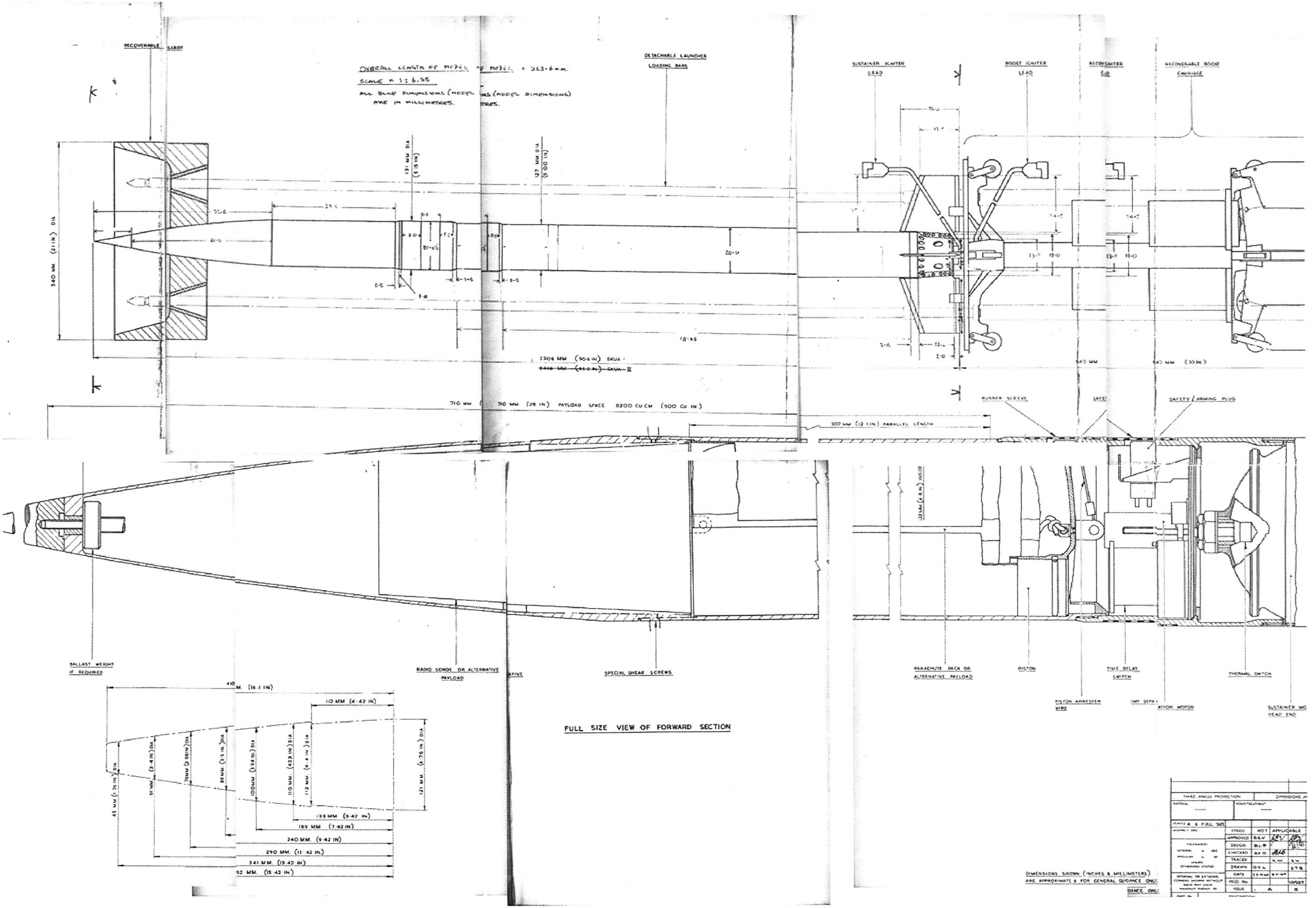
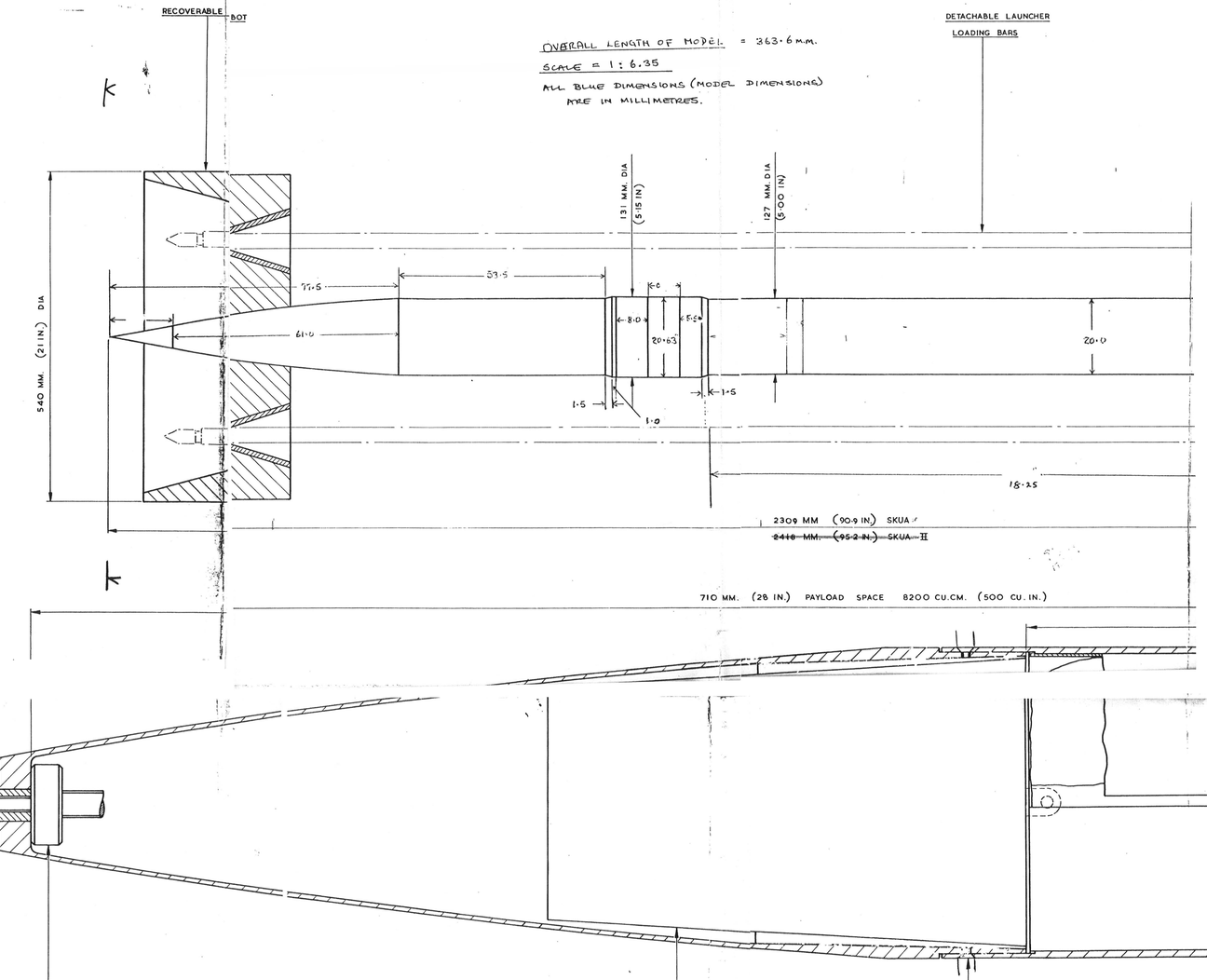
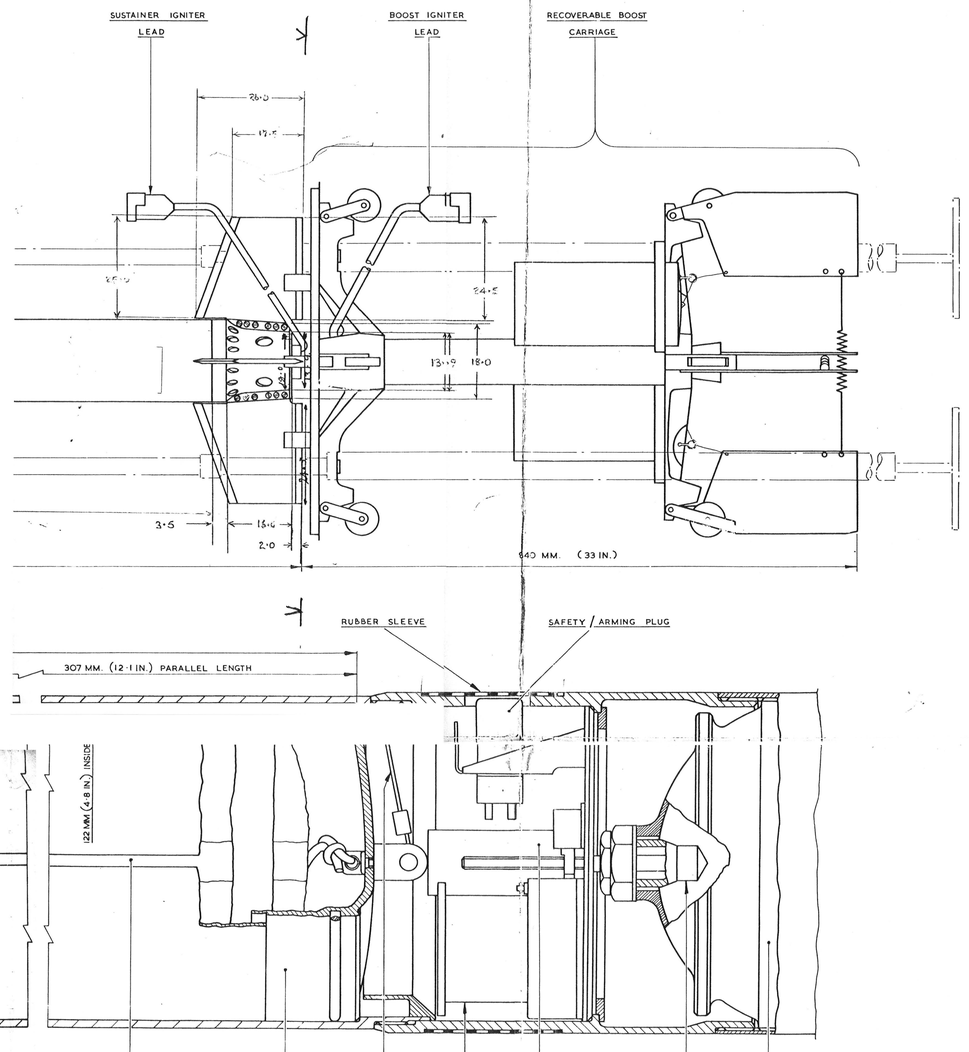
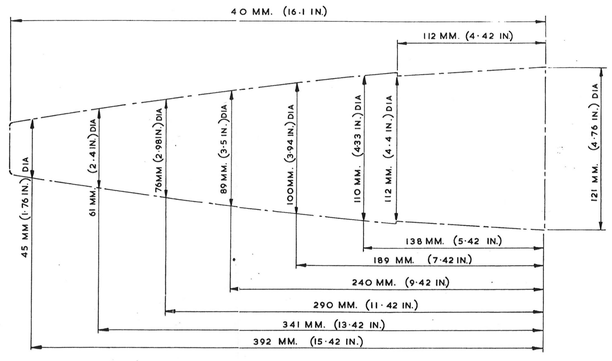
WASC 1976

Shuttle Rocket
System Documentation
and Drawings
1964


RECOVERABLE SABOT
SCALE = 1 : 6.35
DETACHABLE LAUNCHER LOADING BARS
SUSTAINER IGNITER LEAD
BOOST IGNITER LEAD
RECOVERABLE BOOST CARRIAGE
540 MM. (21 IN) DIA.
131 MM DIA (5.15 IN)
127 MM DIA (5.00 IN)
2304 MM (90.6 IN) SKUA
710 MM. (28 IN) PAYLOAD SPACE 8200 CU.CM (500 CU. IN)
307 MM (12.1 IN) PARALLEL LENGTH
RUBBER SLEEVE
SAFETY / ARMING PLUG
BALLAST WEIGHT IF REQUIRED
RADIO SONDE OR ALTERNATIVE PAYLOAD
SPECIAL SHEAR SCREWS
PARACHUTE PACK OR ALTERNATIVE PAYLOAD
PISTON
TIME DELAY SWITCH
THERMAL SWITCH
PISTON ARRESTER WIRE
FULL SIZE VIEW OF FORWARD SECTION
112 MM (4.42 IN)
121 MM. (4.76 IN) DIA.
138 MM (5.42 IN)
189 MM. (7.42 IN)
240 MM. (9.42 IN)
290 MM. (11.42 IN)
341 MM. (13.42 IN)
DIMENSIONS SHOWN (INCHES & MILLIMETERS) ARE APPROXIMATE & FOR GENERAL GUIDANCE ONLY
THIRD ANGLE PROJECTION







OVERALL LENGTH OF MODEL = 363·6 m.m.

SCALE = 1 : 6.35

ALL BLUE DIMENSIONS (MODEL DIMENSIONS) ARE IN MILLIMETRES.

FULL SIZE VIEW OF FORWARD SECTION

DIMENSIONS SHOWN (INCHES & MILLIMETERS) ARE APPROXIMATE & FOR GENERAL GUIDANCE ONLY.

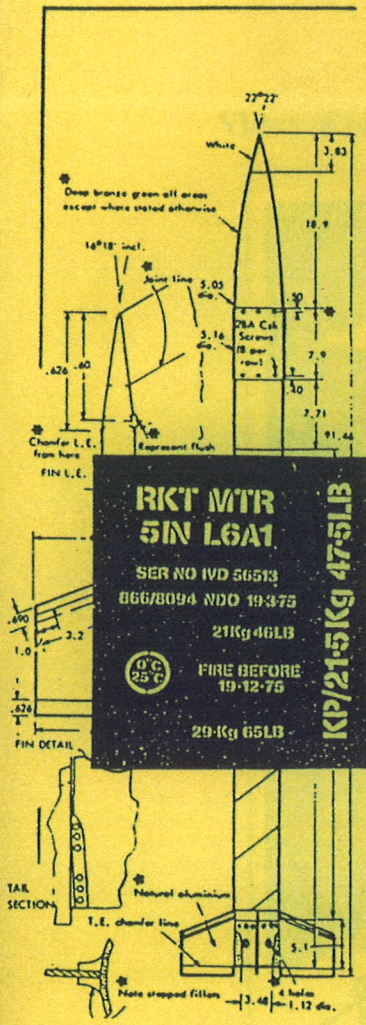
THIRD ANGLE PROJECTION	DIMENSIONS ARE IN INCH UNITS UNLESS OTHERWISE STATED.				
MATERIAL : —	FORM/TREATMENT : —	SPECIFICATION : —	PROTECTIVE TREATMENT : —		
SCALE 1:4 & FULL SIZE					
ASSEMBLY DRG.	STRESS	NOT	APPLICABLE		D.J.B
	APPROVED	G.E.V	GEV	GEV	
TOLERANCES GENERAL ± ·010 ANGULAR ± 30′ UNLESS OTHERWISE STATED	DESIGN	D.J.B			
	CHECKED	E.F.D	MAG		
	TRACED		S.W	S.W	
	DRAWN	D.C.L		S.T.B	
INTERNAL OR EXTERNAL CORNERS SHOWN WITHOUT RADII MAY HAVE MAXIMUM RADIUS ·03	DATE	22·10·64	6·11·64	[illegible]	
	MOD. No.			10907	
	ISSUE	.	A	B	
PART No.	DESCRIPTION				

Bristol Aerojet Ltd.

SKUA ROCKET SYSTEM

Stuart Lodge

British Space Modelling Association



SCALE 1:4 & FULL SIZE												
ASSEMBLY DRG.	STRESS	NOT	APPLICABLE	D.J.B								
	APPROVED	G.E.V										
TOLERANCES GENERAL ± .010 ANGULAR ± 30' UNLESS OTHERWISE STATED	DESIGN	D.J.B										
	CHECKED	E.F.D										
	TRACED		S.W	S.W								
	DRAWN	D.C.L		S.T.B								
INTERNAL OR EXTERNAL CORNERS SHOWN WITHOUT RADII MAY HAVE MAXIMUM RADIUS .03	DATE	22-10-64	6-11-64									
	MOD. No.			10907								
	ISSUE	A		B								

PART No. AND INSPECTION STAMP TO BE MARKED AT #

DESCRIPTION

SKUA ROCKET SYSTEM

DRAWING No. 1514

BRISTOL AEROJET LIMITED, BANWELL, SOMERSET. U

S T U V AMDO SIZE 10

THE SKUA ROCKET SYSTEM was developed in the middle-1960s at Bristol Aerojet Ltd. of Banwell, Somerset, United Kingdom. The series was designed to obtain meteorological readings in the upper atmosphere and the prototypes were possessed of a 70,000m.(200,000') altitude capability. Operational firings were timed to coincide with the International Quiet Sun Year (IQSY) programme, from the South Uist island launch site.

The prototypes were boosted from truck-borne tubes utilising a discarding sabot to centralise the projectile in the launcher and cut down launch dispersion. Throughout the late 1960s and early 1970s the Skua Rocket System proved a great success with over 500 firings being recorded.

The model depicted is a SKUA 2 and represents an average example of the marque and does not duplicate a specific prototype.

Enclosed within this pack are the following:-

- Dimensioned drawings of the full-sized Skua 2 taken from *Aeromodeller* magazine, July 1984. These are approved by BAJ (the company Bristol Aerojet Ltd. has become).
- Simple workshop drawing of the model.
- Colour photographs and xerographic prints of full-size Skua 2 prototypes stored at the *London Science Museum & University College London.*
- Scale ruler applicable to model @ 1:3.0769 scale.

Issued August 1990

STUART LODGE
British Space Modelling Association

Bristol Aerojet Ltd.

SKUA ROCKET SYSTEM

Stuart Lodge

British Space Modelling Association

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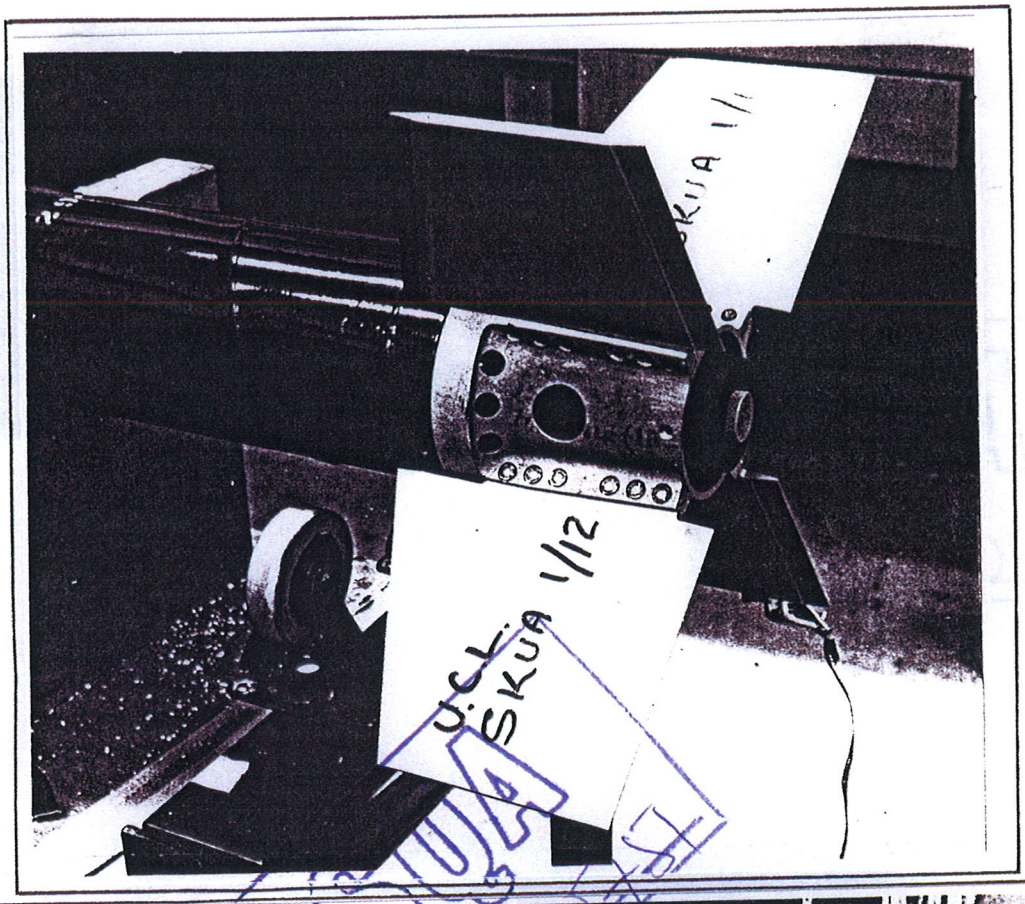
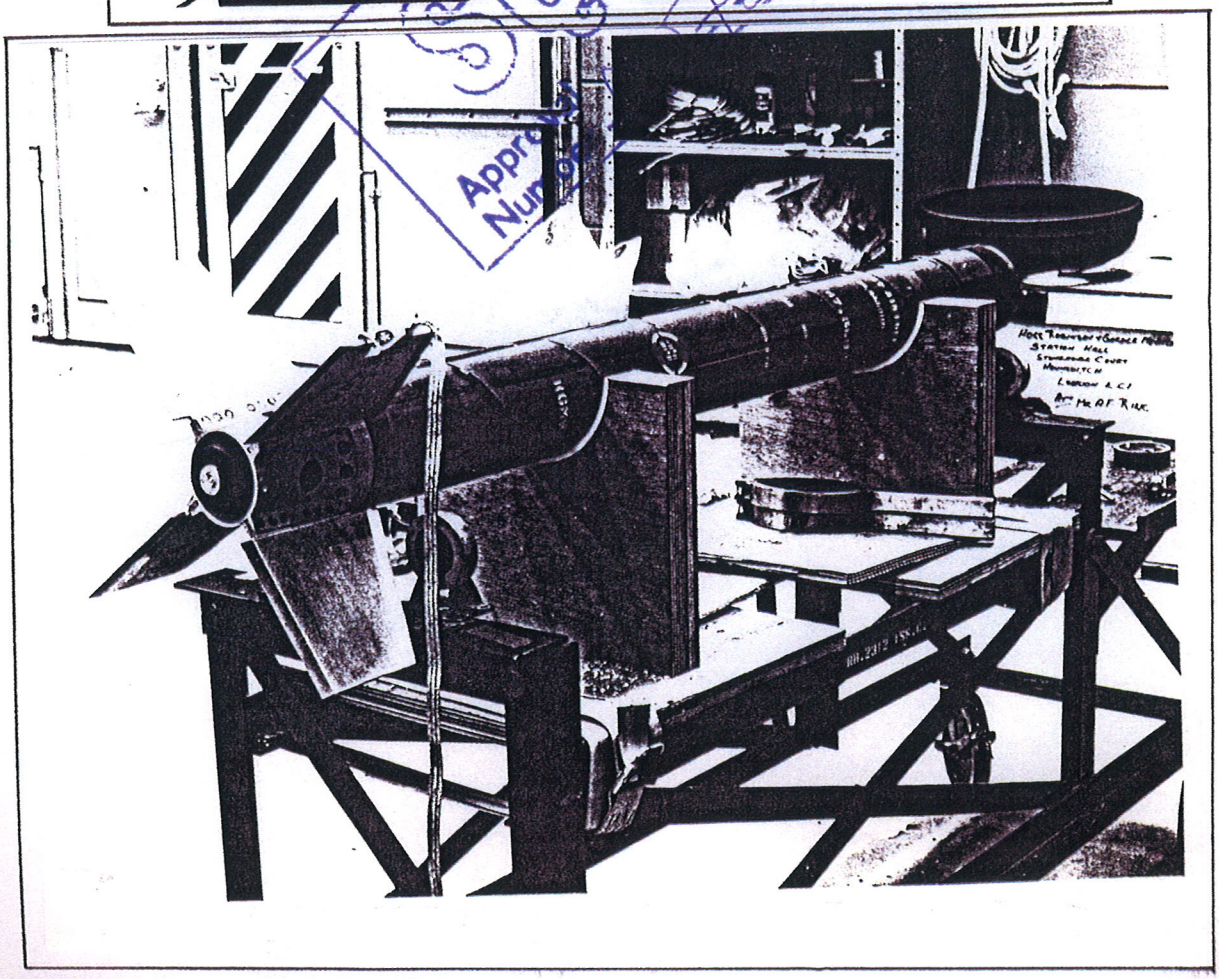
2nd August 1990

STUART LODGE
British Space Modelling Association

BRITISH AEROJET SKUA 2

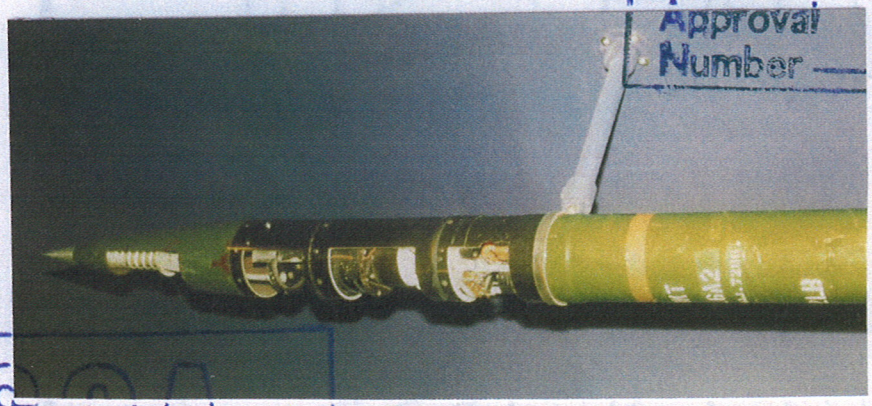
Views of sub-assemblies - prototype stored at University College London

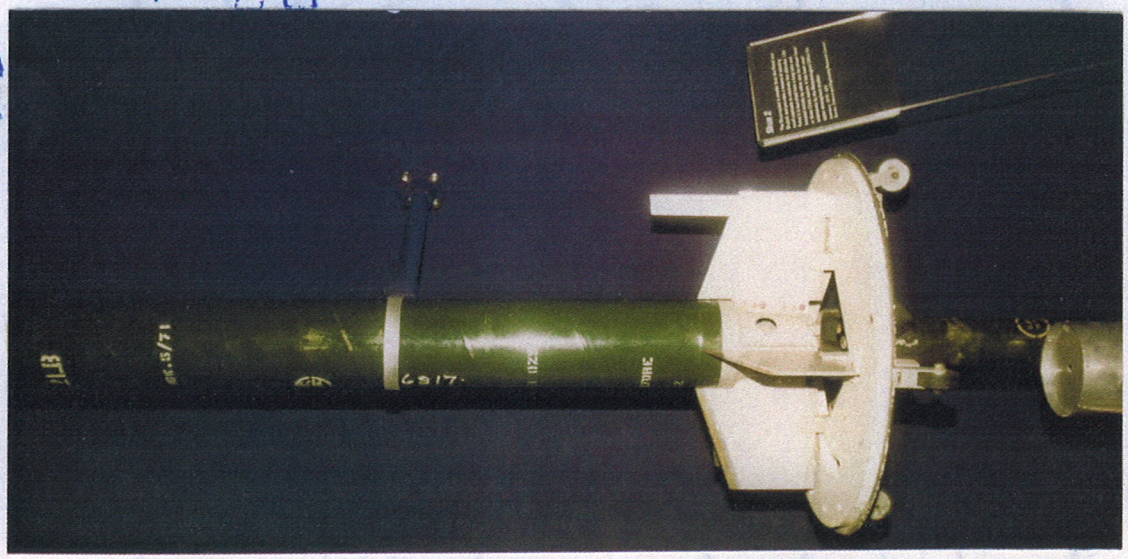




BRITISH AEROJET SKUA 2

Colour Photographs - prototype stored at London Science Museum





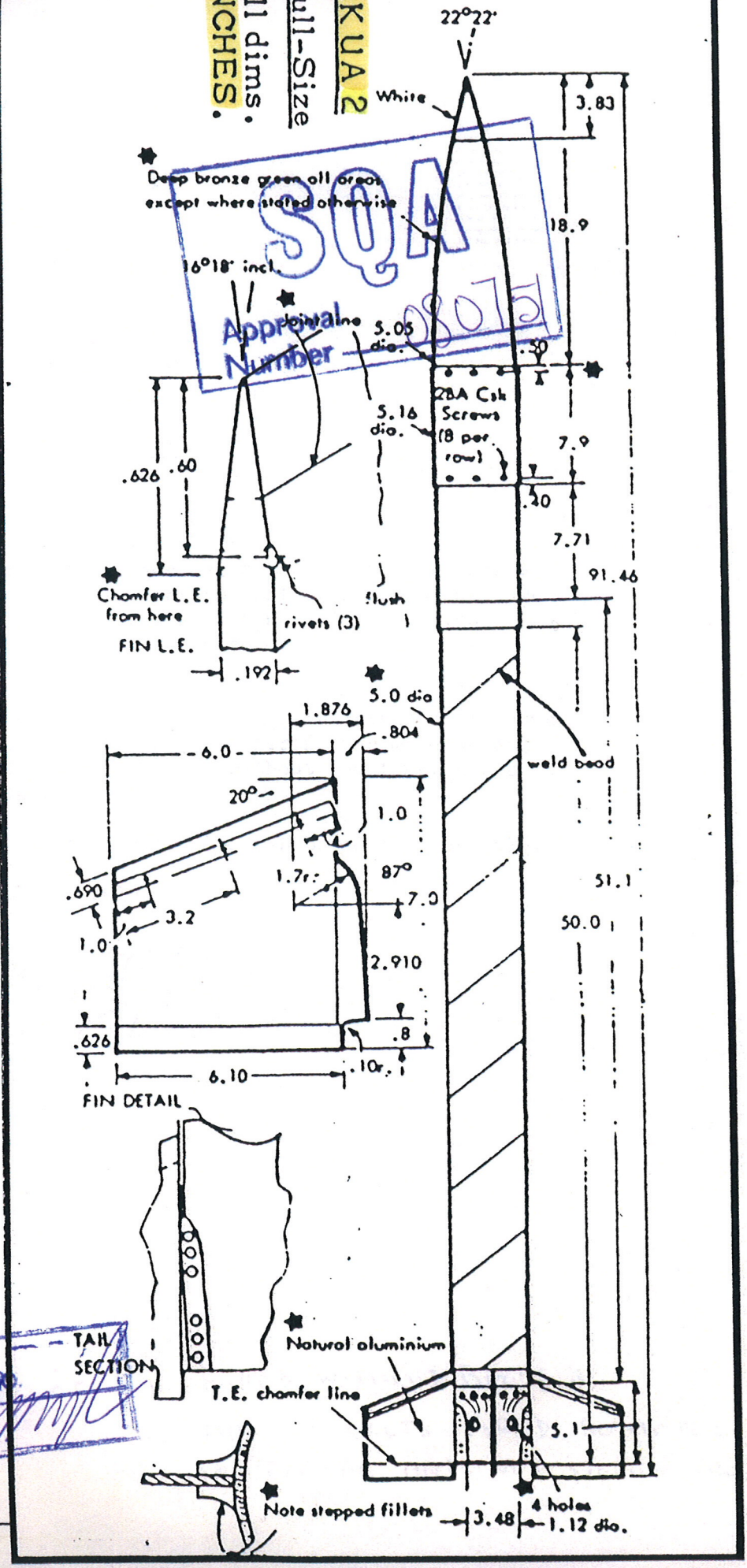
SQA
Approval Number 07085
SQA

Dimensions of Full-Size Prototype.

SKUA 2

Full-Size

All dims. INCHES.



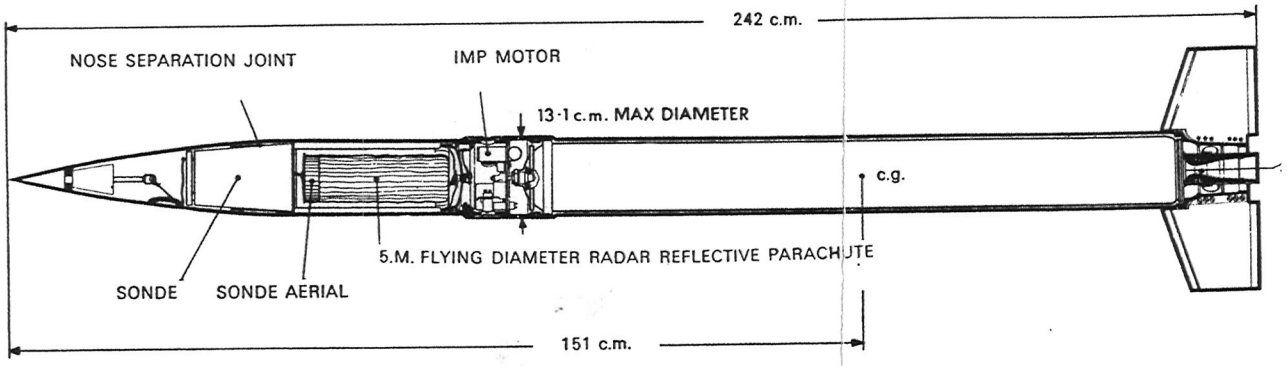
SQA
Approval Number 08075
CODE NO.

low dispersion. The exceptional economy of this type of sounding rocket system is due to the use of a simple case bonded, end burning, solid propellant charge and a recoverable boost system. The motors are supplied by the Rocket Propulsion Establishment, and possess a very high performance for their size. The recoverable boost lands very close to the launcher. A non-recoverable boost can be supplied for firings from ships.

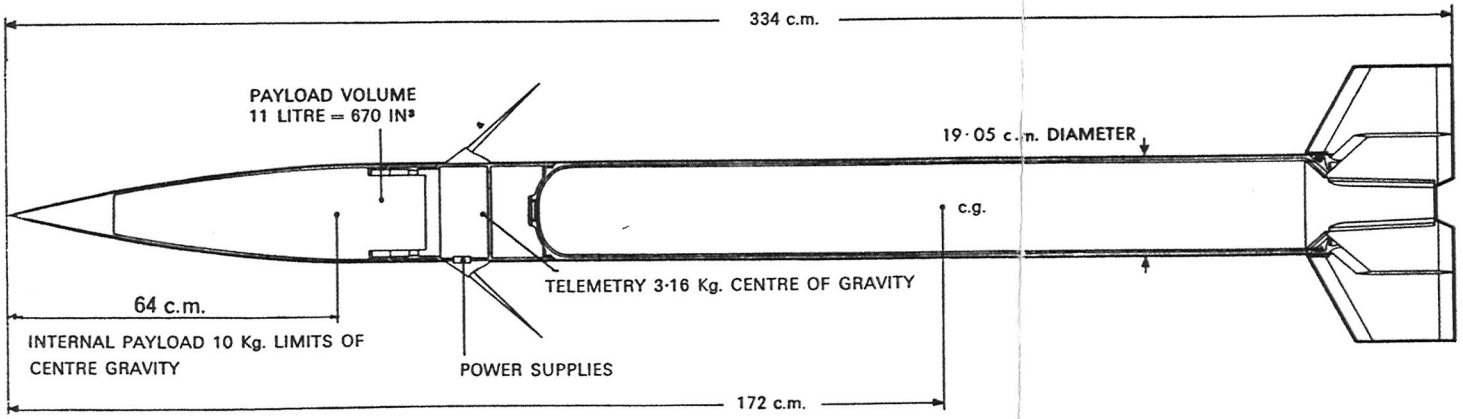
SKUA and PETREL rockets both use the same launcher. This is basically a 53 cm. diameter tube, 10 m. long which can either be mounted on a truck (the mobile launcher,) on a turntable or a simple crane (pivot launcher).

PETREL and SKUA can be supplied with standard forward ejecting or clam shell noses.

SKUA ROCKET



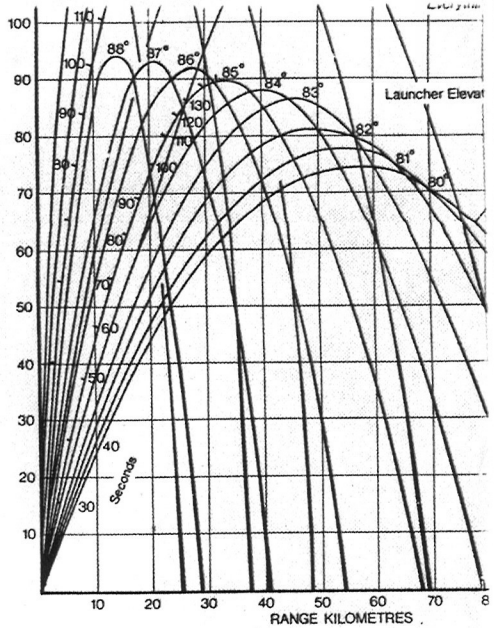
PETREL ROCKET

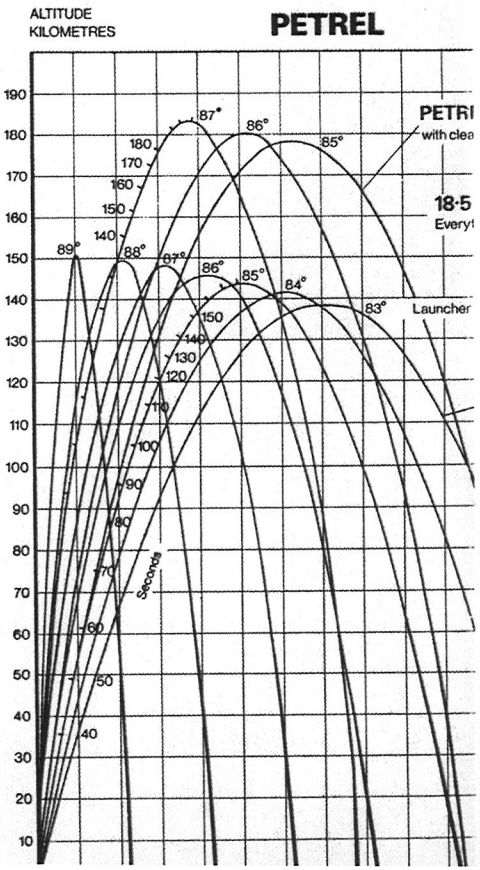


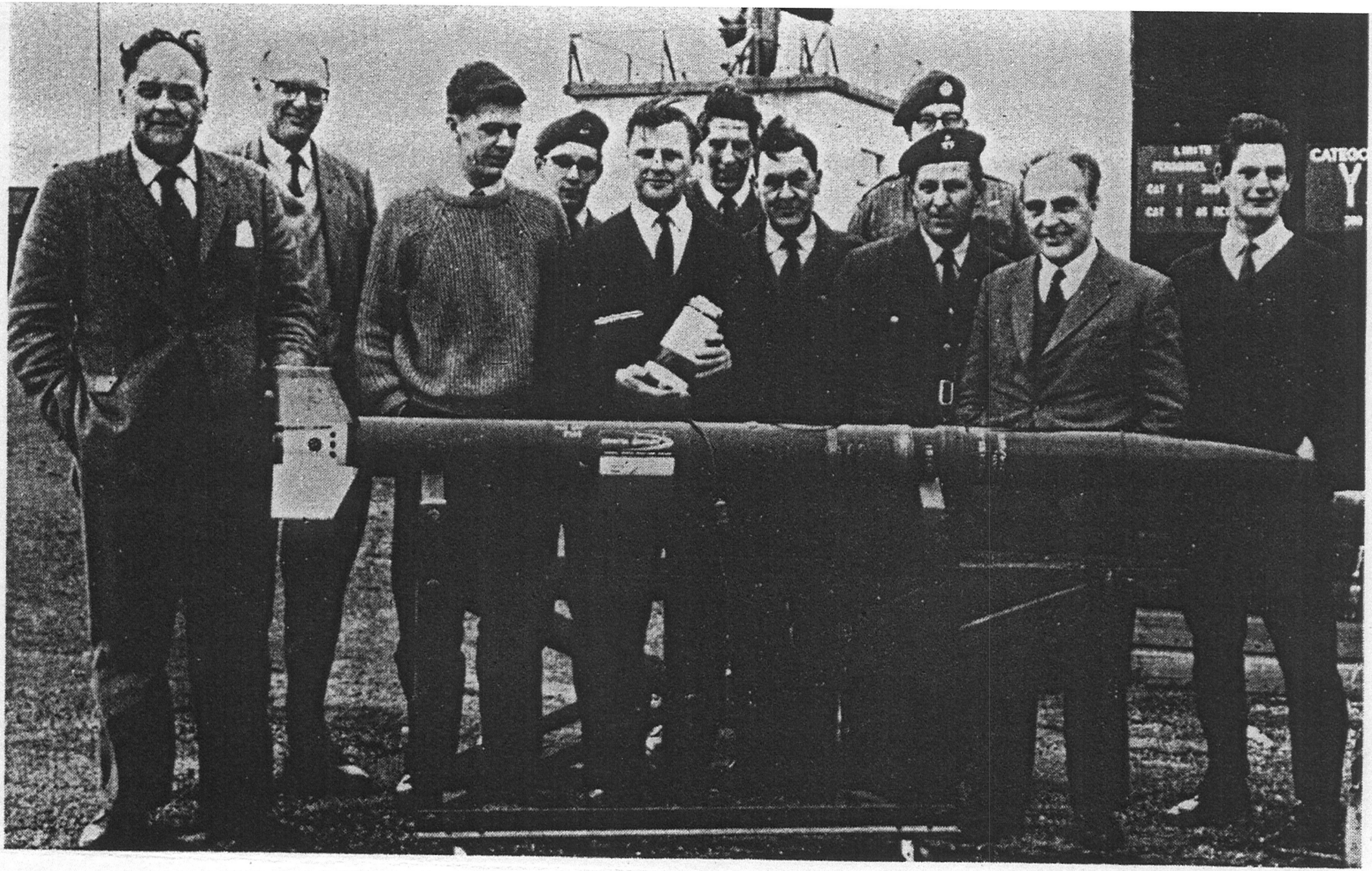
PIVOT LAUNCHER

SKUA BOOST

The Skua boost A employs







Crown Copyright

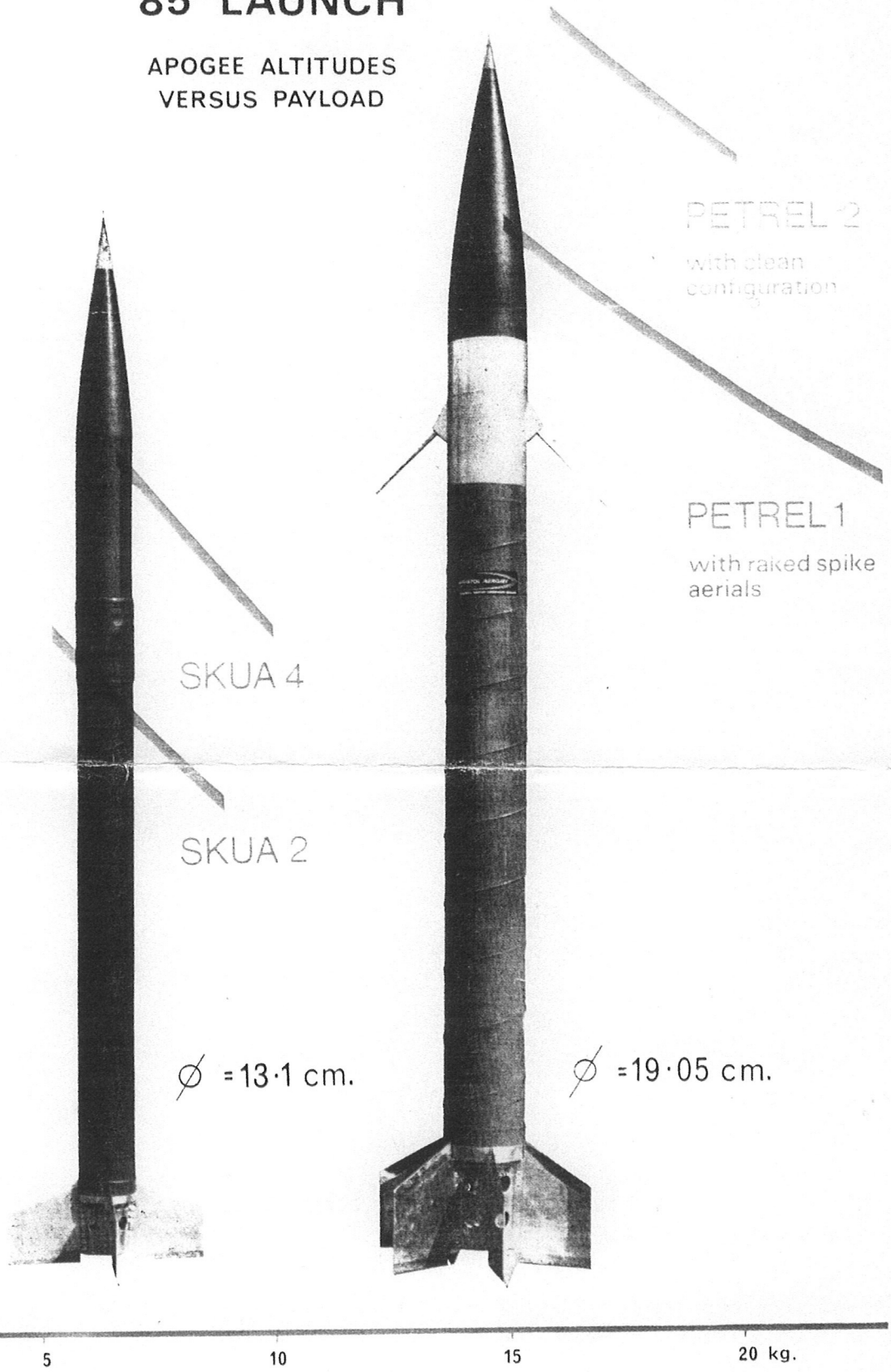
PLATE IV—THE SKUA ROCKET WITH DEVELOPMENT AND LAUNCHING TEAMS

From left to right: Mr. D. N. Hoare and Mr. W. T. Fisher, Bristol Aerojet Ltd.; Mr. S. E. C.

ALTITUDE
KILOMETRES

85° LAUNCH

APOGEE ALTITUDES
VERSUS PAYLOAD



190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

5 10 15 20 kg.

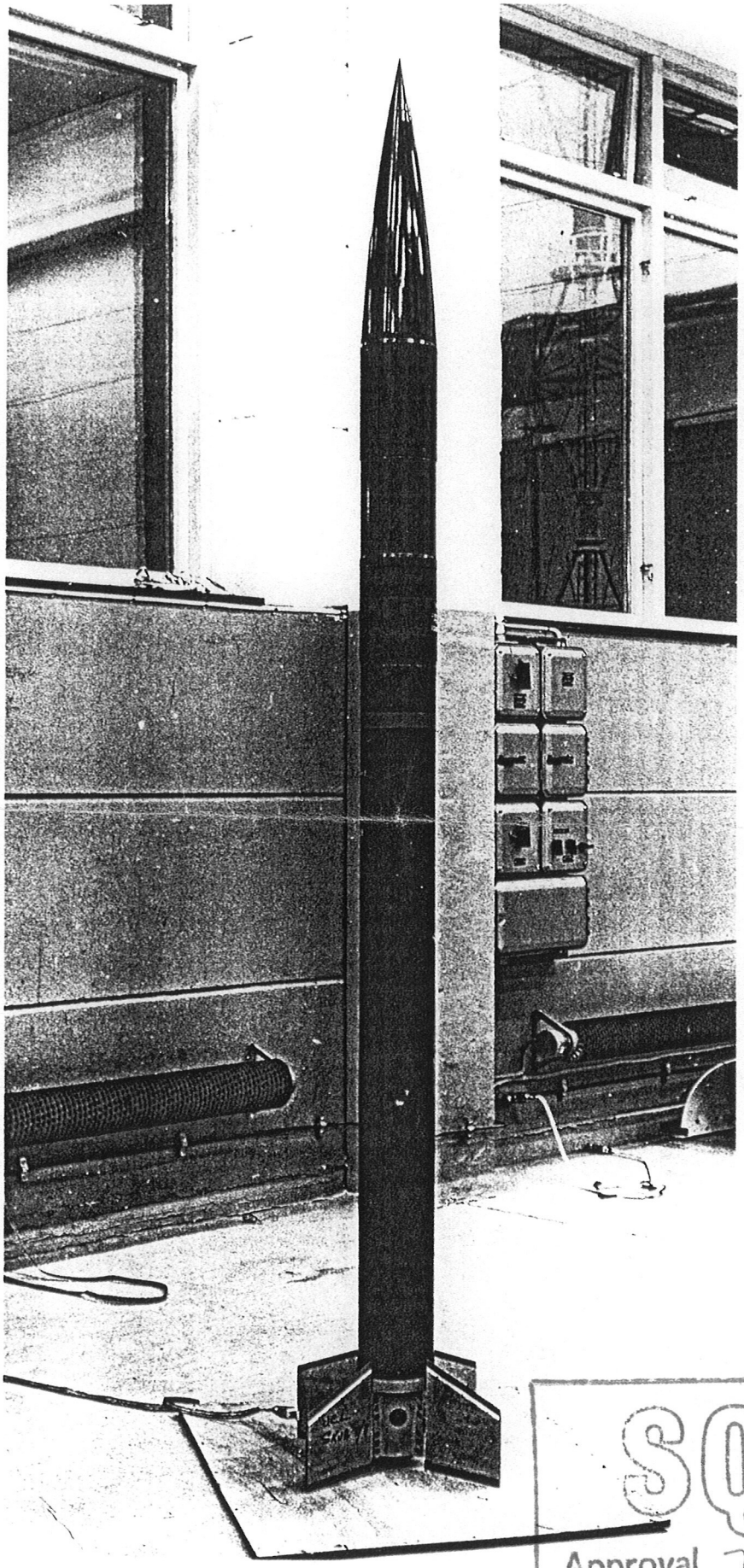
Weight of PAYLOAD (Everything Forward of Motor)

STORAGE LIFE

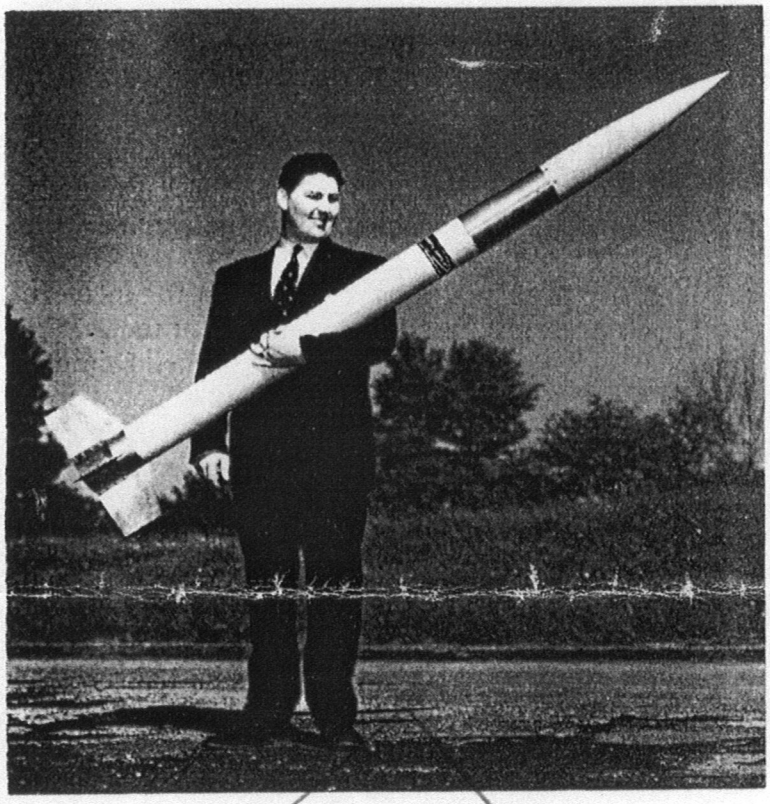
The storage life of the main motors is 9 months, this applies to both SKUA and the PETREL. The storage life of the boost motors is 5 years and this applies also to all the igniter units. The storage life of the payload ejection motor for the SKUA is also 5 years.

TEMPERATURE LIMITS OF MOTORS

Bristol Aerojet Ltd.,
Banwell,
Weston-super-Mare,
England.



SQA
Approval Number 76857



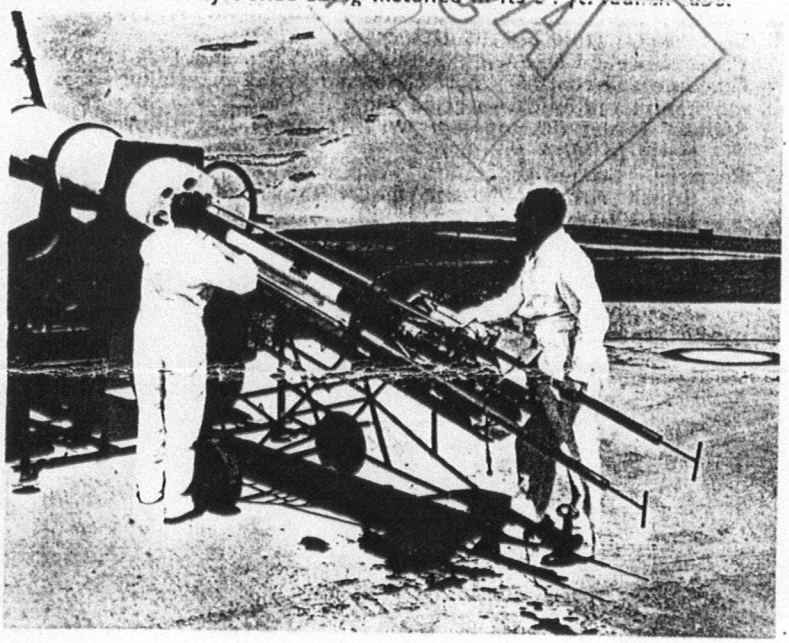
The Bristol Aerojet 5-in. meteorological rocket.

Bristol Aerojet Ltd.

May '63

SOA Approval Number

A Bristol Aerojet Skua being installed in its 24 ft. launch tube.



Sept '64

STABILITY DATA

Moment = 1022

Normal force = 15.4

Cp = 66.3 cm

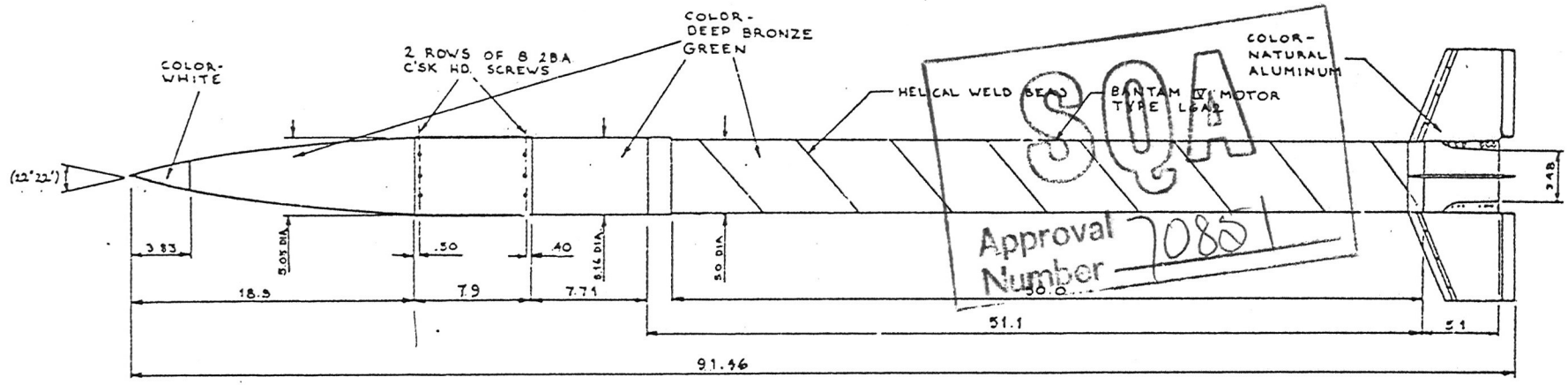
CG = 55.3 cm

Stab. margin = 11.0 cm

Stab. margin in Calibers = 2.66

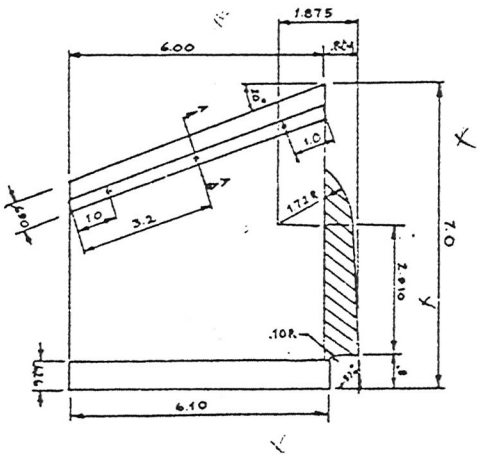
STABLE !

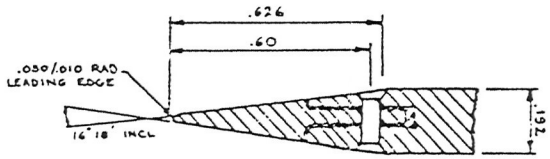
According to STABCALC - 1 HOSLER.



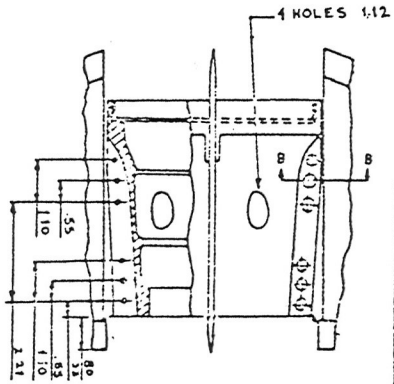
SQA
Approval Number 7085

NOTE: ALL DIMENSIONS IN INCHES

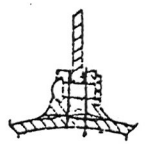




SECTION A-A
SCALE 4:1



FIN ATTACHMENT ASSY
SCALE 1:2



TYPICAL SECTION B-B

SKUA

SOUNDING ROCKET

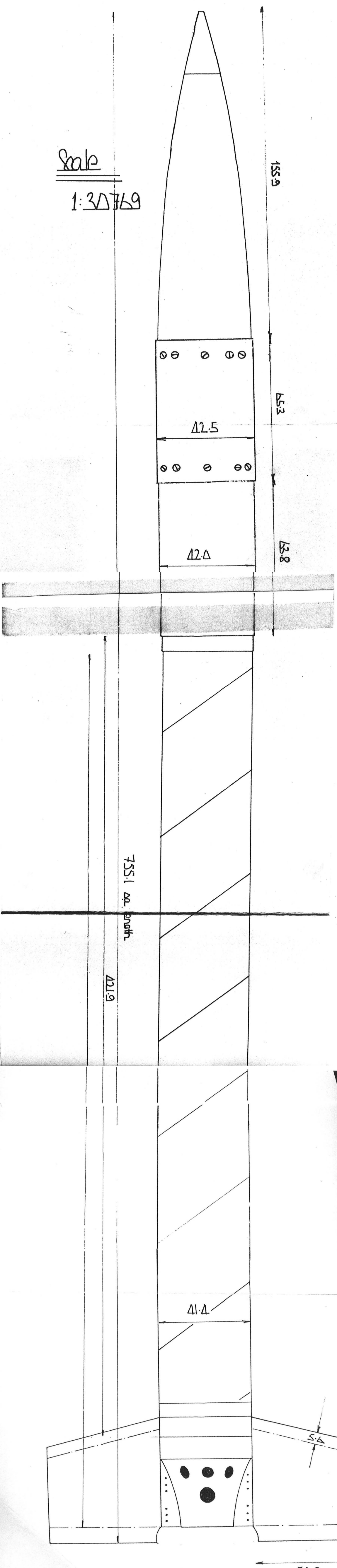
BRISTOL AEROJET LTD.

DRN. BY- [signature]

JUNE 2, 1970

Scale

1:30769



SCALE 1:4 & FULL SIZE												
ASSEMBLY DRG	STRESS	NOT	APPLICABLE		D.J.B							
	APPROVED	G.E.V										
TOLERANCES	DESIGN	D.J.B										
GENERAL ± .010	CHECKED	E.F.D										
ANGULAR ± 30'	TRACED		S.W	S.W								
UNLESS OTHERWISE STATED	DRAWN	D.C.L		S.T.B								
	DATE	22.10.64	6.11.64									
INTERNAL OR EXTERNAL CORNERS SHOWN WITHOUT RADII MAY HAVE MAXIMUM RADIUS .03	MOD. No.			10907								
	ISSUE	. A		B								

PART No. AND INSPECTION STAMP TO BE MARKED AT ##

DESCRIPTION

SKUA ROCKET SYSTEM

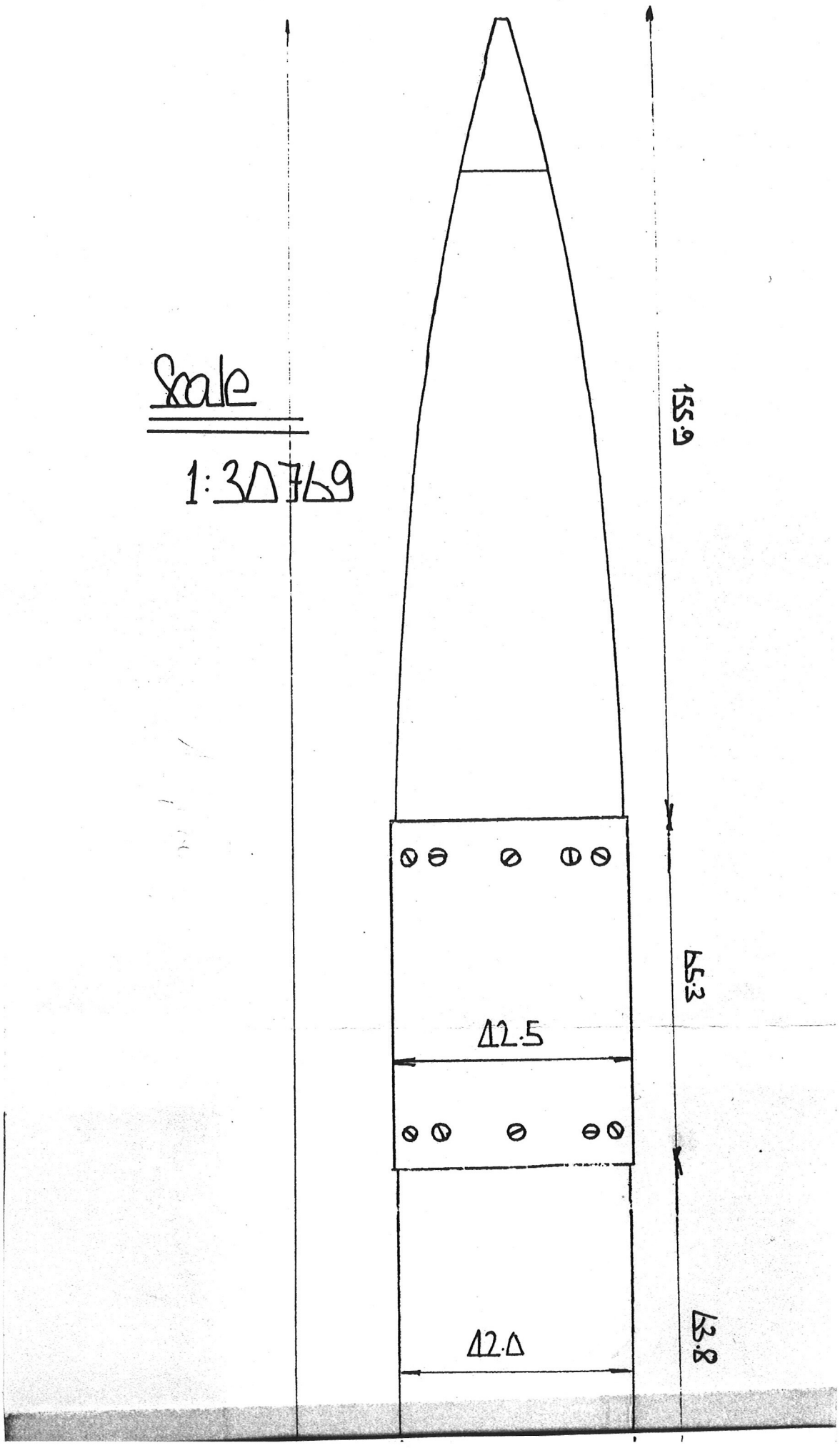
DRAWING No. 1514

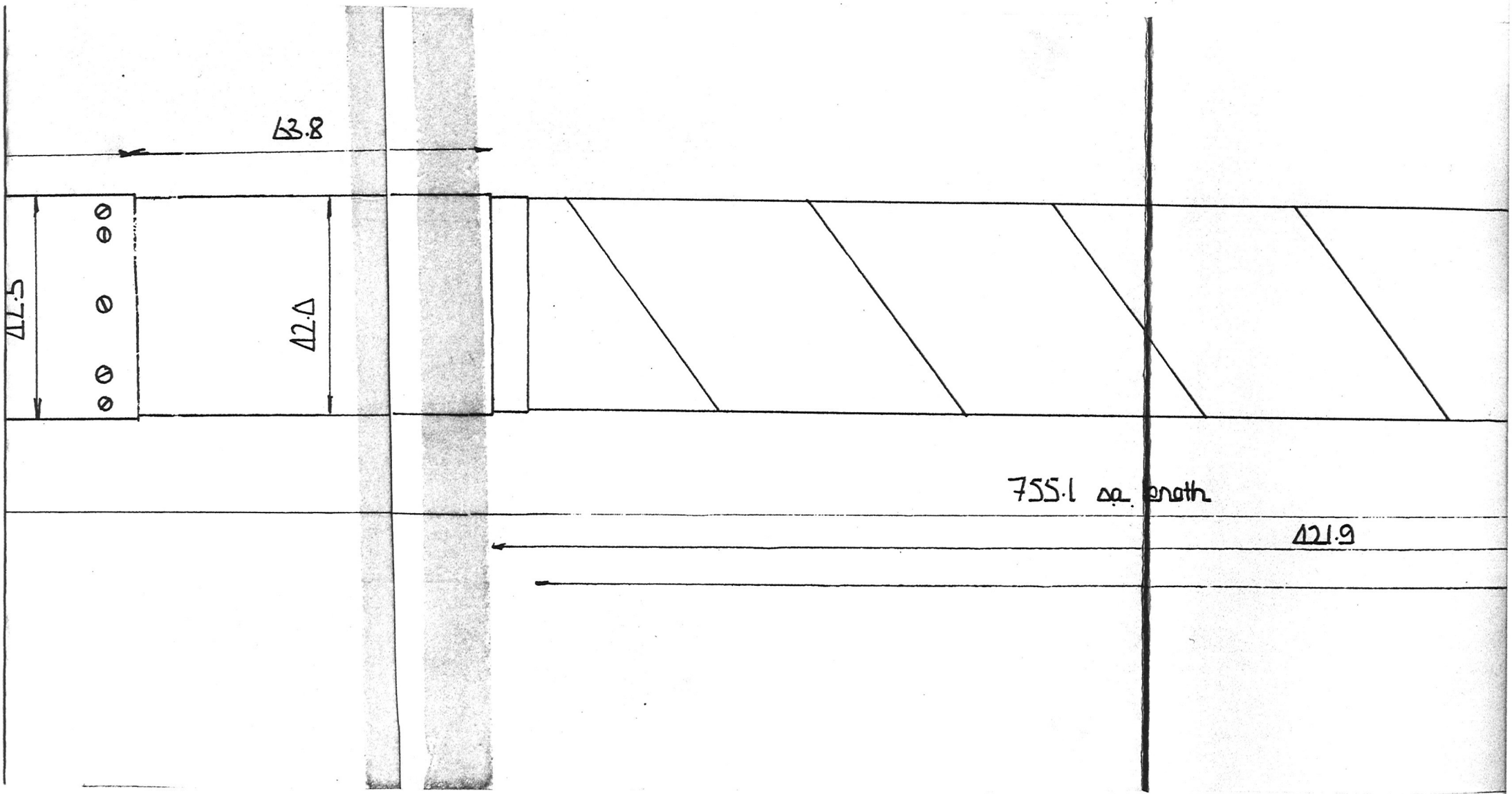
BRISTOL AEROJET LIMITED, BANWELL, SOMERSET. U

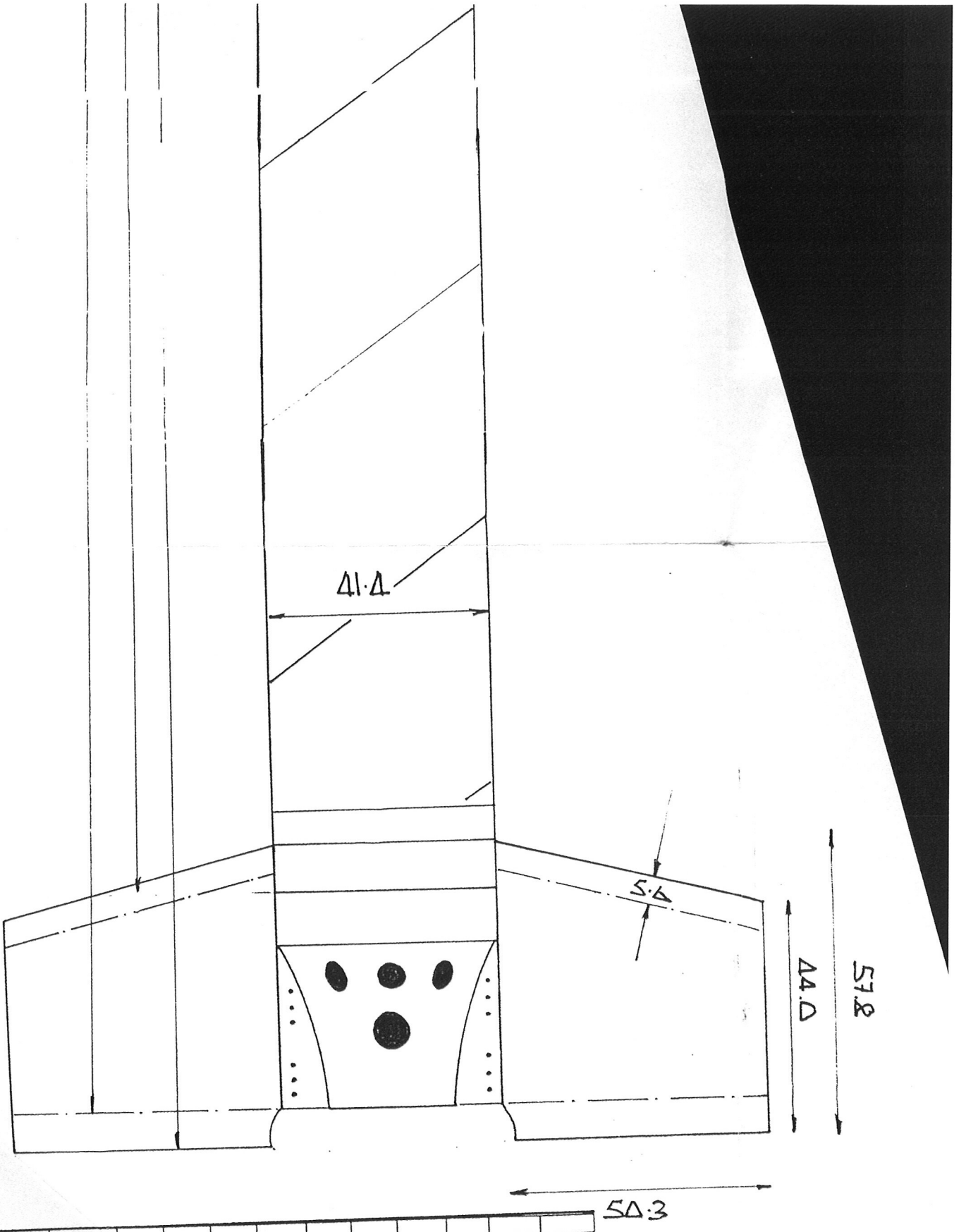
C I T I U I V RMDO SIZE 10

Scale

1:30769




63.8
42.5
42.4
755.1 sq. meath
421.9



SCALE 1:4 & FULL SIZE												
ASSEMBLY DRG	STRESS	NOT	APPLICABLE		D.J.B							
	APPROVED	G.E.V	GEV	GEV								
TOLERANCES	DESIGN	D.J.B										
GENERAL ± ·010	CHECKED	E.F.D	MAG									
ANGULAR ± 30'	TRACED		S.W	S.W								
UNLESS OTHERWISE STATED	DRAWN	D.C.L		S.T.B								
	DATE	22·10·64	6·11·64									
INTERNAL OR EXTERNAL CORNERS SHOWN WITHOUT RADII MAY HAVE MAXIMUM RADIUS ·03	MOD. No.			10907								
	ISSUE	.	A	B								

PART No. AND INSPECTION STAMP TO BE MARKED AT #

DESCRIPTION

SKUA ROCKET SYSTEM

DRAWING No. 1514

BRISTOL AEROJET LIMITED, BANWELL, SOMERSET. U

C T T T U T V AMDO SIZE 10

From : CEVA spol. s r.o. TRENCIN PHONE No. : 42831536393 Oct. 13 1997 8:19AM P01

(1 kumark ka S7, 1 Kom. ka S5B)

CLASS S7 / S5B, MODEL'S ADHERENCE TO SCALE IN DIMENSION

NAME: LODGE STUART

FAI NUMBER: GBR 79141

COMPETITION No: 192

NATIONAL TEAM: UK

PROTOTYPE NAME: SKUA

PROTOTYPE SERIAL No:

SCALE OF MODEL: 1:3,0769

% Deviation = Difference × 100 / Scale dimen. = (B−C) / B × 100

<1% deviation = 25 points

1 – 4,99% = 20 points

5 – 9,99% = 10 points

10% or greathre dev. = 0 points

Scale Adherence	(A) Prototype Dimension [mm]	(B) Scale Dimension [mm]	(C) Measured Dimension [mm]	(B−C) Difference [mm]	Deviation [%]	Points
Nose cone lenght	480.06	156	175	19	12.18	0 *
Body lenght	1843.	599	597	2	0.33	25
Body diameter	123	40	40	0	0	25
Overall lenght	2323	755	772	17	2.25	20
Selected dim.	131	42.6	41.5	0.9	2.11	20
Fin lenght	177.8	57.78	56	1.18	2.04	20
Fin width	155	50.37	51	0.63	1.25	20
Overall fin span	436.9	142	145.5	3.5	2.46	20

Measuring judges:

1. [signature]

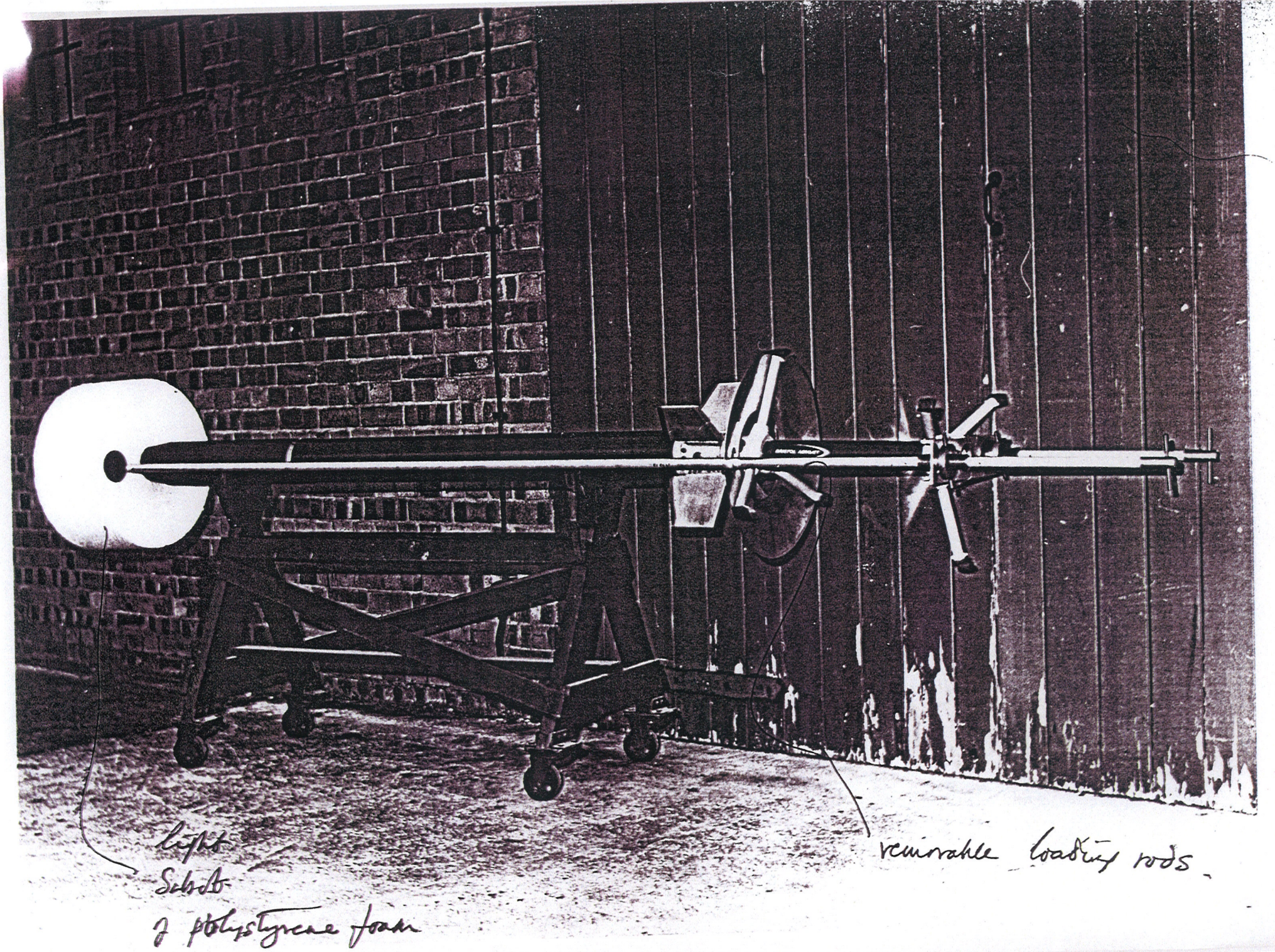
2.

3.

Total points (200 max.) 150

Chief judge [signature]

* sorry, it's true


Light
Sabot
2 Polystyrene foam
removable loading rods

SCALE ; 1:3.076923

Key: RED = inches
GREEN = millimetres
BLACK = inches-FULLSCALE

SUGGESTED MODELLING DETAILS
Standard body tube to suit
(if may be necessary to select
scale of model to fit tube dia

FULL SIZE SKUA
Dimensions in inches

Deep bronze green all areas
except where stated otherwise

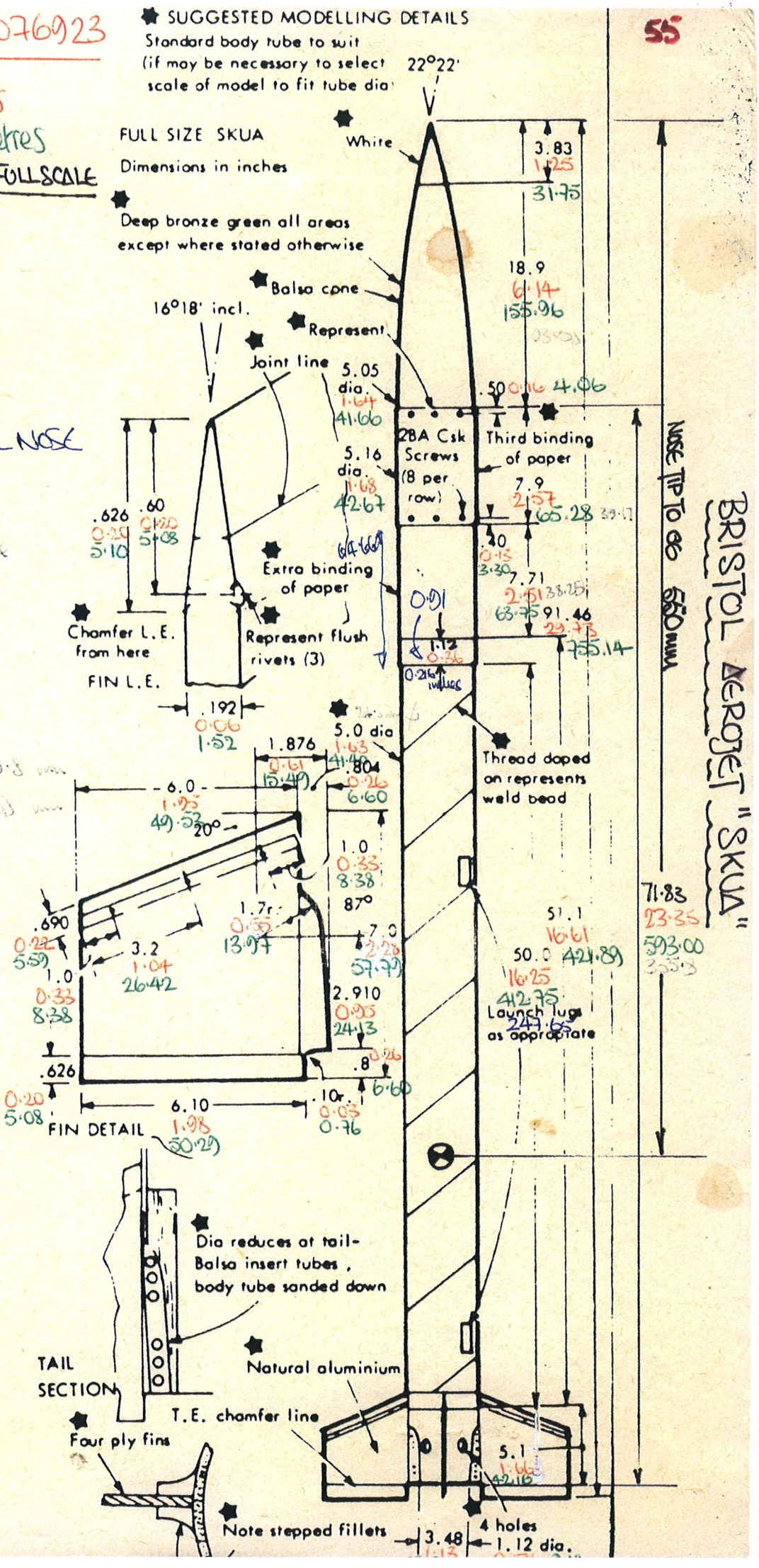
155.96
65.28
63.75
0.91
285.90 TOTAL NOSE

5.0" ϕ FULL SIZE
BIG 41.40 mm ϕ body tube
SMALL 24.38 mm ϕ body tube

CONVERSION FACTOR: 24.8 / 41.4 = (0.6)

Body tube length = 355.3 mm
Cone length = 185.3 mm

Small SKUA ; 1:51282



$D_{nose\ base}$ = 41.66

$C_{fin\ root}$ = 57.79

$C_{fin\ tip}$ = 44.00

$S_{fin\ semi}$ = 50.00

$L_{mid\ chord}$ = 51.00

$R_{body\ rad}$ = 20.70

X_R* = 13.00

X_B* = ~~[illegible]~~ 723.00

66 = 553.00 from Tip.

* X_R = dist fin rt LE α
Fin tip LE // to body.

CHICK MOTORS (3)
HSP. 21/012 7071.