FLIGHT MANUAL SUPPLEMENT SCAA No:……

Modification according to TDM 1/00 of Scottish Aviation Bulldog Series 100 Model 101 Version D

Performed by IAPS

AIRCRAFT REGISTRATION: SE-MEK

AIRCRAFT SERIAL NUMBER: 188

This supplement shall be attached to the Flight Manual when the conversion is accomplished. For limitations, procedures and performance information not contained herein, consult the basic Flight Manual and applicable supplements.

SCAA (Swedish Civil Aviation Administration) approves this supplement.

Norrköping Sweden Date:

LIST OF EFFECTIVE PAGES

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Section

Section 0
INTRODUCTION

Contents of the Royal Swedish Air Force modification to aircraft type Bulldog series 100 model 101 in chronological system.

Introduction of gyrosyn compass and gyro slaving equipment.

Introduction of new type of turn and slip indicator (electrical).

Introduction of new VHF-communications transceiver, transponder, encoder, clock and introduction of ELT 406 (Emergency Location Transmitter).

Introduction of transponder and new dial for the altimeter, vertical speed indicator and speed indicator to the measurements foot, foot per min and knot.

Modifications in purpose to transfer SK61.070 (the Royal Swedish Airforce registration number) to the civil register as Bulldog (Series 100, Model 101). The modification consists of the following items:

- Introduction of a horn for the artificial stall warning system.
- Introduction of wing-flap position indicator
- Relocation of the wing-flap control
- Modification of the “Supply system control equipment and circuits” by separate the stall warning and boost pump system by two different circuit breaker
- Modification of the control lock, i a w locking the left side control column with safety belt harness
- Introduction of a amplifier to the VHF-com system reference to increase the system reliability
- Introduction of alternative static source
- Introduction of placards and labels.

Section 1
GENERAL

The following additions or changes are made to the information contained in supplement No 1 in the Approved Flight Manual Doc. No. SH.3.1.

Applicability

This supplement applies to SE-MEK, Scottish Aviation Bulldog Series 100 Model 101 Version D modified ac cording to Saab Nyge Aero TDM 1/00 except the control lock modification.

Special Features

Special features of this variant are as follows.

Configuration

The external brackets are removed from the airframe for the attachment of the associated restraining cables. This is also true for the external brackets on the airframe for the carriage of personal skis of the aircraft occupants.

Instrument and controls

1. Fresh air louvres
2. Synchronies indicator for the gyroscopic direction indicators.
3. Clock
4. Turn and slip indicator
5. Airspeed indicator
6. Gyroscopic bank and pitch indicator
7. Altimeters
8. VOR-indicator
9. Oil temperature/oil pressure/cylinder head temperature indicator
10. Magnetic compass
11. Manifold pressure / fuel flow indicator
12. Engine rotational speed indicator
13. Slip indicator
14. Alternative static source selector
15. VHF-com emergency switch
16. Intercom panels
17. Gyrosyn compass
18. Vertical speed indicator
19. VHF communication transmitter and receiver
20. Switch for wing-flap position indicator (Test and Dim)
21. Wing –flap selector
22. Wing-flap position indicator
23. Vacuum gauge
24. VHF navigation receiver
25. Gyroscopic compass
26. Transponder
27. ELT 406 remote panel

The main differences between this layout and that given in Figure 6.1-1 on page 6.1-3 in Flight Manual doc. No.SH.3.1 supplement No 1. are the addition of avionic equipment to the instrument panel.
The flap selector is moved to the central console and a flap position indicator is also installed in the central console. A horn is added to the stall warning system. The VHF communication system is equipped with a separate amplifier for emergency.

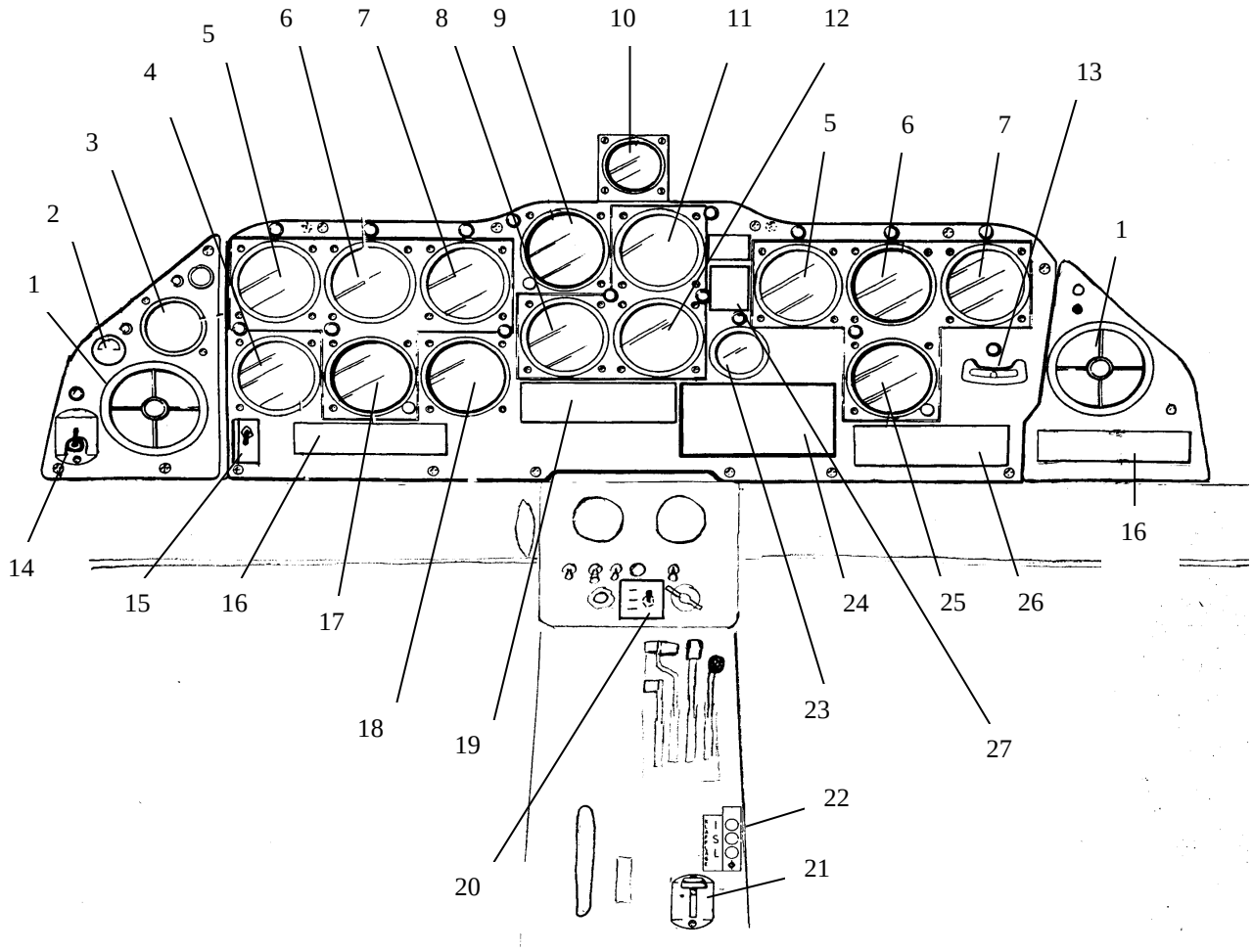

Figure 1: Instrument Panel and Controls

Avionics
Panel mounted avionic equipment is located as shown in Figure 1**.**

Section 2
LIMITATIONS

Speed

Never exceed Speed (V_{NE})

V_{NE} is 169 kn IAS

Normal Operating Limit Speed (V_{NO})

V_{NO} is 126 kn IAS

Manoeuvring Speed (V_A)

V_A is 130 kn IAS

Wing-Flaps Extended Speed (V_{FE})

V_{FE} is 125 kn IAS for extension to the 10° position (S-setting) and 95 kn IAS for extension to the 45° position (L-setting)

Instrument Colour Markings

The colour markings on the airspeed indicator have following meaning:

Red radial line : V_{NE} 169 kn IAS
Yellow arc : Cautionary range, from V_{NE} to V_{NO} (169 – 126 kn IAS)
Green arc : Normal operating range with wing-flaps retracted, from V_{NO} to V_{S1} (126 – 60 kn IAS)
White arc : Normal operating range with wing-flap fully extended, from V_{FE} to V_{So} (95 – 57 kn IAS).

Miscellaneous

Type of Operation

The aeroplane is equipped and approved for VFR day & night operations.
The stall warning system must be installed and serviceable for all operations.
The aeroplane is not approved for flight into icing conditions.

Pitot/Static system

When the alternate static source is selected there will be a different reading than normal, concerning the altimeter and airspeed indicator. In purpose to decrease this deviation, all cabin vents and the cockpit canopy shall be closed when the alternative static source is selected. But even if the cabin vents and the cockpit canopy has not been closed, the deviation to normal reading never exceed 160 ft in altitude or 15 kn in speed.

IPA Normal static system [ft]	IPA (deviation) Alternate static sours [ft]	
	Closed cockpit canopy	Open cockpit canopy
0 - 4500	0 to +80	+60 to +160

NOTES: IPA (Indicated Pressure Altitude) the number actually read from an altimeter when the barometric subscale has been set to 1013 hPa .

IAS Normal static system [kn]	IAS (deviation) Alternate static sours [kn]	
	Closed cockpit canopy	Open cockpit canopy
56 - 169	-2 to +10	+10 to +15

NOTES: For the configuration “Open cockpit canopy” this table does not include IAS greater than 113 kn.

Manoeuvres

Due to engine limitations, the aeroplane is not approved for inverted flight if the oil separator has been removed from the lubrication system.

Recommended entry speeds for performing aerobatic manoeuvres are as follows:

Manoeuvre	Recommended Entry IAS [kn]
Spins	V_{S1} or 66
Inside loops	130
Half loop and roll out	134
Half roll and dive out	85
Stall rolls	113
Slow rolls	113
Barrel rolls	113
Flick rolls	70 – 81

For flick rolls the speed of 81 kn IAS must not be exceeded.

Opening of Cockpit Canopy in Flight

The indicated airspeed shall not exceed 113 kn when opening the canopy.

Placards

Notices which are required to be placarded are displayed as follows:

Left Sidepanel (below left hand throttle control)

<table>
<tr><td colspan="4">MANOEUVRES</td></tr>
<tr><td>OPERATION</td><td>NON-AEROBATIC</td><td colspan="2">AEROBATIC</td></tr>
<tr><td>MAX. PERMISSIBLE WEIGHT (kg)</td><td>1066</td><td colspan="2">975</td></tr>
<tr><td>AFT CG LIMIT, AFT OF DATUM (m)</td><td>1.816</td><td colspan="2">1.751</td></tr>
<tr><td>MAX. PERMISSIBLE NORMAL ACCELN. , FLAPS UP (g)</td><td>+ 3.8
- 1.52</td><td colspan="2">+ 6.0
- 3.0</td></tr>
<tr><td rowspan="2">PERMITTED MA-NOEUVRES</td><td rowspan="2">STALLS ONLY, AEROBATIC MANOEUVRES PROHIBITED</td><td>STALLS,
WITH FLAPS UP –
SPINS
INSIDE LOOPS
HALF LOOP & ROLL OUT
HALF ROLL & DIVE OUT
STALL TURNS
SLOW ROLLS
BARREL ROLLS
FLICK ROLLS</td><td>Recommended Entry KIAS
V_{S1} or 66
130
134
85
113
113
113
70 - 81</td></tr>
<tr><td colspan="2">SUSTAINED INVERTED FLIGHT PROHIBITED</td></tr>
<tr><td colspan="4">WHEN PERFORMING AEROBATIC MANOEUVRES –
REAR SEAT SHALL NOT BE OCCUPIED
EACH SEAT IN USE SHALL BE PROVIDED WITH SAFETY HARNESS
BAGGAGE SHALL NOT BE CARRIED</td></tr>
<tr><td colspan="4">WITH CANOPY OPEN GENTLE MANOEUVRES ONLY SHOULD BE PERFORMED</td></tr>
</table>

Instrument Panel

OPERATION
OPERATE IN ACCORDANCE WITH APPROVED FLIGHT MANUAL
VFR, IFR DAY & NIGHT OPERATIONS PERMITTED WHEN REQUIRED EQUIPMENT INSTALLED & WHEN ALLOWED BY OPERATING REGU-LATIONS
STALL WARNING SYSTEM MUST BE INSTALLED & SERVICEABLE
FLIGHT INTO ICING CONDITIONS PROHIBITED

NO SMOKING

WARNING
Altimeter supplied by the alternate static source could result in higher readings than normal. Refer to AFM Supplement

This placard is used when the oil separator is removed:

INVERTED FLIGHT PROHIBITED. THE OIL SEPARATOR IS REMOVED
INVERTED FLIGHT WILL DRAIN THE LUBRICATE SYSTEM FROM OIL

NOTES: The oil separator can be removed from the lubrication system in purpose to avoid corrosion to the engine parts. If so there must be a placard with following text " INVERTED FLIGHT PROHIBITED. THE OIL SEPARATOR IS REMOVED INVERTED FLIGHT WILL DRAIN THE LUBRICATE SYSTEM FROM OIL" and this must be displayed in a conspicuous place.

Canopy

In red on white background

TO JETTISON CANOPY FOR EMERGENCY EXIT
PULL DOWN RED HANDLE. PUSH OUTWARDS.

Section 3
EMERGENCY PROCEDURES

Landing with Engine Inoperative (Forced landing)

(4) Position aeroplane so that a height of 1000 ft above ground level is reached at the end of the downwind leg maintaining a minimum airspeed of 76 kn IAS and judging the point to turn across wind according to wind strength.

(5) Proceed on to approach, maintaining minimum airspeed of 76 kn IAS. If an excessive over-shooting tendency is apparent, sideslipping is effective in steepening the angle of approach.

Landing with Wing-flap Retracted

Final approach should be made at 76 kn IAS.

Restarting Engine in Flight with Propeller Stopped

NOTES: (1) Propeller may not commence to windmill below an airspeed of 113 kn IAS.

Systems Control

Electrical System

Alternator Failure -

(-1) Switch OFF the VOR-equipment and if measure 1 or 2 succeeded switch ON the VOR-equipment.

NOTES: This item will be added to the existing items under the heading of "Alternator Failure" in Flight Manual doc. No.SH.3.1 .

Flap Actuator Failure -

Refer to Section 3 –Emergency Procedures, Page 3-5, in Flight Manual doc.No.SH.3.1 (Wing-Flap position indicator introduced).

Inadvertent Activation of the Emergency Locator Transmitter (ELT)

If the ELT has been inadvertent activated perform the following action to restore the ELT (indicated on the ELT 406 remote panel by short and long flashes on the red visual indicator):

1. Press the switch on the remote panel downwards to the RESET/TEST position for at least 1 second and then release it (the switch comes back to the ARMED position)
2. Verify that the red indicator has stopped flashing
3. Report to technical responsible.

Failure of VHF-communication system.

1. Check the switches on the intercom panel and VHF-com transceiver.
2. "INTERFONSYST"-switch : "NÖDLÄGE" (emergency)

NOTES: When the "INTERFONSYST"-switch are in position "NÖDLÄGE" the VHF-com system only works from the pilot seat and then it is not possible to receive any identification signal from the NAV-system and it is no longer possible to communicate with the co-pilot and passengers through the intercom-system.

Failure of the Pitot/static system (Altimeter, Rate of Climb and Descent- and Speed- indicator).

If there are any indications of malfunction of the pitot/static system by confirmed error detection or supposed error condition, do turn the valve cock at the alternative static source intake to position "ÖPPEN" (OPEN).

NOTES: When the alternate static source is selected, the pilot's airspeed indicator, altimeter and rate of climb indicator utilize cabin air for static pressure. Under these conditions the altimeter and airspeed indicator readings will be higher than normal for the most flight attitudes (refer to Section 2 – Limitations).

Section 4
NORMAL PROCEDURES

External Inspection

(23b) Oil (Checking the chip collector)

For first flight of day

1. Remove the top cowling
2. Put the master switch in position "TILL" and check if the chip indicator lamp (located at the bulkhead, starboard side) is activated, if so do not start the engine
3. Put the master switch in position "FRÅN".
4. Put the top cowling back.

NOTES: This item will be added to the existing items under the heading of "External Inspection" in Flight Manual doc. No.SH.3.1

Before Starting Engine

(3) VOR : OFF
(4) Transponder : OFF
(5) Synchronising of gyroscopic direction indicator. : ON

NOTES: These items will be added to the existing items under the heading of "Before Starting Engine" in Flight Manual doc. No.SH.3.1 .

After Starting Engine

(4) Radio : ON, test
(7) VOR : ON
(8) Transponder : STBY

NOTES: The testing procedure of the radio includes a test of the emergency function of the system by switching over to "NÖDLÄGE". Do not forget to switch back to "NORMAL" after the emergency system been confirmed.

These items will be added to the existing items under the heading of "After Starting Engine" in Flight Manual doc. No.SH.3.1 .

Before Take-Off

(20) Transponder : ON/ALT (code)

NOTES: This item will be added to the existing items under the heading of "Before Take-Off " in Flight Manual doc. No.SH.3.1 .

Take-off

Align the aeroplane with the take-off path, release the brakes and open the throttle fully. There is little tendency to swing. Nosewheel steering is effective in keeping the aeroplane straight. Check operation of the ASI. Rotate at 55 kn IAS and lift off at 61 kn IAS and hold the aeroplane down until the take-off safety speed appropriate to the take-off weight (see figure 2) is reached, let the aeroplane climb at this speed through the 50 ft height point.

At a safe height of approximately 200 ft, the wing-flaps may be retracted and the airspeed to the en route climbing speed scheduled on Page 14 in this supplement, the climb continues at this speed and configuration. There is no loss of height and negligible trim change when raising the wing-flaps.

Set fuel booster pump OFF at 1000 ft AGL minimum.

Climb

Airspeed

The en route climbing speed is given on page 14 in this supplement.

Technique

The relationship between fuel flow and altitude for maximum power (i.e. maximum take-off and maximum continuous) with “best power” mixture is marked on the fuel flow gauge. The relationship between fuel pressure and altitude for this condition is given in Figure 4-1 on Page 4-7 in Flight Manual doc. No.SH.3.1 and the relationship between fuel flow and fuel pressure in Figure 3.

Mixture should be adjusted at maximum power so that the fuel flow gauge is appropriate to the altitude marked on the gauge.

NOTES: The altitude marked on the fuel flow gauge face plate is in the unit metre.

Cruise

(2) Mixture: Obtain fuel pressure from Figure 8-3 in Flight Manual doc. No.SH.3.1 appropriate to rotational speed, mixture condition and power condition. Set mixture to give the fuel flow given in Figure 3 appropriate to this fuel pressure.

Flight in Rough Air

Airspeed

The recommended speed for flight in severe turbulence is 85 kn IAS with the wing-flaps retracted.

Stalling

With wing-flaps extended, a light on the instrument panel and a horn provides a visual and audible warning 5 kn above the true stall.

Power-off stalling speeds are given on Page 13 in this document.

Aerobatics

Recommended entry speeds are given on Page 7 in this document.

Spinning

Before intentionally entering a spin, rudder trim should be set to zero and elevator trim NOS NED as appropriate between just aft of rear edge of S band for CG forward and in centre of S band for CG aft.

For a dynamic entry, apply full rudder at 66 kn IAS and continue to pull the control stick centrally back until full up-elevator is reached.

In spins to port the airspeed stabilises below 53 kn IAS and spins to starboard between 60 and 63 kn IAS.

At forward CG, recovery action should be taken on approaching 81 to 89 kn IAS.

Flick roll

With power on at airspeed between 70 and 81 kn IAS, apply full rudder and full up-elevator simultaneously.

Stall Turn

With power on, pull up at 113 kn IAS. Apply full rudder in the desired direction of turn at 73 kn IAS.

Approach

Enter the approach at 97 kn IAS with wing-flaps retracted.

After Landing

(6) Transponder : OFF

NOTES: This item will be added to the existing items under the heading of "After Landing" in Flight Manual doc. No.SH.3.1 .

Engine Shut-Down

(2.1) VOR : OFF

(3) Test magnetos at this speed for dead cut and do one extra check by rotate the switch lever through the "OFF" détente to the extreme limit of its travel in the "OFF" position direction. If the engine continues to run with the switch manually held in the "Past OFF" position, it is an indication that one magneto is still "Hot" or Ungrounded.

NOTES: These items will be added to the existing items under the heading of "Engine Shut-Down" in Flight Manual doc. No.SH.3.1 .

Systems Control

The electrical system fitted is shown in Figure 7

Section 5
PERFORMANCE

General

Pitot-Static Head Position

A diagram showing the position in which the pitot-static head is installed on this aeroplane is given in Figure 6. 1-3 on Page 6. 1-12 of the Flight Manual doc. No.SH.3.1 supplement No1.

Position and compressibility Error Corrections

The Position and compressibility Error Correction (PEC) to be applied to the IAS to obtain EAS is shown in Figure 4 for wing-flaps retracted (I-setting), and Figure 5 and 6 for wing-flaps extended to the 10° position (S-setting) and to the 45° position (L-setting).

The static error to be applied to the altimeter is negligible in all cases.

NOTES: These corrections apply only when the pitot-static system defined in Figure 6. 1-3 of the Flight Manual doc. No.SH.3.1 supplement No.1 is installed.

Stalling Speeds

The power-off stalling speeds are as follows:

Weight [kg]		1066		900		800		EAS Symbol
Wing-Flap		Power-off Stalling Speed [kn]						
Position [º]	Setting	IAS	EAS	IAS	EAS	IAS	EAS	
0	I	62,5	57,5	58,5	54,0	55,0	51,0	
10	S	60,0	55,5	56,0	52,0	53,0	49,0	V_{s1}
45	L	59,0	54,0	55,0	51,0	52,0	48,0	V_{s0}

The effect of angles of bank is to increase the speeds stated above by the following:

Angle of Bank [º]	Increase in Speed [kn]
20	1
40	6
60	19

Take-Off Procedures and Speeds

Airspeed

To take-off safety speed V_2 , with the wing-flaps in the 10° position (S-setting) is given in Figure 2.

Technique

The technique upon which the take-off performance information scheduled in this section is based on the following:

With the wing-flaps in the 10° position (S-setting) and the engine at maximum power, rotate at 55 kn IAS and lift off at 61 kn IAS. The aeroplane is then held down until the scheduled take-off safety speed appropriate to the take-off weight (see figure 2) is reached and then climb further at this speed through the 50 ft height point.

When field length or flight path obstacle clearance is critical, any unnecessary increase in speed above the take-off safety speed should be avoided. Reference should be made to the assumption regarding technique made in the take-off net flight path performance scheduled in this section. This technique gives the optimum obstacle clearance for the most adverse conditions.

En Route

Airspeed

The en route climbing speed with the wing-flaps retracted at all weight is 80 kn IAS at all altitudes up to 5000 ft and 77 kn IAS at all altitudes above 5000 ft. This speed provides the best gradient of climb in this configuration.

With the engine inoperative, the en route gliding speed with the wing-flaps retracted is 77 kn IAS at all weights and altitudes. This speed provides the best gradient of descent in this configuration.

Landing Procedures and Speeds

Airspeed

The approach speed for a normal powered approach with the wing-flaps in the 45º position (L setting) is 72 kn IAS.

Technique

The technique upon which the landing performance information scheduled in this section is based is as follows.

On nearing the runway threshold following a normal powered approach, the wing-flaps are extended to the 45° position (L-setting) and the aeroplane flown so that the scheduled approach speed over the end of the runway at the 50 ft height point is achieved. At the threshold, the throttle is fully closed after which the aeroplane is landed following a smooth transition. The nosewheel is lowered immediately after touchdown and wheel braking commenced as soon as possible once the aeroplane is firmly on the ground.

Section 6
WEIGHT AND BALANCE

If the oil separator is removed as in TOMF 61-61-Ä115 the influence on weight and balance characteristics is shown in the table below.

Weight and Balance change:

Item	Installation instructions	Cg. Stn [In]	Weight [kg]	Moment [kg · cm]
Removing the oil separator	TOMF 61-61-Ä115	31,09	-1,5	-11,8

The A/C is weighed after modification and the weight and C.G. is defined. The result is shown in "Airplane Mass & Balance Data Sheet".

Section 7
DESIGN FEATURES

Control lock

To lock the control column when parking the a/c outdoors use the left hand forward seat safety harness. Extend the hardness, connect and lock the left and right waste part of the harness around the left flight column. Tighten the harness gently around the flight column. Release the control locking by disconnecting the harness lock.

On ground the rudder is prevented from moving by the nosewheel steering mechanism.

Section 8
FIGURES

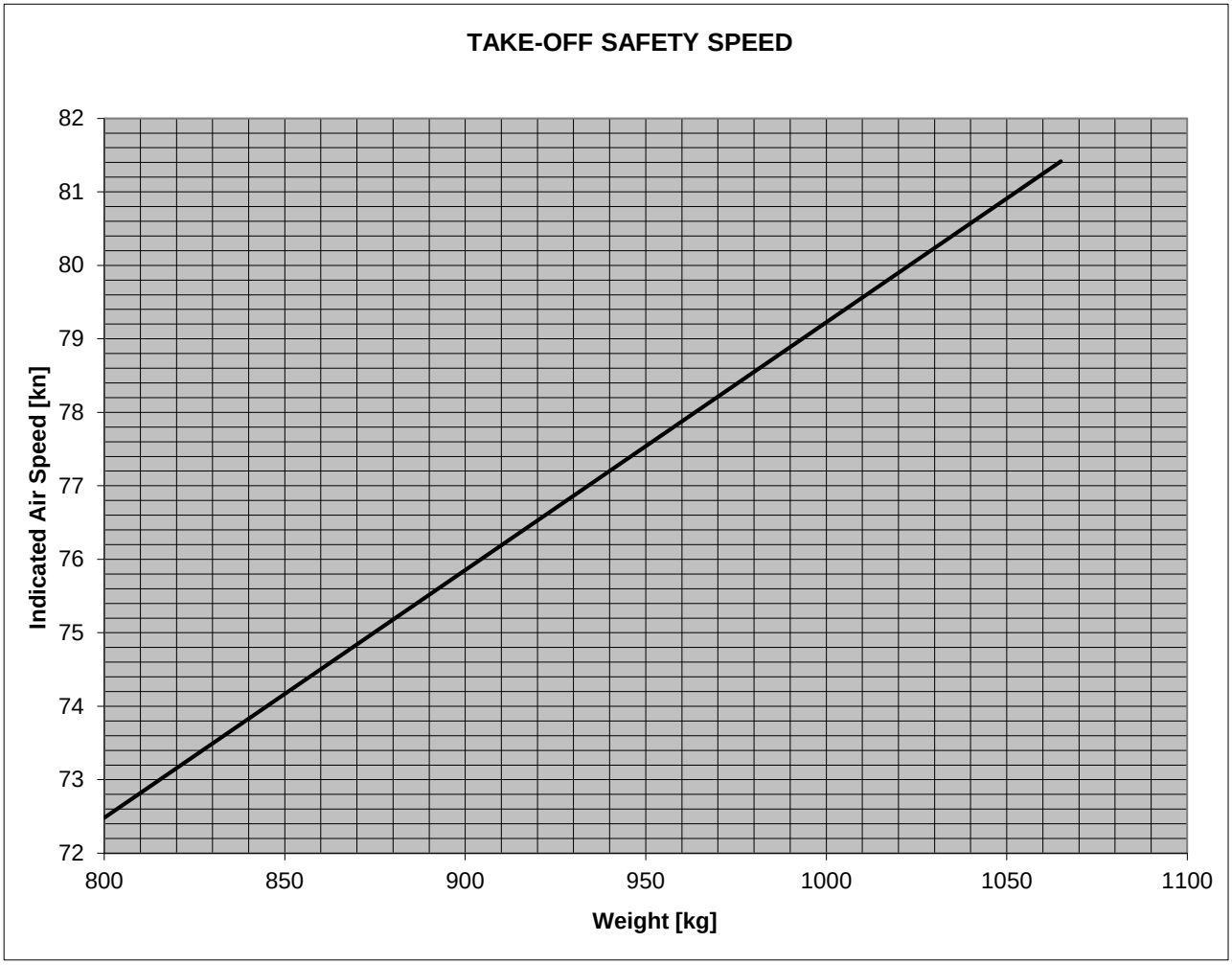

Figure 2: Take-Off safety speed

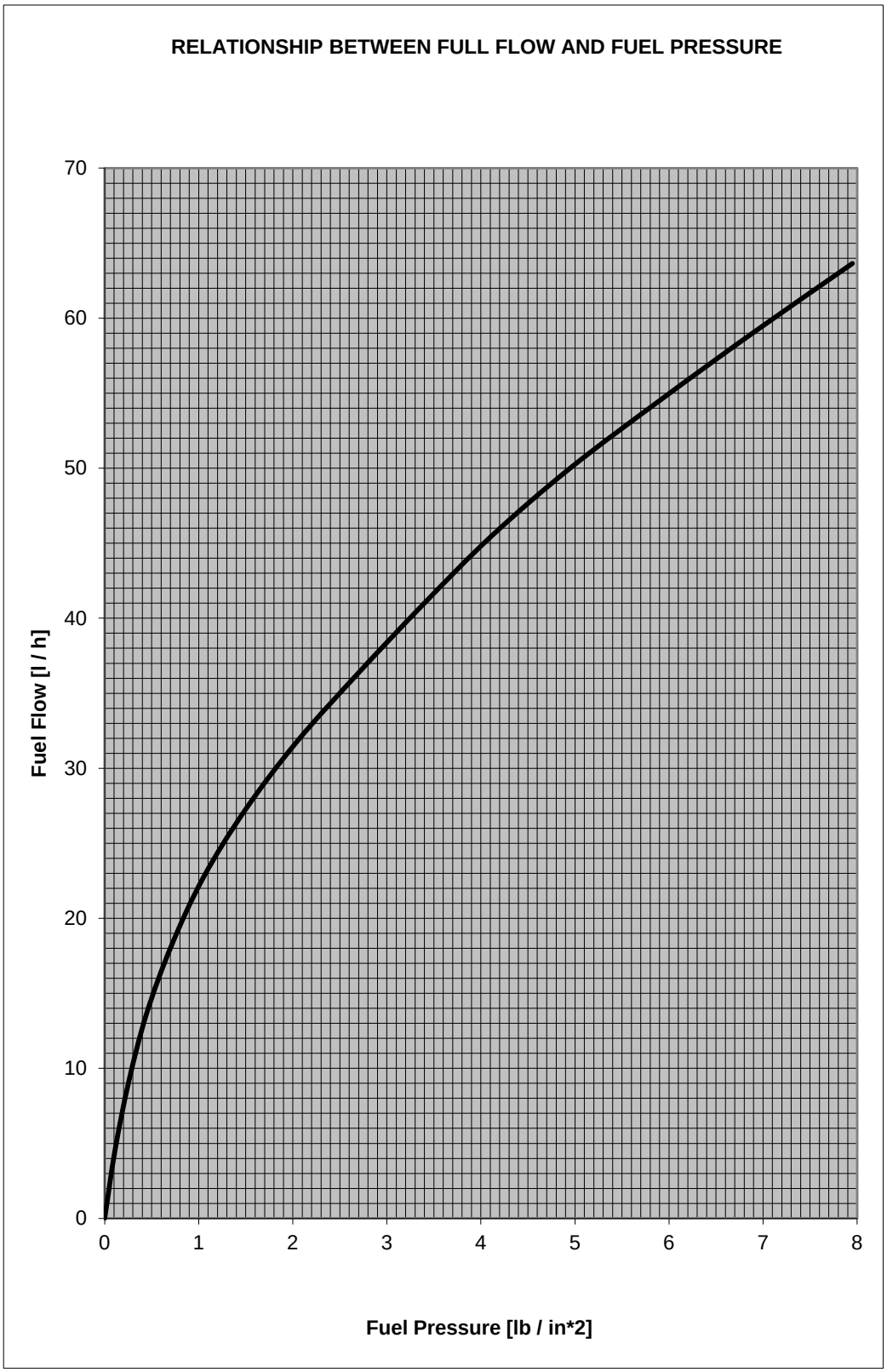

Figure 3: Fuel Flow vs Fuel Pressure

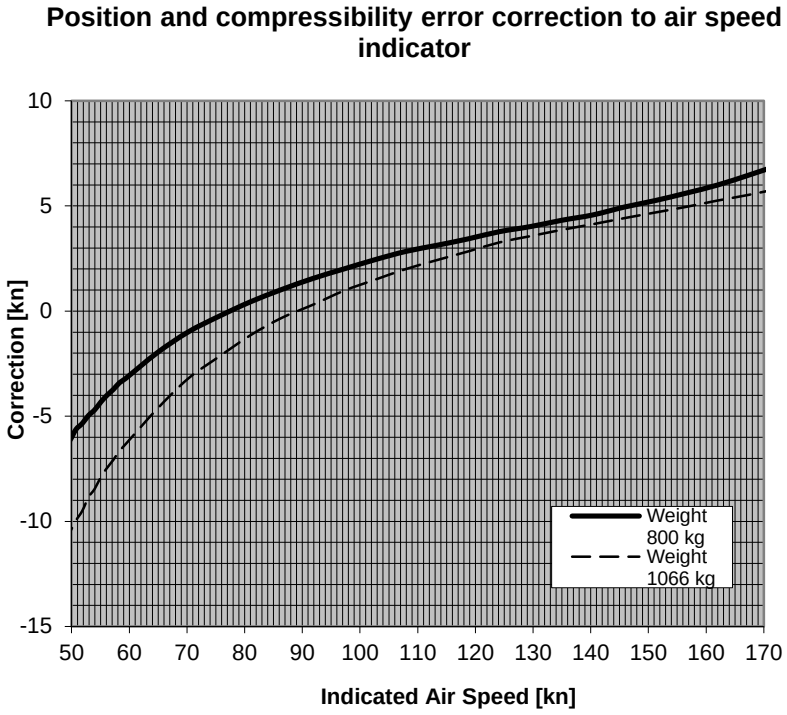

Figure 4: PEC at Wing Flaps Position 0°

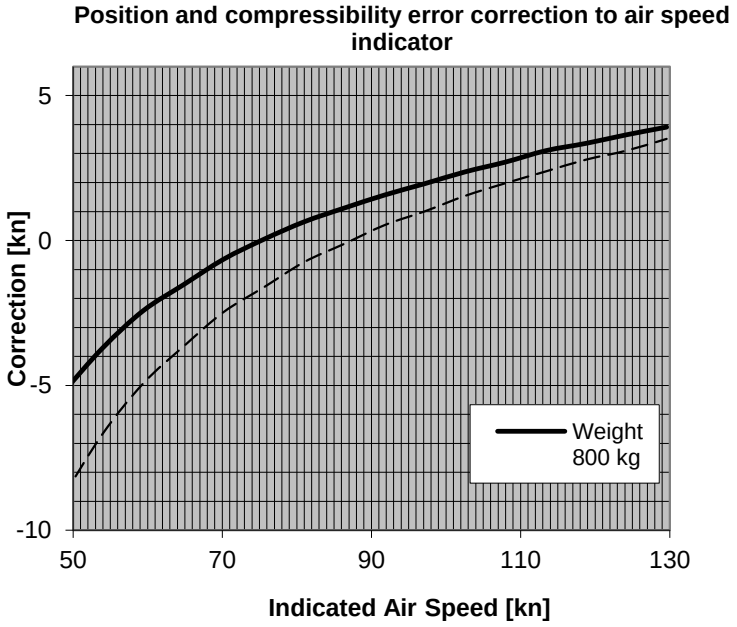

Figure 5: PEC at Wing Flaps Position 10°

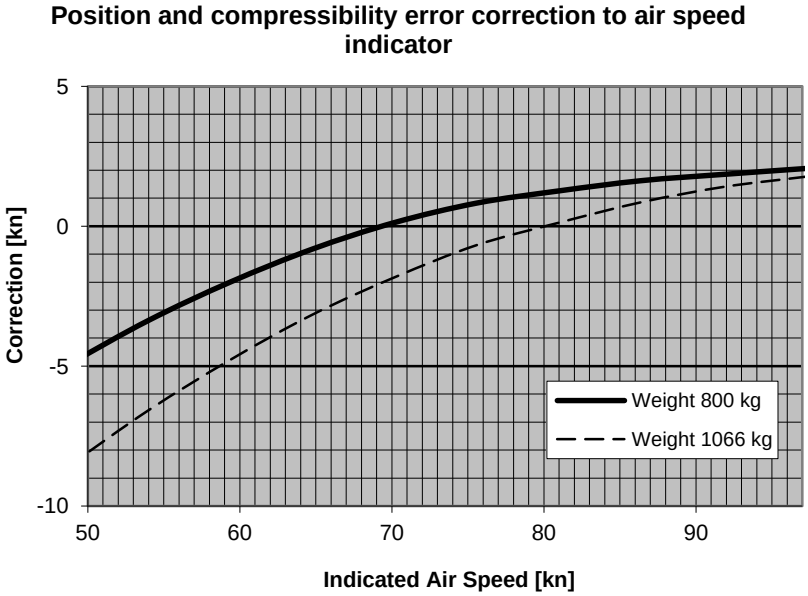

Figure 6: PEC at Wing Flaps Position 45°

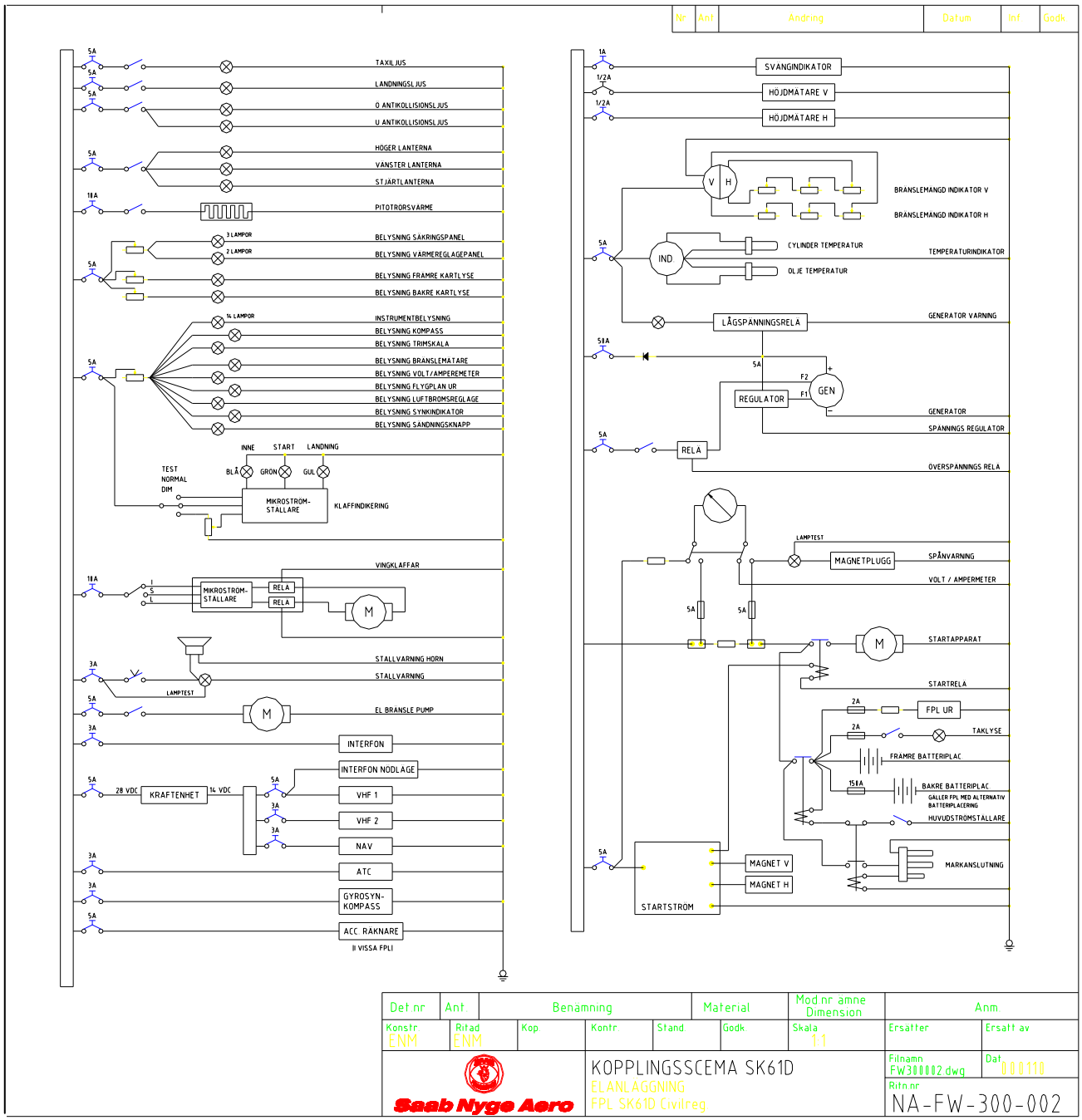

Figure 7: Electrical System