STUDENT HANDOUT

23 North
85 East
95 Richard

RADAR AND INSTRUMENT LANDING SYSTEM

5/69-3826-4(U)

AUGUST 1969

UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

DEPARTMENT OF ROTARY WING TRAINING
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

File No. 3826-4(U)

PERFORMANCE OBJECTIVES

RADAR AND INSTRUMENT LANDING SYSTEM

1. KNOWLEDGES: With the aid of his copies of DOD Flight Information Publications (IFR Supplement, Terminal Approach Charts, and Planning Document Section II) and the TM 1-225, the student will be able to:

(Period one of four periods)

a. Name the two types of radar used in radar approaches and describe the operating characteristics of each.

b. Describe the two methods normally used in requesting radar approaches.

c. State the initial approach procedure used with both Precision and Airport Surveillance Radar approaches.

d. List three differences in the final approach procedures used with Precision and Airport Surveillance Radar approaches.

(Period two of four periods)

e. List the five required components comprising a complete Instrument Landing System (ILS).

f. Describe the method of identification and state the operating frequencies for the following navigational aids used with the Instrument Landing System (ILS):

(1) Localizer.

(2) Glideslope.

(3) Marker beacons.

(4) Compass locators.

g. Explain the use of the following equipment in an Instrument Landing Approach:

(1) Localizer.

(2) Glideslope.

(3) Marker beacons.

(4) Compass locators.

(5) Approach lights.

h. Name the DOD Flight Information Publication (FLIP) in which information pertaining to instrument approach lighting may be found.

(Period three of four periods)

i. Locate and list the following information on an ILS Instrument Approach Chart:

(1) Procedure identification and aerodrome name.

(2) Communications frequencies.

(3) Radio aids.

(4) Obstructions.

(5) Approach altitudes.

(6) Landing minima (straight-in and circling approaches).

(7) Time/distance table.

(8) Missed approach procedure.

(9) Field elevation.

(10) Approach lighting.

j. State the rule governing the reduction of published approach visibility or Runway Visual Range (RVR) minimums by Army helicopter pilots and the minimums which apply in each instance.

k. Explain the function of the Runway Visual Range (RVR) transmissometer and what the numerical value of the RVR indicates to the pilot.

(Period four of four periods)

l. Read and interpret all requested radar and Instrument Landing System approach information while working a Practical Exercise within a time limit of 30 minutes.

2. SKILLS: None.

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STUDENT OUTLINE

RADAR AND INSTRUMENT LANDING SYSTEM

1. Film.

2. Types of radar approaches.

a. Airport Surveillance Radar (ASR) does not have a glide slope does have a 360° azmuth and 1- to-40 miles range detection

b. Precision Approach Radar (PAR) 20° azmuth coverage and 10 miles range, and elevation to a glide slope

3. Requesting radar approaches.

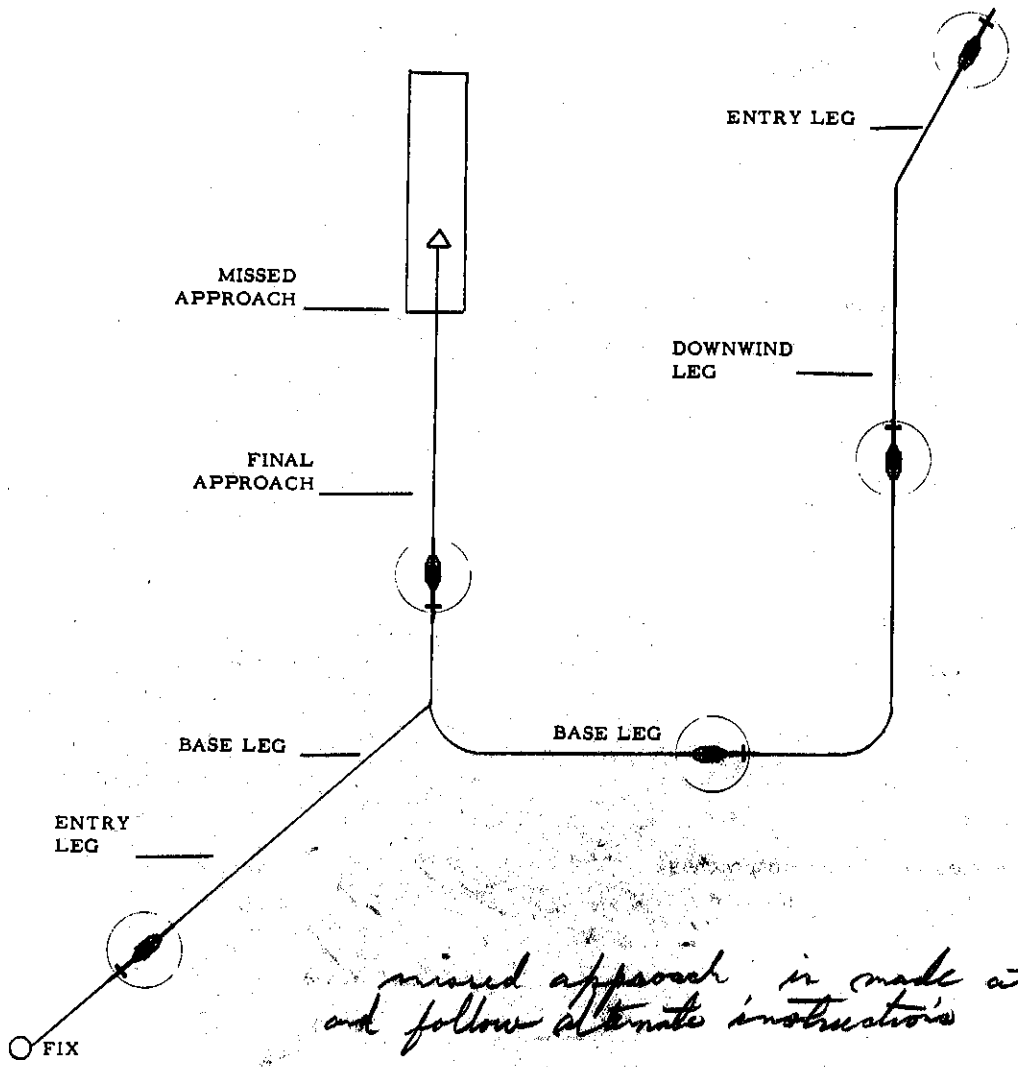
a. VFR. request from the tower

b. IFR. — request through approach control

c. Location of approach minimums. the initial MSA all the same for both but can be found in the IFR SCAL,

4. Initial radar approach procedure.

a. wind, weath, terran, local regulation + tactical avoidance situation change the pattern



missed approach is made at minimum and follow alternate instructions

b. Approach information prior to final approach.

(1) attimitter setting

(2) weather

(3) landing cockpit ck,

(4) only before final he gives you your position

(5) gives you altitude situation.

(6) tells us rate of descent

(7) which runway II

8. final approach freq (if different)

5. Radar final approach procedure.

a. Precision Approach Radar (PAR)

(1) contact final controller

(2) you must get transmission every 5 sec. then follow you do not need to reply unless requested. (attitude with

(3) range at least 1 every mile

(4) over approach lights and over runway on touchdown ~~stop point~~

(5) he relays you landing clearance for you and tells you if you are clear your course decide the minimum.

b. Airport Surveillance Radar (ASR)

(1) contact final approach (if different) every 15 seconds get a transmission from controller

(2) range and bearings frequently, gives you desired altitudes if (you request) it.

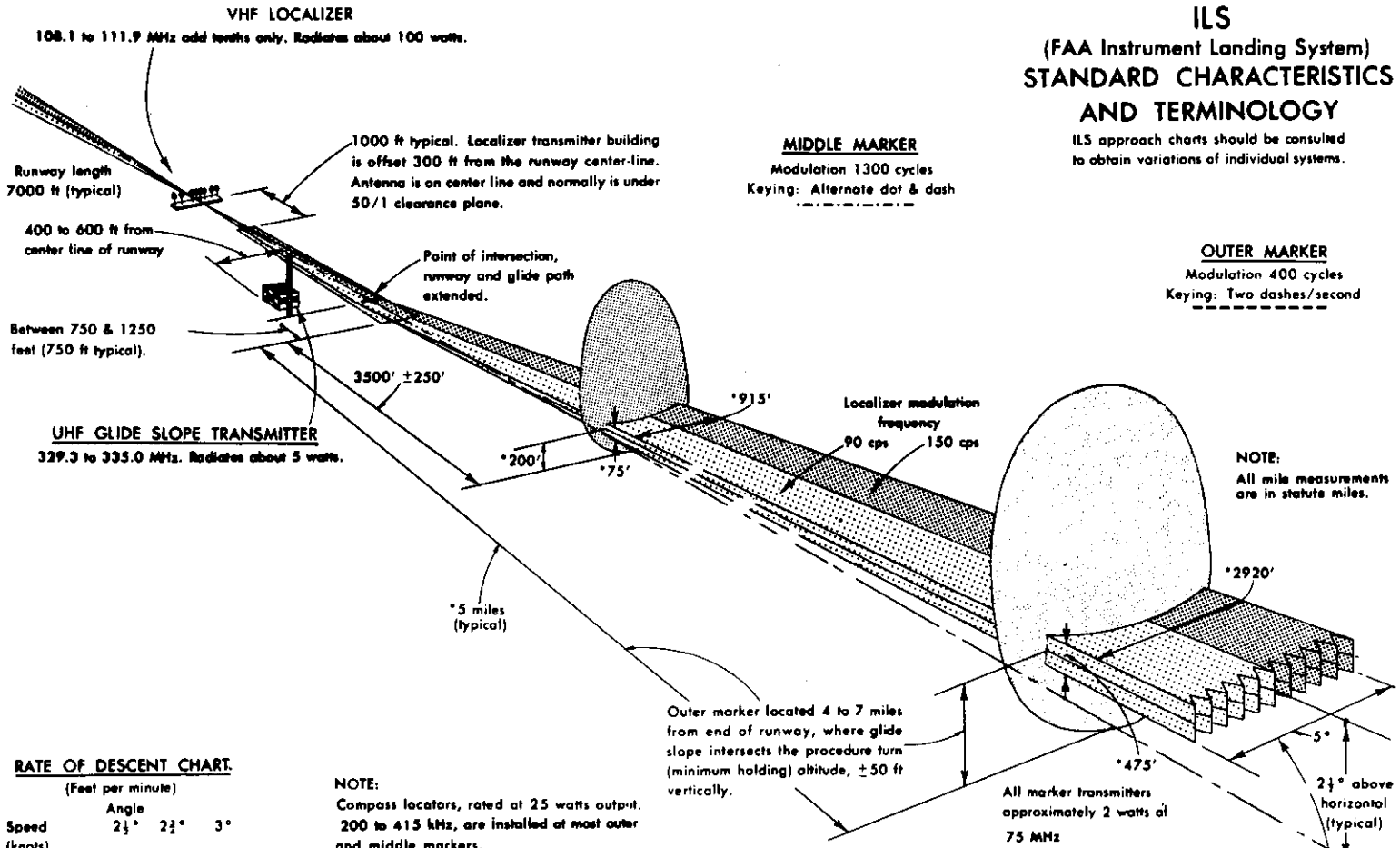
(3) you should report when runway is in sight and steps guidance from runway

(4) he relays your landing permission.

(5)

ILS
(FAA Instrument Landing System)
STANDARD CHARACTERISTICS AND TERMINOLOGY

ILS approach charts should be consulted to obtain variations of individual systems.



MIDDLE MARKER
Modulation 1300 cycles
Keying: Alternate dot & dash

OUTER MARKER
Modulation 400 cycles
Keying: Two dashes/second

NOTE:
All mile measurements are in statute miles.

RATE OF DESCENT CHART.
(Feet per minute)

Speed (knots)	Angle 2½°	2¾°	3°
90	400	440	475
110	485	535	585
130	575	630	690
150	665	730	795
160	707	778	849

NOTE:
Compass locators, rated at 25 watts output, 200 to 415 kHz, are installed at most outer and middle markers.

*Figures marked with asterisk are typical. Actual figures vary with deviations in distances to markers, glide angles and localizer widths.

(6)

(7)

6. Performance Check. Instructor will assign as homework if not completed in class.

7. Instrument Landing System film.

8. Instrument Landing System (ILS) components and inflight indications.

a. Localized transmitter.

(1) outer marker
(2) middle marker
(3) localizer
(4) glide slope
(5) approach light

b. Inflight indications on the ID 453.

(1) 108.1 - 111.9 odd tenths, preceded the station identification with an I.
(2)
(3)
(4)

c. Glideslope transmitter.

(1)
(2)
(3)
(4)

d. Inflight indications on the ID 453.

(1)

(2)

(3)

e. Marker beacon transmitters.

(1)

(2) 75 MC both ~~make~~ all makes have the same frequency and send a fan shaped signal the outer is a series of dashes the inner give dots and dashes

(4)

(5)

f. Approach lights.

(1)

(2)

g. Compass locator transmitters.

(1) 2 1/2° or 5° width

(2) glide slope registers .7°

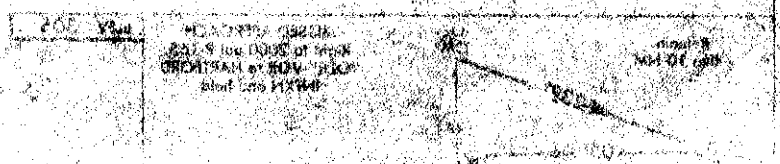
(3) locate outer marker use a 2 letter identifier in code.

(4)

(5)

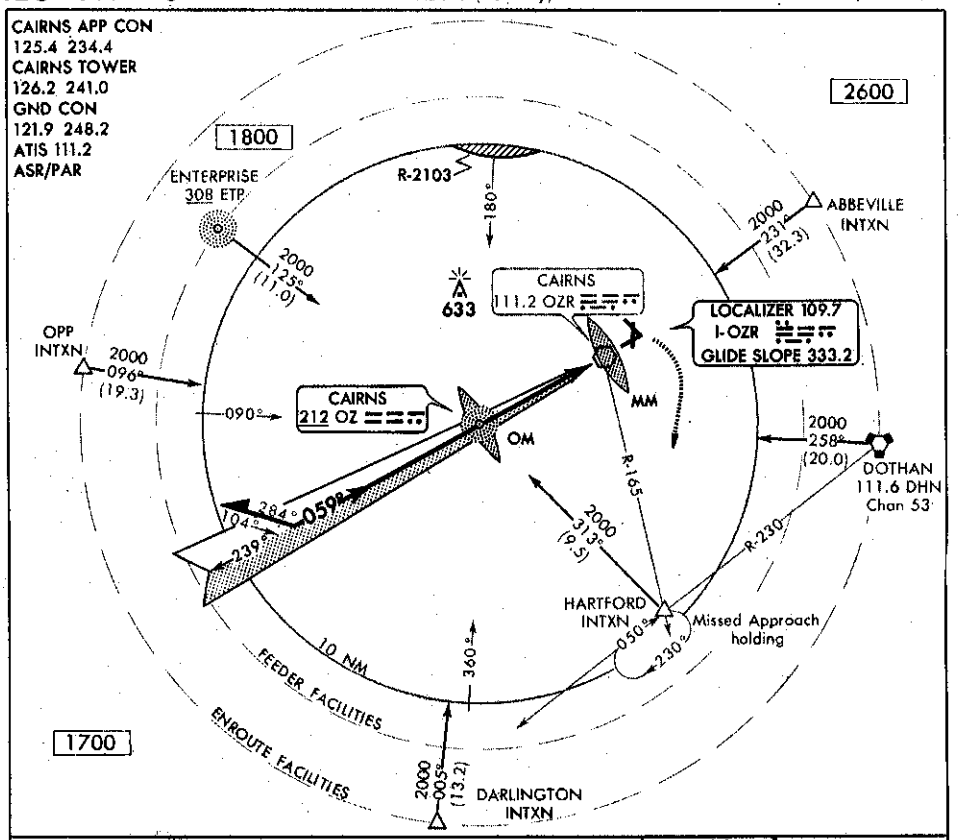
9. Performance Check. Instructor will assign as homework if not completed in class.

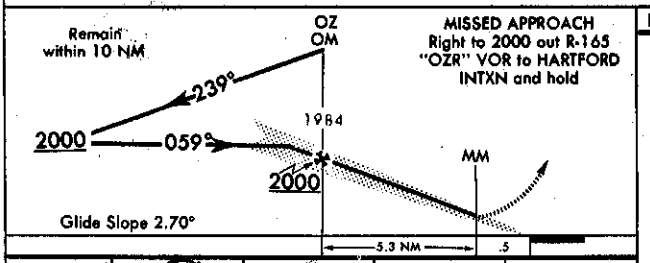
(NOTES)



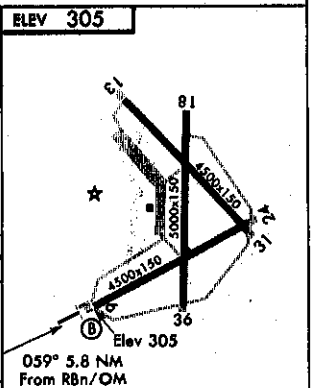
ILS RWY 6

CAIRNS AAF
FORT RUCKER, ALABAMA





CATEGORY	(A)	(B)	C	D
S-ILS-6	505-½	200 (200-½)		NOT AUTHORIZED
S-LOC	630-¾	325 (400-¾)		
CIRCLING	760-1	455 (500-1)	760-1½ 455 (500-1½)	



RBn/OM to LOC Missed Approach 5.8 NM

Knots	70	100	125	150	165
Min: Sec	4:58	3:29	2:47	2:19	2:07

S-ILS-6 (start in I.L.S. approach to runway 06)

HELICOPTER

ILS RWY 6

31°16'N-85°43'W

CAIRNS AAF
FORT RUCKER, ALABAMA

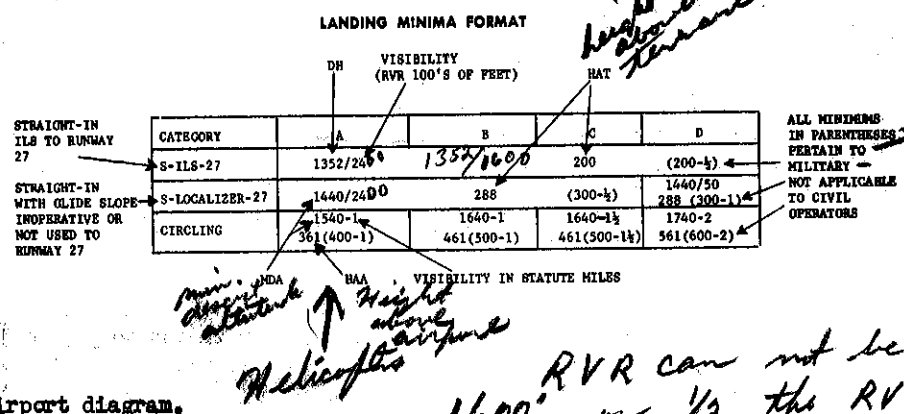
10. Instrument Landing System (ILS) Approach Charts.

a. Procedure identification.

b. Plan view.

c. Profile (side) view.

d. Landing minima. (Height Above Airport, HAA, and Height Above Touchdown, HAT - civil use only)



e. Airport diagram.

11. Minimums for Army helicopter pilots. (Ref: AR 95-2)

a.

b.

c.

MOA minimum descent altitudes for non-precision ~~domestic~~ approach

d. Circling minimum will be used when the ∠ between your approach and the runway is greater than 30°

less than VFR conditions or when less than 2000' ceiling or 3 mi visibility.
the very lowest visibility is 1/4 miles

12. Performance Check. Instructor will assign as homework if not completed in class.

13. Practical Exercise.

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PERFORMANCE CHECK

RADAR AND INSTRUMENT LANDING SYSTEM

(Period one of four periods)

1. What is the normal range of Airport Surveillance Radar (ASR)? 1 - 40 miles.

2. What is the maximum range of Precision Approach Radar (PAR)? 40 miles.

3. Requests for practice radar approaches under VFR flight conditions would normally be made through ~~the traffic control~~ control tower.

4. A complete radar approach is similar to a VFR landing approach. Name the four legs flown in a complete radar approach.

   a. final.
   b. base.
   c. downwind.
   d. entry.

5. During a radar approach the controller will normally tell the pilot to conduct his cockpit check. On which leg of the approach is this check conducted? downwind leg.

6. The normal azimuth coverage of Airport Surveillance Radar (ASR) is 360°.

7. The normal azimuth coverage of Precision Approach Radar (PAR) is 20°.

(Period two of four periods)

1. The localizer transmitter of the Instrument Landing System (ILS) uses what range of frequencies? 108.1 - 111.9 odd tenths.

2. List the five components required to make up a complete Instrument Landing System.

   a. localizer.
   b. outer marker.
   c. middle marker.
   d. glide slope.
   e. approach lights.

3. While heading inbound on the front course of an Instrument Landing System the BLUE sector will be to the pilot's right (Right/Left).

4. There is NO OFF flag warning device provided for the glideslope indicator. (True/False)

5. Describe the use of the following Navigation Aids in the Instrument Landing System-

a. Compass locator NDB approach (when published), and transition to the inst. land. apt.

b. Marker beacons tells you just where you are on the glideslope, how many miles out.

6. Name the Flight Information Publication in which information pertaining to instrument approach lighting may be found. low altitude, instrument approach ~~IFR supplement~~ procedure booklet.

(Period three of four periods)

1. Use the ILS RWY 6 instrument approach chart for Cairns AAF, page 15 of this handout, to answer the following questions -

NOTE: LEGEND OF APPROACH SYMBOLS MAY BE FOUND ON INSIDE FRONT COVER OF THE LOW ALTITUDE INSTRUMENT APPROACH PROCEDURE BOOKLETS

a. What UHF frequency is listed for Cairns tower? 241.0 MHz.

b. What is the published transition from the Enterprise (ETP) NDB? MEA 2000 feet, Magnetic course 125° degrees, distance 11 NM.

c. The distance from the Outer Marker to the end of the runway is 5.8 NM.

d. What is the Decision Height (DH) for this approach? 505 feet. MSL

e. What are the ceiling and visibility requirements for a circling approach? (Catagory "A") ~~600 - 2~~ 500 - 1.

f. What is the procedure turn minimum altitude? 2000 feet.

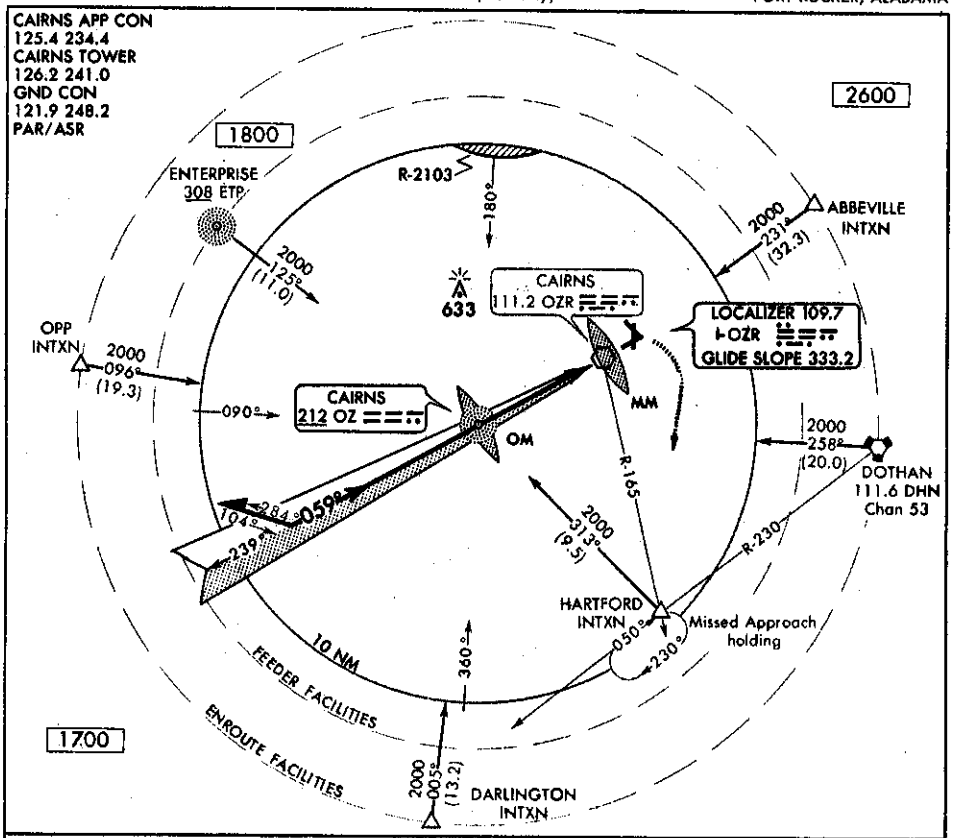
g. What minimum visibility is the Army helicopter pilot authorized to use for a straight-in ILS approach to runway 6? 1/4 NAT mile.

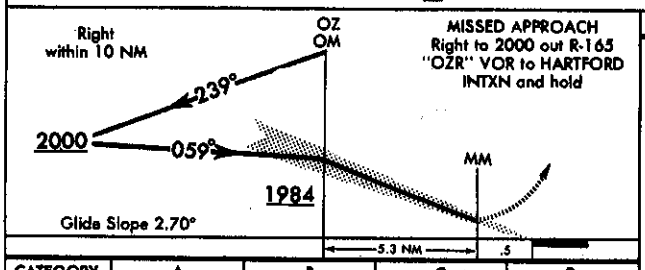
h. Which runway(s) have approach lighting at Cairns AAF? 6.

ILS RWY 6

CAIRNS AAF
FORT RUCKER, ALABAMA

CAIRNS APP CON
125.4 234.4
CAIRNS TOWER
126.2 241.0
GND CON
121.9 248.2
PAR/ASR

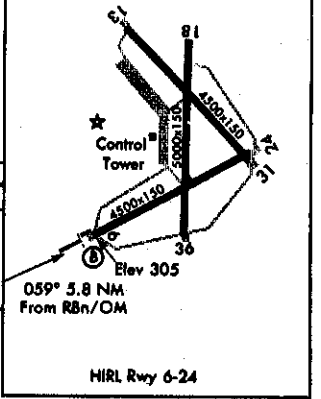




MISSED APPROACH
Right to 2000 out R-165
"OZR" VOR to HARTFORD
INTXN and hold

CATEGORY	A	B	C	D
S-ILS-6	505-½	200 (200-½)		NOT AUTHORIZED
S-LOC	630-¾	325 (400-¾)		
CIRCLING	760-1	455 (500-1)	760-1½ 455 (500-1½)	

ELEV 305



HIRL Rwy 6-24

RBn/OM to LOC Missed Approach 5.8 NM

Knots	70	100	125	150	165
Min:Sec	4:58	3:29	2:47	2:19	2:07

ILS RWY 6

31°16'N-85°43'W

FORT RUCKER, ALABAMA
CAIRNS AAF

CAPSHAW, ALA. 34°46'25''N 86°46'44''W **L-14**
RBn (MHW) 350 CWH 179° 7.3 NM to Huntsville-Madison Co.

CARBONDALE, ILL. 37°47'00''N 89°15'30''W **L-21**
RBn (BMH) MDH 248 At Southern Illinois. Privately owned.

CARIBOU MUNI, ME. 46°52'N 68°01'W (AOE) "DT" **L-26**
P 623 B*L4 H34 ①(ASP/CON) (S51) **(CAR)**
FUEL- (NC-C1A1)
AERODROME REMARKS- Attended daylight hrs. ①3175' aval for ldg rwy 29.
Ⓡ **LORING APP CON-** 318.1 363.8 134.1 122.5R **(E)**
LORING DEP CON- 359.3
PRESQUE ISLE (H) BVORTAC PQI 116.4 Chan 111 46°46'27''N 68°05'42''W 049° 6.5 NM to Fld.

CARLETON, MICH. 42°02'53''N 83°27'28''W **H-3, L-23, A-2**
(H) BVORTAC CRL 115.7 Chan 104 026° 10.3 NM to Detroit Metropolitan Wayne Co
080° 13.5 NM to NAS Grosse Ile

CARLSBAD, N. MEX. 32°15'23''N 104°13'32''W **L-4-15**
RADIO- 255.4 123.6 122.6 122.1R 116.3T **(E)**
(L) BVOR CNM 116.3 325° 4.7 NM to Cavern City Air Terminal.

CARMEL, N.Y. 41°16'48''N 73°34'54''W **H-3, L-25-28, A-4**
(L) BVORTAC CMK 116.6 Chan 113 050° 6.7 NM to Danbury Muni. See VFR-S for A/D data.

CAROLINA BEACH, N.C. 34°06'22''N 77°57'42''W **H-4, L-20-27**
RBn (HW) CLB 216 022° 10 NM to New Hanover Co

CARROLLTOWN, PA. 40°32'47''N 78°44'50''W **L-24**
(L) BVORTAC ⓒ CLN 110.6 Chan 43 200° 5.3 NM to Ebensburg. See VFR-S for A/D data
RADIO/NAV REMARKS- ⓐ VOR portion unusable beyond 10 NM 070°-085°.

◆ **CARSWELL AFB,** TEX. (Ft. Worth) 32°47'N 97°26'W "DT" **H-2-4, L-13, A-1**
AF (AFRES) 650 BL4, 6, 7, 9, 10 H120(CON) (S150, T215, TT550) (SWL 65/PSI 750) **(KFWH)**
JASU- (MA-1A), (MD-3M), (MC-1A), (MD-3A)
FUEL- A+J4, SP, ADI, W, O-123-128-133-148 PRESAIR LPOX LOX
A-GEAR
RWY 17 BAK-12(B) (THLO) ——— BAK-12(B) (THLD) RWY 35
AERODROME REMARKS- CAUTION-Do not land on twy E of ond parallel to rwy 17-35. VFR tfc will opr W avoiding populated areas of Ft. Worth. Rgt tfc rwy 17. Rectangular tfc ptn 1800'; overhead tfc ptn 2300'. BAK-12 engine housings 77.3' E side 79.0' W side app end rwy 17 and 81.3' E side 78.8' W side app end rwy 35. Engines are 5.1' high with obst lts 7' high. Tran alert svc unrested. Due to extv tng flts in all quads, tran acft can expect only full stop termination ldg 1800-2400Z Mon-Fri. Info for General Dynamics: Indicate in DD Form 175 if destn is General Dynamics. General Dynamics ramp clsd to all tran acft ex OFFL BUS ONLY. Inbd acft ctc G-D radio 15 min out. Svcg aval weekends by prior req only.
COMMUNICATIONS- (SFA)
G-D RADIO- 284.1 316.6 Opr 1300-2400Z Mon-Fri.
Ⓡ **FT WORTH APP CON-** 263.0 118.1 **(E)**
TOWER 255.9 236.6 126.2 120.2 108.8T 108.4T **(E) GND CON-** 275.8
FT WORTH DEP CON- 319.2 291.0 123.9
VFR ADVISORY SVC- Call APP CON 30 NM out.
PFSV: METRO- 342.5
RADIO AIDS TO NAVIGATION
(L) TACAN ⓐ FWH Chan 24 32°44'57''N 97°26'18''W At Field
BENBROOK (L) VOR BEO 108.8 32°36'31''N 97°26'35''W 351° 8.7 NM to Fld
EAGLE MOUNTAIN LAKE (L) VOR EWX 108.4 32°56'58''N 97°26'29''W 170° 9.6 NM to Fld
ILS-Lczr offset. Extended rwy centerline located 2° right of lczr flight path.
RADAR b 395.8x 392.0x 379.3x 371.2x 363.8x 139.9x 134.1x **(E)**

	RWY	CATEGORY	MDA	RVR	HAA	CEIL-VIS
ASR	17	A, B, C, D, E	1060	/40	410	(500-¾)
	35	A, B, C, D, E	1100	/24	450	(500-½)

	RWY	CATEGORY	DH	RVR	HAT	CEIL-VIS
PAR	35	A, B, C, D, E	750	/16	100	(100-¼) GS 2.5°
	17	A, B, C, D, E	885	/40	250	(300-¾) GS 2.5°

	RWY	CATEGORY	MDA	VIS	HAA	CEIL-VIS
CIRCLING	17-35	A, B	1140	-1	490	(500-1)
	17-35	C	1140	-1½	490	(500-1½)
	17-35	D	1200	-2	550	(600-2)
	17-35	E	1220	-2	570	(600-2)

RADIO/NAV REMARKS- ⓐ Unusable beyond 35 NM below 3200' MSL 195°-290°. ⓑ IFF/SIF svc aval.

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UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

File No. 3826-4(U)

PRACTICAL EXERCISE

RADAR AND INSTRUMENT LANDING SYSTEM

1. During an Airport Surveillance Radar approach (ASR) the controller discontinues approach guidance when the aircraft is at what distance from the end of the runway?

   1 mile.

2. During the final approach phase of an ASR approach what is the maximum period of time that a pilot may proceed without communications prior to executing lost communications procedure?

   a. 5 seconds

   b. 10 seconds

   c. ~~15~~ seconds

   d. 45 seconds

3. Which of the following is given to the pilot by the final controller during a Precision Radar approach (PAR)?

   a. range and elevation only

   b. range, azimuth and elevation

   c. range and azimuth only

   d. azimuth and elevation only

4. What is the maximum range of Precision Approach Radar? 40 N. M.

5. Who authorizes the pilot to land when making a radar approach? Tower

6. The final PAR controller gives the pilot range at least once every 1 mile(s).

7. Use the IFR Supplement extract, page 16 of this handout, to answer the following questions concerning Carswell AFB.

   a. What type radar approaches are available at Carswell AFB? PAR, ASR.

   b. What are the published radar minimums for an ASR approach to RWY 17?

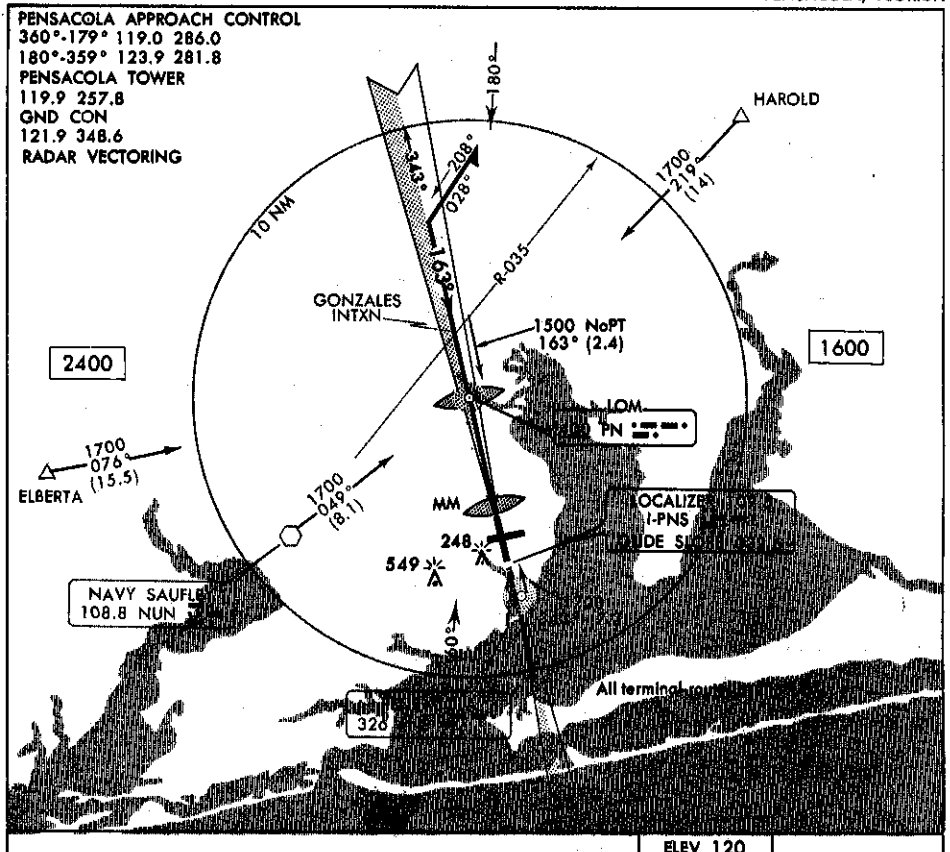
      MDA 1060; RVR 4000'; Ceiling 500'; Visibility 3/4 mi.

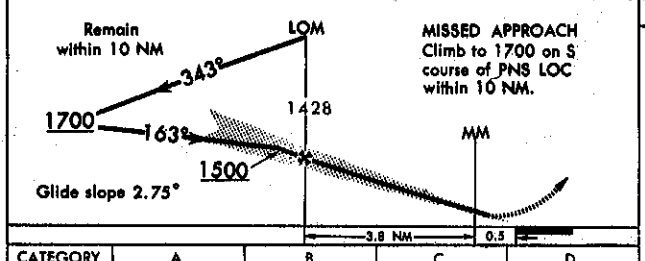
      As an Army helicopter pilot flying a catagory "A" aircraft you are authorized to use what minimums for this approach? ~~MDA 1004~~ RVR 2000' ~~C 500' V 3/4 mi~~

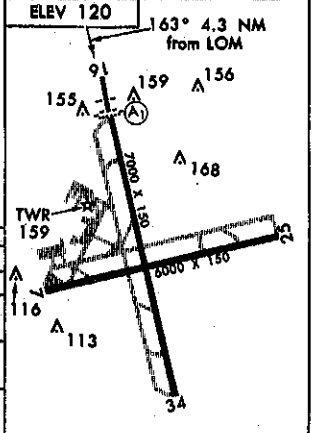
   c. The published minimums for a PAR approach to RWY 35 are: DH 760; RVR 1600'; Ceiling 100'; Visibility 1/4 mi As an Army helicopter pilot flying a catagory "A" aircraft you are authorized to use what approach minimums? the same

ILS RWY 16

PENSACOLA MUNI
PENSACOLA, FLORIDA







CATEGORY	A	B	C	D
S-ILS-16	318-½ 200 (200½)			
S-LOCALIZER 16	480-½ 362 (400-½)			480-¾ 362 (400-¾)
CIRCLING	480-1 362 (400-1)	580-1 462 (500-1)	580-1½ 462 (500-1½)	680-2 562 (600-2)

CAUTION: Warning Area 10 NM South of PNS RBn. Extensive VFR student training all quadrants.

HIRL Rwy 16-34

LOM to Localizer Missed Apch 4.3 NM					
Knots	70	100	125	150	165
Min:Sec	3:41	2:35	2:04	1:43	1:34

8. Use the ILS RWY 16 approach chart for Pensacola Municipal Airport, page 18 of this handout, to answer the following questions.

a. In making a transition from Harold Intersection to the Outer Marker you should tune your ADF to 400 kHz and the identification of the Locator at the Outer Marker (LOM) is PN ·--·.

b. The distance from Harold Intersection to the Outer Marker is 14 nm, the magnetic course is 219°, and the MEA is 1700 feet.

c. What is the elevation (MSL) of the highest obstruction shown on the approach chart? 549 feet. tower

d. The procedure turn should be executed at what minimum altitude? 1700 feet.

e. The localizer transmits on a frequency of 109.5 MHz, the identification is I-PNS, and the frequency of the glideslope transmitter is 332.6 MHz.

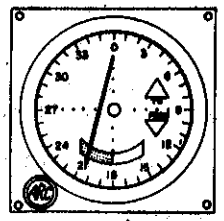
f. While inbound on the front course you see indications on your ID 453 as illustrated below. Where are you in relation to the localizer course?

(1) in the 90 cycle per second sector

(2) right of the centerline

(3) in the yellow sector

(4) left of the centerline



g. Your altitude over the outer marker should be 1428 feet, if you are on the glideslope.

h. Your DH for a straight-in ILS approach to RWY 16 is listed as 318 feet with visibility 1/2 mile(s). As an Army helicopter pilot you are authorized to use what minimum visibility for this approach? 1/4 mile(S).

i. Is RVR indicated for any of the approaches shown on the approach chart? no.

j. What is the missed approach procedure listed? climb to 1700' on South course of PNS Locstay within 10 N. m.

k. What is the elevation listed for the airport? 120 feet.

l. Which of the runways shown indicates approach lighting installed? 16.

m. If you were cleared for a circling approach by Approach Control, as an Army helicopter pilot, you would be authorized to use what minimums? 480-1/2

THE FOLLOWING QUESTIONS ARE GENERAL QUESTIONS ABOUT THE INSTRUMENT LANDING SYSTEM

9. What does a reported RVR of 4000 feet indicate to the pilot?

   a. The tower operator can see a 25 candlepower light located 4000 feet from the control tower.

   b. The pilot will be able to see the end of the runway when he reaches 4000 feet MSL, during the approach.

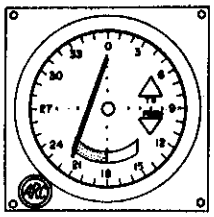
   (c) The horizontal distance that can be seen down the landing runway from the approach end is 4000 feet.

   d. The pilot will be able to see the end of the runway when he is 4000 feet out from the approach end of the runway.

10. During an Instrument Landing System (ILS) approach full scale deflection of the vertical needle indicates to the pilot that he is 2½ ° or more off course.

11. What component of the ILS system utilizes a UHF frequency? the glideslope indicator.

12. While outbound on the front course of an ILS the aviator receives indications as shown below. Where is the aircraft located?



   a. In the 90 cycle per second sector.

   b. Right of the centerline.

   c. In the yellow sector.

   (d) Left of the centerline.

13. Which of the following frequencies would by used with an ILS?

   a. 114.3 MHz.

   (b) 109.9 MHz.

   c. 110.2 MHz.

   d. 119.9 MHz.

14. The width of the glideslope beam is 1.4 °.

15. Which of the following is not a required component of a complete ILS?

   a. Localizer.

   (b) Locator.

   c. Marker beacon.

   d. Glideslope.

DEPARTMENT OF ROTARY WING TRAINING
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

File No. 3826-4(U)

RUNWAY VISUAL RANGE

RADAR AND INSTRUMENT LANDING SYSTEM

1. **PURPOSE.** This circular is issued to advise airspace users of the application of Runway Visual Range reports in determining landing and take-off minimums which may apply to their operations.

2. **BACKGROUND.** It has become apparent that the purpose and use of Runway Visual Range is not clearly understood by all users. This circular has been prepared to provide explanatory information on Runway Visual Range and Runway Visibility. Where minimums are discussed, it should be understood that they apply only to those classes of users for which a requirement has been established in the Federal Air Regulations.

3. **DEFINITIONS.**
   a. Prevailing visibility is the horizontal distance at which targets of known distance are visible over at least half of the horizon. It is determined by an observer viewing selected dark objects against the horizon sky during the day and moderate-intensity unfocused lights at night.
   b. Runway visibility (RVV) is the meteorological visibility along an identified runway. It can be measured by instrument or human observer. Where a transmissometer is used for measurement, the instrument is calibrated in terms of a human observer; i.e., the sighting of dark objects against the horizon sky during daylight and the sighting of moderately intense unfocused lights of the order 25 candlepower at night.
   c. In the United States, runway visual range (RVR) is an instrumentally-derived value, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end; it is based on the sighting of either high-intensity runway lights or on the visual contrast of other targets, whichever yields the greatest visual range.
   d. Note that runway visibility is defined in terms of the distance at which an observer can see a moderate-intensity light source (25 candlepower). Runway visual range is defined in terms of the distance high-intensity runway lights can be seen. It is evident that the brighter the light, the farther it can be seen. It is clear then that the high-intensity runway lights, which have peak intensities measured in thousands of candlepower can be seen at a much greater distance than a standard 25 candlepower light. This is the primary advantage of RVR.

4. **TRANSMISSOMETER.** The primary instrument used to determine RVR and RVV is the transmissometer. It consists of a projector, a detector, and a meter or instrument to indicate the transmission of light through the atmosphere. The projector directs a steady light beam of constant intensity toward a receiver a known distance away. The receiver

is a photoelectric detector which is sensitive to the varying intensity of the projected light beam. The intensity of the light received at the detector is dependent on the degree to which the path between the projector and detector is obstructed by rain, snow, fog, haze, smoke, dust, etc. The projector and detector are spaced 500 feet apart (750 feet in the earlier installations) and are adjacent to the touchdown area of the runway.

5. STATUS OF RVR INSTALLATION PROGRAM (4–28–63).

Total transmissometers installed	117
RVR dial indicator	29
RVR digital indicator systems	14
RVR total systems installed	43
ILS systems installed	231
Approach Light Systems (Type A)	179

The U.S. Weather Bureau has 142 additional transmissometers on order with delivery expected at the rate of 20 units per month. The present plan is that RVR equipment will be installed on each runway equipped with an instrument landing system and on takeoff runways without ILS where deemed necessary. All presently installed Runway Visibility Systems will be converted to Runway Visual Range Systems as fast as equipment is available.

6. LANDING AIDS—RVR. The following landing aids will be required for approval of RVR for landing without respect to the reported ceiling:

a. High-intensity runway lights spaced not more than 200 feet apart along the runway.

b. Full configuration A approach lights with condenser discharge flashers.

c. Complete ILS or PAR.

d. Transmissometer and associated control tower display equipment calibrated in feet.

e. All-weather runway markings or runway centerline lighting.

f. Compass locator at the outer marker.

7. TAKE-OFF AIDS—RVR. The following aids will be required for approval of RVR for takeoff without respect to reported ceiling:

a. High-intensity runway lights spaced not more than 200 feet along the runway.

b. Transmissometer and associated control tower display equipment calibrated in feet.

c. All-weather runway markings or runway centerline lighting.

8. RVR MINIMUMS.

a. RVR minimums are published in Part 97 of the Federal Aviation Regulations and the Federal Register, and are depicted on Coast and Geodetic AL charts. Additional minimums for air carriers are contained in the Air Carrier Operations Specifications. Landing minimums of RVR 2600′ are normally approved for those runways that have the required landing aids installed and operating, and have meteorological landing minimums of 200–½. At those locations that have all of the required aids and, in addition, have high-intensity runway lights spaced along the runway at 100′ intervals or touchdown zone lighting and runway centerline lighting, landing minimums of RVR 2000′ may be approved.

b. Where glide slope or localizer roughness or a displaced threshold holds the ILS landing minimums up to no more than 300–¾, minimums of RVR 4000′ (without regard to meteorological ceiling) may be approved provided the runway meets the requirements for RVR (paragraph 6 above) and the obstruction clearance requirements for ILS minimums of 200–½.

c. If visual contact is not made at the minimum descent altitude approved for the runway and type of approach being conducted, the missed approach will be immediately executed. The minimum decent altitude is normally 200 feet above the airport when RVR 2600′ or RVR 2000′ is approved, and it will always be shown on the Coast and Geodetic approach chart.

9. OPERATIONAL USE OF RVR.

a. Whenever the latest weather report furnished by the U.S. Weather Bureau or a source approved by the Weather Bureau, including an oral report from the control tower, contains a visibility value specified as runway visual range or runway visibility for a particular runway of an airport, such visibility value will control for all straight-in instrument approaches, landings, and takeoffs for that runway, regardless of the reported prevailing visibility for the airport.

b. Runway visual range is authorized as the operating minimum for LANDING without regard to reported meteorological ceiling, only at airports where the basic meteorological minimums are 300–¾ or less and all of the required aids and related airborne equipment are in satisfactory operating condition. Descent below the minimum authorized altitude for the approach will not be made unless visual contact with the approach lights has been established, or the aircraft is clear of clouds.

c. In the event it is not possible to use RVR as an operating landing minimum, without regard to ceiling, due to required equipment being inoperative or for other reasons, the appropriate ceiling minimum specified for the airport will apply together with a RVR minimum, which shall be used in lieu of the meteorological visibility minimum specified for the airport. Such RVR minimums will be determined in accordance with the following:

Meteorological Visibility	*RVR*
½	2400 feet
¾	4000 feet
1	5000 feet
1¼	6000 feet

d. Whenever the transmissometer is inoperative or runway visibility measurements (RVR or RVV) are otherwise not available, the meteorological ceiling and visibility minimums specified for the airport are applicable. The foregoing also applies to airports where basic ILS or PAR meteorological weather minimums are greater than 300–¾.

10. RVR SYSTEMS LIMITATIONS.

a. The advantages of RVR are that the visibility is determined in the area where the landing or takeoff is to be made and not from a point which may be a considerable distance away. Also, RVR takes advantage of the ability of high-intensity runway lights to penetrate obstructions to vision such as fog and haze. Further, it is not subject to variations that would exist between different runway observers, and it is on the job continuously.

b. The limitation is that RVR samples the transmissivity of the atmosphere over a 500′ baseline (750′ in the early installations) and extrapolates RVR values up to 6000′. Obviously, the visibility may vary along the runway from that sampled and this will not be reflected in the reported RVR value. However, experience has shown that in a large majority of cases it is representative of the visibility along the entire runway. Also, it should be understood that RVR is not a slant-range visibility along the glide path. It is what a pilot touching down or taking off on the runway would see in terms of high-intensity runway lights.

11. REPORTING OF RUNWAY VISUAL RANGE.

a. When RVR becomes operational at an airport, it is reported irrespective of the subsequent operation or nonoperation of navigational or visual aids required for the application of RVR as a take-off or landing minimum.

b. RVR will be reported as inoperative (RVRNO) when the transmissometer is inoperative or the high-intensity runway lights are inoperative.

c. When RVR on the instrument runway is 6000′ or less and/or prevailing visibility is 1½ miles or less, RVR will be reported by approach control on initial contact and subsequently as requested to each pilot intending to land straight-in on the instrument runway.

d. When RVR on the instrument runway is 4,000′ or less, RVR will be reported by the local controller or PAR controller on the mitial contact and subsequently as required to each pilot intending to land straight-in on the instrument runway.

e. When RVR on the instrument runway is 6000′ or less and/or the prevailing visibility is 1½ miles or less, the RVR will be reported by the local controller or ground controller to each pilot intending to depart on the instrument runway.

f. A ten-minute mean of RVR values is contained in the hourly weather teletype reports for those runways equipped with RVR. However, the RVR reported to you on approach or takeoff is a one-minute mean.

THIS IS AN EFFECTIVE TOOL TO AID YOU IN MAKING YOUR FLIGHTS AS SAFE AS POSSIBLE. USE IT WHEN EVER AVAILABLE.

DEPARTMENT OF ROTARY WING TRAINING
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

File No. 3826-4(U)

PERFORMANCE CHECK KEY

RADAR AND INSTRUMENT LANDING SYSTEM

(Period one of four periods)

1. 1 - 40 miles.

2. 40 miles.

3. the Control Tower.

4. a. Entry leg, b. Downwind leg, c. Base leg, d. Final approach leg.

5. downwind leg or equivalent.

6. 360°.

7. 20°.

(Period two of four periods)

1. 108.1 through 111.9 MHz (odd tenths only).

2. a. Localizer, b. Glideslope, c. Middle marker, d. Outer marker, e. Approach lights.

3. Right.

4. False.

5. Compass locator - used for transition to the Instrument Landing System and for ADF approach, when published.

   Marker beacons - used to give a definite radio position fix.

6. Low Altitude, Instrument Approach Procedures Booklet.

(Period three of four periods)

1. a. 241.0 MHz.

   b. MEA - 2000 feet, Magnetic course - 125°, Distance 11.0 NM.

   c. 5.8 NM.

   d. 505 feet MSL.

   e. 500 - 1

   f. 2000 feet.

   g. ½ mile.

   h. Runway 6.

DEPARTMENT OF ROTARY WING TRAINING
UNITED STATES ARMY AVIATION SCHOOL
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Flie No. 3826-4(U)

PRACTICAL EXERCISE KEY

RADAR AND INSTRUMENT LANDING SYSTEM

1. 1 mile.

2. c.

3. b.

4. 40 miles.

5. the Control Tower.

6. each mile.

7. a. PAR and ASR.

   b. MDA - 1060 feet MSL; RVR 4000 feet; ceiling 500 feet; visibility 3/4 mile. Minimum for Army helicopter - 2000 feet RVR.(50% of 4000)

   c. DH - 750 feet MSL; RVR - 1600 feet; ceiling 100 feet; visibility 1/4 mile. Minimum for Army helicopter - 1600 feet RVR. (1600' RVR minimum authorized)

8. a. 400 kHz; PN.

   b. 14.0 nm, 219°, 1700 feet.

   c. 549 feet.

   d. 1700 feet.

   e. 109.5 MHz, I-PNS, 332.6 MHz.

   f. 2.

   g. 1428 feet.

   h. 318 feet MSL, visibility $\frac{1}{8}$ mile. Minimum visibility authorized for Army helicopter pilot is $\frac{1}{4}$ mile.

   i. No.

   j. Climb to 1700 on South course of ILS LOC and stay within 10 nm.

   k. 120 feet MSL.

   l. Runway 16.

   m. 480 - $\frac{1}{8}$. (Ref AR 95-2, Para 3-9 b.)

9. c.

10. 2½°.

11. Glideslope.

12. d.

13. b.

14. 1°.

15. b.