Reference Number: 8858/38/J

8th May, 1958
Mr. F. Brame
S. Kwiatkowski

STRUCTURAL INTEGRITY MANOEUVRES AS REQUIRED BY SPECIFICATION MIL-S-5711 (U.S.A.F.)

The manoeuvres listed below are required to demonstrate structural integrity to specification requirements. Due to the presence of dampers in theArrow some of these manoeuvres are not representative cf design loads, cthers are limited to values below structural integrity limits by limiters and other prctective devices as described in Memo 8792/02E/J. The following remarks apply to manoeuvres listed in section 4.2.2.1.2.2 of the specification.

(a) Normal symmetrical pull-out
Maximum value limited by command limiter and "g" limiter in normal mode. In emergency mode of control can be performed in areas where adequate controllability exists at high angles of attack up to reasonable high normal accelerations but not necessarily equal to the structural integrity limits.

(b) Normal symmetrical push-down
Push-dcwn in normal mode to -3 g will cause nuisance disengagements in normal mode. Safe limit has not yet been established in the emergency mode (cross-coupling effects).

(c) Gust load factor simulation manoeuvre
Not required fcr theArrow because manoeuvre load factors are always higher then gust load factors.

(d) Normal unccordinated rolling pull-out.
In normal mode of control pilot's coordination is not required and rolling pull-outs will be coordinated autcmatically. These in some conditions are limited to values well below the structural integrity limits.

(e) Abrupt symmetrical pull-out
Abruptness of pull-outs is smoothed out by damper action. Case nearly equivalent to (a).

(f) Abrupt symmetrical pull-out with checking.
It is not possible to check the design case because damper action will tend to oppose initially the abrupt checking.

(g) Abrupt symmetrical push-down with abrupt checking (see item f).

USE AND PROCESSING OF FLIGHT DATA

A. 1. 200 channels will be used to confirm the flight air loads.

2. Distribution of gauges.

O/Wing	22 plus 10	)	65% Wing
I/Wing	78 plus 20	)	
Fin	20		10% Fin
Fwd. Fuse	20	)	25% Fuse
Aft. Fuse	30	)	

3. Readings taken in flight 20 times/sec. and recorded on tape for strain gauges.

4. Accelerometer readings continuous recording.

5. Scan accelerometer readers and select point closest to static test condition for similar case.

6. Extract from magnetic tape punch card strain gauge information at same time interval as accelerometer.

7. Compare strain gauge results to static test strain gauge results - note static test gauges are zeroed to zero load; flight strain gauges are zeroed to 1g inertia load.

   (a) Direct comparison
   (b) Plot of results round a section
   (c) Plot of results along spar or longeron

8. Declare whether in general results are out by more than 10%

9. Discuss any variation with Technical Design.

B. 1. If variation extensive use 400 gauges and calibration of wing.

2. Distribution of gauges

O/Wing	45	15	)	65% Wing
I/Wing	160	40	)	
Fin	40			10% Fin
Fwd. Fuse.	40		)	25% Fuse.
Aft. Fuse.	60		)	