



**INSTALLATION, OPERATION  
AND MAINTENANCE MANUAL FOR  
T40 Mk. 2 DISC BRAKE CALIPER  
M1492**

**AMENDMENT AND ISSUE RECORD  
M1492**

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#### **REFERENCE DRAWINGS**

A13131	Standard T40 Mk.2 Disc Brake Caliper Assembly
A13132	Standard T40 Mk.2 Piston & Body Assembly

# **1 INSTALLATION**

## **1.1 General description**

The Twiflex T40 Disc Brake is a directly applied hydraulic caliper of split design consisting of identical halves that are bolted to each side of a central mounting plate or bracket. The mounting plate should be the same thickness as the brake disc and this may range from 20mm and upwards. Brake discs may be of any diameter from 300mm diameter with no upper limit.

Each caliper half consists of a one piece casting of spheroidal graphite (nodular) cast iron into which the cylinder is machined. The cylinder is fitted with a simple wiper (an O-ring), a two part hydraulic seal, and a piston that bears directly on the friction pad backing plate. The piston is steel, hardened and ground. Friction pads are connected to the pistons, in order to effect retraction of the pads, but are also guided in a machined slot in the housing which supports the braking forces. All Twiflex calipers are fitted with asbestos-free pads.

T40 calipers are designed for use with mineral oil based hydraulic fluids only, but optional seals are available for use with automotive type brake fluids.

## **1.2 Positioning**

Ideally two T40 disc brake calipers should be used on each brake disc, mounted on the horizontal centre line, diametrically opposite each other. This would neutralise the braking torque reaction forces on the shaft bearings.

If the caliper is to be installed in any other position around the brake disc it may be necessary to provide special bleeding arrangements since the bleed screw should be placed uppermost.

Sufficient space should be allowed around the brake position for installation, inspection and maintenance.

## **1.3 Mounting**

Details of mounting plate drilling are as shown in Fig. 1. The mounting plate should be the same thickness as the disc, and in line with it, so that the brake pads are presented squarely to the brake disc and the caliper halves are equally spaced either side of the brake disc.

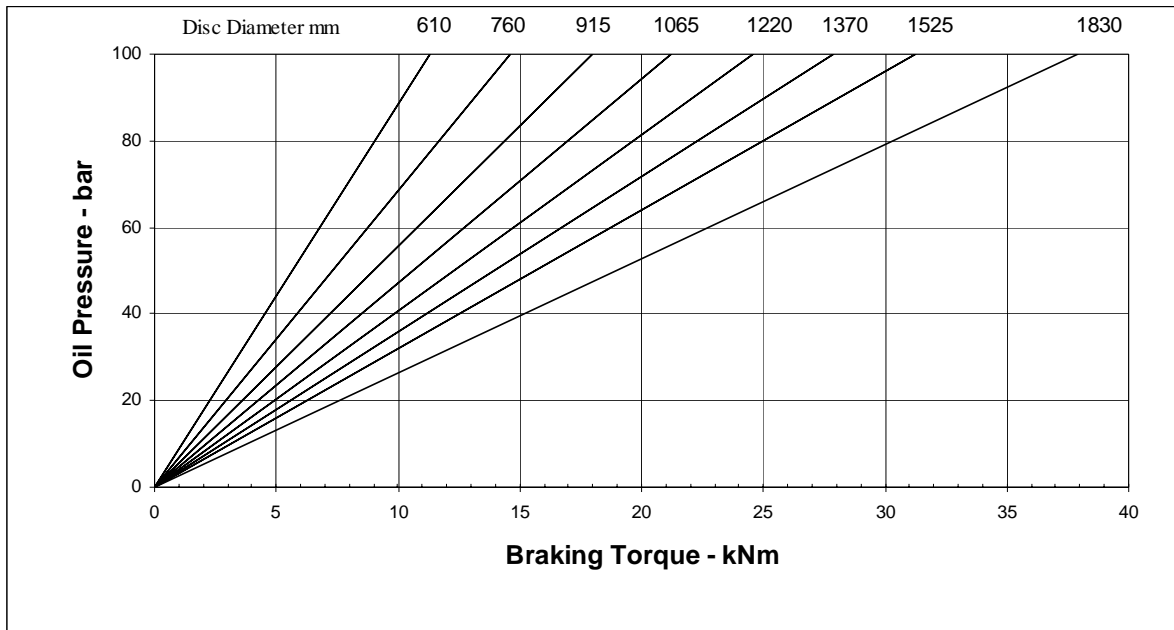
Two M24 mounting bolts are used to secure the caliper to the mounting plate or bracket. The bolts must be tightened to a torque of 680 Nm (500lbf.ft). The bolts must be grade 8.8 minimum and the nut must be grade 8. A bolt assembly kit is available from Twiflex to suit calipers used on brake discs up to 30mm thick.

## 1.4 Braking force (45kN at 100 bar oil pressure, normal maximum working pressure)

Braking force is defined as the Tangential Force acting on the brake disc at the Effective Disc Radius.

Braking Torque (Nm) = Braking Force (N) x Effective Disc Radius (m)

Where Effective Brake Disc Radius = Actual Disc Radius – 0.045



These are typical performance figures for fully bedded and conditioned brake pads. For bedding-in and conditioning see publication M1060.

When used with standard Twiflex brake discs an appropriate service factor should be applied when designing the braking system, and in case of brakes used for holding duties or in wet conditions this should be not less than 2.0.

## 1.5 Hydraulics

Connect each caliper half into a common tee piece using suitable hydraulic fittings and tubing. The port size is G1/8" (1/8" BSP) and fittings and tubing should have a bore size of 4mm minimum. Fitting kits are available from Twiflex.

Ensuring that pipework is supported securely, connect the hydraulic supply to the tee piece. Loosen the bleed screws in each module and fit over each nipple a length of flexible transparent tube with its other end in a suitable receptacle.

Slowly pressurise the caliper until fluid emerges from each bleed screw bubble free, then tighten the bleed screws and remove the transparent tubing.

## **2 TECHNICAL DATA**

Total caliper weight (2 caliper halves only) –20 kg (excluding mounting bracket and bolts)

Weight of two bolts (M24 x 200) and two nuts (M24) – 1.92 kg

Pad dimensions (new) – 85 x 85 x 19mm

Pad wear allowance – 10mm

Total pad friction area – 144cm<sup>2</sup>

Total oil displacement volume per 1mm stroke – 15ml (for two caliper halves)

Minimum disc diameter – 300mm

Disc thickness – T40 can accommodate brake discs or wheels from 20mm upwards

Hydraulic fluids – use with MINERAL OIL BASED hydraulic fluids such as Shell Tellus 37 or Castrol Hyspin AWS32

Correctly formulated oil in water emulsions may also be used

Initial oil filling varying from 150ml (pads new) to 265ml (fully worn pads)

## **3 OPERATION**

### **3.1 Initial Operation**

Fully pressurise the caliper to 100 bar (or maximum available if less) and inspect all joints and connections for leaks.

Ensure that clamping has taken place on the brake disc and that brake pads are flat and square on the brake disc.

Release hydraulic pressure and observe that pressure collapse is rapid and that brake pads retract fully from the brake disc.

Operate the caliper several times checking for correct operation and leaks. Leave the caliper installation clean and dry. Full brake performance will not be realised until the pads have been bedded in and conditioned.

## **4 MAINTENANCE**

Item numbers in brackets refer to Fig. 2.

### **4.1 Routine maintenance**

Very little routine maintenance is required. Ensure that the brake pads and disc are kept free of oil and grease; replace pads if they become contaminated. The brake disc must be kept clean, and build-up of dust or other deposits removed periodically from the caliper.

The level and cleanliness of hydraulic fluid in the system should also be monitored periodically; contaminated fluid should be replaced and the whole system flushed through with clean fluid.

### **4.2 Brake pad replacement**

Pads should be replaced when any part of a pad is worn to a thickness of 9mm.

Brake pads can easily be changed with the brake in situ. Pad replacement is carried out from the rear of the caliper. With the brake off, the worn pads may be removed after unscrewing the pad retaining plate screws (Item 7) and removing the pad retaining plates (Item 3).

Re-assembly of the new replacement pads follows the reverse of this procedure, but note that the mating surfaces are clean and that the slotted pad backing plate is located around the keep button on the piston. The pads should slide easily into position.

### **4.3 Servicing**

The servicing procedure in the event of leakage or incomplete pad retraction consists merely of disassembly and inspection, followed by replacement of seals and other components as necessary.

Before disconnecting the hydraulic pipes, the caliper should be cleaned, especially in the areas around the hydraulic connection and bleed screws.

Disconnect the hydraulic pipes, controlling any spillage, and remove the caliper from its mounting. Transfer the caliper to a bench, and clean externally before dismantling.

The piston can be either be pulled out using the pad retention button, or blown out using compressed air at the hydraulic input port.

The piston should be renewed if the sealing surface is damaged.

The front seal, which acts basically as a wiper, is an O-ring and thus easily removed. The main seal is a two-part type consisting of a split P.T.F.E. backing ring and a rubber-sealing element. The backing ring must be removed first. Take care not to damage the groove surfaces when removing the seals.

New seals are easily fitted without tools, but it is important to fit the parts of the main seal in their correct orientations - see Fig. 2. In particular the backing ring has one radiused edge only, and the scarf joint must lie flat after fitting. Cleanliness is vital.

Before re-inserting the piston assembly, lubricate the piston seals and piston lightly with clean hydraulic fluid or soft compatible grease.

#### **4.4 Loss or reduction of braking force**

Possible causes are:

- a) Low hydraulic pressure

##### Remedy

- i) Check pressure
- ii) Re-adjust or rectify supply unit.

- b) Contaminants on surface of brake pads and disc, especially lubricants

##### Remedy

- i) Remove source of contamination
- ii) Clean brake disc thoroughly
- iii) Fit new brake pads.

- c) Excessive friction in the caliper, due to corrosion or damage

##### Remedy

- i) Dismantle caliper as above
- ii) Ascertain cause of problem and rectify, replacing parts as required
- iii) Reassemble and replace caliper.



## 5 SPARES

Pad Assembly (asbestos free)  
2 required per caliper

Part No. 708142-Z

Seal Kit  
*Comprising –*  
2 main seals (2 parts),  
2 main O-rings

Part No. 6000360

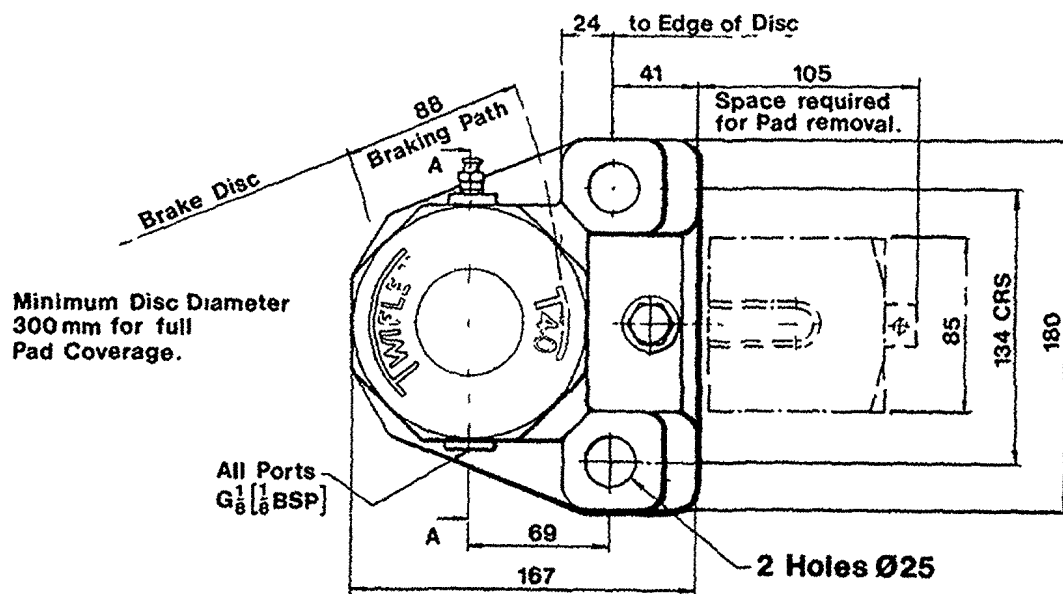
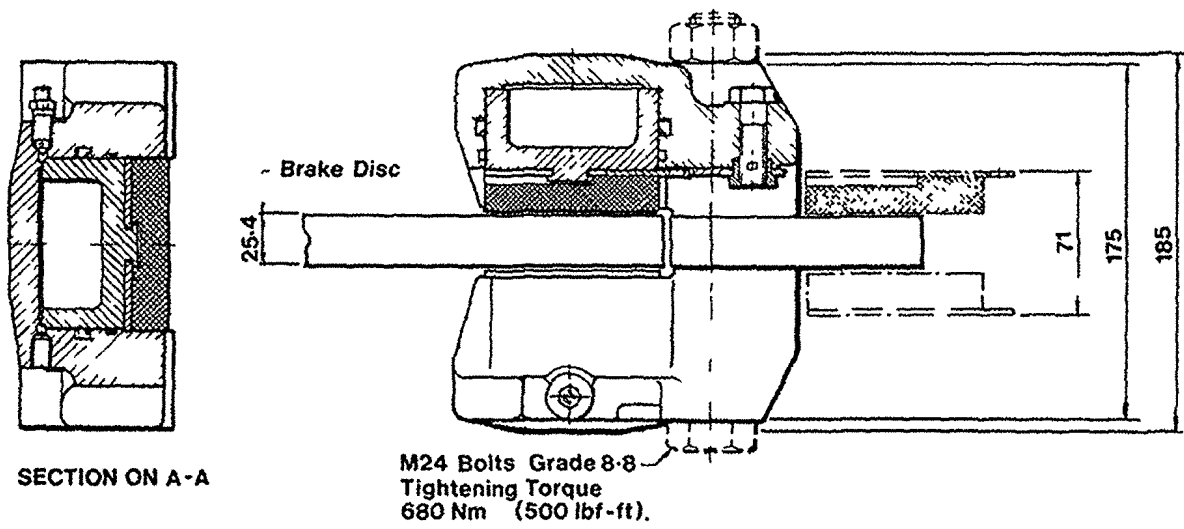
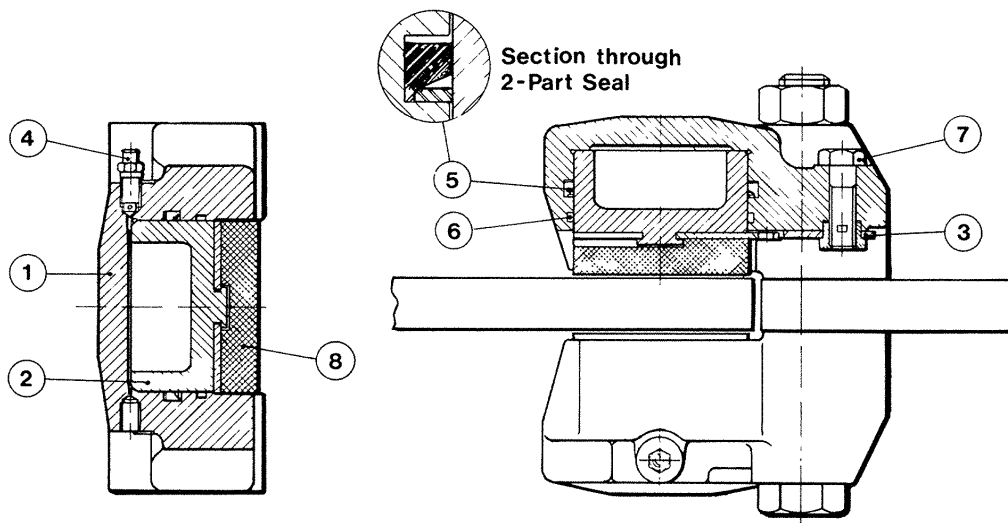


Fig. 1



**Disc Brake Caliper Type T40**

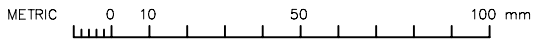
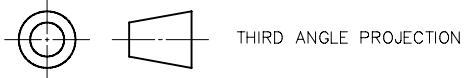
**Parts List**

Item	Component	Qty.
1	Caliper Body	2
2	Piston	2
3	Pad Retaining Plate	2
4	Bleed Screw	2

Item	Component	Qty.
5	Seal	2
6	O-Ring	2
7	Pad Retaining Screw	2
8	Pad Assembly	2

Fig. 2

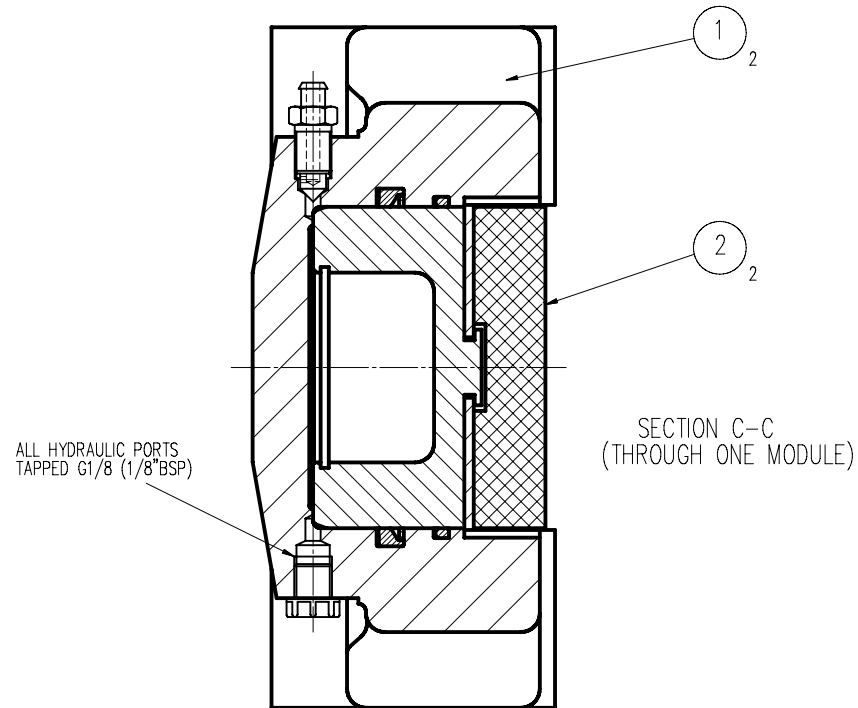
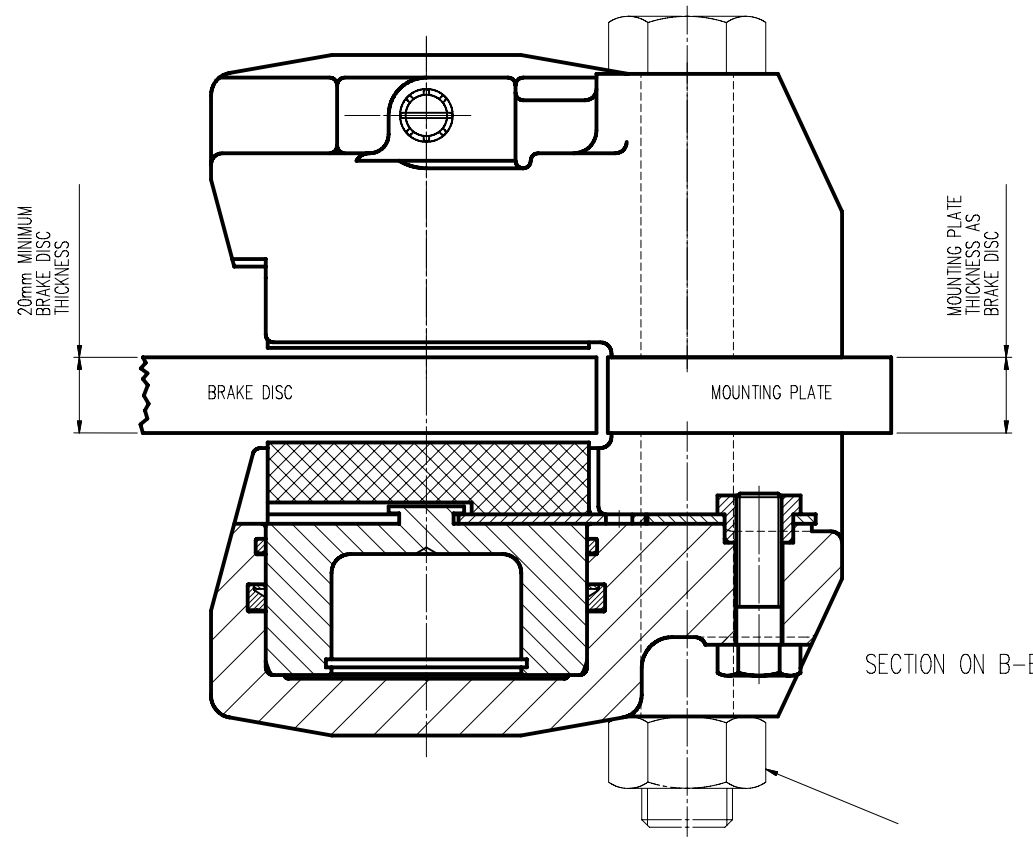
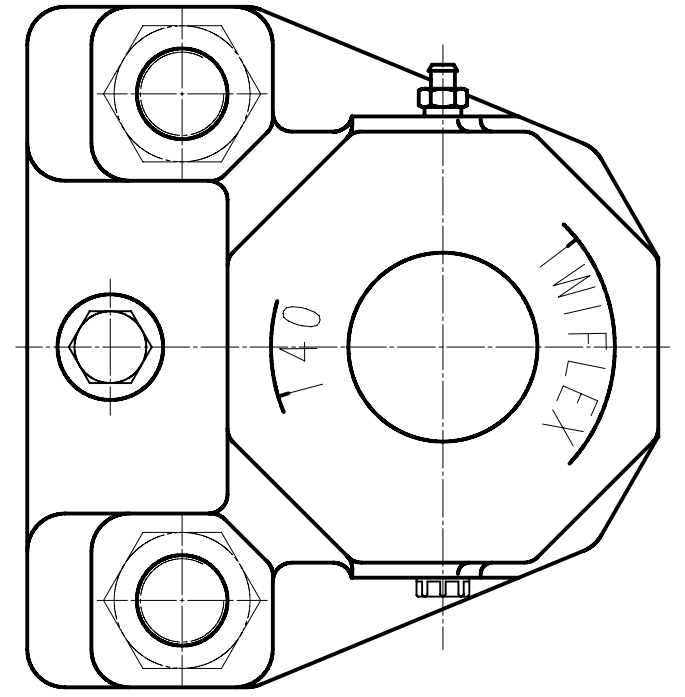
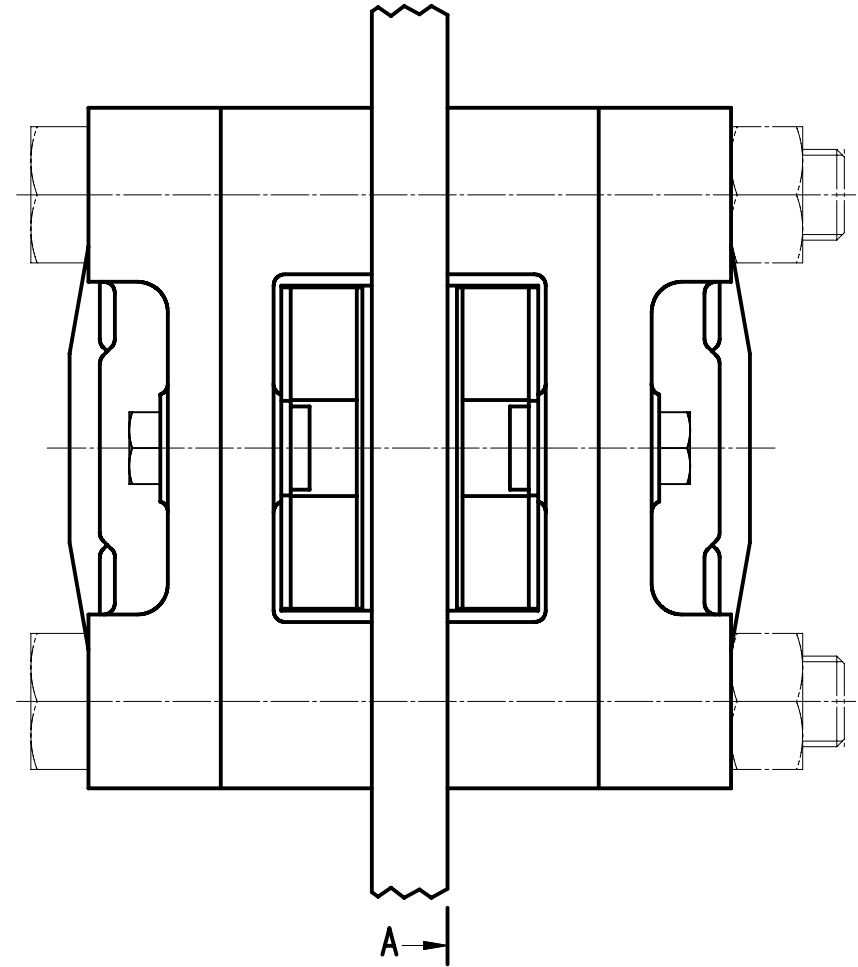
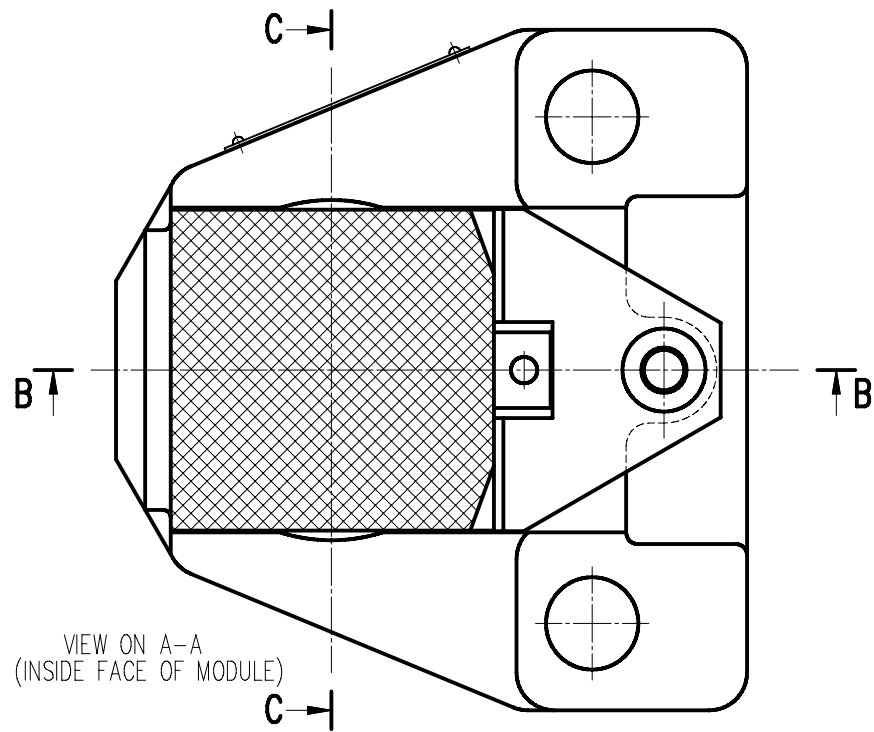
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REMOVE SHARP EDGES

DO NOT SCALE

DIMENSIONS AND TOLERANCES TO BS 308



2 OFF - M24 MOUNTING BOLTS GRADE 8.8 x 200 LONG AND 2 FULL NUTS GRADE 8. THIS LENGTH OF BOLT IS SUITABLE FOR BRAKE DISC THICKNESS UP TO 30. (BOLTS AND NUTS NOT INCLUDED ON BASIC SCHEDULE).  
TIGHTENING TORQUE 680Nm (500 lbf.ft.).

ISSUE No.	ALT.No.	DATE	DESCRIPTION	GRID REF
01		12/09/03		
			ALTERATION	



DIMENSIONS IN mm.  
OPEN TOLERANCES ± 0.25  
ANGLES ± 0.5°  
GENERAL M/C FINISH = 1.6 µm  
SURFACE FINISH IN MICRONS  
e.g.  $\sqrt{2}$  = 2 MICRONS  
(0.002mm) CLA  
( = 80 MICRO-INCHES CLA)

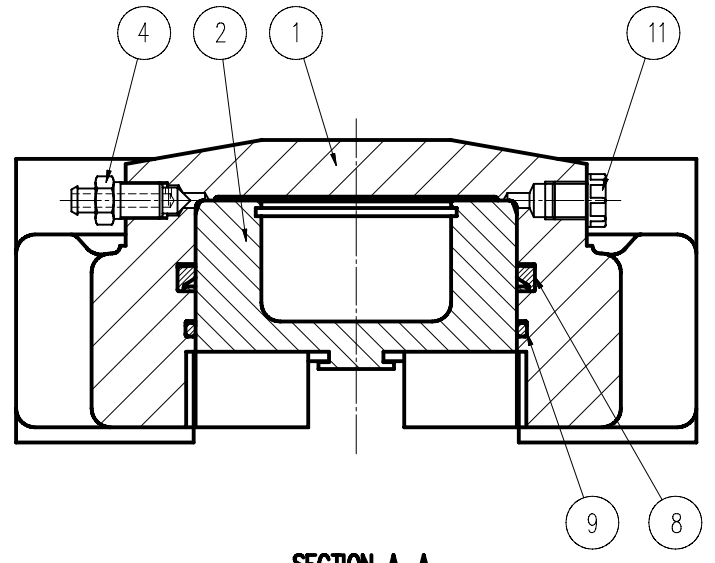
CERT'D	
CHECKED	
DRAWN	R.E.G.
DATE	12/09/03
SCALE	1 : 1

DESCRIPTION	<b>DISC BRAKE CALIPER ASSY TYPE T40 Mk.2</b>	
MATERIAL		FINISH

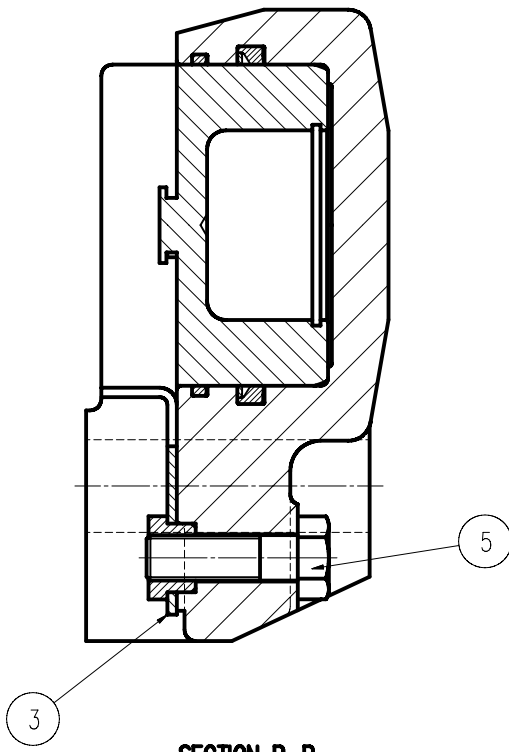
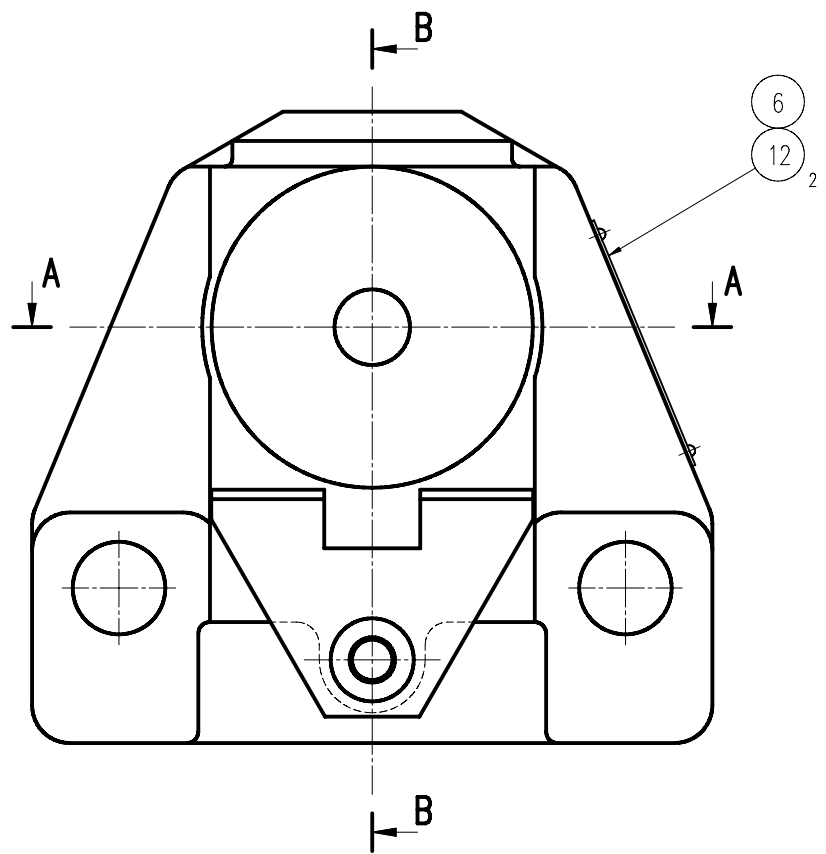
SCHEDULE Z155/14		THIS ISSUE 01
INERTIA	WEIGHT	
-	kg m <sup>2</sup>	9.28/MODULE kg
PART No.	<b>6781508</b>	
DRG. No.	<b>A13131</b>	



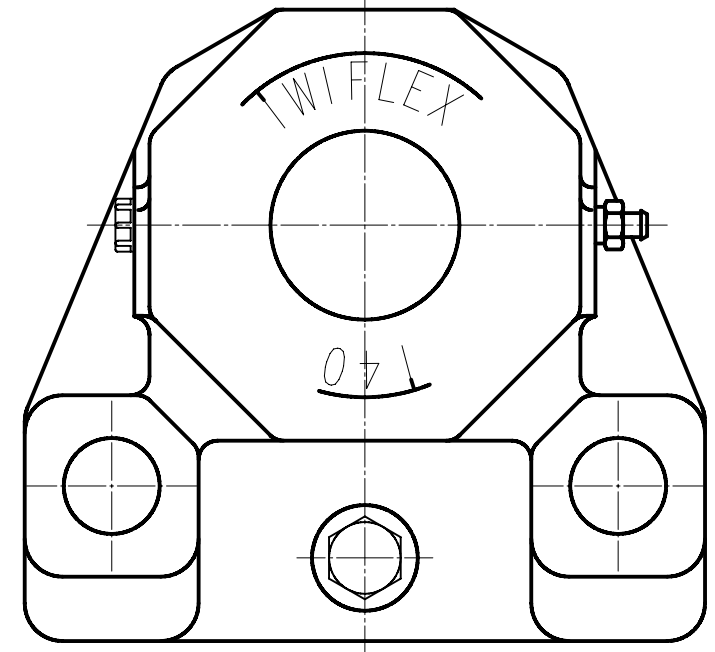
6781508  
A13131  
Z155/14



SECTION A-A



SECTION B-B



ISSUE No.	ALT.No.	DATE	DESCRIPTION	GRID REF
01		15/09/03		
ALTERATION				



DIMENSIONS IN mm.  
OPEN TOLERANCES ± 0.25  
ANGLES ± 0.5°  
GENERAL M/C FINISH = 1.6 µm  
SURFACE FINISH IN MICRONS  
e.g.  $\sqrt{R}$  = 2 MICRONS  
(0.002mm) CLA  
( = 80 MICRO-INCHES CLA)

CERT'D	
CHECKED	
DRAWN	R.E.G.
DATE	15/09/03
SCALE	1 : 1

DESCRIPTION	<b>PISTON/BODY ASSEMBLY TYPE T40 Mk.2</b>	
MATERIAL		FINISH

INERTIA	WEIGHT
-	9.28/MODULE kg
PART No.	<b>6701509</b>
DRG. No.	<b>A13132</b>

SCHEDULE Z155/15

THIS ISSUE 01

