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Report No. 72/Systems 32/50

EFFECTS OF FAILURE IN ASTRA

SCANNER DRIVE HYDRAULIC SYSTEM

UNCLASSIFIED

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A. V. ROE CANADA LIMITED

MALTON - ONTARIO

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TECHNICAL DEPARTMENT (Aircraft)

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FORM 1316A

A V AIRCRAFT LIMITED
MALTON - ONTARIO
TECHNICAL DEPARTMENT

AIRCRAFT:		REPORT No 72/System 32/50
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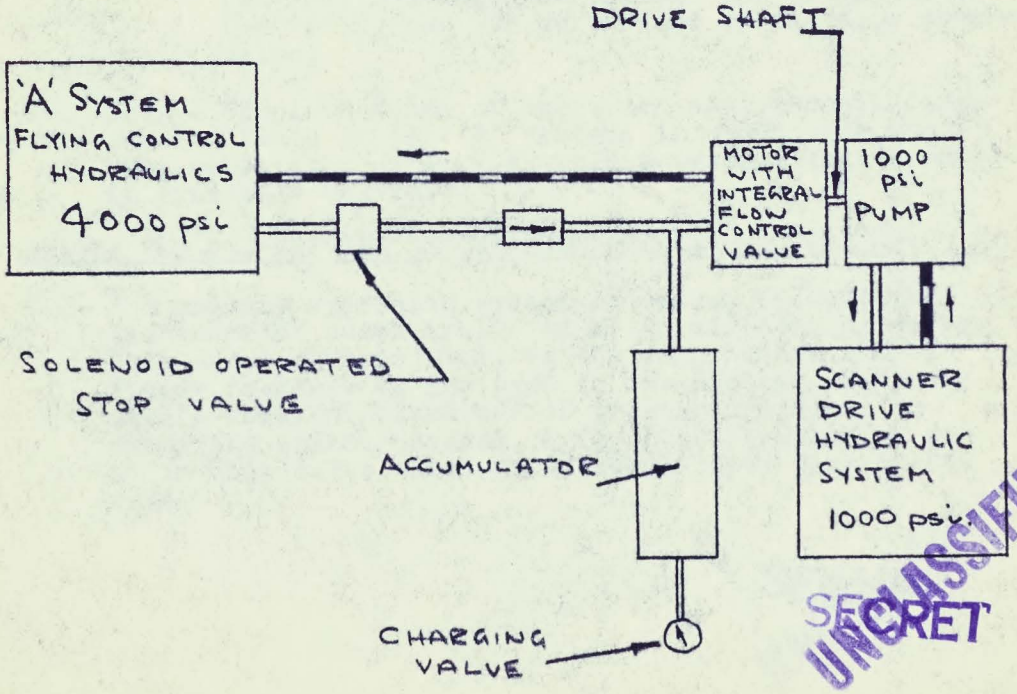
EFFECTS OF FAILURE IN SCANNER DRIVE SYSTEM

1. SUMMARY OF SYSTEM

1.1 System is a 1000p.s.i., 13 gpm system powered by a constant-displacement pump and containing a relief valve set at 1250 p.s.i. to prevent system overload. This pump is one half of a motor-pump combination, the motor portion being driven by an off-shoot of the 'A' system, hydraulic flying controls. The motor operates at 4000 p.s.i. and is controlled to 3½ gpm by a built-in flow control valve. The motor-pump combination is designed to stall with a load of 1000 p.s.i. in the scanner drive system. An accumulator is built into the motor drive lines to maintain pressure for the motor should the flying controls be drawing off sufficient fluid to starve the motor system.

1.2 DIAGRAM OF SYSTEM



FORM 1319A

1.3 The only added vulnerability to the 'A' system of the flying controls is the motor drive circuit.

2. EFFECTS OF FAILURE IN MOTOR DRIVE

2.1 Should there be a failure of the supply lines to the motor portion of the motor-pump, then fluid from the 'A' system hydraulics would be lost.

2.2 The aircraft would remain in a safe condition in this event, retaining full rate control from the remaining 'B' system, although at a reduced available hinge moment.

3. EFFECTS OF FAILURE IN SCANNER DRIVE PROPER

3.1 Any failure in the drive system from the pump side of the motor-pump would cause loss of fluid from the scanner drive such that the pump would begin to run dry and therefore sieze. This could have one of two results.

3.1.1 It could stall the hydraulic motor, in which case the motor would cease to draw its 3½ gpm from the 'A' system, or -

3.1.2 It could shear the drive shaft between the motor and the pump. In this case the motor would run free and continue to draw its 3½ gpm from the 'A' system (as controlled by the flow control valve).

3.4 Only a complete burst of the motor casing could cause loss of fluid in the 'A' system, in which case the same conditions as in 2.2 would prevail. This event is extremely unlikely.

4. REASON FOR NOT DRIVING SYSTEM FROM UTILITY HYDRAULICS

4.1 The utility hydraulic system is driven by constant displacement pumps, relieved by an off-loading valve. This valve returns fluid to the compensator when a steady pressure is achieved in the system. However, with a constant bleed-off of pressure required to drive the scanner system, a fluctuation would be set up in this valve which would cause rapid wear of the unit.

5. ALTERNATIVE METHODS FOR SCANNER DRIVE

5.1 Alternative methods of driving the scanner are under investigation in conjunction with a proposed simplification of the Utility Hydraulic System and will be fully presented at a later date.