ARROW I - FLIGHT TESTS

[illegible]

DESCRIPTION OF SKETCH

Let OX, OY and OZ be three mutually perpendicular axis with origin O, such that:-

OX is parallel to the longitudinal datum of the aircraft,
OY is parallel to the lateral or spanwise datum,
and OZ is perpendicular to the plane XOY.

Let O be projected into a horizontal plane in O', also project OX into O' X', OY into O' Y',. Let O'C' be a reference direction in the horizontal plane, and let OC be the reference direction in the plane of the aircraft.

Let the horizontal plane through O intersect XX' in X'', and YY' in Y'', then,

ANGLE OF PITCH θ = $\angle$XOX'', the angle between the longitudinal datum of the aircraft and the horizontal plane.

ANGLE OF BANK ϕ = $\angle$YOY'', the angle between the lateral datum of the aircraft and the horizontal plane.

AZIMUTH ANGLE ψ = $\angle$C'O'X', the angle between the reference direction and the projection of the longitudinal datum of the aircraft in the horizontal plane.

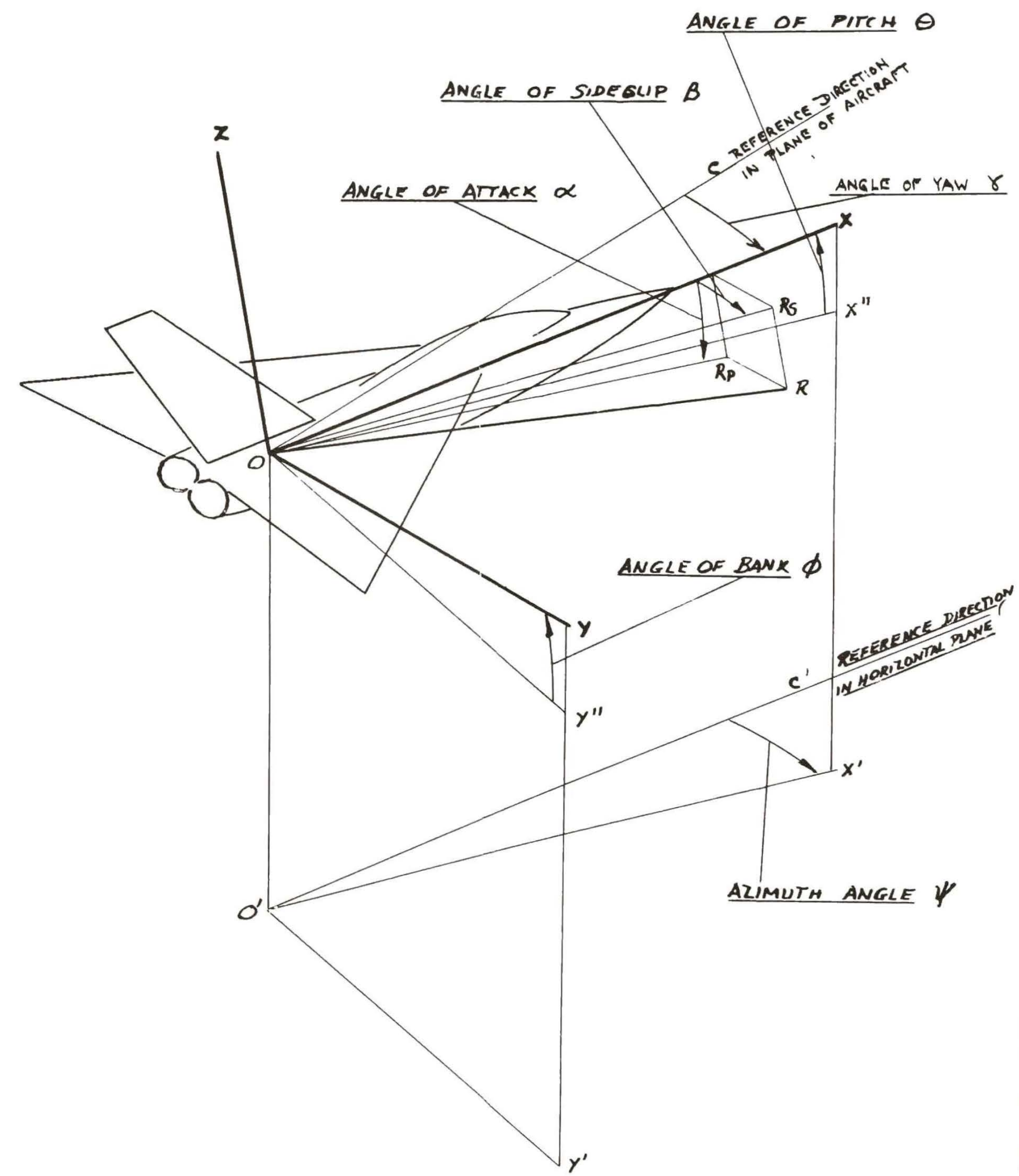
YAW ANGLE γ = $\angle$COX, the angle between the reference direction and the longitudinal datum of the aircraft, in the plane of the aircraft, XOY.

Further, let OR lie parallel to the direction of the relative wind, and let OR_s and OR_p be projections of OR in planes XOY and XOZ respectively, then,

ANGLE OF ATTACK α = $\angle XOR_p$, the component of the relative wind in the plane XOZ.

ANGLE OF SIDESLIP = $\angle XOR_s$, the component of the relative wind in the plane XOY.

ITEM	QUANTITIES TO BE MEASURED		
Angle of Pitch	θ	$\dot{\theta}$	
Angle of Bank	ϕ	$\dot{\phi}$	
Azimuth Angle	ψ		
Angle of Attack	α		
Angle of Sideslip	β		
Longitudinal Acceleration			$\ddot{X}$
Lateral Acceleration			$\ddot{Y}$
Normal Acceleration			$\ddot{Z}$
Yaw angle		$\dot{\gamma}$	$\ddot{\gamma}$



SKETCH DEFINING MOTION OF AIRCRAFT

FIG. 2

NOTE ON FLYING CONTROL MECHANISM

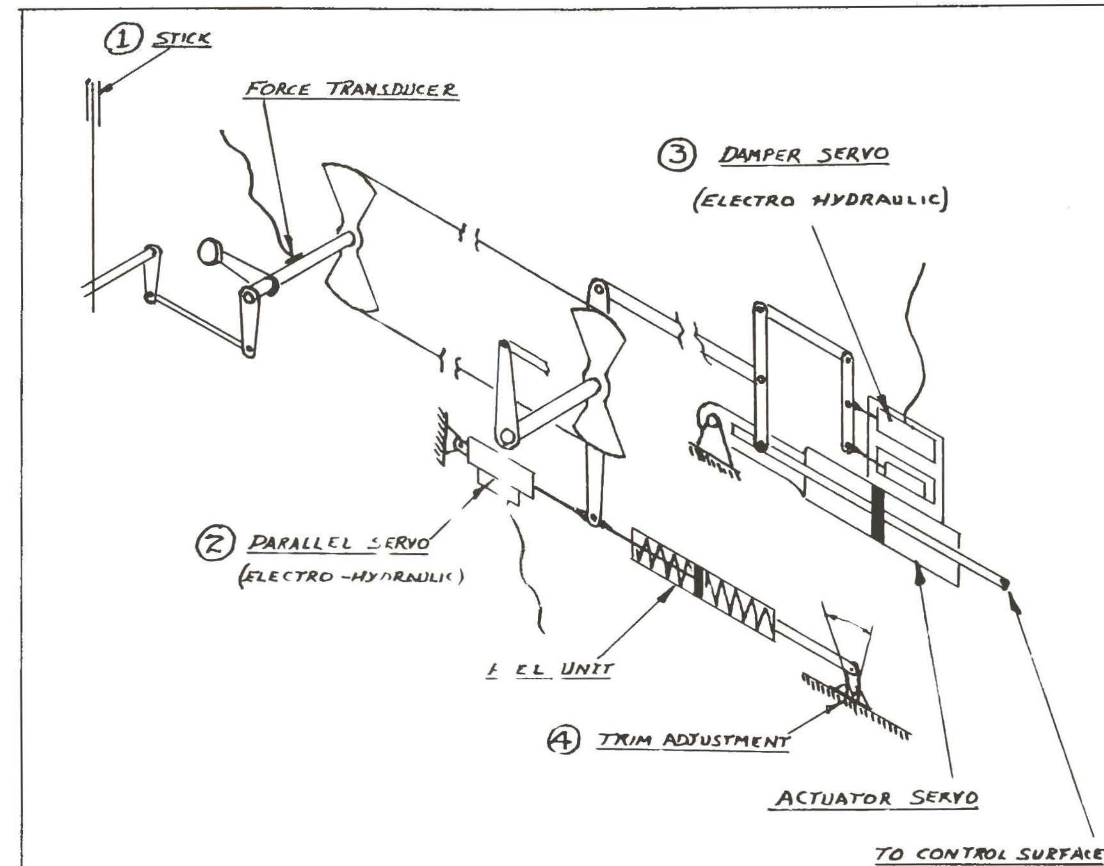
The sketch opposite, shows the elevator control system in its essentials, for the purpose of describing the instrumentation.

While the aileron system is practically identical to the elevator system, the rudder system has no parallel servo.

In the elevator and aileron systems the feel unit and trim adjustment are employed only in Emergency Manual mode of operation, when the parallel servo is by-passed and the damper servo is centralised by a centralising device. The rudder damper servo is also provided with a centralising arrangement, and has duplicate electrical and hydraulic systems.

In Manual Mode of operation, the pilot's effort on the stick strains the mechanism from the stick grip to the rear quadrant against the parallel servo, which operates in response to an "error" signal. The strain is picked-up by a force transducer, the signal being balanced against the signal from the "feel" network which may consist of - stick position, q, stick force/g, etc., components.

The resulting "error" signal, suitably amplified, is fed to the parallel servo, which moves in such a direction as to reduce the error signal to zero.



SKETCH OF FLYING CONTROL MECHANISM

REF: BROC URE F.C.

Key:

1. Stick Force - Elevator, Aileron, and Rudder Pedal Force.
   Stick Position - Elevator, Aileron, and Rudder Pedal Position.
2. Position of Parallel Servos - Elevator and Aileron.
3. Damper servo signal - Elevator, Aileron, Rudder and Emergency Rudder.
   Damper servo position - Elevator Port & Stb'd, Aileron Port & Stb'd, and Rudder.
4. Trimmer position - Elevator, Aileron, and Rudder.

FIG. 3