LONG RANGE CRUISE CONTROL

To become competent and qualified to navigate a long range flight you must first be able to use and understand airplane cruising charts, methods of cruise control, preflight planning, and methods of controlled flight. Many crews have been lost because they didn't have enough fuel to reach destination. **Don't let this happen to you.**

Use the following procedures to prepare for a long range flight:

Flight Analysis

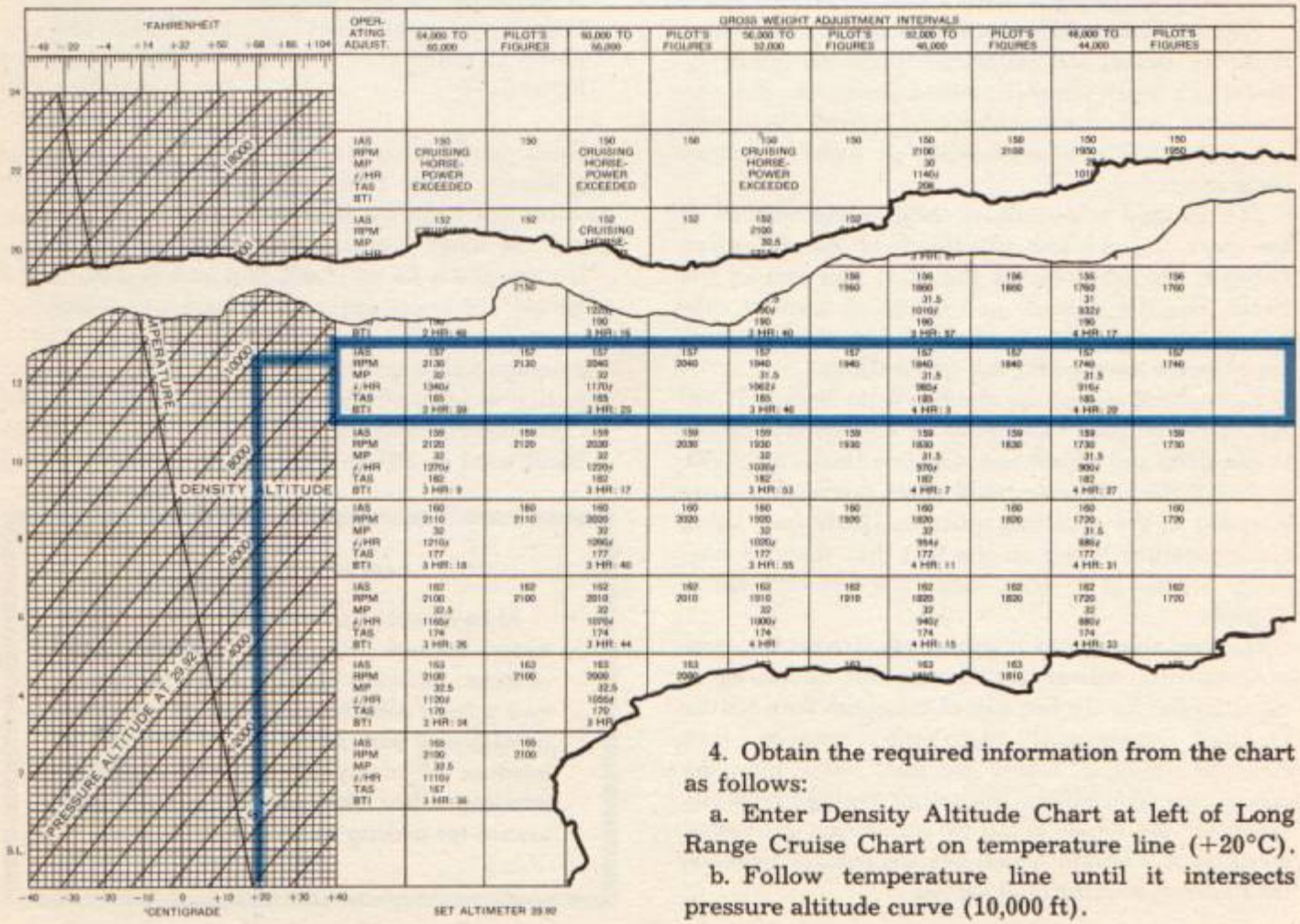
Assume your flight is from San Francisco to Hickam Field, T. H. Distance, 2110 nautical miles.

1. Check route weather conditions with your pilot and the weather office. Decide the altitude or altitudes at which the flight will be made. The considerations that direct your decisions are weather, effective wind, and navigation hazards.

2. After analyzing the flight you decide to fly at a pressure altitude of 10,000 feet, outside air temperature + 20°C.

3. Obtain the proper Long Range Cruise Chart from the Operations Officer, or from the T. O. on the airplane. Be sure that the chart contains the specifications that fit your airplane. Your airplane is a B-24J. It has Army paint on it, turrets and guns in combat position, C-3 jets, and uses Grade 100/130 fuel. Check with the flight engineer to be sure you are both using the same cruise control data. This is vital to proper planning.

LONG RANGE CRUISE CHART B-24J WITH C-3 JETS; TURRETS AND GUNS IN COMBAT POSITION – ARMY PAINT



4. Obtain the required information from the chart as follows:

a. Enter Density Altitude Chart at left of Long Range Cruise Chart on temperature line (+20°C).

b. Follow temperature line until it intersects pressure altitude curve (10,000 ft).

c. Follow horizontal density altitude line from temperature/pressure altitude intersection to the left, and read density altitude (12,800 ft).

d. Use data for flight contained in bracket opposite density altitude (11,000 to 13,000 ft).

Definitions of other terms in columns on chart

IAS—Indicated airspeed
RPM—Revolutions per minute
MP—Manifold pressure
#/HR—Pounds of fuel used per hour
TAS—True airspeed
BTI—Bracket time interval (time to fly in weight bracket)

5. The true airspeed for your flight is 185 mph. Convert mph to knots to conform with your other computations. All computations are in knots.

6. Divide your proposed flight into zones as indicated by the winds aloft for the altitude of your flight. Each set of winds occupy a zone.

7. Obtain fuel consumed in climb from the T.O. on your airplane. Obtain fuel consumed after climb as follows:

a. Consult Long Range Cruise Chart in correct weight bracket of your airplane at takeoff.

b. Read #/HR figure.

c. Compute pounds of fuel used in each zone. Be sure to subtract weight of fuel used from gross weight of airplane at takeoff for each computation, and change #/HR figure as gross weight changes from one weight adjustment interval to another. Where #/HR figure changes in the middle of a zone use the proper #/HR figure for the portion of the zone applicable.

8. Make your flight plan as follows:

DATE 10 MARCH 1945

AIRPLANE TYPE B-24J NO. 4328015

FROM HAMILTON TO HICKAM, T.H.

FLIGHT PLAN

PILOT J. D. SMITH, CAPT

NAVIGATOR L. M. JONES, LT.

58,000 GROSS WEIGHT AT TAKEOFF

16,200 LB./GAL ABOARD AT TAKEOFF

FROM	TO	ZONE NO.	DIST.	TOTAL DIST.	TRUE COURSE	PRESSURE ALTITUDE	WIND DIRECTION AND VELOCITY	TEMP.	TRUE AIRSPEED	TRUE HEADING	GROUND SPEED	ELAPSED TIME	TOTAL TIME	FUEL CONSUMED	FUEL REMAINING	REMARKS
CLIMB	C	26	26	241°	CLIMB	NO WIND	+30°	147	241°	147	:12	:12	870	15,330	
	*	1	421	450	241°	10,000	60°/25K	+20°	161	241°	186	2:17	2:29	3400	12,800	
		2	300	750	241°	10,000	280°/40K	+20°	161	250°	128	2:20	4:49	5880	10,320	
		3	750	1500	241°	10,000	80°/30K	+20°	161	238°	190	3:57	8:46	9760	6440	
		4	610	2110	241°	10,000	150°/30K	+20°	161	230°	159	3:50	12:36	13,260	2940	

Take fuel consumed in climb and distance traveled in climb from the T.O. of the airplane, as indicated in flight plan.
* You are in the 60,000 to 56,000 weight bracket for only 58 minutes of Zone 1. For 1 hr., 19 min. you are in the 56,000 to 52,000 weight bracket.

POINT OF NO RETURN 4 ENG. 1010 MILES

ALTERNATE NONE

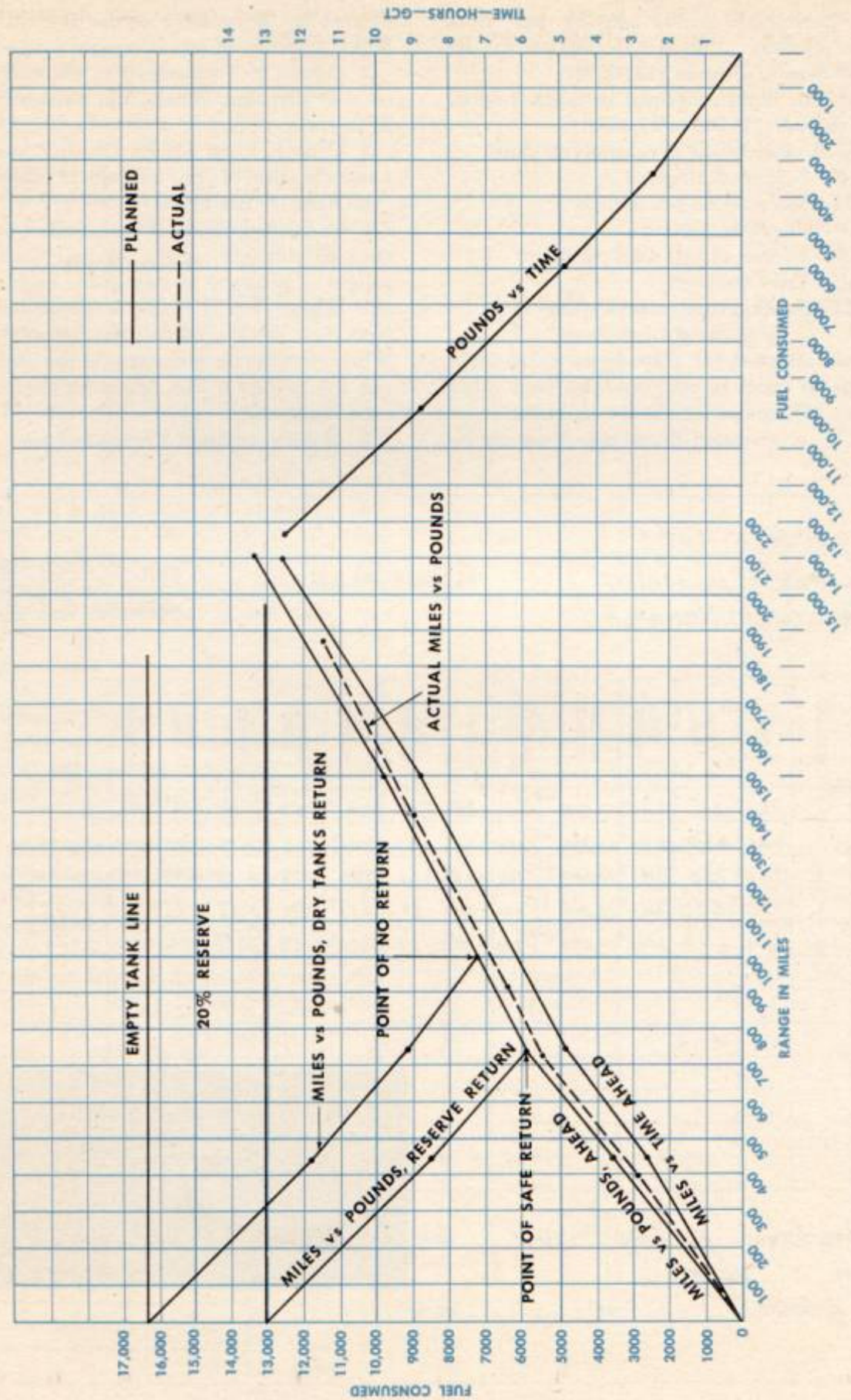
TIME TO ALTERNATE ____ HRS. ____ MINS.

/E
TION

PILOT
OPERATIONS OFFICER

RANGE CONTROL CHART

FROM HAMILTON TO HICKAM, T. H.



9. Construct a Range Control Chart. This chart gives you a means of comparing estimated with actual flight performance. It projects flight trends during flight and forecasts critical conditions before they actually happen.

Plot the following six curves before takeoff:

a. Miles vs. pounds, ahead. Use the figures in Total Distance column and Fuel Consumed column of your flight plan. This shows the number of pounds of fuel you normally use for any given distance.

b. Miles vs. pounds, reserve return. Draw this curve by setting up a reserve and plotting Total Distance column and Fuel Consumed column on a reciprocal course. Use the wind on the reciprocal heading and use the same true airspeed. Re-figure pounds used and plot from empty tank line. Use a reserve of 10% to 20% depending upon your operation. Set up this reserve by decreasing the amount of fuel available on your chart. The point at which this curve crosses the first curve (miles vs. pounds, ahead) is your point of safe return. By turning back at this point, you can return to your departure point with a reserve of fuel in your tanks.

ZONE	GS	MILES	ELAPSED TIME	FUEL USED
No. 1	136	450	3:18	4480
No. 2	194	750	1:33	7115
No. 3	132	1,500	5:41	12,520
No. 4	163	2,110	3:44	15,940

c. Miles vs. pounds, dry tanks return. Draw this curve by plotting Total Distance column and Fuel Consumed column as above. Do not use a reserve. Use the wind on the reciprocal heading and use the same true airspeed. The point at which this curve crosses the first curve (miles vs. pounds, ahead) is your point of no return. By turning back at this point, you will reach your departure point with empty tanks.

d. Miles vs. time, ahead. Plot this curve from Total Distance column and Total Time column of your flight plan. This gives you a check on distance traveled for the time of the fix.

e. Plot pounds vs. hours to show fuel consumed at any given time. If your airplane has flow meters you do not need this curve.

During Flight

During flight, plot your performance curve in a dotted line from actual fixes. Plot pounds used vs. actual miles traveled.

Sample Analysis

Assume that the airplane does not have flow meters.

At the end of 8 hours a fix shows that you have traveled 1400 nautical miles.

1. Follow up the right side of the Range Control Chart, on the time scale, to 8 hours. Follow this grid line until it intersects pounds vs. hours curve.
2. Read the fuel scale at the bottom of the chart under this point. It indicates that you have used 9000 pounds.
3. Then enter the pounds scale at the left of the chart at 9000 pounds.
4. Follow the grid until it intersects vertically above the miles scale at the bottom of the chart at 1400 nm. This is your actual miles vs. pounds point.
5. Every time you obtain a fix, establish such a point on your chart.
6. Join these points by a dotted line. This gives you a curve on the trend of your flight.

You can also plot actual miles vs. time from flight data to compare with the precomputed miles vs. time ahead curve.

Be sure to establish a trend before reaching the point of no return.