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Hydraulic Test Rig

- by -

M. Healey

## Hydraulic Test Rig

The rig comprises a grinding wheel head spindle driven by a motor and carrying an inertia load made up of detachable steel discs. On the opposite end of the shaft to the motor is mounted a radial diffraction grating and a d.c. tachogenerator (see Fig. 1).

Three motors are currently available, all with their own mounting brackets for easy changing:

- a) Vickers-Sperry, 6 axial pistons motor type MF-3906-30.
- b) Boulton Paul; 9 radial pistons with shaped cam track.
- c) Hartmann Rol-vane H.T.10 (Telehoist).

Two types of spool valve are available:

- a) Dowty Moog, Series 22
- b) Pegasus type 120.

A manifold block is available to make the two Moog valves interchangeable.

The Bolton Paul and Telehoist motors both have double ended shaft so that a tachometer can be mounted direct onto the motor. The tachometer used in a Servo tach. (5 rads/sec./volt). The other tachometer (mounted on the test rig) is an Evershed-Vignoles (7.9 rads/sec./volt). The Evershed is about 50% less noisy.

The diffraction grating is mounted onto a detachable shaft which, after removing the reading heads and tachometer can be screwed out. The 1000 line grating requires centring to about .0002" and so is mounted on eccentric screws. Two diametrically opposite reading heads are used so that with no eccentricity of the grating both signals will stay in phase. A 90 line grating is also being mounted but the same reading heads will have to be used.

The gratings are made by Paton-Hawksley at Bristol, but Hilger and Watts would be a better source.

The oil supply is delivered from a Keelavite gear pump driven by a 3 phase induction motor, via pressure reducing valves. An accumulator would be an improvement and should be fitted as indicated.

## Power Pack

Keelavite gear pump type P 2004 5 g.p.m. at 1500 r.p.m. 3-phase induction motor  $7\frac{1}{2}$  H.P. 1500 r.p.m. 440v. Supply pressure 1500 psi with overload to 2000 psi at lower flow rates. High pressure relief valve Keelavite type B4612/1/I.J./200. Low pressure control valve I.V. Filter Dowty Rotol 1.00021.739 (5 micron). Oil Cooler Keelavite B 1492. Accumulator.

Motors:

	Boulton Paul	Vickers	Telehoist
Type	GX 8830	MF 3906-30	H.T.10
Displacement in <sup>3</sup> /rev.	2.2	.09	1
in <sup>3</sup> /rad.	.35	.015	.16
Volume under compression in <sup>3</sup>	1.25	.57	.77
Inertia lb-in-sec. <sup>2</sup>	.07	.0035	.002
Leakage in <sup>3</sup> /sec/psi	4 x 10 <sup>-4</sup>	4.4 x 10 <sup>-6</sup>	-
Speed range rpm	1 - 1500	100 - 6000	5 - 1000
Torque lb-ins/psi	.35	.015	.16
Viscous friction coeff. lb-in/rad/sec.	.87	-	.095

Load

Inertia of shaft = .015 lb-in-sec.<sup>2</sup>

Inertia of each disc = .5 lb-in-sec.<sup>2</sup>

∴ max. load inertia = 1 lb-in-sec.<sup>2</sup>

A large single disc is also available with inertia = lb-in-sec.<sup>2</sup>

Electrohydraulic spool valves

	Dowty-Moog	Pegasus
Type	Series 22 3.00243.001	120
Rated flow in <sup>3</sup> /sec.	38.5 at 1000 psi across valve	35
Rated input current mA	± 8	
Coil resistance ohms	1000	22

Two series 22 valves are available and early tests with the Boulton-Paul motor used a series 21 Moog value which has been returned to Dowty Technical Department.

