SEAT TEST PROGRAM

OUTLINE

- OBJECTIVES
- TEST CONFIGURATIONS AND DATA ACQUIRED
- MATERIAL TEST RESULTS
- SEAT TEST RESULTS
- CONCLUSIONS

OBJECTIVES

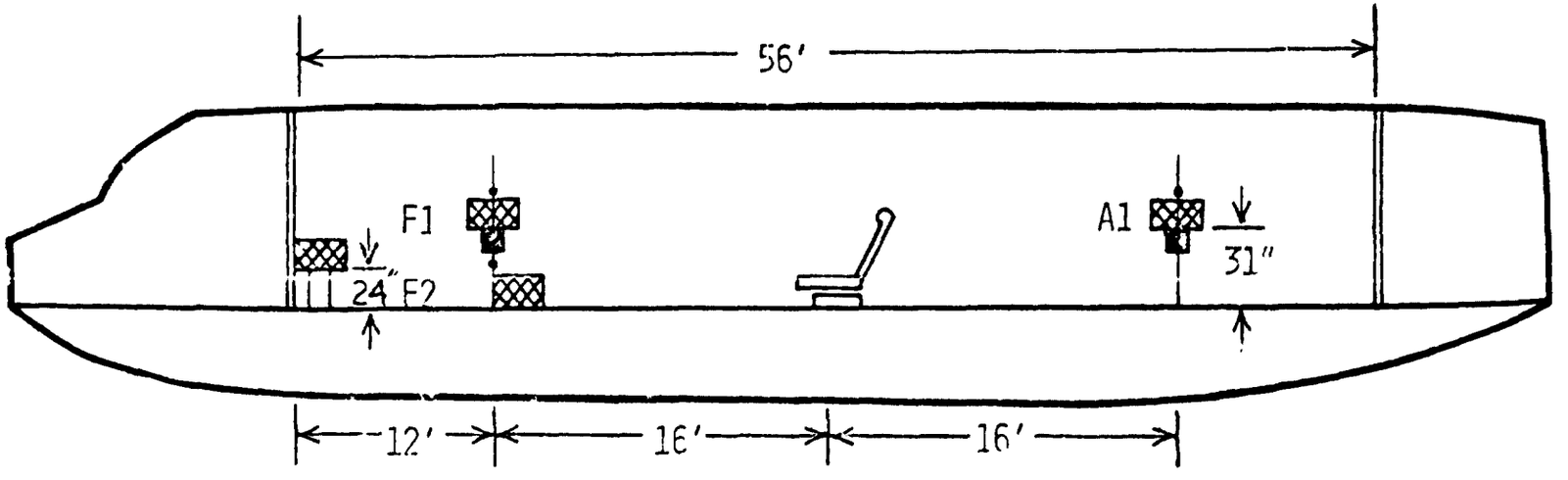
- EVALUATE SEVERITY OF NEWSPAPER IGNITION SOURCE WITH CONTEMPORARY SEATS
  - DETERMINE WEIGHT LOSS AND VISUAL DAMAGE
  - DETERMINE IF IGNITION SOURCE IS SEVERE ENOUGH TO SHOW IMPROVEMENT WITH NEW MATERIAL CONFIGURATIONS
- COMPARE DAMAGE WITH JET A-1 IGNITION SOURCE
- DETERMINE IF MATERIALS FOR SEAT TESTS PASS FAR 25 AND OBTAIN LOI

TEST CONFIGURATIONS

- TESTS CONDUCTED IN STANDARD BODY FUSELAGE WITH IN FLIGHT VENTILATION
- TEST 1
  - NEWSPAPER TENTED ON CENTER SEAT OF THREE UNMODIFIED SEATS
  - NEWSPAPER IGNITED WITH MATCHES
- TEST 2
  - NEWSPAPER TENTED ON CENTER SEAT
  - ARMRESTS REMOVED
  - LEFT SEAT MOVED ADJACENT TO CENTER SEAT
  - NEWSPAPER IGNITED WITH HOT COIL
- TEST 3
  - ARMRESTS REMOVED
  - LEFT SEAT MOVED ADJACENT TO CENTER SEAT
  - 1 LITER OF JET A-1 IN 1 X 1 FOOT PAN UNDER CENTER SEAT
  - FUEL IGNITED WITH PROPANE BURNER

727 TEST SECTION

- VOLUME - 5920 FT^3
- VENTILATION RATE - 1500 CFM



DATA ACQUIRED

- SEATS SUSPENDED FROM LOAD CELL FOR WEIGHT LOSS DURING TEST
- SEAT WEIGHED PRE- AND POST-TEST
- STILL PHOTOS BEFORE AND AFTER
- THREE REAL TIME MOVIE CAMERAS
- ONE VIDEO MONITOR (TAPED)
- TC'S AND CALORIMETERS IN FUSELAGE
- SIX LOSS OF VISIBILITY MEASUREMENTS
- GAS ANALYSIS (O_2, CO, CO_2, HYDROCARBONS, HCN, HCL, AND HF)

SEAT MATERIAL TEST RESULTS

- LOI
  - CUSHION FOAM - 26
  - WOOL BLEND UPHOLSTERY - 32
  - TWO SEAT CUSHION BACKING MATERIALS - 21 AND 28

- FAR 25
  - UPHOLSTERY AND BACKING MATERIALS PASS
  - CUSHION FOAM COATED SPECIMENS FAIL
  - UNCOATED FOAM PASSES DUE TO MELTING AND RECEDING FROM FLAME

SEAT TEST RESULTS

TEST 1

- IGNITION SOURCE SLOW TO DEVELOP (TOO TIGHTLY COMPRESSED)
- AT ~5 MINUTES ARMREST IGNITED
- ARMREST IGNITED ADJACENT SEAT
- CENTER SEAT MATERIALS ~90 PERCENT BURNED
- ADJACENT SEAT ~70 PERCENT BURNED
- TOTAL MATERIAL WT. LOSS 10.5 LBS.
- TEMPERATURES IN CABIN FROM AMBIENT TO 350°F
- NO SIGNIFICANT HEAT FLUXES
- MUCH SMOKE-LOSS OF VISIBILITY AFTER SEAT INVOLVEMENT
- HIGH CO, HCN AT 10 MIN.

SEAT TEST RESULTS

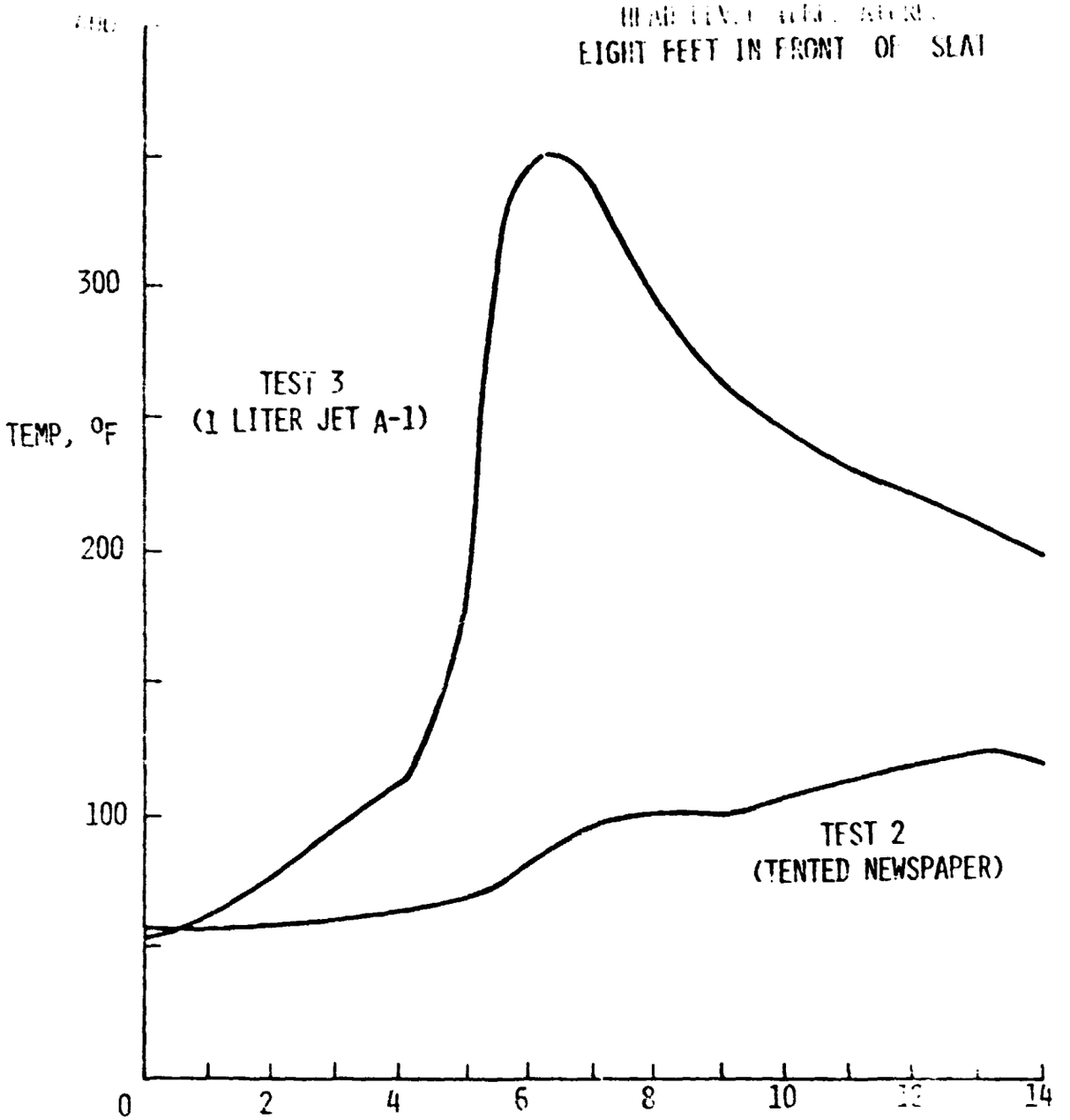
TEST 2

- MORE RAPID DEVELOPMENT OF NEWSPAPER IGNITION SOURCE
- CENTER SEAT BACK IGNITED AT ~ 4 MINUTES
- CENTER SEAT MATERIALS ~70 PERCENT DESTROYED
- ADJACENT SEATS NOT IGNITED
- TOTAL MATERIAL WT. LOSS ~7 LBS.
- CABIN TEMPERATURES 80°F TO 240°F
- NO SIGNIFICANT HEAT FLUXES
- CONSIDERABLE SMOKE-LOSS OF VISIBILITY AFTER SEAT INVOLVEMENT
- HIGH HCN, CO AT 12 AND 15 MIN.

SEAT TEST RESULTS

TEST 3

- MORE RAPID INVOLVEMENT OF SEATS THAN WITH NEWSPAPER
- EXTENSIVE PROPAGATION TO ADJACENT SEATS (~ 90 PERCENT OF ALL 3 SEATS DESTROYED
- WEIGHT LOSS ~31.4 LBS. (> 3 TIMES THAT WITH NEWSPAPERS)
- CABIN TEMPERATURES 200 TO 950°F
- BURNING AND SMOKE OVER LONGER PERIOD (15 MIN.)
- HIGH CO, HCN, AND HCL LEVELS


EIGHT FEET IN FRONT OF SEAT
TEMP, °F
300
200
100
0
2
4
6
8
10
14
TEST 3
(1 LITER JET A-1)
TEST 2
(TENTED NEWSPAPER)

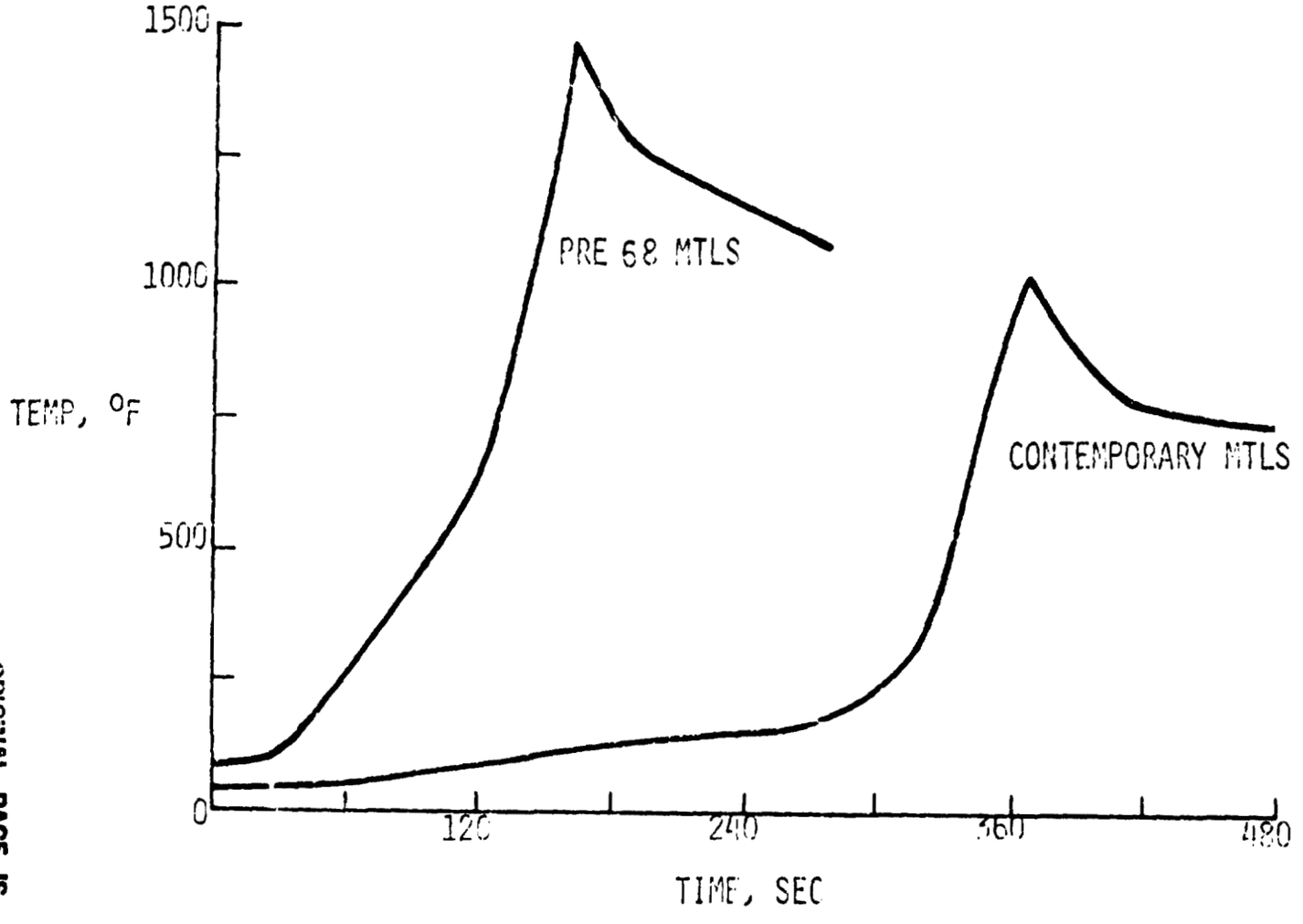
GAS ANALYSIS RESULTS

(5 FEET HIGH ALONG CENTER LINE)

TEST NR AND IGNITION SOURCE		MAXIMUM GAS LEVELS					
		CO		HCN		HCL	
		8 FT FWD	16 FT AFT	8 FT FWD	16 FT AFT	8 FT FWD	16 FT AFT
1 NEWSPAPER WITH ARMRESTS	PPM	1340	2294	108	78	522	330
	T	9.5	9.5	9.5	9.5	9.5	9.5
2 NEWSPAPER WITHOUT ARMRESTS	PPM	1126	712	102	25	414	23
	T	15	13	12.5	11.5	11.5	15.5
3 JET A-1 FUEL	PPM	2232	3097 3596*	330	102	880	192
	T	6.5	6.5	6.5	7.5	12.5	15.5

*EIGHT FEET AFT — 20 INCHES HIGH AT 5.5 MIN

COMPARISON OF CONTEMPORARY AND PRE 68 MTLS



CONCLUSIONS

- ARMRESTS OF THE SEATS TESTED HIGHLY FLAMMABLE
- NEWSPAPER IGNITION SOURCE WILL IGNITE SEAT IT IS ON (NO SIGNIFICANT PROPAGATION TO ADJACENT SEATS)
- FUEL PAN FIRE UNDER SEAT PROPAGATES TO AND DESTROYS ADJACENT SEATS
- SEATS TESTED NOT SIGNIFICANTLY BETTER THAN WITH PRE-68 MTLS (BASED ON FUEL PAN TESTS BY FAA, AIA, AND JSC)
- NEWSPAPER IGNITION SOURCE WILL BE MARGINAL IN SHOWING SIGNIFICANT DIFFERENCES WITH IMPROVED SEAT MATERIALS