South Carolina AVIATION News Letter

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G. C. MERCHANT, JR., DIRECTOR — J. F. BARRY, ASSISTANT DIRECTOR

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AVIATION EDUCATION WORKSHOP

Twenty-eight public school teachers were awarded certificates upon completion of the fourteenth Annual Aviation Education Workshop. The workshop was held at the University of South Carolina and was sponsored by the S. C. Aeronautics Commission, and Civil Air Patrol. Scholarships for the course were awarded by the sponsors.

The course, which was directed by John F. Barry, Assistant Director of the Aeronautics Commission is designed to give the teachers an orientation in all phases of Aviation.

The first field trip was to be an aerial tour to the Greenville-Spartanburg Airport to visit the facilities of Stevens Aviation, but due to bad weather, the trip was cancelled.

Trips to Hilton Field at Fort Jackson, to the Marine Corps Air Station and Cape Kennedy were also a part of the three weeks program which included lectures by outstanding speakers from various segments of the aviation industry.

The following teachers were awarded certificates: Miss Diana J. Ashworth, Columbia, S. C.; Mr. Edgar L. Bazemore, Cayce, S. C.; Mrs. Susan B. Beall, Columbia, S. C.; Mrs. Jean T. Blaylock, Columbia, S. C.; Mr. Thomas A. Bradley, Columbia, S. C.; Mrs. Harriet W. Brickle, Orangeburg, S. C.; Miss Patricia S. Clark, Columbia, S. C.; Mrs. Marguerite Crumpton, Ridgeway, S. C.; Mrs. Betty N. Dinkins, Manning, S. C.; Mrs. Sandra Dodd, Columbia, S. C.; Mr. Robert Earle Gunter, Wagener, S. C.; Miss Linda N. Hayes, Latta, S. C.; Mrs. Barbara P. Leath, Columbia, S. C.; Mrs. Elizabeth B. Lorick, Cayce, S. C.; Miss Jean Ludlam, Chapin, S. C.; Mrs. Patricia B. McCarthy, Columbia, S. C.; Mrs. Frances McNamara, Parris Island, S. C.; Miss Patricia E. Mack, Columbia, S. C.; Mrs. Katherine A. Mims, Cayce, S. C.; Mrs. Jacqueline R. Osborne, Camden, S. C.; Mrs. Doris Ann Rawl, West Columbia, S. C.; Mrs. Sarah S. Ray, Columbia, S. C.; Miss Jimmie Ruff, Chapin, S. C.; Miss Sheri R. Snyder, Columbia, S. C.; Mrs. Velma Tomlinson, Columbia, S. C.; Mrs. Joyce F. Tomlinson, Columbia, S. C.; Mr. James T. Wicker, Newberry, S. C.; Mrs. Margaret P. Wright, Columbia, S. C.

Outstanding speakers for the three weeks course were: Mr. Arthur B. Baskin, U. S. Weather Bureau; Miss Frances Miller, Miller Aviation; Mr. Monroe David, Columbia Metropolitan Airport; Capt. W. W. Owen, Eastern Air Lines; Mr. L. F. Hembel, S. C. Helicopters; Mr. Philip Geary, Trans World Airlines; Major W. L. Gerald, University of South Carolina; Mrs. Betty McNabb, Hospital Historian; Miss Page Shamburger, Cross-Country News; Mr. Don Britt, Piedmont Airlines; Mr. Ralph Nelson, Aircraft Owners & Pilots Asso.; Mr. W. J. Reynolds, Civil Air Patrol; Mr. Stewart Williams, Federal Aviation Agency; Mr. Barnett, Warrant Officer; Major Egan, Operation Officer of the Beaufort Marine Air Station. Mr. G. C. Merchant, Jr., Director, S. C. Aeronautics Commission presented the certificates to the teachers.

FEDERAL AVIATION AGENCY
VFR EXAM-O-GRAM *NO. 33

USE OF PERFORMANCE CHARTS

A report of an accident was stated in the following words: "Takeoff was attempted on a 1,600-foot strip; the airplane cleared the fences but sank back and struck a ditch." The pilot stated that he failed to consider the effects of the grassy, rough field, the 90° temperature, heavy load of fuel and passengers, and the calm wind. COULD THE USE OF THE TAKEOFF PERFORMANCE CHART FOR HIS AIRCRAFT HAVE PREDICTED THE SAD ENDING TO THIS FLIGHT?

WHAT ARE PERFORMANCE CHARTS? They are charts that describe or predict the performance of an aircraft under a given set of conditions or ground rules. They may be in tabular or graph form. (Because of their importance to safety, all applicants are being tested, and will continue to be tested, on use of performance charts in the written examinations.)

WHERE DO YOU FIND PERFORMANCE CHARTS? You can find them in the FAA-approved Airplane Flight Manual and the Owner's Manual or Handbook prepared by the manufacturer. In many cases, the FAA-approved Flight Manual must be carried in the aircraft at all times.

ARE THE CONDITIONS OR GROUND RULES UNDER WHICH YOU USE A PARTICULAR TYPE PERFORMANCE CHART ALWAYS THE SAME? No. The particular set of conditions or ground rules, as well as format, will vary with the manufacturer. Although ground rules for their use may be different, the information obtainable is essentially the same--takeoff and landing distance (ground run or roll and to clear a 50-foot obstacle), fuel consumption, rate of climb, true airspeed, etc.

HOW ACCURATE SHOULD YOU CONSIDER THE PREDICTIONS OF PERFORMANCE CHARTS? You will be headed in the safe direction if you always consider the performance of the airplane you fly to be less than predicted by the performance charts. The following statement is contained in one airplane flight manual: "Flight tests from which the performance data was obtained were flown with a new, clean airplane, correctly rigged and loaded, and with an engine capable of delivering its full rated power." You can expect to do as well only if your airplane, too, is kept in the peak of condition.

IS IT NECESSARY THAT YOU ALWAYS CONSULT PERFORMANCE CHARTS PRIOR TO TAKEOFF OR LANDING? No. Obviously, if you are taking off or landing on a 10,000-foot runway in a light airplane, you need not check the takeoff or landing data charts. But where is the dividing line--6,000? 4,000? 2,000? This depends on a lot of factors which include the equipment you are flying; pilot skill, proficiency, and familiarity with equipment; and the relative values of the 3 major factors affecting aircraft performance (density altitude, gross weight, and wind) plus the type and condition of the runway.

WHEN SHOULD YOU CHECK YOUR PERFORMANCE CHARTS? Any time there is doubt in your own mind, whether it be due to the length and/or condition of the runway, the high density altitude, a recognition of your own limitations or a lack of familiarity with the equipment you are flying--which will be alleviated through the use of performance charts. You should begin an operation with complete confidence in its success. Use everything at your disposal to establish this confidence. Charts do not cover all conditions that might have an effect on performance; but by making adequate allowances to the information obtained, you can ensure a greater margin of safety.

WHAT CAN YOU OBTAIN FROM TAKEOFF PERFORMANCE CHARTS? You can find the predicted length of the takeoff ground run and/or the predicted distance necessary to clear a 50-foot obstacle (which includes the ground roll). For example:

Chart 1: At an elevation of 4,000 feet, zero mph wind, 75° F, 15° of flaps, and maximum gross weight (2,300 lbs. for this airplane) the predicted ground run is 1,380 feet and the predicted distance necessary to clear a 50-foot obstacle is 2,065 feet. If the airplane weighed 200 lbs. less than maximum gross weight, these distances would be reduced by 30% and become 966 feet and 1,445 feet, respectively. (See NOTE at bottom of chart.)

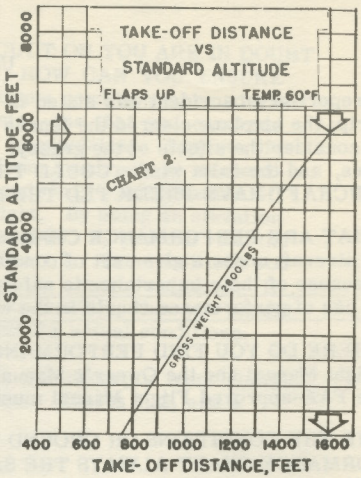
OBSTACLE TAKEOFF DATA — 15° FLAPS

	Sea Level			2000 ft.			4000 ft.			6000 ft.			8000 ft.		
Wind Vel. mph	Temp. °F	Ground Run Ft.	To Clear 50' Obst. Ft.	Temp. °F	Ground Run Ft.	To Clear 50' Obst. Ft.	Temp. °F	Ground Run Ft.	To Clear 50' Obst. Ft.	Temp. °F	Ground Run Ft.	To Clear 50' Obst. Ft.	Temp. °F	Ground Run Ft.	To Clear 50' Obst. Ft.
0	30	785	1175	20	900	1310	15	1060	1500	10	1260	1895	0	1175	2305
	50	890	1320	32	1035	1535	35	1215	1810	38	1130	2170	30	1695	2735
	90	1005	1590	80	1160	1720	75	1380	2065	70	1610	2560	60	1890	3275
10	30	620	955	20	715	1095	15	850	1300	10	1015	1570	0	1195	1920
	50	705	1080	32	830	1260	35	975	1595	38	1160	1810	30	1380	2290
	90	805	1220	80	935	1425	75	1110	1715	70	1335	2135	60	1575	2700

CHART 1

*NOTE: Decrease distance approximately 15% for 100 pounds decrease in gross weight.

Chart 2: At an elevation of 4,000 ft., 75° F, flaps up, and gross weight of 2,800 lbs., the takeoff distance is 1,600 ft. If you get 1,275 ft., it is because you used the same set of ground rules that you used in Chart 1. Since Chart 2 is based on standard altitude (standard temperature and pressure), you must first convert the elevation (to be completely accurate, the pressure altitude at that elevation) and temperature to a density altitude. A temperature of 75° F at an elevation (pressure altitude) of 4,000 ft. results in a density altitude of approximately 6,000 ft. (see Density Altitude Chart, page 4). Using an altitude of 6,000 ft. in Chart 2, you obtain the predicted takeoff distance of 1,600 ft. (75° F = 24° C)



WHAT CAN YOU OBTAIN FROM CLIMB PERFORMANCE CHARTS? Primarily, the rate of climb under various conditions. The information from these charts becomes exceedingly important when you have to cross high mountain ranges relatively soon after takeoff. Some charts also give the best climb airspeed and fuel consumed during the climb. For example:

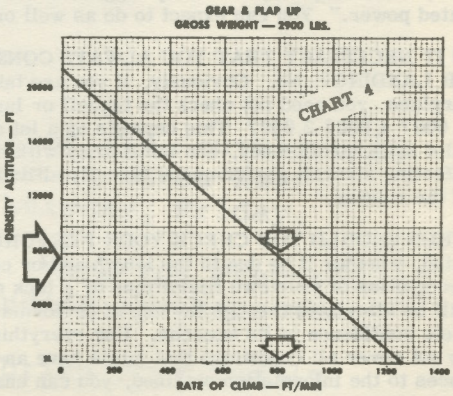
CLIMB DATA

GROSS WEIGHT LBS.	AT SEA LEVEL & 59°F. BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	GAL. OF FUEL USED	AT 5000 FT. & 41°F. BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	From SL FUEL USED	AT 10000 FT. & 23°F. BEST CLIMB IAS MPH	RATE OF CLIMB FT/MIN	From SL FUEL USED
2100	87	1470	1.5	82	1200	2.8	78	925	4.3
2400	88	1210	1.5	84	960	3.1	80	710	5.0
2650	90	1030	1.5	86	795	3.5	83	560	5.9

Note: Flaps up, full throttle and 2600 RPM. Mixture leaned for smooth operation above 5000 ft. Fuel used includes warm-up and take-off allowance.

Chart 3: At 5,000 ft., 41° F, and 2,100 lbs. gross weight, the rate of climb is 1,200 ft./min.; best climb speed is 82 mph; and fuel used to climb from sea level to 5,000 ft. is 2.8 gal. At a gross weight of 2,650 lbs. under the same conditions, the rate of climb is 795 ft./min.

Chart 4: At 5,000 ft., 86° F, and 2,900 lbs. gross weight, the rate of climb is approximately 810 ft. -- not 970 ft. Note that you must first convert the altitude and temperature to a density altitude using the Density Altitude Chart, page 4. The density altitude at this altitude and temperature is approximately 7,750 ft. (86° F = 30° C)



WHAT CAN YOU OBTAIN FROM CRUISE PERFORMANCE CHARTS? Some of the items you can obtain include recommended power settings at various altitudes, along with percent of brake horsepower at these settings, rate of fuel consumption (gal/hr), true airspeed, hours of endurance with full tanks, and range in miles under standard conditions and zero wind. Not all of these values are obtainable from all charts. For example:

Chart 5: At 5,000 ft., 2,300 RPM, and 21 inches of manifold pressure, you should get 64% rated power, approximately 151 mph true airspeed, and consume approximately 11.9 gal./hr. of fuel which will give you an endurance of 4.6 hrs. and a range of 700 miles under standard conditions, zero wind, and full fuel tanks.

CRUISE AND RANGE PERFORMANCE

Altitude	RPM	M. P.	BHP	%BHP	TAS MPH	Gal/Hr.	End. Hours	MI/Gal.	Range Miles
5000	2450	23	179	78	163	14.5	3.8	11.2	615
		22	169	73	158	13.6	4.0	11.7	640
		21	161	70	156	13.0	4.2	12.0	660
		20	150	65	151	12.2	4.5	12.5	689
	2300	23	167	73	158	13.4	4.1	11.8	650
		22	158	69	155	12.6	4.4	12.2	675
		21	148	64	151	11.9	4.6	12.7	700
		20	139	60	146	11.2	4.9	13.1	720
	2300	23	157	68	155	12.4	4.4	12.5	685
		22	148	64	151	11.7	4.7	12.9	710
		21	138	60	146	11.0	5.0	13.2	730
		20	131	57	143	10.5	5.2	13.6	750

Cruise performance shown is based on standard conditions, zero wind, lean mixture, 55 gallons of fuel, no fuel reserve, and 2650 pounds gross weight.

Chart 6: At 8,000 ft. you can obtain 55% rated power and 10.3 gal./hr. fuel consumption with 2,200 RPM and 19 inches of manifold pressure.

Power Setting Table—

Press. Alt. 1000 Feet	Std. Alt. Temp. °F	138 HP—55% Rated Approx. Fuel 10.3 Gal./Hr. RPM AND MAN. PRESS. 2100	2200	2300	2400	163 HP—65% Rated Approx. Fuel 12.3 Gal./Hr. RPM AND MAN. PRESS. 2100	2200	2300	2400
SL	59	21.6	20.8	20.2	19.6	24.2	23.3	22.6	22.0
1	55	21.4	20.6	20.0	19.3	23.9	23.0	22.4	21.8
2	52	21.1	20.4	19.7	19.1	23.7	22.8	22.2	21.5
3	48	20.9	20.1	19.5	18.9	23.4	22.5	21.9	21.3
4	45	20.6	19.9	19.3	18.7	23.1	22.3	21.7	21.0
5	41	20.4	19.7	19.1	18.5	22.9	22.0	21.4	20.8
6	38	20.1	19.5	18.9	18.3	22.6	21.8	21.2	20.6
7	34	19.9	19.2	18.6	18.0	22.3	21.5	21.0	20.4
9	27	19.4	18.8	18.2	17.6	—	21.3	20.7	20.1
8	31	19.6	19.0	18.4	17.8	—	—	20.5	19.9
10	23	19.1	18.6	18.0	17.4	—	—	—	19.6

CHART 6

CRUISE PERFORMANCE

ALT.	RPM	% BHP	TAS MPH	58.8 Gal Endurance Hours	58.8 Gal Range Miles
2500	2500	75	130	6.0	773
	2350	63	118	7.1	832
	2200	53	107	8.4	894
3500	2525	75	131	6.0	775
	2400	65	121	6.9	827
	2250	55	110	8.0	874
4500	2550	75	132	6.0	780
	2400	63	120	7.0	841
	2250	53	109	8.3	905
5500	2600	77	135	5.8	775
	2450	65	123	6.8	837
	2300	55	112	8.0	887

CHART 7

Chart 7: At 5,500 ft. and 2,450 RPM, you have 65% rated power, should obtain approximately 123 mph true airspeed, have an endurance of 6.8 hrs., and a range of 837 miles.

Use cruise performance charts to plan refueling stops. If you learn that your airplane performs differently than predicted by the chart, use this information; especially when performance is worse than predicted by the chart.

WHAT CAN YOU LEARN FROM STALL SPEED CHARTS? Chart 8 is a typical example of a Stall Speed Chart taken from an airplane flight manual. Note and continually be aware of the wide variation in stall speed between straight-and-level flight and various angles of bank. Note that the stall speed in a 60° bank with flaps up and power off (102 mph) is almost double the stall speed in straight-and-level flight with flaps down and power off (55 mph). Even with power on in the 60° bank, the stall speed is reduced only 4 mph to 98 mph. Study this chart and be aware of its significance, especially during traffic patterns and landings. You will find similar charts in any airplane flight manual.

STALL SPEEDS IAS

CONFIGURATION	ANGLE OF BANK 0°	20°	40°	60°
Flaps Up — Power Off	72 mph	74 mph	82 mph	102 mph
Flaps Up — Power On	69 mph	71 mph	79 mph	98 mph
Flaps Down (30°) — Power Off	64 mph	66 mph	73 mph	91 mph
Flaps Down (30°) — Power Off	55 mph	57 mph	63 mph	78 mph

CHART 8

WHAT CAN YOU OBTAIN FROM LANDING PERFORMANCE CHARTS? The same type of information that you get from Takeoff Performance Charts--distance required to clear a 50-foot obstacle, length of the ground run, and in some cases, the recommended approach speed on which these figures are based. Landing Performance Charts will generally be used in the same way as Takeoff Charts for any given airplane, since each manufacturer usually follows the same format in these two charts. If you can read Takeoff Charts, you should have no difficulty reading Landing Charts.

HOW CAN YOU OBTAIN VALUES FROM PERFORMANCE CHARTS FOR CONDITIONS INTERMEDIATE TO THOSE GIVEN? By interpolation. For example, in Chart 1 (page 1) find the ground run required at an elevation of 5,000 ft., 72.5°F, zero wind, and maximum gross weight:

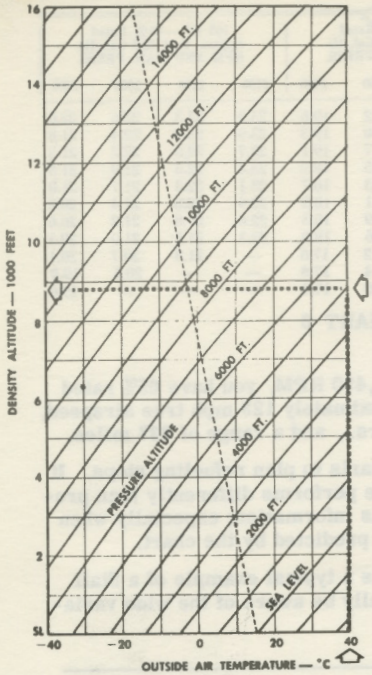
Ground run at 4,000 ft., 75°F, zero wind = 1,380 ft.	1,640 - 1,380 = 260
Ground run at 5,000 ft., 72.5°F, zero wind = ?	1/2 x 260 = 130
Ground run at 6,000 ft., 70°F, zero wind = 1,640 ft.	1,380 + 130 = 1,510

Since 5,000 ft. is halfway between 4,000 and 6,000 and the temperature is halfway between 75° and 70°, the ground run should be halfway between 1,380 and 1,640, which is 1,510.

Find the distance to clear a 50-foot obstacle at 4,000 ft., 65°F, zero wind, and maximum gross weight:

Distance at 4,000 ft., 45°F, zero wind = 1,810 ft.	2,065 - 1,810 = 255
Distance at 4,000 ft., 65°F, zero wind = ? ft.	2/3 x 255 = 170
Distance at 4,000 ft., 75°F, zero wind = 2,065 ft.	1,810 + 170 = 1,980

Since 65° is two-thirds of the way between 45° and 75°, the distance should be two-thirds of the way between 1,810 and 2,065 which is 1,980 ft.



IF INTERPOLATION IS DIFFICULT OR YOU ARE IN DOUBT ABOUT YOUR COMPUTATION, HOW CAN YOU ENSURE BEING ON THE SAFE SIDE? Use a condition more adverse than the one that actually exists--one that you can read directly from the chart without interpolating. Suppose, for example, you were taking off from an airport at an elevation of 5,200 ft. with a 5 mph headwind, a temperature of 65° F, and maximum gross weight. By using an elevation of 6,000 ft., a zero mph wind, and 70° F, you can read the takeoff distance directly from Chart 1. The conditions you are using are more adverse than the actual conditions. If the results indicate that takeoff is feasible, then you should have no difficulty taking off under the actual conditions.

(NOTE: Charts 1, 3, 5, 6, and 7 are excerpts from charts. Charts 2, 4, 8, and 9 are complete. Charts 1, 2, and 4 have been reduced.)

Chart 9: Density Altitude Chart. At an elevation of 5,000 ft. (assuming pressure altitude and elevation are identical) and a temperature of 40° C (104° F) the density altitude is approximately 8,750 ft.

SEATA CONVENTION

The sixteenth Annual Regional meeting of the Southeastern Aviation Trades Association will be held at Ocean Reef, North Key Largo, Florida, Wednesday, Thursday, Friday, July 20, 21, 22, 1966.

The theme for the business session -- "Are You Prepared For Growth"? We have some very outstanding speakers who will participate on our program.

Make plans to attend this meeting---bring your family for a wonderful vacation.

Reservations can be made by writing directly to the Ocean Reef or to the S. C. Aeronautics Commission, Box 1176, Columbia, S. C.

EVERYBODY WELCOME!!!

NOTAM

The Sumter Airport is undergoing runway construction and is closed until further notice. It is expected to be reopened within the next thirty days.

MICROPHONE TECHNIQUE AND DEPARTURE CLEARANCES

At controlled airports it is necessary to obtain a taxi clearance from the Control Tower before you start taxiing. When you establish radio contact with Ground Control (for this taxi clearance), make sure both transmitter and receiver are tuned to the appropriate frequency, and that they have had time to warm up before making your initial call. After receiving clearance to taxi, make sure you understand the route to be followed. If you are on a strange airport, advise the Ground Controller and he will give additional information as you proceed to the active runway. Your clearance to a runway does not constitute a clearance to taxi on the active runway. Upon arriving at the runway you will be changed (and asked to change) to the tower frequency for take-off clearance. When advising the tower you are ready for take-off, a clearance to taxi into position and hold may be received (because of landing or departing traffic on an intersecting runway or traffic that is ahead on your runway). Make sure take-off clearance is received before starting your roll.

When not wishing to go to the end of a runway for take-off, you may be cleared to an intersection, but only at pilots request.

When you have had satisfactory communications with th control tower with lots of transmissions being heard and THEN everything goes SILENT, please check your microphone switch; Chances are it has stuck on and no one can use the frequency. The stuck mike has happened a lot recently.

Additional information can be found in the Airman's Information Manual, Part I.

By Bob Dean, Columbus Ohio Tower

AVIATION WORKSHOP

A three weeks workshop in Aviation Education is now in progress at the Florence Branch of the University of South Carolina. Thirty-four teachers are enrolled in this course which is sponsored by the Civil Air Patrol and is directed by Major Vick Hoppel, Air Force Liaison Officer and Bill Reynolds, Regional Aviation Educationist.

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BREAKFAST CLUB NEWS

The July 10th joint meeting with the North Carolina Aero Club at Marion, North Carolina, was a big surprise to everyone. It was the last time for pilots to land at Marion Airport. The Marion Airport was renamed Sunday in honor of "Uncle Bill" Shiflet, in recognition of his hard work and devotion to aviation.

About fifty aircraft were counted and one hundred and twenty-five people had breakfast in the school cafeteria. Dr. John P. Gore, President of the N. C. Aero Club presided and Homer Collum of the S. C. Breakfast Club assisted him. The meeting was arranged by the Marion Airport Commission to honor "Uncle Bill". South Carolina was well represented.

The next meeting of the Breakfast Club will be Sunday, July 24th at Bishopville, South Carolina. The Bishopville Airport is located east of the City and is a 3000' sod strip.

H & H AVIATION

H & H Aviation at Columbia Metropolitan Airport is no longer charging tie-down fees for permanently based aircraft. For further information on this, see Harold Hall or Bill Holecek.