9369

Department of Defence

Government Aircraft Factories

- Fishermen's Bend
  226 Lorimer Street, Fishermen's Bend, Victoria
  Private Bag No. 4 Port Melbourne 3207
  Telegram : "GAFAIR" Telex : AA34851
  Telephone : (03) 647 3111
- Avalon Airfield
  Beach Road, Lara, Victoria 3212
  Telephone : (052) 82 2988

Reference : 485-2-01
Contact : J White
Telephone : 647 3306

5 February 1987

Director Air Warfare
Department of Defence (Navy)
Russell Offices
CANBERRA ACT 2600

TARGET AIRCRAFT AND GROUND SYSTEM DEVELOPMENT

1. GAF were grateful for the opportunity to share ideas with RAN on the 30 January.

2. Please find enclosed copies of the overhead slides on the target aircraft and ground system developments as requested.

3. The RAN will appreciate that because of the considerable cost and effort that has been spent to date on both projects, and that GAF will be competing commercially, the information presented and contained herein should be treated as Commercial-in-Confidence.

4. We understand that it is the RAN's preferred option at this stage to keep the existing ground complex at JBRF working until the mid 1990's, however, the final decision will not be made until the end of February. GAF request the opportunity to present more detailed arguments to support the option of introducing a full NPB 1319 system into service in 1991. The Product Development Department have prepared a fully costed proposal which we would wish to present to the RAN before the end of February for consideration in the discussions on the future of the JBRF equipment. The proposal will also include indicative costs of a minimum system to replace the existing ground complex and form the basis of the ultimate NPB 1319 requirement.

5. GAF (ATA) look forward to future co-operation with the RAN.

(L JONES)
PRODUCTION DEVELOPMENT MANAGER

Encl

cc ASP (ODP)
L Jones
C Mulhauser
D Prowse

PRODUCT DEVELOPMENT DEPARTMENT

TARGET AIRCRAFT
GROUND CONTROL SYSTEM

1. BACKGROUND TO PROJECT

* RAN PERSPECTIVE

  - CURRENT SYSTEM DIFFICULT TO SUPPORT (SPARES & WEAR-OUT)
  - NON TRANSPORTABLE
  - LARGE NUMBER OF OPERATORS
  - LARGE NUMBER OF TRAINING FLIGHTS
  - CURRENT SYSTEM IS JINDIVIK SPECIFIC
  - PRESENTATION ACCURACY NOT GOOD
  - RANGE SURVEILLANCE DIFFICULT

* ODP/GAF REQUIREMENT

  - MARKETING TOTAL AIRCRAFT SYSTEM
  - ENHANCING CAPABILITY OF TOTAL JINDIVIK/TARGET AIRCRAFT SYSTEMS

TARGET AIRCRAFT
GROUND CONTROL SYSTEM

2. GAF & RAN INVOLVEMENT

* NSR 1319 - EARLY 1984
* GAF INITIAL PROPOSAL - AUG 1984
  (PROPOSED A SPLIT OF DEVELOPMENT COSTS)
* NPB 1319 - 1985
* SYSTEM TECHNICAL REQUIREMENT SPEC.
  (DNAE & GAF)
* DECISION TO GO OPEN TENDER
* GAF PROVIDED RAN WITH BUDGETARY COSTS
* GAF SUPPLIED INFORMATION TO FDA TO SUPPORT FULL NPB 1319 SYSTEM
* ITR - OCTOBER 1986
  (GAF REGISTERS AS BOTH PRIME AND SUB-CONTRACTOR)

3. SYSTEM DESCRIPTION - MAJOR SUBSYSTEMS

* COMMAND AND CONTROL SUBSYSTEM
* TRACKING SUBSYSTEM
* SURVEILLANCE RADAR SUBSYSTEM
* RANGE COMMUNICATIONS SUBSYSTEM
* FIRST TWO SUBSYSTEMS
    - 70-80% TOTAL TASK
    - WILL PROVIDE CAPABILITY TO INTERFACE WITH OTHER RANGE SYSTEMS HAVING RADAR FACILITIES
    - MAJORITY OF THE DEVELOPMENT WORK AT GAF TO DATE

TARGET AIRCRAFT
GROUND CONTROL SYSTEM

4. COMMAND AND CONTROL SUBSYSTEM

* MEETS ALL RAN NEEDS (NPB 1319)

* GAF UNIQUELY AWARE OF SHORT-COMINGS OF CURRENT SYSTEM

* DESIGN OBJECTIVES

  - FLEXIBILITY TO CATER FOR REQUIREMENTS OF FUTURE TARGET AIRCRAFT

    . SOFTWARE RE-CONFIGURATION
    . DATA LINK INTERFACES

  - REDUCTION IN PERSONNEL

  - PORTABLE

  - TRAINING FACILITIES

  - HIGH RELIABILITY

* HARDWARE FEATURES

  - SELF CONTAINED MILITARY STYLE SHELTERS

  - OFF THE SHELF HARDWARE

  - BUILT-IN-TEST TO SRA LEVEL

  - LIFE-OF-TYPE OF 25 YEARS

* SOFTWARE FEATURES

  - DESIGNED TO LATEST DOD STANDARDS (DOD-STD-2167 AND MIL-STD-490A)

  - LOADING AIRCRAFT AND SYSTEM PARAMETERS PRE-FLIGHT

  - PRE-FLIGHT PLANNING

  - TRAINING VIA SIMULATION

  - AIRCRAFT FAULT ANALYSIS

  - COMMAND BLOCKING

  - NOVEL DISPLAYS

  - EXPANSION CAPABILITY

5. TRACKING SUBSYSTEM

* USE OF GPS NAVSTAR - CONSISTENT TIME-SCALES

* USE OF MODULARISED GPS RECEIVERS

  - STRAIGHT-FORWARD CONFIGURATION FOR 700 SERIES JINDIVIK

  - EXPANDED CONFIGURATION FOR GREATER MANOEUVRING TARGET AIRCRAFT

6. PROGRAMME

* WORK TO DATE

  - PROJECT MANAGEMENT PLAN (PMP)

    . SPECS
    . PERT
    . CFSR
    . QA PLAN
    . TEST & EVALUATION PLAN
    . WBS
    . COST PLAN
    . CM
    . ILS PLAN

  - DESIGN SPECIFICATIONS

  - CONSTRUCTION OF DEMONSTRATION CONSOLE FOR EVALUATING THE SKIPPERS INTERFACE

* RAN OPTIONS

  - FULL NPB 1319 SYSTEM

  - MINIMUM CONFIGURATION FOR JINDIVIK

  - NO CHANGE TO CURRENT SYSTEM

JINDIVIK OPERATIONS AT THE JERVIS BAY RANGE FACILITY

POTENTIAL RAN SAVINGS

1991 - 1995 (4 YEARS)

SAVING	CURRENT GCS	MINIMUM CONFIG	FULL NPB1319 SYSTEM
SAVING ON SUBSIDY ($5K/Flt)	$5Kx100Fx4Yr *$2.0M*	-	$5Kx25Fx4Yr *$0.5M*
REDUCED FLIGHTS (50% reduction training flts)	-	-	$25Kx25Fx4Yr *$2.5M*
LOWERING ATTRITION RATE (Command Blocking Limit checking Flight envelopes)	1 in 150 2.7 AC/4Yr -	1 in 150 2.7 AC/4Yr -	1 in 300 1 AC/4Yr *$1.7M*
CREW REDUCTIONS	-	2 Less *$0.4M*	4 Less *$0.8M*
LESS MISSION ABORTS (Accurate flt planning, fuel budgeting, accurate nav.)	-	1 Racetrack in 30 Saved (Assume 4 Racetracks/flight) *$0.3M*	1 Racetrack in 15 Saved *$0.6M*
TOTAL SAVINGS OVER 4 YEARS	*$2.0M*	*$0.7M*	*$6.1M*

HENCE IN CURRENT DOLLAR TERMS, OPERATIONAL SAVINGS OF $4.1M COULD BE MADE BY INTRODUCING THE FULL NPB 1319 SYSTEM INTO JBRF IN 1991 INSTEAD OF 1995.

THIS ANALYSIS DOES NOT ACCOUNT FOR THE FACTORS THAT ARE DIFFICULT TO QUANTIFY, SUCH AS INCREASED OPERATIONAL AVAILABILITY, INCREASED RANGE SURVEILLANCE, BETTER DATA RECORDING, TRANSPORTABILITY, ETC.

EXPLANATION OF LOT COSTING

1. Saving on Subsidy

Costing is based on a Navy statement that they would be prepared to accept a small increase in flight cost, say $5K, provided that the ground control system introduced at JBRF had some further benefits for the next generation ground control/target system.

For the minimum configuration, the subsidy would be $2.0M over the 4 year period based on 100 flights per year. The 4 year period corresponds to the period between the original programmed introduction of NPB 1319 and the introduction date if NPB 1319 and JPB7 are combined. For the full NPB 1319 system the subsidy would be $1.5M based on 75 flights per year (for an explanation of the 75 flights refer to para 2).

Hence the Saving on Subsidy, compared to the minimum configuration system, is $2.0M for the current ground complex and $0.5M for the full NPB 1319 system.

Please note that these figures do not account for the increased operational availability, increased range surveillance, better data recording, transportation and other features of the full NPB 1319 system, which will have benefits over the other options that are difficult to quantify.

2. Reduced Flights

The full NPB 1319 system proposed will include training facilities via simulation for Skipper and Bats/Pilot. It is assumed that the number of training flights used to maintain currency will drop from 50 to 25 per year.

This calculation assumes a saving of $25K per flight. Whilst it is understood that the current flight cost at full recovery is $35K per flight, overheads will increase the cost per flight as the number of flights is reduced.

3. Lowering Attrition Rate

The current 'natural' attrition rate is approximately 1 in 150 flights. GAF believe that with the new features in the full NPB 1319 system, the 'natural' attrition will decrease to approximately 1 in 300 flights. Features will include:

a. Command Blocking - Radio commands to the aircraft that would cause it to be flown outside its operational boundaries will be inhibited.

b. Limit Checking - This feature will include duties the Flight Monitor currently performs and will high-light aircraft parameters going outside of acceptable limits. Checking will be performed on the data converted to engineering units to account for the particular calibration history of the aircraft and the sensors used.

c. Flight Envelopes - The operational boundaries (IAS versus Altitude) for the current aircraft state will be displayed for the Skipper at all times. This will take into account the particular dress of the aircraft. A preview facility will exist to give the Skipper the option of checking the operational boundary that will exist if a particular command is issued. This check will ensure that the safety of the aircraft is not at risk prior to issuing commands.

Hence, the lower assumed attrition rate will account for the loss of 1 aircraft in 4 years in the full NPB 1319 system compared with the current (and minimum configuration system) figure of 2.7 aircraft in 4 years. The difference of 1.7 aircraft has been assumed to be worth $1.7M.

4. Crew Reductions

Figures provided by Alan Anderson at the RAN meeting on NPB 1319, in March '86 (Northbourne House), indicate that the non NPB 1319 system duties at the range will still account for approximately two men-equivalents. In addition the following Technicians are required for the full NPB 1319 system:

a. Data Processing Technician - Responsible for the majority of the equipment in the main Command and Control Shelter including computing and display systems.

b. Communications Technician - Responsible for the radio command and telemetry link equipment in the Command and Control Shelter and setting-up the surveillance radar equipment in the smaller Radar and Communications Shelter.

Hence, in the full NPB 1319 system only two Technicians on the hill are required giving four total, compared with the current seven. The fourth person shown on the LOT savings chart is a Controller, due to the combining of the current Skipper and Navigator responsibilities.

For the minimum configuration, one less Technician and one less Controller than the current ground complex have been allowed.

5. Less Mission Aborts

This calculation is based on the assumption that there is currently at least one aborted race-track in 15 due to the lack of information regarding aircraft and personnel safety. The following features built into the full NPB 1319 system will reduce this:

a. Accurate Flight Planning and Fuel Budgeting - This feature will enable the planned activation to be 'flown' under simulated conditions and will reduce uncertainties.

b. Accurate Navigation - With GPS Navstar planned for both the target aircraft and the participating platforms, more accurate presentations will be possible.

c. Aircraft Fault Analysis - This facility will enable known aircraft faults to be displayed to the Skipper as they occur, together with the recommended corrective actions. In some circumstances mission aborts will not be necessary if the faults are minor, or the eventual outcome able to be predicted.

If a saving of one race-track in 15 is made with the full NPB 1319 system, and there are an assumed average 4 race-tracks per operational flight, then the saving will be $12.5K per race-track, and $0.6M over the 4 years with 53 race-tracks saved.

Without accurate navigation or simulation facilities in the minimum configuration, only 1 in 30 race-tracks is assumed to be saved.

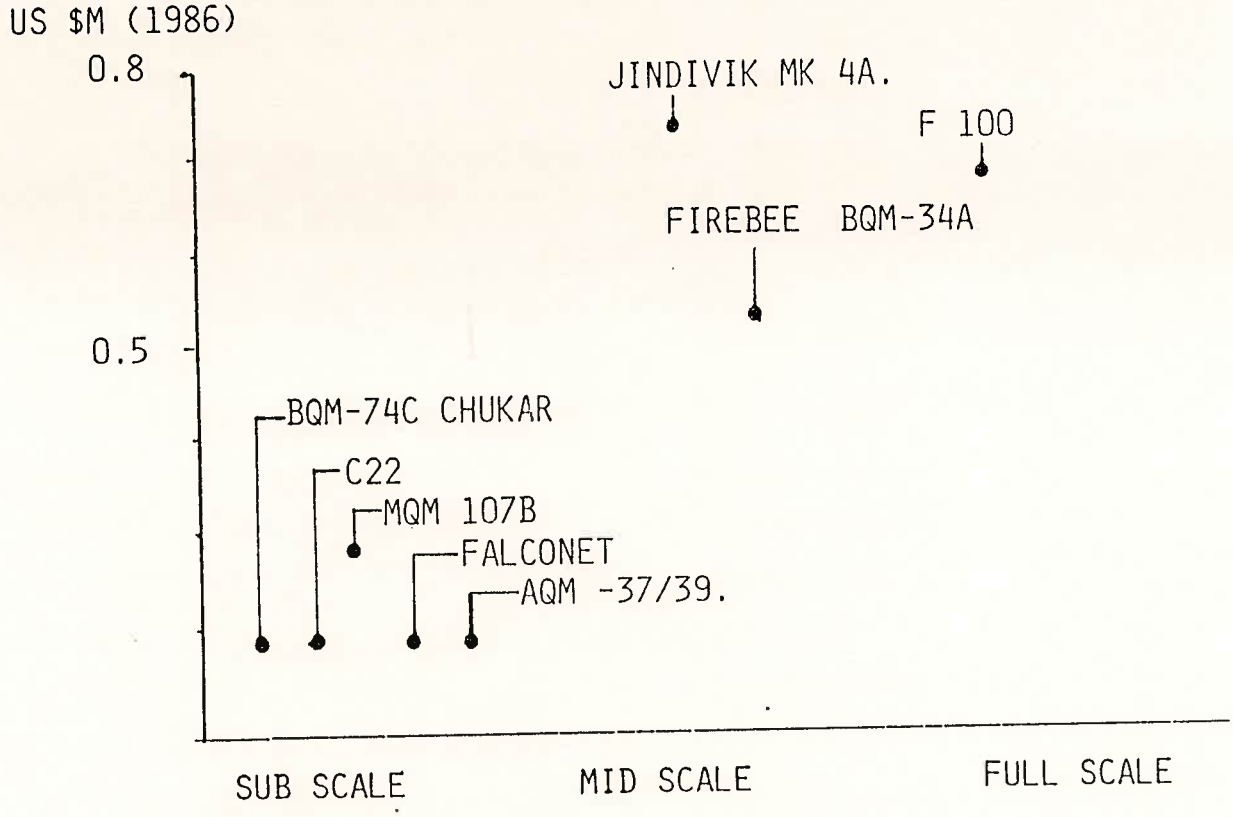
JPB-7 REQUIREMENTS. (ISSUE 7).

1. Height 50 -60,000 Ft. Speed 550 Kts. 0.95 Mach
2. Endurance 120 minutes. 500kts (IAS) Medium level (10,000-25,000Ft)

   Target streamed 60 minutes. Sortie length of 30 minutesat low level including 10 minutes at maximumpower (towed target housed) and remainder at 350kts (IAS).
3. A 6 'g' manoeuvring capability is required.
4. Radar cross section - design aim is 0.05 sq. metres head on aspect withenhancement to 1.0 sq. metres.
5. Towed Targets.
6. Miss distance scoring devices.
7. Transportable by RAAF C130 and by military medium cargo trucks, MC2.
8. Flight profiles are to be capable of pre-programming
9. In the event of loss of signal, the target aircraft is to be capable of returning to base at a predetermined height, changing over to an emergency channel and being commanded on that channel.
10. Reliablility - injury to personnel or property other than the target aircraft, at greater than the following rates:-
    (a) within the range boundaries - no injury in less than 10^5 operating hours.
    (b) Outside the range boundaries - no injury in less than 10^6 operating hours.
    (c) Aircraft attrition rate no greater than 1:50 from aircraft system causes.

NOTES

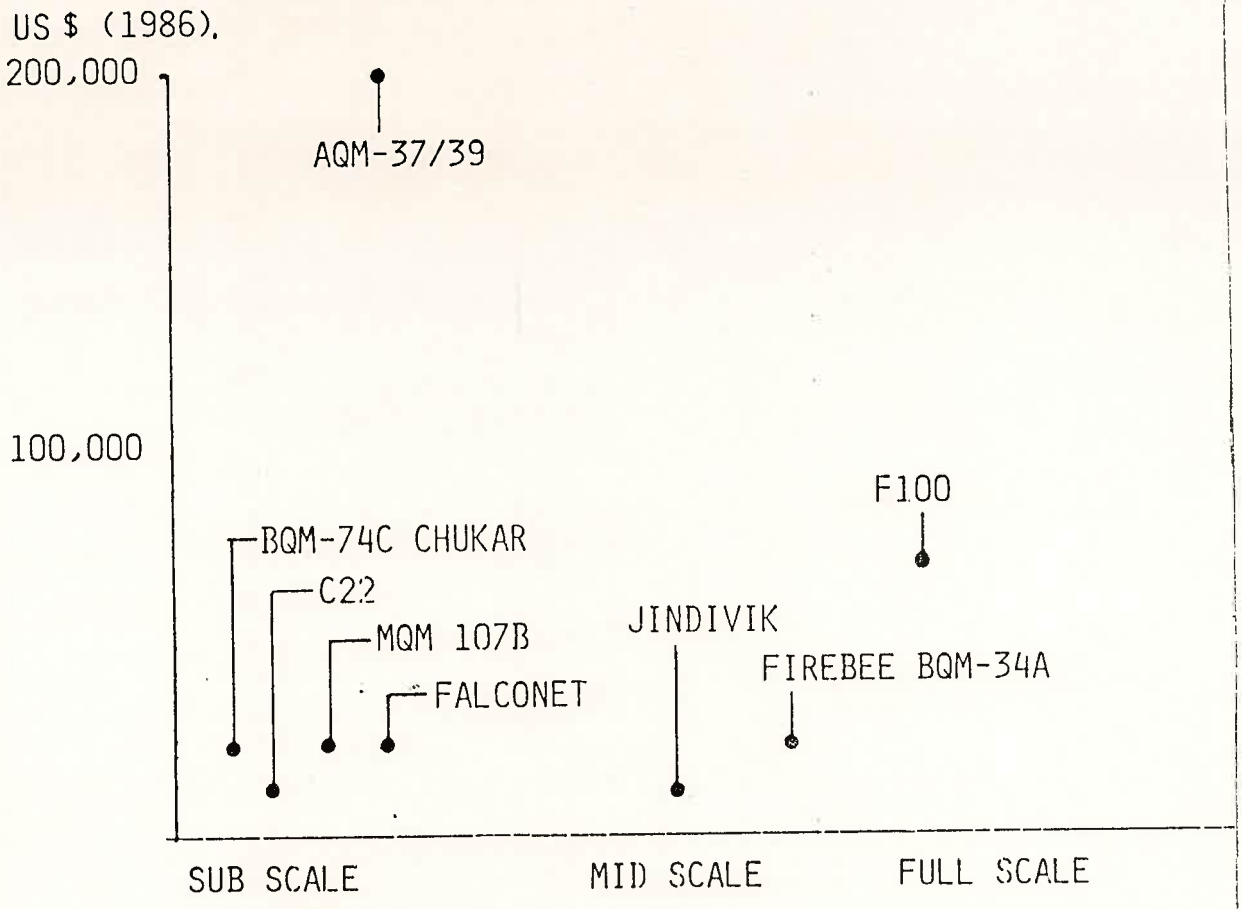
COST OF OWNERSHIP PER VEHICLE.



NB:-

1. Prices will vary due to size of production lots.
2. Booster motors, parachutes etc. not costed.

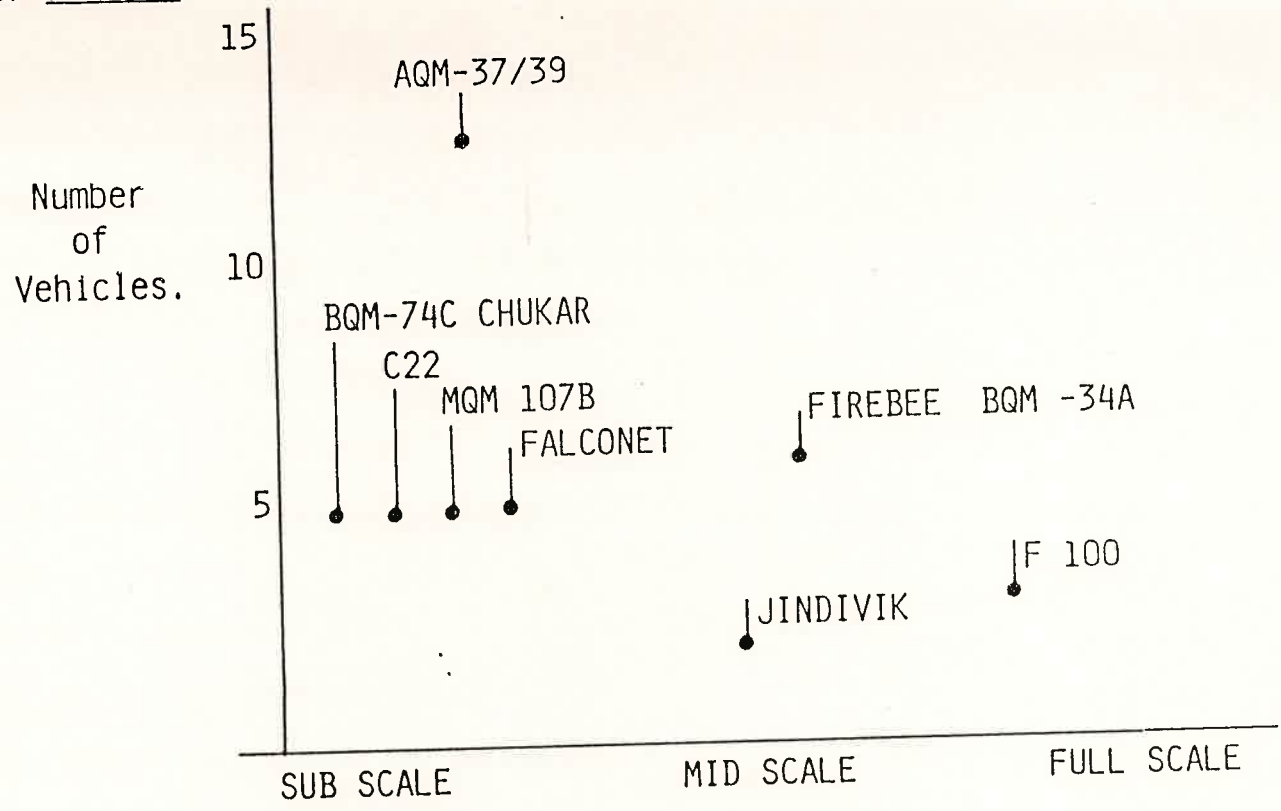
APPROXIMATE COST PER SORTIE,
- EXCLUDING KNOCKDOWNS,
FOR EXPECTED LIFE.



	ASSUMED FLIGHTS FOR LIFE	BOOSTERS.
BQM-74C CHUKAR	10	Yes
C22	20	Yes
MQM 107B	15	Yes
FALCONET	10	No
AQM-37/39	1	Yes
JINDIVIK	150	No
FIREBEE BQM-34A	120 (assumed)	Yes
F100	10	No

NUMBER OF VEHICLES REQUIRED TO CATER FOR A TYPICAL 'SURGE' PROGRAMME.

Assume the programme requires 4 presentations per day for 3 days.



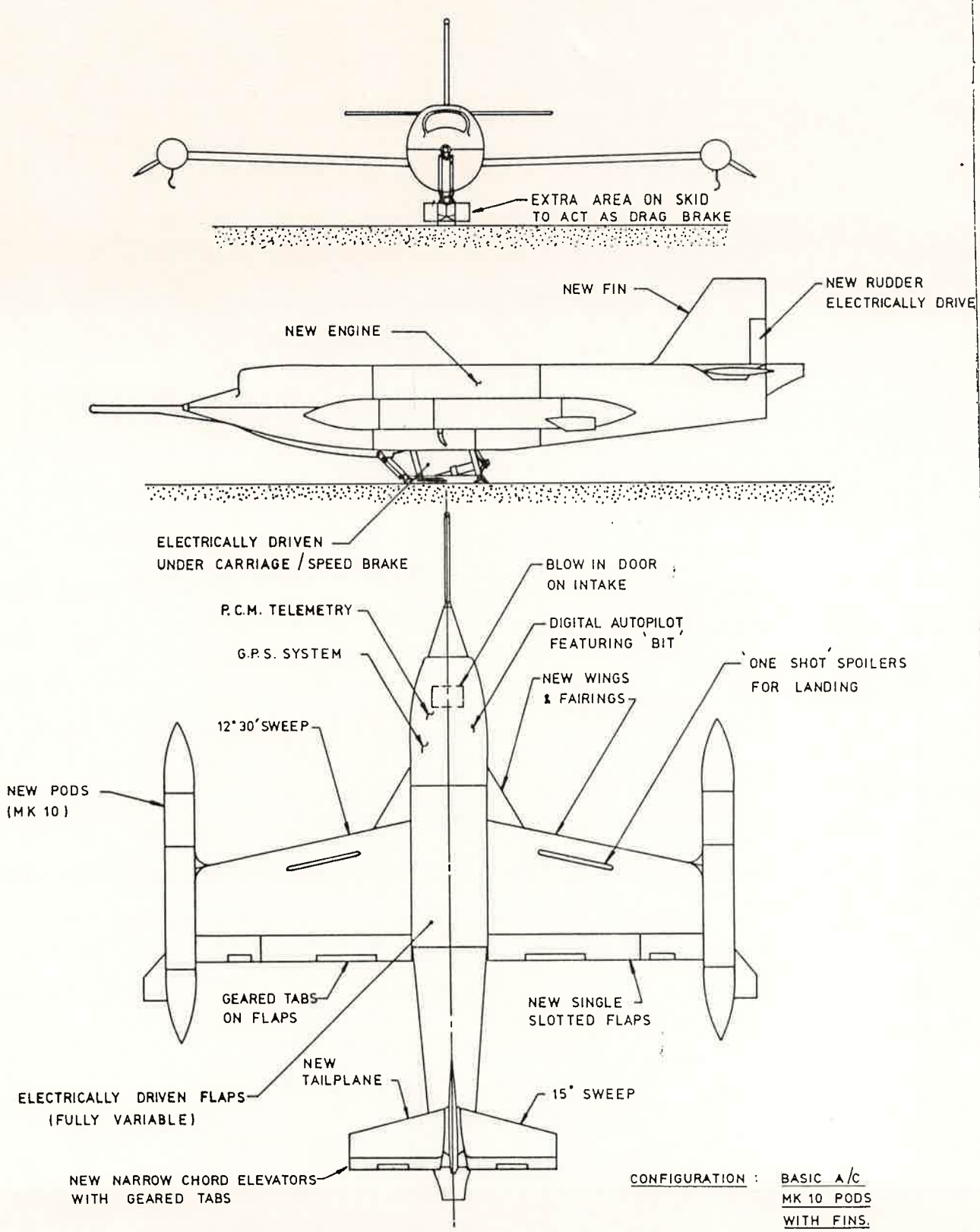
BQM 74C CHUKAR	8 Hrs.	
C22	8 Hrs.	
MQM 107B	8 Hrs.	TURNAROUND
FALCONET	8 Hrs.	(SERVICING)
AQM -37/39	N/A	TIME.
JINDIVIK	1 Hr.	
FIREBEE BQM 34A	24 Hrs.	
F 100	2 Hrs.	

NB:- 1 spare assumed to cover a malfunctioning vehicle.

DESIGN FEATURES OF NEW MK5 JINDIVIK.

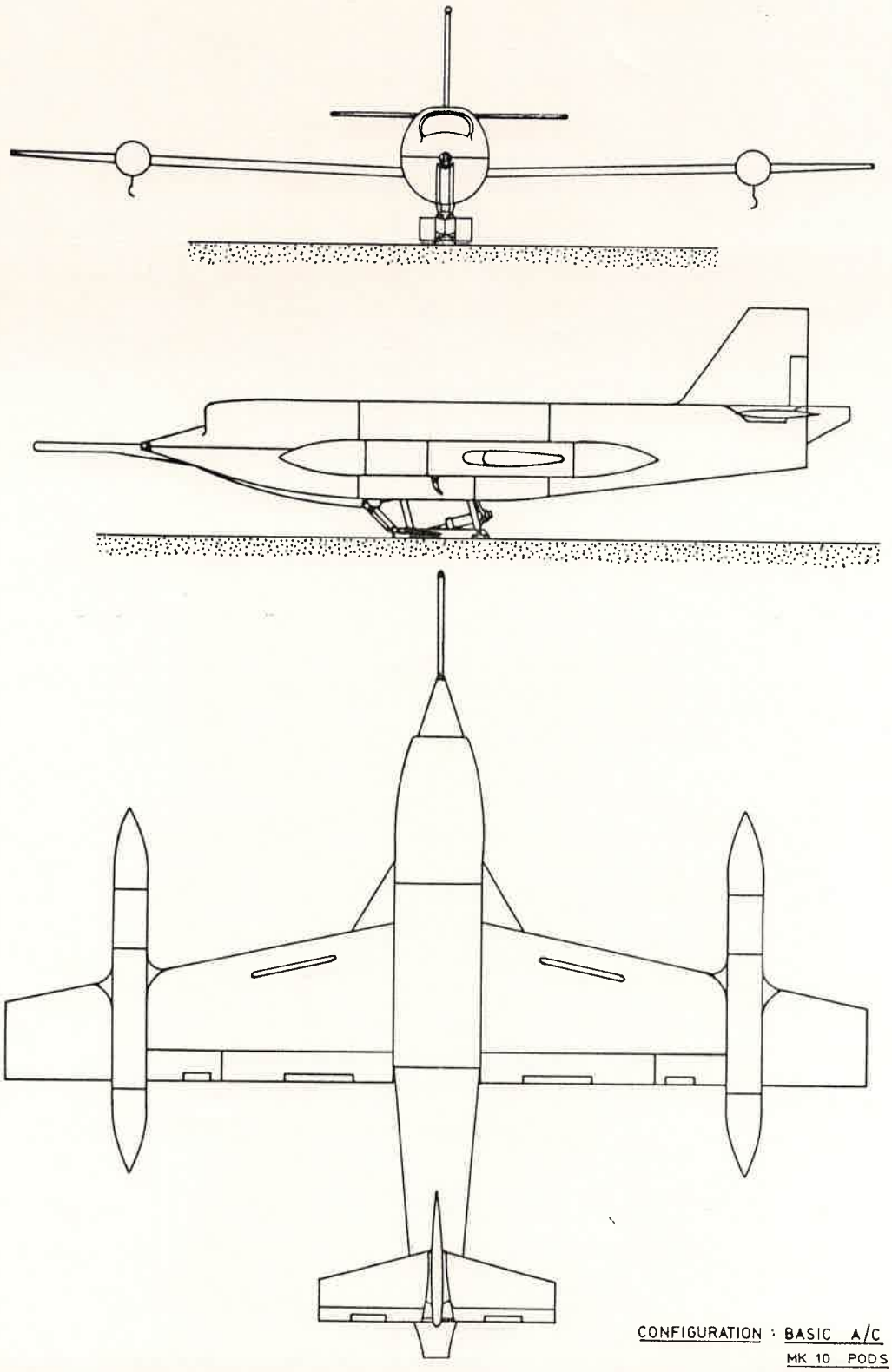
1. Reduction of cost/parts count.
2. Mainly composite construction.
3. Swept wings.
4. Refined flap system infinitely variable to expand flight envelope for ~~manufacture.~~ manoeuvre.
5. Reduced balanced field length.
6. Speed brake.
7. Empennage incorporating 'relaxed' stability.
8. More hard points.
9. Possible alternative engine.
10. Digital autopilot with BIT.
11. P.C.M. telemetry.
12. G.P.S.
13. Stealth features.
14. Fibre optics to connect black boxes.
15. Almost manned aircraft reliability.
16. 'Universal' system tester.
17. Increased crosswind limits.

NOTES



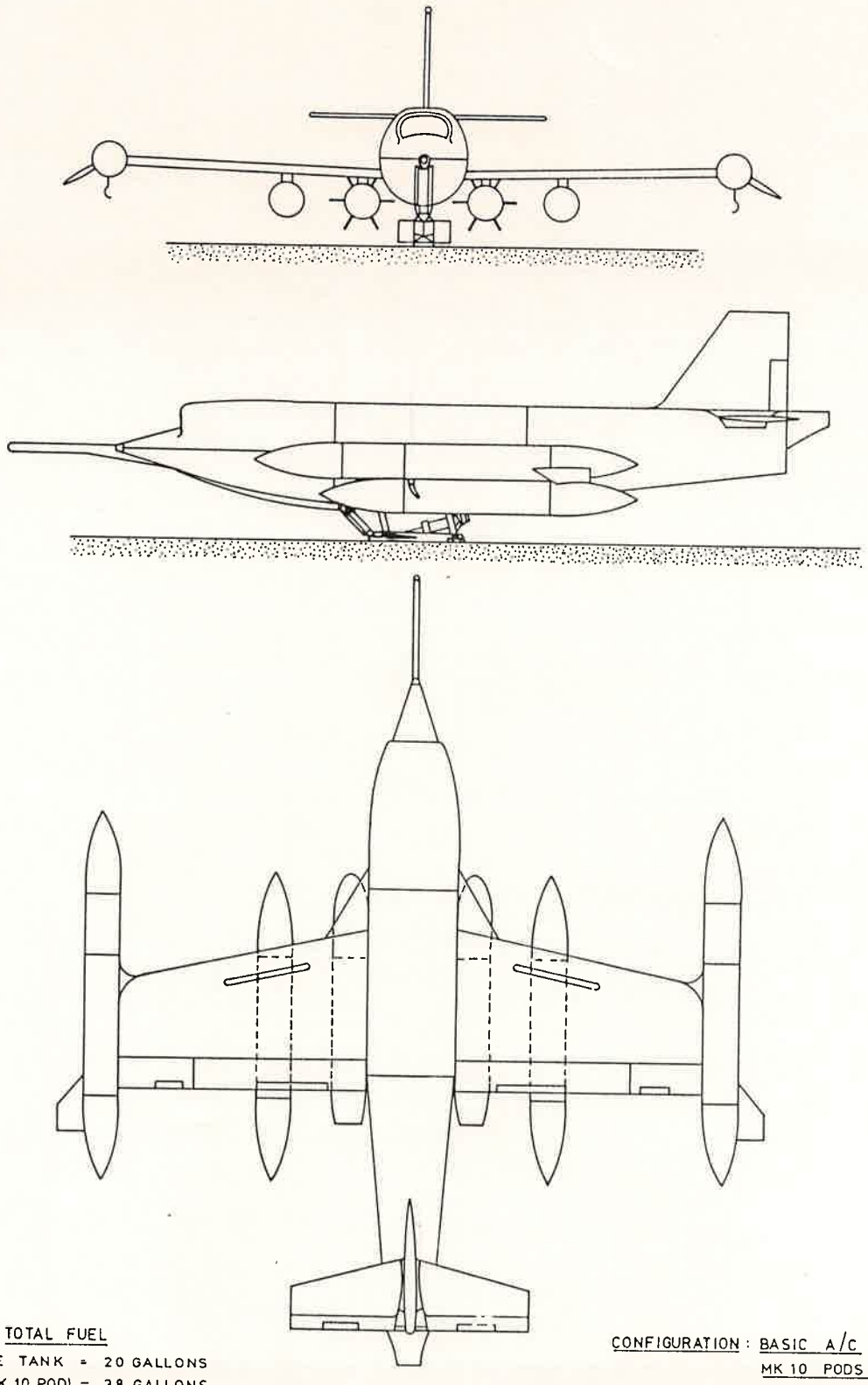
CONFIGURATION : BASIC A/C
MK 10 PODS
WITH FINS.

JINDIVIK MK 5



CONFIGURATION : BASIC A/C
MK 10 PODS
WITH WING EXTENSIONS

JINDIVIK MK 5



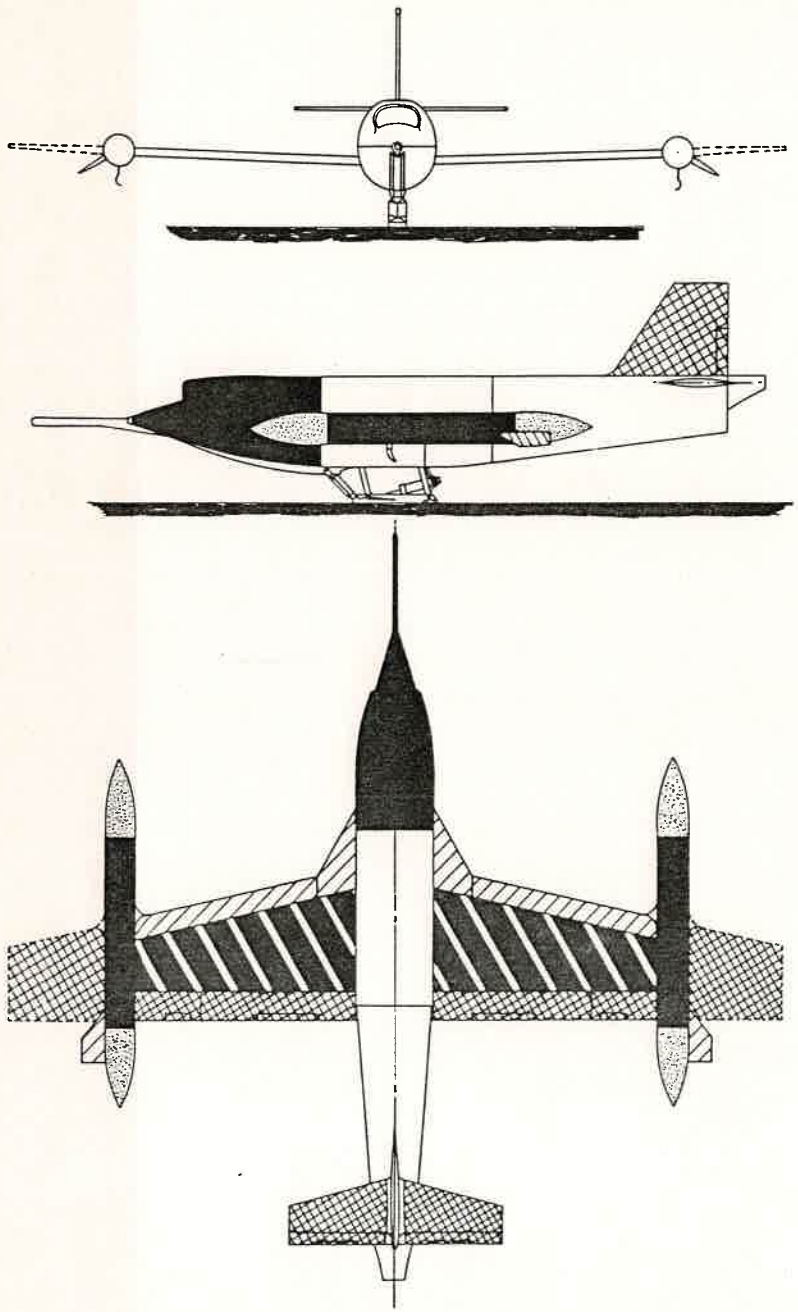
JINDIVIK MK 5

TOTAL FUEL

FRONT FUSE TANK = 20 GALLONS
WING TIP TANKS (MK 10 POD) = 38 GALLONS
WING TANKS = 31 GALLONS
CENTRE FUSE TANK = 61 GALLONS
EXTERNAL FUEL TANKS = 38 GALLONS

TOTAL = 188 GALLONS

CONFIGURATION : BASIC A/C
MK 10 PODS WITH FINS
PLUS 2-OFF MK 10 PODS
LESS CAMERA SECTION
PLUS 2 OFF 'HUTTS' TOWS
ON INBOARD STATIONS.



THERMOPLASTIC COMPOSITES

FILAMENT WOUND COMPOSITES

GLASS REINFORCED COMPOSITES (POSSIBLE F W)

SINGLE CURE FOAM FILLED COMPOSITE

COMPOSITE SKINS ALUMINIUM SUBSTRUCTURE

ALUMINIUM (POSSIBLE F W DEVELOPMENT)