



National
Defence

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C-12-114-000/MW-000

CT114 TUTOR

WEIGHT AND BALANCE DATA

(ENGLISH)

Issued on Authority of the Chief of the Defence Staff
Publiée avec l'autorisation du Chef d'état-major de la Défense

OPI: DAEPM(FT) 5-2

2002-09-01
Ch 2 2005-08-01

Canada

LIST OF EFFECTIVE PAGES

Insert latest changed pages; dispose of superseded pages in accordance with applicable orders.

NOTE

The portion of the text affected by the latest change is indicated by a black vertical line in the margin of the page. Changes to illustrations are indicated by miniature pointing hands or black vertical lines.

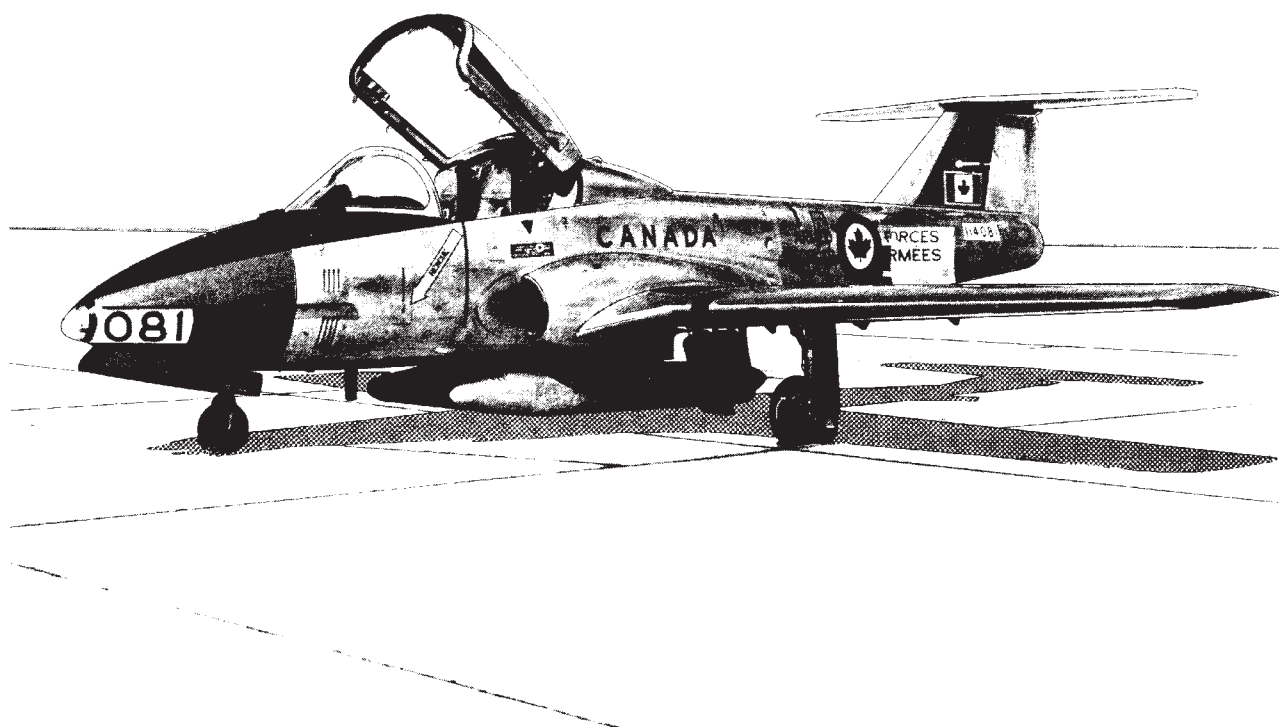
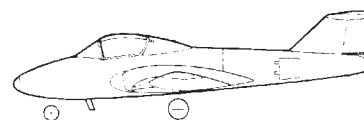
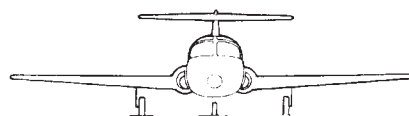
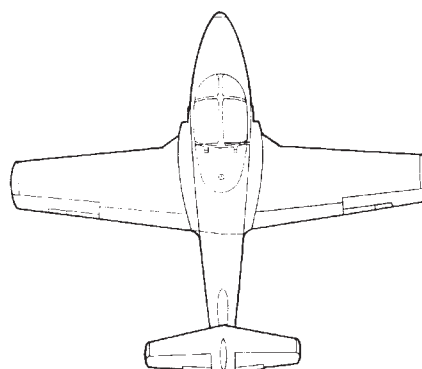
Dates of issue for original and changed pages are:

Original	.....	0	.....	2002-09-01	Ch	.....	2	.....	2005-08-01
Ch	.....	1	.....	2004-02-01					

Zero in Change No. column indicates an original page. Total number of pages in this order is 60 consisting of the following:

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A 2	4-7 to 4-11 0
i to ii 0	4-12 2
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1-1/1-2 0	6-1 to 6-5/6-6 0
2-1/2-2 0	7-1 to 7-12 0
3-1/3-2 0	8-1 to 8-2 0
4-1 to 4-5 0		

CT114 TUTOR



FOREWORD

For complementary information, refer to C-12-114-000/MB-001, Aircraft Operating Instructions, and C-12-114-000/MF-000 and C-12-114-000/MF-001, Description and Maintenance Instructions – Introduction and General Information. It is mandatory that the orders contained in C-12-005-008/AM-000 be carried out prior to weighing the aircraft.

It is mandatory that the instructions contained in C-05-010-009/AM-000, Preservation Inspection and Re-activation of Aircraft and Installed Airborne Equipment, be carried out prior to weighing re-activated aircraft.

Where a conflict exists between this CFTO and C-12-005-008/AM-000, the C-12-005-008/AM-000 shall take precedence.

NOTES TO USERS

GENERAL

1. This Canadian Forces Technical Order (CFTO) is divided into the following eight parts:

- a. PART 1 – INTRODUCTION to the weight and balance of the CT114 aircraft.
- b. PART 2 – WEIGHT AND BALANCE REQUIREMENTS describes when the aircraft shall be weighed.
- c. PART 3 – AIRCRAFT PREPARATION describes the initial preparation activities to be undertaken by the technician prior to performing weight and balance.
- d. PART 4 – AIRCRAFT BASIC WEIGHT provides definitions of aircraft basic weight, two aircraft basic weight checklists, and also describes how the basic weight checklist shall be used.
- e. PART 5 – WEIGHING INSTRUCTIONS provides the procedures to establish the aircraft weight and balance, together with the test equipment required.
- f. PART 6 – AIRCRAFT WEIGHING RECORDS illustrates the forms required and provides an explanation of their completion process.
- g. PART 7 – WEIGHT AND BALANCE DATA provides loading data and tables to establish the weight and moments of items that may be loaded on the aircraft, and filling instructions for the loading schedule.
- h. PART 8 – CENTRE OF GRAVITY supports the calculation of aircraft centre of gravity in terms of Percentage Mean Aerodynamic Chord (%MAC) versus weight and moment /1000, and provides the centre of gravity limits.

REFERENCES

2. The following CFTOs are referenced herein:
 - a. C-12-005-008/AM-000 – Aircraft Weight and Balance
 - b. C-12-114-000/MB-001 – Aircraft Operating Instructions
 - c. C-12-114-000/MF-000 and C-12-114-000/MF-001 – Description and Maintenance Instructions – Introduction and General Information
 - d. C-67-Z69-000/MS-001 – Mobile Electronic Weighing System II

FORM NUMBERS

3. New form numbers have been instated to replace form numbers CF 366 and CF 367 as follows:

NOTE

Forms DND 3133 – Aircraft Weighing Record and DND 3134 – Aircraft Basic Weight Record Change shall be inserted immediately after the Basic Weight Checklist, in the aircraft log set.

- a. Form CF 366 – Aircraft Weighing Record is now referred to as form DND 3133.
- b. Form CF 367 – Aircraft Basic Weight Record Change is now referred to as form DND 3144.

TERMINOLOGY

4. For definitions or terminology used throughout this CFTO, refer to C-12-005-008/AM-000.

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PART 1

INTRODUCTION

PURPOSE

1. This Canadian Forces Technical Order (CFTO) is intended to provide the necessary information for

the technician to establish and control the weight and balance of the CT114 aircraft. This CFTO is to be used in conjunction with C-12-005-008/AM-000.

PART 2**WEIGHT AND BALANCE REQUIREMENTS****PURPOSE**

1. This part provides specific requirements for weight and balance control of the CT114 aircraft in accordance with C-12-005-008/AM-000. Information contained herein is of a specific or exempting nature and does not relieve any general requirements found in C-12-005-008/AM-000, except where specifically noted or exempted herein.

WEIGHING REQUIREMENTS

2. Aircraft shall be weighed in accordance with C-12-005-008/AM-000:

- a. After major rework.
- b. After a modification when the instruction so directs.
- c. Whenever the validity of a weighing is in doubt.
- d. At the discretion of the Aircraft Maintenance Engineering Officer (AMEO).
- e. At every number 4 periodic inspection, as described in C-12-114-000/NF-000.

PART 3

AIRCRAFT PREPARATION

PREPARATION FOR WEIGHING

1. Refer to C-12-005-008/AM-000 and proceed as follows:

- a. Assemble the necessary equipment (scales, jacks, levelling equipment, measuring tape, etc.).
- b. Clean the aircraft in accordance with [C-12-114-000/MF-000](#).
- c. Drain fuel from all tanks using tank drains with the aircraft in its normal ground attitude. Fuel remaining is trapped fuel and no further calculations are necessary. Safety precautions for the defuelling of the aircraft shall be adhered to.
- d. If impracticable to drain fuel, refuel the tanks to capacity. Immediately prior to weighing, record the fuel specific gravity using a hydrometer. This will prevent subsequent errors caused by temperature changes. Using the total internal fuel quantity of 260.5 imp. gal. (ie 258 imp. gal. of usable fuel plus 2.5 imp. gal. of residual fuel) calculate the actual weight as follows:

$$\left[\begin{array}{c} \text{calculated} \\ \text{fuel weight} \end{array} \right] = \left[\begin{array}{c} \text{total fuel} \\ \text{(imp. gal.)} \end{array} \right] \times 10 \times \left[\begin{array}{c} \text{measured} \\ \text{specific} \\ \text{gravity} \end{array} \right]$$

• • • • •
• CAUTION •
• • • • •

Use hydrometer measurement only, regardless of fuel temperature. Large errors in weight can result from using the incorrect specific gravity.

- e. Determine the moment arm for the tank and calculate the new moment contribution:

$$\left[\begin{array}{c} \text{moment due} \\ \text{to fuel in} \\ \text{particular tank} \end{array} \right] = \left[\begin{array}{c} \text{calculated fuel} \\ \text{weight} \end{array} \right] \times \left[\begin{array}{c} \text{moment} \\ \text{arm} \end{array} \right]$$

• • • • •
• CAUTION •
• • • • •

The moment contribution may differ from the data listed in the CFTO because it is possible for the fuel density to be different from that indicated. Enter the calculated fuel weight, arm and moment in column 1 of Form DND 3133.

- f. Fill hydraulic and oxygen system reservoirs to FULL.
- g. Replenish oil systems as required.
- h. Service landing gear shock struts as required.
- j. Weigh the aircraft in accordance with the weighing instructions in [Part 5](#). Aircraft weighing platforms shall be calibrated according to the instructions contained within the weighing equipment publications (refer to C-67-Z69-000/MS-001). All weights must be measured in pounds and the totals shall be approximated to the nearest pound.

NOTE

These preparation instructions apply to the CT114 aircraft weighing using Load Cells and Jacks or In-floor Platform systems.

AIRCRAFT WEIGHING CONFIGURATION

2. The aircraft shall be weighed in the following configuration:
 - a. Canopy and access panel closed.
 - b. Speedbrake retracted.
 - c. Flaps retracted.

PART 4

AIRCRAFT BASIC WEIGHT

PURPOSE

1. This part provides the definitions of CT114 aircraft basic weight and maximum weight, a description of how the basic weight checklists are to be used, and the basic weight checklists for the aircraft. (For detailed procedures refer to C-12-005-008/AM-000).

BASIC WEIGHT

2. Basic weight is defined as the weight of an aircraft and its normal airborne equipment including its permanent fixed ballast. It includes the following fluid systems filled to capacity: hydraulic and oil systems, but does not include residual and usable fuel. Trapped fuel is included in the aircraft basic weight. The basic weight of the CT114 aircraft is approximately 5300 lb.

MAXIMUM WEIGHTS

3. The maximum weights for the CT114 Tutor are as follows:

- a. External fuel tanks installed:
 - (1) Gross take-off weight – 8500 lb.
 - (2) Maximum landing gross weight – 8300 lb.
- b. Clean configuration:
 - (1) Gross take-off weight – 7292 lb.
 - (2) Maximum gross landing weight – 7000 lb.

4. For permissible flight load factors, refer to [C-12-114-000/MB-001](#).

BASIC WEIGHT CHECKLIST

5. The basic weight checklist (see [Figures 4-1 and 4-2](#)) consists of a check-off list for all fixed operating equipment items (e.g. cameras, radios).

6. All basic weight checklist items have their weight given in pounds, their location in inches from the reference datum (arm), and the moments in $\text{lb}/1000$.

7. Items are listed according to compartment location. Compartments are listed alphabetically. Items within a compartment are numbered consecutively.

8. As a result of distinctive characteristics, the basic weight checklist is divided into two parts:

- a. A complete basic weight checklist for the trainer and Snowbird version (see [Figure 4-1](#)).
- b. A complete basic weight checklist for the trainer and Snowbird version following DLIR and Rewire (see [Figure 4-2](#)).

NOTE

Standard symbols used when completing the Basic Weight Checklist are:

A check mark (✓) for items IN AIRCRAFT.

A zero (0) for items NOT IN AIRCRAFT.

9. Whenever revised checklist pages are issued, units shall ensure that all data under the DELIVERY EQUIP column is transcribed from the old to the new page(s). This will ensure that a record of the aircraft state at time of delivery is preserved.

10. User units should consider the checklists to be an inventory, and check (✓) all items installed in the IN AIRCRAFT column. Any items not installed are to be designated with a zero (0). Each time the inventory is checked, the date must be entered in the RECORD OF CHECKING column.

11. The USAGE column provides information to help identify whether a listed item is used on a trainer or Snowbird configured aircraft. The USAGE column will be annotated with the applicable model letter; (T) for trainer and (S) for Snowbird.

12. At the time of verification, all items which are aboard the aircraft will be checked with a (✓) in the IN AIRCRAFT column and the items **not** aboard the aircraft will be identified with a (0) in the IN AIRCRAFT column. All items which are part of the basic aircraft but are **not** on the aircraft at the time of weighing will be identified in column 2 of form DND 3133, and an (X) will be put in the DND 3133 ENTRY column. Those items which are **not** part of the basic aircraft but **are** installed on the aircraft at the time of weighing will be identified in column 1 of form DND 3133 column.

13. When an aircraft is weighed, only that equipment which is part of the basic aircraft should be considered essential. Optional checklist items which are not aboard the aircraft should **not** be listed in

column 2 of form DND 3133. Until the next weighing, all changes to the "as weighed" configuration must be recorded on form DND 3134.

Figure 4-1 (Sheet 1 of 6) Basic Weight Checklist (Pre DLIR and Rewire)

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)										
AIRCRAFT TYPE AND MARK			REGISTRATION NO.			CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, <input type="checkbox"/> 0 NOT IN AIRCRAFT											
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP:	1	2	3	4	5	6	7	8			
							IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	
A	Nose Equipment (FS 85 to 149)																
A-1	Taxi Lamp MS24517-4570	T, S	2.0	89.0	0.18												
A-2	Receiver-transmitter RT-5011/ARC 552	T	54.0	119.0	6.43												
A-3*	RT-5077 or RT-5078 AN/ARC 164	T, S	8.1	121.0	0.98												
A-4	MT4838/ARC 1164 Mounting Base	T, S	1.2	121.0	0.15												
A-5	Directional Gyro 41A-00010-20	T, S	7.0	123.0	0.86												
A-6	Accelerometer 41A-00010-38 (2)	T, S	3.0	123.0	0.37												
A-7	Receiver-transmitter RT-5036/ARN 504	T	40.0	132.0	5.28												
	or																
A-7-1*	Receiver-transmitter RT-5036/ARN 504	T, S	40.0	130.0	5.20												
A-8	RT862()/APX and Mount	T, S	15.5	129.0	2.00												
A-9	TS-1843/APX and Mount	T, S	3.5	133.0	0.47												
A-10	Batteries-22Amp NI-CAD (2)	T, S	110.0	140.0	15.40												
A-11	Quick-disconnect - Battery (2)	T, S	2.0	140.0	0.28												
A-12	Amplifier - Type A2/C	T, S	7.0	143.0	1.00												
A-13	Inverter Rotary (2)	T	23.0	143.0	3.29												
						Usage Column Legend S Snowbird T Trainer											
*	IAW C-12-114-000/CF-459 and CF-461																

Figure 4-1 (Sheet 2 of 6) Basic Weight Checklist (Pre DLIR and Rewire)

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)														
AIRCRAFT TYPE AND MARK			REGISTRATION NO.			CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, <input type="checkbox"/> NOT IN AIRCRAFT															
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP:	1	2	3	4	5	6	7	8							
							IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY
A-14	Repeat Amplifier - INST 8-7	T, S	3.0	143.0	0.43																
A-15-1*	Inverter ASH 564 (2)	T, S	52.9	142.6	7.54																
	or																				
A-15-2*	Inverter 1B1000 (2)	T, S	48.9	142.6	6.97																
	or																				
A-15-3*	Inverters ASH 564 and 1B1000	T, S	50.9	142.6	7.26																
A-16	RT5048/ARC 511	T, S	11.0	116.0	1.28																
A-17	ADF Shockmount DF206A	S	0.8	124.7	0.10																
A-18	RX-VOR/ILS	T	7.0	135.0	0.95																
A-18-1**	RX-VOR/ILS	T, S	7.0	121.0	0.85																
A-19	VOR/TAC Change-over Relay	T, S	2.0	143.0	0.29																
A-20	RX-DFR 206A ADF	S	4.5	124.0	0.56																
A-21***	Ballast - ARC 511 41A-30030-2	T, S	15.7	116.0	1.82																
A-22***	Ballast - 41A-35023-12 & -13	T, S	21.6	97.3	2.10																
A-23	RT5014/ARC504	T	9.0	143.0	1.29																
*	-1, -2 and -3 are possible inverter																				
	combinations																				
**	IAW C-12-114-000/CF-463																				
***	IAW C-12-114-000/CF-459 and CF-461																				

Usage Column Legend S Snowbird
 T Trainer

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C-12-114-000/MW-000

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)										
AIRCRAFT TYPE AND MARK		REGISTRATION NO.				CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, 0 NOT IN AIRCRAFT											
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP:	1	2	3	4	5	6	7	8			
							IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY
B-15	IFF Control C6280/APX	T, S	3.0	196.0	0.59												
B-16	C5287/ARN504 TACAN Control	T, S	2.0	172.0	0.34												
B-17	Survival Kit (1)	T, S	40.0	190.0	7.6												
B-17-1	Survival Kit (1)	T, S	40.0	190.0	7.6												
B-18*	UHF Antenna	S	1.5	190.0	0.29												
B-19*	UHF Antenna Cable Ext.	S	0.5	177.0	0.09												
B-20	UHF Control C5067/ARC552	T	4.0	190.0	0.76												
	NOTE The above antenna was located at FS 164, but was not listed on this form. In addition, 2 ft. of coaxial cable was added. The weight and arm of this cable is averaged in B-19.																
B-21	VHF Antenna	T	2.0	143.5	0.487												
B-22	ARAD, LH Seat Installation	S	17.7	192.0	3.4												
B-23	ARAD, RH Seat Installation	S	17.7	192.0	3.4												
						Usage Column Legend S Snowbird T Trainer											
*	Applicable to Snowbird aircraft with																
	DF-206A installed																

Figure 4-1 (Sheet 4 of 6) Basic Weight Checklist (Pre DLIR and Rewire)

Figure 4-1 (Sheet 5 of 6) Basic Weight Checklist (Pre DLIR and Rewire)

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)										
AIRCRAFT TYPE AND MARK			REGISTRATION NO.			CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, 0 NOT IN AIRCRAFT											
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP:	1	2	3	4	5	6	7	8			
							IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY	IN AIRCRAFT DND 3133 ENTRY			
C	Centre Fuselage (FS 217.5 to 308)																
C-1	Oxygen Bottle 860870 (2)	T, S	20.0	225.0	4.50												
C-2	Oxygen Charge 2 x 623 litres	T, S	4.0	225.0	0.90												
C-3	Anti-collision Light G8400A (2)	T, S	4.0	243.0	0.97												
C-4	Engine J85-CAN-40 less Build-up Kit	T, S	409.0	305.0	124.75												
C-5	Quick Engine Change Kit	T, S	114.0	305.0	34.77												
C-5-1	Shut-off Valve	T, S	3.0	301.0	0.90												
C-5-2	Starter Generator	T, S	60.0	304.0	18.24												
C-5-3	Fire Wall	T, S	4.0	312.0	1.25												
C-5-4	Hyd. Pump	T, S	11.0	289.0	3.18												
C-5-5	Overboard Ducts	T, S	5.0	294.0	1.47												
C-5-6	Front Frame Adapter	T, S	12.0	283.0	3.40												
C-5-7	Engine Mounts	T, S	10.0	302.0	3.02												
C-5-8	Oil Press and Tach/Gen Trans.	T, S	3.0	301.0	0.90												
C-5-9	Attaching Hardware	T, S	1.0	300.0	0.30												
C-5-10	Engine Sundries	T, S	5.0	296.0	1.48												
						Usage Column Legend S Snowbird T Trainer											

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[illegible]

Figure 4-2 (Sheet 1 of 5) Basic Weight Checklist (Post DLIR and Rewire)

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)															
AIRCRAFT TYPE AND MARK			REGISTRATION NO.			CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, <input type="checkbox"/> NOT IN AIRCRAFT																
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP.	1		2		3		4		5		6		7		8	
							IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY
A	Nose Equipment (FS 85 to 149)																					
A-1	Taxi Lamp MS24517-4570	T, S	2.0	89.0	0.18																	
A-2	RT-5077 or RT5078 AN/ARC164	T, S	8.1	121.0	0.98																	
A-3	MT4838/ARC 164 (V) Mounting Base	T, S	1.2	121.0	0.15																	
A-4	Directional Gyro 41A-00010-20	T, S	7.0	123.0	0.86																	
A-5*	Accelerometer 41A-00010-38 (2)	S	3.0	123.0	0.37																	
A-6*	ADF Receiver DFR-206A	S	4.5	124.0	0.56																	
A-6-1*	ADF Receiver Mount DFM-206A	S	0.8	124.0	0.10																	
A-7	Receiver-transmitter RT-5036/ARN 504V	T, S	40.0	130.0	5.20																	
A-8	RT-862()/APX and Mount	T, S	15.5	129.0	2.00																	
A-9	TS-1843/APX and Mount	T, S	3.5	135.0	0.47																	
A-10	Batteries 30242-002 (2)	T, S	116.0	140.0	16.24																	
A-11	Quick-disconnect - Battery (2)	T, S	2.0	140.0	0.28																	
A-12	Amplifier - Type A2/C	T, S	7.0	143.0	1.00																	
A-13	Repeat Amplifier INST 8-7	T, S	3.0	143.0	0.43																	
*	Applicable to Selected Snowbird						Usage Column Legend S Snowbird T Trainer															
	Aircraft only																					

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)										
AIRCRAFT TYPE AND MARK		REGISTRATION NO.				CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, <input type="checkbox"/> NOT IN AIRCRAFT											
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP.	1	2	3	4	5	6	7	8			
							IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY
B-3	Rate Switch Gyro 41A-00010-13	T, S	2.0	157.0	0.31												
B-4	Instrument Panel Complete 41A-52003	T, S	59.0	170.0	10.03												
B-5	Rear View Mirror 41A-42208 (4)	T, S	4.0	175.0	0.70												
B-6	LH Seat - Ejectable 41A-40552	T, S	77.0	192.0	14.78												
B-7	RH Seat - Ejectable 41A-40553	T, S	77.0	192.0	14.78												
B-8	VOR/ILS Control	T, S	1.3	170.0	0.22												
B-9	Dual Cockpit Configuration	S	10.0	185.0	1.85												
B-10*	ADF Control DFC-206A	S	1.6	175.7	0.28												
B-11*	ADF Antenna DFA-206A	S	3.4	166.1	0.56												
B-12	UHF Antenna	T, S	1.5	164.0	0.25												
B-13*	UHF Antenna	S	1.5	190.0	0.29												
B-14*	UHF Antenna Cable Ext.	S	0.5	177.0	0.09												
	NOTE This UHF antenna is re-located at FS 190 with ADF installed. In addition, 2 ft. of coaxial cable extension is added. The weight and arm of this cable is averaged in B-14.																
*	Snowbird Aircraft with ADF (DF-206A)						Usage Column Legend S Snowbird T Trainer										
	installed																

Figure 4-2 (Sheet 3 of 5) Basic Weight Checklist (Post DLIR and Rewire)

BASIC WEIGHT CHECKLIST						DELIVERY DATE	RECORD OF CHECKING (ENTER DATE)								
AIRCRAFT TYPE AND MARK			REGISTRATION NO.			CHECK: <input checked="" type="checkbox"/> IN AIRCRAFT, <input type="checkbox"/> NOT IN AIRCRAFT									
COMPARTMENT AND ITEM NUMBER	ITEMS AND LOCATION (GROUPED BY COMPARTMENT)	USAGE	WEIGHT (lb)	ARM (in.)	MOMENT 1000 (in•lb)	DELIVERY EQUIP.	1	2	3	4	5	6	7	8	
							IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT	DND 3133 ENTRY	IN AIRCRAFT
B-15	Survival Kit (1)	T, S	40.0	190.0	7.6										
B-16	Survival Kit (1)	T, S	40.0	190.0	7.6										
B-17	VHF Antenna	T, S	2.0	143.5	0.487										
B-18	ARAD, LH Seat Installation	S	17.7	192.0	3.4										
B-19	ARAD, RH Seat Installation	S	17.7	192.0	3.4										
C	Centre Fuselage (FS 217.5 to 308)														
C-1	Oxygen Bottle 860870 (2)	T, S	20.0	225.0	4.50										
C-2	Oxygen Charge 2 × 623 litres	T, S	4.0	225.0	0.90										
C-3	Anti-collision Light G8400A (2)	T, S	4.0	243.0	0.97										
C-4	Engine J85-CAN-40 less Build-up Kit	T, S	409.0	305.0	124.75										
C-5	Quick Engine Change Kit	T, S	114.0	305.0	34.77										
C-5-1	Shut-off Valve	T, S	3.0	301.0	0.90										
C-5-2	Starter Generator	T, S	60.0	304.0	18.24										
C-5-3	Fire Wall	T, S	4.0	312.0	1.25										
C-5-4	Hyd. Pump	T, S	11.0	289.0	3.18										
						Usage Column Legend S Snowbird T Trainer									

Figure 4-2 (Sheet 4 of 5) Basic Weight Checklist (Post DLIR and Rewire)

PART 5

WEIGHING INSTRUCTIONS

PURPOSE

1. This part provides the procedures for measuring the weighing dimensions and establishing the weight and balance of the CT114 aircraft. Included are the general conditions and a list of recommended test equipment required to perform the procedures. For complementary information, refer to C-67-Z69-000/MS-001, Mobile Electronic Weighing System II (MEWS II).

GENERAL CONDITIONS

AIRCRAFT PREPARATION

2. Ensure aircraft has been prepared for weighing in accordance with [Part 3](#).

CONFIGURATION

3. Ensure aircraft has been configured for weighing in accordance with [Part 3](#).

INVENTORY

4. Check the aircraft inventory against the Basic Weight Check List in accordance with C-12-005-008/AM-000. List any discrepancies in Columns 1 or 2 of form DND 3133.

WEIGHING ENVIRONMENT

5. To minimize the effects of temperature fluctuations and wind on the weighing equipment and aircraft, it is recommended that the aircraft be weighed in a hangar with the hangar doors kept closed during the weighing routine. During clement weather, when windspeed is less than 8 mph, this recommendation may be ignored. Heating fans directed on the aircraft shall be turned off.

TEST EQUIPMENT REQUIRED

6. The following items of test equipment are necessary for measuring the weighing dimensions and for weighing of the aircraft:

- a. Mobile Electronic Weighing System, MEWS II, Part No. 464113 (kit) (see [Figures 5-1](#) and [5-2](#)).
- b. One Measuring tape (20 ft minimum).

WEIGHING PROCEDURE

LOCATION CONSIDERATIONS

7. Maximum inclination of surface shall be less than 4 degrees.

8. Surface shall be capable of supporting a maximum pressure of 136 PSI.

9. Area shall be free of debris and clutter.

DEPLOYMENT OF AIRCRAFT AND MEWS II EQUIPMENT

10. Position aircraft just forward of intended measuring platform area. Ensure wheels of aircraft and mule (tractor) are straight.

11. Position MEWS II equipment forward of aircraft nose, on LH side.

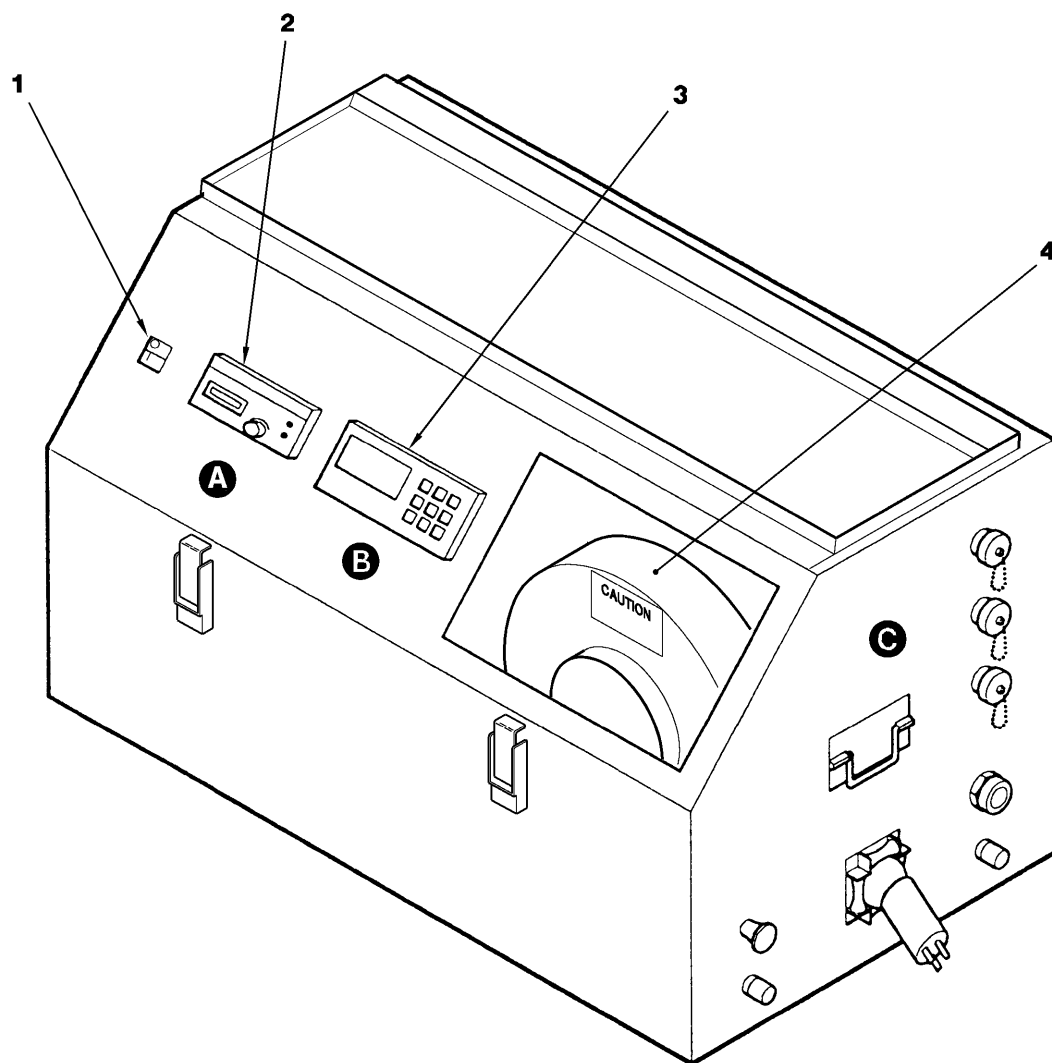
12. Locate and mark with chalk the centreline of the main landing gear each side of the gear such that the marks are across from each other.

13. Measure 16 in. aft from each axle reference mark and make another chalk mark. This second mark must be directly aft and parallel to the marks located on the centreline of each main landing gear axle. This second mark denotes the starting point for the lower ramp section.

14. Position lower ramp sections in line with each main landing gear wheel at the 16-inch chalk marks. Keep ramps square and parallel. Attach upper ramp sections to lower ramp sections, maintaining square and parallel installation.

15. Position a MEWS II platform at the end of each upper ramp section. Insert platform T-hooks into upper ramp sections one at a time. Maintain a 1/8 in. clearance between each platform and upper ramp section to eliminate interference (see [Figure 5-3](#)).

16. Ensure platform displays are facing outwards and are clearly visible to the operator.



ITEM

- 1 I/O (ON/OFF) POWER SWITCH
- 2 PRINTER
- 3 NETWORK CONTROLLER
- 4 RETRACTABLE POWER CABLE

BMW05001

Figure 5-1 (Sheet 1 of 2) MEWS II Equipment – Run-Weigh Console

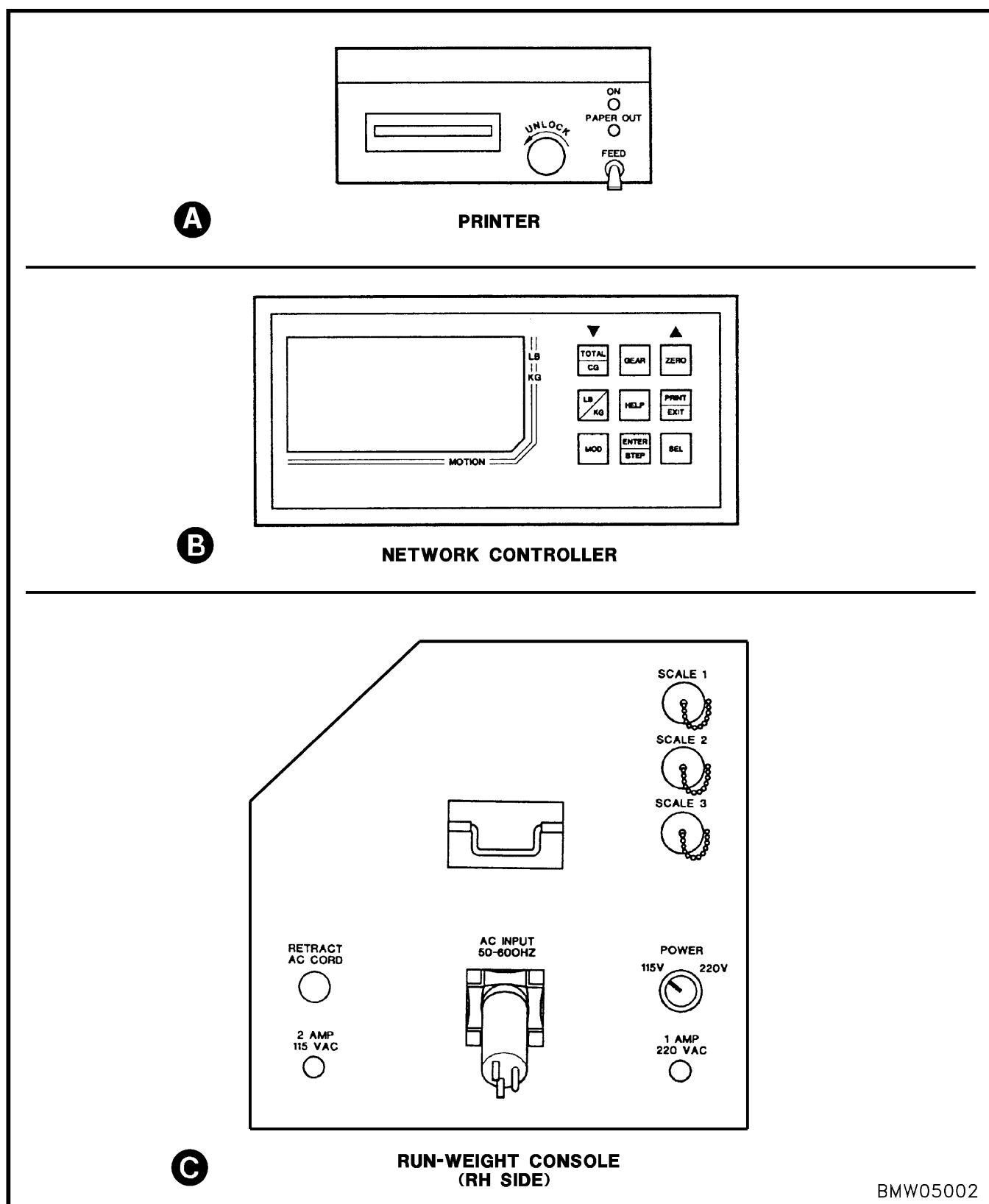


Figure 5-1 (Sheet 2 of 2) MEWS II Equipment – Run-Weigh Console

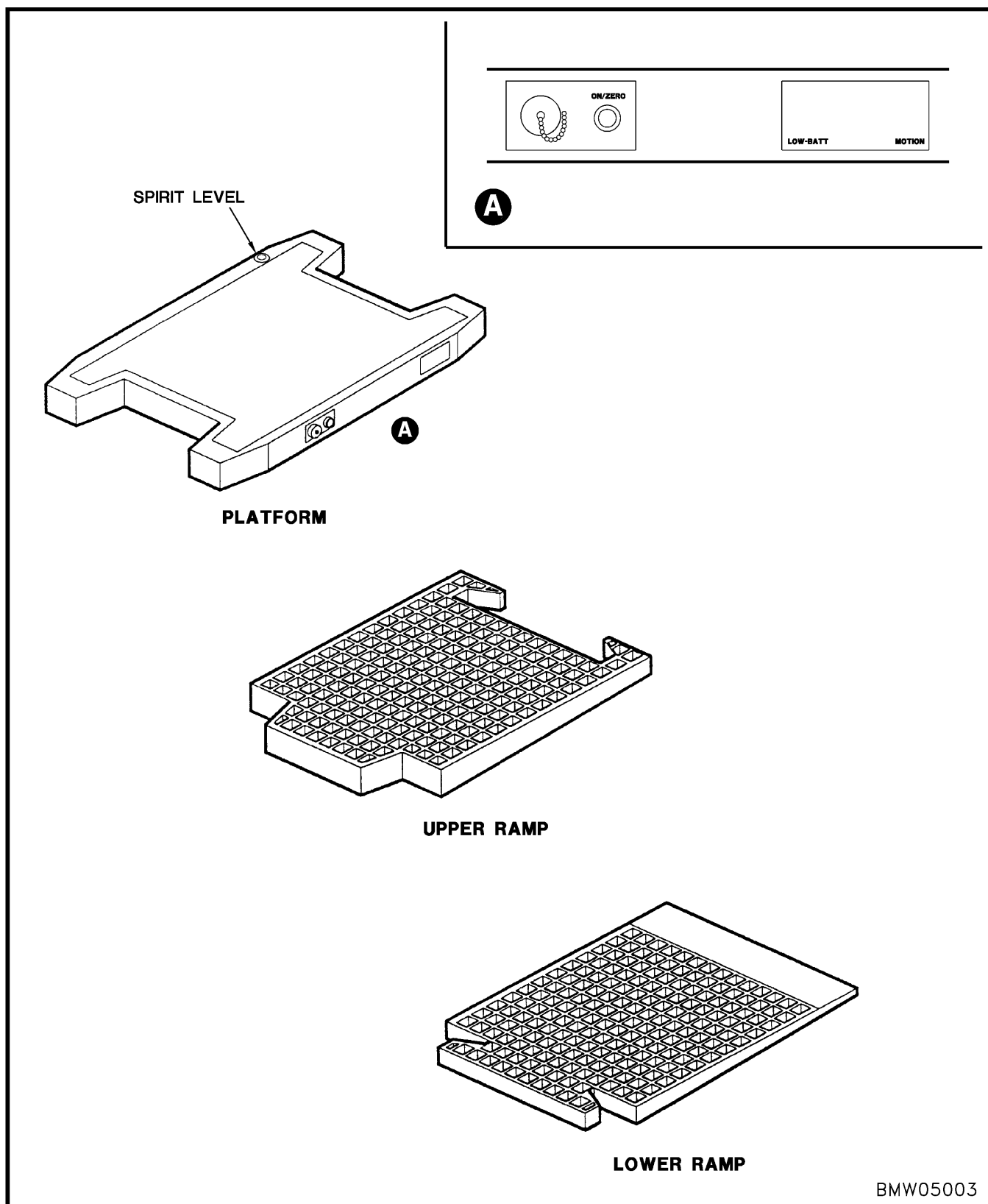


Figure 5-2 MEWS II Equipment – Platform and Ramps

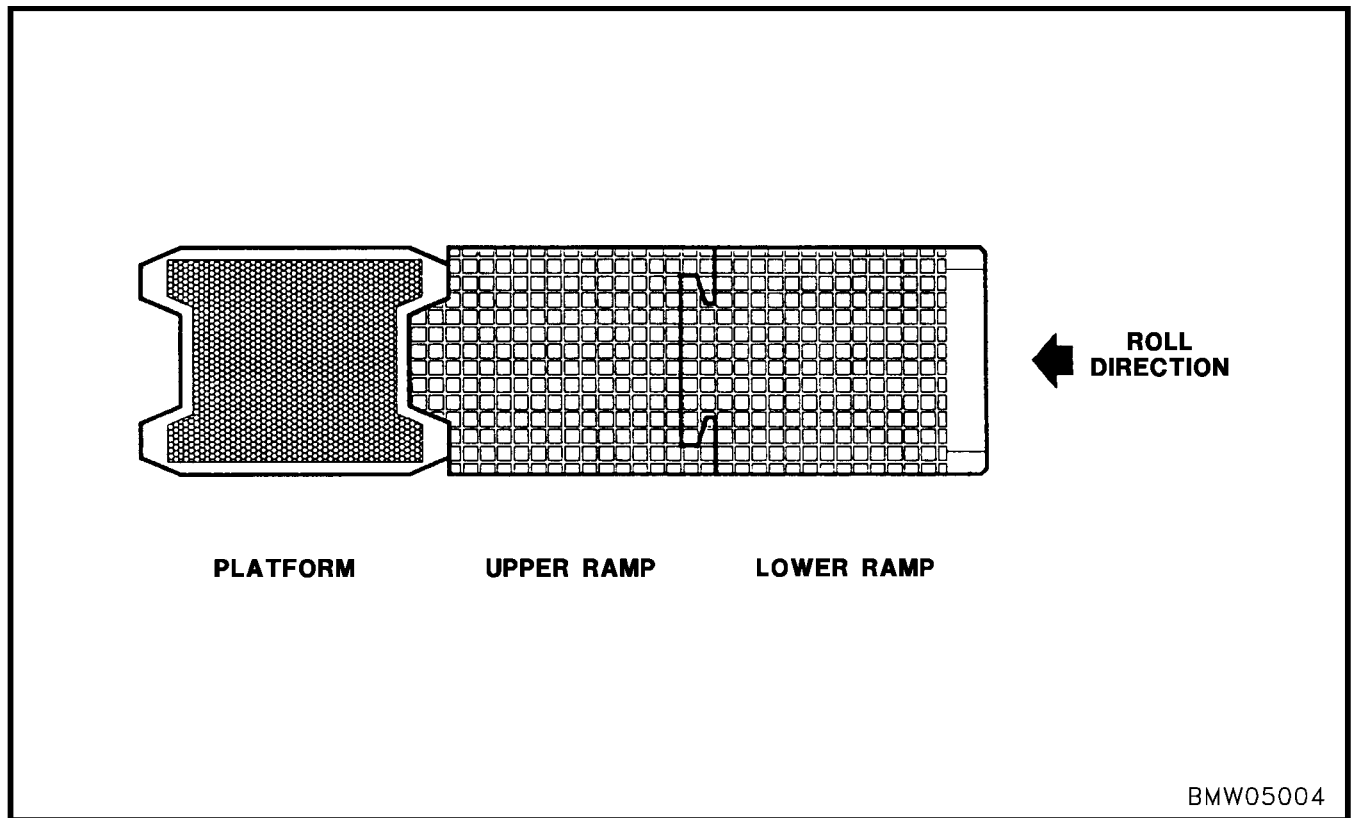


Figure 5-3 MEWS II Platform and Ramp Configuration

17. Mark centreline of nose landing gear on both sides. Measure distance between platform and main landing gear axle centreline. Transfer this distance to the nose, marking the location of the nose platform. Position nose landing gear platform ensuring that it is square and parallel to the nose landing gear axle centreline. Attach upper and lower ramp.

NOTE

The three platforms shall be arranged such that when the aircraft is pushed onto them, all wheels are centred in the non-skid area of each platform.

ROUGH LEVELLING OF PLATFORMS

18. Adjust variable height footpads until firm contact is established at all four footpads.

19. Use shim kit together with built-in spirit level to level each platform. Rough levelling is completed when bubble is within centre ring of spirit level.

FINE LEVELLING OF PLATFORMS

• • • • •
• CAUTION •
• • • • •

Damage to the platforms and ramps may result if the platforms and ramps are not levelled correctly.

20. Turn adjustable footpad counter-clockwise until platform rocks diagonally.

21. Have someone stand on the platform corner diagonally across from the adjustable footpad.

22. Turn adjustable footpad clockwise until it contacts the ground.

23. Turn adjustable footpad an extra 45 to 90 degrees.

24. Have the person standing on the platform shift their weight from side-to-side to make sure the platform does not rock.

25. Repeat fine levelling for each of the platforms.

NOTE

During the levelling operation of any platform, should more than 1/4 in. of accumulated shims be needed at any footpad, relocate the platforms to a less severely sloped part of the floor. This will keep the shimmed platform surfaces no higher than 1/4 in. above the upper ramp. Ramps should not be shimmed.

FUNCTIONAL PLATFORM CHECK

26. Check each platform in turn for functional accuracy as follows:

- a. Press ON/ZERO button on platform (see [Figure 5-2](#)).
- b. Check that display on platform indicates 0.
- c. Stand on platform and check that platform indicates your weight when motion detector is not illuminated.
- d. Press ON/ZERO button on platform once again.

INITIAL AIRCRAFT WEIGHING

Platform cables must not be crossed, walked on, rolled on, or disturbed. They could be damaged and/or erroneous readings could result.

27. Connect the three platforms to the Run-Weigh Console as follows using the cables supplied:

- a. Right main landing gear to SCALE 1 connector.
- b. Left main landing gear to SCALE 2 connector.
- c. Nose landing gear to SCALE 3 connector.



Prior to connecting external power, ensure that power selector switch is set to the same setting as the available power. Failure to do so may result in electrical damage to the MEWS II system.

28. Set power selector switch on the Run-Weigh Console to 115 V (see [Figure 5-1](#)).

29. Pull power cord to required length then pull RETRACT AC CORD knob out to secure cable at that length (see [Figure 5-1](#)).

30. Place wheel chocks on appropriate platforms, switch on Run-Weigh Console, then press ZERO on Network Controller key pad (see [Figure 5-1](#)). The auto zero feature on the MEWS II equipment will automatically compensate for chock weight.

31. With aircraft brakes off, push aircraft on platforms. Ensure that each wheel is centred on footpads, then chock aircraft wheels and disconnect tow bar from aircraft.

32. Press PRINT on Network Controller to record weight data, when motion detector is not illuminated. The resultant printout serves to seat the MEWS II platforms and need not be kept.

33. Attach tow bar to aircraft, remove chocks, then pull aircraft off the platforms. Print weigh data.

34. Repeat Paragraphs 30 to 33 twice; once for the official weighing and once for the validation weighing.

35. Compare data from official and validation weighings, and check the following points:

- a. The two total weight values should be within 0.1% of each other.
- b. The individual platform readings should fall within 0.1% on each of the weighings, (i.e. compare platform 1 values to platform 1 values for each weighing). Use ENTER together with GEAR on the Network Controller key pad to view individual platform weight values.

36. If evaluation of data for accuracy and repeatability are within the 0.1% tolerance, continue with final aircraft weighing ([Paragraph 40](#)).

37. If either is out of tolerance, check the installation set-up and the possibility of motion error. If these two conditions are deemed acceptable, repeat [Paragraphs 30 to 33, and Paragraph 35](#).

38. If weighed values are within tolerances, continue with final aircraft weighing (Paragraph 40).

39. If weighed values are still out of tolerances, return the MEWS II equipment for recalibration or repair.

FINAL AIRCRAFT WEIGHING

40. Visually inspect each platform to ensure even, level ground contact.

41. Ensure MOTION detector on Network Controller is not illuminated, then press PRINT to record zero weight.

42. Push aircraft on platforms, chock wheels, and disconnect tow bar from aircraft.



The inflation range for the nose tire is 10 to 82 psi. For the main tire the inflation range is 100 to 170 psi.

43. For minor levelling of the aircraft in the lateral and longitudinal axes, adjust the nose and main wheel tire pressure.

44. Ensure MOTION detector on Network Controller is not illuminated, then press PRINT to record aircraft weight on nose and main landing gear.

45. Measure aircraft dimensions in accordance with form DND 3133 (refer to [Part 6](#)) to establish main landing gear arm (E) and nose landing gear arm (F).

46. Record calculated values of E and F in appropriate boxes of form DND 3133.

47. Attach tow bar to aircraft, remove chocks, then pull aircraft off MEWS II platforms.

48. Ensure MOTION detector on the Network controller is not illuminated, then press ZERO to end weighing process.

49. Write aircraft tail number on printout, detach, and staple printout to form DND 3133.

50. Switch off MEWS II equipment, detach cables from platforms, disassemble ramps, and return equipment to stores.

PART 6

AIRCRAFT WEIGHING RECORDS

PURPOSE

1. This part provides samples of aircraft weighing record, form DND 3133, and aircraft basic weight change record, form DND 3134. Basic instructions for completing these forms are given in C-12-005-008/AM-000.

AIRCRAFT WEIGHING RECORD –FORM DND 3133

2. A sample of an aircraft weighing record, form DND 3133, is illustrated in [Figure 6-1](#).

3. The following entry columns are not used with the MEWS II weighing procedure described in [Part 5](#):

- a. CELL CORRECTION
- b. TARE WEIGHT

c. NET WEIGHT

4. One copy of the current DND 3133 shall be forwarded to Air Command (attention SO AMS 3) and one copy to the applicable Aircraft Engineering Officer (AEO) at LOGCON/DGAEPM/DAEPM (FT) after each aircraft weighing.

AIRCRAFT BASIC WEIGHT CHANGE RECORD – FORM DND 3134

5. A sample of an aircraft basic weight change record, form DND 3134, is illustrated in [Figure 6-2](#). The information contained in this form takes precedence in validity over the aircraft weighing record, form DND 3133.

6. It is recommended that the Commanding Officer (CO) periodically reviews the aircraft basic weight change records with a view to updating the basic weight checklists.



AIRCRAFT WEIGHING RECORD - FICHE DE PESÉE D'AÉRONEF

DATE (WEIGHED - PENSÉE)		AIRCRAFT TYPE		MARK-MODÈLE	REGISTRATION NO. - ND'ENREGISTREMENT	
PLACE WEIGHED - LIEU DE LA PESÉE				WEIGHT AND BALANCE AUTHORITY - RESPONSABLE DU POIDS ET CENTRAGE		
SUPPORT POINTS POINTS D'APPUI	SCALE READING LECTURE DE LA BALANCE	CELL CORRECTION CORRECTION DE LA CELLULE	TARE WEIGHT POIDS NET	NET WEIGHT POIDS NET	ARM BRAS	MOMENT
LEFT MAIN TRAIN GAUCHE *					(E/E')	
					(E'')	
RIGHT MAIN TRAIN DROIT *					(E/E')	
					(E'')	
NOSE or TAIL NEZ ou QUEUE					(F)	
TOTAL (weighed) TOTAL (pesé)					(H)	

MEASUREMENTS

I = (INCHES) The distance from the reference datum to some accessible exterior jig point or frame of the aircraft from which a plumb bob can be dropped to the ground (as indicated in the relevant CFTO).

E = (INCHES) The distance from the reference datum to the centre line of the main support points.

F = (INCHES) The distance from the reference datum to the centre line of the nose or tail support point.

H = (INCHES) Average Arm = $\frac{\text{TOTAL MOMENT}}{\text{TOTAL WEIGHT}}$

MESURES

I = (POUCES) La distance du point de repère à un point extérieur accessible ou à une partie de l'aéronef d'où un fil à plomb peut être suspendu jusqu'au sol (tel qu'indiqué dans l'ITFC approprié).

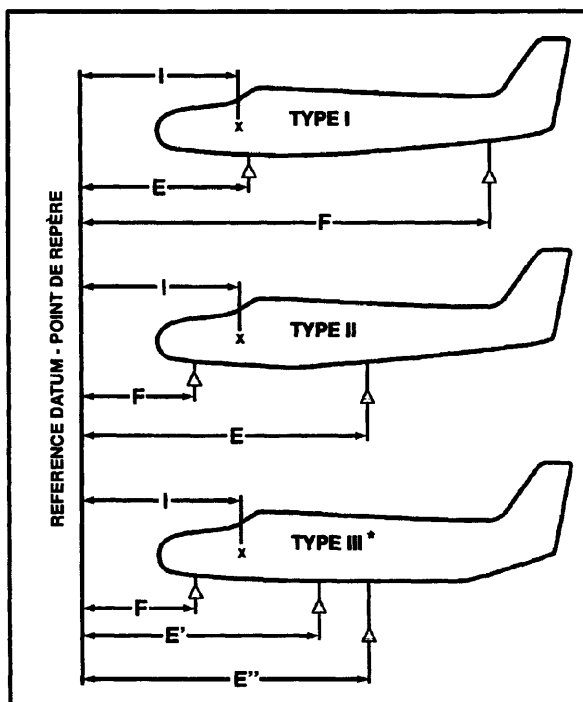
E = (POUCES) La distance du point de repère à la ligne qui rejoint les centres des points d'appui principaux.

F = (POUCES) La distance du point de repère à la ligne passant par l'axe principal du point d'appui du nez ou de la queue.

H = (POUCES) Bras Moyen = $\frac{\text{MOMENT TOTAL}}{\text{POIDS TOTAL}}$

DIAGRAMS FOR MEASURING VARIOUS TYPES OF AIRCRAFT TO DETERMINE ARM OF SUPPORT POINTS.

DIAGRAMMES SERVANT À MESURER DIFFÉRENTS TYPES D'AÉRONEFS POUR DÉTERMINER L'EMPLACEMENT DU BRAS DES POINTS D'APPUI.



DND 3133 (12-94)

BMW06001

Figure 6-1 (Sheet 1 of 2) Aircraft Weighing Record – Form DND 3133

DESCRIPTION				NET WEIGHT POIDS NET	ARM BRAS	MOMENT	$\frac{\text{MOMENT}}{1000}$
TOTAL (AS WEIGHED) TOTAL (PESÉ)							
TOTAL OF ITEMS WEIGHED BUT NOT PART OF BASIC WEIGHT (FROM COL. 1 BELOW) TOTAL DES ARTICLES PESÉS MAIS NON INCLUS DANS LE POIDS DE BASE (VOIR COL. 1 CI-DESSOUS)				-			
TOTAL OF BASIC ITEMS NOT IN AIRCRAFT WHEN WEIGHED (FROM COL. 2 BELOW) TOTAL DES ARTICLES DE BASE HORS DE L'AÉRONEF LORS DE LA PESÉE (VOIR COL. 2 CI-DESSOUS)				+			
BASIC AIRCRAFT (TRANSFER TO DND 3134) AÉRONEF DE BASE (REPORTER À LA DND 3134)				BASIC WEIGHT POIDS DE BASE	BASIC C of G C de G DE BASE	BASIC MOMENT MOMENT DE BASE	
COLUMN - 1 - COLONNE				COLUMN - 2 - COLONNE			
ITEMS WEIGHED BUT NOT PART OF BASIC WEIGHT ARTICLES PESÉS MAIS NON INCLUS DANS LE POIDS DE BASE	WEIGHT POIDS	ARM BRAS	MOMENT	BASIC ITEMS NOT IN AIRCRAFT WHEN WEIGHED ARTICLES DE BASE HORS DE L'AÉRONEF LORS DE LA PESÉE	WEIGHT POIDS	ARM BRAS	MOMENT
TOTAL				TOTAL			
REMARKS - REMARQUES							
METHOD OF SUPPORT - MÉTHODE D'APPUI				ATTITUDE (LEVEL - NORMAL) (NIVEAU - NORMAL)			
ORDER REFERENCE AND DATE - RÉFÉRENCE ET DATE				TYPE OF SCALES - TYPE DE BALANCE			

Whenever possible, aircraft are to be weighed with all and only basic equipment installed. If any item of basic equipment is missing, it must be recorded in column 2. Items weighed but not part of the basic equipment must be noted in column 1. Totals of items listed in columns 1 and 2 must be taken into account when establishing the C of G of the basic aircraft.

Dans la mesure du possible, les aéronefs ne doivent être pesés qu'avec tout l'équipement de base en place. Tout article manquant de l'équipement de base doit figurer à la colonne 2. Les articles pesés mais ne faisant pas partie de l'équipement de base doivent figurer à la colonne 1. Pour déterminer le C de G de l'aéronef de base, il faut tenir compte de tous les articles figurant aux colonnes 1 et 2.

DND 3133 (12-94)

BMW06002

AIRCRAFT BASIC WEIGHT CHANGE RECORD - FICHE DE MODIFICATION DU POIDS DE BASE D'UN AÉRONEF

BASIC WEIGHT
POIDS DE BASE

BASIC WEIGHT
POIDS DE BASE

DATE OF WEIGHING
DATE DE LA PESÉEDATE OF WEIGHING
DATE DE LA PESÉEAIRCRAFT TYPE AND MARK
TYPE ET MODÈLE D'AÉRONEFAIRCRAFT TYPE AND MARK
TYPE ET MODÈLE D'AÉRONEF

REGISTRATION NO.
N° D'IMMATRICULATION

REGISTRATION NO.
N° D'IMMATRICULATION

BASIC WEIGHT
POIDS DE BASE

BASIC WEIGHT
POIDS DE BASE

BASIC C OF G (INCHES FROM DATUM)

BASIC C OF G (INCHES FROM DATUM)

BASIC INDEX (IF REQUIRED)
INDICE DE BASE (AU BESOIN)BASIC INDEX (IF REQUIRED)
INDICE DE BASE (AU BESOIN)[illegible]

OND 3134 (12-94)

(OVER - AU VERSO)

[illegible]

NOTE:

1. THIS FORM IS TO BE COMPLETED BY THE WEIGHT AND BALANCE AUTHORITY IMMEDIATELY FOLLOWING EACH AIRCRAFT WEIGHING OR WHEN WEIGHT CHANGE IS MADE DURING MAINTENANCE.
2. NEW WEIGHING RECORDS ARE TO BE COMPARED BY AIRCRAFT MAINTENANCE OFFICERS TO EXISTING RECORDS TO ENSURE THAT UNACCOUNTABLE VARIATIONS ARE INVESTIGATED.

REMARQUES:

1. LA PRÉSENTE FORMULE DOIT ÊTRE REMPLIE PAR L'AUTORITÉ DE POIDS ET CENTRAGE IMMÉDIATEMENT APRÈS LE PESAGE DE L'AVION ET LORSQUE LE POIDS EST MODIFIÉ AU COURS DE L'ENTRETIEN.
2. LES OFFICIERS CHARGÉS DE L'ENTRETIEN DES AÉRONS DOIVENT COMPARER LES NOUVELLES DONNÉES DE POIDS AUX DONNÉES EXISTANTES AFIN DE S'ASSURER QU'IL Y AIT ENQUÊTE SUR LES VARIATIONS INEXPLIQUÉES.

BMW06004

Figure 6-2 (Sheet 2 of 2) Aircraft Weighing Record – Form DND 3134

PART 7

WEIGHT AND BALANCE DATA

LOADING DATA

REACTION POINTS

1. Any measurements below marked (*) are approximate and serve only as a guide. The actual dimensions for individual aircraft are to be determined by measurements when the aircraft is in the horizontal position, immediately after each weighing. The reaction points, (i.e. jacking points or wheel axle centrelines) are located aft of the reference datum as follows (see [Figure 7-1](#)):

- a. Centreline of main wheels: 260.5 in.*
- b. Centreline of nose wheel: 127.0 in.*
- c. Wing jacking points: 280.0 in.
- d. Forward jacking points: 148.2 in.
- e. Fuselage jacking points: 284.4 in.

LEVELLING POINTS

2. Lateral and longitudinal levelling points (lugs) are provided on the floor of the electrical and radio compartment and are accessible by opening the nose compartment doors (see [Figure 7-1](#)).

DATUM POINT

3. The datum point located at Fuselage Station (FS) 200 is marked on plates, 18 in. each side of the aircraft centreline. The points are placarded WEIGHING DATUM POINT FUS STA 200 (see [Figure 7-1](#)).

REFERENCE DATUM

4. The reference datum is located at FS 0 which is 200 in. forward of the datum point (see [Figure 7-1](#)).

MEAN AERODYNAMIC CHORD

5. The leading edge of the Mean Aerodynamic Chord (MAC) is 231.6 in. aft of the reference datum. The length of the MAC is 75.45 in. (see [Figure 7-1](#)).

MAC CONVERSION TABLE

6. For a percentage MAC conversion table, see [Figure 7-2](#).

UNDERCARRIAGE RETRACTION MOMENT

7. The undercarriage retraction moment is +1300 in•lb (i.e. when the undercarriage is retracted, the aircraft moment is increased by 1300 in•lb).

FUEL DATA

8. The weights and moments for fuel are shown in [Figure 7-3](#).

MINIMUM FUEL FOR LANDING

9. For practical purposes, use 150 lb with a moment/1000 of 35.0 in•lb.

TRAPPED FUEL

10. The weight of trapped fuel is negligible.

RESIDUAL FUEL

11. Residual fuel is 2.5 Imp. Gal. with the arm located at 241.5 inches.

LOADING SCHEDULE

PURPOSE

12. The purpose of the loading schedule is to record the weight and CG of the aircraft in its basic weight condition, and to provide a quick and accurate method of obtaining the total weight of a loading. It is also used to check the aircraft balance to ensure that the flight and landing CG is within the established CG limits. [Figure 7-4](#) illustrates typical loading samples.

RECORDING RESULTS

13. Form DND 3133 is used to record the results when the aircraft is being weighed. The scale reading at each reaction point is noted and recorded. The location of the reaction points is measured, if necessary, and recorded. Alternatively, the predetermined locations, if applicable, are used. Using this information, and adjusting for basic items not in the aircraft at the time of weighing or items in the aircraft at the time of weighing but not part of the basic aircraft, the basic weight and centre of gravity of the aircraft are obtained. Any change to this basic weight is recorded on form DND 3134.

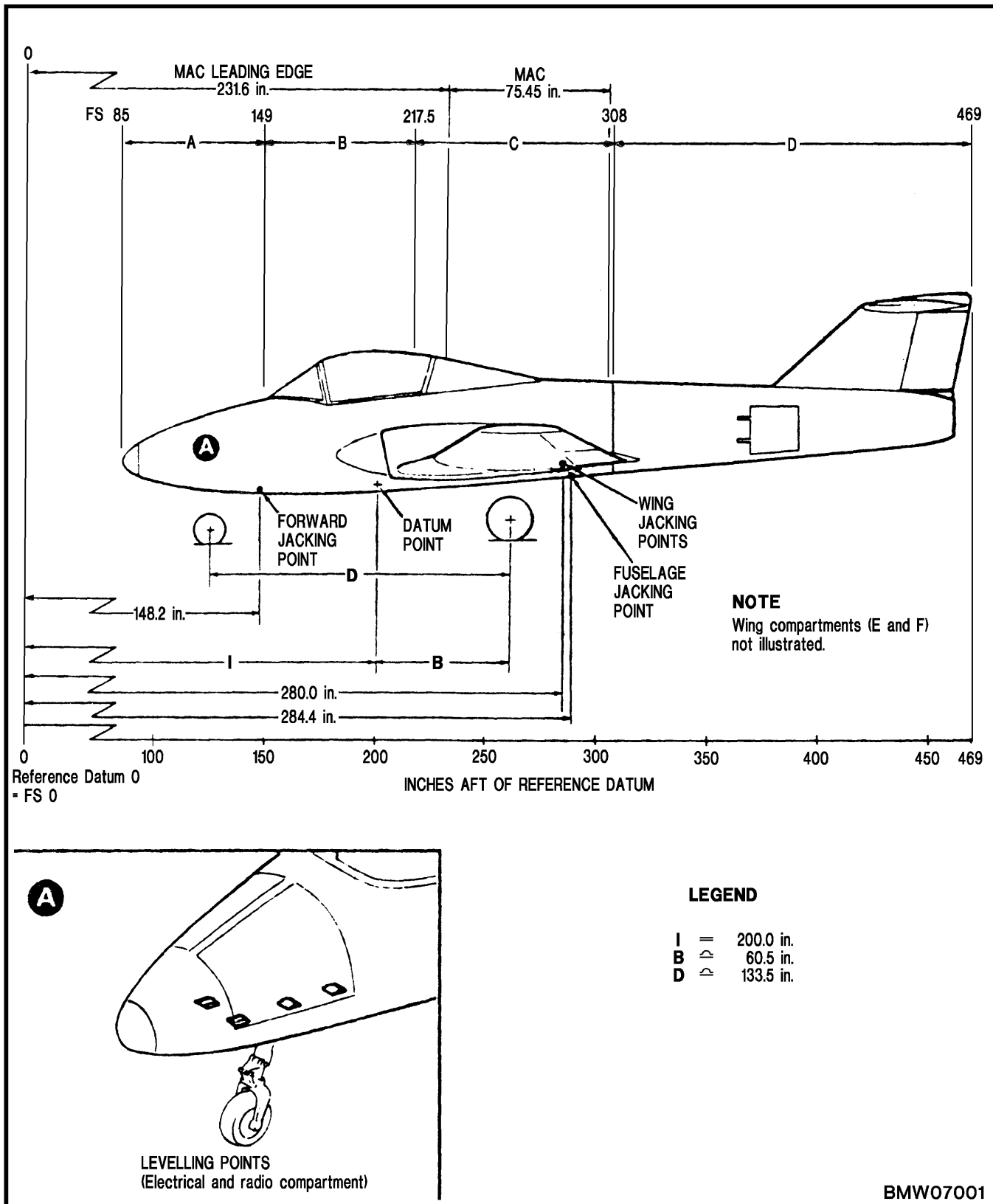


Figure 7-1 Aircraft Diagram

Arm	.0	.1	.2	.3	.4	.5	.6	.7	.8	.9
243	15.1	15.2	15.4	15.5	15.6	15.8	15.9	16.0	16.2	16.3
244	16.4	16.6	16.7	16.8	17.0	17.1	17.2	17.4	17.5	17.6
245	17.8	17.9	18.0	18.2	18.3	18.4	18.6	18.7	18.8	19.0
246	19.1	19.2	19.3	19.5	19.6	19.7	19.9	20.0	20.1	20.3
247	20.4	20.5	20.7	20.8	20.9	21.1	21.2	21.3	21.5	21.6
248	21.7	21.9	22.0	22.1	22.3	22.4	22.5	22.7	22.8	22.9
249	23.1	23.2	23.3	23.5	23.6	23.7	23.8	24.0	24.1	24.3
250	24.4	24.5	24.6	24.8	24.9	25.0	25.2	25.3	25.4	25.6
Example: Arm of 247.6 inches = 21.2% MAC										

Figure 7-2 Percentage MAC Conversion Table

REFERENCE TABLES

14. [Figures 7-5 to 7-11](#) are tables to be used as references. These tables indicate the weight and moment for all the items which may be loaded on the aircraft, depending on its role.

CENTRE OF GRAVITY TABLE

15. The Centre of Gravity (CG) table (see [Figure 8-1](#)) provides a means of checking each loading to ensure that the loading is properly balanced, i.e., that the CG of the aircraft is within the established limits.

COMPUTING LOADING

16. To compute a loading and determine that the balance is satisfactory, proceed as follows:

- Record the basic weight and moment/1000 obtained from form DND 3134.

- Add the weight of each item placed aboard the aircraft to the aircraft basic weight. See [Figures 7-5 to 7-11](#) for the values of the loaded items.
- Add the moment/1000 of each item placed aboard the aircraft to the aircraft basic moment. See [Figures 7-5 to 7-11](#) for the values of the loaded items.
- Having obtained the take-off gross weight, refer to the gross weight column in the centre of gravity table (see [Figure 8-1](#)). Select the value in the column which most closely approximates the gross weight of the aircraft. Note the minimum and maximum moment/1000 which corresponds to the selected weight value. Compare the take-off moment/1000 value to the minimum and maximum values. If the moment falls between the two values above, the loading of the aircraft is satisfactory. If it is outside, the loading will have to be changed to make it fall between these values. It is also essential to check the landing condition.

CAN/CDSG-3.22 - JP4				
Imperial Gallons	U.S. Gallons	*Weight (lb)	Arm (in.)	Moment/1000 (in•lb)
19.2	23	**150	233.6	35.0
30	36	234	233.6	54.7
40	48	312	233.7	72.9
50	60	390	234.0	91.3
60	72	468	234.4	109.7
70	84	546	235.4	128.5
80	96	624	236.1	147.3
90	108	702	236.7	166.2
100	120	780	237.3	185.1
110	132	858	237.7	203.9
120	144	936	238.1	222.9
130	156	1014	238.5	241.8
140	168	1092	238.9	260.9
150	180	1170	239.2	279.9
160	192	1248	239.5	298.9
170	204	1326	239.8	318.0
180	216	1404	240.0	337.0
190	228	1482	240.3	356.1
200	240	1560	240.5	375.2
210	252	1638	240.7	394.3
220	264	1716	240.8	413.2
230	276	1794	241.0	432.4
240	288	1872	241.2	451.5
250	300	1950	241.3	470.5
258	310	2012	241.5	485.9
* Based on 7.8 lb per imperial gallon. ** Minimum fuel for landing				

Figure 7-3 (Sheet 1 of 3) Fuel Table

CAN/CDSG-3.23 - Jet A-1				
Imperial Gallons	U.S. Gallons	*Weight (lb)	Arm (in.)	Moment/1000 (in•lb)
18.3	22	**150	233.6	35.0
30	36	246	233.6	57.5
40	48	328	233.7	76.7
50	60	410	234.0	95.9
60	72	492	234.4	115.3
70	84	574	235.4	135.1
80	96	656	236.1	154.9
90	108	738	236.7	174.7
100	120	820	237.3	194.6
110	132	902	237.7	214.4
120	144	984	238.1	234.3
130	156	1066	238.5	254.2
140	168	1148	238.9	274.3
150	180	1230	239.2	294.2
160	192	1312	239.5	314.2
170	204	1394	239.8	334.3
180	216	1476	240.0	354.2
190	228	1558	240.3	374.4
200	240	1640	240.5	394.4
210	252	1722	240.7	414.5
220	264	1804	240.8	434.4
230	276	1886	241.0	454.5
240	288	1968	241.2	474.7
250	300	2050	241.3	494.7
258	310	2116	241.5	511.0
* Based on 8.2 lb per imperial gallon. ** Minimum fuel for landing				

Figure 7-3 (Sheet 2 of 3) Fuel Table

CAN/CJSB-3.23 - JP8				
Imperial Gallons	U.S. Gallons	*Weight (lb)	Arm (in.)	Moment/1000 (in•lb)
18.3	22	**150	233.6	35.0
30	36	246	233.6	57.5
40	48	328	233.7	76.7
50	60	410	234.0	95.9
60	72	492	234.4	115.3
70	84	574	235.4	135.1
80	96	656	236.1	154.9
90	108	738	236.7	174.7
100	120	820	237.3	194.6
110	132	902	237.7	214.4
120	144	984	238.1	234.3
130	156	1066	238.5	254.2
140	168	1148	238.9	274.3
150	180	1230	239.2	294.2
160	192	1312	239.5	314.2
170	204	1394	239.8	334.3
180	216	1476	240.0	354.2
190	228	1558	240.3	374.4
200	240	1640	240.5	394.4
210	252	1722	240.7	414.5
220	264	1804	240.8	434.4
230	276	1886	241.0	454.5
240	288	1968	241.2	474.7
250	300	2050	241.3	494.7
258	310	2116	241.5	511.0
* Based on 8.2 lb per imperial gallon. ** Minimum fuel for landing				

Figure 7-3 (Sheet 3 of 3) Fuel Table

TYPICAL LOADING SAMPLE (TRAINER) STUDENT & INSTRUCTOR – EXTERNAL TANKS FULL (FWD CASE)			
TRAINER	WEIGHT (LB)	ARM (IN)	MOMENT (LB.IN)
Basic weight from DND 3133 - CT114146 (*)	5379.0	250.6	1347977.0
Student & Chute	256.0	195.0	49920.0
Instructor & Chute	256.0	195.0	49920.0
Internal Fuel – (260.5 Gal.) JP-8	2136.0	241.6	516058.0
External Fuel (80 Gal.) – JP-8	656.0	245.0	160720.0
TAKE-OFF CONDITION (GEAR DOWN)	8683.0	244.68	2124595.0
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 8683.0 lb, the minimum moment is 2109751.0 and the maximum moment is 2161507.0.			
Since 2124595.0 falls between these values, the aircraft CG is within limits.			
Retract Gear			+ 1300.0
TAKE-OFF CONDITION (GEAR UP)	8683.0	244.8	2125895.0
CG CHECK AGAIN PROVES TO BE WITHIN LIMITS			
Delete Take-Off Fuel (Internal)	-2136.0	241.6	-516058.0
Delete Take-Off Fuel (External)	-656.0	245.0	-160720.0
Add Minimum Landing Fuel	150.0	233.6	35040.0
Gear down			-1300.0
LANDING CONDITION	6041.0	245.5	1482857.0
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 6041.0 lb, the minimum moment is 1467812.0 and the maximum moment is 1503819.0.			
Since 1482857.0 falls between these values, the aircraft CG is within limits.			
(*) Fleet Refurbishment Program 11-77-SE-010-039 (Spar Aerospace)			

Figure 7-4 (Sheet 1 of 4) Typical Loading Sample

TYPICAL LOADING SAMPLE (TRAINER) ONE PILOT – EXTERNALS TANKS EMPTY (AFT CASE)			
TRAINER	WEIGHT (LB)	ARM (IN)	MOMENT (LB.IN)
Basic weight from DND 3133 –CT114146(*)	5379.0	250.6	1347977.0
Student & Chute	175.0	195.0	34125.0
Internal Fuel (260.5 Gal.) - JP-4	2032.0	241.6	490931.0
TAKE-OFF CONDITION (GEAR DOWN)	7586.0	246.9	1873034.0
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 7586.0 lb, the minimum moment is 1843208.0 and the maximum moment is 1888425.0.			
Since 1873034.0 falls between these values, the aircraft CG is within limits.			
Retract Gear			+ 1300.0
TAKE-OFF CONDITION (GEAR UP)	7586.0	247.1	1874334.0
CG CHECK AGAIN PROVES TO BE WITHIN LIMITS			
Delete Take-Off Fuel (Internal)	-2032.0	241.6	-490931.0
Add Minimum Landing Fuel	150.0	233.6	35040.0
Gear down			-1300.0
LANDING CONDITION	5704.0	248.4	1417142.0
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 5704.0 lb, the minimum moment is 1385929.0 and the maximum moment is 1419928.0.			
Since 1417142.0 falls between these values, the aircraft CG is within limits.			
(*) Fleet Refurbishment Program 11-77-SE-010-039 (Spar Aerospace)			

Figure 7-4 (Sheet 2 of 4) Typical Loading Sample

TYPICAL LOADING SAMPLE (SNOWBIRD) ONE PILOT – SMOKE TANKS FULL (FWD CASE)			
SNOWBIRD	WEIGHT (LB)	ARM (IN)	MOMENT (LB.IN)
Basic weight	5406.0	250.7	1355284.0
Student & Chute	175.0	195.0	34125.0
Internal Fuel (260.5 Gal.) - JP-8	2136.0	241.6	516058.0
Smoke Tank Fuel (2)	<u>266.0</u>	<u>243.2</u>	<u>64691.0</u>
TAKE-OFF CONDITION (GEAR DOWN)	7983.0	246.8	1970158.0
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 7983.0 lb, the minimum moment is 1939669.0 and the maximum moment is 1987252.0.			
Since 1970158.0 falls between these values, the aircraft CG is within limits.			
Retract Gear			<u>+ 1300.0</u>
TAKE-OFF CONDITION (GEAR UP)	7983.0	247.0	1971458.0
CG CHECK AGAIN PROVES TO BE WITHIN LIMITS			
Delete Take-Off Fuel (Internal)	-2136.0	241.6	-516058.0
Delete Smoke Tank Fuel (External)	-266.0	243.2	-64691.0
Add Minimum Landing Fuel	150.0	233.6	35040.0
Gear down			<u>-1300.0</u>
LANDING CONDITION	<u>5731.0</u>	<u>248.6</u>	<u>1424449.0</u>
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 5731.0 lb, the minimum moment is 1392489.0 and the maximum moment is 1426649.0.			
Since 1424449.0 falls between these values, the aircraft CG is within limits.			
(*) Fleet Refurbishment Program 11-77-SE-010-050 (Spar Aerospace)			

Figure 7-4 (Sheet 3 of 4) Typical Loading Sample

TYPICAL LOADING SAMPLE (SNOWBIRD) ONE PILOT – SMOKE TANKS EMPTY (AFT CASE)			
SNOWBIRD	WEIGHT (LB)	ARM (IN)	MOMENT (LB.IN)
Basic weight	5406.0	250.7	1355284.0
Student & Chute	175.0	195.0	34125.0
Internal Fuel (260.5 Gal.) - JP-4	<u>2032.0</u>	<u>241.6</u>	<u>490931.0</u>
TAKE-OFF CONDITION (GEAR DOWN)	7613.0	247.0	1880340.0
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 7613.0 lb, the minimum moment is 1849768.0 and the maximum moment is 1895146.0.			
Since 1880340.0 falls between these values, the aircraft CG is within limits.			
Retract Gear			<u>+ 1300.0</u>
TAKE-OFF CONDITION (GEAR UP)	7613.0	247.2	1881640.0
CG CHECK AGAIN PROVES TO BE WITHIN LIMITS			
Delete Take-Off Fuel (Internal)	-2032.0	241.6	-490931.0
Add Minimum Landing Fuel	150.0	233.6	35040.0
Gear down			<u>-1300.0</u>
LANDING CONDITION	<u>5731.0</u>	<u>248.6</u>	<u>1424449.0</u>
CG CHECK			
From the CG table (see Figure 8-1), for a weight of 5731.0 lb, the minimum moment is 1392489.0 and the maximum moment is 1426649.0.			
Since 1424449.0 falls between these values, the aircraft CG is within limits.			
(*) Fleet Refurbishment Program 11-77-SE-010-050 (Spar Aerospace)			

Figure 7-4 (Sheet 4 of 4) Typical Loading Sample

Item	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
Crew Member and Parachute	200	195	39.0
Crew Member and Parachute	215	195	41.9
Crew Member and Parachute	230	195	44.9

Figure 7-5 Crew Table

Item	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
1 Kit	40	190	7.6
2 Kits	80	190	15.2

Figure 7-6 Survival Kits Table

Item	Capacity (Gallons)	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
Fuel – External Auxiliary Tank (2) (Empty)	80 Imp. (100 U.S. Ref)	110	243.0	26.7

Figure 7-7 External Auxiliary Fuel Tanks Table

Item	Capacity (Gallons)	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
Fuel – External Auxiliary Tank (2)	80 Imp. (100 U.S. Ref)	651 – JP4 (680 – JP1)	245.0 245.0	159.5 (166.6)

Figure 7-8 Fuel Table – External Auxiliary Fuel Tanks

Item	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
Pylons (2) & Crutches	66	248.0	16.4

Figure 7-9 Pylons & Crutches Table

Item	Capacity (Gallons)	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
Smoke Tanks (2) (Empty)	37.0 Imp.	72	243.2	17.5

Figure 7-10 Smoke Tanks Table

Item	Capacity (Gallons)	Weight (lb)	Arm (in.)	$\frac{\text{Moment}}{1000}$ (in•lb)
Fuel – Smoke Tank (2)	37.0 Imp.	266	243.2	64.7

Figure 7-11 Fuel Table – Smoke Tanks

PART 8

CENTRE OF GRAVITY

CENTRE OF GRAVITY TABLE

1. The centre of gravity table (see [Figure 8-1](#)) provides a method to establish the Centre of Gravity (CG) in terms of Percentage Mean Aerodynamic Chord (%MAC).

CENTRE OF GRAVITY LIMITS

2. The centre of gravity limits for all flight conditions are as follows:

- a. Forward limit: 243.0 in. aft of reference datum (15.1 per cent MAC).
- b. Aft limit: 249.0 in. aft of reference datum (23.1 per cent MAC).

CENTRE OF GRAVITY LIMITS(BASIC WEIGHT CONDITION)

3. The centre of gravity limits for the basic weight condition differ with the aircraft role:

- a. The forward limit for the trainer version is 248.2 in. aft of the reference datum (22.0 per cent MAC).
- b. The aft limit for the trainer version is 254.0 in. aft of the reference datum (29.7 per cent MAC).
- c. The forward limit for the Snowbird version is 246.0 in. aft of the reference datum (19.1 per cent MAC).
- d. The aft limit for the Snowbird version is 252.0 in. aft of the reference datum (27.0 per cent MAC).

NOTE

The basic weight CG limits are provided as a guide only. They must be used with caution.

Gross Weight (lb)	Moment/1000 (in•lb)		Gross Weight (lb)	Moment/1000 (in•lb)	
	Fwd Limit 15.1% MAC Arm: 243.0	Aft Limit 23.1% MAC Arm: 249.0		Fwd Limit 15.1% MAC Arm: 243.0	Aft Limit 23.1% MAC Arm: 249.0
4950	1202.9	1232.6	6800	1652.4	1693.2
5000	1215.0	1245.0	6850	1664.6	1705.7
5050	1227.2	1257.5	6900	1676.7	1718.1
5100	1239.3	1269.9	6950	1688.9	1730.6
5150	1251.5	1282.4	7000	1701.0	1743.0
5200	1263.6	1294.8	7050	1713.2	1755.5
5250	1275.8	1307.3	7100	1725.3	1767.9
5300	1287.9	1319.7	7150	1737.5	1780.4
5350	1300.1	1332.2	7200	1749.6	1792.8
5400	1312.2	1344.6	7250	1761.8	1805.3
5450	1324.4	1357.1	7300	1773.9	1817.7
5500	1336.5	1369.5	7350	1786.1	1830.2
5550	1348.7	1382.0	7400	1798.2	1842.6
5600	1360.8	1394.4	7450	1810.4	1855.1
5650	1373.0	1406.9	7500	1822.5	1867.5
5700	1385.1	1419.3	7550	1834.7	1880.0
5750	1397.3	1431.8	7600	1846.8	1892.4
5800	1409.4	1444.2	7650	1859.0	1904.9
5850	1421.6	1456.7	7700	1871.1	1917.3
5900	1433.7	1469.1	7750	1883.3	1929.8
5950	1445.9	1481.6	7800	1895.4	1942.2
6000	1458.0	1494.0	7850	1907.6	1954.7
6050	1470.2	1506.5	7900	1919.7	1967.1
6100	1482.3	1518.9	7950	1931.9	1979.6
6150	1414.5	1531.4	8000	1944.0	1992.0
6200	1506.6	1543.8	8050	1956.2	2004.5
6250	1518.8	1556.3	8100	1968.3	2016.9
6300	1530.9	1568.7	8150	1980.5	2029.4
6350	1543.1	1581.2	8200	1992.6	2041.8
6400	1555.2	1593.6	8250	2004.8	2054.3
6450	1567.4	1606.1	8300	2016.9	2066.7
6500	1579.5	1618.5	8350	2029.1	2079.2
6550	1591.7	1631.0	8400	2041.2	2091.6
6600	1603.8	1643.4	8450	2053.4	2104.1
6650	1616.0	1655.9	8500	2065.5	2116.5
6700	1628.1	1668.3	8550	2077.7	2129.0
6750	1640.3	1680.8	8600	2089.8	2141.4

Figure 8-1 Centre of Gravity Table