Australian Government

Civil Aviation Safety Authority

TRAINING & EXAMINATION WORKBOOK
for
DAY VFR SYLLABUS
Version 3 - 01 July 2011

[formerly titled VFR (Day) Work Booklet]

The workbook is only for use in training to the Day VFR aeronautical knowledge syllabus of training and the associated CASA PPL and CPL examinations, and not to be used for any other purpose.

After use in a CASA PPL or CPL examination, the workbook must not be removed from the examination room but left with the CASA CyberExams supervisor for destruction. Failure to comply with these instructions may give CASA grounds for taking action against the candidate under CAR 298A, which action could lead to the outcome indicated in CAR 298A (5).

TABLE OF CONTENTS

Pages 27 to 30, WAC Extracts.

EXTRACT FROM COMPANY OPERATIONS MANUAL

Fuel Reserves

Fuel Reserves (for all flights) shall be carried in accordance with Civil Aviation Advisory Publication, **CAAP 234-1 (1) dated November 2006**.

Aeroplane Landing Areas

Selection of and operation into landing areas other than licensed aerodromes, shall be in accordance with Civil Aviation Advisory Publication, **CAAP 92-1 (1) dated July 1992**.

Helicopter Landing Sites

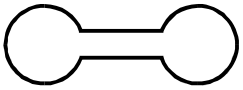
Selection of and operations into helicopter landing sites (HLS), which are not licensed aerodromes, shall be in accordance with the Civil Aviation Advisory Publication, **CAAP 92-2 (1) dated January 1996**.

AERODROME MARKERS

Figure 1

(i)

(ii)



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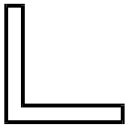

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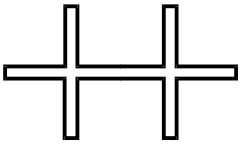
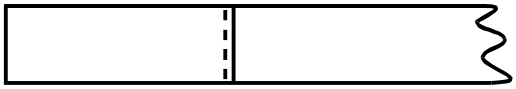


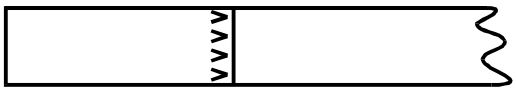
AERODROME MARKINGS

Figure 2

(i)



(ii)



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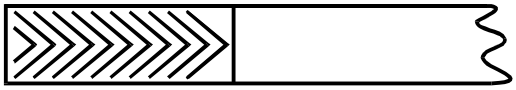
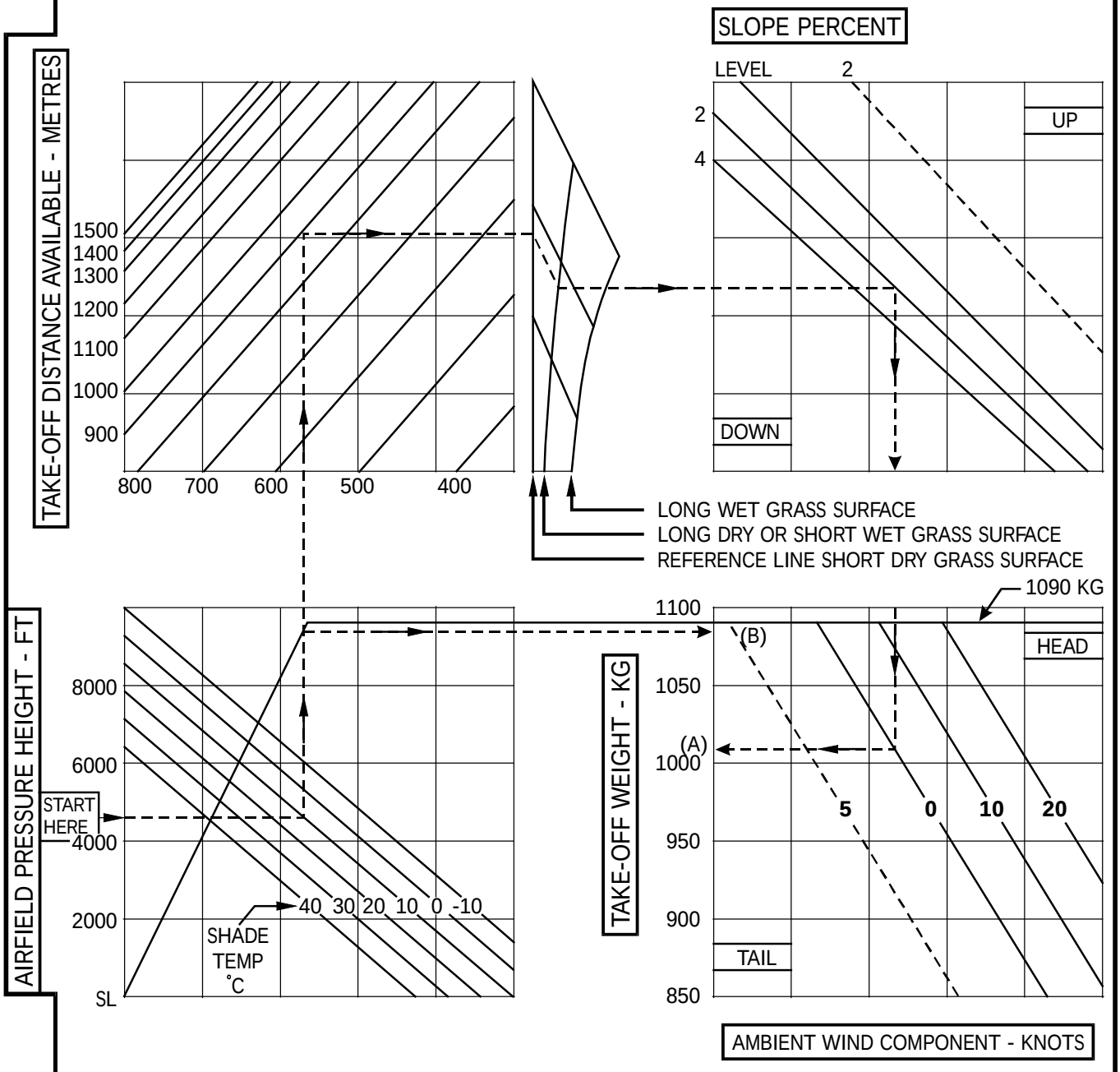


(iv)

TAKE-OFF WEIGHT CHART
Figure 3



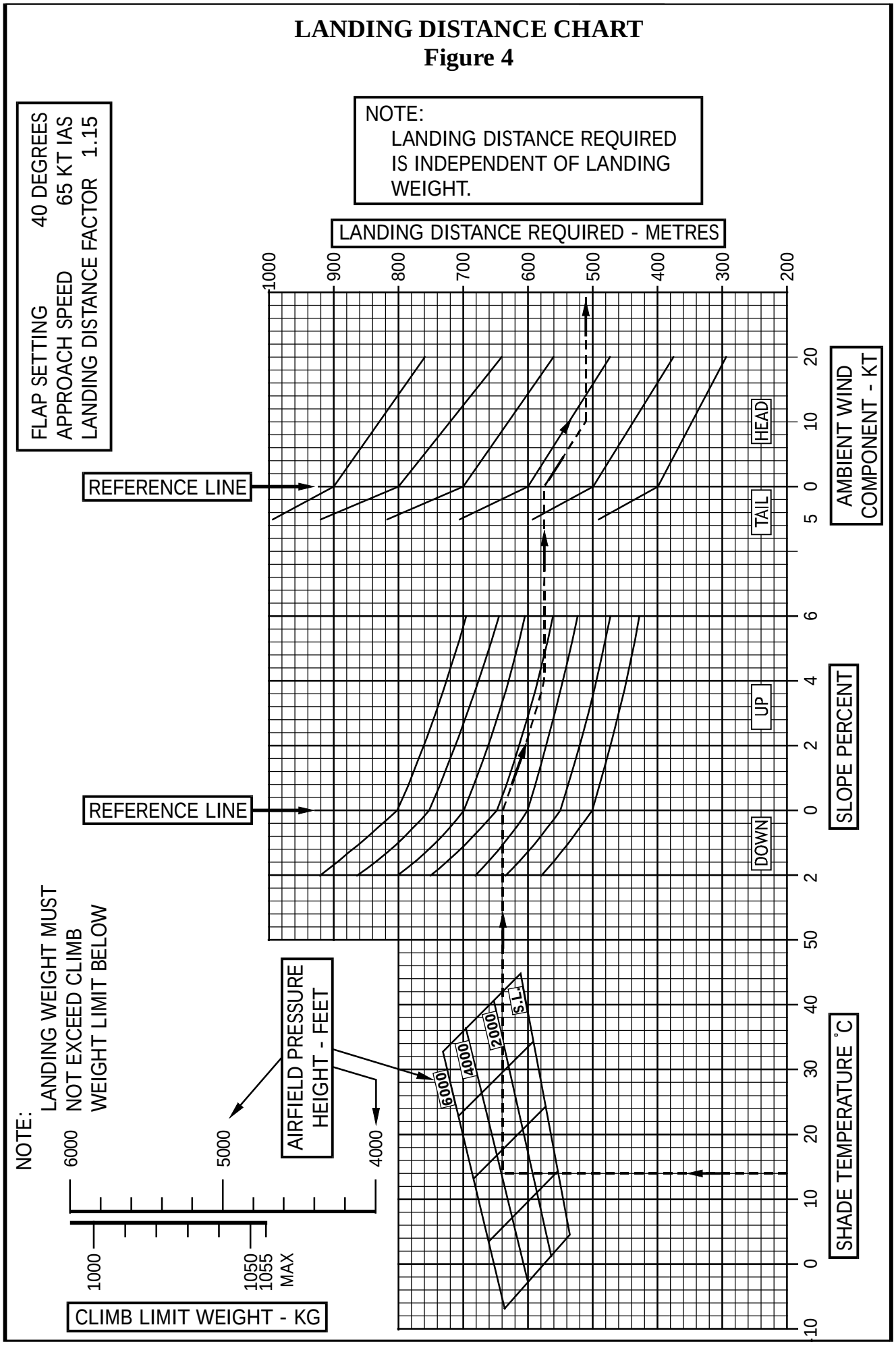
NOTES:

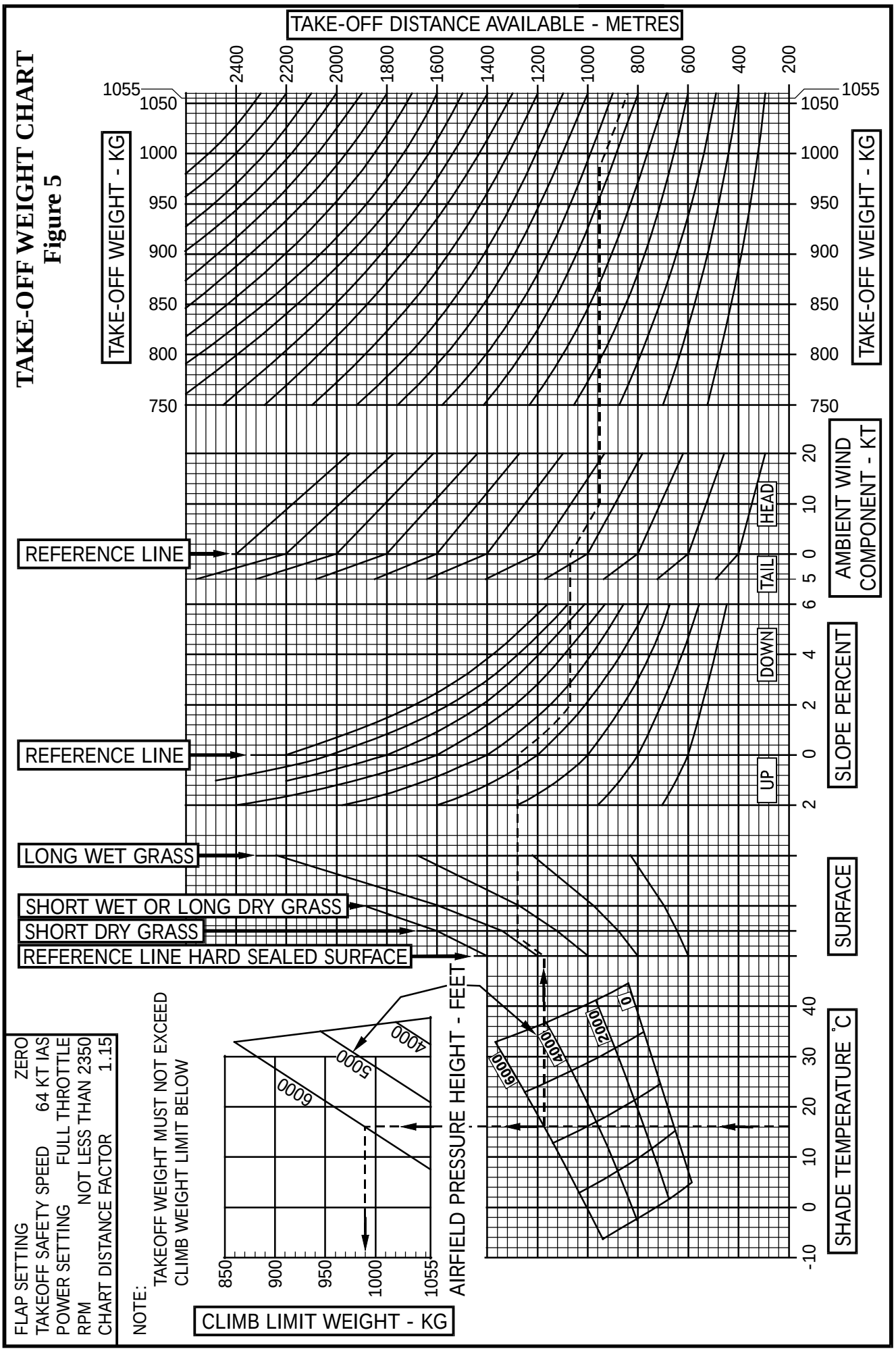
(1) THE GROSS WEIGHT AT TAKE-OFF SHALL NOT EXCEED THE LESSOR OF (A) AND (B).

(2) THE MAXIMUM TAKE-OFF WEIGHT = 1090 KG

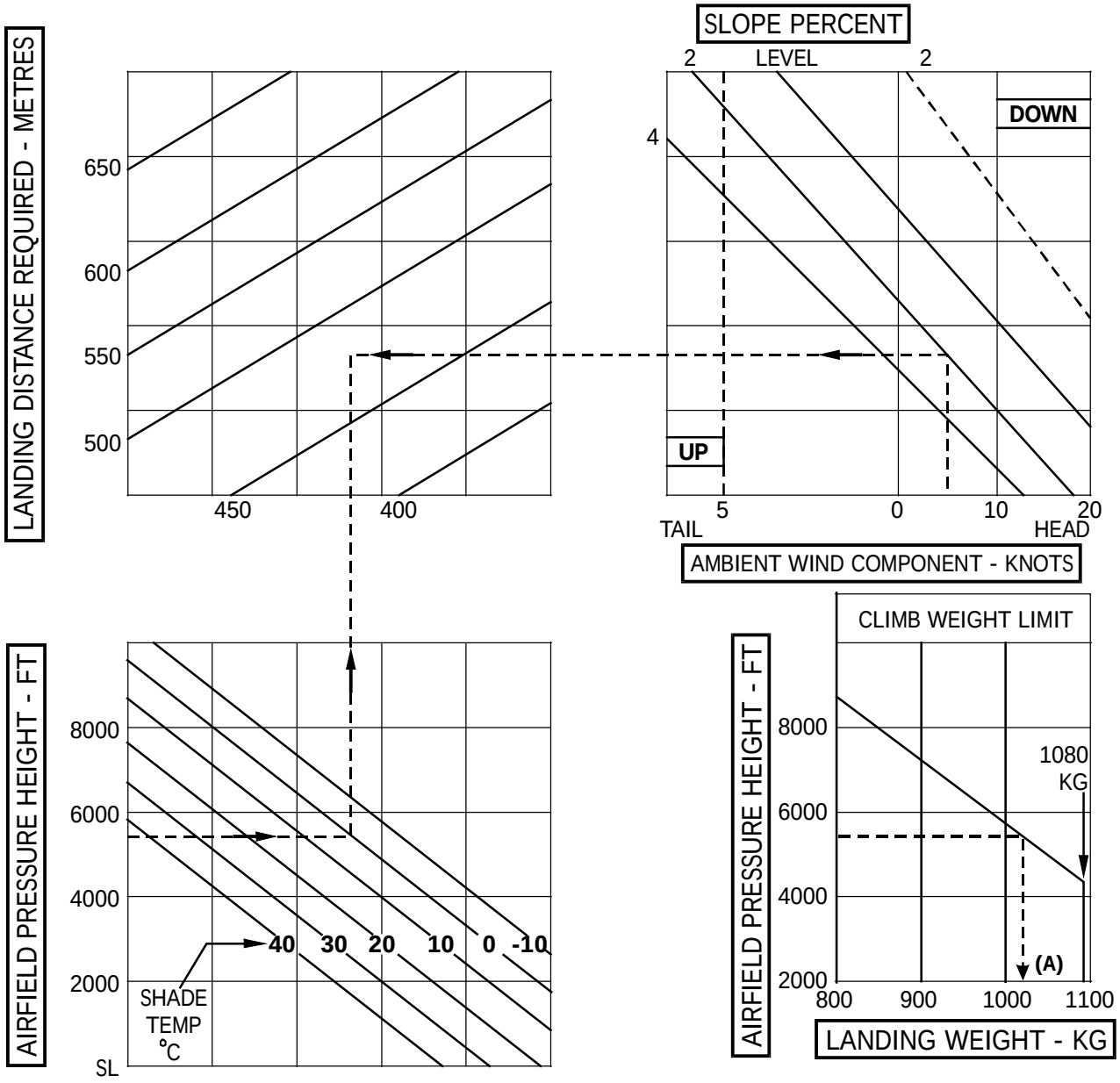
POWER TO BE USED	FULL THROTTLE
FLAP SETTING	10 DEGREES
TAKE-OFF SAFETY SPEED	60 KIAS
TAKE-OFF DISTANCE FACTOR	1.15

LANDING DISTANCE CHART
Figure 4




TAKE-OFF WEIGHT CHART
Figure 5
TAKE-OFF DISTANCE AVAILABLE - METRES
2400
2200
2000
1800
1600
1400
1200
1000
800
600
400
200
TAKE-OFF WEIGHT - KG
1055
1050
1000
950
900
850
800
750
REFERENCE LINE
REFERENCE LINE
LONG WET GRASS
SHORT WET OR LONG DRY GRASS
SHORT DRY GRASS
REFERENCE LINE HARD SEALED SURFACE
AMBIENT WIND COMPONENT - KT
HEAD
TAIL
SLOPE PERCENT
DOWN
UP
SURFACE
SHADE TEMPERATURE °C
AIRFIELD PRESSURE HEIGHT - FEET
0
2000
4000
6000
FLAP SETTING ZERO
TAKEOFF SAFETY SPEED 64 KT IAS
POWER SETTING FULL THROTTLE
RPM NOT LESS THAN 2350
CHART DISTANCE FACTOR 1.15
NOTE:
TAKEOFF WEIGHT MUST NOT EXCEED
CLIMB WEIGHT LIMIT BELOW
4000
5000
6000
850
900
950
1000
1055
CLIMB LIMIT WEIGHT - KG

LANDING CHART
Figure 6



NOTES:

(1) THE GROSS WEIGHT AT LANDING SHALL NOT EXCEED (A).

(2) LANDING DISTANCE REQUIRED DOES NOT VARY SIGNIFICANTLY WITH WEIGHT

FLAP SETTING	30 DEGREES
APPROACH SPEED	58 KIAS
LANDING DISTANCE FACTOR	1.15

LOADING SYSTEM ALPHA
CONFIGURATION: 6/7 SEATS

INSTRUCTIONS FOR USE OF LOADING SYSTEM

1 Obtain Basic Empty Weight and Index Units from current Section of 6.2 of Flight Manual.

2 Mark Basic Empty Weight Index Units on top scale. Enter Basic Empty Weight at top of right-hand column.

3 Enter weights of load items required for flight in appropriate squares of right-hand column. Maximum weights for load items are indicated on Index Unit scales.

4 Total weights in right-hand column to obtain Zero Fuel Weight and Take-Off Weight. **

5 Draw horizontal lines on CG Envelope graph corresponding to Zero Fuel Weight and Take-Off Weight.

6 Draw a line vertically down from point marked on Basic Empty Weight Index Units scale to first load item scale.
* Move to the left or right on this load item index scale as per arrow directions, and mark point as appropriate to the load indicated in the right-hand column.
(e.g. 154 KG load @ 77 KG/div. = 2 div.).

7 Draw a line vertically down from the point marked on the first load item index scale to the second load item index scale and continue as per * above. Continue down the scales to "Rear Baggage". Draw a line vertically from the "Rear Baggage" point down to intersect the Zero Fuel Weight line and Take-Off Weight line previously marked on the CG envelope graph.

8 The two intersection points as per 7, above must not exceed the boundaries of the CG envelope graph. If they do, re-organise the load in the aircraft and start again with steps 3 to 7.

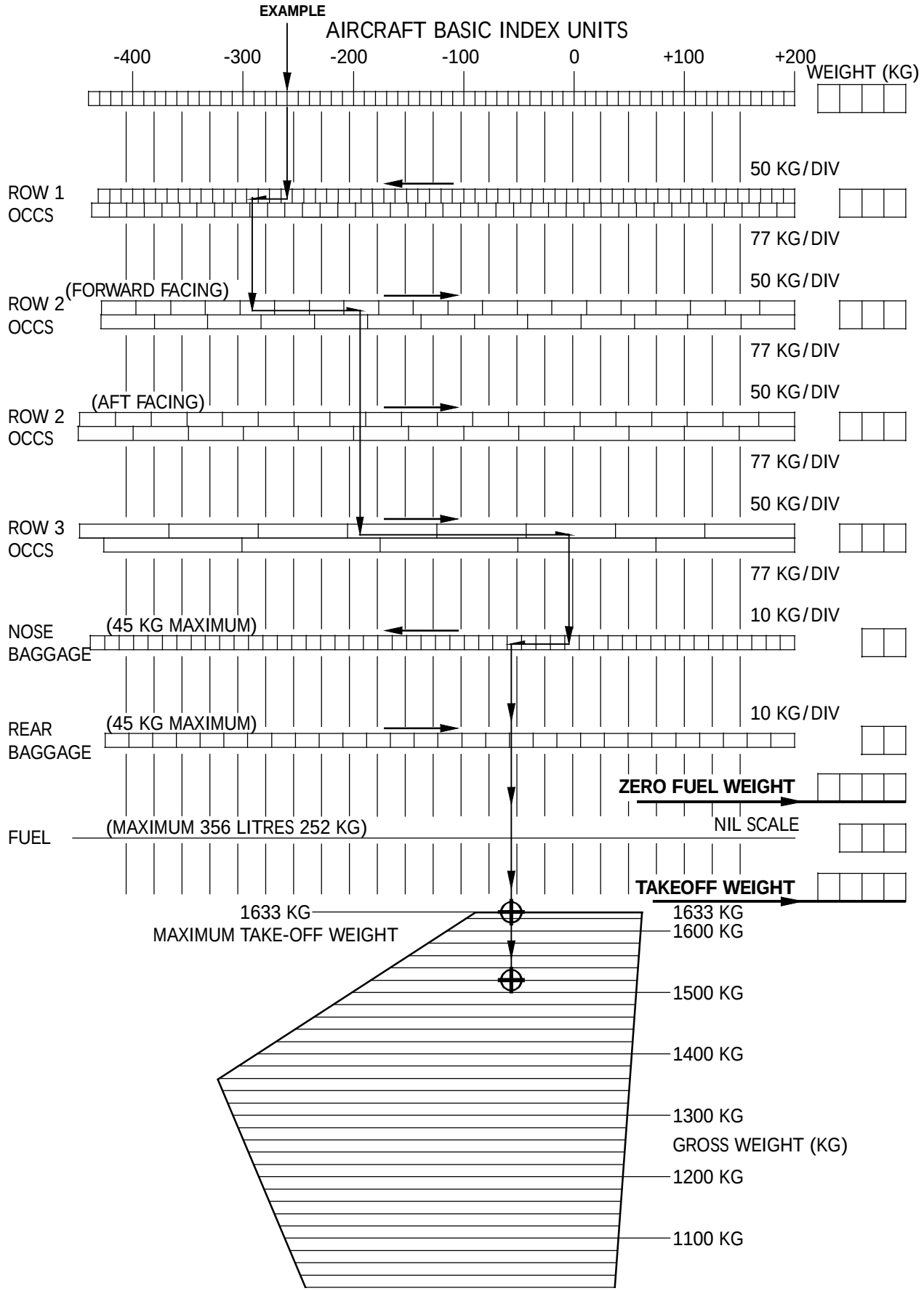
**** DO NOT EXCEED MAXIMUM TAKE-OFF WEIGHT AS SHOWN ON CG ENVELOPE DIAGRAM OF THIS LOADING SYSTEM**.

EXAMPLE:

Basic Empty Weight	1050 KG
Empty Index units	-260
Row 1	150 KG (2 persons)
Row 2 (forward facing)	160 KG (2 persons)
Row 3	120 KG (2 persons)
Nose baggage	40 KG ---------- Zero Fuel Wt = 1520 KG
Rear baggage	Nil
Fuel	113 KG ---------- Take-Off Wt = 1633 KG

Note: Basic Empty Weight includes unusable fuel and full oil.

LOADING SYSTEM ALPHA
Figure 7



LOADING SYSTEM BRAVO
CONFIGURATION: 4 SEATS

INSTRUCTIONS FOR USE OF LOADING SYSTEM

To check the loading of the aircraft before take-off, calculate the total weight and total moments as shown in the example below.

Plot the total weight and moment on the "Centre of Gravity Envelope" chart, and if the intersection point is within the envelope, the loading is acceptable.

AIRCRAFT LIMITATIONS

Maximum take-off weight
Normal category: 1000 KG / 2200 lbs
Utility category: 841 KG / 1850 lbs

Maximum baggage compartment baggage: 53 KG / 120 lbs

Notes:

1 The aircraft is fitted with standard tanks (37 US Gallons at 6 lbs / gallon)
2 Empty weight includes unusable fuel and undrainable oil
3 Obtain Moment / 1000 inch pounds from the loading graph

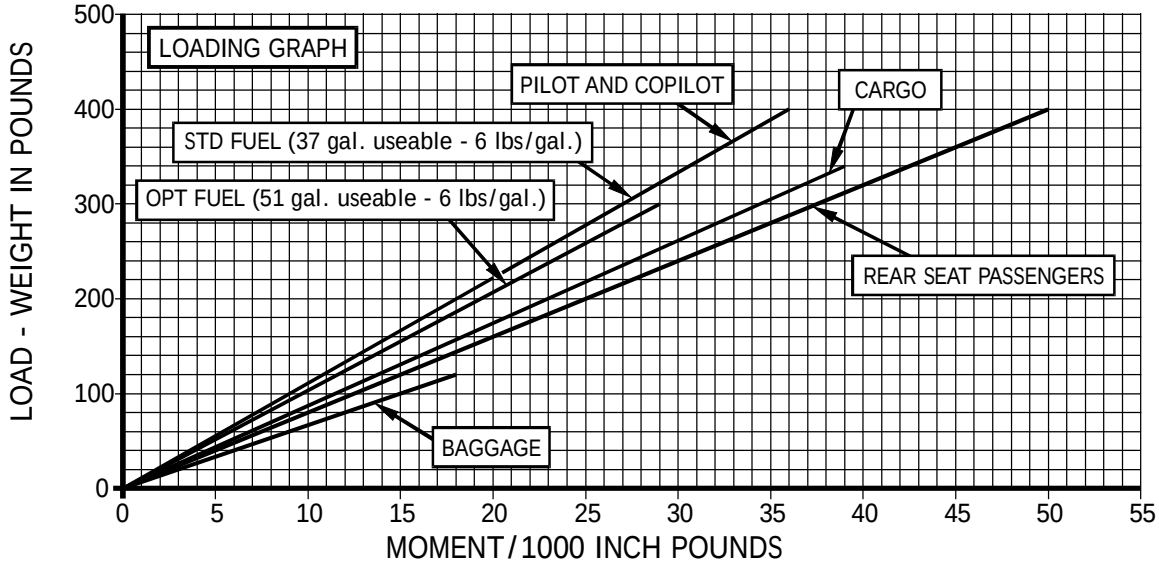
EXAMPLE:

	WEIGHT (LBS)	ARM (IN)	MOMENT/1000 IN LB
Empty weight	1260	80	100.80
Oil	15	32	.48
Fuel (141 litres)	222	91	20.02
Pilot & Co-Pilot	320	91	29.12
Rear seat passengers	350	126	44.10
Baggage	25	151	3.78
Take-Off Weight	2192		198.30

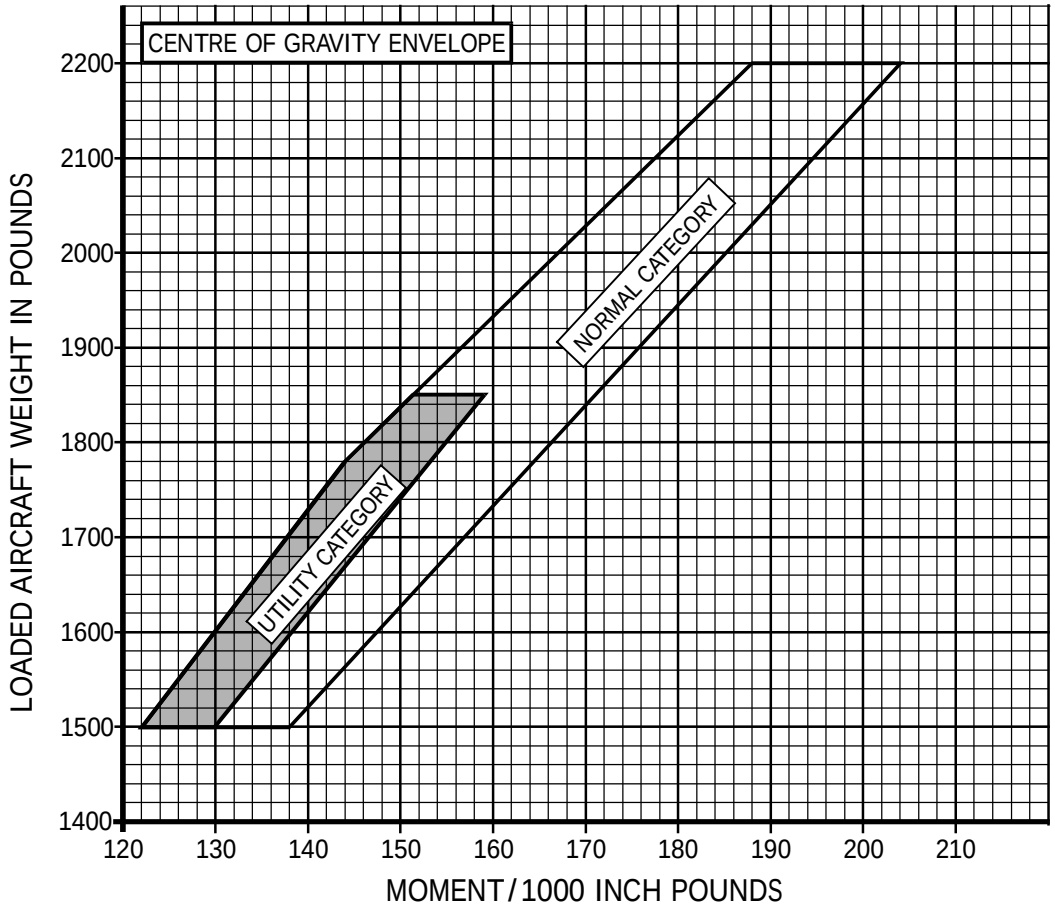
Check CG is within the envelope

LOADING SYSTEM BRAVO
Figure 8

Add weight of items to be carried to aeroplane licensed empty weight. Add moment/1000 of items to be carried to total aeroplane moment/1000. Use Centre of Gravity Envelope to determine acceptibility.



LOADING GRAPH



CENTRE OF GRAVITY ENVELOPE

LOADING SYSTEM CHARLIE
CONFIGURATION: 4 SEATS

INSTRUCTIONS FOR USE OF LOADING SYSTEM

To check the loading of the aircraft before take-off, carry out a summation of weight and index units as shown in the example below. Check the centre of gravity of the aircraft at Zero Fuel Weight and Take-Off Weight by use of the formula:

$$\text{CG (mm aft of datum)} = \frac{\text{Index unit} \times 100}{\text{Weight}}$$

The CG must be within the envelope given at all times.

AIRCRAFT LIMITATIONS

Maximum take-off weight	
Normal category:	1115 KG
Utility category:	925 KG
Maximum baggage compartment baggage:	122 KG

Notes:

1 Aircraft empty weight includes unusable fuel and undrainable oil
2 All arms are in mm aft of datum
3 1 index unit = 100 KG mm

EXAMPLE:

		KG	**IU**
Aircraft empty weight		687	19,522
Full oil		7	86
1 pilot + 1 passenger	Row 1	140	3,850
2 passengers	Row 2	160	5,760
Baggage		20	842
Zero Fuel Weight		1014	30,060
Fuel 140 litres		99	2,920
Take-off Weight		1113	32,980

CG check 1. At Zero Fuel Weight = (30,060 x 100) / 1014 = 2965 mm OK

2. At Take-Off Weight = (32,980 x 100) / 1113 = 2963 mm OK

LOADING SYSTEM CHARLIE

INDEX UNITS

Fuel	ARM: 2950		BAGGAGE	ARM: 4210
20	14	413	10	421
40	28	826	20	842
60	43	1,268	30	1,263
80	57	1,682	40	1,684
100	71	2,095	50	2,105
120	85	2,507	60	2,526
140	99	2,920	70	2,947
160	114	3,363	80	3,368
180	129	3,806	90	3,789
200	142	4,189	100	4,210
216	153	4,513	110	4,631
			122	5,136

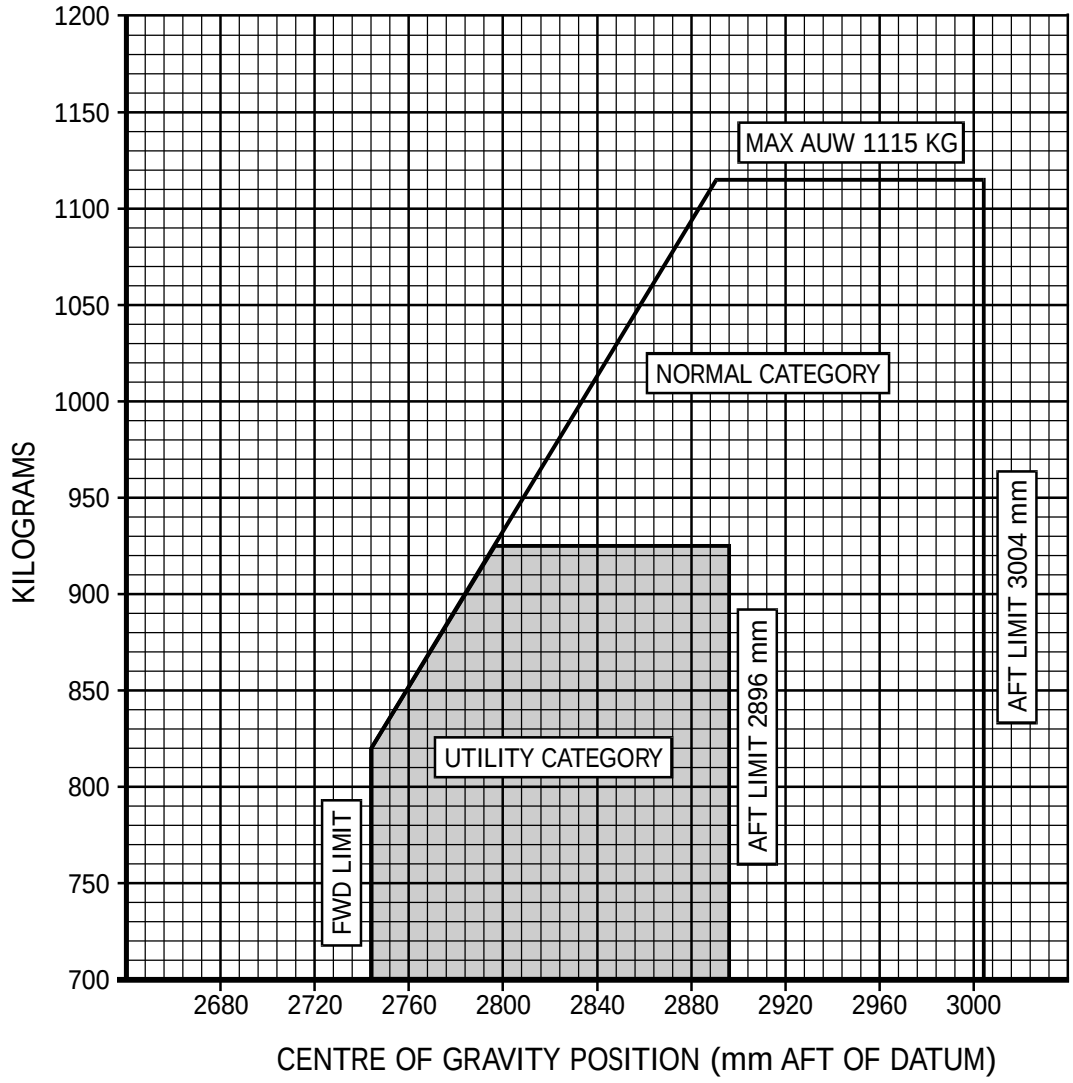
OCCUPANTS

KG	ROW 1 ARM: 2750	ROW 2 ARM: 3600
40	1,100	1,440
45	1,237	1,620
50	1,375	1,800
55	1,512	1,980
60	1,650	2,160
65	1,786	2,340
70	1,925	2,520
75	2,062	2,700
80	2,200	2,880
85	2,338	3,060
90	2,475	3,240

OIL ARM : 1230

US Quarts	LITRES	KG	INDEX UNITS
6	5.7	5.0	62
7	6.6	6.0	74
8	7.6	7.0	86

LOADING SYSTEM CHARLIE
Figure 9



ALLOWABLE CENTRE OF GRAVITY ENVELOPE

CONVERSION FACTORS

1 inch = 25.4 mm

1 foot = 0.305 metre

1 lb = 0.454 KG

1 Imp gal = 1.201 US gal = 4.546 litres

100/130 aviation gasoline: Specific Gravity = 0.71

LOADING SYSTEM ECHO
CONFIGURATION: 6 SEATS

INSTRUCTIONS FOR USE OF LOADING SYSTEM

1 Moment Index chart (fig 10, page 20) may be used to determine the balance of the aeroplane. Locate the weight (in KG) of a particular load item on the vertical scale and move horizontally to the line representing the location of that item. From that point drop vertically to read off the Moment Index for that item.

2 Obtain the aeroplane basic empty weight and index units from the examination question. Add up the required total weight (Gross Weight) of the aeroplane and the corresponding Total Moment Index.

3 Refer to the Centre of Gravity chart (fig 11, page 21). Locate the Gross Weight of the loaded aeroplane (in KG) on the vertical scale and move horizontally to meet the vertical line representing the Total Moment Index of the loaded aeroplane. If the point of intersection, which represents the Centre of Gravity, falls in the shaded area, the aeroplane is correctly loaded.

Note: The Centre of Gravity must lie in the shaded area at ALL stages of flight.

Weight Limitations:

Maximum Take-off Weight	2950 KG
Maximum Landing Weight	2725 KG
Maximum Zero Fuel Weight	2630 KG

Balance Data: The Mean Aerodynamic Chord (MAC) data is as follows:

Length of chord	1900 mm
Location of leading edge	2190 mm aft of datum

Centre of Gravity range is a follows:
2400 mm to 2680 mm at 2360 KG or less
2560 mm to 2680 mm at 2950 KG
Linear variation between the points given

Loading Data:

Location	Maximum Permissible Load	Load Arm (mm Aft of Datum)
Seating:		
Row 1 (Seats 1 & 2)	Pilot + 1 Passenger	2290
Row 2 (Seats 3 & 4)	2 Passengers	3300
Row 3 (Seats 5 & 7	2 Passengers	4300
Cargo & Baggage Compts:		
Forward Compt	55 KG	500
Left wing Compt.	55 KG	3550
Right wing Compt.	55 KG	3550
Rear Compartment	155 KG	5000
Floor loading intensity	(All Compts) 450 KG/m^2	
Fuel:		
Left main tank	50 gal	1780
Right main tank	50 gal	1780
Left auxiliary tank	40 gal	2800
Right auxiliary tank	40 gal	2800

LOADING SYSTEM ECHO (continued)

Note: All passenger seats weigh 5 KG each and may be removed to permit the carriage of additional cargo or baggage in the cabin.

The maximum permissible load in the area otherwise occupied by a passenger seat is 82 KG.

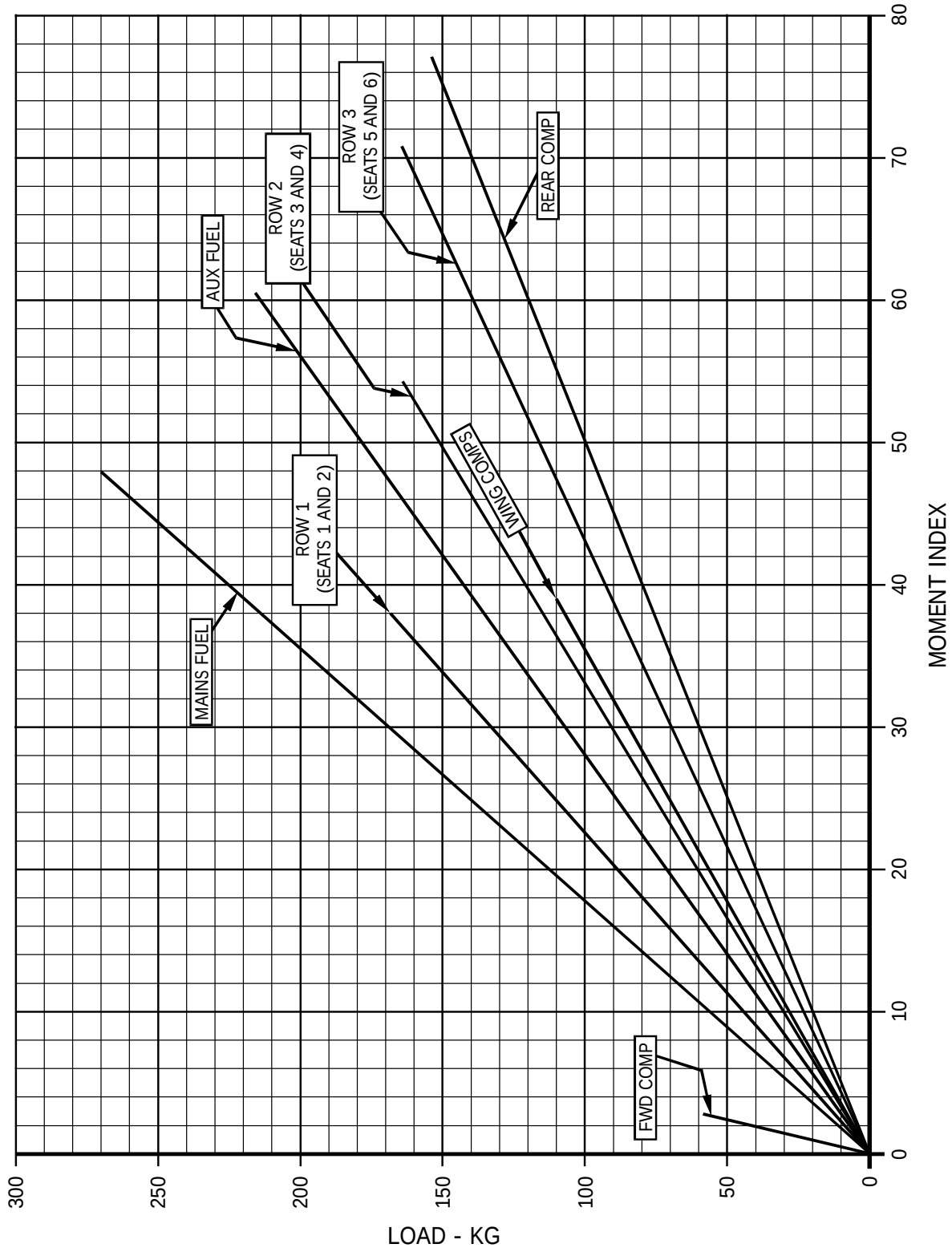
If a passenger seat is removed, adjust the empty weight and empty moment.

EXAMPLE:

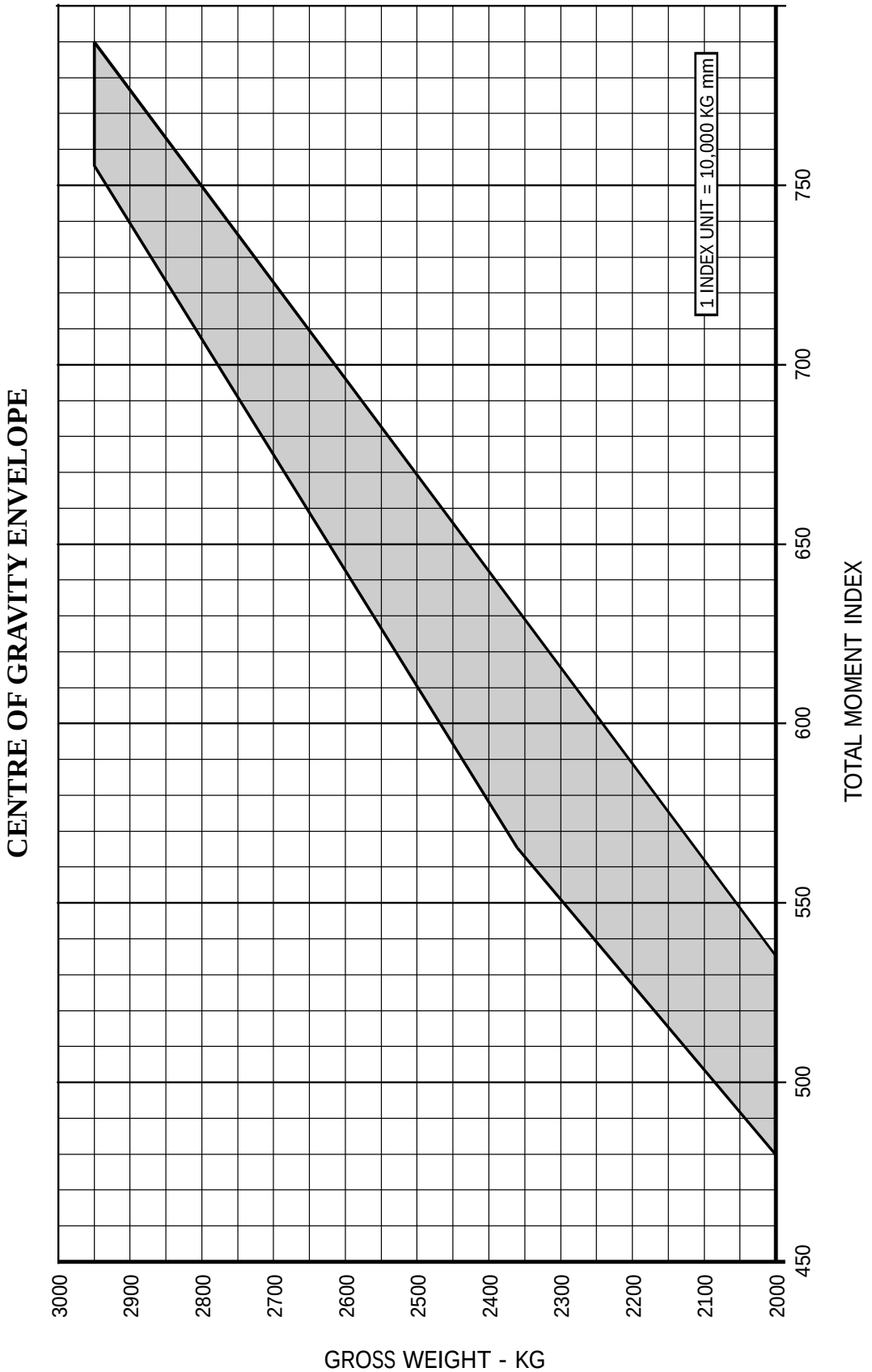
	WEIGHT (KG)	**MOMENT INDEX** (Refer to Figure 10)
Aeroplane Basic Empty Weight	1970	478.0
Row 1 (2 passengers)	150	34.0
Row 2 (2 passengers)	140	46.3
Row 3 (2 passengers)	130	56.0
Rear compartment	100	50.0
Zero Fuel Weight	**2490**	**664.3**
Fuel in Main tanks	200	35.5
Take-off Weight	**2690**	**699.8**
Fuel Burn-off	80	14.3
Landing Weight	**2610**	**685.5**

Refer to the Centre of Gravity Chart (Fig 11, page 21) to assess whether the horizontal line from the "Gross Weight" in question intersects the vertical line from its corresponding Total Moment Index in the shaded area.

LOADING SYSTEM ECHO
Figure 10

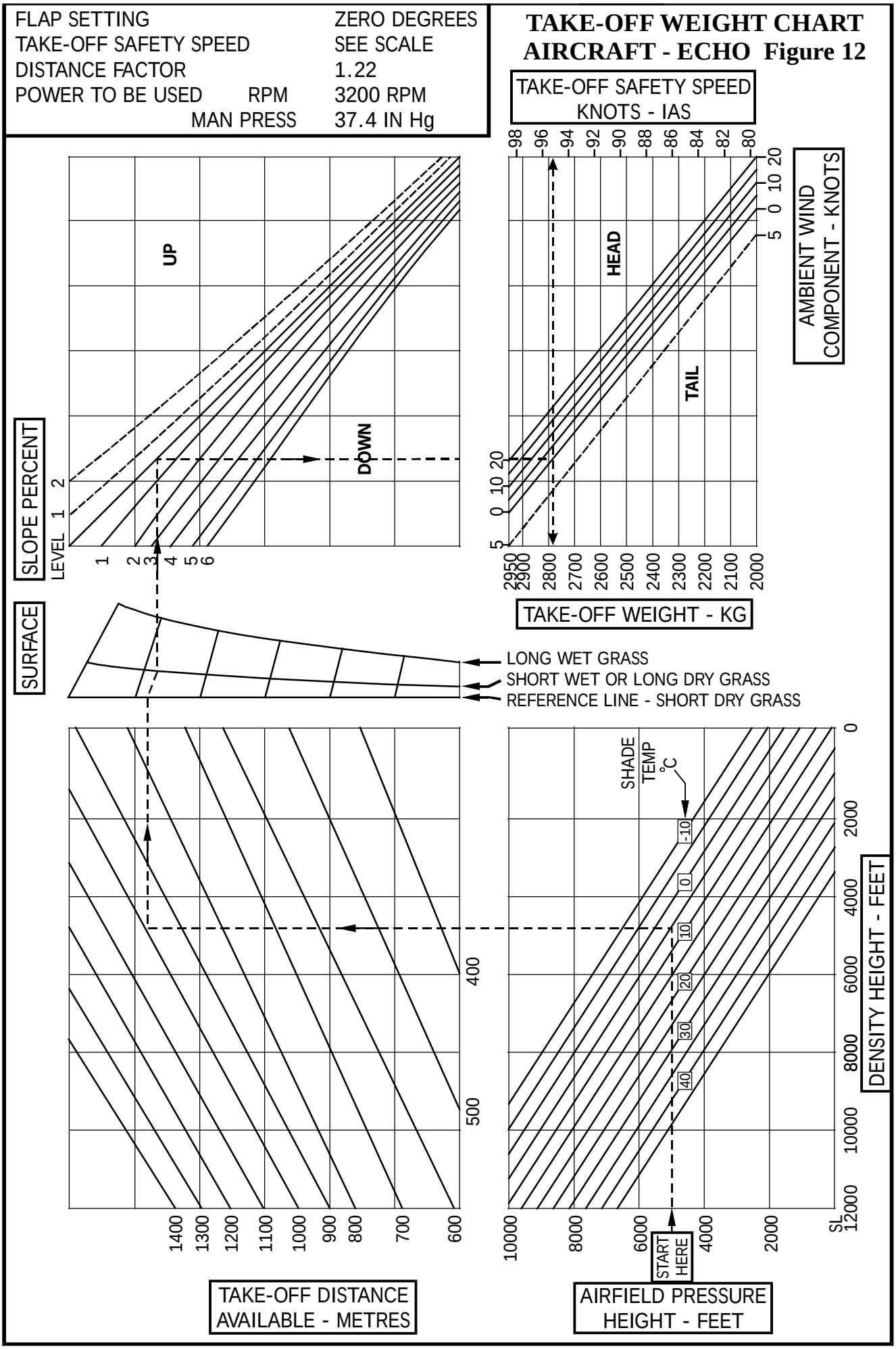


LOADING SYSTEM ECHO
Figure 11

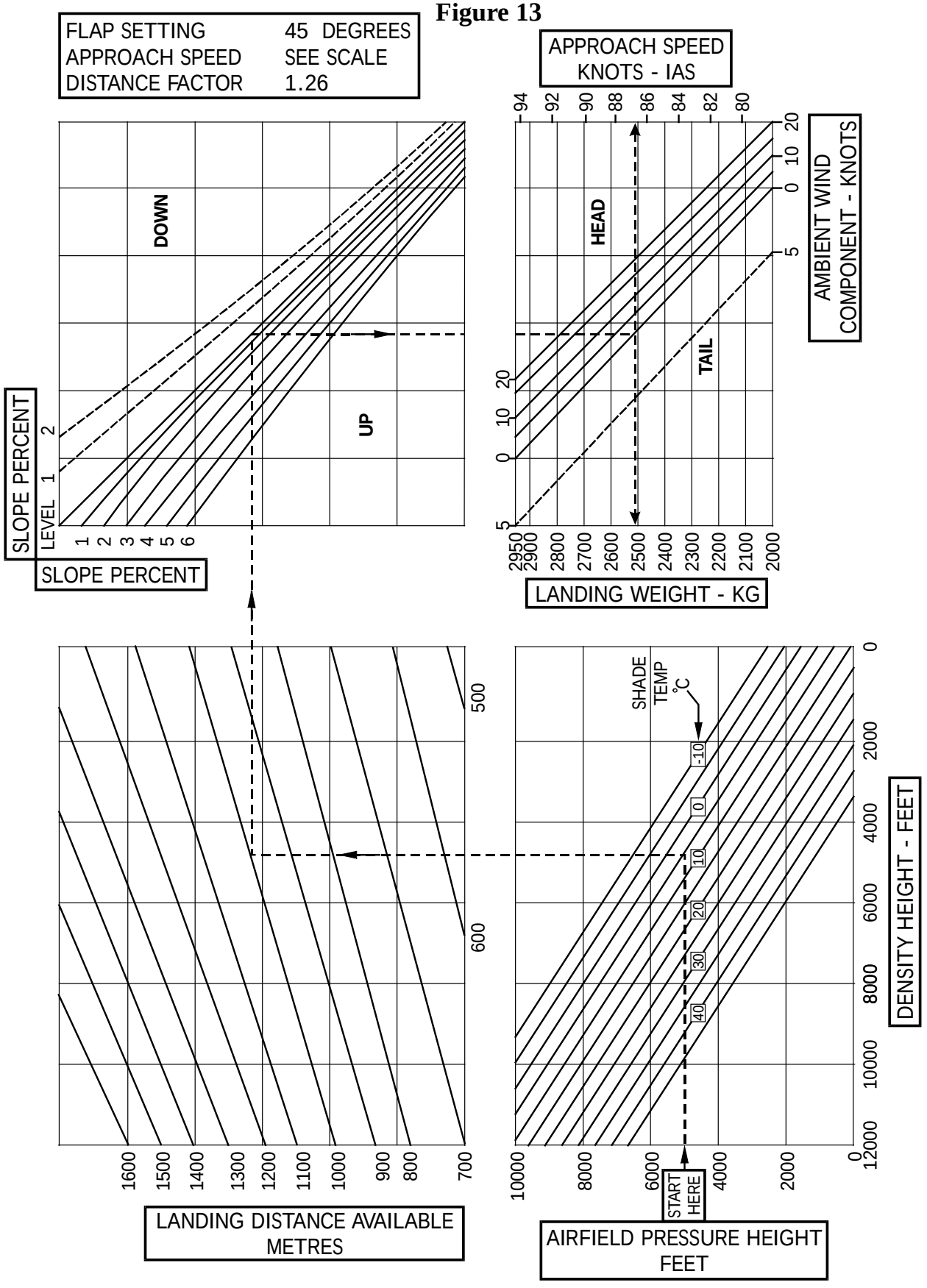


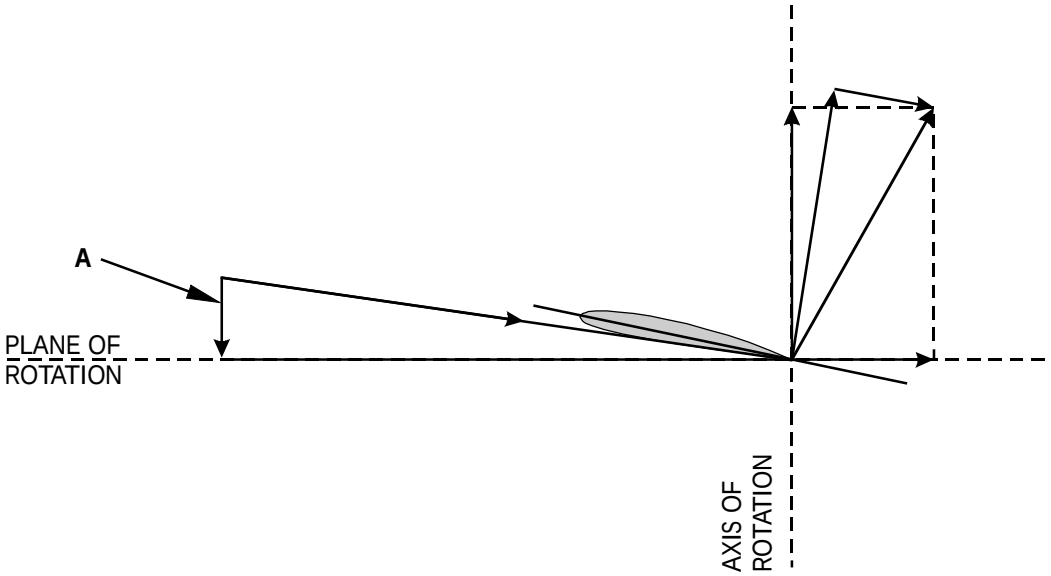
TAKE-OFF WEIGHT CHART
AIRCRAFT - ECHO Figure 12

FLAP SETTING	ZERO DEGREES
TAKE-OFF SAFETY SPEED	SEE SCALE
DISTANCE FACTOR	1.22
POWER TO BE USED RPM	3200 RPM
MAN PRESS	37.4 IN Hg

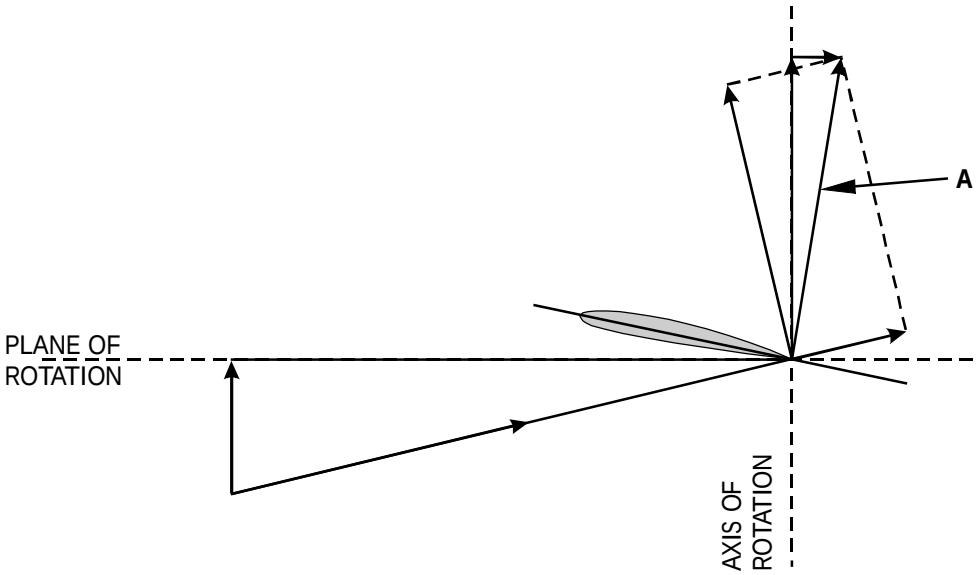


LANDING WEIGHT CHART
AIRCRAFT - ECHO
Figure 13

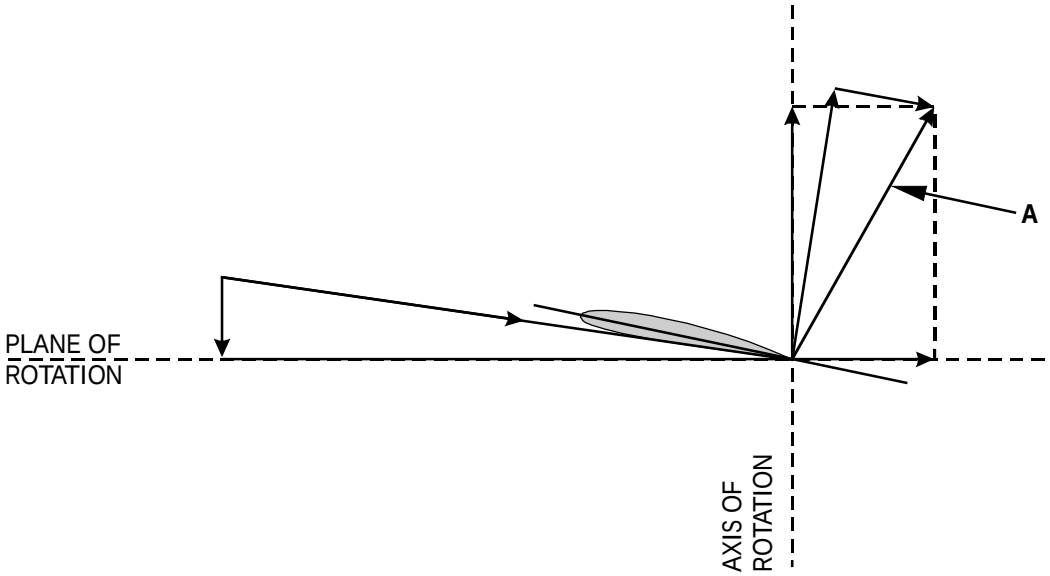




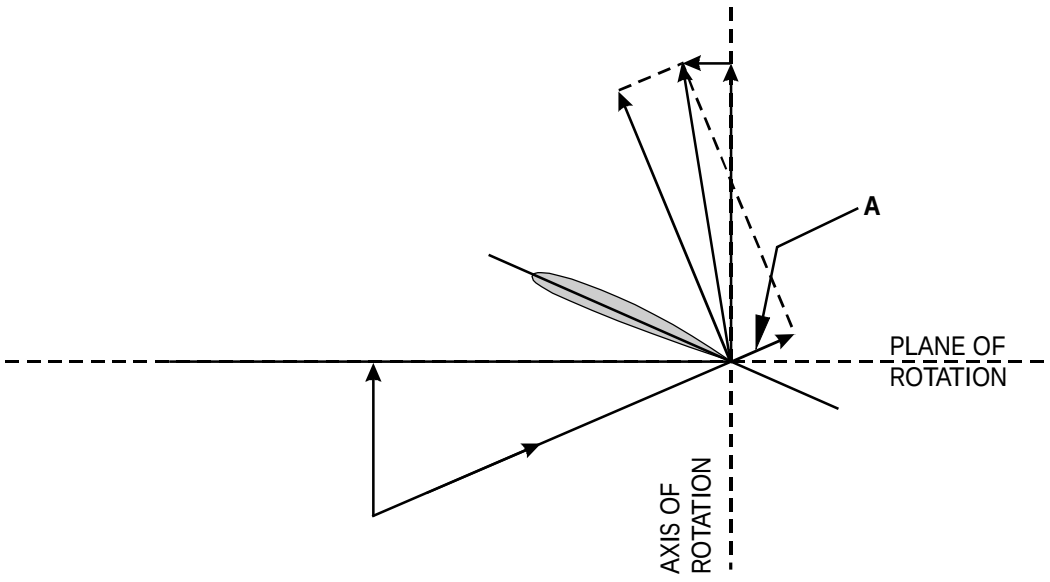
Helicopter Figure "A"



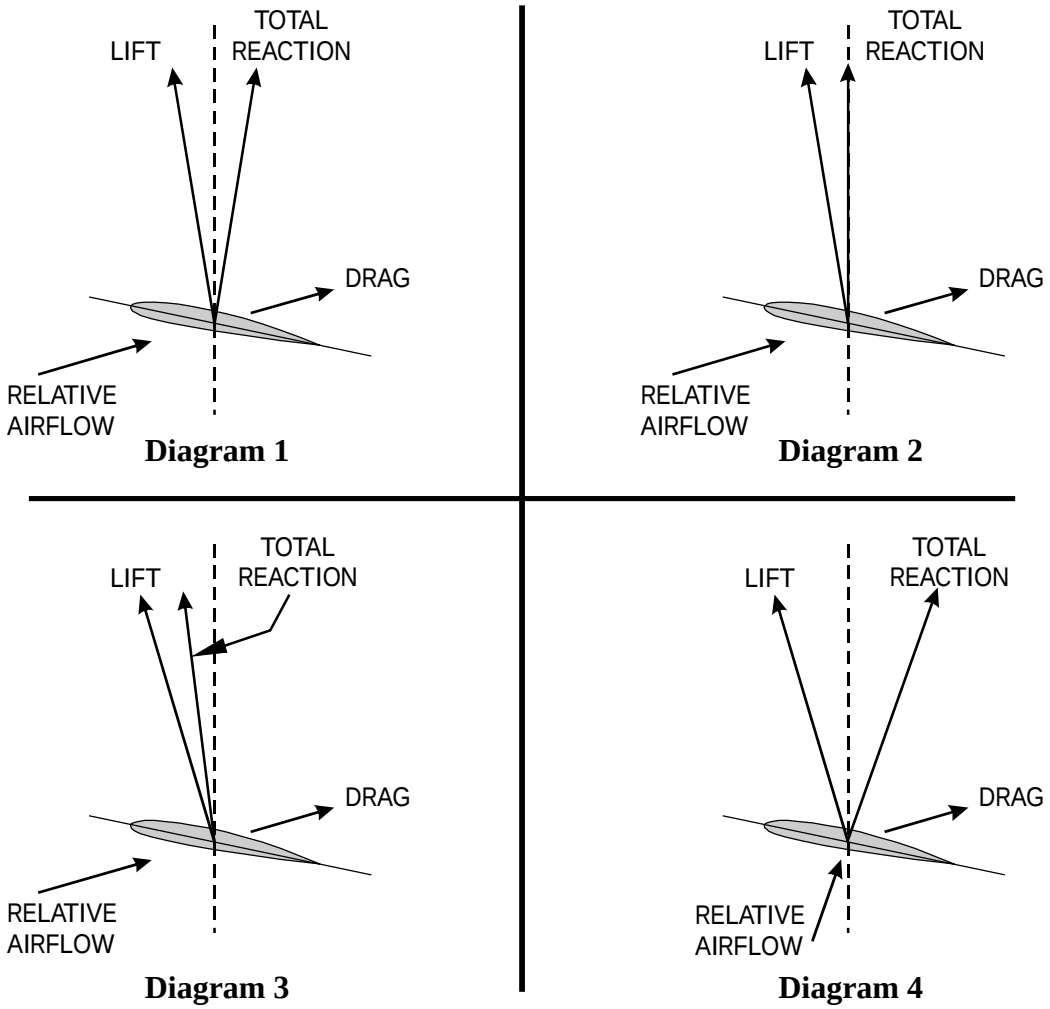
Helicopter Figure "B"



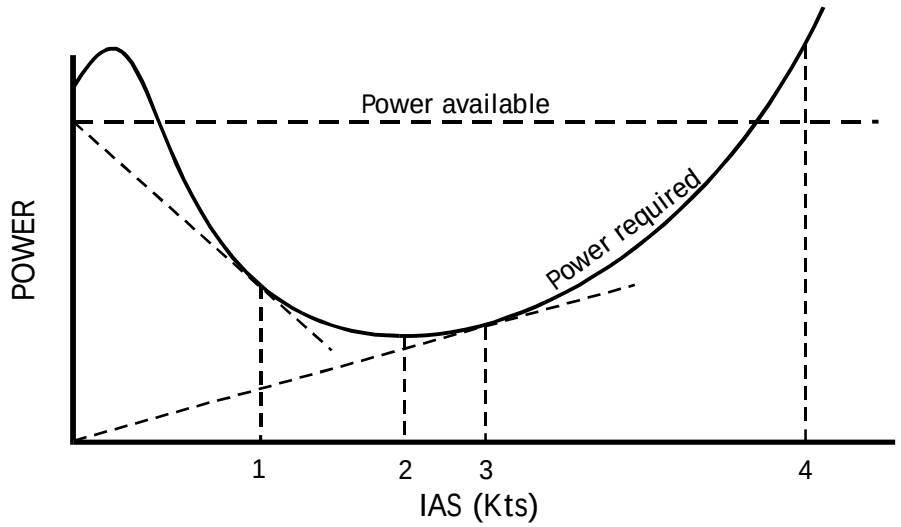
Helicopter Figure "C"



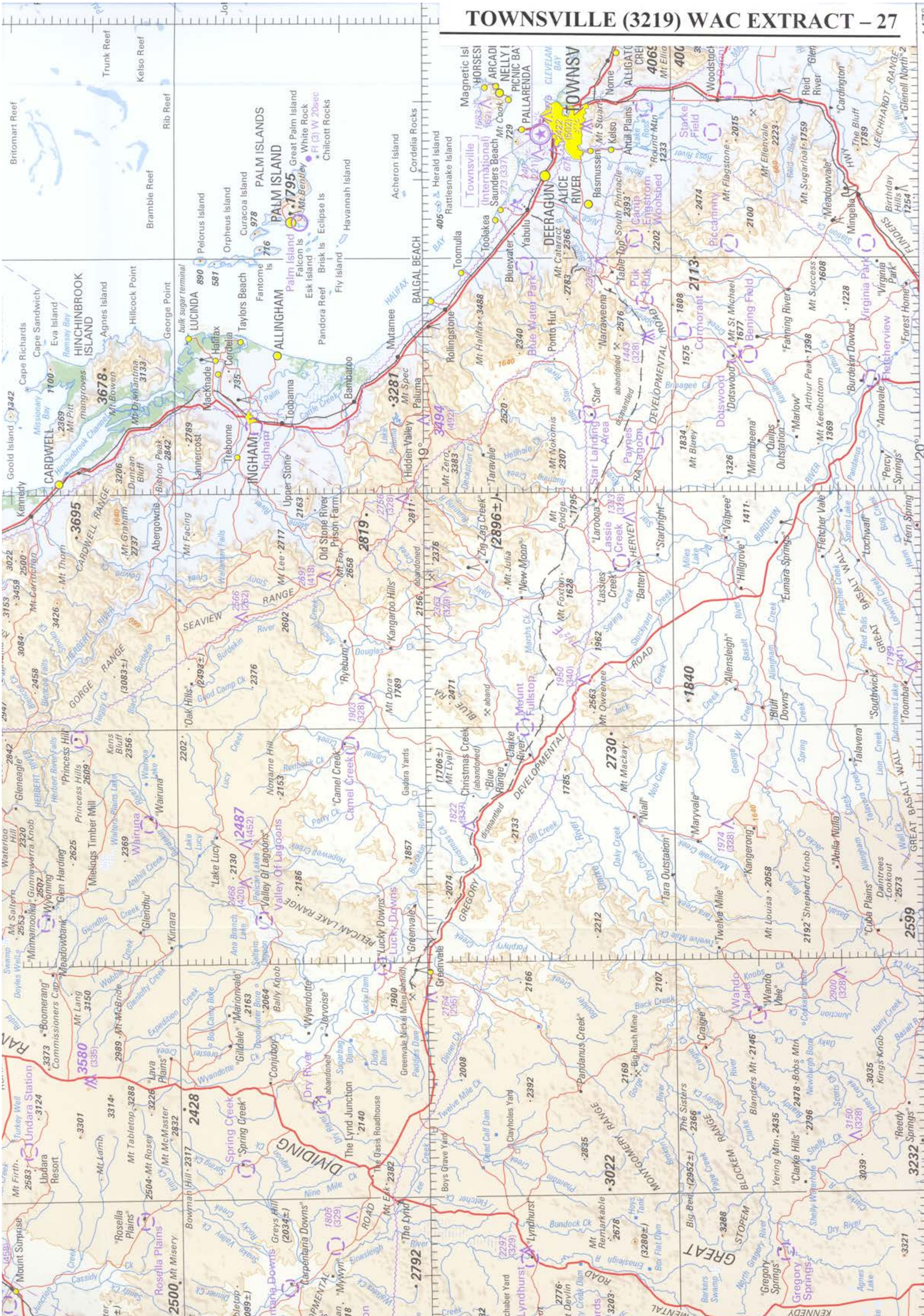
Helicopter Figure "D"



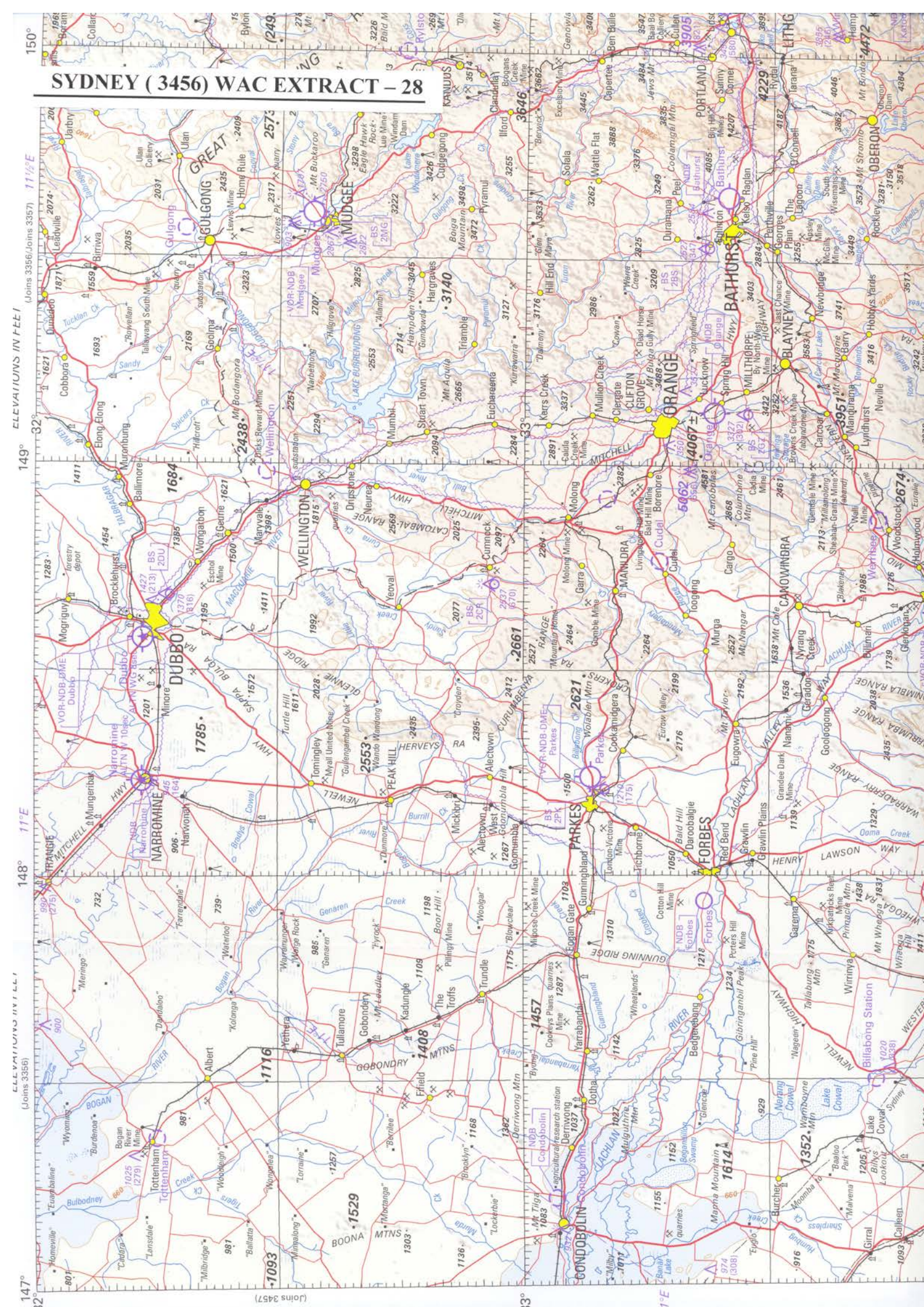
Helicopter Figure "E"

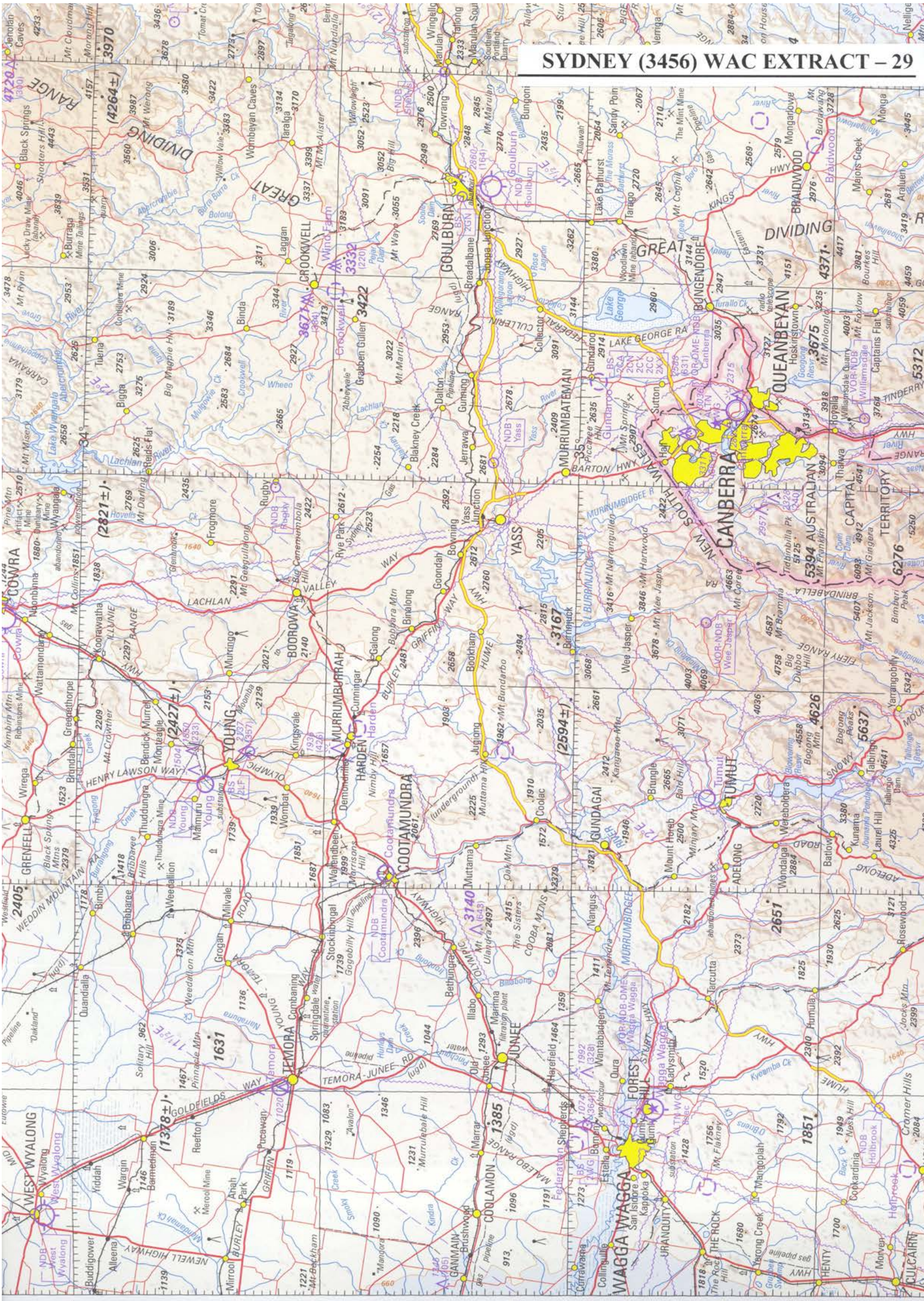


Helicopter Figure "F"


PALM ISLANDS
PALM ISLAND
HINCHINBROOK ISLAND
CARDWELL
LUCINDA
INGHAM
ALLINGHAM
BALGAL BEACH
DEERAGUN
ALICE RIVER
Townsville (International)
CARDWELL RANGE
GORGE RANGE
SEAVIEW RANGE
PELICAN LAKE RANGE
DIVIDING
GREGORY DEVELOPMENTAL
MONTGOMERY RANGE
BLOCKEM RANGE
STOPEM
GREAT BASALT WALL
Valley Of Lagoons
Mount Fullstop
Star Lagoon
Greenvale
Undara Station
Spring Creek
Dry River
Rosella Plains
Lyndhurst
Gregory Springs
Blue Water Park
Virginia Park
Fletcherview
Dotswood
Cormorant
Bening Field
Piccaninny
Payne's Lagoon
Lassie Creek
Wairuna
Camel Creek
Lucky Downs

SYDNEY (3456) WAC EXTRACT – 28

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CANBERRA
BUNGENDORE
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COWRA
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YOUNG
HARDEN
MURRUMBURRAH
COOTAMUNDRA
GUNDAGAI
TUMUT
ADELONG
GRENFELL
TEMORA
JUNEE
WAGGA WAGGA
FOREST HILL
WEST WYALONG
COOLAMON
GANMAIN
URANQUINTY
THE ROCK
HENTY
CULCAIRN
GREAT DIVIDING RANGE
AUSTRALIAN CAPITAL TERRITORY
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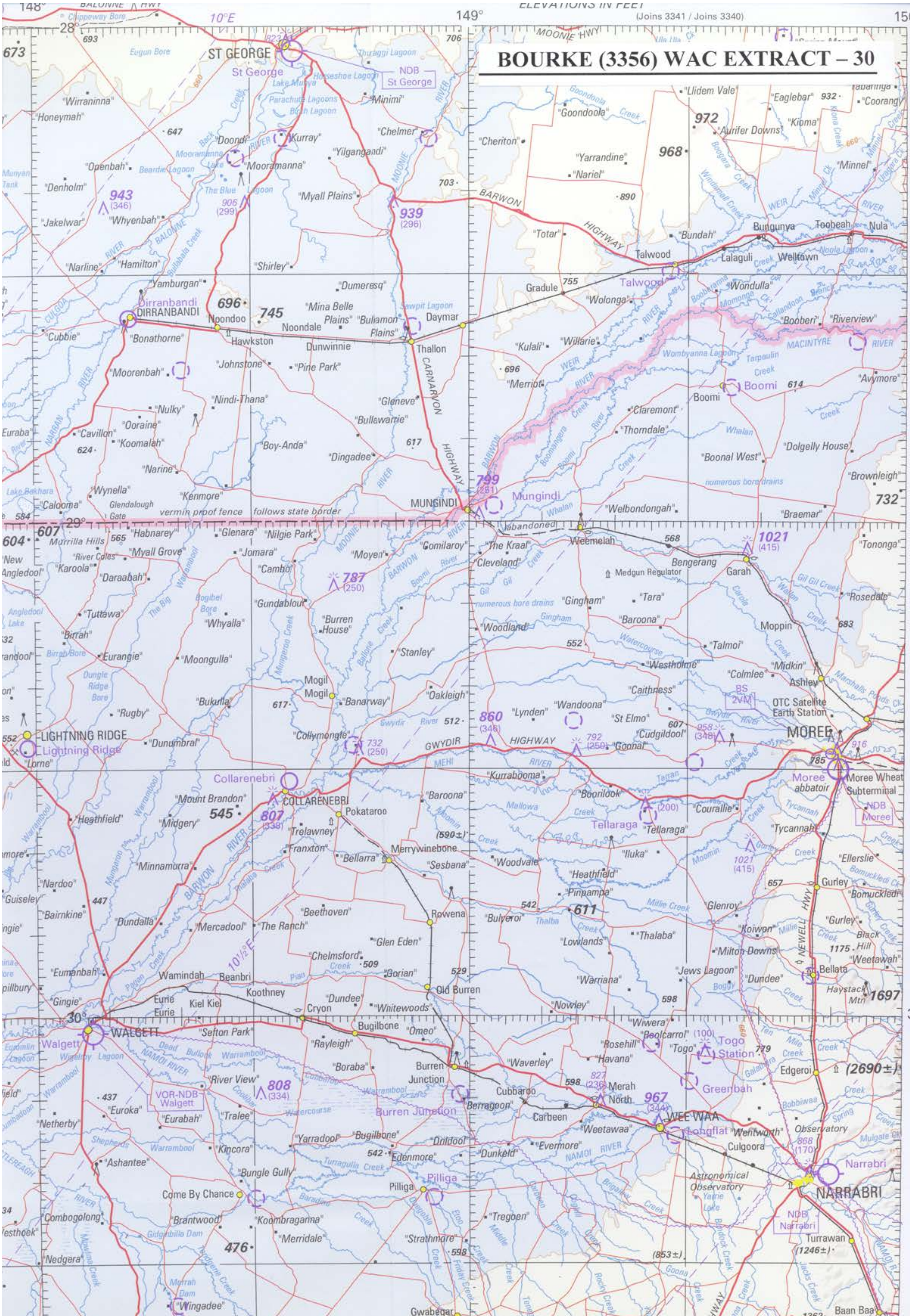
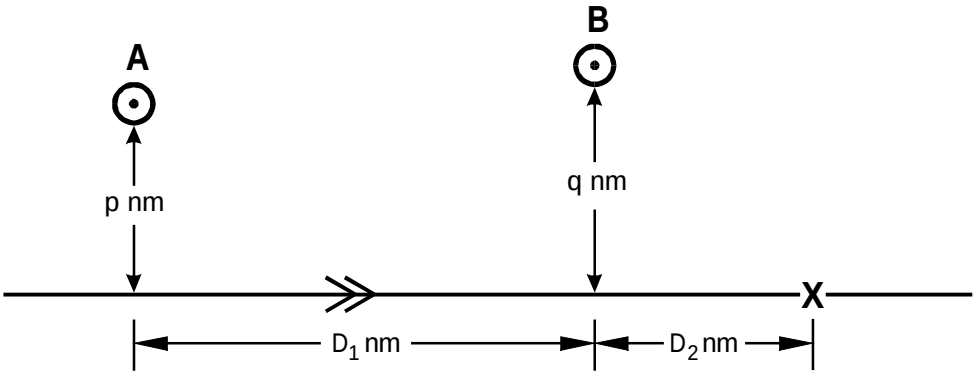
(Joins 3457)

BOURKE (3356) WAC EXTRACT – 30





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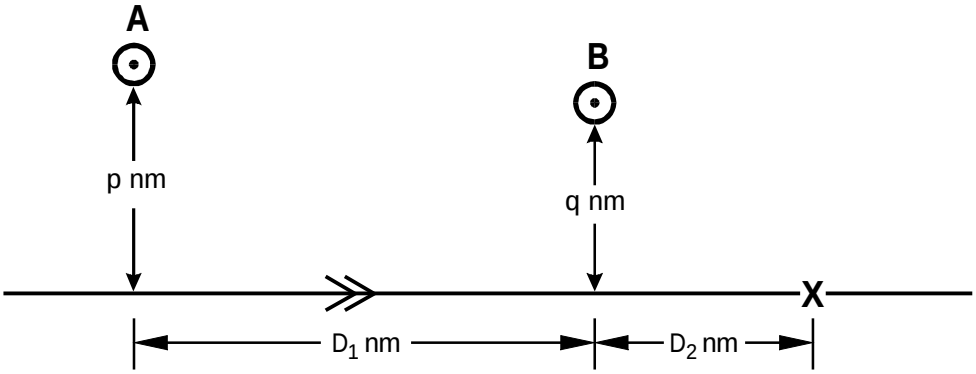

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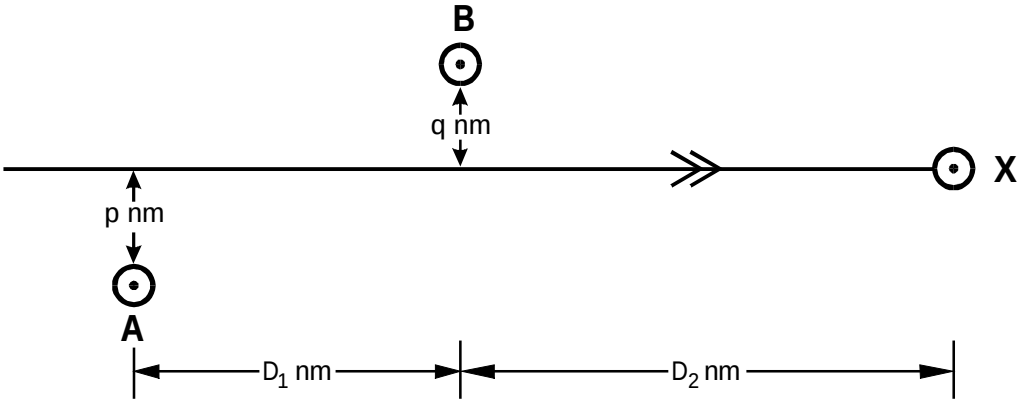
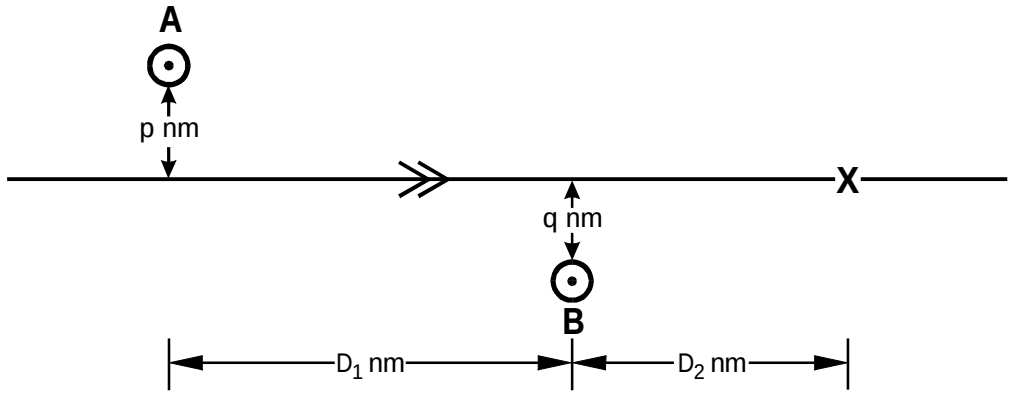


Figure 18



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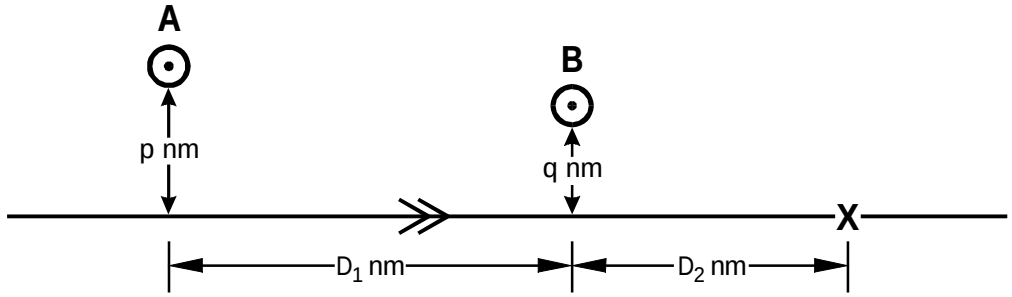

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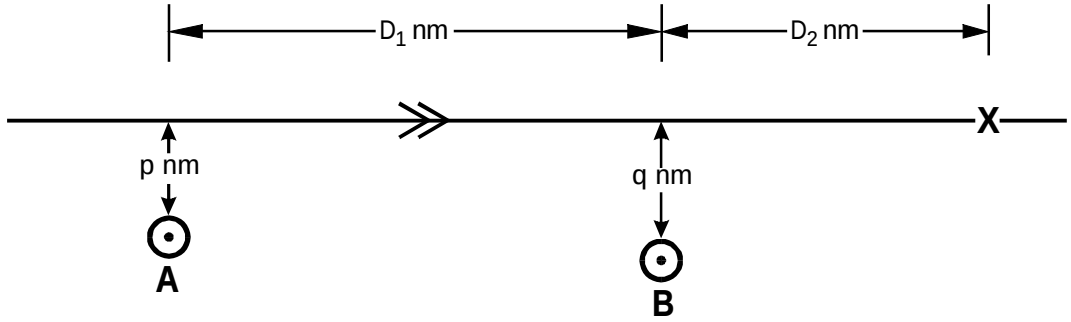


Figure 21

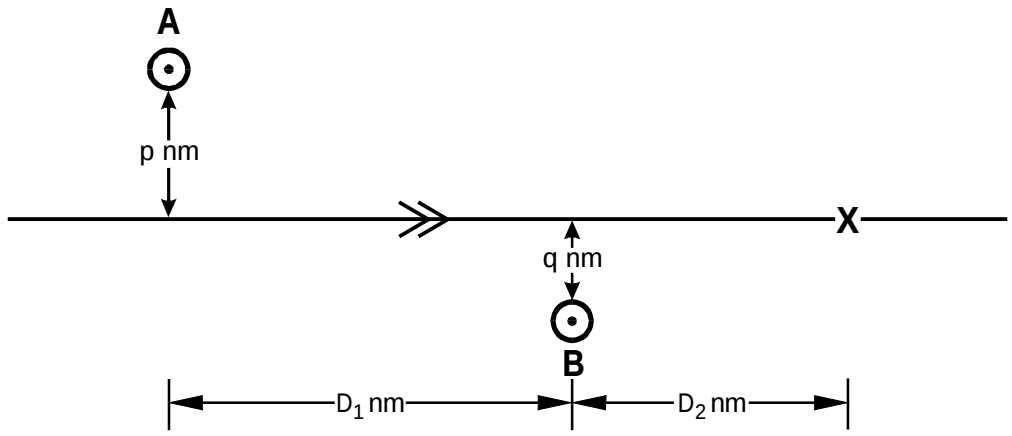


Figure 22

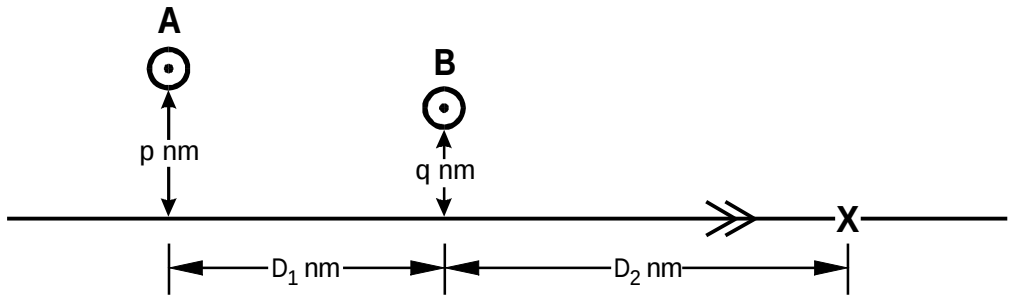
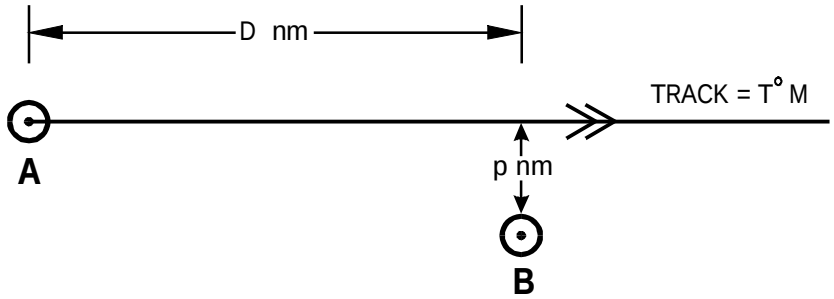


Figure 23



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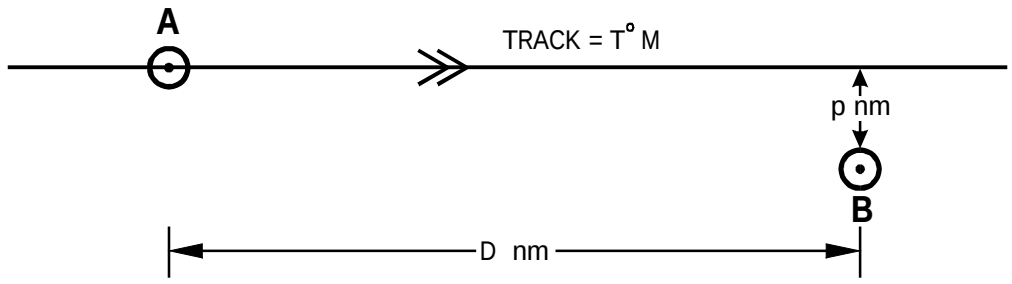

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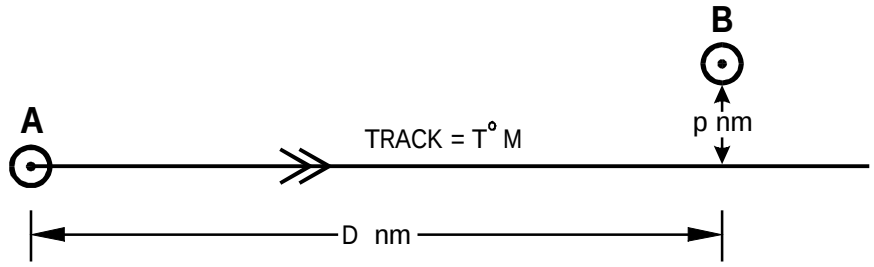

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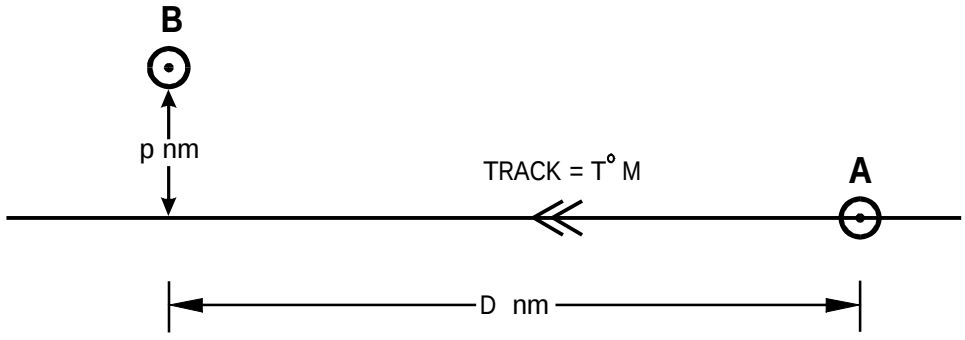

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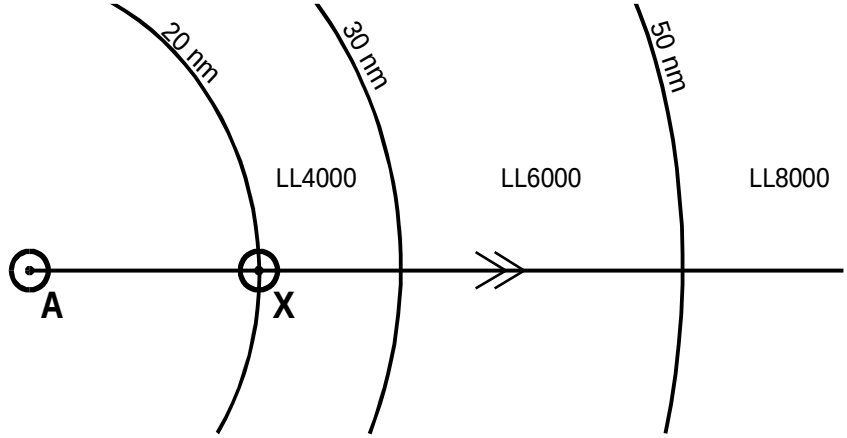

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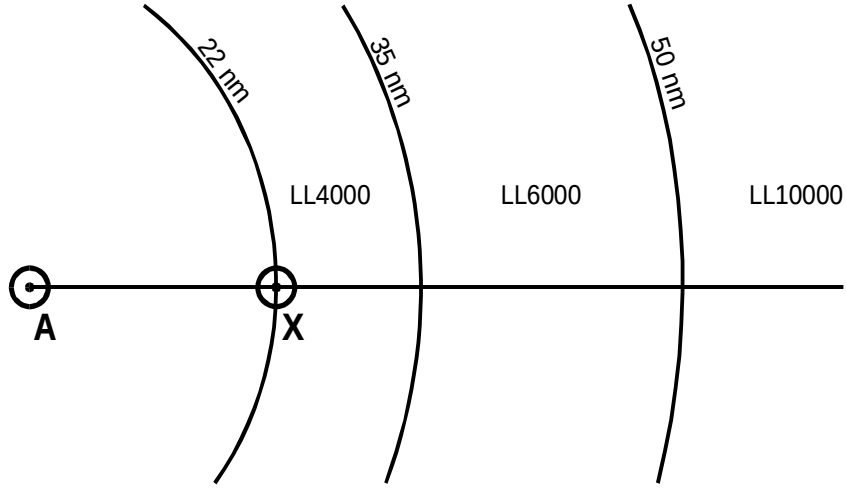

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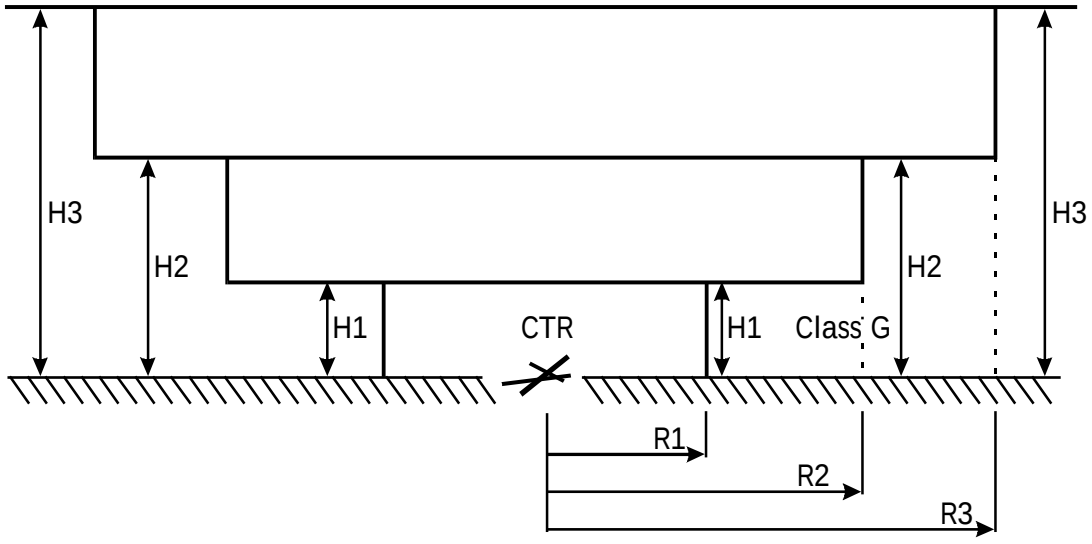


Figure 29A

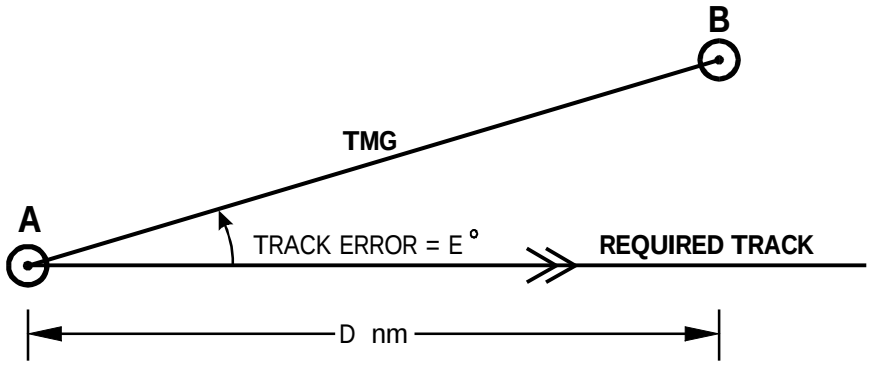
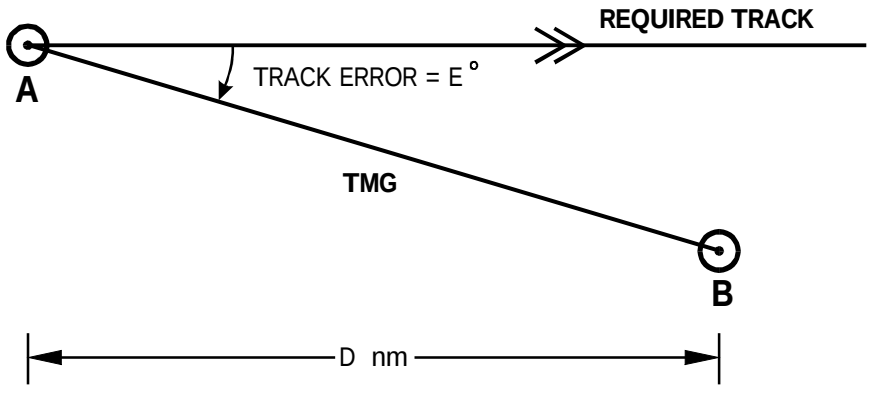


Figure 30



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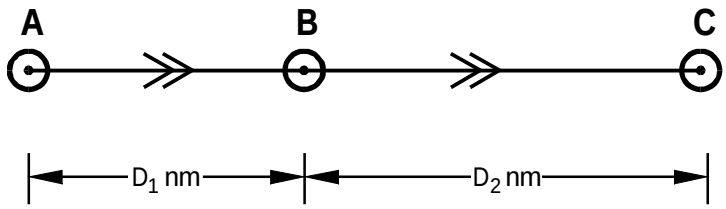

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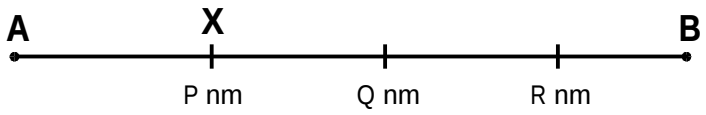

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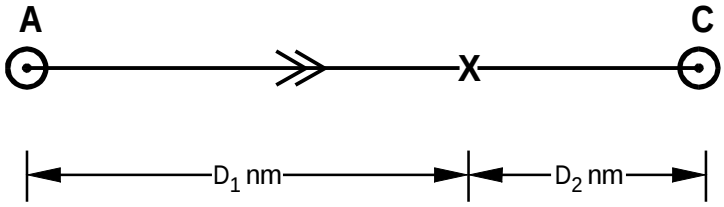

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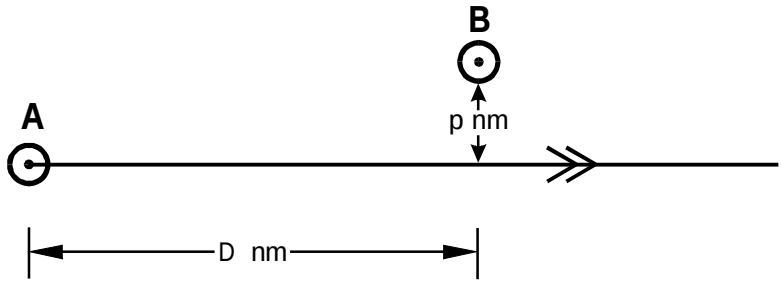
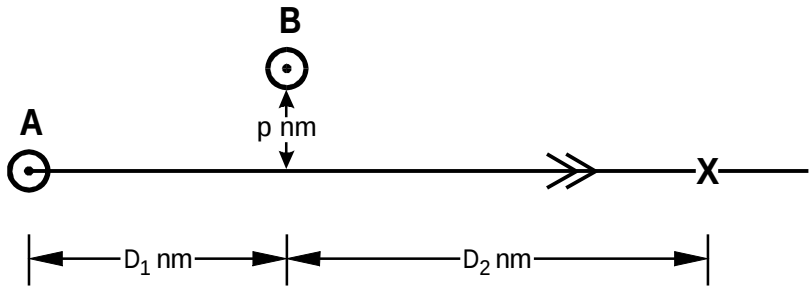


Figure 35



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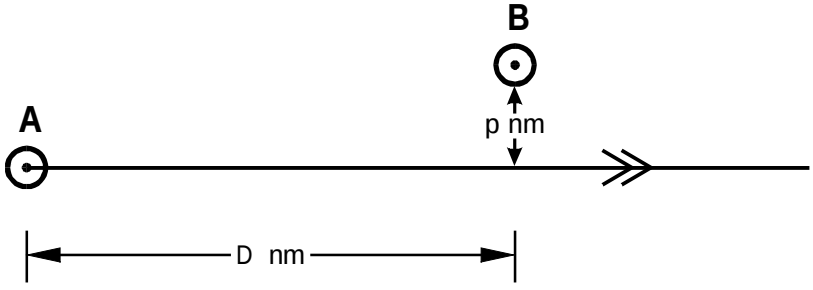


Figure 37

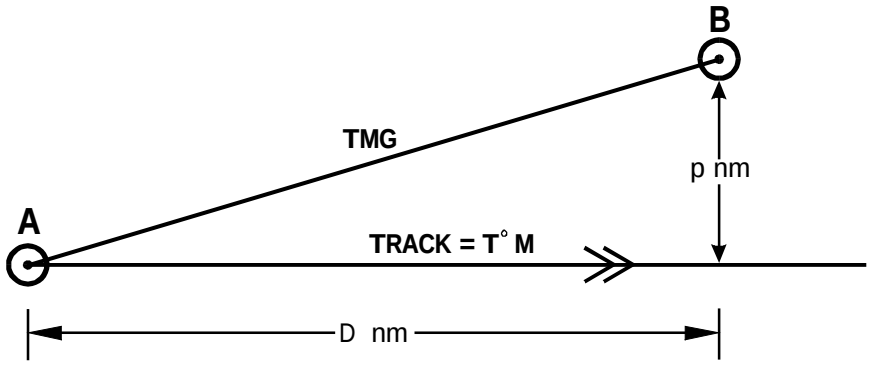


Figure 38

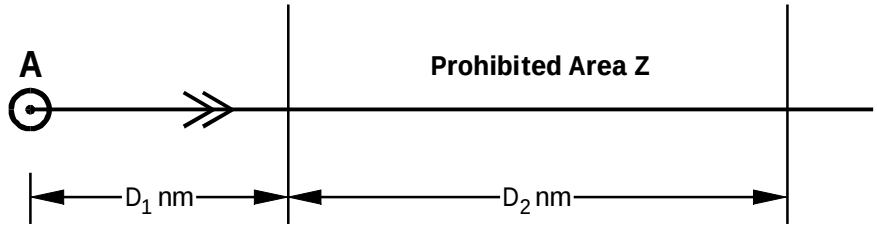


Figure 39

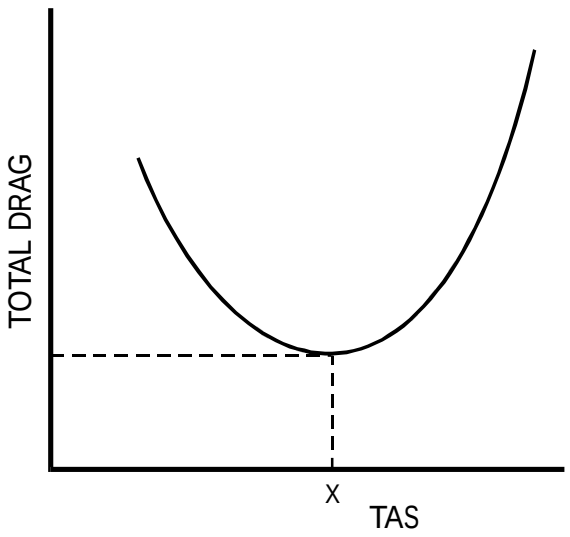
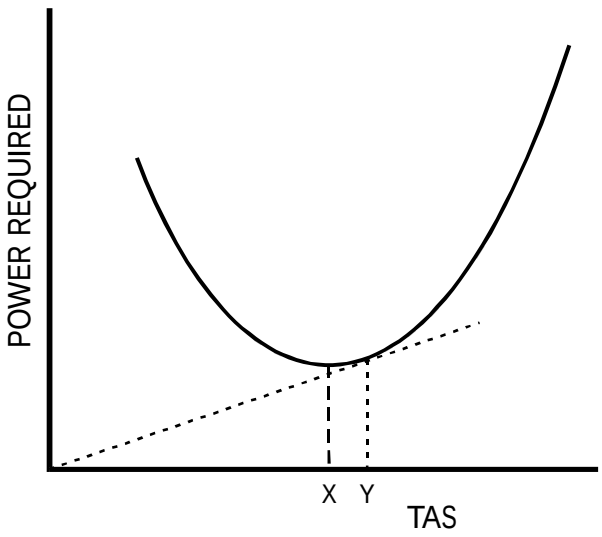


Figure 40



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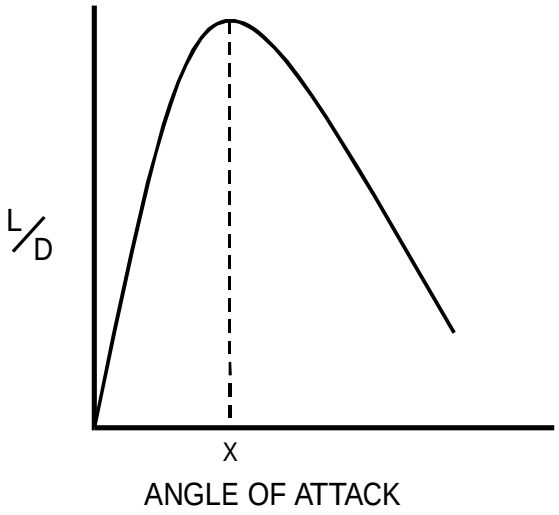


Figure 42

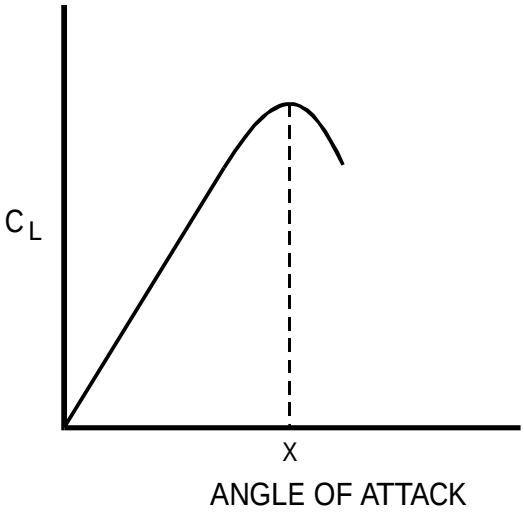
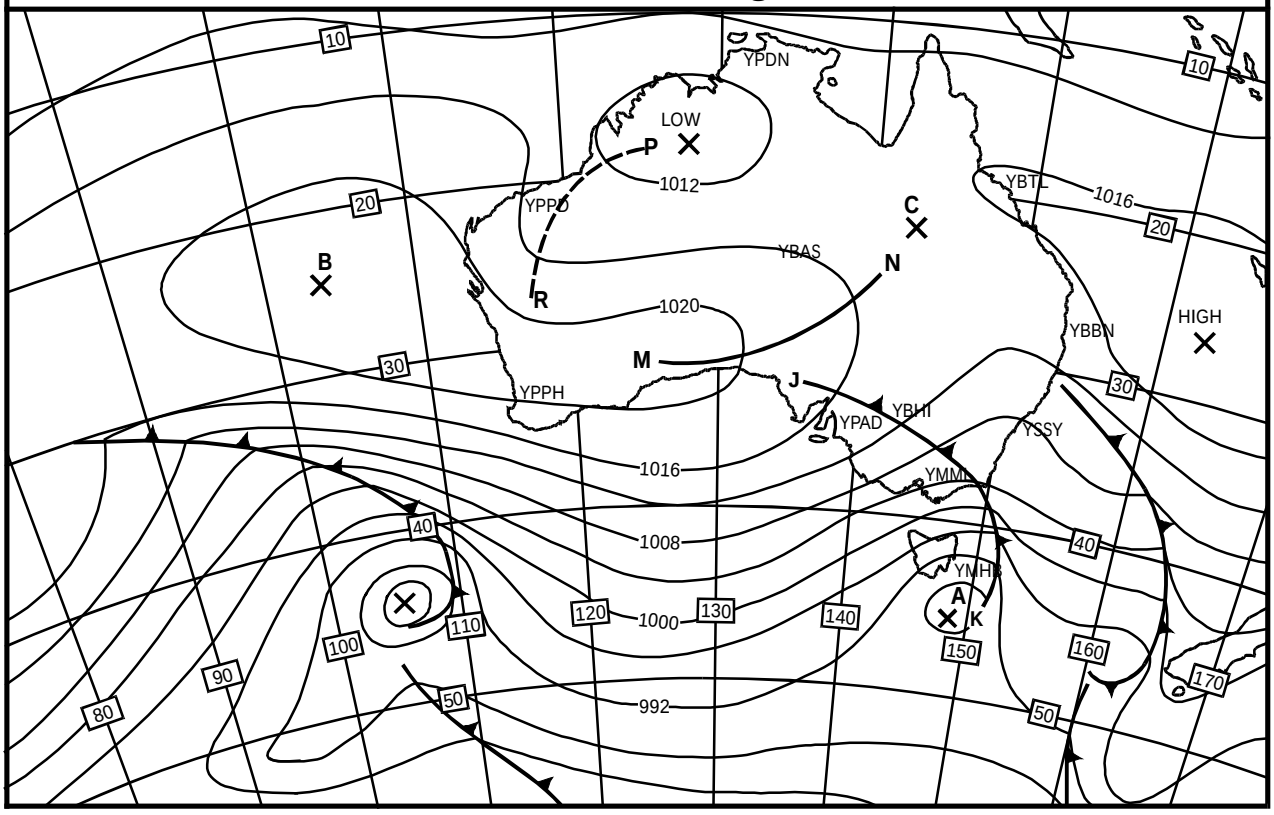
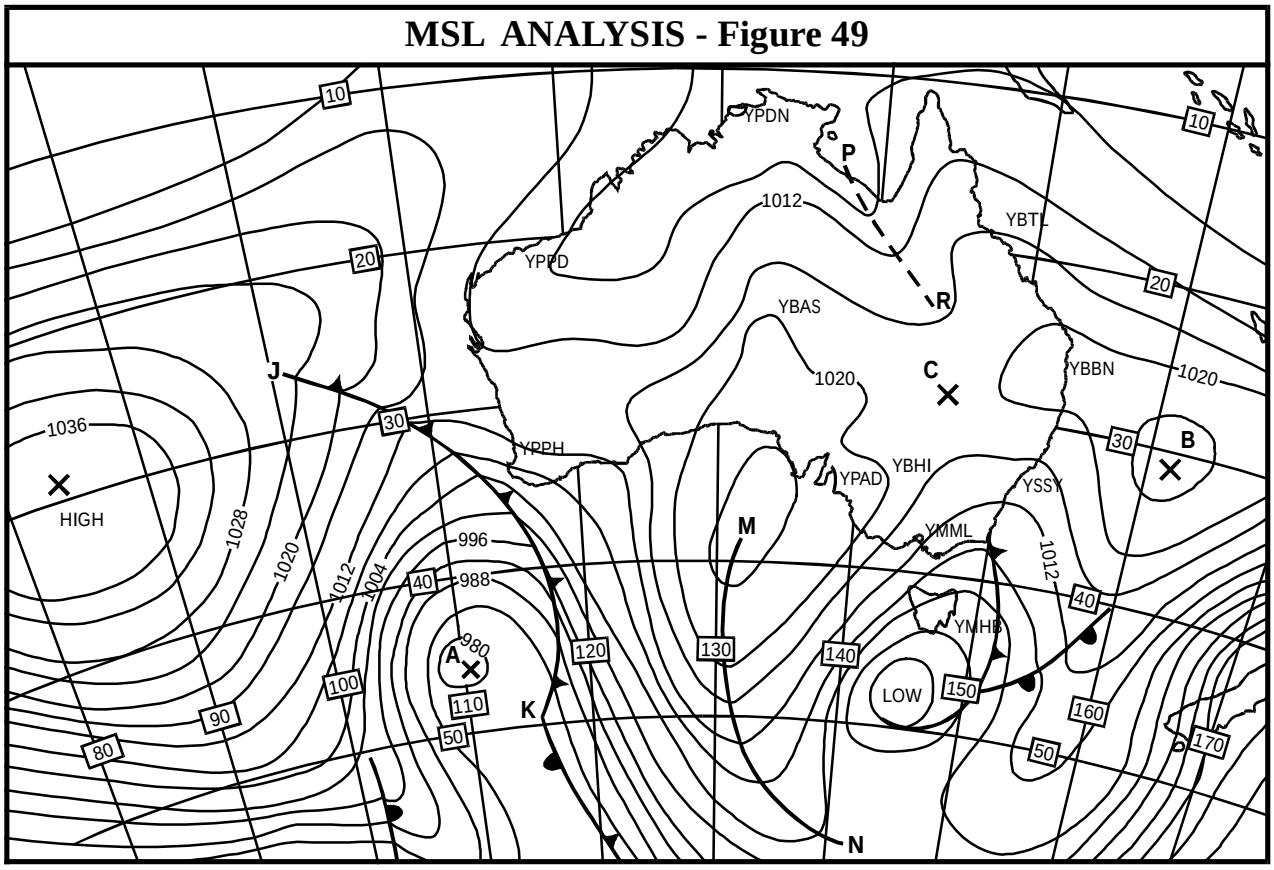


Figure 43

MSL ANALYSIS - Figure 48



MSL ANALYSIS - Figure 49



MSL ANALYSIS - Figure 49

ARFOR No. 1

AREA 21 (21)
AMEND AREA FORECAST 090200 TO 091700 AREA 21
OVERVIEW
SURFACE TROUGH AT 2200 Z: THROUGH YYNG/YMER
0500 Z: YBTH/YSNW
1100 Z : EAST OF AREA
SCATTERED SHOWERS AND THUNDERSTORMS. INCLUDING ISOLATED HAIL. AREAS OF RAIN. CONTRACTING EASTWARDS ISOLATED FOG AFTER 1100Z
REFER SIGMET RE SQUALLS AND HAIL.
SUBDIVISIONS:
A: E OF TROUGH: B: W OF TROUGH
AMD WIND

	2000	5000	7000	10000	14000	18500
A :	350/25	340/30	340/35	340/40	340/50 MS04	340/55 MS14
B :	260/25	260/30	260/30	280/30 ZERO	280/40 MS08	280/60 MS17

AMD CLOUD
AREAS OF BKN ST 1000/3000 W SLOPES 3000/5000 RANGES.
ALSO WITH PRECIPITATION 1000/3000 COAST/SEA
BKN CUSC 2500/10000 W SLOPES 4500/11000 W RANGES
SCT CUSC 2500/10000 COAST/SEA 4500/11000 E RANGES
ISOL CB 5000/35000
BKN ACAS ABV 10000 CONTRACTING E
AMD WEATHER
RA CONTRACTING E SH/TS WITH HAIL FOG AFTER 11
VISIBILITY
5000M SH/RA 3000 TS
AMD FREEZING LEVEL
A: 12000 B: 9500
AMD ICING
MOD IN CU 9500/11000 AND AC
AMD TURBULENCE
MOD WITH CU AND AC
MOD TO ISOL SEV RANGES/COAST/60NM OFFSHORE
NOTE: REFER SIGMET RE SQUALLS AND HAIL

ARFOR No. 2

AREA 21 (21)
AMEND AREA FORECAST 090100 TO 091700 AREA 21
OVERVIEW:
SURFACE TROUGH AT 0400 Z : THROUGH YSWG/YMCO
1000 Z : YCWR/YMRY
1600 Z : EAST OF AREA
SCATTERED SHOWERS AND THUNDERSTORMS. INCLUDING ISOLATED HAIL. AREAS OF RAIN. CONTRACTING EASTWARDS ISOLATED FOG AFTER 1600Z REFER SIGMET RE SQUALLS AND HAIL.
SUBDIVISIONS:
A: E OF TROUGH
B: W OF TROUGH
AMD WIND:

	2000	5000	7000	10000	14000	18500
A:	350/25	340/30	340/35	340/40	340/50 MS04	340/55 MS14
B :	260/25	260/30	260/30	280/30 ZERO	280/40 MS08	280/60 MS17

AMD CLOUD:
AREAS OF SCT ST 1000/3000 W SLOPES 3000/5000 RANGES.
ALSO WITH PRECIPITATION 1000/3000 COAST/SEA
BKN CUSC 2500/10000 W SLOPES 4500/11000 W RANGES
SCT CUSC 2500/10000 COAST/SEA 4500/11000 E RANGES
ISOL CB 5000/35000
BKN ACAS ABV 10000 CONTRACTING E
AMD WEATHER:
RA CONTRACTING E SH/TS WITH HAIL FOG AFTER 16
VISIBILITY
5000M SH/RA 3000 TS
AMD FREEZING LEVEL
A: 12000 B: 9500
AMD ICING
MOD IN CU 9500/11000 AND AC
AMD TURBULENCE:
MOD WITH CU AND AC
MOD TO ISOL SEV RANGES/COAST/60NM OFFSHORE

ARFOR No. 3

AREA 21 (21)
AMEND AREA FORECAST 092300 TO 101100 AREA 21
OVERVIEW:
WEAK SURFACE TROUGH THROUGH NSW SLOPING WEST WITH HEIGHT,
AT 23 Z: 10000FT ABOUT PARKES/MORUYA
18500FT ABOUT WAGGA/ORBOST
SUBDIVISIONS:
A: E OF TROUGH
B: W OF TROUGH
AMD WIND:

	2000	5000	7000	10000	14000	18500
A:	240/25	250/25	250/25	280/35 MS04	280/50 MS11	280/70 MS20
B:	240/30	240/30	240/30	240/30 MS06	240/35 MS13	220/45 MS22

AMD CLOUD
SCT ST 1000/3000 SW SLOPES. BKN RANGES TILL 02
SCT CUSC 5000/7000 RANGES/SLOPES. BKN SLOPES IN S
SCT CU 4000/7000 SEA/COAST
AMD WEATHER
ISOL SHOWERS RANGES/W SLOPES S OF 35S
ISOL SHOWER SEA
VISIBILITY:
5000M SHOWERS
AMD FREEZING LEVEL:
6000 S OF 35S / 9000 N
AMD ICING
MOD IN CU TOPS
AMD TURBULENCE
MOD BLW 10000 RANGES/E

ARFOR No. 4

AREA 21 (21)
AMEND AREA FORECAST 092300 TO 101100 AREA 21
OVERVIEW:
WEAK SURFACE TROUGH AT 0200 Z : THROUGH YSWG/YORB
0700 Z : YPKS/YMRY
1100 Z : YBTH/YSNW
SUBDIVISIONS:
A : E OF TROUGH
B : W OF TROUGH
AMD WIND :

	2000	5000	7000	10000	14000	18500
A:	240/25	250/25	250/25	280/35 MS04	280/50 MS11	280/70 MS20
B:	240/30	240/30	240/30	240/30 MS06	240/35 MS13	220/45 MS22

AMD CLOUD:
SCT ST 1000/3000 SW SLOPES. BKN RANGES TILL 08
SCT CUSC 5000/7000 RANGES/SLOPES. BKN SLOPES IN S
SCT CU 4000/7000 SEA/COAST
AMD WEATHER:
ISOL SHOWERS RANGES/W SLOPES S OF 35S
ISOL SHOWER SEA
VISIILITY:
5000M SHOWERS
AMD FREEZING LEVEL:
A: 8000 B: 9000
AMD ICING
MOD IN CU TOPS
AMD TURBULENCE:
MOD BLW 10000 RANGES/E

ARFOR No. 5

AREA 21 (21)
AREA FORECAST 062100 TO 071100 AREA 21
OVERVIEW:
ISOLATED SHOWERS CHIEFLY ALONG COAST WITH AREAS OF LOW CLOUD TILL 04Z
PATCHY RAIN NORTH OF ORANGE/SYDNEY. ISOL FOGS RANGES/EAST TILL 23Z
SUBDIVISIONS:
NIL
WIND

2000	5000	7000	10000	14000	18500
VRB/15	260/15	260/15	260/25 ZERO	270/30 MS08	270/40 MS17

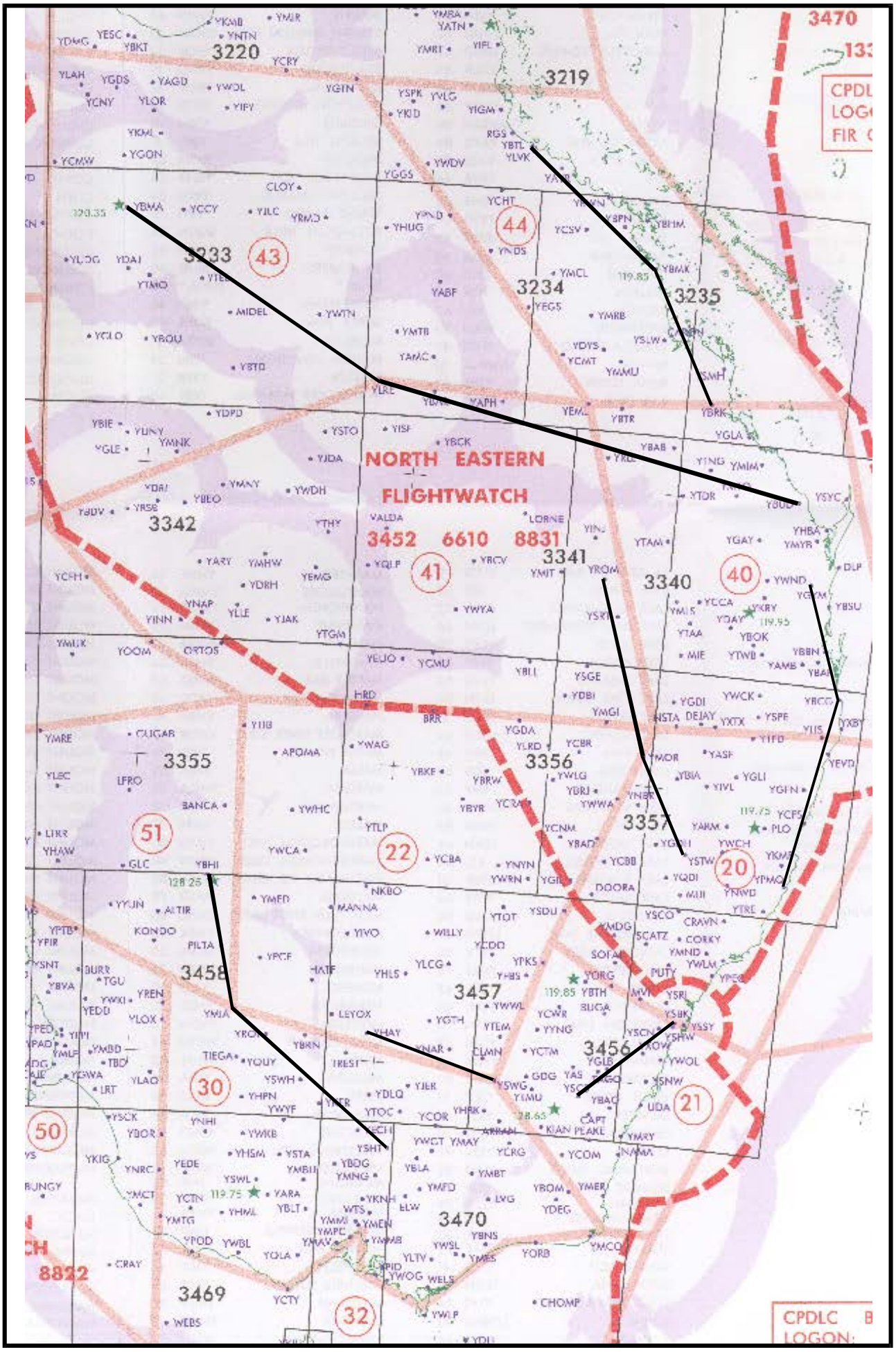
CLOUD
AREAS OF BKN ST 1000/3000 SEA/COAST TILL04
3000/5000 RANGES IN E TILL 02
AREAS OF CU/SC 3000/8000 SEA/COAST ISOL TOPS SEA 20000
SCT CU/SC 4000/8000 RANGES, BKN IN S AND E
SCT SC 5000/8000 W SLOPES
AREAS OF BKN ACAS ABOVE 11000
WEATHER:
SH IN E. PATCHY RA N OF YORG/YSSY
ISOL FOG RANGES AND EAST TILL 23
VISIBILITY:
5000 SH/RA
FREEZING LEVEL
10000
ICING
MOD IN CU/AC
TURBULENCE:
MOD IN CU/AC
CRITICAL LOCATIONS: (HEIGHT ABOVE MSL)
MT VICTORIA: BKN SC 4000
FM23 5000M SH BKN CU 5000
BOWRAL: 500M FOG
FM22 5000M BKN ST 3000
FM00 8000M BKN SC 4500

ARFOR No. 6

AREA 22 (22)
AREA FORECAST 112300 TO 121100 AREA 22
OVERVIEW:
THUNDERSTORMS WITH HAIL (SMALL) DEVELOPING IN W AREA 22 EXTENDING E
SCATTERED SHOWERS/DRIZZLE
WIDESPREAD LOW CLOUD, BECOMING SCATTERED NW
ISOLATED SEVERE TURBULENCE BELOW 8000
REFER SIGMET FOR LATEST DETAILS OF SEVERE ICING
WIND:

2000	5000	7000	10000	14000	18500
270/40	270/35	260/40	270/45 MS10	270/50 MS18	260/60 MS28

CLOUD:
OCNL CB 2500/28000 W AREA 22 EXTENDING E
BKN ST 800/3000, BECOMING SCT NW
BKN CU 2500/15000
WEATHER:
TS (HAIL) SH/DZ
VISIBILITY:
4000M SH/DZ/TS
FREEZING LEVEL:
4000S/5000N
ICING:
REFER SIGMET
TURBULENCE:
ISOL SEV BELOW 8000


NORTH EASTERN
FLIGHTWATCH
3452 6610 8831
3220
3219
3470
3233
3234
3235
3342
3341
3340
3355
3356
3357
3458
3457
3456
3469
8822
43
44
41
40
51
22
20
30
21
50
32
CPDLC
LOGON