

Maps Charts and Instructions for Dual 5

VOR Navigation

TSI Practice

About this Simulation

This simulation facilitates practice of VOR and ADF navigation in a custom designed world we call “Selkirk Land.” Selkirk Land has 22 VORTACs, 13 NDBs and 5 airports all in relatively close proximity to each other, which facilitate intense practice tracking between nav aids.

The attached maps and plates are simplified examples of the documentation you will use as an IFR pilot.

The routes are fully described in the Avia 110 program manual including the IFR clearances you should expect at each stage of the flight. Using those clearances and this simulation you can (and must) completely rehearse the flight before Dual 5 and 6.

Route Selection

The opening window requires you to choose between four routes. Routes 1 and 2 begin at Mountain airport. These are the two VOR navigation routes you will use in the course. The other two routes are for ADF navigation and you can ignore them.

If you wish to fly route 2 using route 1 winds simply select route 1.

Drift and Bracketing

Before attempting to use this simulation you must fully understand the concept of drift. You must know how to calculate drift, and especially how to estimate it quickly using the “magic number” concept. You must also understand the concept of “bracketing.” The required theory is covered in your textbook *Navigation for Professional Pilots* and practice of these concepts is provided in other simulations on our Intranet site. Be sure to complete the *Drift Estimation Challenge* and *Bracketing* before proceeding with this simulation.

HSI and RMI Navigation

To use this simulation you must understand how an HSI and an RMI display navigation information. This is explained in your textbook and is demonstrated in other simulations such as *Navigation Displays* and *ADF – VOR RMI Comparison*. Be sure to master this material before using this simulation.

!!! Tune, Setup, Identify !!!

Tune Setup Identify (TSI) is the most important skill you will develop using this simulation and the corresponding lessons in the Alsim. You should always tune the radios, then setup the navigation equipment and then identify the nav aids. This concept is elaborated in your textbook. The explanations given below simply explain how to tune, setup, and identify within this simulation.

The simulation is quite accurate as a representation of the Alsim system. The HSI, RMI, GPS, Autopilot, etc work like the ones in the ALSIM, however the interface has been adapted to facilitate using a mouse rather than turning knobs, flipping switches, and pushing buttons. Of these turning knobs is the most difficult to replicate in a computer interface. Thus the tuning knobs on the radios have been replaced with + and – buttons. You should spend a few minutes practicing tuning the radios and you will soon learn to do it efficiently.

Notice that the cursor on the GNS430 by default is on the standby comm frequency. To move it to the standby nav frequency you tap the tuning knob on a real GNS430, in this interface you click the Com / VLOC button. The cursor will return to the standby comm. Frequency after 10 seconds.

The simulation deliberately restricts the use of GPS since the purpose is to learn to use VOR and ADF. If you click the FPL button on the GNS430 you toggle through the following waypoints:

- CMTN
- TIDOY
- CROY
- TURKA
- CMAC

- CERC
- CWAY

As each waypoint appears the DTK is the current track to that waypoint and the DIS and XTK fields display as they would in the ALSIM. DTK can be updated using the *direct* button. The XTK value has a < or > symbol before it indicated left or right (in the real GNS430 this is more of an arrow icon.)

You can switch the GNS430 into OBS mode, just as in the ALSIM. The DTK then matches the HSI course setting and the XTK reflects this new course. Use the OBS mode on TIDOY and TURKA for the published arrival procedures shown below. Set the waypoint to the airport in use for takeoff and landing. Enroute use VLOC mode and ignore the GPS.

The transponder can be tuned by increasing each digit individually from 0 through 7. Turn the transponder on by clicking on the selector switch – it toggles between SBY and ALT. When on the transponder will display random interrogations and will flash the interrogation light if you click on the *Ident* button.

As you know, there are **eight items to setup**. These are all replicated in the simulation and are found in essentially the same location as in the ALSIM. The eight items are:

1	EHSI Mode	Nav 1 or Nav 2	Click on switch above ADI
2	Primary RMI Selector	ADF – VOR1 – VOR2	Click on switch above ADI
3	Single RMI needle	ADF or VOR1	Click icon lower left of RMI
4	Double RMI needle	ADF or VOR2	Click icon lower right of RMI
5	GPS / VLOC	Annunciator above HSI GNSS – NAV1 – NAV2	Click CDI button on GPS
6	HSI Course	Course bar setting	Drag OBS knob below and left of HSI left and right then fine tune using arrow icons beside knob. Clicking arrows changes course 1 degree, holding mouse down causes course to change 15 degrees per second.
7	Heading bug	Red heading bug	Drag bug knob below and right of HSI or second knob on autopilot. Works same as OBS knob.
8	DME selector	Switch is beside transponder (in Alsim it is below transponder.	Clicking cycles between N1, H1, N2 and H2 (note the current setting is displayed above HSI unless GPS mode is active. If GPS is in use distance shown is GPS and no source icon is shown.

To identify the nav aids once you have completed tune and setup as described above simply click on the Nav 1, Nav 2, or ADF switch on the audio panel. A balloon with the nav aids name will appear over the radio. The words “No Ident” will appear if you have not chosen a valid frequency.

You will notice that the balloon for ADF ident is faded out if the ADF radio is in ADF mode. Switching to ANT (click ADF button on ADF radio) will result in a clear ident, but the ADF needle will “park” at the right wingtip. This is the same effect as in a real airplane.

Flying the Simulation

Complete all checklists ensuring that flaps are set and all radios set as per TSI. Arm the altitude select to the altitude you are cleared to; clicking the black + button beside the altitude selector bringing up ALT ARM on the Annunciator above the ADI. Set the pitch command to 10° nose up using the toggle switch on the left of the autopilot. Remember to activate HDG mode.

Taxi using the left and right arrow keys to turn; the longer you hold down the key the faster the airplane turns. To stop turning tap the up or down arrow keys.

When ready for takeoff advance throttles by dragging them up – observe torque and ITT limits. Set torque to redline for takeoff.

At Selkirk we always use flaps APPR for takeoff which results in Vr of 94. The simulation will not fly below Vr.

At Vr pitch the nose up using the down arrow key (representing pulling back) to 10° nose up. At 10 feet agl the simulator enters “flight mode” in which you can pitch and bank using the arrow keys just like a real airplane.

At positive rate retract the gear (click on gear switch.) At Vyse retract flaps. At 160KIAS switch the FD to IAS mode.

At 400 feet set climb power

It is usually best to activate the autopilot early in the flight. From this point on you can fly using the heading bug or judiciously using NAV mode.

Remember to use NAV mode wisely, as covered in class. Always switch the HDG mode when changing nav frequency and for station passage. When NAV mode is selected NAV ARM will appear and the FD will never switch to NAV CPLD unless an intercept is made. I.E. it is your responsibility to ensure the selected heading intercepts the course.

When descending using the autopilot you must first set a new altitude in the altitude alerter and activate it. Once ALT ARM appears on the Annunciator you can change altitude. If ALT HOLD is annunciated the FD will not allow you to make pitch commands.

Once the new altitude has been selected use one of the following techniques to initiate the descent.

	Method	Advantages and disadvantages.
1	Toggle pitch down with switch on autopilot	Increases airspeed – this is the equivalent of descending by pushing forward on the control column. Technique may result in an over-speed if close to the barber pole. Technique is the best for enroute descents when adequate speed is available between current IAS and the barber pole.
2	Change FD to IAS mode then throttle back.	Technique results in descending with no change in IAS. It is the equivalent of throttling back and then pitching down to maintain current airspeed. Technique is best when descending on an approach where no airspeed change is desired.
3	Use VS mode	Technique 1 or 2 must be used first. Once the descent is initiated using technique 1 or 2 it is usually best to engage VS mode. The AP will then pitch as required to maintain the selected vertical speed. Throttle can then be used to control airspeed either to “ride the barber pole” during an enroute descent or maintain target approach speed when landing.

Other Simulation Interface Elements

Airspeed bugs are provided. Simply drag the bugs to the desired setting. White should be used for V_r and V_{ref} orange for V_2 and red for any speed restrictions. Get used to using the orange bug throughout the flight for the speed you are currently targeting.

One altitude bug is provided. Set it to 400 agl for takeoff and to MDA for arrivals. Above 10,000 it should be set to zero.

The Colesman setting is adjusted using the + and – buttons on the altimeter.

The radar altimeter bug is set by dragging it around the interface. Decision height lights above the ADI and on the radar altimeter will illuminate (turn yellow) when below the selected radar altitude. The simulation contains only a very restricted terrain database consisting of the field elevation of the four airports (CMTN, CROY, CMAC, CERC, CWAY) The radar altitude will read correctly at these airports. Elsewhere the ground is at sea level.

Gear is retracted or extended by clicking on the gear switch. There is no ground safety system (i.e. the gear can be retracted on the ground.) Drag changes when gear is retracted or extended. Be sure to retract the gear after takeoff. Three green “lights” below the gear switch show the position of the gear. The switch moves when clicked.

Flaps can be set to up – approach – down (just like the Alsim) use the buttons beside the flap position indicator, just above the autopilot.

All autopilot modes except APPR work just like in the Alsim. Turn the FD on before takeoff and set the command bars to 10° nose up using the switch on the left side of the autopilot (exactly as in the ALSIM.) Remember to select HDG mode before takeoff and set the heading bug to runway heading.

Time compression is a method of speeding up the passage of time (or freezing time.) Notice the + and – buttons below the clock. The default time compression value is X1 which means normal time. You can increase it up to X20 which means everything happens 20 times faster

than real time. You should be able to fly the simulation, if you are efficient, at X3 compression. Thus a 30 minute flight can be completed in 10 minutes.

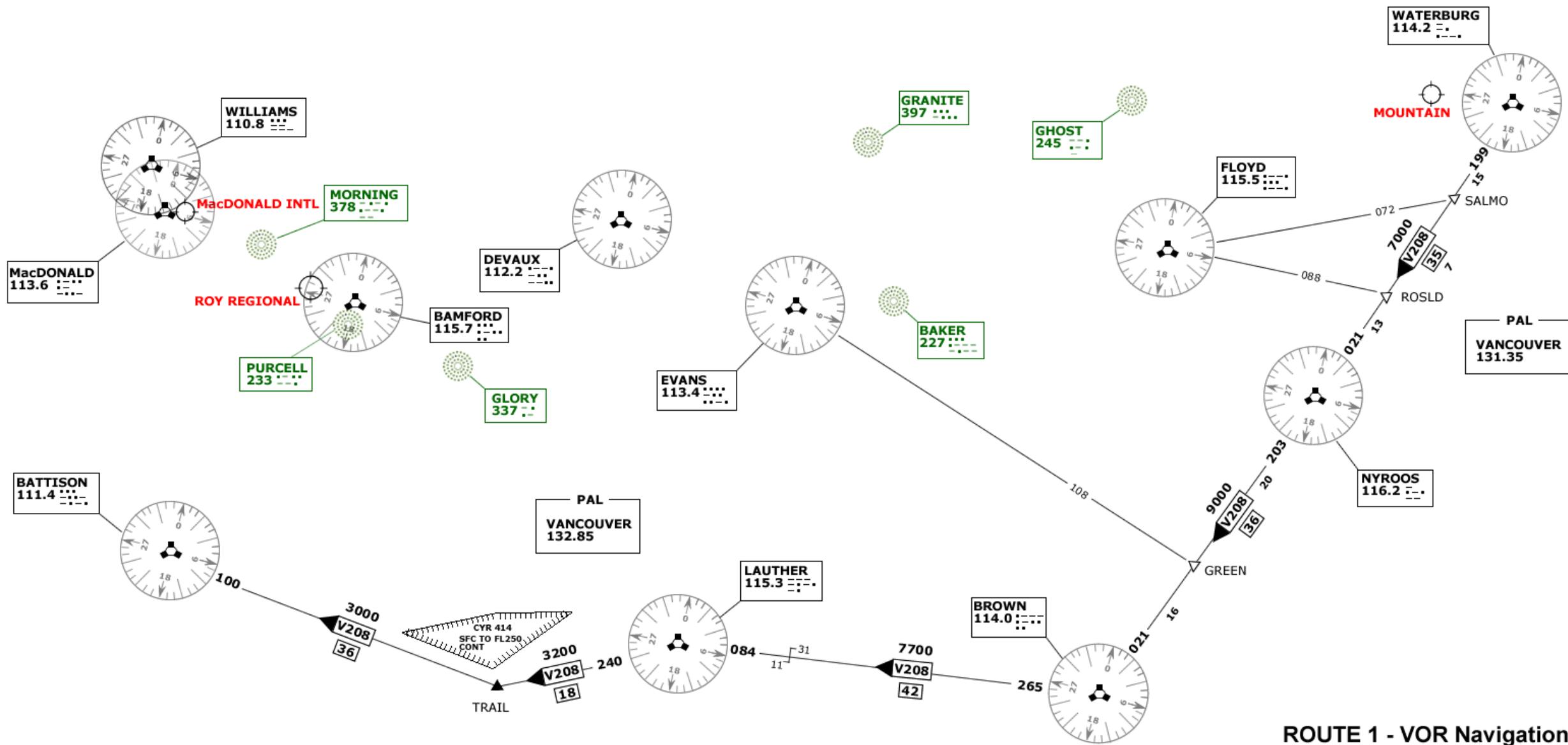
The *Show Wind* button at the upper right displays the wind profile for the chosen route. You can check the wind before takeoff and then practice using your drift estimation skills, or you can leave the wind hidden and practice bracketing. If you do this you should estimate the wind before revealing it to yourself late in the flight.

The *Alt Setting* button displays the current altimeter setting, your currently set value and the indicated and true altitude. The ATIS provided below contains the altimeter setting so it is not really necessary to use this button.

Things that DON'T Work

There are several switches in the interface that don't actually do anything. They are there only to complete the look of the interface but they are never required. They are:

- SPK switch on audio panel (always on)
- MKR switch (always off)
- MKR test switch (always off)
- HSI 1 switch (on autopilot, always set to HSI 1)
- MSG button on GPS
- PROC button on GPS
- MENU button on GPS
- ENT button on GPS
- CLR button on GPS



ROUTE 1 - VOR Navigation

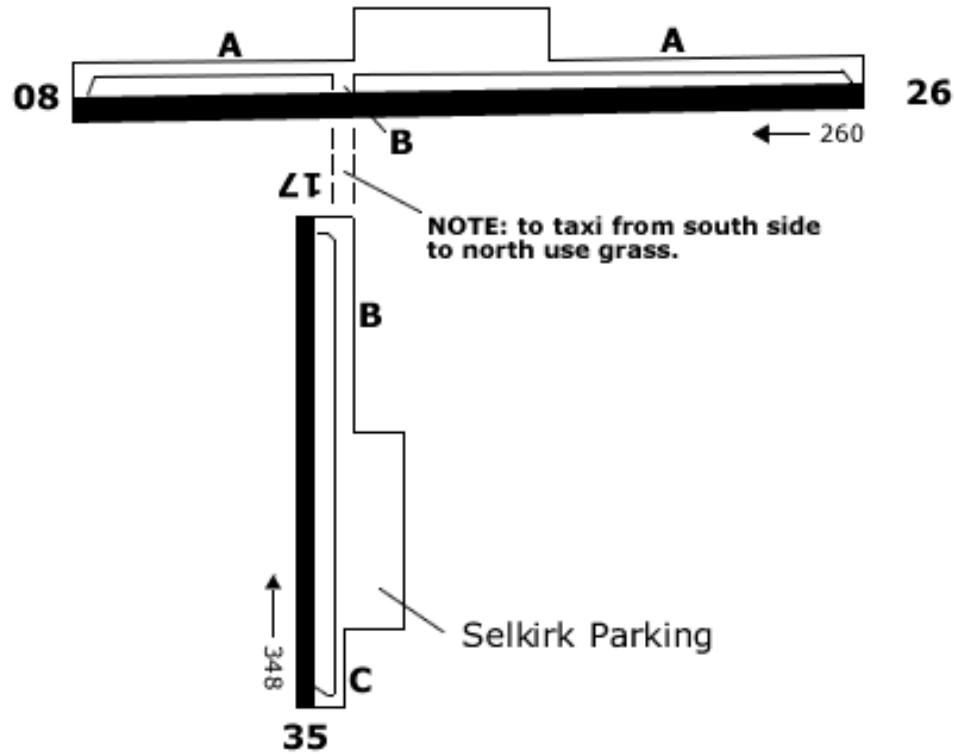
AERODROME CHART

**MOUNTAIN
SELKIRK LAND**

ATIS 119.75	CLNC DEL 123.75	GND 121.7	TWR 127.35	DEP 131.35
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CMTN

ELEV 1905



*** DEPARTURE PROCEDURE**

RWY 26 AND 35 – SPEC VIS

CLB visually over airport to 6000 feet.

Once established over airport at 6000 TRACK 085 to WATERBURG vortac.

Once established on 085 track CLIMB to 10,000 feet.

Contact VANCOUVER CENTRE 131.35 thru 6500 feet.

TAKEOFF MINIMA
RWYS 26 35 *
RWYS 08 17 N/A

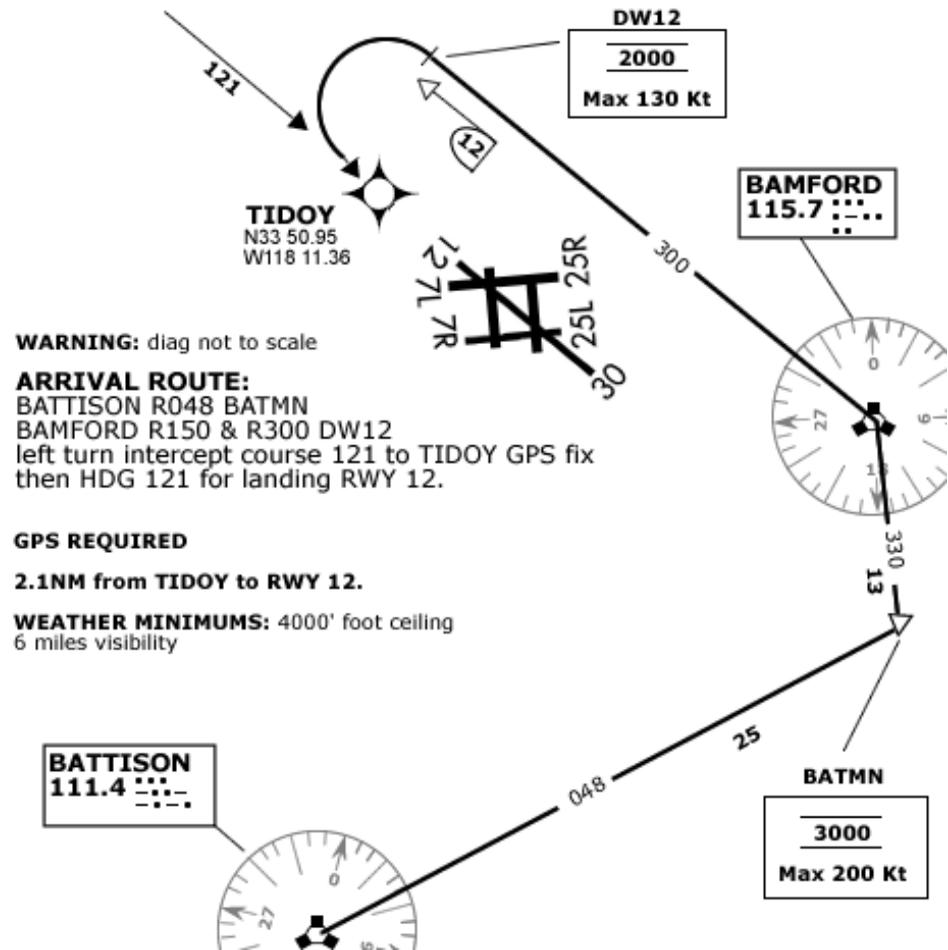
Communications Failure:

In the event of communications failure squawk 7600 and climb to flight plan altitude after passing WATERBURG VOR

VISUAL ARRIVAL RWY 12

ATIS 118.0
ARR 134.55
TWR 126.55
GND 133.0

ROY REGIONAL
SELKIRK LAND
ELEV 60
CROY



Altitude Profile:

Cross BATTISON at 5000 feet
Cross BAMFORD at 3000 feet
Descend to 2000 feet immediately upon intercepting R300 to DW12
Not below 1000 until past TIDOY on final
Runway elevation 60 feet asl.

VISUAL ARRIVAL RWY 12

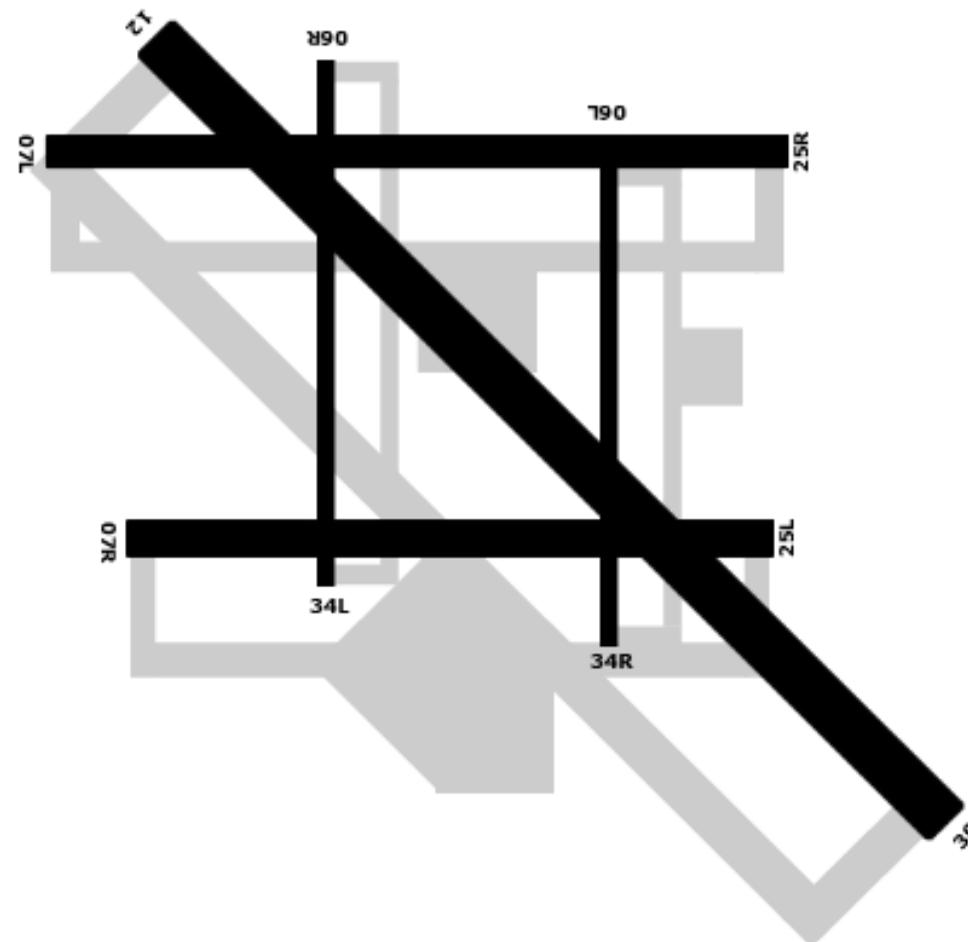
SELKIRK LAND
ROY REGIONAL

AERODROME CHART

ROY REGIONAL
SELKIRK LAND

ATIS 118.0	CLNC DEL 122.0	GND 133.0	TWR 126.55	DEP 130.55
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CROY

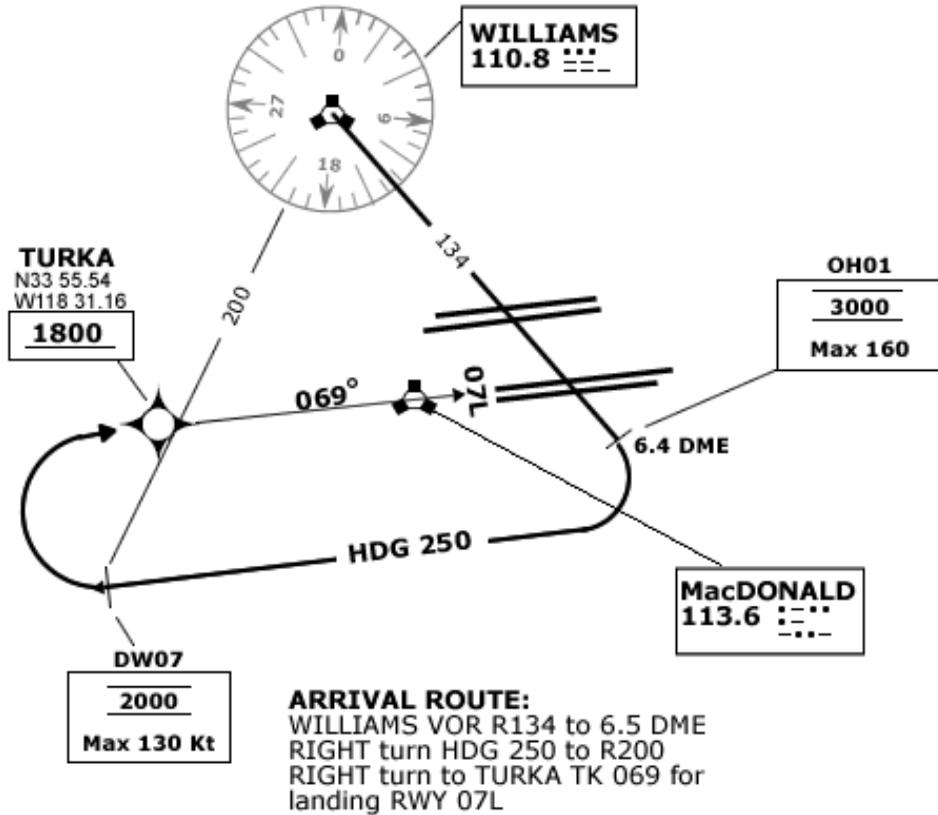


TAKEOFF MINIMA
ALL RWYS 1/2

VISUAL ARRIVAL RWY 07L

**MACDONALD INTL
SELKIRK LAND
CMAC
ELEV 126**

ATIS 120.45
ARR 136.15
TWR 127.35
GND 121.75



WEATHER MINIMUMS: 4000 foot ceiling 6 miles visibility

Altitude Profile:

Cross WILLIAMS vortac at or above 3000
Descend to 3000 feet by 6.4 DME
Established on heading 250 descend to 2000 feet.
Not below 1800 feet until past TURKA on final RWY 07L
Runway elevation 126 asl.

NOTE: sidestep to RWY 07R may be required; TWR will advise no later than 2NM on final.

VISUAL ARRIVAL RWY 07L

**SELKIRK LAND
MACDONALD INTL**

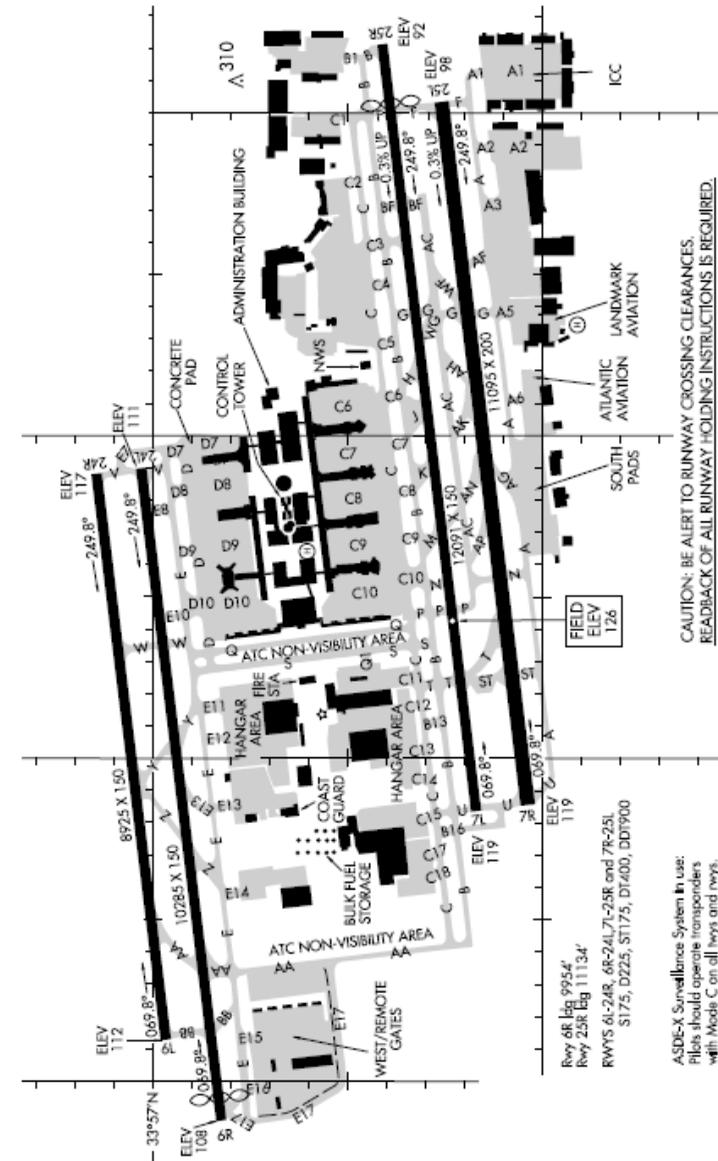
AERODROME CHART

**MACDONALD INTL
SELKIRK LAND**

ATIS 120.45	CLNC DEL 124.45	GND 121.75	TWR 127.35	DEP 132.15
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CMAC

ELEV 126



TAKEOFF MINIMA
ALL RWYS 1/2