



**INSTALLATION, OPERATION
AND
MAINTENANCE INSTRUCTIONS
FOR
MRK BRAKE CALIPER**

MI506

AMENDMENT AND REVISION RECORD – M1506

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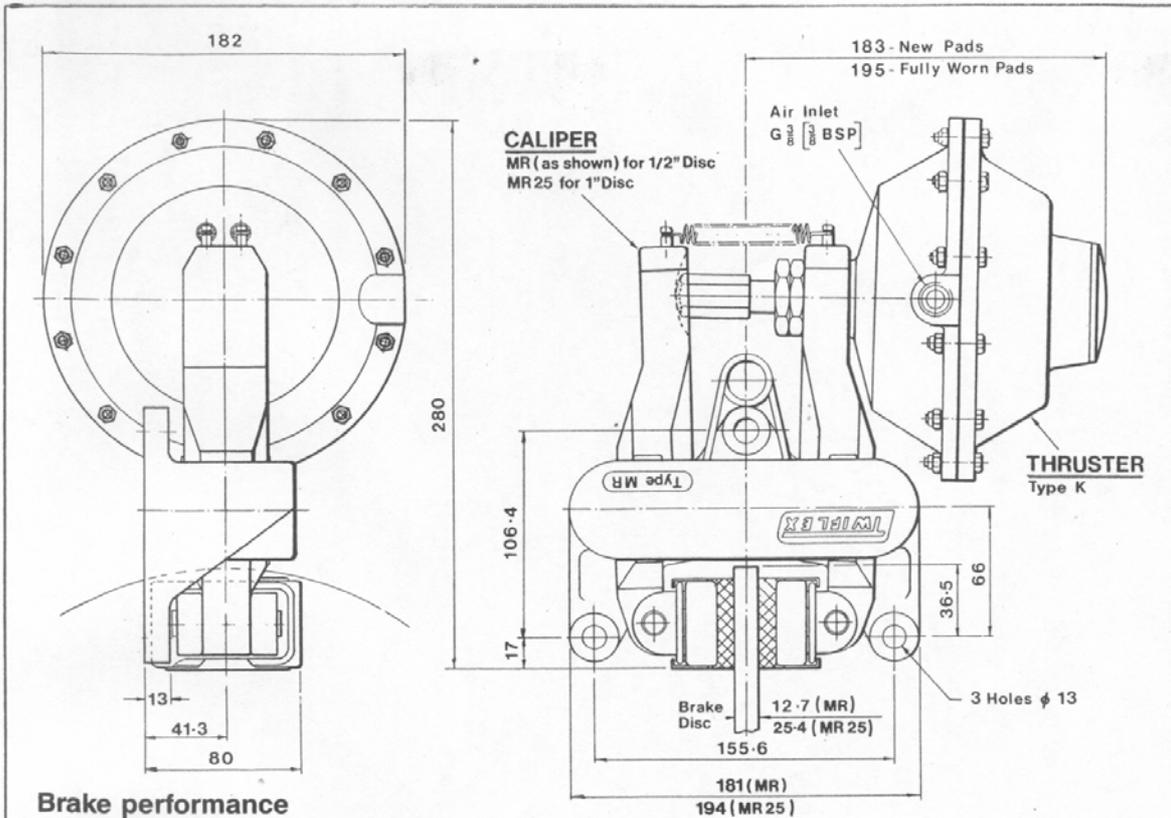
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FIGURES

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FIG. 1 'MXK' BRAKE CALIPER ASSEMBLY



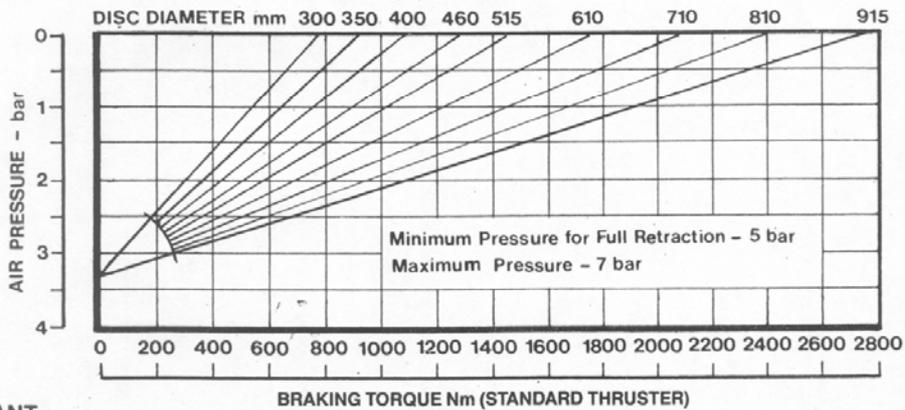
Brake performance

Braking Force — See table on back page.

Braking Force is defined as the tangential force acting at the effective disc radius.

Braking Torque (Nm) = Braking Force (N) × Effective disc radius (m)

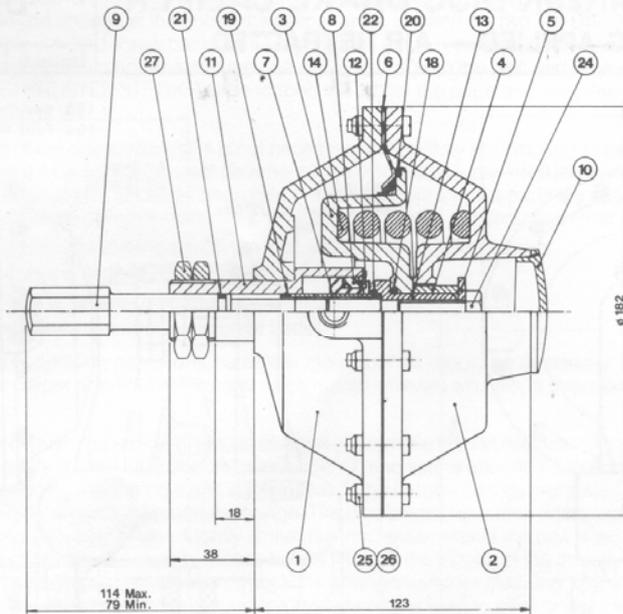
where Effective disc radius (m) = Actual disc radius (m) — 0.030



IMPORTANT

These are typical performance figures for bedded and conditioned brake pads having a friction coefficient of 0.4 when used with standard Twiflex brake discs. An appropriate service factor should be applied when designing the braking system, and in the case of brakes used for holding duties or in wet conditions this should not be less than 2.0.

FIG. 2 'K' THRUSTER ASSEMBLY



Thruster — Type K (with automatic pad wear adjustment)

Full rate Thruster Part No. 7200654

2/3 rate Thruster Part No. 7200770

1/3 rate Thruster Part No. 7200576

Marinised versions are available to special order.

Parts List

Item No.	Component	Part No.	No. Off	Item No.	Component	Part No.	Qty. No.
1	Front Cap	7940534	1	14	Main Spring (Full rate)*	2500076	1
2	Rear Cap	7940517	1	or	Main Spring (2/3 rate)*	2500114	1
3	Thrust Bearer	7940501	1	or	Main Spring (1/3 rate)*	2500084	1
4	Spacer	7950506	1	18	'O' Ring (Thrust Nut)	6000164	1
5	Washer	4750219	1	19	'O' Ring (Rack Screw)	6000210	1
6	Diaphragm	7201042	1	20	'O' Ring (Diaphragm)	6000172	1
7	Rack Screw	7900511	1	21	'O' Ring (Push Rod)	6000229	1
8	Rack Ring	7900935	1	22	Spring Ring	7900516	1
9	Push Rod	*	1	23			
10	End Cap	8300013	1	24	M10 x 30 Safety Screw	5300192	1
11	Mounting Barrel	*	1	25	M5 x 25 Hex. hd. Bolt	5000674	12
12	Rack Spring	2500118	1	26	M5 Nut	5100195	12
13	Thrust Nut	5100216	1	27	3/4 BSP Locknut	5100051	2

*These components depend on thruster type and rating, consult Twiflex quoting thruster Part No.

Technical Data:

Caliper — SG Iron to BS 2789.

Thruster — Aluminium alloy to BS 1490.

Weights — MR Caliper — 6.3 kg.

MR25 Caliper — 6.80 kg.

'K' Thruster — 3.50 kg.

Total Pad Area: MR and MR25 Caliper — 58cm².

Pad Dimensions (new) — 63.5x46x12.7mm thick.

Pad Wear Allowance — 7mm.

1. GENERAL DESCRIPTION

The Twiflex MRK brake unit consists of a lever type caliper operated by a spring applied thruster. The caliper has replaceable brake pad assemblies, each retained by a spring clip, and a return spring is incorporated to maintain running clearance when the brake is off. The thruster incorporates a powerful spring and an automatic adjusting mechanism. The spring provides the force to operate the brake and the brake is released by applying pneumatic pressure.

The automatic adjusting mechanism compensates for brake pad wear by extending the push rod, giving constant braking performance irrespective of the state of the pad wear and maintaining the total disc/pad clearance at two millimetres.

The brake is designed for bi-directional drives, giving equal braking torque in either direction.

2. INSTALLATION

The assembly of the brake to the machine should be carried out as follows:-

- 2.1 Centralise the brake unit to the disc so that the pads are presented squarely to the disc face and do not project over the edge of the disc. Check that the disc and brake pads are clean and free from oil or other pollutants.
- 2.2 Braking torque is taken by a lug on the brake shoe, i.e. under load the pad is restrained by this lug and NOT BY THE BONDING.
- 2.3 Secure the brake to the machine framework or mounting stand and connect the air supply as required. The air supply should be connected via a length of flexible piping to accommodate the movement during operation. Ensure that all connections are tight and that the thruster cylinder is not restrained from free movement.
- 2.4 Support all pipe work and protect against possible damage.
- 2.5 It will be noticed that the pivot base is of symmetrical design to permit mounting of the thruster assembly to the left or right side of the brake caliper as required. Shoe arm assemblies are interchangeable to allow this.
- 2.6 To fit the thruster remove the two 3/4" BSP (ISO G3/4) locknuts and offer the hexagon pushrod through the hole in one of the caliper arms, place locknuts on pushrod, and make sure the hexagon fits into the slot in the opposite arm. Pull the arms apart so that the brake pads are pressing against the disc and rotate the hexagon pushrod until the gap between the thruster body and the arm is 6mm with the hexagon fully engaged in the slot (see Figure 3). Tighten the locknut to 50 - 60Nm (37 - 44 lbf - ft) torque to secure the thruster to the arm. Tightening this nut compresses a spring inside the thruster and it should

be tightened until the 6mm gap disappears. The second locknut is now tightened against the first. Replace the tension springs.

- 2.7 Operate the brake a few times (with the machine running if possible, to condition the brake pad material), then carry out any statutory or other testing that may be required. If the brake is designed for severe emergency use which might afterwards require disc re-surfacing and or pad replacement, this should be borne in mind and testing at 50% or 75% full speed may be considered sufficient.

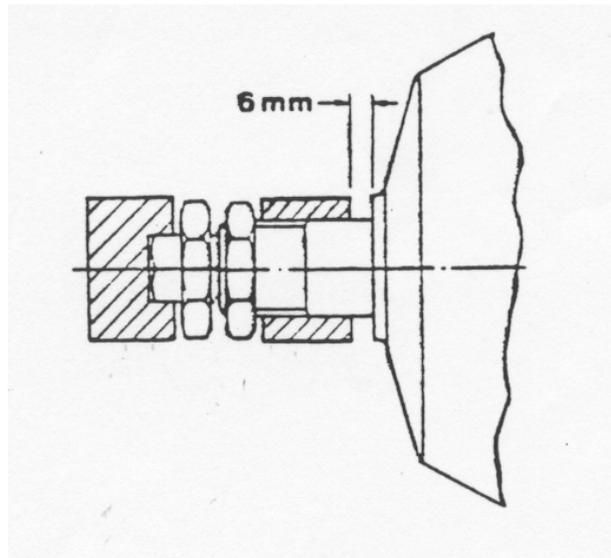


FIGURE 3. THRUSTER TO CALIPER ARM ASSEMBLY

3. OPERATION

- 5.1 If an electric solenoid valve is used to control brake operation, the delay time between the electrical signal and full brake release depends on the solenoid response time, pipe sizes and lengths, number of brake callipers and the air pressure. Typical brake release times using standard Twiflex controllers are as follows:

Type GL controller 100 - 200 ms
Type GK controller 40 -100 ms

- 5.2 The delay time to brake fully on will be similar to the release time unless a quick exhaust valve is fitted, in which case the delay will be only 20-50 ms depending on the solenoid, and pipe lengths, as above.

- 5.3 A constant push rod stroke of between 4 and 5mm is maintained by the automatic stroke adjusting mechanism which ensures consistent response times and spring thrust independently of friction pad wear.

6. MAINTENANCE

- 6.1 Check the brake as necessary to ensure that it remains clean and dry, especially that the pads and disc brake path are free of oil or other pollutants.
- 6.2 Carry out any periodic statutory testing that is required, or otherwise check for satisfactory performance.
- 6.3 Replace the friction pads when worn. The stroke of the hexagon push rod is maintained at approximately 4mm by the automatic adjusting mechanism in the thrusters as pad wear occurs, maintaining constant spring thrust. When only one pad is worn down to 6.5mm at any point, all the brake pads should be replaced.

The pivoted shoe design of the MR caliper ensures as far as possible that wear is even over the whole surface of the pads. The attainment of even wear is, however, dependant on a number of factors such as disc diameter, disc material and condition, disc temperature, pad material, power dissipation and rubbing speed. It may not always be possible therefore to obtain the ideal even wear pattern in service under diverse operating conditions and, it is considered economic to do so, it is suggested that the pads be 'turned around' periodically if inspection shows a tapered pattern to be developing.

- 6.4 To replace the pads, secure the installation as necessary to ensure safety. With air pressure released, remove the tension springs at the end of the caliper arms, slacken the two $\frac{3}{4}$ " BSP (G3/4) locknuts securing the thrusters and screw back the hexagon push rod to create space between pads and disc. Ease out the spring retaining clips and remove worn pads. Clean the disc and fit new pads. RE-ADJUST THE THRUSTER STROKE as described in 2.6 and retighten the nuts. Replace the tension springs.
- 6.5 Re-machining of the disc brake paths is not necessary unless they are cracked or badly pitted. Some grooving of the disc is normal and is not detrimental to performance, provided the surface has a polished appearance. Disc wear is generally negligible if standard Twiflex brake pads are used, If skimming of the brake paths does become necessary, however, the following tolerances must be observed:

Thickness variation of disc flange: 0.05mm total variation at any given radius.

Minimum thickness of flange: 75% of total initial thickness.

Maximum run out of flange: 0.15mm T.I.R.

Surface finish of braking paths: 2 micron or better.

- 6.6 Under average operating conditions, no further maintenance should be necessary, but a light smear of grease on the caliper arm knuckle joints at three month intervals will help to maintain efficiency and reduce wear.
- 6.7 Replacement of push rod seal (21) and diaphragm (6): remove the thrusters from the caliper after securing the installation. Access to the 'O' ring seal is obtained simply by unscrewing the push rod. After doing this the front and back halves of the thrusters can be separated by unscrewing the twelve M5 bolted connections round the flange. The diaphragm (6) is then easily replaced together with the 'O' ring (20) if necessary. Lightly smear the inside diameter of the new diaphragm and the outside of the push rod with mineral grease before fitting. If the interior of the thruster shows evidence of excessive moisture or contamination check the arrangements for cleaning, drying and lubricating the air supply. Re-assemble, making sure that the lugs on the floating pawl engage with the helical slots in the cylindrical end of the mounting barrel (11). Check air tightness. Remount the thruster to the caliper using the installation procedure (section 2)

7. SPARES

- 7.1 A spare set of brake pads, diaphragm and a set of 'O' rings should be kept in a cool, dry, dark place where there is no chance of oil pollution.
- 7.2 Spare components for air line equipment, including the filters and the controller, should be kept in readiness, as appropriate.

8. Range of 'K' thrusters available for use with 'MR' type brake caliper.

Thruster Spring Force	Part Nos. of 'K' Thrusters of different spring rates	Braking Force (N) using standard brake pads Part No. 7080123-Z	Minimum Retraction Pressure (bar)	'MR' Brake Part No.
Full Rate	7200654	6400	5	6780413
2/3 Rate	7200770	4300	3.3	
1/3 Rate	7200576	2150	1.7	