thumbscrew. These thumbscrews are fitted on alternate sides of the mast to give maximum operational clearance. For conditions where more clamping power is required or where the thumbscrews are considered to be an obstruction for the feeder cables, it is possible for these thumbscrews to be replaced with socket head cap screws. These can be tightened with a 6mm Allen key. All the parts necessary for both methods of clamping the collars are supplied with each mast.

All masts, with the exception of the NY series, have a base piston spigot diameter of 76mm and all mounting arrangements should be based on this size. All masts, except the NY series, have inlet and exhaust ports at ¼" BSP. The NY series ports are tapped 3/8" BSP.

Masthead spigots for all masts, with the exception of the NY series, will be 150mm long x 51mm diameter, except where specified.

If U-bolts and clamps are used to fasten antennas directly to the top section of the mast, DO NOT over-tighten as this can damage the keyway. BR series masts have a flange which is a 6" x 5-½" x ½" thick rectangular plate secured with one quick release pin. It can be drilled to suit customer's requirements.

Long Duration Storage

If possible, store in an upright position to prevent seal distortion (see Maintenance section)

LOADINGS – WIND SPEEDS – GUY RADII FOR HILOMASTS

Mast	Vertical headload	Maximum wind speed unguyed	Maximum wind speed with top guys	Top guy reference number	Antenna side surface area	R1	R2
	kgs	Kph	Kph		Sq. cms	metres	metres
NH5	18	180	180	NUG/1	1000	1.2	2.4
NH7	15	135	160	NUG/1		1.5	3.4
NH9							
NK6	27	164	164	NUG/2	1400	1.5	2.8
NK9	22	114	137	NUG/2		2.0	4.3
NK11	18	96	125	NUG/3		2.0	5.3
NK16	20	65	112	NUG/4		4.0	7.6
NL8	32	140	140	NUG/2	2000	1.5	3.8
NL9	35	130	130	NUG/6		2.0	4.1
NL10	27	110	120	NUG/5		2.0	5.0
NL12	25	95	110	NUG/4		2.0	6.0
NL16	23	78	102	NUG/6		4.0	7.3
NL22	14	56	92	NUG/8		4.0	10.5
NX8	50	155	155	NUG/6	3000	1.5	3.5
NX10	50	120	120	NUG/7		2.0	4.8
NX14	35	92	95	NUG/5		2.0	6.6
NX18	30	70	83	NUG/10		4.0	8.8
NX25	20	52	80	NUG/9		4.0	12.0
NX30	14	44	75	NUG/8		4.0	14.5
NY7	120	150	*	-	11000	-	-
NY10	100	126	*	-		-	-
NY12	90	90	*	-		-	-
NY14	70	80	*	-		-	-
NY18	50	83	*	-		-	-
NY21	40	67	*	-		-	-

The above table shows the vertical headload each mast will support and the maximum operational wind speed. The weight of the antenna, however, is not usually the main criterion when selecting a mast. The limiting factor is usually the 'side surface area' of the antenna.

For areas in excess of those shown in the table, the maximum wind speed will be reduced.

SAFETY

At times be aware of overhead obstructions especially power lines (we recommend use of the **Sigalarm**, high voltage power line proximity warning system. Please call for further details). Note that in the interest of safety and reducing mast wear, the Sigalarm and air supply system must be arranged so as to dump air from the mast in the event of triggering the Sigalarm or any similar device. With vehicle mounted installations where a retracted mast projects above the roofline, always fix a notice in the driving cab advising the driver of the overall height. Where a mast is vehicle or trailer mounted **DO NOT MOVE THE VEHICLE OR TRAILER WITH THE MAST EXTENDED** (see also Magnetic Switch page 14).

When erecting a mast, watch particularly for snagging guys and cables.

Due to the low pressures needed to extend masts, under no circumstances should standard commercially available compressors be used without consultation with the supplier/manufacturer.

Mast Air pressure

NH/NK series	1.75kg/cm maximum – 1.20kg/cm minimum (25-17 psi)
NL/NX series	1.40kg/cm maximum – 1.12kg/cm minimum (20-16 psi)
NY series	1.12kg/cm maximum – 0.98kg/cm minimum (16-14 psi)

Air pressure should not be increased above that stipulated without first referring to the supplier/manufacturer. Over pressurisation severely strains the collar and base section screws and can, in extreme circumstances, force a collar off and allow the tube to blow out.

If a tube section sticks during the extension of a mast severely enough to cause it to crash into its relevant collar, the cause must be investigated immediately. Failure to do so will result in progressive mechanical damage. The most common causes are as follows:

Lack of lubrication:	See Maintenance section (page 8)
Key sticking in keyway:	See Maintenance section (page 13)
Bent or damaged section:	Usually caused by overloading mast and/or operating at too high a wind speed.

If there is no obvious reason for a section to stick, that section must be removed for inspection and possibly also the next largest section into which it slides.

When fitting optional rotation handles, tighten sufficiently for the components to hold firmly. **DO NOT** over-tighten as this can distort the base tube and cause the mast to stick at that point.

DO NOT remove the exhaust valve in an attempt to retract a mast more quickly, especially when the mast is carrying a heavy headload, since this action removes control over the rate of descent. In extreme cases, the uncontrolled collapse of a mast can lead to the headload being damaged, together with applying shock loads to the mast fixings.

OPERATING INSTRUCTIONS

NH/NK/NL/NX Series Hilomasts

- (1) Close the mast exhaust valve by turning in a clockwise direction until finger tight.
- (2) All locking collars, with the exception of the top one, should be securely tightened by turning the thumbscrew in a clockwise direction. The locking collars are situated immediately above the guide collars at the top of each section.
- (3) Connect the air supply to the mast (see maximum air pressures in safety section). When the top section is fully extended the locking collar should be securely clamped with thumbscrew. It is sometimes helpful to switch off the compressor between clamping sections. The next lower collar should then be released and that section raised and clamped and so on, until the mast is fully extended.
- (4) If the mast is to be used for frequent operations of short duration, the collars need not be clamped, since all Hilomast compressors are fitted with differential pressure switches that will maintain mast air pressure.
- (5) To lower the mast, open the mast exhaust valve by turning anti-clockwise. When the air is released, unclamp the lowest collar. As each section of the mast descends it will bring down the next collar for release and so on, until the mast is fully retracted. The rate of descent cannot be increased as it is controlled by the air release valve to protect the mast.
- (6) In the case of NX series masts carrying large headloads, additional control over the rate of descent may be afforded as follows:

After releasing air pressure (see 5), close the mast exhaust valve before releasing the locking collars. The load will then be cushioned on trapped column of air. Release air from the mast to give the rate of descent required.
- (7) All Hilomast compressors are fitted with either manually or electrically operated exhaust valves and it may be more convenient to lower the mast through these.
- (8) When the mast is required to operate on only one or two sections, it is only necessary to unclamp those sections.
- (9) Locking the top section or sections in the retracted position will allow the shortened mast to operate in higher wind speeds.

Note: The locking collars are adjusted during assembly. However, if any locking collar is not clamping the section securely when fully tightened, it should be released and the socket screw or thumbscrews adjusted until the clamping action is sufficient. As a guide the gap on each side of the locking collar should be equal when that locking collar has been tightened. If one side is closed too much, the mast section may not release properly.

For frequent operations or for situations where the sections will be locked more permanently the thumbscrews can be replaced with socket set screws operated with a T key.

NY series

NY series masts are built specifically for high accuracy/high load operation and would normally form part of a fixed installation.

Standard NY series masts are not supplied with locking collars; therefore, loads would normally be carried on a maintained column (see maximum air pressures in Safety section). NY series of masts must be operated at full extension.

Locking collars can be fitted at extra cost. (Ask for details)

- (1) When pressurising the mast, it is imperative to ensure the free running of all antenna feeders and other equipment cables. The mast extension could be powerful enough to snap the cable and the air pressure supplied to do this will cause the mast to shoot up, possibly with sections crashing into their respective collars, resulting in heavy shock loads.
- (2) Air must be exhausted in a controlled manner. Remember that the NY series of masts can carry a dead weight up to 120kg. All Hilomast compressors are fitted with either manually or electrically operated exhaust valves. If a remotely operated exhaust valve is fitted to the mast a restriction nozzle may be required to give a maximum descent speed for the load the mast carries.

MAINTENANCE AND REPAIR

Mast maintenance

Inspect and lubricate mast sections at four-week intervals or every 200 operations, whichever occurs first. If the mast has been used in a dusty environment resulting in a build up of contaminants and old lubricant on the surface of the tubes, then this must be removed. This can be done by wiping each section with an oil soaked cloth. SMC build the masts using Hilomast lubricant oil (SMC Part No. 000055500). To protect the seals oil should be injected into the spring-loaded grease fitting situated in each collar. Alternatively, proprietary oil misters may be incorporated within the air supply line. Sufficient oil is needed to run down the inside of each tube. During periods of sustained cold and freezing conditions SMC/Hilomast LLC recommend the use of Kilfrost (SMC Part No. 000055600). Periodically oil the locking collar thumbscrew treads if fitted. Lubricant and dispensing cans are available from SMC/Hilomast LLC. Use of oils other than those prescribed by SMC/Hilomast LLC will invalidate the mast warranty.

FAILURE TO LUBRICATE THE MAST WILL RESULT IN DAMAGED SEALS THAT WILL NOT BE REPLACED UNDER GUARANTEE.

Where masts are to be extended for long periods, a coating of silicone grease is recommended to help prevent corrosion forming on the exposed metal. In dusty conditions it may help to use silicone spray, which is almost dry in operation, on the sections. These products are available from retail outlets.

- (1) It is possible for water to enter a mast in two ways.
 - a) By vapour carried down the compressor line condensing in the mast. This may be drained through the mast exhaust valve.
 - b) By rainwater running down the sections and collecting above the seals. This makes a mast vulnerable to icing up. It is therefore advisable to use a mast cover when the mast is retracted and to leave the exhaust valve open or remove it altogether, when the mast is not in use if the conditions so dictate. Great care should be exercised if the mast is likely to be used in freezing conditions.
- (2) Compressors should be placed on a level with or below the base of the mast to prevent moisture build up in the airlines. If a compressor has to be placed higher than the base of the mast, care must be taken not to allow water to become trapped in the airlines. Disconnect the airline from the mast and blow out the line at frequent intervals or fit a drain valve at the base level of the mast.

Hilomast Seal Replacement

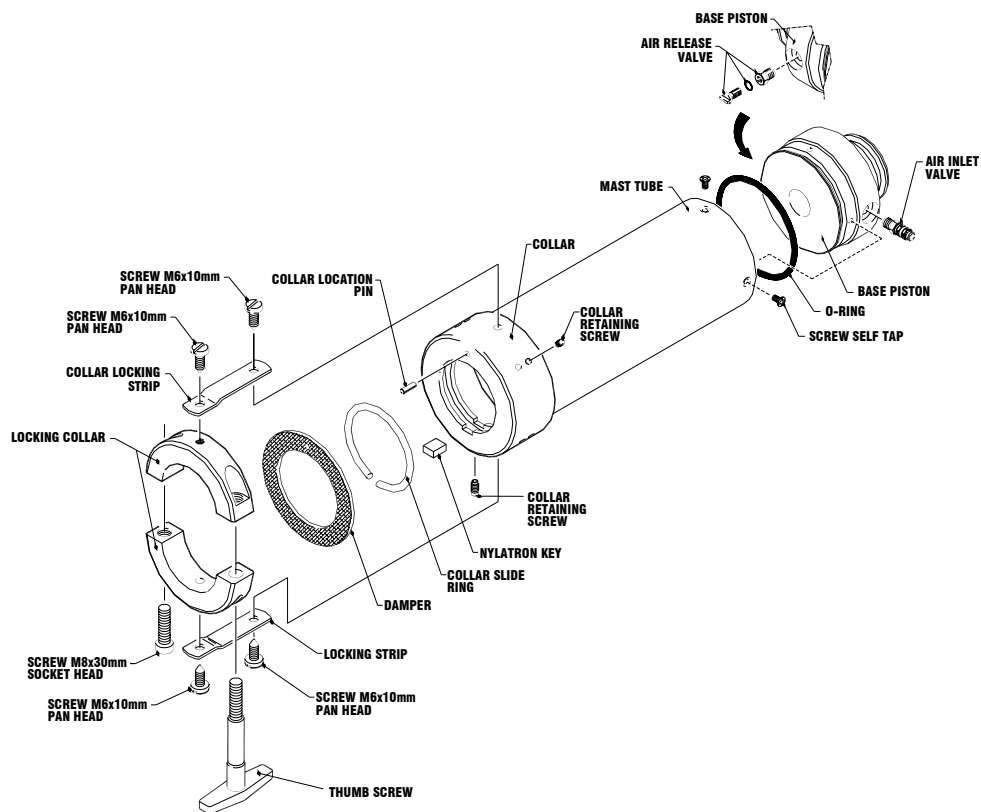
If the mast will not extend due to air leakage, first check that air is not escaping from the inlet or air release valves.

When the mast has been stored in a horizontal position, the seals may deform slightly and allow air to pass. It is also possible under some storage conditions, for the grease used in manufacture to harden and prevent the seal lip from touching the tube wall.

To correct this, stand the mast at a vertical position and inject some Hilomast lubricating oil, allowing it to drain down inside the tubes. Then pull out each section in turn and thrust downward (with the air release valve closed). This forces the lip of the seal back to its original position against the wall of the tube.

DISMANTLING THE MAST

If possible, lay the mast horizontally and pull out the sections to full extension. **MAKE SURE TO PROVIDE THE MAST WITH SEVERAL SUPPORTS ALONG ITS LENGTH TO PREVENT THE TUBES BENDING.** Apply low air pressure to the mast and test for air leaks around the collars using a soap solution. If an air leak is discovered, remove the sections above that collar i.e. all the smaller sections, as one unit if possible, by releasing the collar from its tube (see following instructions). If no positive leaks are found by the above method, closely examine the keyways for cracks. If none can be found proceed as follows:



- (1) Loosen the lower pan head screw on the stainless straps (if fitted with locking collars). Remove any sealing compound from screw holes to reveal screws. Loosen the socket set screws "A" from the collar, except the one securing the Nylatron key "B". Note there are two screws in each hole. The outer screws are shorter and used to lock main screws.
- (2) Holding the collar onto its tube, pull out all the remaining sections (keeping them together as one unit) until the tube stop "C" is against the collar.

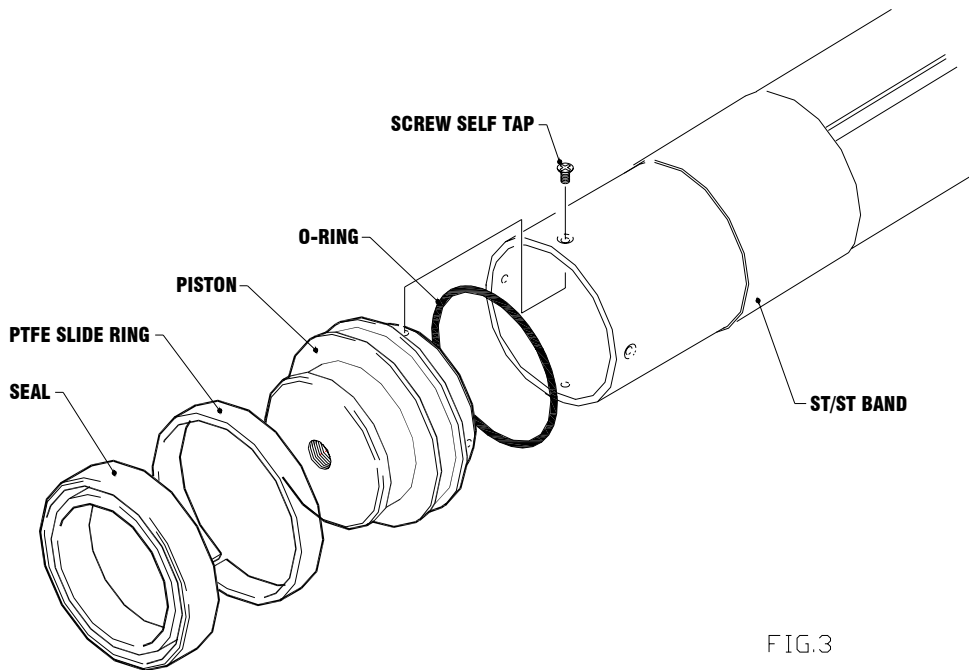


FIG.3

- (3) Taking care to support the extended sections, slide the collar away from the bottom tube. Continue pulling the extended sections out until the piston is free from the bottom tube.
- (4) Remove the air inlet valve from the base of the mast or spares kit and fit into the tapped hole "D" in the exposed position. With a foot pump attempt to extend the remaining sections. If they extend it will indicate that the exposed seal is the one requiring replacement. If they do not extend, expose the next piston and seal using the same procedure – and so on – until the faulty seal is located.

Since it is unusual for a seal to fail, it is necessary at this stage to establish the cause if possible. If small particles of metal are found around the seal, it usually indicates that something has scraped the tube. This can happen if the mast has been violently abused, if some modification with different screws or clamps have been fitted by the customer or if the mast has not been serviced and lubricated regularly.

- (5) Clean the tubes with a cloth and examine the tube surfaces. If there are dents or sufficient surface damage to affect the seals, then the section will not function correctly and should be replaced.
- (6) Remove the faulty seal; in most cases the damage is imperceptible. Having oiled or greased the new seal, fit into the piston groove using only the fingers, DO NOT USE METAL TOOLS. The PTFE slide ring "E" should be replaced at this stage if necessary (see separate instructions at 6a over page).
- (7) The sections must now be refitted with great care. It is possible to damage the new seal on the edge of the receiving tube. Check the edge for sharpness or burrs also check the screw holes and ensure they are completely smooth. Then oil or grease it to help insertion of the section with the new seal.
- (8) Line up the section to be inserted, with the new seal at a slight angle to the mouth of the receiving tube. Hold the edge of the seal down with the thumb and turning the tube, allow the compressed part of the seal to enter the receiving tube. Once all the seal is inserted, correct the angle so that the tubes line up and insert Teflon slide ring. Keep the tube being fitted as concentric as possible with the receiving tube, until the stainless steel tube stop "C" has just entered. The collar can now be pushed forward onto the receiving tube and when secured it will maintain radial clearance.

NY SERIES

The NY mast has additional anti-rotation locking pins engaging in slot in the stainless steel stop sleeve.

The mast should be assembled in the normal way but with these pins removed. Replace them as each section is built up.

- (1) Pull out section to its maximum i.e. until the stop sleeve comes against the support collar.
- (2) With a pencil, mark the section at the collar.
- (3) Push in section about 25mm. Screw in locking pin until it touches the bottom of the keyway then unscrew half a turn.
- (4) Pull out section. If the pin is engaging the slot the section will come out enough to enable the pencil mark to be seen again i.e. the stop sleeve will be against the collar.
- (5) If the pin does not engage push in the section again, continue to unscrew the locking pin and repeat instruction 4. The pin should only be unscrewed a few degrees at a time each successive attempt
- (6) Finally, screw lock nut down firmly.

PTFE Slide Ring Replacement

(6a) The Teflon rings should be examined for scuffing and wear. If replacement is necessary they should be fitted before the seals. A length of Teflon should be cut so that there is a small gap between the ends when it is wrapped around the piston groove. The piston should then be pushed into the receiving tube over its entire length of travel. Should any tight spots be revealed, the PTFE should be thinned down slightly with a sharp knife or abrasive paper, taking care to keep the thickness as even as possible. This procedure should continue until the piston slides freely.

Piston replacement

When the mast is dismantled, the pistons should not be removed. They are fitted during manufacture by heat shrinking the tube onto the piston, in the event of removing the piston; they cannot be secured by the same system. It should be noted that the smaller tubes have the extra security of screws into the piston spigot "F" and this must be used to refit a piston.

After removing the seal and PTFE ring, coat the piston spigot "F" with a sealing compound and insert into the tube. Drill two holes and countersink for the screw head, clear away all swarf and fit self-tapping screws. Should air leaks be evident, use further sealer on the screw heads and around the piston where it meets the end of the tube.

NYLON KEY REPLACEMENT

Tools required: 3mm Allen key and screwdriver, a fine file may also be needed.

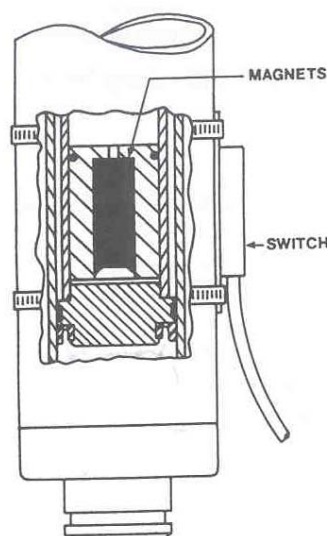
- (1) For this operation, dismantle as described on page 9 onwards, but only the mast collars need be removed, the tubes may be left in their nested position. Mark the base tube with a pencil so that the collar is assembled at the same place.
- (2) When the collars have been removed from the end of the tube, the green nylon key can be seen in its slot inside the main collar. After removing the old key, slide the appropriate tube out until the stainless steel 'stop band' shows (no further please) this is the lower end of the keyway channel. Slide the new key along this key way to ensure it runs smoothly along the entire length, if there are any tight spots carefully dress the edge of the keyway with a fine file, do not dress the key itself or you will end up with a loose fit elsewhere.
- (3) There is an adjustment screw and locking screw behind the key slot in the collar, back these off and insert the new key – largest collar first. Replace the collar onto the tube using the pencil mark to locate the same place. Use the Allen key through one hole in the collar to locate the hole in the tube and line it up exactly so that the dog point screw will not miss it, failure to locate the screws in the tube means that it would come apart when pressurised.
- (4) Repeat this operation at the position directly opposite the first screw, then fit the rest, and the locking screws. Do not over tighten, when tight go further quarter turn but no more. Use a thread-locking compound (Loctite 243) on the pan-head screws.
- (5) Now adjust the nylon key screw, it should be just tight enough to allow the tube to run smoothly, again do not over tighten, and finish with the locking screw.

FITTING INSTUCTIONS

Magnets

- (1) Grease O-ring on magnet housing.
- (2) Remove mast cap and insert the magnets in their housing into the top tube, O-ring first. The housing should be a tight fit but if too tight the O-ring should be trimmed with a sharp knife.
- (3) Push the unit down to the bottom of the tube with a rod and replace the cap.

DO NOT hammer the rod to make sure that the unit is fully down, since this could disturb the piston on which the magnet housing is sitting.



Magnetic Switch

- (1) The proximity switch should be strapped to the mast such that it may be moved up and down: nylon cable ties are usually the best.
- (2) Connect a meter across the switch and move the switch up and down until the optimum position is found.

Note: If a length of the top section is being used to directly mount antennas, position the switch with the antennas in place.

- (3) Tighten straps.

Various methods may be used to hold the switch to the mast but obviously DO NOT drill fixing holes in the mast.

	NK & NH	NL & NX
Minimum breakdown voltage	200V DC	500V DC
Maximum current	0.25A	1.5A
Maximum voltage	28V DC 20V AC	- -
Maximum load	3W	20W
Contact resistance	100m ohm	250m ohm
Cable colour code	White-common Red-N/O Blue-N/C	Brown-N/C Blue-common Black-N/O Green-case

MAST MOUNTINGS

There are several mounting arrangements available for the installation of masts. They can be mounted either internally or externally to a vehicle or building. For erecting masts on open ground, base guy assemblies are available; they are the strongest for field mounting. For the NH, NK, NL and NX series, field stands have been designed specifically for the purposes, up to extended height of 18m.

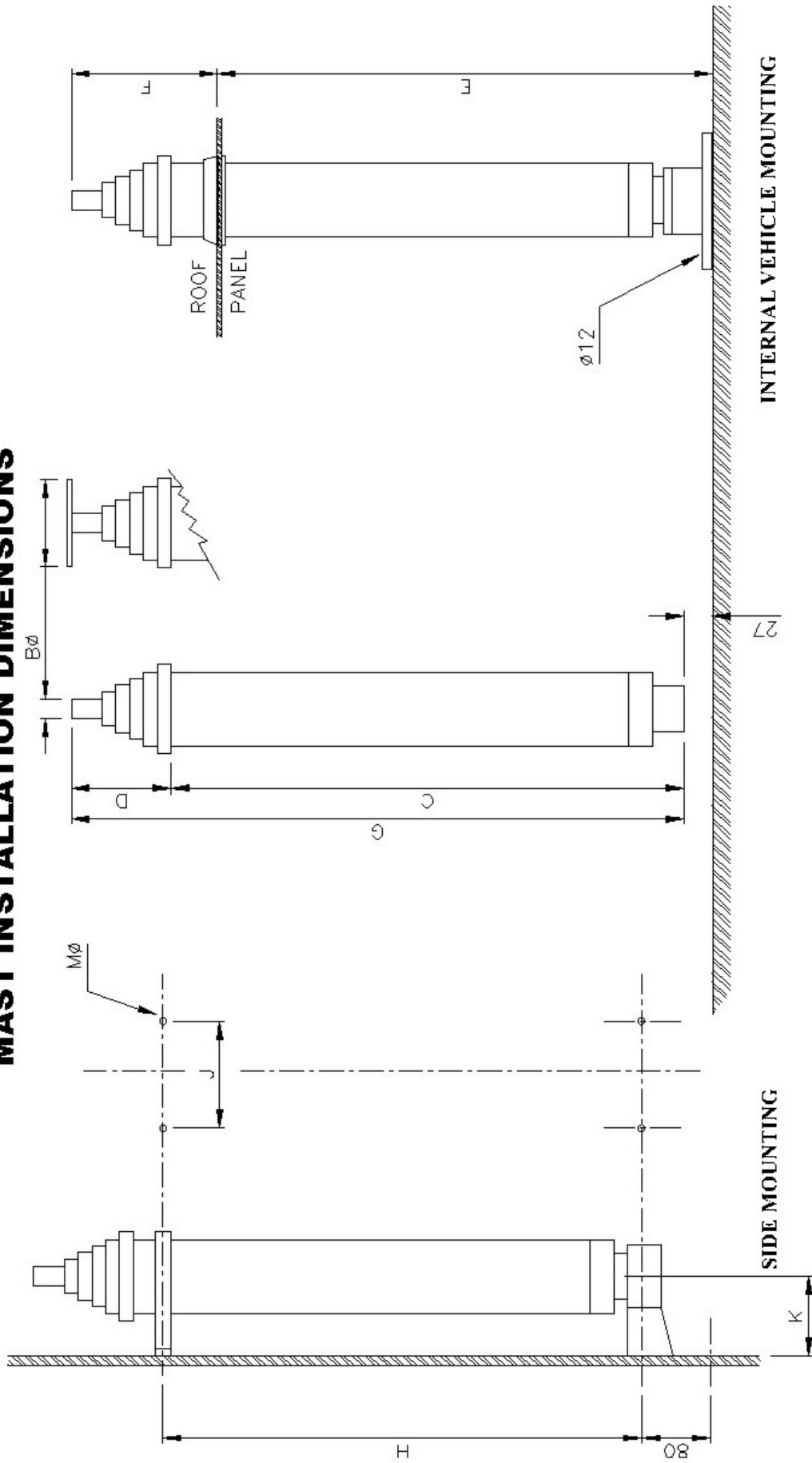
Side Mounting Brackets

For mounting masts to a vertical surface of a vehicle or building, the set includes two brackets. The aluminium top bracket has one half detachable to allow for removal of the mast without disturbing the bracket fixings. It incorporates Teflon bearing rings to protect the mast. The lower bracket has a PTFE disk to permit easy rotation of the mast and thumbscrew for locking in any azimuth direction. On the NX and NY series, the bracket is galvanised steel with aluminium base plate and collar break.

The dimensions for drilling the mounting holes are shown on pages 16 and 17. Note that for the NY series, the bottom bracket has two additional holes. It is important that the correct size bolts are used as shown in the table. It is important also when bolting to a vertical surface to ensure that the structure is strong enough or suitably reinforced to take the loads. If any doubt, please contact supplier/manufacturer for specific loadings for each mast.

All of the lower mountings are fitted with M6 screws on each side. After the installation of the mast, these screws should be tightened and adjusted to permit the mast to rotate but to prevent it from disengaging vertically from the bearing. It is important that the upper and lower bearings are aligned carefully to permit the mast to rotate easily.

MAST INSTALLATION DIMENSIONS



Mast	A Dia	B Dia	C	D	E Min	E Max	F Min	G	H Min	H Max	J	K	M Dia
NH5	89	38	1161	252	800	1125	315	1413	800	1100	150	108	10
NH7	89	38	1586	252	1000	1550	315	1838	1000	1530	150	108	10
NH9	89	38	2043	252	1200	1955	315	2268	1200	1990	150	108	10
NK6	102	50	1361	277	900	1325	340	1638	900	1300	150	108	10
NK9	102	50	2026	277	1300	1990	340	2303	1300	1970	150	108	10
NK11	102	38	2026	340	1300	1990	403	2366	1300	1970	150	108	10
NK16	102	50	3736	277	2000	3700	340	4013	2000	3680	150	108	10
NL8	127	50	1368	403	900	1332	466	1771	900	1300	150	108	10
NL9	127	50	2033	407	1300	1997	470	2440	1300	1980	150	108	10
NL10	127	50	2033	470	1300	1997	533	2503	1300	1980	150	108	10
NL12	127	50	2033	403	1300	1997	466	2436	1300	1980	150	108	10
NL16	127	50	3743	407	2000	3707	470	4150	2000	3680	150	108	10
NL22	127	50	3743	403	2000	3707	466	4146	2000	3680	150	108	10
NX8	152	50	1375	533	900	1339	596	1908	900	1300	160	130	12
NX10	152	50	2040	470	1300	2004	533	2510	1300	1960	160	130	12
NX14	152	50	2040	596	1300	2004	659	2636	1300	1960	160	130	12
NX18	152	50	3850	470	2000	3814	533	4320	2000	3770	160	130	12
NX25	152	50	3850	596	2000	3814	659	4446	2000	3770	160	130	12
NX30	152	50	4040	529	2200	4004	592	4569	2000	3980	160	130	12
NY7	238	150	1381	282	900	1343*	347	1663	900	1300*	200	130	12
NY10	238	150	2026	239	1300	1988*	304	2265	1300	1950*	200	130	12
NY12	238	150	2026	325	1300	1988*	390	2351	1300	1950*	200	130	12
NY14	238	150	2026	368	1300	1988*	433	2394	1300	1950*	200	130	12
NY18	238	150	3756	239	2000	3718*	304	3395	2000	3680*	200	130	12
NY21	238	150	3756	282	2000	3718*	347	4038	2000	3680*	200	130	12

Note: All dimensions in mm

* Dimension will decrease by 68mm for non-rotating base plate

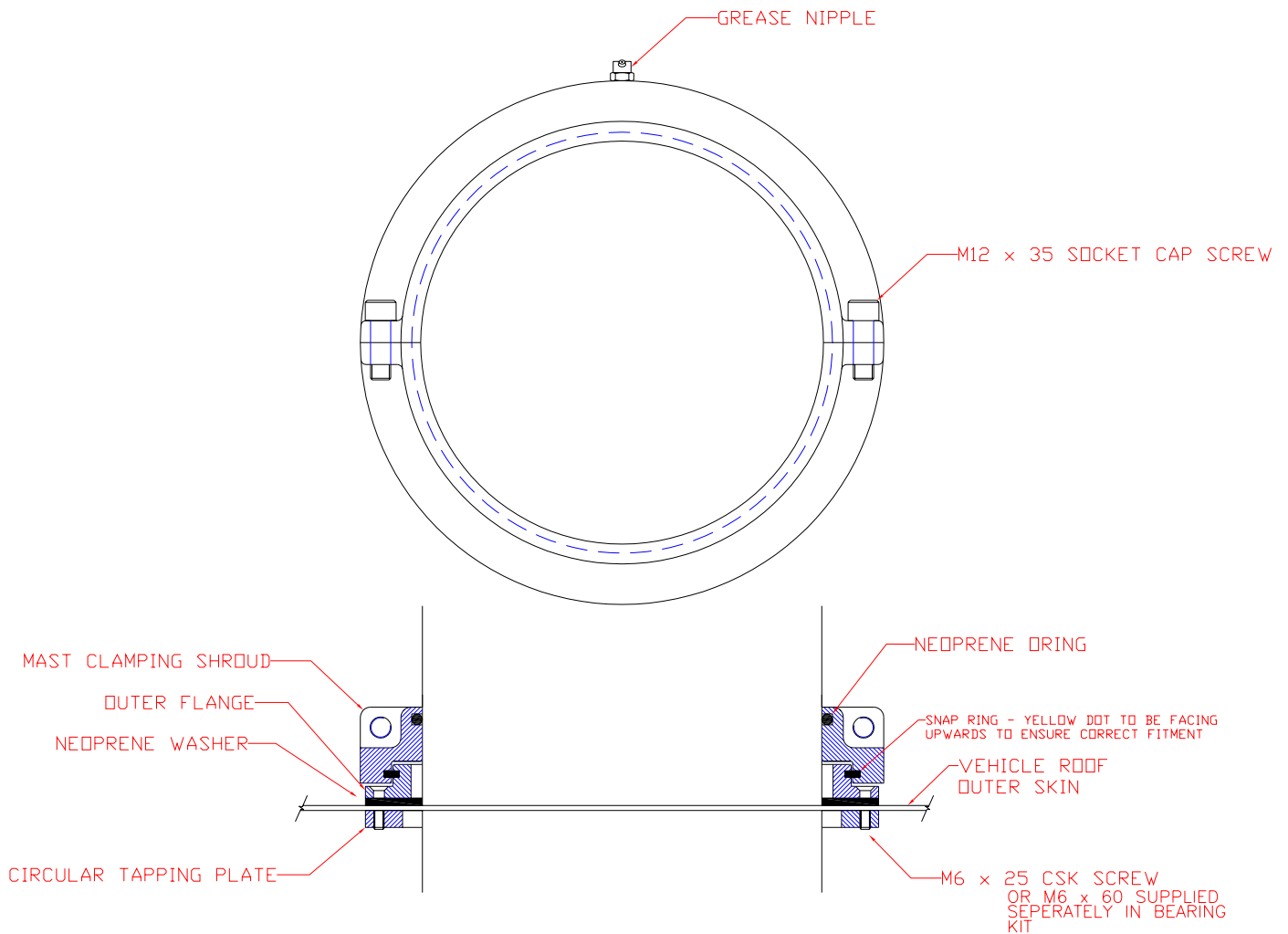
NH NK NL NX FM VEHICLE BEARINGS

- (1) Select a suitable horizontal location for the roof bearing. Maximum and minimum installation dimensions are shown on pages 16 and 17.
- (2) Cut a hole in the outer skin equal to the internal diameter of the bearing tapping plate.
- (3) Clamp the outer flange centrally over the hole and using as a template, drill six holes 6.5mm diameter (8 holes for NY series)
- (4) Assemble bearing as shown in drawing, with the neoprene gasket sandwiched between the outer flange and the vehicle skin. The screw head should be sealed with a suitable compound to prevent water ingress. If the roof is not perfectly flat, it may be necessary to use sealer at this location also.
- (5) Remove inlet valve from base of mast with box spanner provided.
- (6) Fit the neoprene O ring over the base of the mast and position at the approximate height of the bearing. Ensure that the PTFE ring is fitted in the flange. The mast may now be lowered through it. It may be necessary to shave a thin layer of the PTFE with a sharp knife to ensure good fit. If the mast is to be rotated in normal use, leave a minimum gap between the mast and the Teflon, since excessive clearance at this point will lead to considerable wind noise when the vehicle is travelling.
- (7) The lower end of the mast can now be fitted into the base plate secured directly below the roof bearing (tighten the two M6 screws in the base plate).
- (8) The two halves of the roof-bearing shroud may now be clamped into position. Lightly grease the outside of the O-ring and make sure that it lines up with the groove in the shroud. The mating faces of the two halves of the shroud should be covered with sealing compound before clamping securely to the bolts. Vertical clearance between the shroud and outer flange should be just enough to allow the mast to rotate without any parts rubbing. If mast rotation in service, is not required to use sealing compound inside the shroud before bolting up.

NY VEHICLE BEARINGS

As can be seen on the drawing below, this mounting is constructed differently from the other vehicle bearing kits before, and therefore needs slightly different fitting. There is no Teflon bearing, as the mast itself makes no contact with the roof bearing or tapping plate. Rotation is supported and guided by the mast-clamping shroud, which fits snugly over the bearing and is lubricated with grease through the nipple provided.

Because the tolerance between the machined parts is critical, greater care must be taken to ensure that the base plate is placed with complete accuracy so that the mast is perfectly vertical. It is also very important that the roof surface and bearing are exactly horizontal otherwise rotation will not be smooth.



- (1) Select a suitable horizontal location for the roof bearing. Maximum and minimum installation dimensions are shown on pages 16 and 17. Ensure that there are no obstructions for the base plate on the floor.
- (2) Cut a hole in the outer skin equal to the internal diameter of the tapping plate.
- (3) Clamp the bearing centrally over the hole and using it as a template, drill eight holes 6.5mm diameter.
- (4) Assemble the bearing and tapping plate as shown with the neoprene gasket sandwiched between the bearing and vehicle skin. The screw heads should be sealed with suitable compound to prevent water ingress. If the surface of the roof is fluted patterned or in some way not perfectly flat, it will be necessary to use filler and sealer to ensure it is horizontal and that there is a perfect seal.
- (5) Ensure that the base plate is in exactly the right position below the bearing by using a plumb line or similar device. Remember that the weight of the mast may be as much as 130kgs, which would affect the horizontal plane of the vehicle.
- (6) Remove all valves from the mast and fit the neoprene O-ring over the base tube, position it at the approximate height of the clamping shroud. The mast may now be lowered through the bearing onto its base plate. The fixed base plate will be screwed to the underside of the mast and then bolted to the floor. The rotating base plate accepts the special base spigot screwed to the mast base.
- (7) The two halves of the clamping shroud may be clamped into position. Lightly grease the O-ring and make sure it lines up with the groove in the shroud. The mating faces of the two halves of the shroud should be covered with silicone sealer compound to make them waterproof. Clearance between the bearing outer diameter and the clamping shroud is already machined to the correct dimension, therefore, only the piston of the clamping shroud above the bearing needs to be set, it should be as close as possible without touching. If mast rotation is not required then the two parts can be coated with sealer where they touch before bolting up.

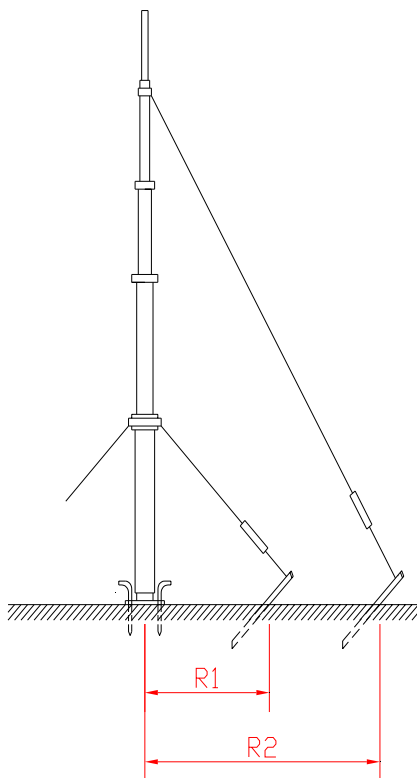
BASE GUY ASSEMBLY

This arrangement is generally the easiest method of erecting a mast on open ground. The kit is complete with the mast fittings, 3 guys, adjusters, base plate, ground stakes and pegs. Foundation bolts are also supplied for mounting on concrete foundations.

The base plate incorporates a PTFE disk to permit rotation of mast and thumbscrew for locking in any azimuth direction.

NH and NK kits have polyester guy ropes with adjusters. The NL and NX kits have galvanised steel guy ropes with conventional rigging screws. The base guy collars are supplied in two halves to permit easy fitting to mast. The base guy collar should be set as close to the top collar on the base tube as is practical.

It should be remembered the guys transmit considerable downward thrust on a mast and should only be sufficiently tightened to restrain movement. When setting up mast on open ground, the ground stakes should be set at a radius R1 as shown in table on page 4.



TOP GUY ASSEMBLY

For use in inclement weather conditions or to give more directional stability to top of mast. In some cases, masts will withstand higher wind speeds, (see table page 4). This assembly comprises a detachable aluminium guy collar, D shackles, 3 pre-stretched polyester guys 5mm diameter, fitted with rope grips, nylon adjusters and ground stakes. The guy collar is supplied in two halves and is designed to clamp to the upper end of the second (from top) section as shown. The specific guy reference for each mast can be found on table page 4. The ground stakes should be set at a radius R2 as shown in this table.

Masts with extended heights of 15m or more may require mid-guys for complete stabilisation, since wind pressure can bow the mast between the ground and the top guys.

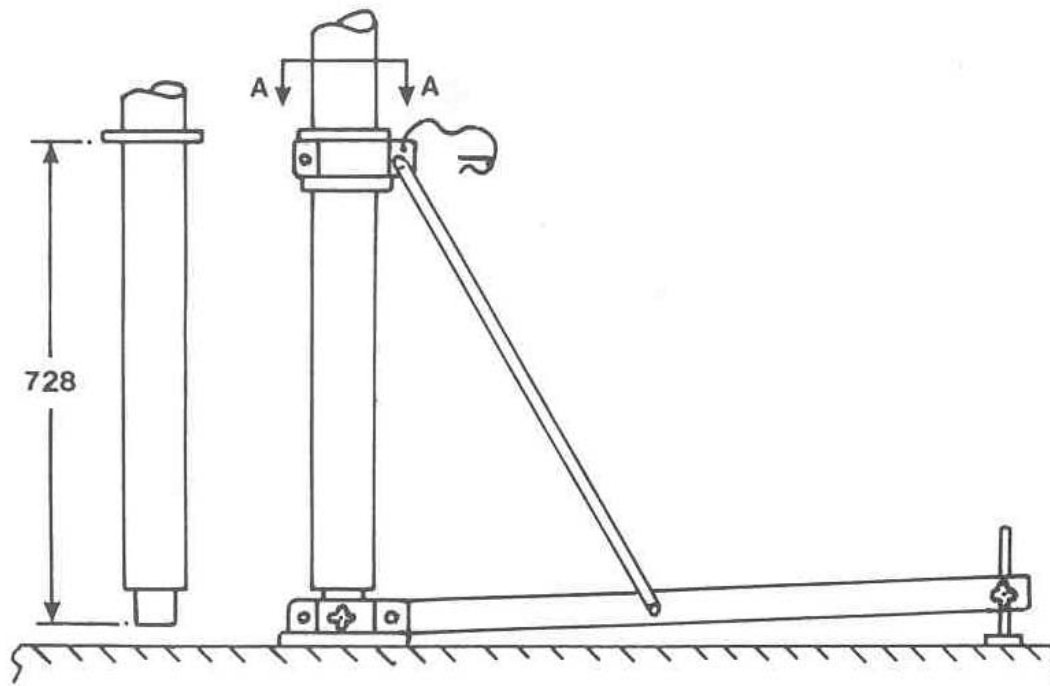
TRIPOD STAND FOR NH MASTS

Fitting instructions

Before the tripod stand can be used, the top bearing must be fitted to the mast as follows:

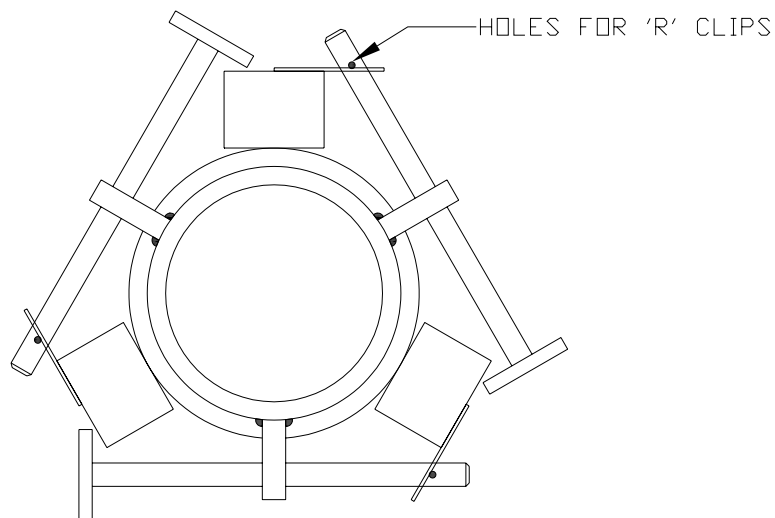
- (1) The top locking collar must be securely clamped in position at 728mm from the base of the mast, as shown in the sketch.
- (2) Remove inlet valve so that the upper bearing can now slide up to meet the top locking collar, ensuring that the Teflon rings are in position.
- (3) The lower locking collar can now be clamped below the bearing but leaving sufficient clearance to allow the bearing to rotate.

Once the upper bearing is fitted it can remain as a permanent fixture on the mast, even when the tripod stand is not used.



Erecting Instructions

- (1) Place the stand in position on the ground and hinge the three legs out into horizontal position.
- (2) Place the mast into the lower bearing, ensuring that the PTFE disk is in position.
- (3) Remove the three struts from their stored position in the legs and fit them into the holes provided in the upper bearings. Push the three attached R clips into holes in struts.
- (4) Lower the adjustable feed just sufficiently to prevent the stand from rocking and to set the mast vertically. Lock the feet with thumbscrews provided.
- (5) Turn the mast to the direction required and lock with the thumbscrew in the lower bearing.
- (6) For transit the legs can be folded into mast and clamped in position with R clips as shown in Section AA.



SECTION A-A
LEGS FOLDED

FIELD STAND (N4L/102) FOR NK MASTS

- (1) Remove inlet valve with box spanner provided.
- (2) On the NK16 masts only, fit the first split collar approximately 2m up from the base of the mast. All other masts split collar should be fitted up against the base collar.
- (3) Slide mast through the stand collar.
- (4) Position the second split collar close under the stand collar, with sufficient clearance to allow it to rotate.
- (5) Refit inlet valve.

DO NOT over tighten split collars.

To erect the mast securely, peg the base plate into the ground and spread legs until they are approximately 45 degrees to the mast. Clamp the sliding sections and securely peg the feet.

Safety note: NK masts mounted on this stand should not be left unattended. The resistance to overturning is determined by the quality of anchorage of the ground pegs in the base plate and feet. Tests have been carried out on average soil conditions and the following rules must be observed.

(For NK6, NK9 and NK11 masts, top guys must be fitted at wind speeds above 40kph.

For NK16 masts, top guys are required at all wind speeds.

A special all steel tripod stand is available for NL and NX models up to 18 metres extended.

COMPRESSORS

GENERAL INFORMATION

Hilomast compressors are air cooled, oil-less electric motors of the diaphragm type enclosed in a steel case. All models incorporate a pressure controlled switch to maintain the correct mast working pressure. They are quiet, maintenance free and assembled from components that have a proven reliability over many years.

Compressor Type	Approximate Rate of Mast Extension (Metres per Minute)				
	NH Series	NK Series	NL Series	NX Series	NY Series
NC1	7.2	4.2	2.6	1.7	-
NC2	13.5	8.1	4.8	3.2	1.7
NC3	-	18.1	10.8	7.5	3.9

To calculate time to fully extend mast: The height of mast is divided by rate e.g. for NL12 mast with NC2 compressor – extension time = 12 / 4.8 = 2.5 minutes. The time to reach maximum pressure is approximately 2 x extension time e.g. 5 minutes.

- (1) Air pressures are monitored by a differential pressure switch, which will stop the compressor at a pre-set level and restart the unit when pressure falls below a second pre-set level. The pressures will normally be set at the factory and will be shown on the label on the front of the case.
- (2) Although electrical components are continuously rated; it is wise to check that the compressor is switching off automatically. If not, the mast and compressor should be checked for air leaks.
- (3) Ensure that there is an adequate air space around the casting, as serious overheating of the unit may result.
- (4) Units may be fitted with a remote control. Since mast systems run on low air pressure, it is advisable to keep pressure and exhaust hoses as short as possible, as this will affect the extension and particularly retraction times markedly. If the compressor forms part of a fixed installation and has to be sited away from the mast, the exhaust valve may be removed and re-sited at the base of the mast.
- (5) Compressors should be placed on a level with or below the base of the mast to prevent moisture build up in the airlines. If a compressor has to be placed higher than the base of the mast, care must be taken not to allow water to become trapped in the airlines. Disconnect the airline from the mast below out the line at frequent intervals or fit a drain valve at the base level of the mast.

TYPES OF COMPRESSORS

Type NC1

Single unit

Output: 17 litres/minute at 0.7kg/cm²

Fuses: 12VDC = 10A, direct switching
24VDC = 5A, direct switching
240VAC = 1A, direct switching

Manual exhaust valve.

Type NC2

Twin unit

Output: 34 litres/minute at 0.7kg/cm²

Fuses: 12VDC = 20A, relay
24VDC = 10A, relay
240VAC = 3A, relay

Solenoid exhaust valve.

Type NC3

Single unit

Output: 65 litres/minute at 0.7kg/cm²

Consumption: 12VDC = 30A, relay
24VDC = 15A, relay
240VAC = 5A, relay

Solenoid exhaust valve.

OPERATING INSTRUCTIONS

NC1 Unit

- (1) Connect compressor to suitable power supply.
- (2) Connect airline to mast inlet valve.
- (3) Close exhaust valves at the base of the mast and compressor.
- (4) Switch on compressor to extend mast.
- (5) To lower mast, check compressor is switched off. Open either the exhaust valve at the base of the mast or that at the compressor.

Opening both valves will allow a more rapid retraction but this can loosen or even damage antennas.

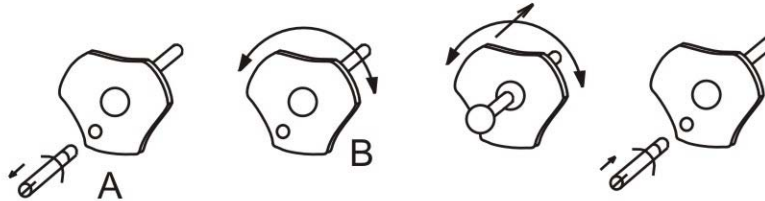
NC2 and NC3 Units

- (1) Connect compressor to suitable power supply.
- (2) Connect airline to mast inlet valve.
- (3) Close exhaust valve at base of mast.
- (4) Turn compressor switch clockwise. The first position (H = hold) will close the compressor exhaust valve. The second position (↑ = up) will start the compressor and extend the mast. During extension the mast may be stopped at any height by switching back to the hold position.

SETTING COMPRESSOR PRESSURE

Setting Pressure Switch in the Compressor

Set pressure switch only when pressure is applied to the system. A gauge must be fitted in order to check pressure.



- (1) Unscrew stop "A" with screwdriver.
- (2) The maximum switching pressure must be adjusted first, this is done by rotating knob "B" (clockwise raises the pressure).
- (3) To adjust minimum switching pressure, depress knob "B" and rotate as before.
- (4) Screw in stop "A".
- (5) Enter cut-in and cutout valves on label.

Remote Controls

- ❖ RC/1 is a rotary switch.
- ❖ RC/2 and RC/3 are 3 button controls.

Remote controls can be fitted to each compressor. When transferring control from the front panel of unit to the remote control device, it is a good practice to set the compressor panel control to the hold position. When the remote circuit is switched back to the compressor panel circuit the mast will then be on hold and therefore maintain its position.

The RC/2 will normally be used for DC operation of AC powered compressor units. Please note that a separate power supply unit is installed within the compressor to supply a DC output.

The RC/3 is a standard remote control similar to the RC/1 but with 3 button operation.

USE OF THIRD PARTY COMPRESSORS

When using third party compressors, ensure that the tank pressure is set to a maximum of 25 p.s.i. To ensure proper operation of the mast use SMC lubricant (Part No. 000055500) in the compressor system.

User Notes:



Issue 3

South Midlands Communications

S.M.House, School Close,
Chadlerds Ford Ind. Est.
Eastleigh, Hampshire,
England. SO53 4BY

Tel: (+44)0 23 8024 6200

Fax: (+44)0 23 8024 6206

Email: sales@smc-comms.com