



**LADDER
CLIMBING
PROCEDURE**

3.4. Erection of Tower Crane with Internal Ladder Climber Frame

There are two options, depending on the building site requirements for erection of internal climbing cranes. The two options are illustrated on the following pages.

ATTENTION

The free standing height of the crane above the top support collar depends on the type of tower section, local weather and the conditions of the surrounding structure. It must be confirmed by Favelle Favco and/or the responsible site engineer for each application.

3.4.1. Option 1 – using starter legs

The bottom climbing section, including the climbing cylinders, is erected and bolted onto cast-in starter legs. The correct number of towers required for the building site is then erected on the bottom section. The slew mount is then bolted onto the top tower. When all the bolts have been correctly tightened, the tower is ready to receive the crane upper section.

3.4.2. Option 2 – partially erected building

When the building is part erected, the crane tower can be supported in the building. The tower will require two supports at a vertical spacing of a minimum of 12m (for standard components). One support can be the building floor or a support collar which is mounted to the building. The bottom climbing section is lowered through the building to its support position. The correct number of towers required for the building site is then erected on the bottom tower and the mount is installed. When the vertical and lateral supports are in place, and all the bolts have been correctly tightened, the tower is ready to receive the crane upper section.

NOTE

When climbing internally, additional tower sections can only be added if a multipurpose slew ring mount is used and an external climbing frame is available to suit the tower sections. It is impossible where a transition tower is used and where the total mass of tower and crane exceeds the climbing cylinder lifting capacity.

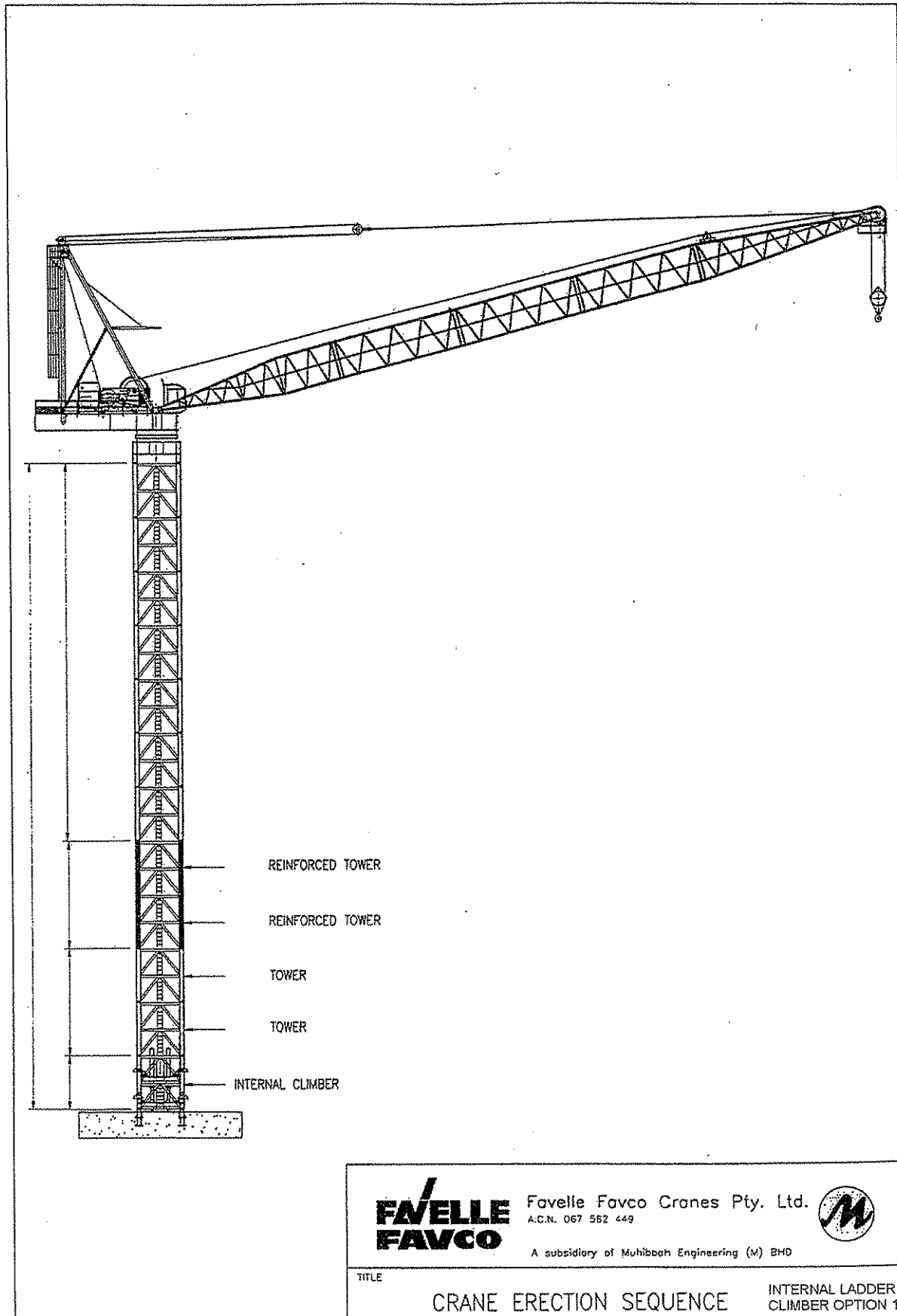
ATTENTION

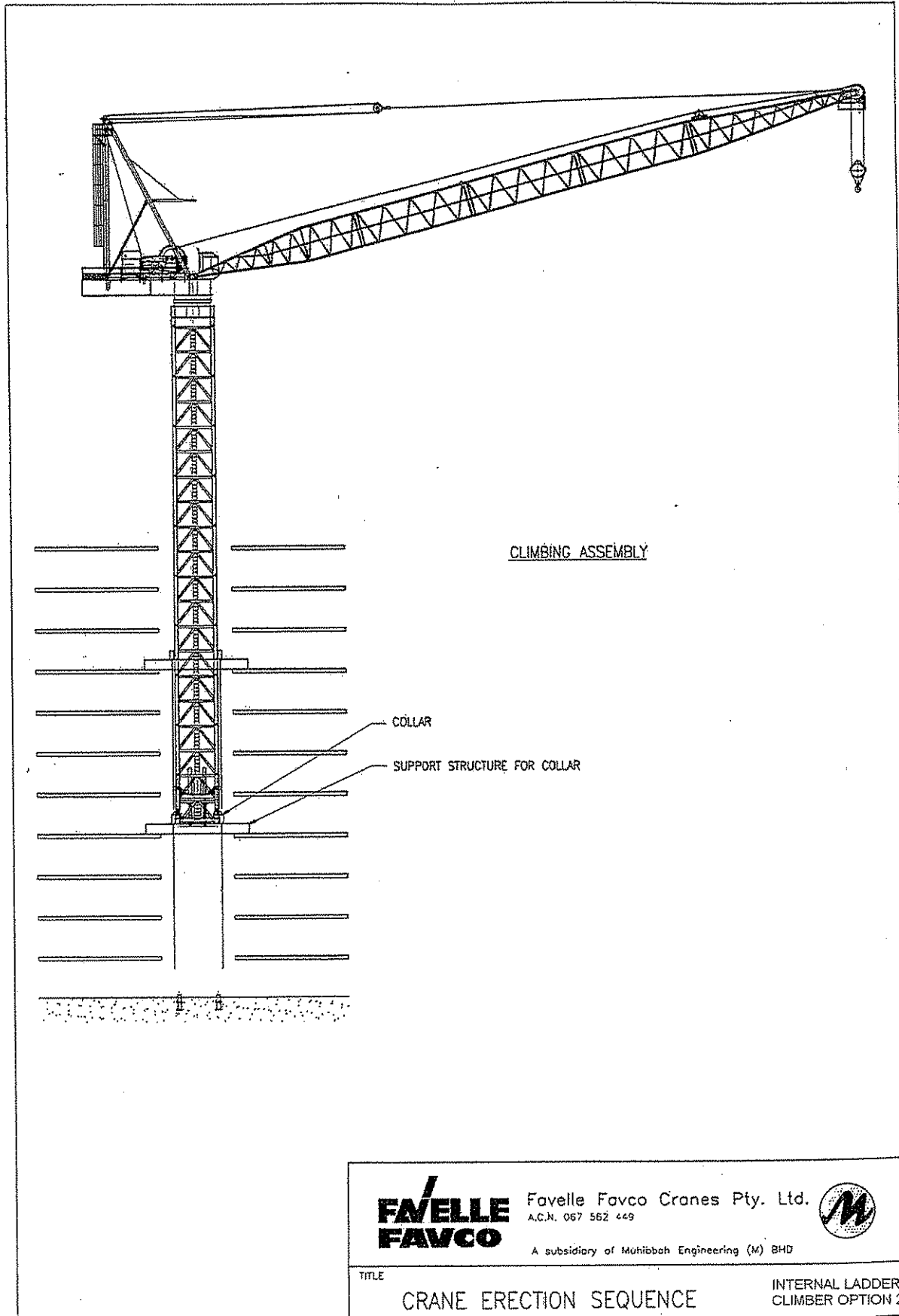
When bolting or placing climbing frame, make certain that the ladders between floors coincide with the flippers in the internal ladder climbing frame.

Tightening torques for lightly oiled bolts for climbing frame to tower, tower to tower or tower to slew ring mount, are listed in drawing A4.9900.578 sheets 1-3 at the end of this section.

Hydraulic hoses from control valves in climbing frame are threaded through all tower sections and secured. Hose ends are carefully rolled up and stored on top tower platform ready for climbing operation.

For climbing frame assembly and hydraulic climbing circuit refer to Section 7 Drawings.





3.5. Internal Ladder Climbing Details

To aid in the understanding of the following procedure, refer to diagrams shown in 3.5.1.

The initial climbing operation must always be carried out under the supervision of a commissioning engineer, who will

1. Instruct the crane driver of correct operation and climbing procedures.
2. ensure that the climbing cylinders are full of oil and that there is no possibility of air being trapped in the cylinders, and
3. Check and adjust the safety throttling valves on both cylinders.

Before commencement of climbing, ensure that the tower will be guided by climbing collars at two positions throughout the complete operation. These guides must be at least 12 metres apart for the use of tower sections and are steel frames attached to the building structure. Refer to the site service structures engineer for building reactions, from which a climbing configuration can be established.

The crane must be balanced and the jacking blocks of the climbing collars must be accurately positioned and retracted to provide approximately 3mm clearance to the tower legs. If the crane moves out of vertical due to inadequate guiding, lateral loads imposed by the crane on the supporting structure will be significantly increased once operation is resumed.

3.5.1. Internal Ladder Balancing

Boom Length		Mass on Hook	Approx. Balance Radius	
(m)	(Ft)		(m)	(Ft)
36.6	122.0	22.0 T	26.1	87.0
41.2	137.3	18.5 T	29.4	98.0
45.8	152.6	15.5 T	32.6	108.6
50.4	168.0	13.0 T	36.0	120.0
55.0	183.3	11.0 T	39.1	130.3
59.6	198.6	9.0 T	42.4	141.3
64.2	214.0	7.3 T	45.6	152.0
68.8	229.3	5.8 T	49.0	163.3
73.4	244.6	4.4T	52.0	173.33

Balancing the crane is dependent on the boom length and is accomplished as follows:

1. Load the crane with the mass specified below and luff in/out to the specified radius.
2. Slew the crane so it is square with the tower sections and apply the slew brake.
3. Commence retracting the collar to tower jacking blocks until there is a clearance of around 3mm. As the jacking block bolts are loosened it may be necessary to luff in or out a minimal amount (not more than ± 2 m) until the crane 'floats' with minimal lateral forces between the tower and climbing collars. The crane is now ready to commence climbing.

Connect the climbing hoses to the climbing tower taking care not to allow dust or foreign matter to enter the system. Dust caps are provided, however, these are sometimes lost during previous climbing exercises.

The climbing circuit oil supply valve can now be locked in to supply oil to the climbing control valve, with the engine throttle set at approximately 1500 - 1800 rpm. The crane should commence to rise slowly, when the control valve is operated. If there is not visible movement, check for obstructions or an out of balance condition.

NOTE

While extending the two (2) climbing cylinders, the oil level in the hydraulic tank will drop below the minimum level and the annunciator in the cabin indicates visual and audible.

ATTENTION

Under no circumstances must the oil tank be topped up at this condition, as the tank will overflow when cylinders are retracted

Raise the crane, for the first time, approximately 2.0 metres to enable the upper pivoting brackets to engage in the ladder in order to support the crane and tower. Visually inspect the brackets to ensure they have extended before lowering

Lower the crane by reversing the climbing control valve until the crane and tower load is taken on the upper pivoting brackets. Further retract the cylinders until climbing foot pivoting supports can rest on the next bottom rung of the ladder.

Care must be taken to equalise the retraction rate of the cylinders, by means of the manually controlled balancing valve located at the base of the tower, to ensure that the support beam remains in the horizontal position.

NOTE

It is recommended to lower the crane with engine at approximately 1000rpm

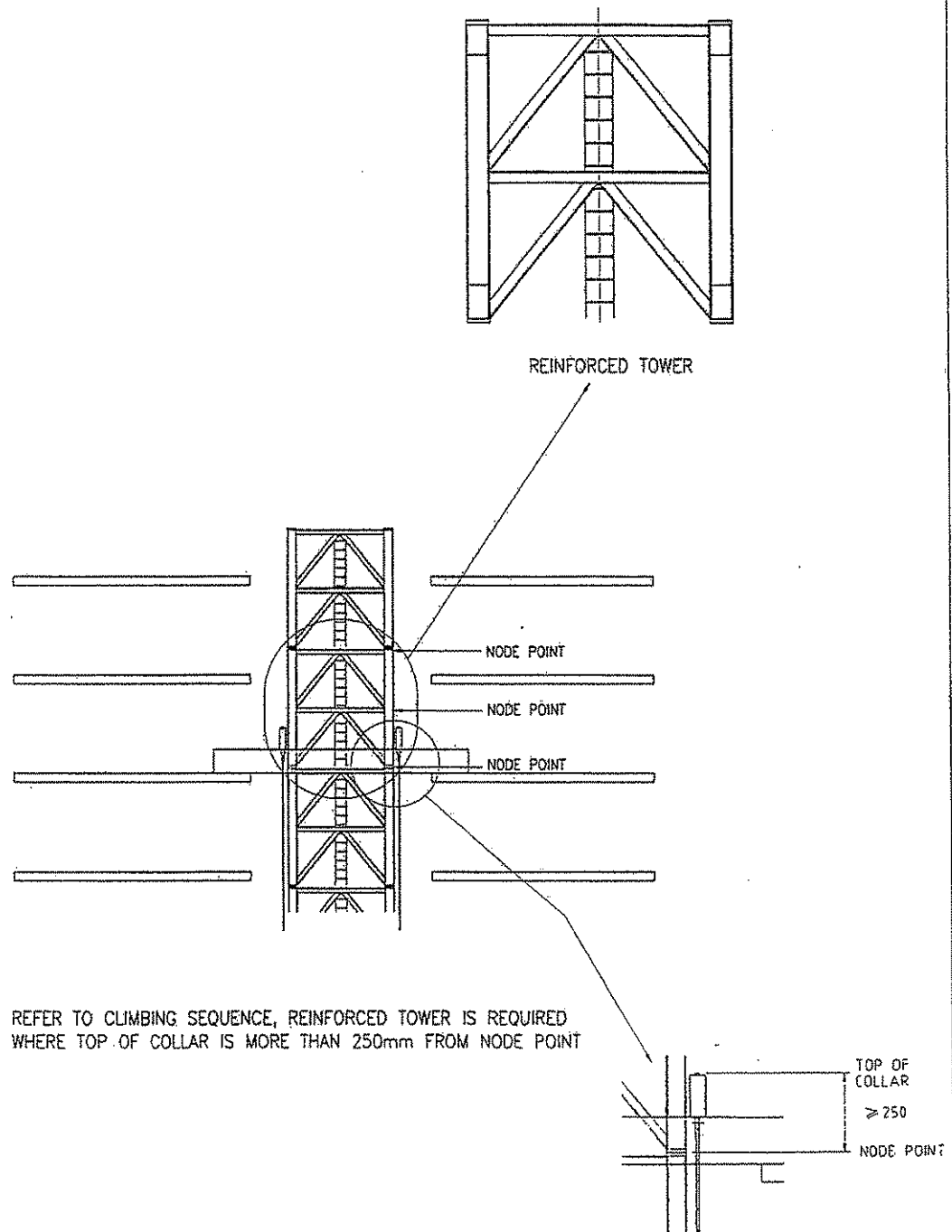
Repeat the climbing procedure as above, lifting crane two rungs at a time, until lower pivoting brackets support the crane on the first of lower climbing support frame.

ATTENTION

While the crane rests on the first supporting climbing collar and is laterally supported by the first and second collar (12m minimum distance) a third collar must be fitted before climbing can commence.

WARNING

Before operating the crane in this new position always ensure that the crane is checked at the two levels of lateral support. These supports must be located at a position no more than 150mm from a panel point (junction between a horizontal brace and the tower leg). If this is not practically possible, the tower must be reinforced accordingly such a reinforced tower is illustrated on the next page.



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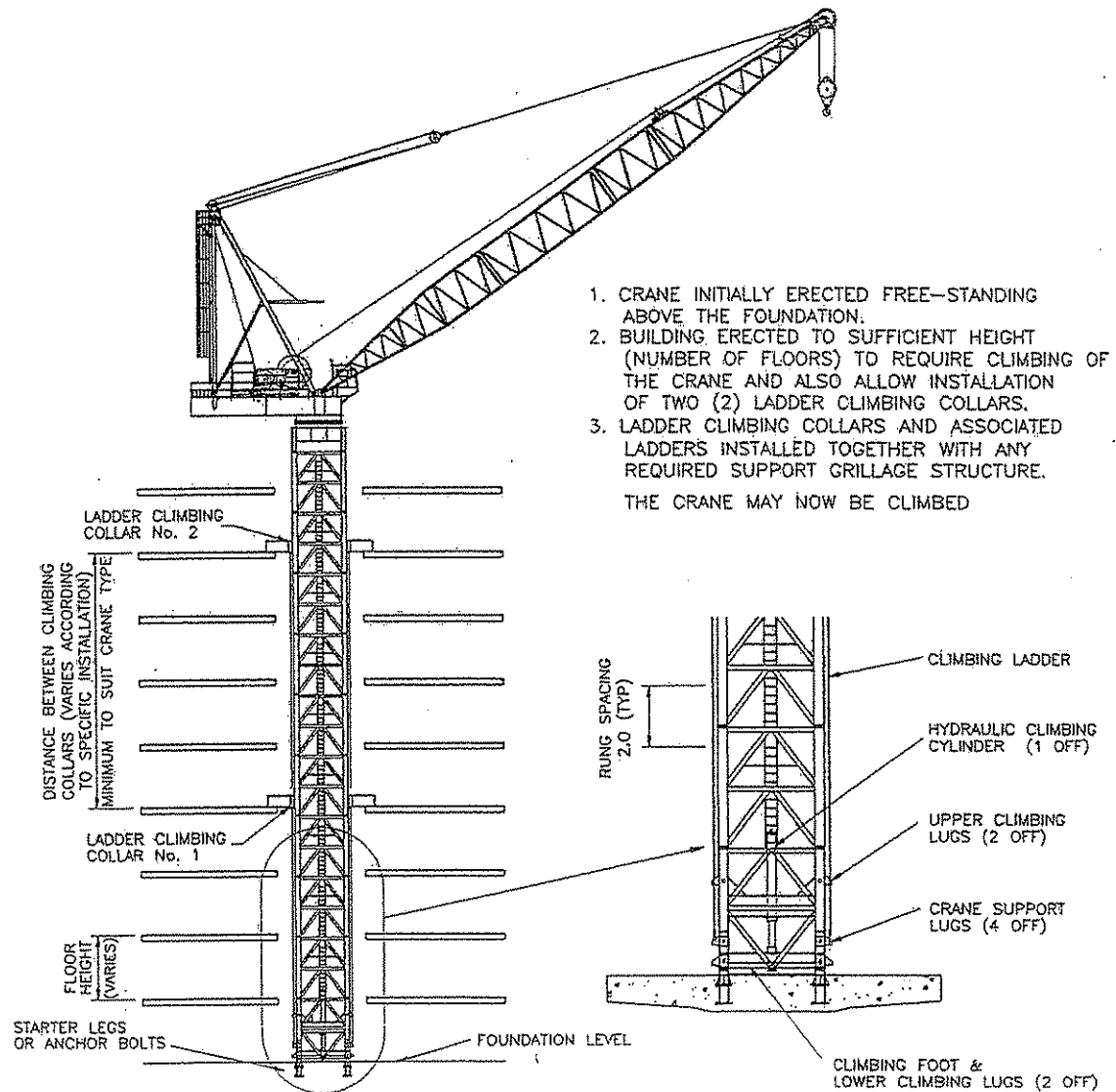
USE OF REINFORCED TOWER

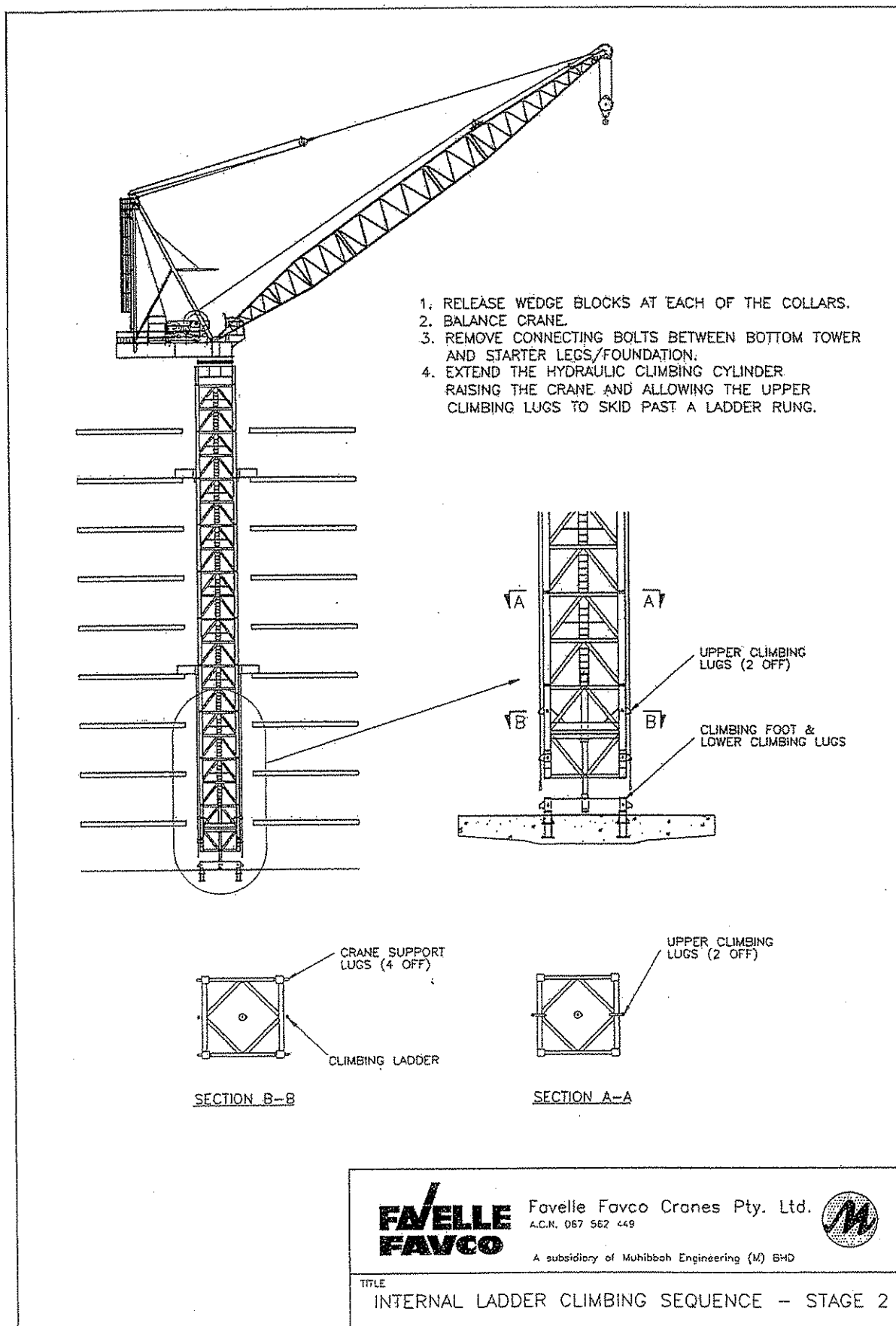
INTERNAL LADDER
CLIMBER REINFORCED
TOWER

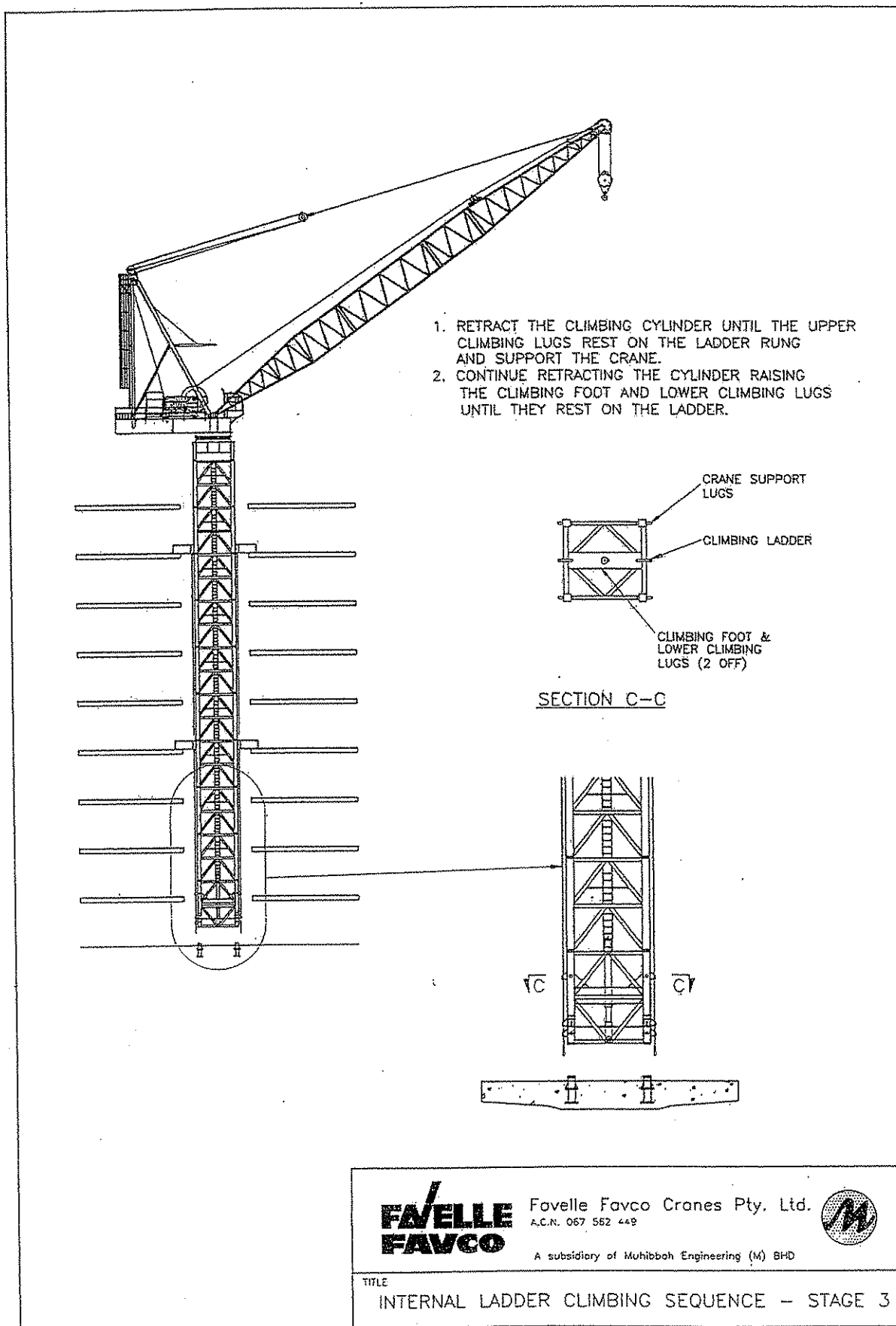
At no time should lateral loading be applied to any of the pivoting brackets.

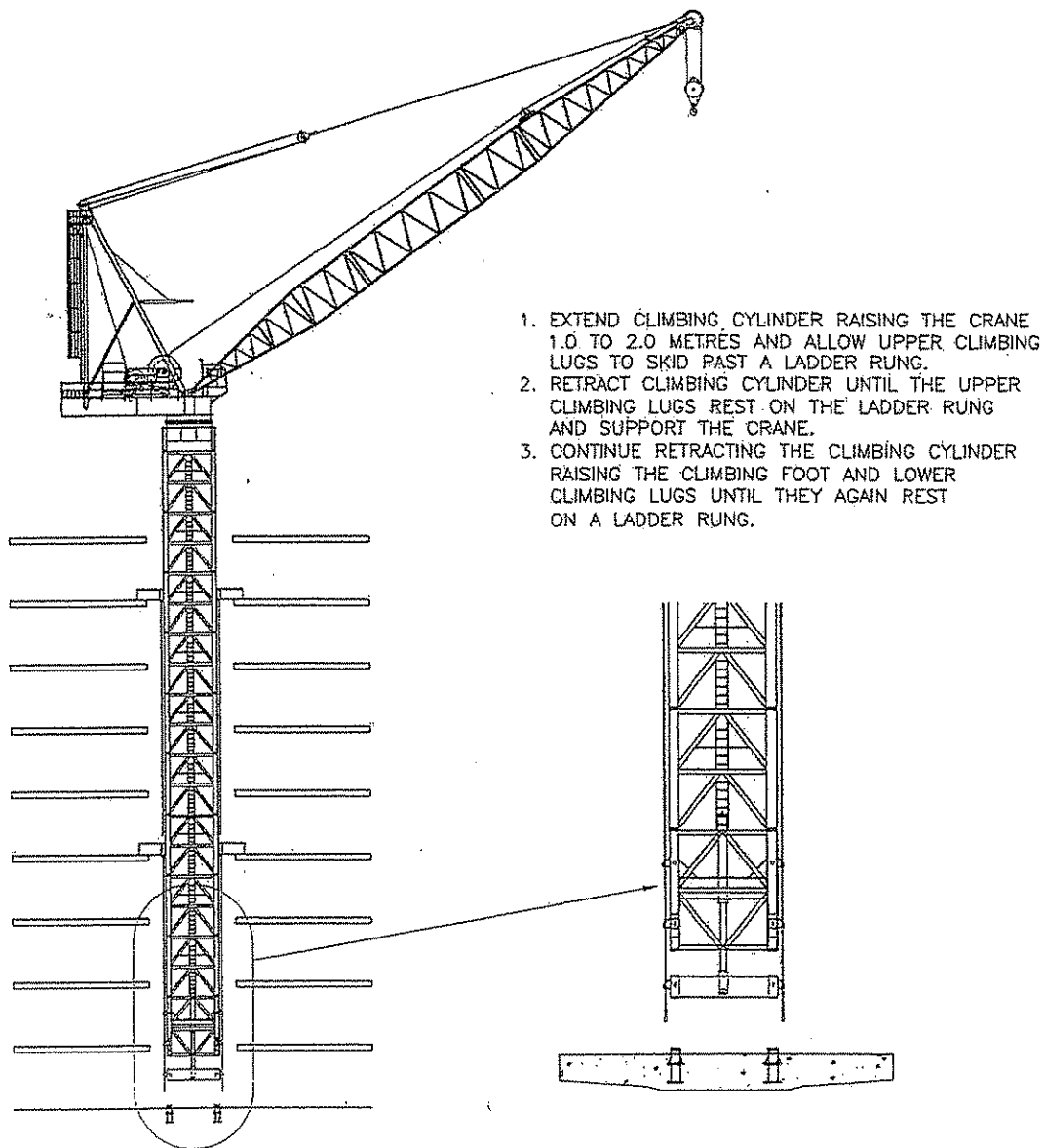
Post climbing the crane must be checked for levelness. While the crane is still balanced, use a straight edge across the underside of the slew ring bearing to enable a 1.2m spirit level with a tolerance of no greater than 1mm/m to test the levelness. No more than 12mm of material must be needed at one end of the spirit level to obtain a level reading. A second reading must be taken at 90° to the first across the slew ring bearing. If the balance is not within tolerance correction takes place using the jacking blocks, and retest until the crane is level.

For climbing procedures refer to the following drawings.









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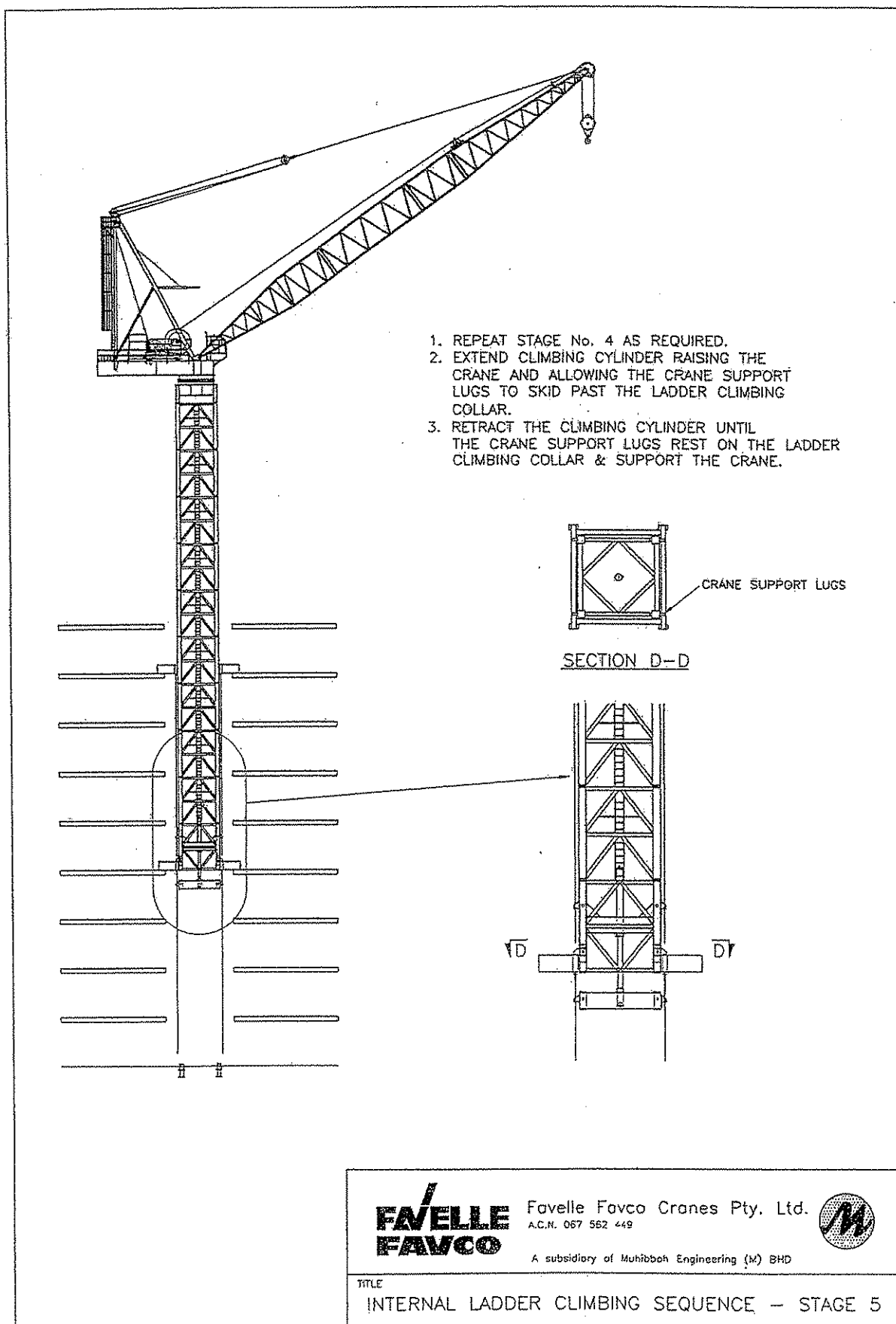
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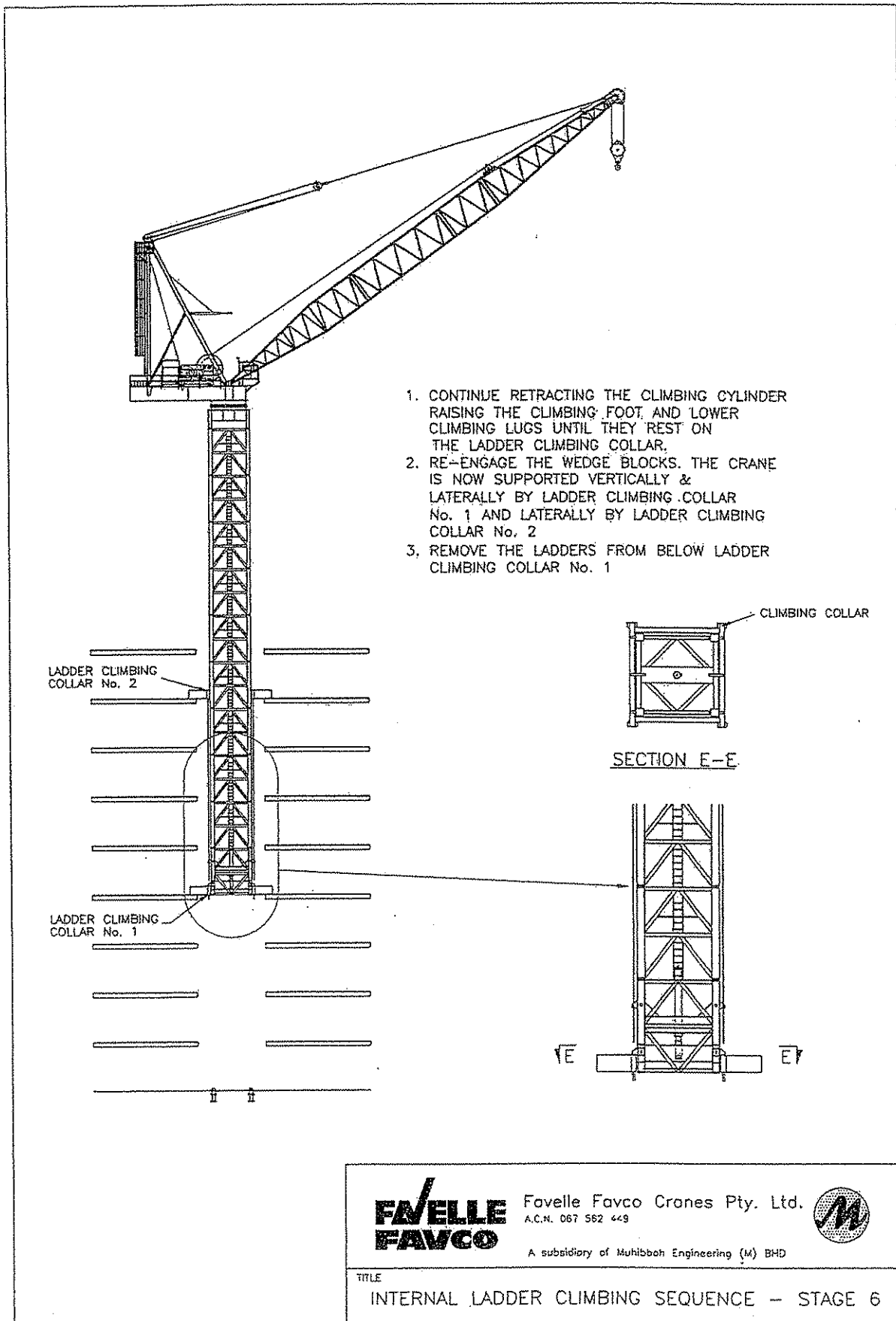


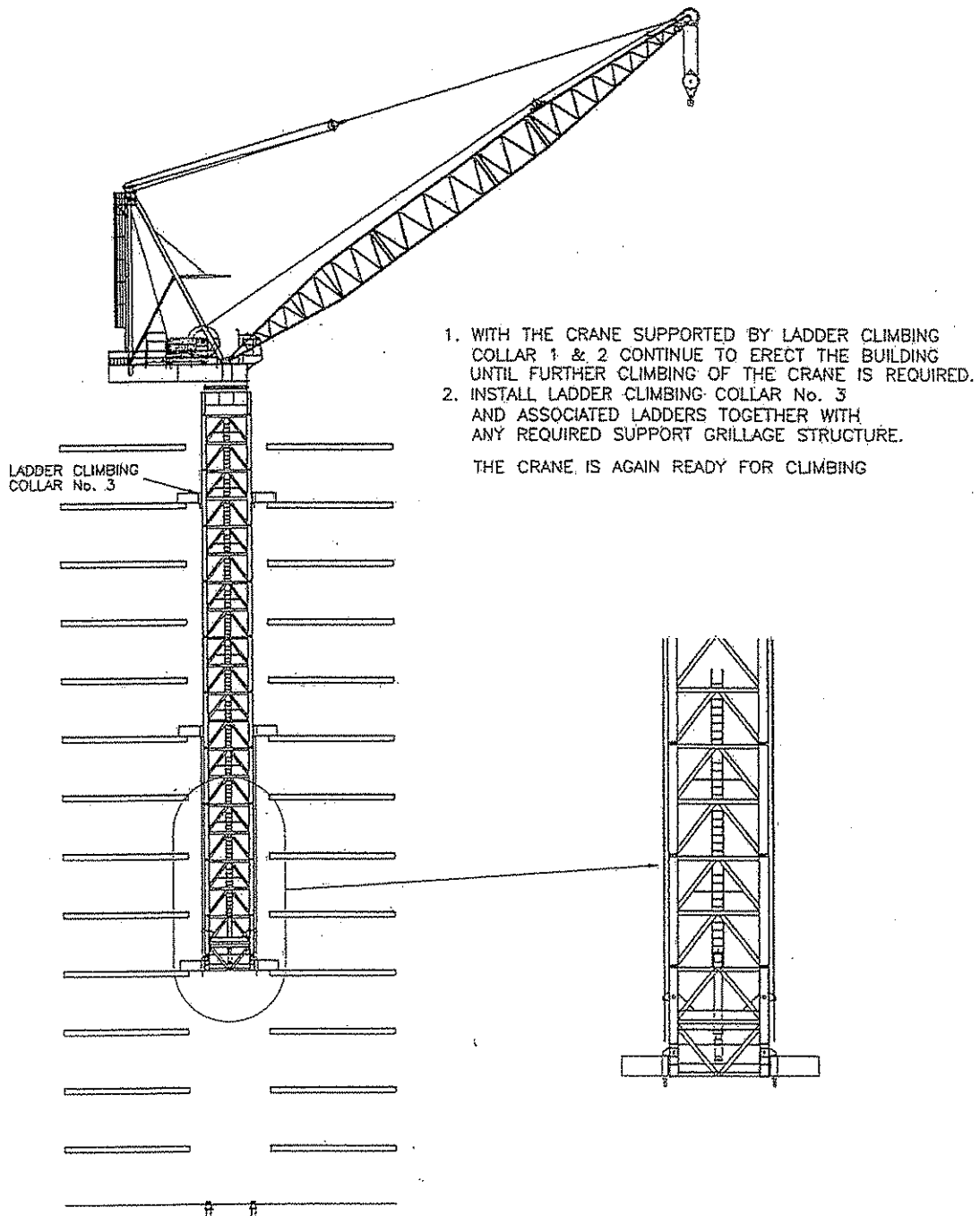
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INTERNAL LADDER CLIMBING SEQUENCE - STAGE 4







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TITLE

INTERNAL LADDER CLIMBING SEQUENCE - STAGE 7

