

# SECTION III

## FLIGHT OPERATION DATA



AT-17B COMPANION MODEL

### 1. GENERAL

This section contains tabulated data of flight operating conditions and restrictions, and specific instructions for the use of the charts in compilation of a flight plan. The charts appear complex but careful study will reveal a valuable amount of information readily useable and requiring little actual calculation to fit existing conditions. The data presented is slightly conservative to account for service conditions.

### 2. FLIGHT DATA CHARTS.

a. **SPECIFIC ENGINE FLIGHT CHART.** - This chart lists the various operating conditions of the engine and the performance which may be expected from the engine under those conditions. Limiting conditions are set forth and precautions or conditions to avoid are noted. The data listed should be committed to memory in order that proper engine performance may be substantiated rapidly.

b. **TAKE-OFF, CLIMB, AND LANDING CHART.** (CONSISTS OF THREE SEPARATE CHARTS) - First, a take-off chart which lists "ground run" and "total distance to clear 50 feet" for various conditions of airplane weight, altitude, and runway surfaces. Second, a climb chart which denotes the rate, time, best indicated air speed, and fuel consumption which may be obtained from the airplane for various weight conditions and at different altitudes. Third, a landing distance chart showing the required distances for various ground surface conditions at various altitudes. Temperature corrections and operating conditions are noted.

c. **FLIGHT OPERATION INSTRUCTION CHART.** - Several flight charts are provided for different gross weights, and one chart shows single-engine operation. The charts are divided into vertical columns for various power conditions with the upper half of the chart giving ranges according to the amounts of fuel noted and the lower half of the chart giving the engine operating conditions at various altitudes with which the ranges listed vertically above may be obtained. The operating conditions noted in each column, except the

column to the extreme left, are so chosen that they give the same miles per gallon for each operating condition listed in that specific column. The ranges apply to each of the conditions shown vertically below, and in the extreme left column applies only at the altitude listed in the footnote. The chart is arranged so that, reading from left to right, the columns give increased range at sacrifice in speed, with maximum cruising speeds on the extreme left and maximum range on the extreme right. Allowance has been made in the ranges listed for fuel consumed in warm-up, taxiing, take-off, and climb to 5000 feet. Single-engine operation has only one column of cruising conditions. Note that it is not possible to secure a greater range on single engine than can be flown on maximum range normal operation.

### 3. METHOD OF USING CHARTS. SAMPLE CALCULATIONS.

#### a. TAKE-OFF, CLIMB, AND LANDING CHARTS.

(1) **TAKE-OFF.** - Given a landing field runway (sod) 1000 feet in length with a total distance of 2000 feet available to clear a 50-foot obstacle, can a UC-78B airplane equipped with wooden propellers use the field safely for take-off, if the gross weight of the airplane is 5700 pounds? Temperature is 70° F (21.1° C), field elevation is 1500 feet, and a head wind of 10-20 mph is anticipated.

**REFERRING TO TAKE-OFF CHART.** - At 5700-pound gross weight - sod - turf runway.

M.P.H. HD. WIND	SEA LEVEL		3000'	
	GRD. RUN TO CLEAR 50'	GRD. RUN TO CLEAR 50'	GRD. RUN TO CLEAR 50'	GRD. RUN TO CLEAR 50'
0	625	1775	800	2225
20	350	975	450	1225

From the chart the temperature correction for the above distance is as follows:

$$70^{\circ}\text{F} - 32^{\circ}\text{F} = 38^{\circ}\text{F}$$

$38/20 = 1.9$  on  $(1.9 \times 10\%) = 19\%$  increase which is to be added to the distances above.



Total distance would therefore be 119%.

Multiplying each of the distances above by 1.19 the corrected distances are:

M.P.H. HEAD WIND	SEA LEVEL		1500'		3000'	
	GRD. RUN	TO CLEAR 50'	GRD. RUN	TO CLEAR 50'	GRD. RUN	TO CLEAR 50'
0	744	2110	847	2380	950	2650
20	417	1160	476	1310	536	1460

Interpolating for 1500-foot altitude we obtain the above distances. It can thus be seen that sufficient distances are provided for take-off safely with the conditions specified. The data is applicable to both wooden and metal propeller as noted on the chart.

(2) CLIMB CHART. - With an airplane gross weight of 5200 pounds, what length of time will be required to climb to 15,000 feet? Free air temperature 80° F (26.7° C).

From the chart, 24 minutes will be required for a "ferry" climb.

Temperature correction would be -

$48/20 = 2.4$  or  $(2.4 \times 10\%) = 24\%$  increase which is to be added to the above time. Total time would be 124%. Multiplying the time noted by 1.24 ( $1.24 \times 24 = 29.76$  min) or approximately 30 minutes.

The above climb to be made at 2000 rpm full throttle.

(3) LANDING CHART. - What distance is required to land over a 50-foot obstacle if ground temperature is 100° F (37.8° C)? Assuming dry sod surface at sea level. What is the best indicated air speed for approach?

From the chart at 5200 pounds the best indicated air speed is 90 mph, and distance to clear 50 feet, 1450 feet; ground roll, 675 feet for dry sod at sea level. Temperature correction - since temperature is above 95° F, (35° C) 10 percent should be added to approach IAS thus best IAS would be 99 mph.

For ground roll a 20 percent increase allowance should be made or 810 feet allowed for ground roll.

b. FLIGHT OPERATION INSTRUCTION CHART. - A flight plan is to be made for a flight of 600 miles using a model UC-78 of 5700 pounds (gross weight) and equipped with a 30-gallon auxiliary fuel tank. A reserve fuel supply of at least 25 minutes is desired and full fuel tanks will be available at take-off. What is the maximum speed at which the flight can be made and how much time will be required to make the trip? A head wind of 10 mph is anticipated at a flight altitude of 6000 feet.

SOLUTION

Fuel supply with the 30-gallon auxiliary tank is 150 U.S. (125 Imperial) gallons total.

Select the flight chart for the weight specified and for the fuel capacity as noted above.

Since a 25-minute reserve fuel is desired, select from the lower half of the chart the fuel consumption (GPH) from the No. I cruising condition at 6000 feet altitude (39GPH). Multiply this figure by the hours of reserve desired to obtain the reserve fuel allowance. ( $25/60 \times 39 = 16.2$  gallons.)

Add the amount of reserve fuel to the fuel allowance for take-off and climb (6 gallons) - and subtract this total from the total amount of fuel, to obtain the fuel available for flight planning purposes.

$150 - (16.2 + 6) = 127.8$  U.S. gallons available fuel.

Select the next lower (120) fuel quantity figure noted on the upper portion of the flight chart as a basis for selecting the cruising condition to be used and select a figure to the right or left of the available amount of fuel, equal to or the next entry greater than the air miles to be flown.

EXAMPLE

Available fuel 127.8 gallons. Next lower figure listed, 120 gallons. Air miles to be flown, 600 statute miles. Next entry equal to or greater than the miles to be flown = 617, which is under alternate cruising condition IV. This cruising condition then represents the highest cruising speed possible at the range desired, considering zero wind. The airplane may be operated under conditions shown in the columns to the right of column IV and still maintain the desired range but cannot be operated under any of the conditions shown in columns to the left of IV, considering no wind, and still maintain the range desired.

Using condition IV - to obtain the range at 6000 foot altitude the engine conditions from the chart are as follows:

Engine Speed	1950 rpm
Indicated Air Speed	130 mph
Manifold Pressure	19 inches Hg
Fuel Consumption	30 GPH
True Air Speed	152 mph

Considering the 10-mph anticipated head wind (component in direction of flight) the "ground speed" will be  $152 - 10 = 142$  mph.

Then the air miles to be flown divided by mph will give the number of hours of flight.



or  $\frac{600}{142} = 4.225$  hours = 13.5 minutes

(Multiply fractional part of hours by 60 to obtain minutes.)

To check the calculation:

4.225 hours times 30 gallons per hour = 126.75 gallons.

Thus, the cruising condition chosen is sufficient to provide a flight of 600 miles in 4 hours and 13 minutes with a 10-mph head wind at a density altitude of 6000 feet with 25 minutes or more\* of reserve fuel.

The flight plan may be changed at any point by running through the calculations as shown above, using the remaining distance to the objective as the range,

and the remaining fuel as the fuel available. It is necessary to allow for reserve fuel but NOT necessary to allow for take-off fuel.

Except for the maximum continuous power column, the ranges listed in the upper part of the chart are for each of the altitude levels listed below; therefore, changes in altitude may be made (changing the engine controls to new conditions) without refiguring the range.

\*NOTE

The reserve fuel was based on the highest fuel consumption in column I. With the reserve fuel allowed, 16.2 gallons, a possible  $(\frac{16.2 \times 60}{23})$ , 42 minutes reserve is obtainable

with the 16.2 gallons of reserve fuel using the maximum "Range-Endurance" condition.



AIRPLANE MODELS		SPECIFIC ENGINE				ENGINE MODELS					
AT-17 SERIES		UC-78 SERIES				R-755-9					
UC-78 SERIES						R-755-9					
CONDITION	FUEL PRESSURE (LB./SQ. IN.)	OIL PRESSURE (LB./SQ. IN.)	OIL TEMP.		COOLANT TEMP.		MAX. PERMISSIBLE DIVING RPM: 2400		ALLOWABLE OIL CONSUMPTION		
DESIRED	2-4	70-90	°C	°F	°C	°F	CONDITION		NORMAL RATED (MAX. CONT.)		
MAXIMUM	4	100	50-70	122	158		4, 2		U.S. QT./HR. . . . . IMP. PT./HR.		
MINIMUM	2	60	85	135			2, 7		U.S. QT./HR. . . . . IMP. PT./HR.		
IDLING	0 TO 1/2	15					2, 1		U.S. QT./HR. . . . . IMP. PT./HR.		
SUPERCHARGER TYPE: NONE			OIL GRADE: (S) . . . . . 1100A (W) . . . . . 1080A			FUEL GRADE: 73 OCTANE					
OPERATING CONDITION	RPM	MANIFOLD PRESSURE (BOOST)	HORSE-POWER	CRITICAL ALTITUDE		USE LOW BLOWER BELOW:	MIXTURE CONTROL POSITION	FUEL FLOW (GAL./HR./ENG.)		MAXIMUM CYL. TEMP.	MAXIMUM DURATION (MINUTES)
TAKE-OFF	2200	FULL THROTTLE	245	WITH RAM	NO RAM	BLOWER	FULL * RICH	U.S.	IMP.	°C	°F
WAR EMERGENCY				SEA LEVEL		-		24.9	-	265	509
MILITARY	2200	FULL THROTTLE	245	SEA LEVEL		-	FULL * RICH	24.9	-	265	509
NORMAL RATED (MAX. CONT.)	2000	FULL THROTTLE	225	SEA LEVEL		-	FULL * RICH	22.5	-	235	455
MAXIMUM CRUISE	2000	22"	187.	6,300		-	F.R. TO RICH SMOOTH *	17.6	-	210	410
MINIMUM SPECIFIC CONSUMPTION	1950	17"	138	13,300		-	BEST * POWER	12.5	-	210	410

REMARKS: \* LEAN TO RICHEST SMOOTH OPERATION ABOVE 5000 FEET.  
DO NOT OPERATE ENGINES UNDER 1900 RPM.  
WHEN OPERATING ON SINGLE ENGINE, DO NOT ALLOW DEAD ENGINE TO SLOW UNDER 600 RPM AS THIS RESULTS IN DANGEROUS VIBRATING FREQUENCIES.



**AIRPLANE MODELS**  
**AT-17 SERIES**  
**UC-78 SERIES**

**TAKE-OFF, CLIMB & LANDING CHART**  
**R-755-9**

**ENGINE MODELS**  
**R-755-9**

**TAKE-OFF DISTANCE ( IN FEET )(FLAPS UP)**

GROSS WEIGHT (IN LBS.)	HEAD WIND	HARD SURFACE RUNWAY						SOD-TURF RUNWAY						SOFT SURFACE RUNWAY					
		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.	
		GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
4500	0	475	850	600	1050	750	1350	525	950	650	1175	825	1500	575	1050	700	1325	900	1675
	20	250	850	325	575	400	725	275	525	350	650	450	825	300	575	400	725	500	925
	40	150	250	175	325	225	400	150	300	200	350	250	450	175	325	225	400	275	500
5200	0	525	1150	825	1450	825	1850	575	1300	725	1625	900	2050	625	1450	800	1825	1000	2300
	20	300	850	375	800	450	1025	325	700	400	900	500	1125	350	800	425	1000	550	1275
	40	150	350	200	450	250	550	175	400	225	500	275	625	200	450	250	550	300	700
5700	0	575	1600	725	2000	925	2550	625	1775	800	2225	1000	2825	700	1950	875	2450	1125	3100
	20	325	875	400	1100	500	1400	350	975	450	1225	550	1500	375	1000	475	1350	625	1700
	40	175	500	225	600	275	775	200	550	250	675	300	850	200	600	275	750	350	950

NOTE: INCREASE DISTANCE 10% FOR EACH 10°C ABOVE 0°C ( 10% FOR EACH 20°F ABOVE 32°F)

ENGINE LIMITS FOR TAKE-OFF 2200 RPM & F.T.

GROSS WEIGHT IN LBS.	TYPE OF CLIMB	COMBAT MISSIONS USE 2200 RPM & F.T. IN. HG						CLIMB DATA						FERRY MISSIONS USE 2000 RPM & F.T. IN. HG					
		S.L. TO 0		FT. ALT. 5000		FT. ALT. 10,000		S.L. TO 0		FT. ALT. 15,000		FT. ALT. 18,000		S.L. TO 0		FT. ALT. 18,000		FT. ALT. 18,000	
		BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN	BEST I.A.S. MPH	TIME FROM S.L. FT/MIN
5200	COMBAT	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FERRY	90	-	1150	0	87	-	900	5	6	-	80	-	570	12	11	-	78	-
5700	COMBAT	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	FERRY	90	-	950	0	85	-	850	6	6	-	78	-	520	15	13	-	75	-

NOTE: INCREASED ELAPSED CLIMBING TIME 10% FOR EACH 10°C ABOVE 0°C FREE AIR TEMPERATURE ( 10% FOR EACH 20°F ABOVE 32°F)

FUEL INCLUDES WARM-UP AND TAKE-OFF ALLOWANCE

GROSS WEIGHT IN LBS.	BEST I. A. S. APPROACH	HARD DRY SURFACE						FIRM DRY SOD						WET OR SLIPPERY					
		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.		AT SEA LEVEL		AT 3,000 FT.		AT 6,000 FT.	
		GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.	GROUND RUN	TO CLEAR 50' OBJ.
5200	90	1400	600	1750	750	2200	950	1450	675	1825	850	2325	1075	1600	800	2000	1000	2550	1275

NOTE: FOR GROUND TEMPERATURES ABOVE 35°C (95°F) INCREASE APPROACH I.A.S. 10% AND ALLOW 20% INCREASE IN GROUND ROLL.

REMARKS THE DATA ABOVE APPLY TO BOTH CONSTANT SPEED AND WOODEN PROPELLER EQUIPPED AIRPLANES.

I.A.S.: Indicated Air Speed  
M.P.H.: Miles Per Hour  
L: Best Landing  
E: Best Climb  
G: Best Cruise  
N: Best Fuel Economy  
D: Best Descent  
IMP: Imperial Gallons  
NOTE: All Distances are Average  
RED FIGURES HAVE NOT BEEN FLIGHT CHECKED



MODEL (S) AT-17 SERIES UC-78 SERIES (WITH CONSTANT SPEED PROPS)		FLIGHT OPERATION INSTRUCTION CHART SHEET ..... OF ..... SHEETS 5200 ..... POUNDS GR. WT. .... TO .....		EXTERNAL LOAD ITEMS NONE		
CONDITION	R.P.M.	M.P. (IN. HG.)	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.
TAKE-OFF	2200	F. T.	-	F. R.	1	24.9
MILITARY POWER	2200	F. T.	-	F. R.	1	24.9
ENGINE (S)	R-755-9					

  

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. NOTES: (A) Avoid continuous cruising in Column I in the upper left corner of chart.

ALTERNATE CRUISING CONDITIONS (NO WIND)												(NO RESERVE FUEL ALLOWANCE)							
I NORMAL RATED (MAX. CONT.)		II		III		IV		V (MAX. RANGE)		FUEL U.S. GALS.		RANGE IN AIR MILES		STATUTE		NAUTICAL			
RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		U.S. GALS.		STATUTE		NAUTICAL		STATUTE		NAUTICAL	
AT S.L.	AT 6,000	AT S.L.	AT 6,000	AT S.L.	AT 6,000	AT S.L.	AT 6,000	AT S.L.	AT 6,000	②	①	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL
502	441	513	450	549	482	442	387	477	419	120	114	585	503	637	552	637	552	637	552
390	353	405	360	434	385	348	310	377	335	90	80	482	397	503	436	447	385	447	385
309	265	315	270	337	289	271	232	293	251	70	60	359	309	391	340	391	340	391	340
220	176	225	180	241	193	183	155	210	168	60	50	256	221	280	242	280	242	280	242
132	89	135	90	145	96	116	77	84	48	30	20	103	88	112	97	112	97	112	97
44	38	45	38	48	38	38	38	42	42	10	10	61	44	56	48	56	48	56	48

  

OPERATING DATA		OPERATING DATA		OPERATING DATA		OPERATING DATA		OPERATING DATA		OPERATING DATA						
R.P.M.	I.A.S. M.P.H.	MIX-TURE IN. HG.	M.P. IN. HG.	T.A.S. G. MPH	R.P.M.	I.A.S. M.P.H.	MIX-TURE IN. HG.	M.P. IN. HG.	T.A.S. G. MPH	DENSITY ALT. IN FEET	R.P.M.	I.A.S. M.P.H.	MIX-TURE IN. HG.	M.P. IN. HG.	T.A.S. G. MPH	DENSITY ALT. IN FEET
2000	180	20	18	26.5	2000	145	F. R. 20	5.34	175	30000	2000	145	F. R. 20	5.34	175	30000
2000	180	20	18	29.6	1950	130	"	"	152	25000	1950	130	"	"	152	25000
2000	180	20	18	33	1950	130	"	"	145	20000	1950	130	"	"	145	20000
2000	180	20	18	38.5	1950	130	"	"	139	15000	1950	130	"	"	139	15000
2000	180	20	18	50	1950	130	"	"	130	12000	1950	130	"	"	130	12000
2000	180	20	18	173	1950	130	"	"	119	9000	1950	130	"	"	119	9000
2000	180	20	18	175	1950	130	"	"	115	6000	1950	130	"	"	115	6000
				S. L.	1950	130	"	"	109	3000	1950	130	"	"	109	3000
				S. L.	1950	130	"	"	109	S. L.	1950	130	"	"	109	S. L.

INDICATED ALTITUDE CORRECTED FOR "SEE AIR TEMPERATURE."  
 TAKE-OFF AND CLIMB TO 5,000 FEET ALTITUDE  
 RETURN FUEL FLOWS TO TANK  
 USE FUEL FROM TANKS IN THE FOLLOWING ORDER:  
 REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

LEGEND  
 ① INDICATED ALTITUDE CORRECTED FOR "SEE AIR TEMPERATURE."  
 ② ALLOW 6 U.S. GALS. IMP. GALS. FOR WARM UP.  
 TAKE-OFF AND CLIMB TO 5,000 FEET ALTITUDE  
 RETURN FUEL FLOWS TO TANK  
 USE FUEL FROM TANKS IN THE FOLLOWING ORDER:  
 REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

WITH TWO SPEED BLOWER: Use high blower above heavy line only

I.A.S.: Indicated Air Speed  
 M.P.: Manifold Pressure (In. Hg)  
 U.S.G.P.H.: U. S. Gallons Per Hour  
 (M.P.G.H.: Imperial Gallons Per Hour)  
 F.T.: Full Throttle  
 F.S.: Full Speed  
 F.R.: Full Rich  
 B.P.: Best Power

RED FIGURES ARE PRELIMINARY: SUBJECT TO REVISION AFTER FLIGHT CHECK



MODEL (S)  
UC-78 SERIES  
**(CONSTANT SPEED PROPS)**

FLIGHT OPERATION INSTRUCTION CHART  
SHEET ..... OF ..... SHEETS

GR. WT. 5700 TO 5200 POUNDS

EXTERNAL LOAD ITEMS  
30 GALLON TANK

CONDITION R.P.M. M.P.H. M.P. (IN. HG.) BLOWER POSITION MIXTURE POSITION DURATION IN MIN. U.S. G.P.H.

TAKE-OFF 2200 F.T. - F.R. I 24.9

MILITARY POWER 2200 F.T. - F.R. I 24.9

ENGINE (S) R-755-9

INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplanes. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. NOTES: (A) Avoid continuous cruising in Column I in the upper left corner of chart.

1 NORMAL RATED (MAX. CONT.)		II				III				IV				FUEL		V (MAX. RANGE)	
RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		RANGE IN AIR MILES		U.S. GALS.		RANGE IN AIR MILES	
STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	STATUTE	NAUTICAL	U.S. GALS.	STATUTE	NAUTICAL	
AT S.L.	AT 5,000	AT S.L.	AT 5,000	AT S.L.	AT 5,000	AT S.L.	AT 5,000	AT S.L.	AT 5,000	AT S.L.	AT 5,000	AT S.L.	AT 5,000	150	805	700	
635	550	648	566	694	606	694	606	740	644	694	606	740	144	805	700		
573	497	585	510	627	546	627	546	667	580	627	546	667	130	726	632		
530	459	540	471	578	505	578	505	617	537	578	505	617	120	670	583		
485	421	495	432	530	462	530	462	565	492	530	462	565	110	614	535		
441	382	450	387	482	419	482	419	513	446	482	419	513	100	558	485		
396	345	405	348	434	377	434	377	462	397	434	377	462	90	503	436		
353	306	360	310	386	335	386	335	410	353	386	335	410	80	447	388		
309	268	315	271	338	293	338	293	359	309	338	293	359	70	391	340		
265	229	270	232	289	251	289	251	306	255	289	251	306	60	335	281		
220	192	225	193	241	210	241	210	256	221	241	210	256	50	280	242		
176	153	180	155	193	168	193	168	205	176	193	168	205	40	224	194		

OPERATING DATA

R.P.M. I.A.S. M.P.H. M.P. (IN. HG.) U.S. T.A.S. G.P.H. ALT. IN FEET

2000 145 F.R. 20 34 175 1950 130 8.P. 19 31 160 9000 2000 119 B.P. 15 23 145

30000 25000 20000 15000 12000 9000 6000 3000 S.L.

LEGEND

1 INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE

2 ALLOW 6 U.S. GALS. IMP. GALS. FOR WARM UP.

TAKE-OFF AND CLIMB TO 5000 FEET ALTITUDE

RETURN FUEL FLOWS TO TANK

USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA.

RED FIGURES ARE PRELIMINARY; SUBJECT TO REVISION AFTER FLIGHT CHECK

BOLD NUMBERS: Use Auto-Rich

LIGHT NUMBERS: Use Auto-Lean

WITH TWO SPEED BLOWER: Use high blower above heavy line only

I.A.S.: Indicated Air Speed  
M.P.: Manifold Pressure (In. Hg)  
U.S.G.P.H.: U.S. Gallons Per Hour  
IMP.G.P.H.: Imperial Gallons Per Hour  
F.T.: Full Throttle  
S.L.: Sea Level  
F.R.: Full Rich  
B.P.: Best Power



MODEL (S) AT-17 SERIES UC-78 SERIES SINGLE ENGINE OPERATION				FLIGHT OPERATION INSTRUCTION CHART SHEET 1 OF 1 SHEETS GR. WT. 5200 POUNDS TO 4500 POUNDS				EXTERNAL LOAD ITEMS (I) PROPELLER FEATHERED																
CONDITION	R.P.M.	M.P.	BLOWER POSITION	MIXTURE POSITION	DURATION IN MIN.	U.S. G.P.H.	INSTRUCTIONS FOR USING CHART: Select figure in fuel column equal to or less than total amount of fuel in airplane. Move horizontally to the right or left and select a figure equal to or greater than the air miles to be flown. Vertically below and opposite desired cruising altitude read optimum cruising conditions. NOTES: (A) Avoid continuous cruising in Column I in the upper left corner of chart.																	
TAKE-OFF	2200	F.T.	--	F.R.	1	24.8																		
MILITARY POWER	2200	F.T.	--	F.R.	1	24.9																		
ENGINE (S)	R-755-9			R-755-9																				
1 NORMAL RATED (MAX. CONT.)							ALTERNATE CRUISING CONDITIONS																	
RANGE IN AIR MILES							(NO RESERVE FUEL ALLOWANCE)																	
STATUTE NAUTICAL							STATUTE NAUTICAL																	
AT S.L. AT 3,000 AT S.L. AT 3,000							U.S. GALS. (2)																	
							600	520				114	100											
							474	410				90	80											
							421	364				80	70											
							368	319				60	50											
							316	273				60	40											
							263	228				50	30											
							210	182				40	20											
							158	136				30	10											
							105	91				20	10											
							52	45				10												
OPERATING DATA							OPERATING DATA							OPERATING DATA										
I.A.S. MIX-TURE M.P. IN. Hg U.S. T.A.S. G. MPH R.P.M.							I.A.S. MIX-TURE M.P. IN. Hg U.S. T.A.S. G. MPH R.P.M.							I.A.S. MIX-TURE M.P. IN. Hg U.S. T.A.S. G. MPH R.P.M.										
See No. 1 Alternate Cruising Condition							SINGLE ENGINE OPERATION							SINGLE ENGINE OPERATION										
Density ALT. IN FEET							Density ALT. IN FEET							Density ALT. IN FEET										
30000							30000							30000										
25000							25000							25000										
20000							20000							20000										
15000							15000							15000										
12000							12000							12000										
9000							9000							9000										
5700							5700							5700										
3000							3000							3000										
S. L.							S. L.							S. L.										

I.A.S.: Indicated Air Speed  
M.P.: Manifold Pressure (In. Hg)  
U.S.G.P.H.: U.S. Gallons Per Hour  
IMP.G.P.H.: Imperial Gallons Per Hour  
F.T.: Full Throttle  
S.L.: Sea Level

**BOLD NUMBERS:** Use Auto-Rich  
**LIGHT NUMBERS:** Use Auto-Lean  
**WITH TWO SPEED BLOWER:** Use high blower above heavy line only

INDICATED ALTITUDE CORRECTED FOR FREE AIR TEMPERATURE.  
ALLOW U.S. GALS. IMP. GALS. FOR WARM UP.  
TAKE-OFF AND CLIMB TO FEET ALTITUDE  
RETURN FUEL FLOWS TO TANK  
USE FUEL FROM TANKS IN THE FOLLOWING ORDER

REFER TO "SPECIFIC ENGINE FLIGHT CHART" FOR ADDITIONAL ENGINE OPERATION DATA. NOTE: With constant speed props, place dead engine prop in High Pitch Position.

RED FIGURES ARE PRELIMINARY: SUBJECT TO REVISION AFTER FLIGHT CHECK