



TEREX | COMEDIL

CTT “City”

Limiting

Devices Adjustment

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Chapter 7

1

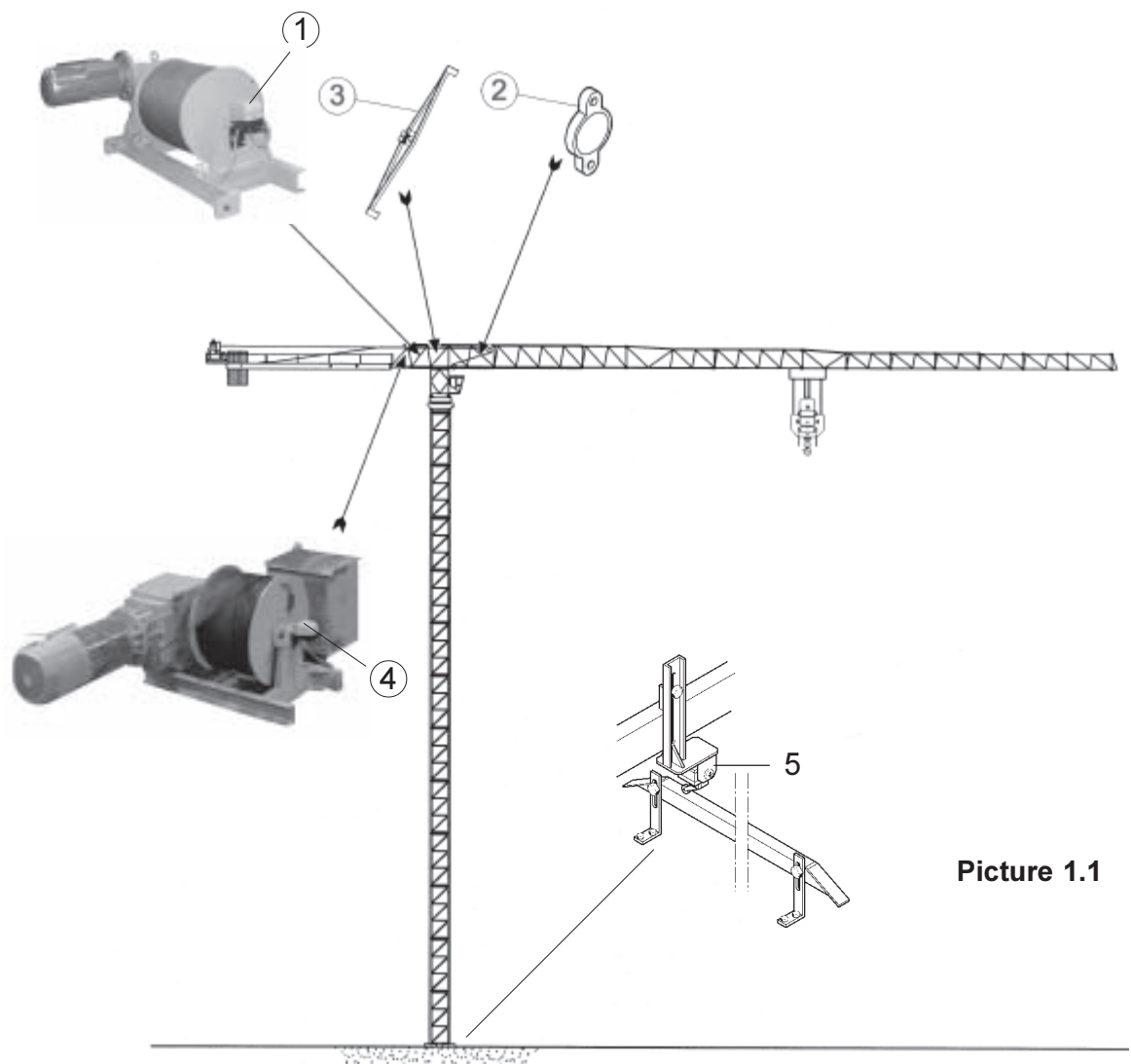
GENERAL



Below is a list of all the limiting devices, either electric, mechanical or hydraulic, that should be adjusted during the crane erection (picture 1.1).

Carry out the adjustments with total accuracy because the safety and correct operation of the crane depend on them.

Perform periodic inspections of these mechanisms as part of the routine maintenance program shown in **Chapter 8 “General Maintenance”** of the crane operation manual to assure the maximum efficiency and safety of the crane in the long run.



Picture 1.1

- 1) Trolley limit switch
- 2) Load limiter
- 3) Moment limiter
- 4) Hoisting limit switch
- 5) Travelling limit switch

1.1 DESCRIPTION

The limit switches, pre-limit switches and limiters are all microswitches. They can be either mechanical or rotating type.

1.1.1 **Limit switch**

It is a microswitch, which intervenes on the auxiliary control circuit to stop the motion in order to avoid exceeding the path limit.

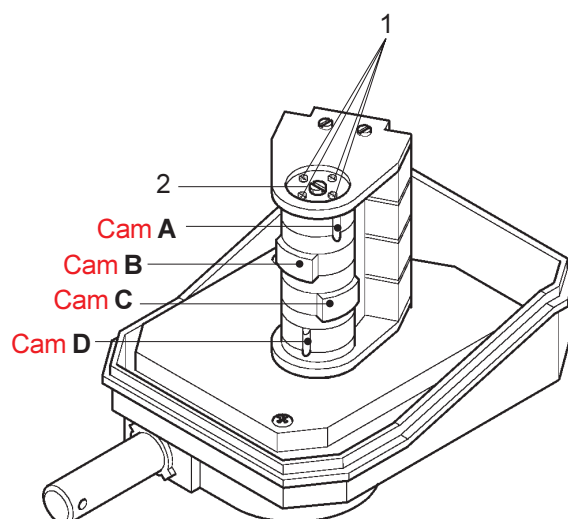
1.1.2 **Pre-limit switch**

It is a microswitch, which intervenes on the auxiliary control circuit to slow down the speed near the point at which the final limit switch is engaged.

1.1.3 **Rotating limit switch**

It consists of a worm screw mechanism on helical gear and a series of reduction wheels controlling the cams that activate the limit switch and pre-limit switch microswitches.

To adjust the cams, operate adjusting screws (1) and tighten lock screw (2) (picture 1.1.1).



Picture 1.1.1

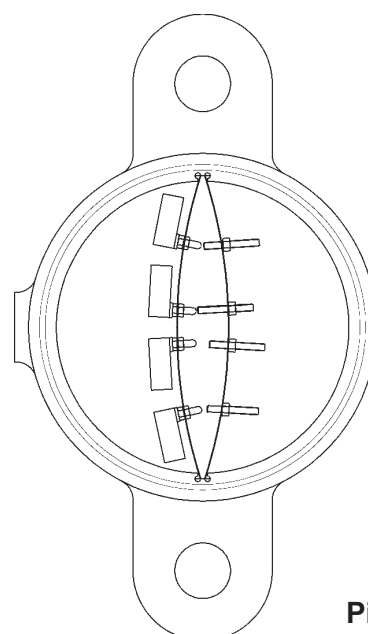
1.1.4 **Limiter**

It is a microswitch, which intervenes on the auxiliary control circuit so as to prevent any maneuver or speed from exceeding a designed limit of the machine.

1.1.5 **Dynamometric ring**

Placed on the first jib section, it is sensitive to the weight hanging from the hook.

It's a mechanical device which deforms in proportion to the load hung (picture 1.1.2).



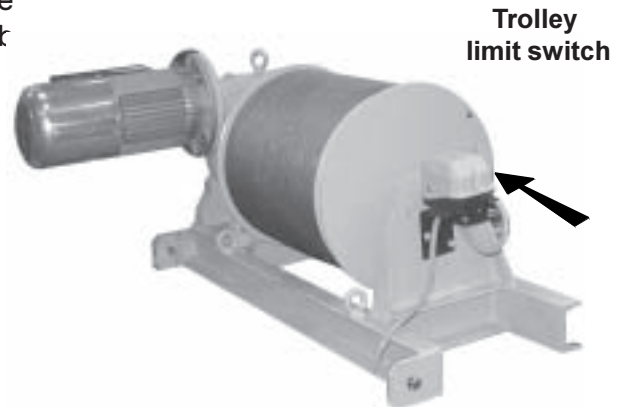
Picture 1.1.2

2

CALIBRATION OF THE LIMIT SWITCHES

2.1 TROLLEY LIMIT SWITCH

The rotating trolley limit switch (picture 2.1.1) determines the maximum movement of the trolley toward the ends of the jib (jib tip and jib foot).



Picture 2.1.1

2.1.1 Adjustment of the cams (picture 1.1.1)

Cam A	- <u>trolley outward limit switch</u> (towards jib tip)	Set for activation when the distance between the trolley buffers and the actuating mechanism on jib point is a few centimeters;
Cam B	- <u>trolley outward pre-limit switch</u> (towards jib tip)	Set for activation when the distance between the trolley buffers and the actuating mechanism on jib point is about 2.5 m (8 ft);
Cam C	- <u>trolley inward pre-limit switch</u> (towards jib foot)	Set for activation when the distance between the trolley buffers and the actuating mechanism on the first jib section is about 2.5 m (8 ft);
Cam D	- <u>trolley inward limit switch</u> (towards jib foot)	Set for activation when the distance between the trolley buffers and the actuating mechanism on the first jib section is a few centimeters.

2.2 HOIST LIMIT SWITCH

The hoist limit switch (picture 2.2.1) is placed on the hoist winch and determines the maximum movement of the hoist block upward and downward.

Before the upward or downward path limit, a pre-limit switch is activated which slows the motor down to the first speed, thus allowing a precision hoisting stop.



Picture 2.2.1

**Hoist
limit switch**

2.2.1 Adjustment of the cams (picture 1.1.1)

Cam A - Load-lifting limit switch

Set for activation when the hoist block is 2.5 m (8 ft) away from the lower longitudinal spar of the jib;

Cam B - Load-lifting pre-limit switch

Set for activation when the hoist block is 3 m (10 ft) away from the actuating mechanism of the hoist limit switch;

Cam C - Load-lowering pre-limit switch

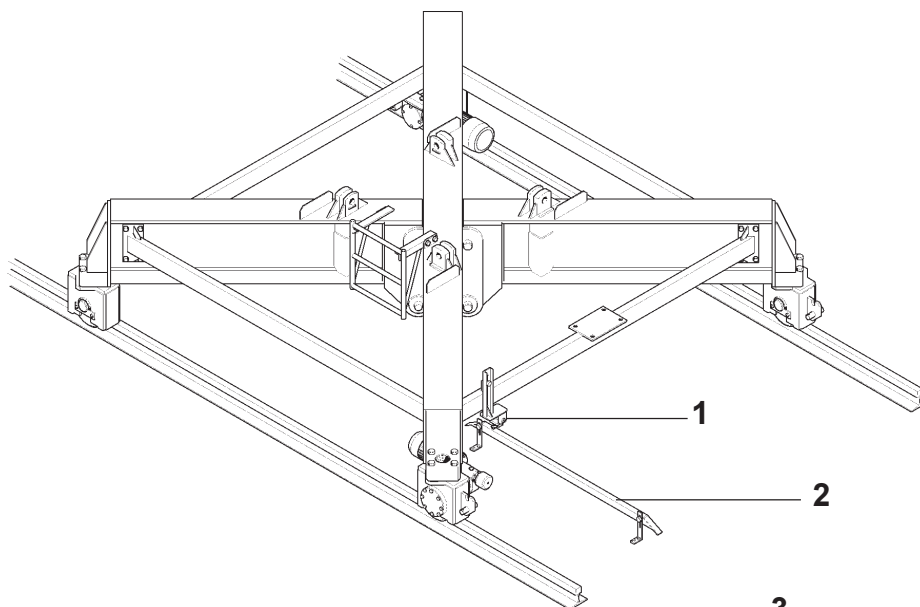
Set for activation when there are no less than six full wraps of rope coiled on the drum;

Cam D - Load-lowering limit switch

Set for activation when there are no less than three full wraps of rope coiled on the drum.

2.3 TRAVELLING LIMIT SWITCH

The travelling limit switch (1) limits the movement of the crane along the rail track (picture 2.3.1). To set the stopping position of the crane, move striker blocks (2), which intervene mechanically on limit switch (1), along the travel tracks bearing in mind that inertia makes the crane move about 0.5 m - 1 m (2 - 3 ft) after the limit switch intervention.

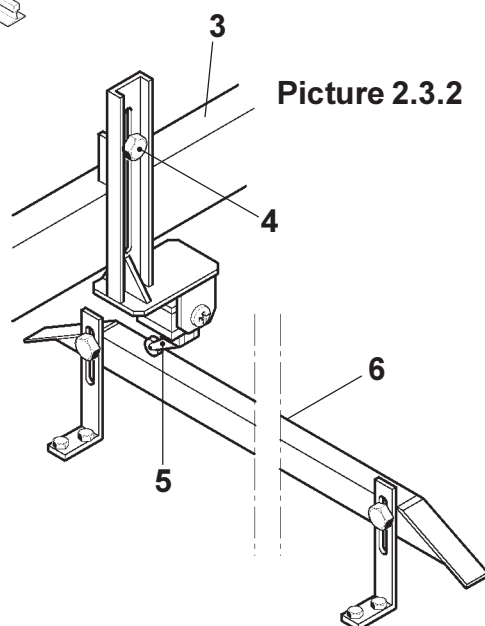


Picture 2.3.1

The microswitch, operating the electric controls of the travelling motor and the parking brake, is located on crossbeam (3) of the undercarriage.

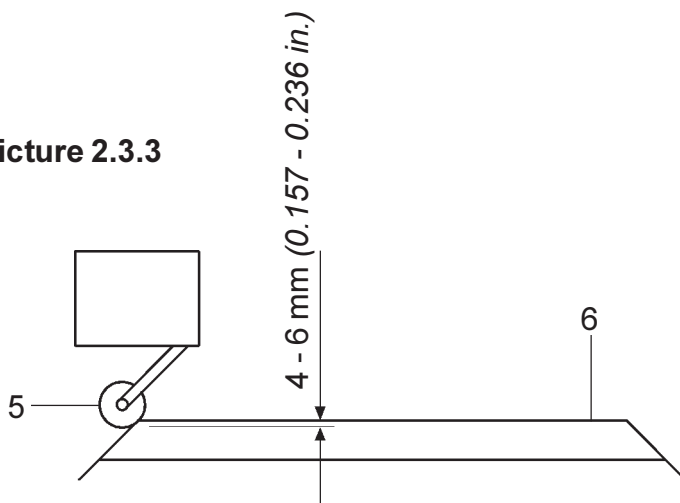
To adjust the tripping movement of the microswitch, loosen fixing bolts (4) and move activating lever (5) (stop adjustment) (picture 2.3.2).

Make sure that the roller of activating lever (5) has an additional clearance of 4 - 6 mm (0.157 - 0.236 in.) to complete its movement on striker block (6) after the microswitch tripping (picture 2.3.3).



Picture 2.3.2

Picture 2.3.3



3 CALIBRATION OF THE LIMITERS

3.1 TEST LOADS

For the correct adjustment of the limiters, provide for test loads as shown in table 3.1.1.

TEST LOADS			
Quantity [No.]	Type	Weight	
1	"A"	Max. capacity 4-Part line (if provided)	APC- AFC winches
1	"B"	5% of "A"	
1	"C"	100% of jib point max. capacity (see load chart)	
1	"D"	5% of jib point max. capacity (see load chart)	
1	"E"	50% of "A"	only APC winches
1	"F"	2.5% of "A"	

Table 3.1.1

The weights shall be in the form of blocks, made of reinforced concrete and be, anyhow, of exact weight ($\pm 3\%$ tolerance). They shall be self-supporting type, duly seasoned and equipped with a proper coupling to match the hoist block chain.

3.2 GENERAL

The different alarm devices activate when the crane is affected by stresses exceeding the rated ones and stop the motion in progress. They allow the operator, however, to override them under controlled conditions and to reset the original working conditions by reversing the maneuver, which generated the system failure.

The intervention of the limiters is signaled by a red lamp in the cab and by a siren anytime a maneuver, which is interdicted by the alarm devices activated, is operated.

Determine the trip setting of the limiters respecting the following sequence:

- 1) Rated capacity limiter for load-lifting 3rd speed (**only APC winches**)
- 2) Moment limiter (100% dynamic)
- 3) Moment limiter (90% static)
- 4) Moment limiter (100% static)
- 5) Rated capacity limiter

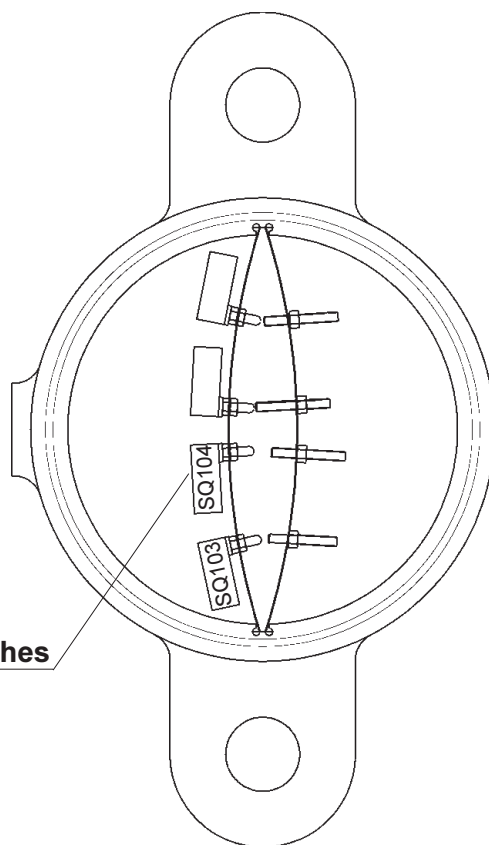
3.3 LOAD LIMITER FOR LOAD-LIFTING 3RD SPEED (only APC winches)

By microswitch SQ 104 it determines the maximum hoist speed according to the load lifted.

Limiter SQ104, which is originally set at Comedil's works, is anyhow to be checked for proper setting and operation after the initial erection before placing the crane in service.



only APC winches



Setting shall be carried out with 4-Part Line engaged (if provided).

Picture 3.3.1

3.3.1 Setting the limiter SQ104

- ↪ hang test load "E";
- ↪ Make sure the limiter allows the engagement of the load-lifting 3rd speed;
- ↪ add test load "F" and set the microswitch for preventing the load-lifting 3rd speed from being engaged;
- ↪ To avoid calibration being affected by undesired dynamic effects, repeat this operation a few times, resetting the value previously considered.

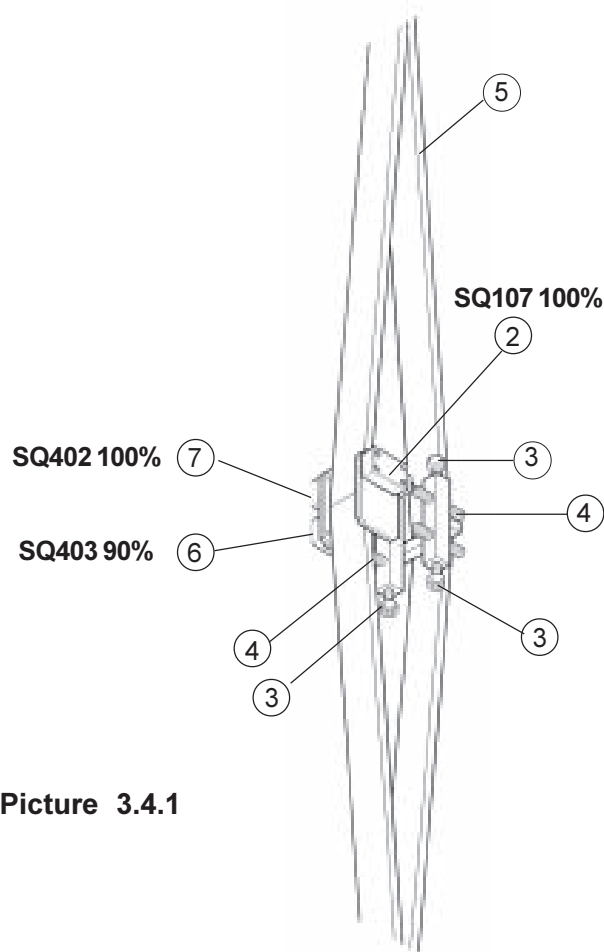
3.4 MOMENT LIMITER

It is placed on the trestle of the first jib section and, when the load hanging from the hook creates a moment which proves greater than the design one, it stops the load lifting and the trolley outward movement.

The load lowering movement and the trolley inward movement remain enabled, thus allowing to return into the safety zone.

It is made of three microswitches: (2) (6) and (7) (picture 3.4.1).

They intervene on the "load-lifting" and "trolley outward" movements separately because of the structure behavior, which differs if the load is lifted in the safety zone and then moved to the danger zone, or if it is lifted not within the safety zone.



Picture 3.4.1

Both static and dynamic settings shall be carried out with 4-Part Line (if provided)

! The load chart does not consider the weight of the ropes. So, determine the trip setting of the limiters (mostly with very high crane towers) by deducting the weight of the ropes uncoiled (see table 3.1.1) from that of the test loads shown in table 3.4.1.

Crane Model	Hoist Rope Diameter	Rope Weight	
		[kg/m]	[lbs/ft]
CTT 181/A-8 CTT 181-8 CTT 161-8 CTT 141-8	Ø 12	0.58	1.28
CTT 141-6 CTT 121-6	Ø 11	0.49	1.08

Table 3.4.1






The weight of the ropes varies, of course, according to the hook height of the crane and to the line parts engaged when setting the limiters (2-part line = 2 rope sections; 4-part line = 4 rope sections).

3.4.1 Setting the moment limiter (100% dynamic) SQ107

- Trolley all the way out;
- hang test load "C";
- move the head of adjusting dowel (4) placed on leaf spring (5) near the microswitch SQ107 (2) (picture 3.4.1);
- operate hoisting and screw the adjusting dowel until the motion stops (the red lamp in the cab lights up and an audible warning activates). So as to avoid calibration being affected by undesired dynamic effects, repeat this operation a few times, resetting the value previously considered and stick-slip operating load lowering until the red lamp is off. If not, repeat the operations from point A) onwards;
- place the load on the ground and add test load "D": operate load lifting and make sure it does not move;
- Repeat the operation a few times, then lock adjusting dowel (4) with screw (3).

3.4.2 Setting the moment limiter (90% static) SQ403

- Trolley all the way in;
- hang test load "A";
- operate hoisting until the load is off the ground;
- trolley out and stop about 2 m (7 ft) away from the maximum jib range allowed for the load being hoisted (**Chapter 2 - Technical Specifications** - para. 1) of the crane operation manual, thus tripping the microswitch SQ403 ("X15" input of "PLC" - "A301" on the electrical box located in the cab mast section);

CTT 141-6														
			m	10	15	20	25	30	35	40	45	50	55	60
3 t	-	36.8	m	3	3	3	3	3	3	2.72	2.36	2.08	1.84	1.65
3 t	-	35.2	m	3	3	3	3	3	3	2.68	2.21	1.92	1.69	1.5
6 t	-	19.51	m	6	6	5.83	4.51	3.64	3.02	2.56	2.21	1.92	1.69	1.5

max. load

max. jib range

Example

- Lock adjusting dowel (4) with screw (3).

3.4.3 Setting the moment limiter (100% static) SQ402

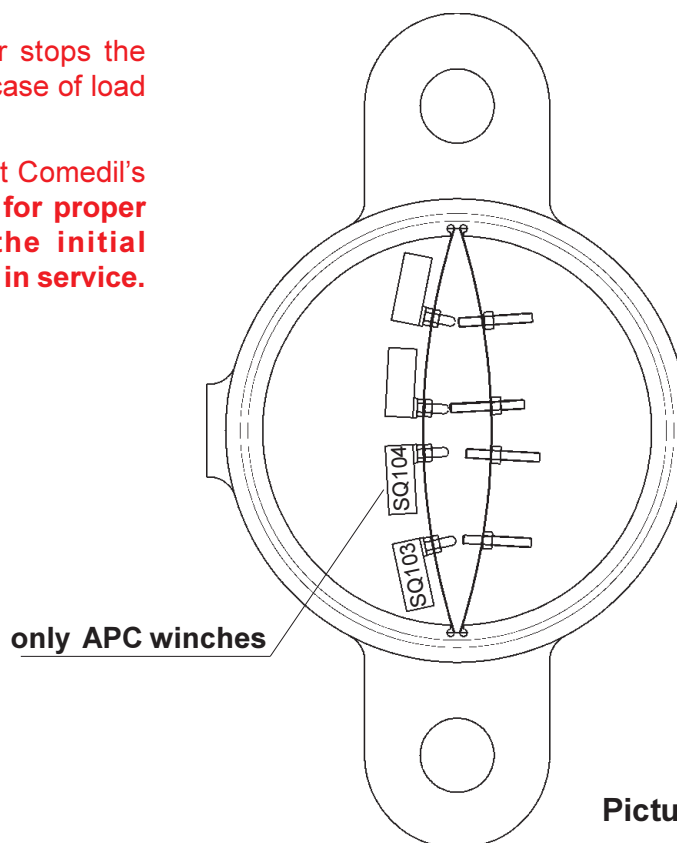
On setting the prealarm microswitch for static moment, proceed as follows without removing load "A":

- trolley all the way out;
- set adjusting dowel of microswitch SQ402 (7) for tripping;
- trolley in a few meters, operate "trolley forward" and make sure it stops at the maximum jib range set.

3.5 RATED CAPACITY LIMITER

By microswitch SQ 103 the limiter stops the maximum hoist speed (upward) in case of load exceeding the rated one.

The limiter, which is originally set at Comedil's works, **is anyhow to be checked for proper setting and operation after the initial erection before placing the crane in service.**



Picture 3.5.1



Setting shall be carried out with 4-Part Line engaged (if provided).

3.5.1 Setting the limiter SQ103

On setting the moment limiter (100% static) called for at para. 3.4.3, proceed as follows with load "A" hanging from the hook:

- ✦ Place the test load "A" on the ground;
- ✦ Make sure the limiter allows lifting at crawl speed (first and second speed);
- ✦ Add test load "B" and set the microswitch so as to prevent it from being lifted;
- ✦ So as to avoid calibration being affected by undesired dynamic effects, repeat this operation a few times, resetting the value previously considered.