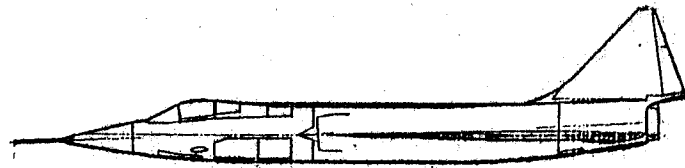
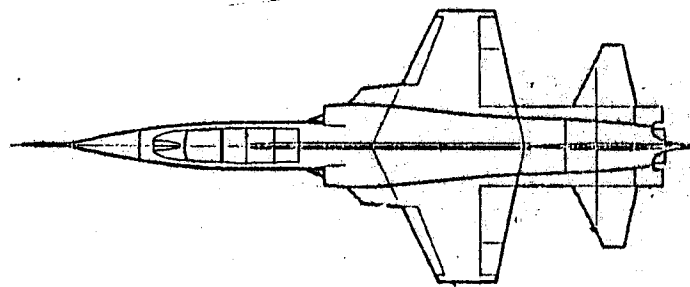


F-104 DOGFIGHTER



F.P. STREID 4/25/85

F-104 AIRCRAFT MODERNIZATION

BACKGROUND

INTERCEPTOR & FIGHTER BOMBER CLASS-DEVELOPED 1954

MODELS PRODUCED THRU 'S' (CURRENT MODELS 'G' & 'S')

PRODUCTION LINE STILL INTACT IN ITALY

LAST AIRCRAFT PRODUCED IN 1979

RETAINED AS FIRST LINE FIGHTER BY SEVERAL NATIONS

WORLD-WIDE INVENTORY IN EXCESS OF 1500 AIRCRAFT

LATEST IMPROVEMENT 1984-ADDED AIM-9L MISSILES (4)

EXTENDED USEAGE TO 1990 AND BEYOND

F-104 AIRCRAFT MODERNIZATION

FUNDING & TEAMING CANDIDATES

AERITALIA (ITALY)

REPUBLIC OF CHINA (TAIWAN)

NASA (USA)

F-104 AIRCRAFT MODERNIZATION

MARKETING POSSIBILITIES

- o ALL EXISTING USERS

BELIGUM

CANADA

GERMANY

GREECE

ITALY

JAPAN

NORWAY

TAIWAN

- o THIRD WORLD NATIONS

- o UNITED STATES - NASA

F-104 AIRCRAFT MODERNIZATION

AIRFRAME STATUS

FLIGHT HOURS

EXTENDS FROM 300 TO EXCESS OF 5000 HOURS

STRUCTURAL STATUS

FUSELAGE

MINOR CORROSION-REPAIRABLE

MINOR CRACKS-REPAIRABLE

WINGS

PERIODIC FITTING & SKIN REPLACEMENT

VERTICAL TAIL

FRONT & REAR BEAM REPAIR OR REPLACEMENT

F-104 AIRCRAFT MODERNIZATION

IMPROVEMENTS

PHASE I

SUBSONIC MANUEVERABILITY

ELIMINATE PITCH-UP PROBLEM

MANUEVERING SPEED-BRAKES

DIFFERENTIAL - HORIZONTAL STABILIZERS

AUTOMATIC MANUEVERING L.E. & T.E. FLAPS

PHASE II CANDIDATES

UPDATE RADAR, AVIONICS & FIRE CONTROL SYSTEMS

AUTOPILOT SYSTEM - 3 CHANNEL

INCREASE INTERNAL FUEL CAPACITY

FLY-BY-WIRE WITH SIDE CONTROLLER

UPDATE ARMAMENT - CANNON & MISSILES

SELF-GENERATING OXYGEN SYSTEM

F-104 AIRCRAFT MODERNIZATION

PERFORMANCE IMPROVEMENTS

TAKEOFF & LANDING RUNS SHORTENED

INCREASED TURN RATE

INCREASED ANGLE OF ATTACK

ELIMINATION OF PITCH-UP CONDITION

PAYLOAD INCREASE

RANGE INCREASE

F-104 AIRCRAFT MODERNIZATION

WETTED AREA INCREASE

LEX	22.8 SQ.FT.
STRAKES	63.4 SQ.FT.
VERT. TAIL	3.9 SQ.FT.
	<hr/>
TOTAL	90.1 SQ.FT.

WEIGHT INCREASE (ESTIMATE)

LEX	30.0 LB.
STRAKES	123.0 LB.
FUS. FRAMES	125.0 LB.
CONTROLS	48.0 LB.
	<hr/>
TOTAL	326.0 LB.

F-104 AIRCRAFT MODERNIZATION

STRUCTURAL CHANGES

WING

ADD LEADING EDGE EXTENSION (LEX)

SHORTEN L.E. FLAP FOR LEX MOD

NEW WING ATTACH FITTINGS (0° DIHEDRAL)

EXTEND L.E. FLAP DRIVE

FUSELAGE

ADD STRAKE STRUCTURE AFT OF WING

ADD RING FRAMES FOR HORIZ. TAIL SUPPORT

ADD INTERNAL SUPPORT STRUCTURE-LEX, STRAKE & WING

NEW FAIRING FOR STRAKE & WING

VERTICAL TAIL

REMOVE HORIZ. TAIL, SUPPORT & ACTUATOR

EXTEND TOP OF VERT. TAIL & RUDDER

F-104 AIRCRAFT MODERNIZATION

STRUCTURAL CHANGES (CONT.)

HORIZONTAL TAIL

DESIGN NEW SURFACE OR MOD EXISTING

NEW TRUNNION FITTING & CONTROL ARM

FUSELAGE STRAKES

DESIGN STRAKES WITH SPEED-BRAKES INCORPORATED

DESIGN TRUNNION SUPPORTS FOR HORIZ. TAIL

F-104 AIRCRAFT MODERNIZATION

FLIGHT CONTROLS

INSTALL HORIZ. TAIL ACTUATORS IN LH & RH STRAKES

SYSTEM DESIGN FOR AUTO-MANUEVERING L.E. & T.E. FLAPS
(POSSIBLE ADOPTION OF F5 SYSTEM)

DESIGN CONTROLS FOR SPEED-BRAKES

F-104 AIRCRAFT MODERNIZATION

PROGRAM EFFORT FOR LOCKHEED

MINIMUM EFFORT

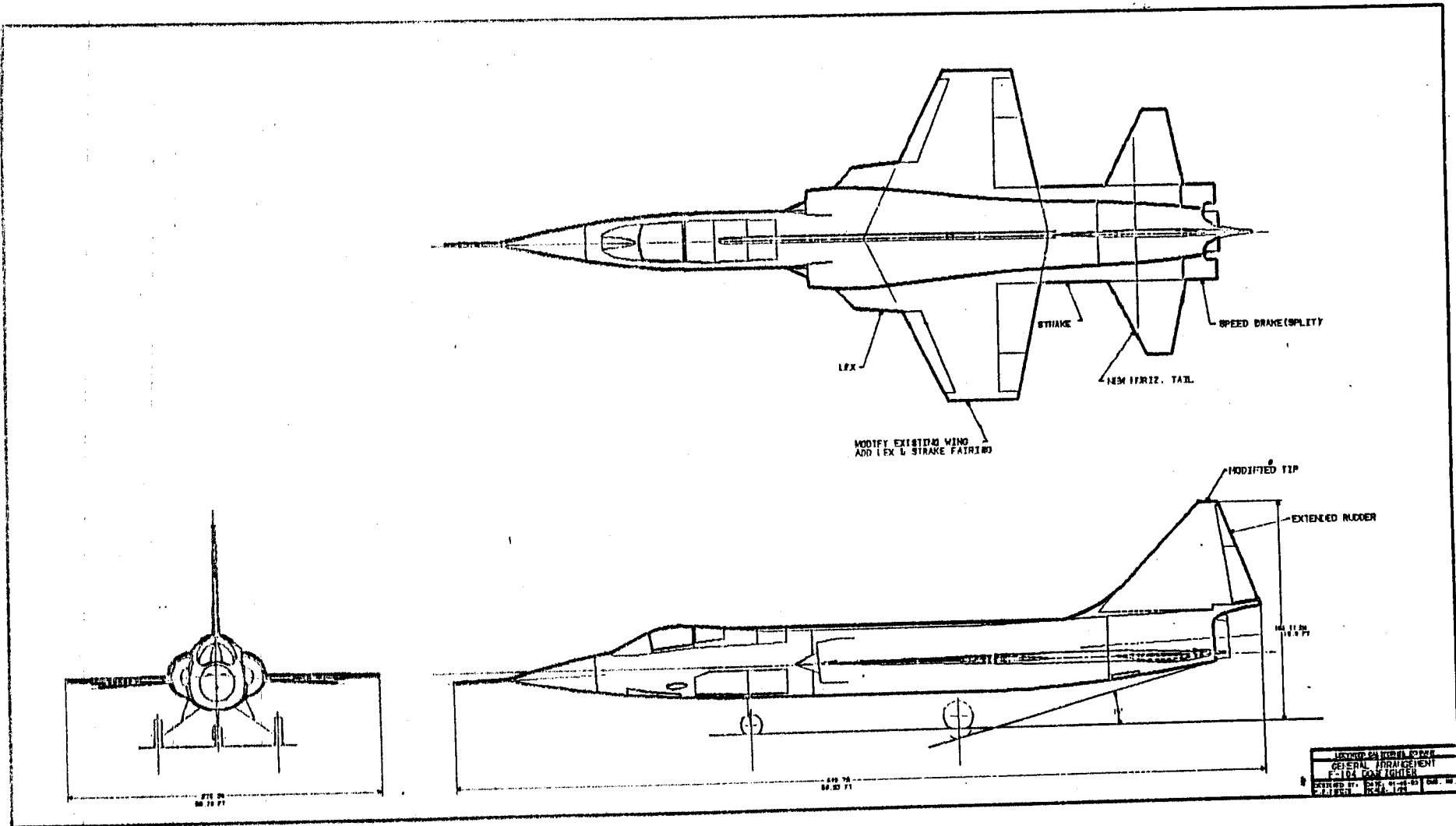
ENGINEERING DEVELOPMENT OF MODIFICATION ONLY

MEDIUM EFFORT

ENGINEERING DEVELOPMENT OF MODIFICATION AND
FABRICATION OF PROTOTYPE

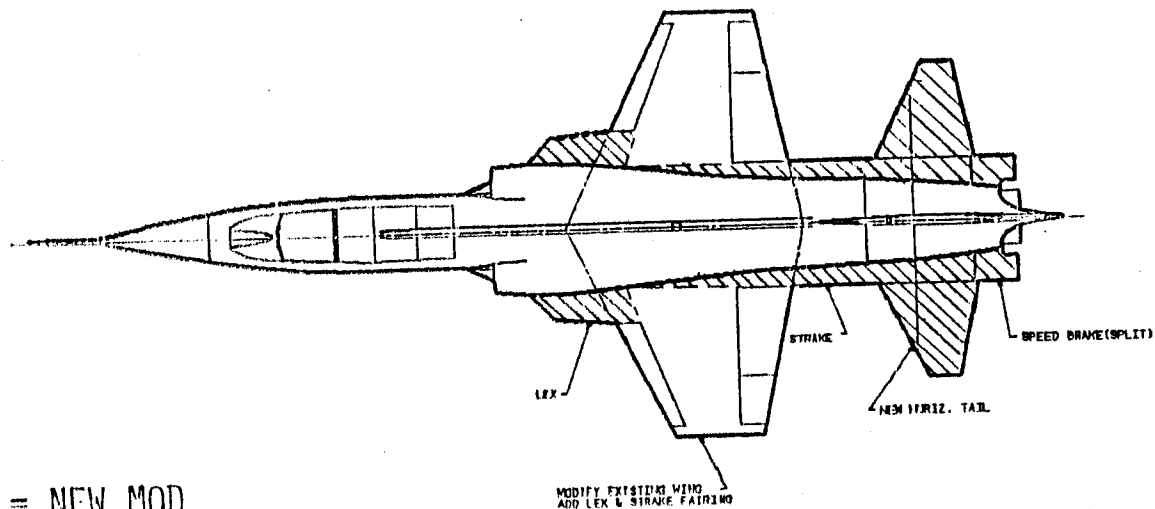
MAXIMUM EFFORT

NEW AIRCRAFT DESIGN & DEVELOPMENT FOR AERITALIA
PRODUCTION LINE

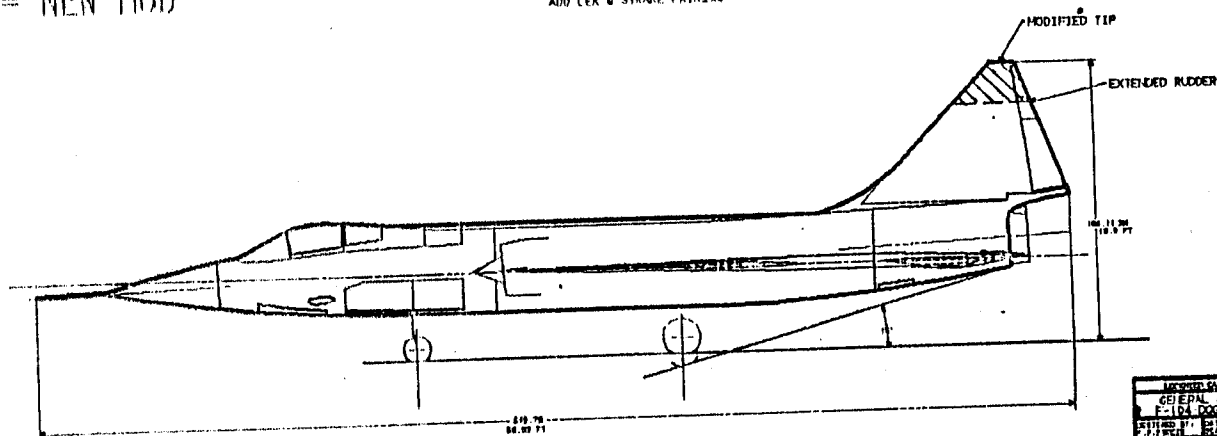
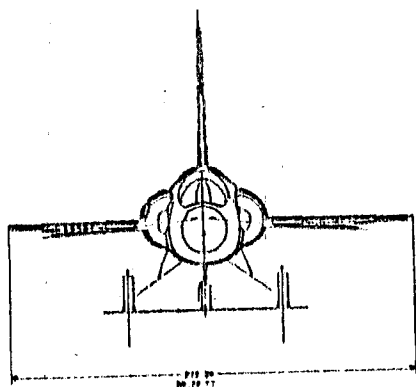


WING AREA = 196.1 SQ. FT.

ASPECT RATIO = 2.65



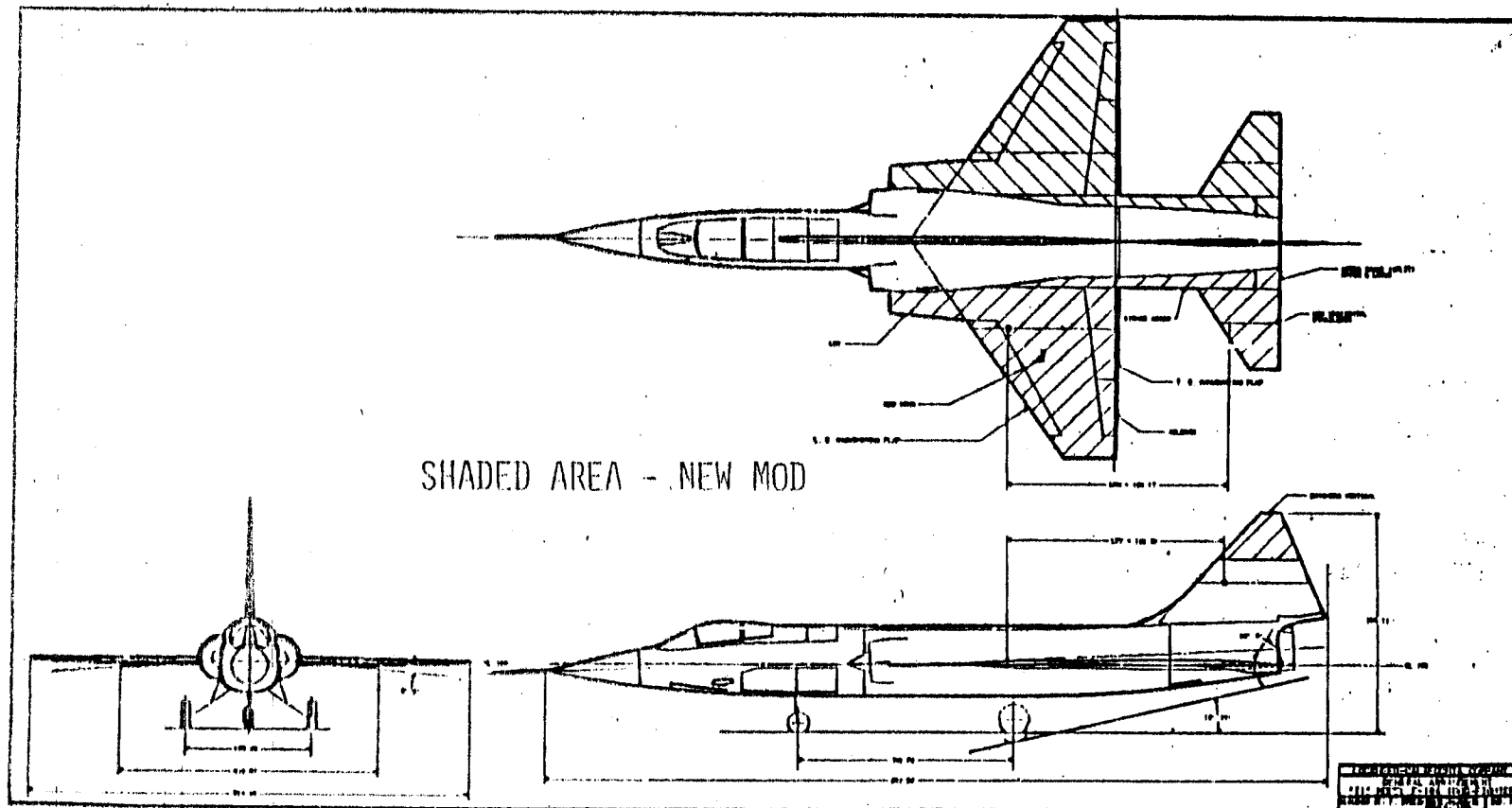
SHADED AREA = NEW MOD

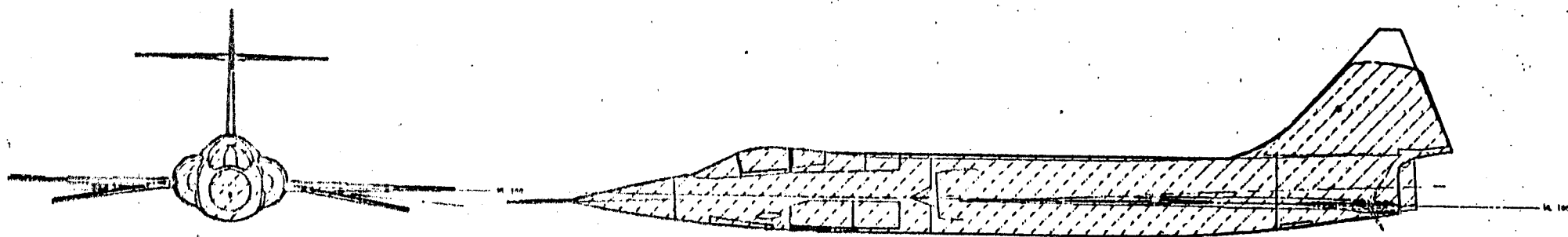
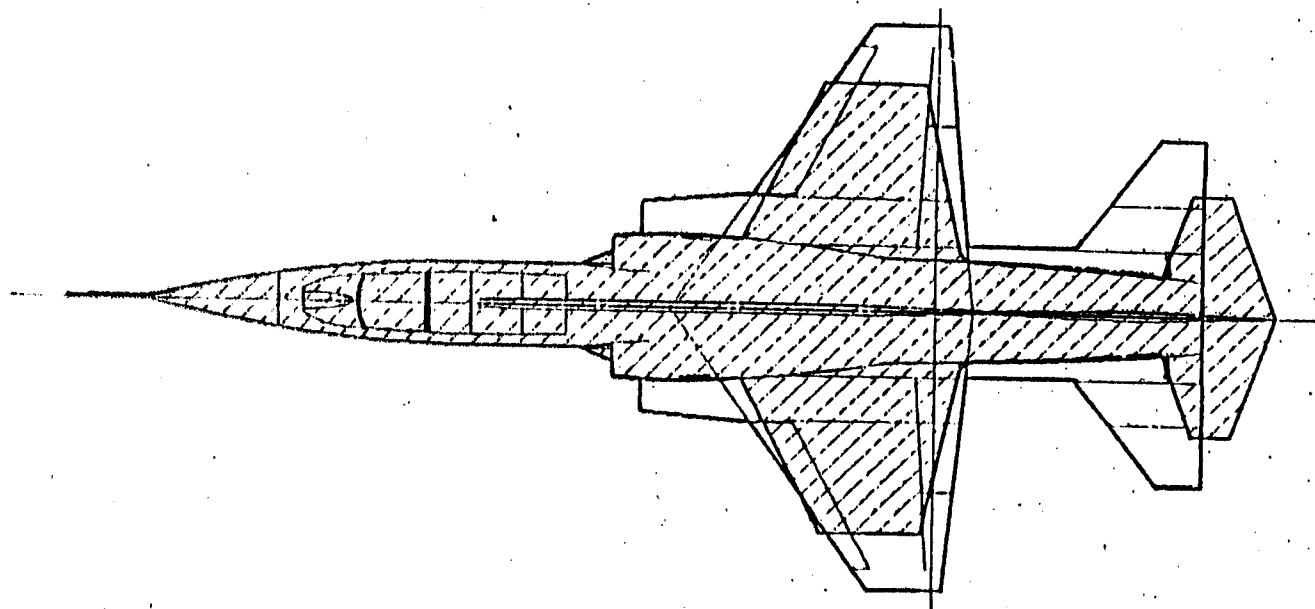


REPORT ON DESIGN STUDY
GENERAL ARRANGEMENT
F-104 DOG FIGHTER
PERFORMED BY RANDOLPH AFB TX
PERIOD OF PERFORMANCE 1964-65

WING AREA = 196.1 SQ. FT.

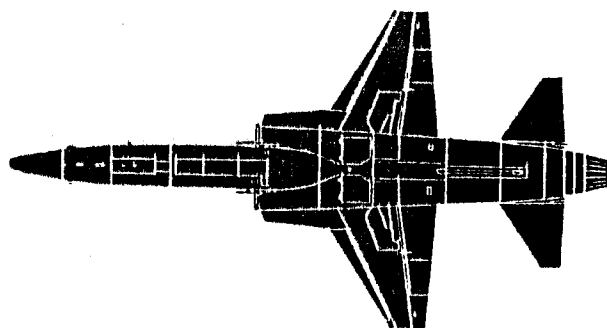
ASPECT RATIO = 2.86



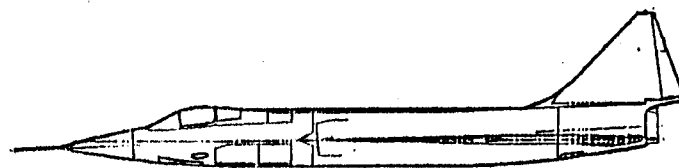
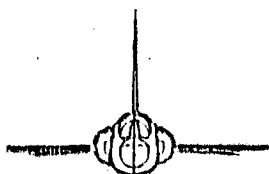
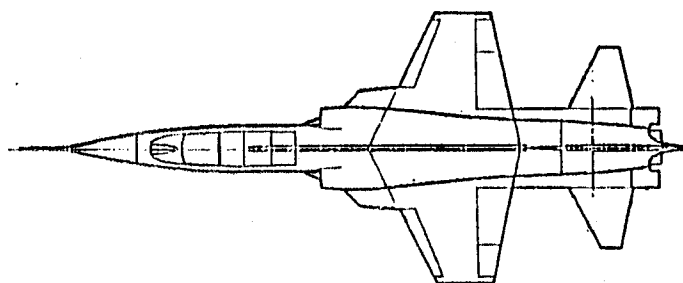


SHADED AREA = F-104 STARFIGHTER

BLANK AREA = F-104 DOGFIGHTER - 250 SQ. FT. WING



F-20 TIGERSHARK



F-104 DOGFIGHTER

F-104 AIRCRAFT MODERNIZATION

COMPARISONS

ITEM	F-104S	F20
WING AREA	196.1 SQ.FT.	186.0 SQ.FT.
ASPECT RATIO	2.86	3.8
POWER PLANT	J79-GE-19	F404-GE-FIG1
POWER PLANT THRUST	17,900 LB.	17,000 LB.
TAKE-OFF WEIGH (CLEAN)	21,584 LB.	18,005 LB.
MAX TAKE-OFF WEIGHT	31,000 LB.	26,290 LB.
MAX. SPEED	MACH 2.2	MACH 2.0
COMBAT CEILING	58,000 FT	54,700 FT