

A Tribute to the Navigator

By Norm Holman & Tim Cook

This Charter flight has been dedicated to the Navigator, who played an important role in helping to get the Airliner from A to B in the early days until he was replaced by the advances in technology with the likes of, Long Range Aid to Navigation (LORAN), Inertial Navigation (INS) and GPS, until becoming as extinct as the "Dodo" in the air, but is still in Maritime use today.

The Navigator's tools consisted of a Sextant, a set of air almanacs, plotting charts, parallel rules, dividers, protractors and within a few moments, he could pinpoint the current position on a Mercator chart which was the culmination of a triad of readings with the sextant. This was very important when crossing large featureless Oceans.

A Sextant is a hand held device that consists of an arc of a circle, marked off in degrees, and a movable radial arm that pivoted at the centre of the circle. A telescope, mounted rigidly to the framework, is lined up with the horizon. The radial arm, on which a mirror is mounted, is moved until a celestial body such as the Sun, the Moon, or a star is reflected into a half-silvered mirror in line with the telescope and appears, through the telescope, to coincide with the horizon. The angular distance of the star above the horizon is then read from the graduated arc of the sextant. From this angle, and knowing the exact time of day as registered by a chronometer, your position can be determined (within a few hundred metres) by means of published tables in the Almanac. This system has been in use for Centuries by sailors.

On smaller aircraft, like the DC-3, it was the co-pilots duty, under direction of the Captain, to take the readings and plot the course. On the R4D and larger aircraft, a Navigator was provided and he stood on a small table and looked out from the glass astrodome on the roof, just behind the Cockpit, to take his readings from different angles. He then plotted the position on a chart and informed the Pilot of the Aircraft's position.

There are two ways to find your position. The easy way is to press SHIFT-Z once, and on the top LH side of the screen is the current input of Latitude, Longitude, Altitude, Heading and Speed. Wind direction and speed are also shown if you fly with Real World Weather which is a must!! The better way is to use the Dave Bitzer and Mark Beaumont Sextant which can be found on AVSim – just search for dc3_bbsx.zip.

Assume these are your Navigators readings and plot your course on the charts provided at every degree North/South or East/West or at 30 min intervals, and make the necessary corrections. Make allowances for wind drift and the great circle route and if you pick up your destination, or beacon radial with little or no deflection on the needle, give yourself "Five Stars" for Navigation.

To give everyone an opportunity to try your hand at this style of Navigation the following Charter has been put together. The flight legs are around 700 – 950 miles long for a good test.

The timeframe is September, 1945 and DC3 Airways will provide the crew to fly the DC3/R4D, with "The Admiral" and other high ranking Officials as passengers, from Ford Island, Hawaii to Henderson Field, Guadalcanal. **REMEMBER, THE ADMIRAL'S SEAT IS ON THE LEFT SIDE OF THE PLANE AND HE GETS HEADACHES ABOVE 8,000 ft.**

Good Luck and Enjoy the challenge!!

2.

NOTAMS. (Read twice. If you mess this up, the Admiral will downgrade you to cabin attendant or baggage handler).

1. This Mission is classified and you must fly the routes given and avoid any large Airports and large populated Islands for security reasons as the War has only been over for two weeks and a few enemy patrols are still operating. Land only where authorized. A few legs have their own NOTAM's under Flight Briefings.
2. All flights are in daylight only, most Island runways are not lit.
3. Speed to be kept at 145 knots indicated airspeed (IAS) to conserve fuel. Based on an average fuel usage of 96 gals per hour, the DC3/R4D range at 145 knots (IAS) is 1050 nm with 100 nm reserve. Enough to do a box search if you miss the islands.
4. The lateral lines on the chart are Latitudes and each degree is approx 60nm apart from the next from North to South Poles. The vertical lines are Longitudes and vary in width from the equator to the poles. Maps are provided but better if you have an Atlas.
5. The Maps are in PDF format and cannot be edited. All flights are from top right to bottom left for this trip.
6. Check our Tech Ed's section for help on course corrections for wind direction, as cross winds coupled with the great circle route can put you many miles off course, and if you miss these tiny islands, life jackets are under the seat. During WWII, many an Aircraft was lost over the Pacific due to Navigational errors.
7. There are no windsocks at most island runways. For landing, the Navigator will advise wind direction. Captain to select applicable runway and best is to follow Tech Ed's procedural approaches. FSNavigator and GPS???? NIY (Not invented yet). Come back in 50 years time!!!!

Remember, "When Flying in the Old Days, you gotta Fly the Old Ways".

3.

LEG 1. Ford Island NALF, Hawaii to Palmyra Atoll, Kiribati.

Ford Island was established in 1919 by the Army as Luke Field, it was the first airstrip in Hawaii. The Navy took full control in 1935 and now operates this diminutive airport in the center of Pearl Harbor with its single 4,000 ft runway. Palmyra Atoll was once USA Territory.

FLIGHT BRIEFING - FUEL TO MAXIMUM and ensure your tank capacity is 804 gals. This is the longest flight. Climb out at 100 ft per min and cruise at 145 knots max to conserve fuel.

There are no Nav aids at Palmyra.

FROM /TO	<u>Flight Description</u> "Runways to be decided by Captain based on Navigator input".				COURSE (Leg)	DISTANCE (Leg)	ETE (Leg) HH+MM
	Dep. Runway-22	Heading – 220°	Init. Alt – 6,500 ft	Apt Elev. - 13 ft			
Ford Island, Hawaii (NPS) to Palmyra, Kiribati. (PLPA)	- Dep R/way 22 at 08.00hrs, maintain hdg until you reach 1,500ft agl. - Then turn to hdg 185°, climb to cruise altitude at 100 f.p.m. and plot course on the chart to Palmyra correcting as necessary.				220°	3nm	0hr 2min
	----- - At N6° 30', commence descent to 1500ft. Palmyra is located at N5°53' W162°04'. - When the island comes into view, check wind direction from Navigator input and land accordingly on either Rwy 6/24, hdgs are 60° and 240°, surface is asphalt, length is 6000ft.				185°	919nm 30nm	6hr 35min
Flight No. 549-03-01	Arrival Airport Elevation: 3ft		Estimated Totals for Flight>>>			959nm	6h 37min

1st Overnight stop here. Navy will service and re-fuel aircraft.

Admiral and party will be taken out to a Cruiser anchored offshore for the night.

Tent accommodation will be provided on the Island for you, the Co-pilot and Navigator.

4.

LEG 2. PALMYRA ATOLL to CANTON ISLAND, Kiribati.

FLIGHT BRIEFING - Take off from here is in the dark at 04.00hrs. ALL LIGHTS TO BE OFF!!!

Aircraft is correctly positioned, watch your heading carefully, if it is a clear night. Pinpointing the stars through the windshield helps.

Rotate at 90 knots. Runway is 6,000 ft long.

Cruise at 150 KIAS

There are no Nav aids at Canton

FROM - TO	Flight Description "Runways to be decided by Captain based on Navigators input".				COURSE (Leg)	DISTANCE (Leg)	ETE (Leg) HH+MM
	Dep. Runway-24	Hdg- 240°	Init. Alt. - 6500 ft	Apt Elev. - 3 ft			
Palmyra, Kiribati. (PLPA) to Canton, Kiribati. (PCIS)	- Dep R/way 24 at precisely 04.00 hrs, maintain ground hdg 240°. Rotate, turn to hdg 218°. - Climb to 6,500ft and plot course on the chart to Canton correcting as necessary. Cruise speed 150 kias. - Make announcement to Passengers when crossing the Equator. ----- - At S2°. 00', commence descent to 1500ft. Canton is located at S2.46' W171.42 - When the island comes into view, check wind direction from Navigator input and land accordingly on either Rwy 9/27, hdgs are 90° and 270°, surface is asphalt, length is 6006ft				218°	778nm	5h 45min
Flight No. 549-03-02	Arrival Airport Elevation: 6ft		Estimated Totals for Flight>>>			778nm	5hr.45min

Navy will service and re-fuel aircraft Pronto!! Only 40 minute refuel stop here

5.

LEG 3. CANTON to FUNAFUTI

FLIGHT BRIEFING - Bad weather and turbulence may be experienced near the International Date line.

FROM - TO	<u>Flight Description</u> "Runways to be decided by Captain based on Navigator input".				COURSE (Leg)	DISTANCE (Leg)	ETE (Leg) HH+MM
	Dep. Runway-27	Hdg – 270°	Init. Alt. – 6500 ft	Apt Elev. - 6 ft			
Canton, Kiribati (PCIS) to Funafuti, Tuvalu (NGFU)	- Dep R/way 27 at 12.00 hrs. Rotate and turn to hdg 226°. - Climb to 6,500ft and plot course on the chart to Funafuti correcting as necessary. - Make announcement to passengers when crossing the International Date Line. "It is now to-morrow" - Set ADF for FU NDB, 340.0 and NAV1 for FU VOR 113.30, DME only. - Commence descent to 1500ft when DME reads 40nm. - When the island comes into view, check wind direction from Navigator input and land accordingly on either Rwy 03/21. Hdgs are 031° and 211°, surface is gravel, length is 4902ft. MIND THE TREES ON APPROACH TO Rwy 21				226°	642nm	4h 35min
Flight No. 549-03-03	Arrival Airport Elevation: 10ft		Estimated Totals for Flight>>>			642nm	4hr.35min

2nd Overnight stop here. Navy will service and re-fuel aircraft.

Admiral and party accommodated in Airport building.

Tent accommodation will be provided on the Island for you, the Co-pilot and Navigator.

6.

LEG 4. FUNAFUTI TO SANTA CRUZ ISLAND.

FLIGHT BRIEFING – Yesterday, an Enemy Submarine was reported in vicinity of Santa Cruz Island. See Special Approach procedure.

FROM - TO	<u>Flight Description</u> "Runways to be decided by Captain based on Navigator input".				COURSE	DISTANCE (Leg)	ETE (Leg) HH+MM
	Dep. Runway-21	Hdg – 250°	Init. Alt. – 6500 ft	Apt Elev. - 10ft	(Leg)		
Funafuti, Tuvalu (NGFU) to Santa Cruz, Solomon Islands (AGGL)	- Dep R/way 21 at 06.00 hrs. Rotate and turn immediately to hdg 249° and plot course on the chart to Santa Cruz correcting as necessary. Set ADF for GB NDB 370.0 SPECIAL APPROACH PROCEDURE – Maintain 6,500ft altitude until directly overhead the Runway then commence a spiral descent, maintaining a 20° banked turn to the left all the way down and stay over the Island land mass. Check wind direction from Navigator input and land accordingly on either Rwy 23/05, hdgs are 054/234°, surface is Grass, length is 2709ft.				249°	804nm	5hr 45min
Flight No. 549-03-04	Arrival Airport Elevation: 10ft	Estimated Totals for Flight>>>				804nm	5hr.45min

45 minute stopover here to refuel aircraft to 75% (600 gals, 3,600 lbs). Fuel at Santa Cruz is in short supply.

LEG 5. SANTA CRUZ, SOLOMON ISLANDS TO HENDERSON FIELD, (GUADALCANAL).

This was the scene of a lot of activity during WWII and these islands were controlled by the enemy until 1945.

FLIGHT BRIEFING

A climbing turn over the Islands land mass must be done to a minimum of 2,500ft before proceeding on course to avoid the possible enemy submarine.

You must avoid the islands as the odd sniper is still active.

FROM - TO	<u>Flight Description</u> "Runways to be decided by Captain based on Navigator input".				COURSE (Leg)	DISTANCE (Leg)	ETE (Leg) HH+MM
	Dep. Runway-23	Heading – 234°	Init. Alt. – 6,500 ft	Apt Elev. - 10ft			
Santa Cruz, Solomon Islands (AGGL) to Henderson Field. Solomon Islands (Guadalcanal) (AGGH)	Set ADF to GR NDB 370.0 and NAV1 to Henderson VOR HN 112.60 - Dep R/way 23 at 12.30 hrs. Rotate and climb over the islands land mass to 2,500ft doing a 360° or 720° turn before passing over the NDB. - After station passage turn to 273°, climb to 6,500ft and plot course on the chart until HN DME reads 80nm. Turn to hdg 307° and maintain this course . First island on your left is San Cristobel and first island on your right is Malaiti. Second island on your left is Guadalcanal and this course puts you between them all the way to final approach. - When DME reads 54nm, turn to hdg 262° and commence descent. - When DME reads 24nm, turn to hdg 239° and make visual approach Land Rwy 24, surface is asphalt, length is 7,234ft				234°	1.0nm	0h 02min
					273°	356nm	2h 38min
Flight No. 549-03-05	Arrival Airport Elevation: 29ft		Estimated Totals for Flight>>>			357nm	2h 40min