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CIVIL USE OF U.S. GOVERNMENT INSTRUMENT APPROACH PROCEDURE CHARTS

APRIL 10, 1968

DEPARTMENT OF TRANSPORTATION

FEDERAL AVIATION ADMINISTRATION

AC NO: 90-1A

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ADVISORY CIRCULAR

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

SUBJECT: CIVIL USE OF U. S. GOVERNMENT INSTRUMENT APPROACH PROCEDURE CHARTS

1. PURPOSE. This Advisory Circular is published to:

   a. Clarify landing minimums requirements under revised FAR 91 and 97.

   b. Introduce revised instrument approach charts.

2. CIRCULARS CANCELLED. Advisory Circulars 90-1 and 90-29 are cancelled.

3. REFERENCES.

   a. U. S. Standard for Terminal Instrument Procedures (TERPS), Handbook 8260.3

   b. Advisory Circular 61-27A, Instrument Flight Handbook

   c. Federal Aviation Regulations 1, 91, 97, 121 and 135

4. GENERAL. Amendments 1-14, 91-44, 97-561, 121-33, and 135-7 of the Federal Aviation Regulations effective November 18, 1967, implement new techniques and criteria associated with the U.S. Standard for Terminal Instrument Procedures (TERPS). These amendments establish the beginning of a changeover period effective November 18, 1967, to the new TERPS procedures to be published in Subpart C, FAR 97, and portrayed in the (TERPS) format on instrument approach procedure charts. There will be a changeover period pending issuance of all procedures in Subpart C during which the procedures that were issued under Subpart B will still be portrayed on charts in the existing (old) format. In such cases, the applicable symbols and terms defined in FAR Sections 1.1, 1.2, and 97.3 will apply to those procedures except for the terms ceiling and visibility with respect to landing minimums.

5. MAJOR CHANGES. Although there are many technical changes to the criteria for terminal procedures, the following changes are considered to be of major importance to the users of instrument approach charts issued by the U.S. Government.

   a. A Minimum Descent Altitude (MDA) or Decision Height (DH) will be used instead of weather ceilings.

   b. Establishment of standard takeoff airport minimums.

   c. Establishment of standard alternate airport minimums.

   d. Establishment of an inoperative components or visual aids table for adjusting landing minimums.

   e. Aircraft are grouped by Category according to approach speed and gross weight for landing instead of by number of engines and stall speed.

6. HOW TO GET THIS PUBLICATION. Obtain additional copies of this circular, AC 90-1A, "Civil Use of U.S. Government Instrument Approach Procedure Charts", from the Department of Transportation, Federal Aviation Administration, Distribution Unit, TAD-484.3, Washington, D.C. 20590.

acting Director
Flight Standards Service

TABLE OF CONTENTS

1. APPLICATION. Civil Instrument Approach Procedures are established by the Federal Aviation Administration after careful analysis of obstructions, terrain features and navigational facilities. Narrative type procedures authorized by the FAA are published in the Federal Register as rule making action under Federal Aviation Regulations, Part 97. Based on this information, the U.S. Coast and Geodetic Survey, and other charting agencies, publish instrument approach charts as a service to the instrument pilot. FAR 91.116a requires use of specified procedures by all pilots approaching for landing under Instrument Flight Rules. Appropriate maneuvers, which include altitudes, courses, and other limitations, are prescribed in these procedures. They have been established for safe letdown during instrument flight conditions as a result of many years of accumulated experience. It is important that all pilots thoroughly understand these procedures and their use.

2. DEFINITIONS.
   a. MDA - "Minimum descent altitude" means the lowest altitude, expressed in feet above mean sea level, to which descent is authorized on final approach, where no electronic glide slope is provided, or during circle-to-land maneuvering in execution of a standard instrument approach procedure.
   b. DH - "Decision height", with respect to the operation of aircraft, means the height at which a decision must be made, during an ILS or PAR instrument approach, to either continue the approach or to execute a missed approach. This height is expressed in feet above mean sea level (MSL), and for Category II ILS operation the decision height is additionally expressed as a radio altimeter setting.
   c. HAA - "Height above airport" indicates the height of the MDA above the published airport elevation. HAA is published in conjunction with circling minimums for all types of approaches.
   d. HAT - "Height above touchdown" indicates the height of the DH or MDA above the highest runway elevation in the touchdown zone (first 3,000 feet of runway). HAT is published in conjunction with straight-in minimums.
   e. NoPT - means No Procedure Turn Required.
   f. "Precision approach procedure" means a standard instrument approach in which an electronic glide slope is provided (ILS or PAR).
   g. "Non-precision approach procedure" means a standard instrument approach in which no electronic glide slope is provided.
   h. Instrument approach procedure. An instrument approach procedure is one that is prescribed and approved for a specific airport by competent authority and published in an acceptable aeronautical information publication.
      (1) U.S. civil standard instrument approach procedures are approved by the FAA as prescribed under FAR Part 97 and are published in the Federal Register. For the convenience of the user, the aeronautical data prescribed in standard instrument approach procedures are portrayed on instrument approach procedure charts and may be obtained from Coast and Geodetic Survey and other publishers of aeronautical charts.
      (2) U.S. military standard instrument approach procedures are established and published by the Department of Defense and are contained in the DOD Flight Information Publication (FLIP). Civilian requests for military procedures should be directed to the Coast and Geodetic Survey, Washington Science Center, Attn: Distribution Division, Rockville, Maryland 20852.

(3) Special instrument approach procedures are approved by the FAA for individual operators and are not published in FAR Part 97 for public use.

(4) Foreign country standard instrument approach procedures are established and published as contained in that country's accepted Aeronautical Information Publication (AIP).

3. DISCUSSION OF MAJOR CHANGES.

a. Minimum Descent Altitude (MDA)/Decision Height (DH) Concept.

(1) IFR landing minimums. FAR sections 91.116 and 91.117, effective November 18, 1967, contain new rules applicable to landing minimums. Ceiling minimums are no longer prescribed in approach procedures as a landing limit. The published visibility is the required weather condition for landing as prescribed in FAR 91.116b. FAR 91 now allows approach down to the prescribed minimum descent altitude (MDA) or decision height (DH), as appropriate to the procedure being executed, without regard to reported ceiling.

(2) Descent below MDA or DH. No person may operate an aircraft below the prescribed minimum descent altitude or continue an approach below the decision height unless—

(a) The aircraft is in a position from which a normal approach can be made to the runway of intended landing; and

(b) The approach threshold of that runway, or approach lights or other markings identifiable with the approach end of that runway, is clearly visible to the pilot.

(c) If, upon arrival at the missed approach point, or at any time thereafter, any of the above requirements are not met, the pilot shall immediately execute the appropriate missed approach procedure.

NOTE: The former FAR authorization to descend 50 feet below the applicable minimum landing altitude when clear of clouds is eliminated.

(3) Conversion of ceiling MDA or DH. Effective November 18, 1967, the Federal Aviation Regulations were amended to provide that if the landing minimums in the instrument approach procedure are stated in terms of ceiling and visibility, the visibility minimum is the applicable landing minimum as prescribed in FAR 91.116b. A ceiling minimum shall be added to the field elevation, and that value is observed as the MDA or DH as appropriate to the procedure being executed.

(4) Publication of landing minimums. The new Government-produced charts always contain the following information listed in this order: MDA or DH, visibility, HAA or HAT, and military minimums (ceiling and visibility) for each aircraft approach category.

NOTE: Since the chart is used by both civil and military pilots, the ceiling, as well as visibility, required by the military will be published in parentheses. Civil operators should disregard this information.

(a) Following are examples of published landing minimums. (Extracted from sample chart Figure 5.)

1 Straight-in precision. An example of straight-in ILS minimums is shown below. The touchdown zone elevation is 965 feet, whereas the airport elevation is 983 feet.

STRAIGHT-IN TO RUNWAY 14	DH	VIS	HAT	MILITARY
S-ILS 14	1165	/ 24	200	(200-½)

It should be noted that the visibility is separated from the DH by a slant line (/) when it is RVR, and separated by a hyphen (-) when it is meteorological visibility. This will help differentiate the two visibility values.

RVR is indicated in 100's of feet, and meteorological visibility is in statute miles. If RVR were not authorized, it would appear 1165-½.

2 Straight-in non-precision. When the ILS approach procedure is used but the aircraft does not have a glide slope receiver or the glide slope ground equipment is out of service, localizer minimums apply to the straight-in landing on that runway.

	MDA		VIS	HAT	MILITARY
S-LOCALIZER 14	1500	/	24	535	(600-½)

3 Circling. Visibility for circling is always in a meteorological value of statute miles. Height of the MDA above the airport elevation is provided by HAA.

	MDA		VIS	HAA	MILITARY
Circling	1640	–	1	657	(700-1)

b. Standard Take-off Minimums. FAR 91.116(c) prescribes take-off rules for FAR 121, 129, and 135 operators and establishes standard take-off visibility minimums as follows:

(1) Aircraft having two engines or less - one statute mile.

(2) Aircraft having more than two engines - one-half statute mile.

In cases where departure procedures or non-standard take-off minimums are prescribed, a symbol ▽ is shown on the chart indicating that the separate listing should be consulted. See figures 5, 13, and 17. Ceiling minimums are no longer prescribed for take-off except for those runways where a ceiling minimum is required to enable the pilot to see and avoid obstructions. The ceiling and visibility minimums previously prescribed apply until individual procedures are reissued under the new criteria.

c. Standard Alternate Minimums. Alternate minimums specified for an instrument approach procedure continue to require both ceiling and visibility minimums. FAR 91.83 establishes standard IFR alternate minimums as follows:

(1) Precision approach procedure: ceiling 600 feet and visibility - two statute miles.

(2) Non-precision approach procedure: ceiling 800 feet and visibility - two statute miles.

The standard IFR alternate minimums apply unless higher minimums are specified for the procedure used. These are denoted by a symbol △ on the chart indicating that the separate listing should be consulted. See figures 6, 14, and 18.

d. Inoperative Components, Visual Aids, and Adjustment of Landing Minimums.

(1) Components and Visual Aids.

(a) Precision approach procedure.

ILS (Instrument Landing System) basic components are localizer, glide slope, outer marker and middle marker. PAR (Precision Approach Radar) basic components are azimuth, range, and elevation information.

The following visual aids may supplement the ILS or PAR, and may provide lower visibility minimums:

ALS Approach Lighting System, 3000′ of Standard High Intensity Lights with Sequence Flashers.

SALS Short Approach Lighting System, 1500′ of Standard ALS.

SSALR Simplified Short Approach Lighting System (1400′ of High Intensity Light Bars) plus 1600′ of Runway Alignment Indicator Lights (RAIL - Sequence Flashers).

MALSR Medium Intensity Lighting of Simplified Short Approach Lighting System (1400′ of Medium Intensity Light Bars) plus 1600′ of Runway Alignment Indicator Lights (RAIL - Sequence Flashers).

TDZL Touchdown Zone Lights.
RCLS Runway Centerline Light System.
HIRL High Intensity Runway Edge Lights.
MIRL Medium Intensity Runway Edge Lights.

(b) Non-precision approach procedures.

The basic component is the facility providing course guidance, i.e., VOR, NDB, etc. In the case of VOR/DME type procedures, basic components are the VOR and DME facilities.

All of the visual aids listed under precision approach procedures may supplement non-precision procedures plus the following:

MALS Medium Intensity Approach Light System. Total 1400'.
RAIL Runway Alignment Indicator Light.
REIL Runway End Identifier Lights.

(2) Previous approach charts (old chart format). In many cases, minimums lower than those authorized in the straight-in line are authorized when lighting aids such as REIL, ALS, etc., are installed for the landing runway. Also, minimums higher than those authorized in its straight-in line are required when certain components of an ILS system are inoperative. This information concerning minimums is published as notes below the minimums section. (Figure 1.)

PREVIOUS APPROACH CHART PRESENTATION

MINIMA — FIELD EL

	65 knots or less 2 eng or less		Over 65 knots 2 eng or less		Over 65 knots Over 2 eng	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
T	300-1	300-1	300-1	300-1	200-½	200-½
C	500-1	500-1	500-1	500-1	500-1½	500-1½
S 21	500-1	500-1	500-1	500-1	500-1	500-1
A	800-2	800-2	800-2	800-2	800-2	800-2
If Parkersburg FM received, the following minimums are authorized:						
S 21*	400-1	400-1	400-1	400-1	400-1	400-1

*400 ⅛ authorized, except for 4-engine turbojet aircraft, with operative REIL or high intensity runway lights.

FACILITY TO AERODROME: 211° 5.8 NM

TIME FROM FACILITY TO MISSED APPROACH					
KNOTS	90	100	110	130	150
MIN: SEC	3:52	3:29	3:10	2:41	2:19

(VOR)

MINIMA — FIELD ELE

	65 knots or less 2 eng or less		Over 65 knots 2 eng or less		Over 65 knots Over 2 eng	
	DAY	NIGHT	DAY	NIGHT	DAY	NIGHT
T	300-1	300-1	300-1	300-1	200-½	200-½
C *	600-1	600-1	600-1	600-1	600-1½	600-1½
S 7L*	200-½	200-½	200-½	200-½	200-½	200-½
A	600-2	600-2	600-2	600-2	600-2	600-2

*400-1 required with any component of ILS inoperative, except 700-1 required when glide slope and 7 Mile DME Fix not utilized.
†Except for 4-engine turbojet acft, 400-⅛ authorized with operative HIRL or 400-½ with operative ALS.
If glide slope not utilized and 7 Mile DME Fix from PUB VOR received, the following minimums are authorized:

C	600-1	600-1	600-1	600-1	600-1½	600-1½
S 7L†	400-1	400-1	400-1	400-1	400-1	400-1

RATE OF DESCENT ON GLIDE SLOPE					
KNOTS	90	100	110	130	150
FEET/MIN	475	530	585	690	795

(ILS)

Figure 1

(3) Inoperative Components or Visual Aids Table (Pertaining to new chart format).

(a) Since all air navigation facilities have a very low out-of-service time, the lowest landing minimums with all components and visual aids operating are published.

To determine landing minimums when components or aids of the system are inoperative or are not utilized, inoperative components or visual aids tables are published and appear on a separate sheet for insertion in the approach chart binders. This method was selected to reduce chart clutter.

INOPERATIVE COMPONENTS OR VISUAL AIDS TABLE

1 ILS and PAR with visibility of ½ mile (RVR 2400) or greater.

Inoperative Component or Aid	Increase DH	Increase Visibility	Approach Category
OM*, MM*	50 feet	By None	ABC
OM*, MM*	50 feet	By ¼ mile	D
ALS	50 feet	By ¼ mile	ABCD
SALS	50 feet	By ¼ mile	ABC

*Not applicable to PAR

2 ILS and PAR with visibility minimum of 1,800 or 2,000 feet RVR.

Inoperative Component or Aid	Increase DH	Increase Visibility	Approach Category
OM*, MM*	50 feet	To ½ mile	ABC
OM*, MM*	50 feet	To ¾ mile	D
ALS	50 feet	To ¾ mile	ABCD
HIRL, TDZL, RCLS	None	To ½ mile	ABCD
RVR	None	To ½ mile	ABCD

*Not applicable to PAR

3 VOR, VOR/DME, LOC, LDA, and ASR.

Inoperative Visual Aid	Increase MDA	Increase Visibility	Approach Category
ALS, SALS	None	By ½ mile	ABC
HIRL, MALS, REILS	None	By ½ mile	ABC

4 NDB (ADF) and RNG.

Inoperative Visual Aid	Increase MDA	Increase Visibility	Approach Category
ALS	None	By ¼ mile	ABC

5 LOC Approaches

Inoperative Component or Aid	Increase MDA	Increase Visibility	Approach Category
ALS, MM	None	By ¼ mile	D

Figure 2

(Reference should be made to the Coast and Geodetic Survey publications for current tables.)

(b) Application of the inoperative components or visual aids table. When using the revised approach charts, the minimums must be adjusted in accordance with the inoperative component or visual aids table. This will be done when a ground component or visual aid pertinent to the procedure is inoperative or not utilized.

With two or more components inoperative, only the greater or greatest increase in altitude or visibility is required; and the increases are not cumulative.

When a visual aid has been installed, but reduced visibility minimums have not been authorized, the above tables would not be used. The following note would appear below the minimums section.

Example: "Inoperative table does not apply to ALS or HIRL Runway 12R." (See figure 14.)

(c) The following general rules will always apply to inoperative components.

1 Operative runway lights are required for night operation.

2 When the facility providing course guidance is inoperative, the procedure is not authorized. On VOR/DME procedures: when either VOR or DME is inoperative, the procedure is not authorized.

3 When the ILS glide slope is inoperative or not utilized, the published straight-in localizer minimum applies.

4 Compass locator or precision radar may be substituted for the ILS outer or middle marker.

5 Surveillance radar may be a substitute for the ILS outer marker. DME, at the glide slope site, may be substituted for the outer marker when published on the ILS procedure.

6 Facilities that establish a stepdown fix, i.e., 75 MHz FM, off course VOR radial, etc. are not components of the basic approach procedure, and applicable minimums for use, both with or without identifying the stepdown fix, are published in the minimums section. (See example figure 14.)

7 Additional methods of identifying a fix may be used when authorized on the procedure.

8 Runway Visual Range (RVR) Minimums.

To authorize RVR minimums, the following components and visual aids must be available in addition to basic components of the approach procedure.

a Precision approach procedures.

(1) RVR reported for the runway.

(2) HIRL.

(3) All weather runway markings.

b Non-precision approach procedures.

(1) RVR reported for the runway.

(2) HIRL.

(3) Instrument runway markings.

c Inoperative RVR minimums. Where RVR visibility minimums are published and the runway markings become unusable, the necessary adjustment will be accomplished by NOTAM and by air traffic advisory.

If RVR minimums for take-off or landing are published in an instrument approach procedure, but RVR is inoperative and cannot be reported for the runway at that time, it is necessary that the RVR minimums which are specified in the procedure be converted and applied as ground visibility in accordance with the table below.

RVR	Visibility (statute miles)
1600 feet	1/4 mile
2400 feet	1/2 mile
3200 feet	5/8 mile
4000 feet	3/4 mile
4500 feet	7/8 mile
5000 feet	1 mile
6000 feet	1 1/4 mile

e. Aircraft Approach Categories. Minimums are specified for the various aircraft speed/weight combinations. Speeds are based upon a value 1.3 times the stalling speed of the aircraft in the landing configuration at maximum certificated gross landing weight. Thus they are COMPUTED values. See FAR 97.3 (b). An aircraft can fit into only one category, that being the highest category in which it meets either specification. For example, a 30,000 pound aircraft landing weight combined with a computed approach speed of 130 knots would place the aircraft in Category C. If it is necessary, however, to maneuver at speeds in excess of the upper limit of the speed range for each category, the minimum for the next higher approach category should be used. For example, a B-727-100 which falls in Category C, but is circling to land at a speed in excess of 140 knots, should use the approach category "D" minimum when circling to land. See following category limits and reference table.

Approach Category — Speed/Weight

- A : Speed less than 91 knots; weight less than 30,001 pounds.
- B : Speed 91 knots or more but less than 121 knots; weight 30,001 pounds or more but less than 60,001 pounds.
- C : Speed 121 knots or more but less than 141 knots; weight 60,001 pounds or more but less than 150,001 pounds.
- D : Speed 141 knots or more but less than 166 knots; weight 150,001 pounds or more.
- E : Speed 166 knots or more; any weight.

Reference Table for Determining Aircraft Approach Categories.

Category A

1.3 V_{SO} less than 91 knots weight less than 30,001 pounds.

This Category includes civil single engine aircraft, light twins, and some of the heavier twins. Typical heavier aircraft in this Category are:

Make	AIRCRAFT Type/Model	SPEED IN KNOTS 1.3 V_{SO}	MAX. LANDING Weight (lbs.)
Aero Commander	680 F	87	8,000
Cessna	310 C	83	4,830
Beechcraft	Queenair 65	90	7,350
Douglas	DC-3	78	26,500

Category B

1.3 V_{SO} 91 knots or more but less than 121 knots; weight 30,001 pounds or more but less than 60,001 pounds.

This group includes most of the heavier twin-engine aircraft, some of which are listed as follows:

Make	AIRCRAFT Type/Model	SPEED IN KNOTS 1.3 V_{so}	MAX. LANDING Weight (lbs.)
Grand Commander		92	8,500
Beechcraft	80	94	8,800
Beechcraft	65-90 Turboprop	100	8,835
Beechcraft	Super 18	97	9,500
Cessna	411 C	95	6,500
Convair	340	107	46,500
Convair	580	110	50,670
Fairchild	F-27	91	36,000

Category C

1.3 V_{so} 121 knots or more but less than 141 knots; weight 60,001 pounds or more but less than 150,001 pounds.

This Category includes the four-engine propeller aircraft, and two and three engine turbojets, some of which are listed as follows:

Make	AIRCRAFT Type/Model	SPEED IN KNOTS 1.3 V_{so}	MAX. LANDING Weight (lbs.)
Boeing	727-100	122	135,000
Caravelle	6	139	105,000
Douglas	DC-4	97	63,500
Douglas	DC-6	110	88,200
Douglas	DC-7	115	97,000
Douglas	DC-9-15	135	81,700
Douglas	DC-9-31	126	95,300
Jet Commander	1121	124	16,000
Lear Jet	24	125	11,800
Lear Jet	23	127	11,800
Lockheed	649, 749	93	89,500
Lockheed	1049	112	110,000
Lockheed	Jetstar	128	30,000
Lockheed	188	124	95,600

Category D

1.3 V_{so} 141 knots or more but less than 166 knots; weight 150,001 pounds or more.

This Category includes the large four-engine turbojet aircraft, some of which are listed as follows:

Make	AIRCRAFT Type/Model	SPEED IN KNOTS 1.3 V_{so}	MAX. LANDING Weight (lbs.)
Boeing	707/123B	133	190,000
Boeing	720/051B	131	175,000
Boeing	300B	126	207,000
Convair	880M	140	155,000
Convair	990A	160	202,000
Douglas	DC-8-21	136	155,000
Douglas	DC-8-61	144	240,000

f. Legend Pages contain the Plain View Symbols, Profile information, Aerodrome Sketch information, and General Information and Abbreviations. The following figures 3 and 4 are Legend Pages to the Coast and Geodetic Survey instrument approach procedures charts.

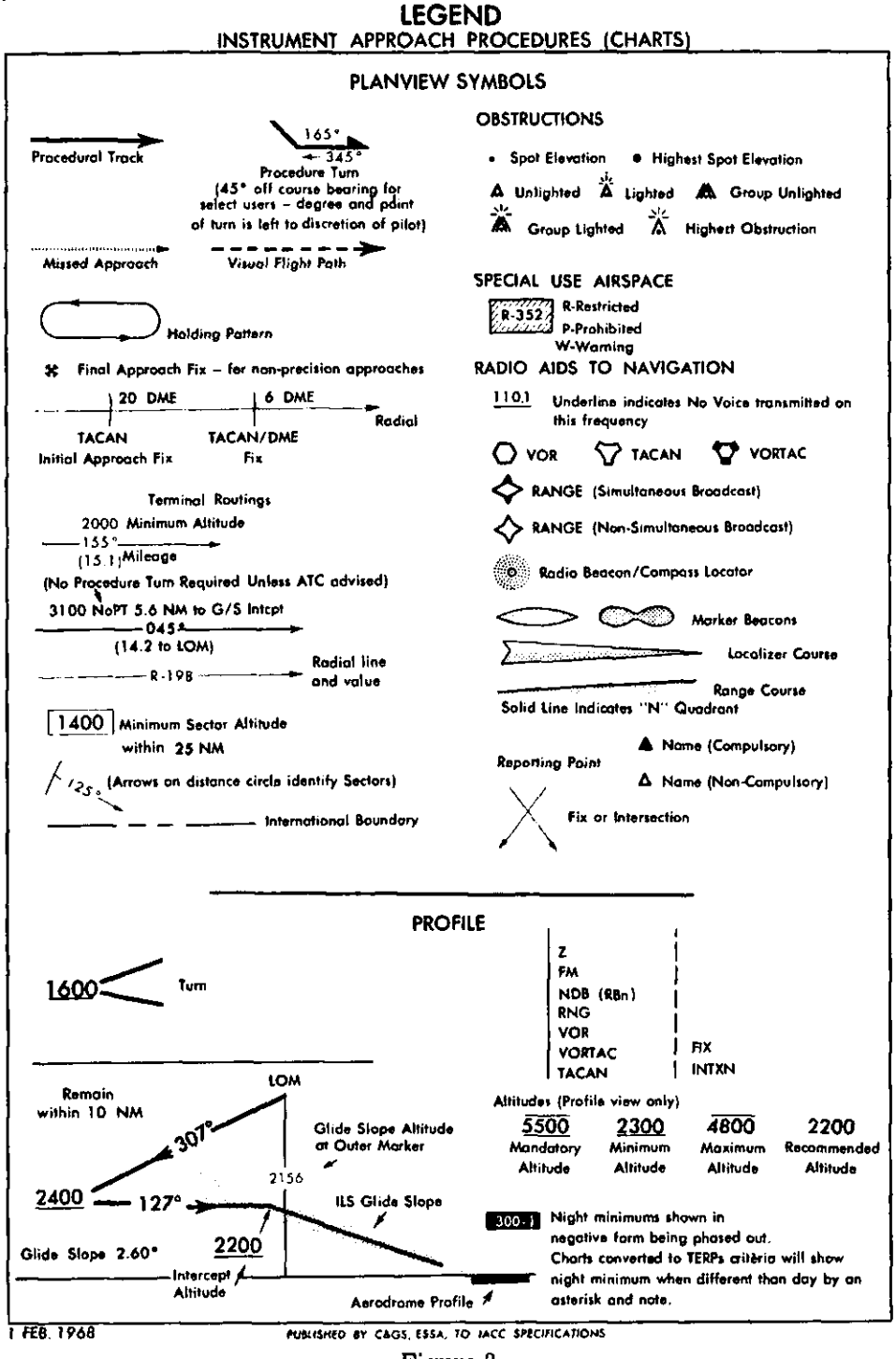


Figure 3

(Reference should be made to Coast and Geodetic Survey publications for the current Legend.)

LEGEND

INSTRUMENT APPROACH PROCEDURES (CHARTS)

AERODROME SKETCH

Runways

Hard Surface — Other Than Hard Surface — Hardstands/Taxiways

Closed Runways and Taxiways — Under Construction — Metal Surface

Over-run — Displaced Threshold

Arresting Gear

uni-directional — bi-directional — Jet Barrier

■ Control Tower
When Control Tower and Rotating Beacon are co-located, Beacon symbol will be used and further identified as TWR.

☆ Rotating Aerodrome Beacon.

Ⓐ U.S. Navy Optical Landing System (OLS) "OLS" location is shown because of its height of approximately 7 feet and proximity to edge of runway may create an obstruction for some types of aircraft.

Ⓗ Helicopter Alighting Area (the prop type symbol is being phased out).

Approach light symbols are shown on a separate legend.

0.8% → UP Total Runway Gradient (shown when runway gradient exceeds 0.3%)

0.8% → DOWN Take-Off Gradient (shown when runway gradient for first 5000' exceeds 0.5%). This take-off gradient being phased out.

△ Indicates other than standard Alternate Minimums apply for U.S. Army and Civil, refer to tabulation.

▽ Indicates other than standard Take-off Minimums or departures procedures apply for Civil users Civil users refer to tabulation.
DOD users refer to Service Directives and DOD produced civil SID publication.

S/S Sliding Scale applicable to U.S. Army

GENERAL INFORMATION & ABBREVIATIONS

All distances in nautical miles (except Visibility Data which is in statute miles and Runway Visual Range which is in hundreds of feet)

Runway dimensions in feet.

Elevations in feet Mean Sea Level.

All radials/bearings are Magnetic.

ADF . . . . . Automatic Direction Finder
ALS . . . . . Approach Light System.
BC . . . . . Back Course.
CHAN . . . . . Channel.
DH . . . . . Decision Height.
DME . . . . . Distance Measuring Equipment.
HAA . . . . . Height Above Aerodrome.
HAT . . . . . Height Above Touchdown.
HIRL . . . . . High Intensity Runway Lights.
INTXN . . . . . Intersection.
LDA . . . . . Localizer Type Directional Aid
LDIN . . . . . Lead in Light System
LOC . . . . . Localizer
MALS . . . . . Medium Intensity Approach Light System.
MDA . . . . . Minimum Descent Altitude.
NDB . . . . . Non-directional Radio Beacon.
NoPT . . . . . No Procedure Turn Required Unless ATC advised.
PAR/ASR . . . . . Published Radar Minimums at this Aerodrome.
Radar Required . . . . . Radar vectoring required for this approach.
Radar Vectoring . . . . . May be expected through any portion of the Nav Aid Approach, except final.
RAIL . . . . . Runway Alignment Indicator Lights
RBn . . . . . Radio Beacon.
REIL . . . . . Runway End Identifier Lights.
RCLS . . . . . Runway Centerline Light System
Runway Touchdown Zone . . First 3000' of Runway.
RVR . . . . . Runway Visual Range.
SALS . . . . . Short Approach Light System.
(S) SALS . . . . . (Simplified) Short Approach Light System.
TAC . . . . . TACAN
TDZ . . . . . Touchdown Zone
TDZL . . . . . Touchdown Zone Lights

1 FEB. 1968 — PUBLISHED BY C&GS, ESSA, TO IACC SPECIFICATIONS

Figure 4

(Reference should be made to Coast and Geodetic Survey publications for the current Legend.)

g. Revised Format for Government-Produced Instrument Approach Procedure Charts. Complete revision to instrument approach chart format has been made. Each chart consists of five sections: margin identification, plan view, profile view, landing minimum section (and notes), and aerodrome sketch. See figures 5 and 6 below.

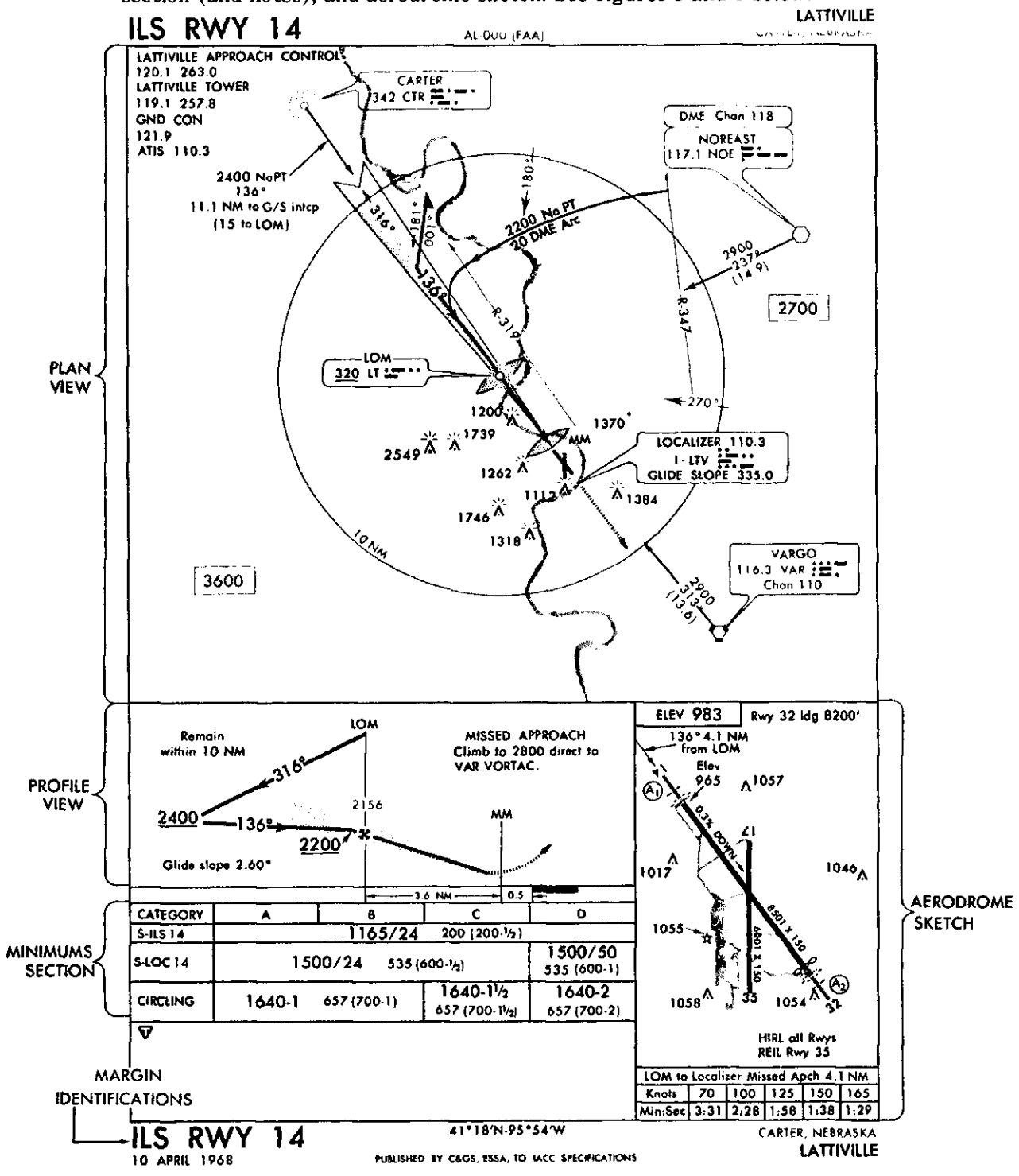


Figure 5

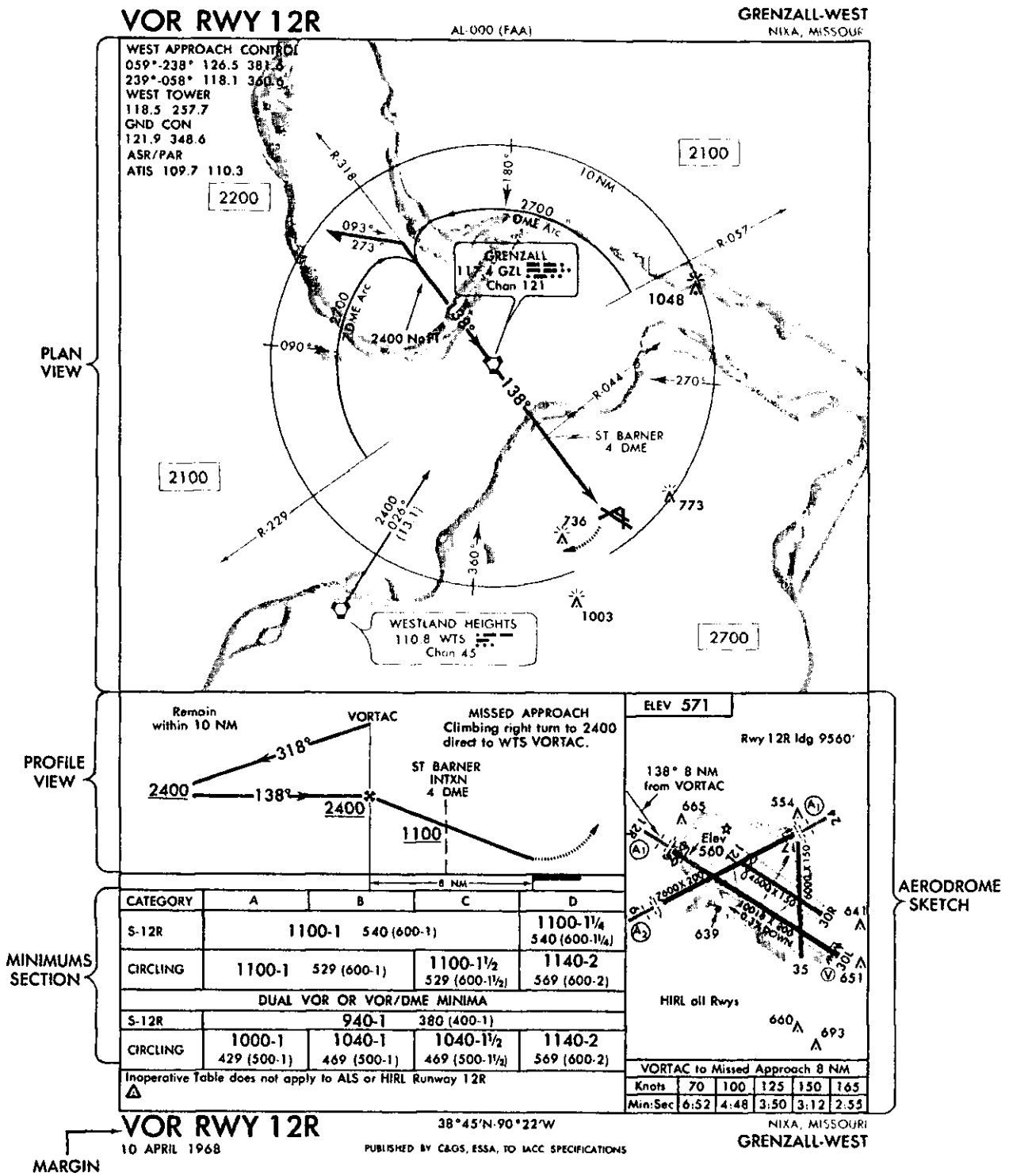
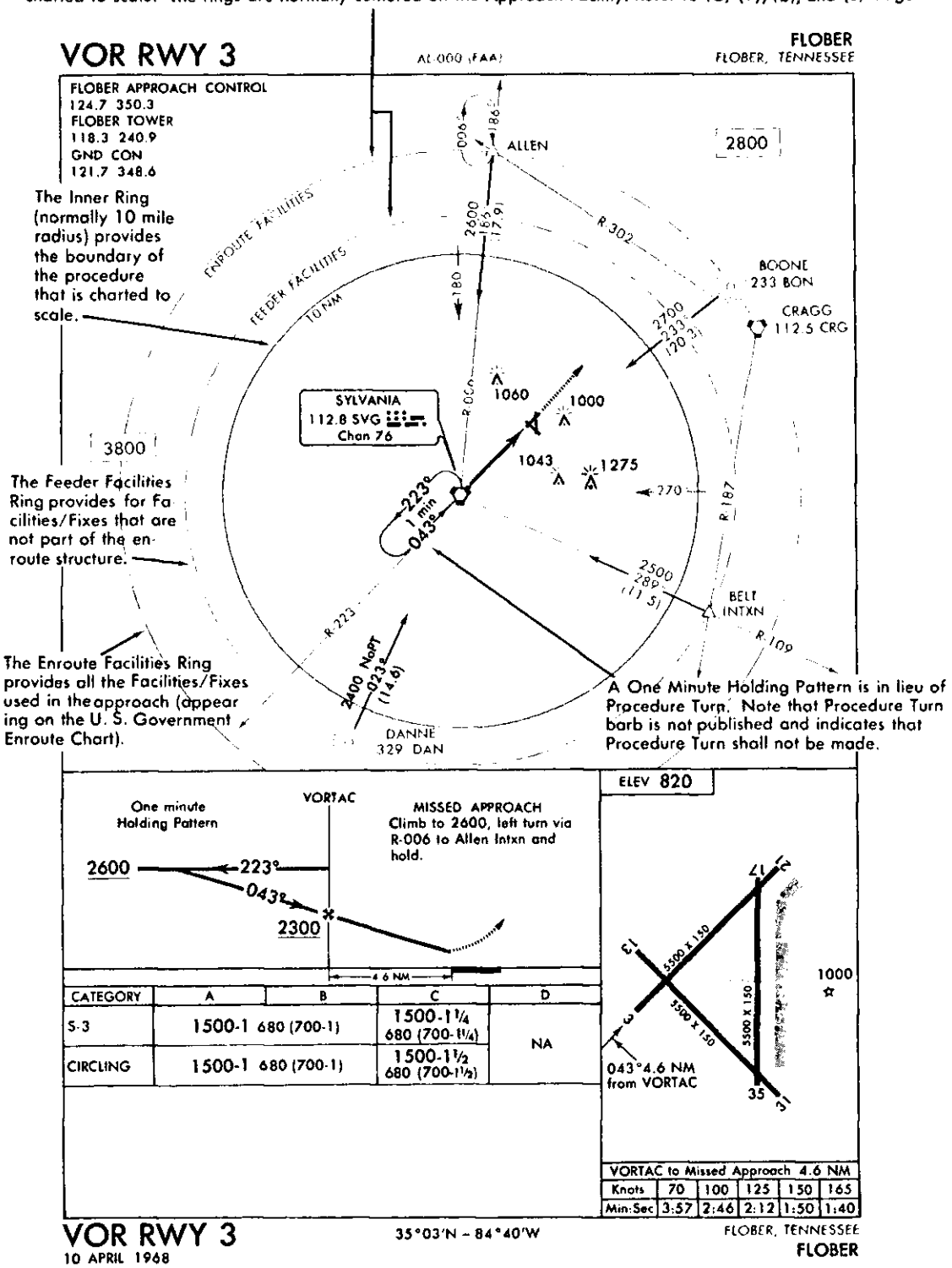

VOR RWY 12R
AL-000 (FAA)
GRENZALL-WEST
NIXA, MISSOURI
WEST APPROACH CONTROL
059°-238° 126.5 381.8
239°-058° 118.1 360.9
WEST TOWER
118.5 257.7
GND CON
121.9 348.6
ASR/PAR
ATIS 109.7 110.3
2200
2100
2700
10 NM
R-318
180°
093°
273°
2700 DME Arc
GRENZALL
GZL
Chan 121
R-057
1048
2400 DME Arc
090°
2400 North
138°
R-044
270°
ST BARNER
4 DME
R-229
2400
026°
(13.1)
360°
736
773
1003
WESTLAND HEIGHTS
110.8 WTS
Chan 45
PLAN VIEW
Remain within 10 NM
VORTAC
318°
2400
138°
2400
MISSED APPROACH
Climbing right turn to 2400 direct to WTS VORTAC.
ST BARNER
INTXN
4 DME
1100
8 NM
PROFILE VIEW
ELEV 571
Rwy 12R ldg 9560'
138° 8 NM from VORTAC
665
554
Elev 560
7500 X 200
6000 X 150
2001 X 600
30R
641
639
35
30L
651
HIRL all Rwys
660
693
AERODROME SKETCH
VORTAC to Missed Approach 8 NM
Knots 70 100 125 150 165
Min:Sec 6:52 4:48 3:50 3:12 2:55
MINIMUMS SECTION
CATEGORY A B C D
S-12R 1100-1 540 (600-1) 1100-1¼ 540 (600-1¼)
CIRCLING 1100-1 529 (600-1) 1100-1½ 529 (600-1½) 1140-2 569 (600-2)
DUAL VOR OR VOR/DME MINIMA
S-12R 940-1 380 (400-1)
CIRCLING 1000-1 429 (500-1) 1040-1 469 (500-1) 1040-1½ 469 (500-1½) 1140-2 569 (600-2)
Inoperative Table does not apply to ALS or HIRL Runway 12R
△
VOR RWY 12R
10 APRIL 1968
MARGIN IDENTIFICATION
38°45'N-90°22'W
PUBLISHED BY C&GS, ESSA, TO IACC SPECIFICATIONS
NIXA, MISSOURI
GRENZALL-WEST

Figure 6

CONCENTRIC RINGS

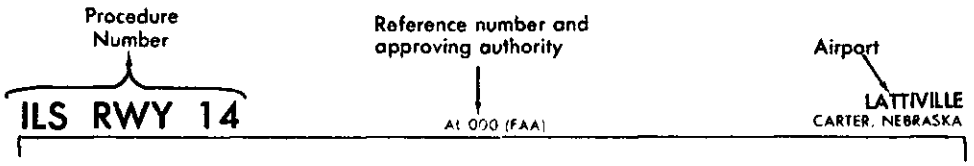
These rings are used when it is necessary to chart facilities which lie beyond the chart area if the procedure was charted to scale. The rings are normally centered on the Approach Facility. Refer to (2) (a), (b), and (c) Page 17



CATEGORY	A	B	C	D
S-3	1500-1 680 (700-1)		1500-1¼ 680 (700-1¼)	NA
CIRCLING	1500-1 680 (700-1)		1500-1½ 680 (700-1½)	

Figure 7

TOP MARGIN IDENTIFICATION



BOTTOM MARGIN IDENTIFICATION

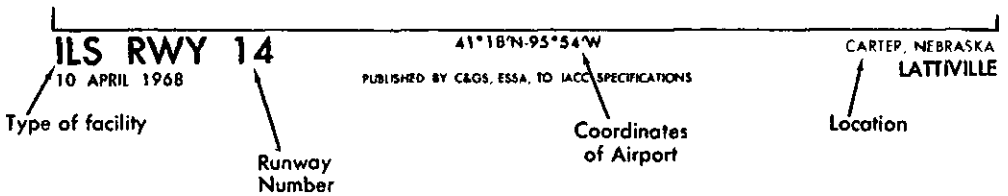


Figure 8

(1) Margin Identification.

(a) The procedure identification is derived from the type facility providing final approach course guidance and (1) runway number when the approach course is within 30° of the runway centerline, i.e., ILS Rwy 14, or (2) sequential number for the airport when the approach course is more than 30° from runway centerline, i.e., VOR-1, VOR-2, etc.

(b) Nondirectional Beacon (NDB), Localizer (LOC) and Localizer Type Directional Aid (LDA) are used to identify more accurately the type facility providing final approach course guidance.

1 "NDB" procedure number replaces ADF type procedure.

2 "LOC" procedure number indicates that a localizer provides course guidance and a glide slope (ground facility) has not been installed. (Includes ILS back course procedures.)

3 "LDA" procedure number is the same as localizer but is not aligned with the runway centerline. The approach chart should be examined to determine the direction and degrees of alignment away from runway centerline.

(c) VOR/DME procedure number means that both operative VOR and DME receivers and ground equipment in normal operation are required to use the procedure. As stated previously, in the VOR/DME procedure, when either the VOR or DME is inoperative, the procedure is not authorized.

(d) When DME arcs and DME fixes are authorized in a procedure and the procedure number does not include the three letter "DME" type of facility in the margin identification, the procedure may be used without utilizing the DME equipment.

(e) VORTAC type procedure is a VOR/DME procedure that is authorized for an aircraft equipped with either VOR/DME or TACAN receiver.

PLAN VIEW
Lattiville Airport
Carter, Nebraska

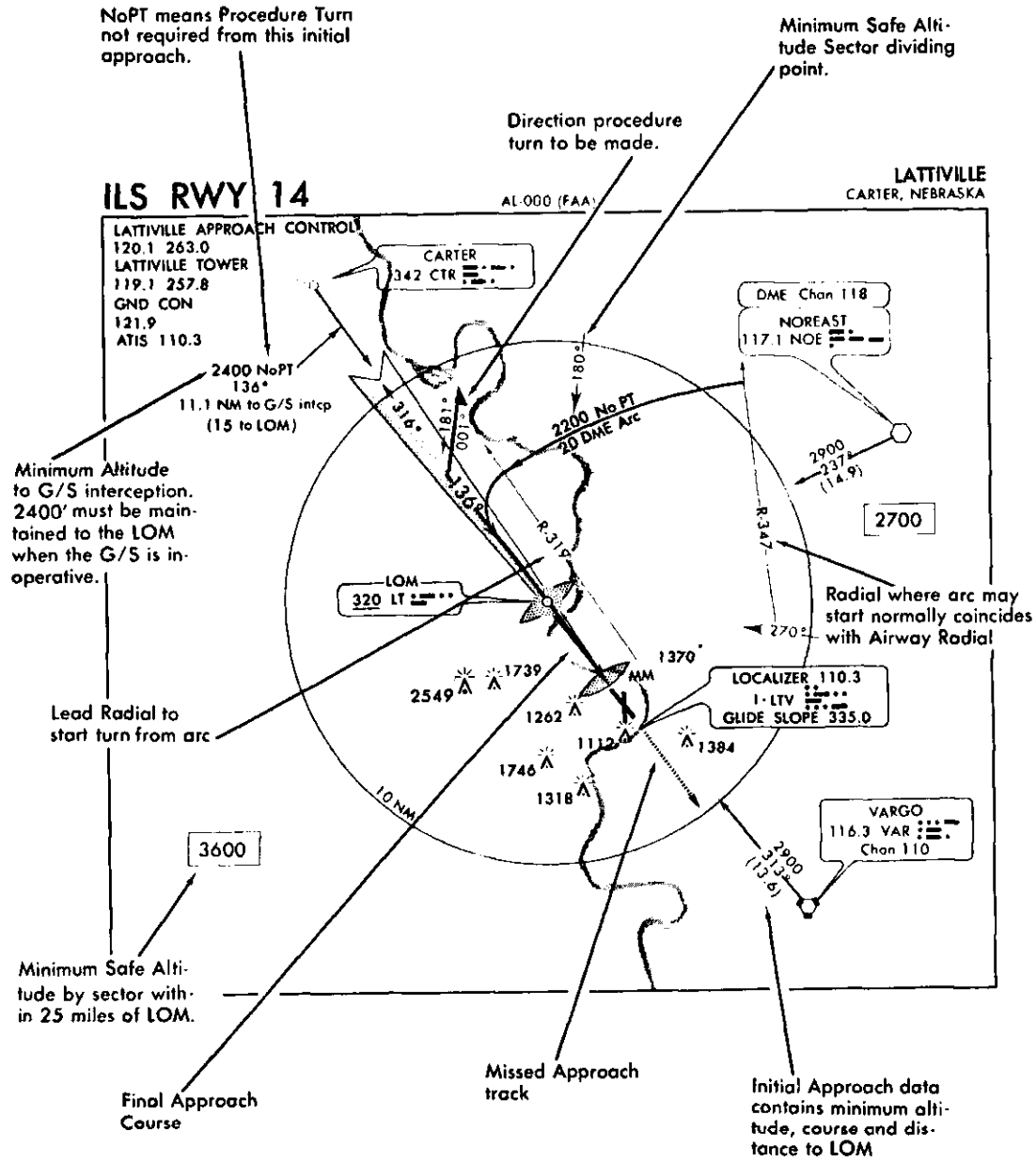


Figure 9

PLAN VIEW
Grenzall-West Airport
Nixa, Missouri

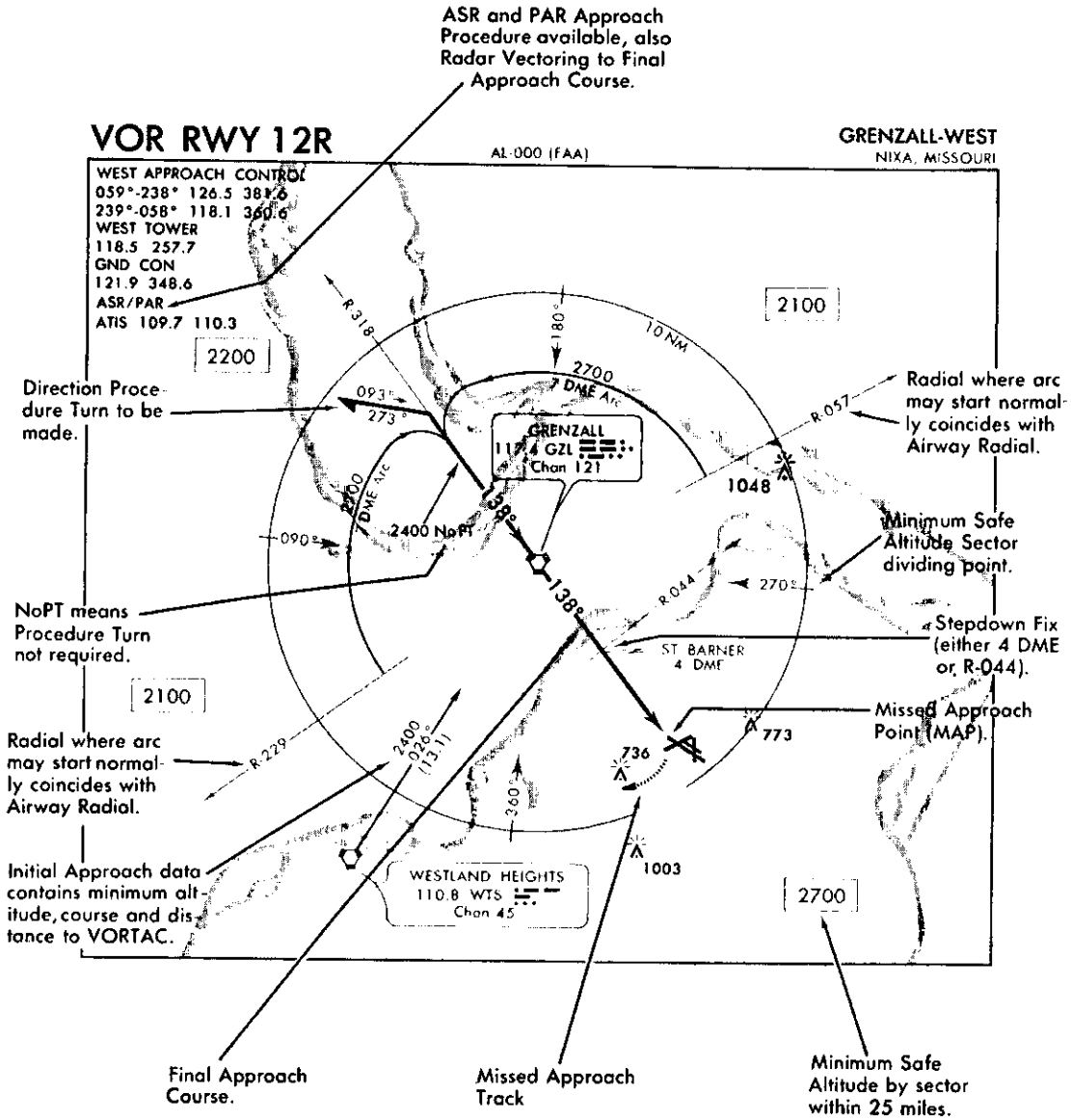


Figure 10

(2) Plan View (Figures 7, 9, and 10). This is a bird's eye view of the entire procedure. Information pertaining to the initial approach segment, including procedure turn, minimum safe altitude for each sector, courses prescribed for the final approach segment and obstructions, is portrayed in this section. Navigation and communication frequencies are also listed on the plan view.

(a) Format. Normally, all information within the plan view is shown to scale. Data shown within the 10 NM distance circle is always shown to scale. (See figure 7.) The dashed circles, called concentric rings, are used when all information necessary to the procedure will not fit to scale within the limits of the plan view area. These circles then serve as a means to systematically arrange this information in their relative position outside and beyond the 10 NM distance circle. These concentric rings are labeled Enroute Facilities and Feeder Facilities.

(b) Enroute Facilities Ring. (See figure 7.) Radio aids to navigation, fixes and intersections that are part of the Enroute Low Altitude Airway structure and used in the approach procedure are shown in their relative position on this Enroute Facilities Ring.

(c) Feeder Facilities Ring. (See figure 7.) Radio aids to navigation, fixes and intersections used by the air traffic controller to direct aircraft to intervening facilities/fixes between the enroute structure and the initial approach fix are shown in their relative position on this Feeder Facilities Ring.

(d) The availability of RADAR (see figure 10) is indicated below the communications information by the appropriate and applicable letters "ASR", "PAR", "ASR/PAR" or "RADAR VECTORING." These terms are applied as follows:

1 ASR - means Airport Surveillance Radar instrument approach procedures are available at the airport, and also that Radar Vectoring is available for the procedure.

2 PAR - means Precision Approach Radar instrument approach procedures are available.

3 RADAR VECTORING - means Radar Vectoring is available but radar instrument approach procedures are not available.

(e) The term "initial approach" is explained in section 97.3(c) (1) of Part 97 of the Federal Aviation Regulations. It is further explained in the FAA Handbook "U.S. Standard for Terminal Instrument Procedures (TERPS)", page 15, section 3, INITIAL APPROACH.

1 In the initial approach, the aircraft has departed the en route phase of flight, and is maneuvering to enter an intermediate or final segment of the instrument approach.

2 An initial approach may be made along prescribed routes within the terminal area which may be along an arc, radial, course, heading, radar vector, or a combination thereof. Procedure turns and high altitude teardrop penetrations are initial approach segments.

3 Initial approach information is portrayed in the plan view of instrument approach charts by course lines, with an arrow indicating the direction. Minimum altitude and distance between fixes is also shown with the magnetic course.

4 When the term "NoPT" appears, an intermediate approach is provided. These altitudes shown with the term "NoPT" cannot be used as an initial approach altitude for the purpose of determining alternate airports requirements under FAR 91.23(c) and 91.83(b).

(f) When an approach course is published on an ILS procedure that does not require a procedure turn (NoPT), the following applies.

1 In the case of a dog-leg track and no fix is depicted at the point of interception on the localizer course, the total distance is shown from the facility or fix to the LOM, or to an NDB associated with the ILS.

2 The minimum altitude applies until the glide slope is intercepted, at which point the aircraft descends on the glide slope.

3 When the glide slope is not utilized, this minimum altitude is maintained to the LOM (or to the NDB if appropriate).

4 In isolated instances, when proceeding NoPT to the LOM and the glide slope cannot be utilized, a procedure turn will be required to descend for a straight-in approach and landing. In these cases, the requirement for a procedure turn will be annotated on the Plan View of the procedure chart.

(g) Procedure turn is the maneuver prescribed when it is necessary to reverse direction to establish the aircraft inbound on an intermediate or final approach course. It is a required maneuver except when the symbol NoPT is shown, when RADAR VECTORING is provided, when a one minute holding pattern is published in lieu of a procedure turn, or when the procedure turn is not authorized. The altitude prescribed for the procedure turn is a minimum altitude until the aircraft is established on the inbound course. The maneuver must be completed within the distance specified in the profile view.

1 A barb indicates the direction or side of the outbound course on which the procedure turn is made. Headings are provided for course reversal using the 45° type procedure turn. However, the point at which the turn may be commenced and the type and rate of turn is left to the discretion of the pilot. Some of the options are the 45° procedure turn, the racetrack pattern, the tear-drop procedure turn, or the 80°—260° course reversal. These maneuvers are diagrammed in the FAA Instrument Flying Handbook (AC 61-27A), and the steps numbered under the figures are intended for student practice under no-wind conditions.

2 Limitations on procedure turns.

a In the case of a radar initial approach to a final approach fix or position, or a timed approach from a holding fix, or where the procedure specifies "NoPT", no pilot may make a procedure turn unless, when he receives his final approach clearance, he so advises ATC and a clearance is received.

b When a tear-drop procedure turn is depicted and a course reversal is required, this type turn must be executed.

c When a one minute holding pattern replaces the procedure turn, the standard entry and the holding pattern must be followed except when RADAR VECTORING is provided or when NoPT is shown on the approach course. Diagrams of the holding pattern and entries into the pattern also are illustrated in the Handbook 61-27A. As in the procedure turn, the descent from the minimum holding pattern altitude to the final approach fix altitude (when lower) may not commence until the aircraft is established on the inbound course.

d The absence of the procedure turn barb in the Plan View indicates that a procedure turn is not authorized for that procedure.

3 A Procedure Turn is not required when the symbol NoPT appears on an approach course shown on the Plan View. If a procedure turn is desired, descent below the procedure turn altitude should not be made since some NoPT altitudes may be lower than the procedure turn altitude.

PROFILE VIEW (Precision)

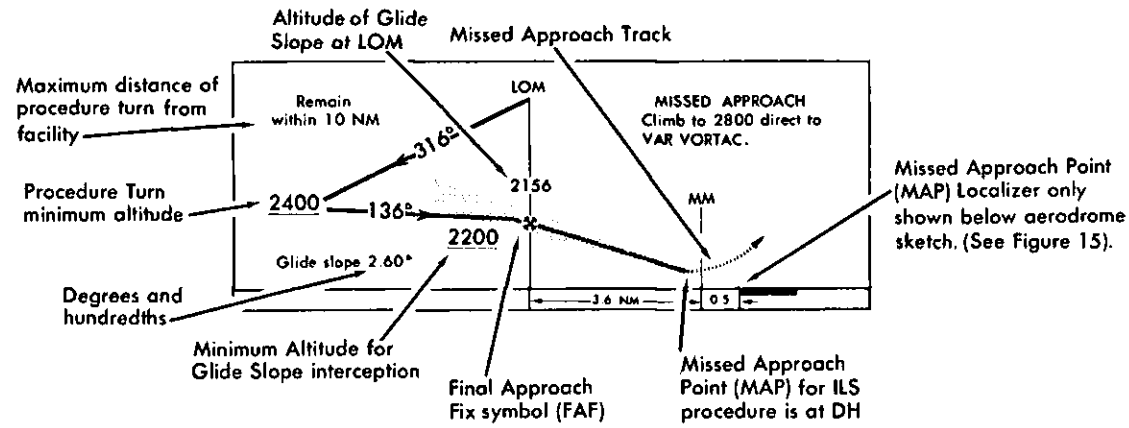


Figure 11

PROFILE VIEW (Non-precision)

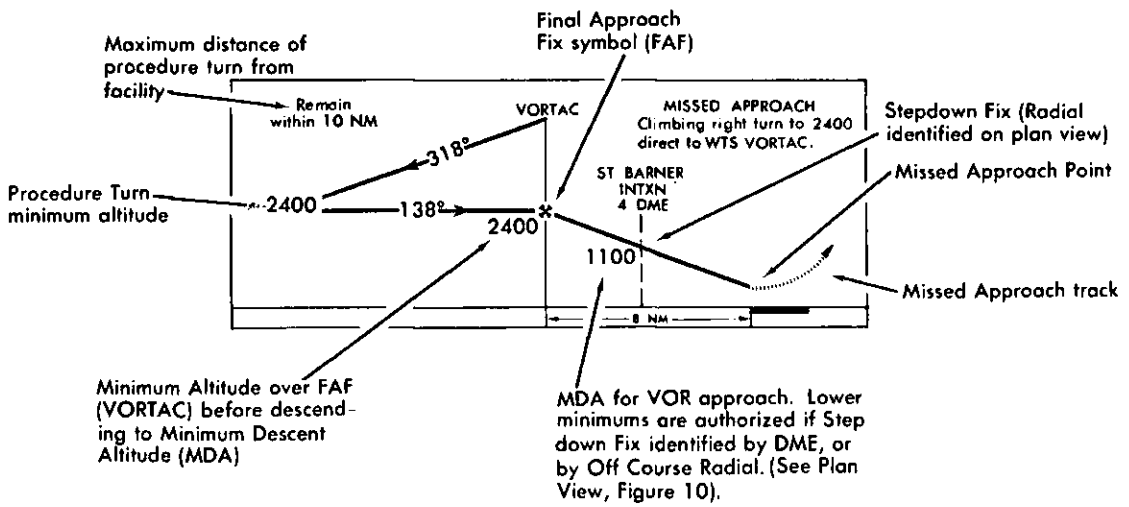


Figure 12

(3) Profile Views (Figures 11 and 12) show a side view of the procedures. These views include the minimum altitude and maximum distance for the procedure turn, altitudes over prescribed fixes, distances between fixes and the missed approach procedure.

(a) Precision approach glide slope intercept altitude. This is a minimum altitude for glide slope interception after completion of procedure turn. It applies to precision approaches and, except where otherwise prescribed, it also applies as a minimum altitude for crossing the final approach fix in case the glide slope is inoperative or not used.

(b) Stepdown fixes in non-precision procedures. A stepdown fix may be provided on the final, i.e., between the final approach fix and the airport for the purpose of authorizing a lower MDA after passing an obstruction. This stepdown fix may be made by an NDB bearing, fan marker, radar fix, radial from another VOR, or by a DME when provided for as shown in figure 12.

(c) Normally, there is only one stepdown fix between the final approach fix (FAF) and the missed approach point (MAP). If the stepdown fix cannot be identified for any reason, the altitude at the stepdown fix becomes the MDA for a straight-in landing. However, when circling under this condition, you must refer to the Minimums Section of the procedure for the applicable circling minimum. See figure 14 for example.

(d) Missed approach point (MAP). It should be specifically noted that the missed approach points are different for the complete ILS (with glide slope) and for the localizer only approach. The MAP for the ILS is at the decision height (DH) while the "localizer only" MAP is usually over the (straight-in) runway threshold. In some non-precision procedures, the MAP may be prior to reaching the runway threshold in order to clear obstructions in the missed approach climb-out area. In non-precision procedures, the pilot determines when he is at the missed approach point (MAP) by timing from the final approach fix (FAF). The FAF has been clearly identified by use of the maltese cross symbol in the profile section. The distance from FAF to MAP and time and speed table, for easy calculation, are found below the aerodrome sketches (figures 15 and 16). This does not apply to VOR/DME procedures, or when the facility is on the airport and the facility is the MAP.

MINIMUMS SECTION (and notes).

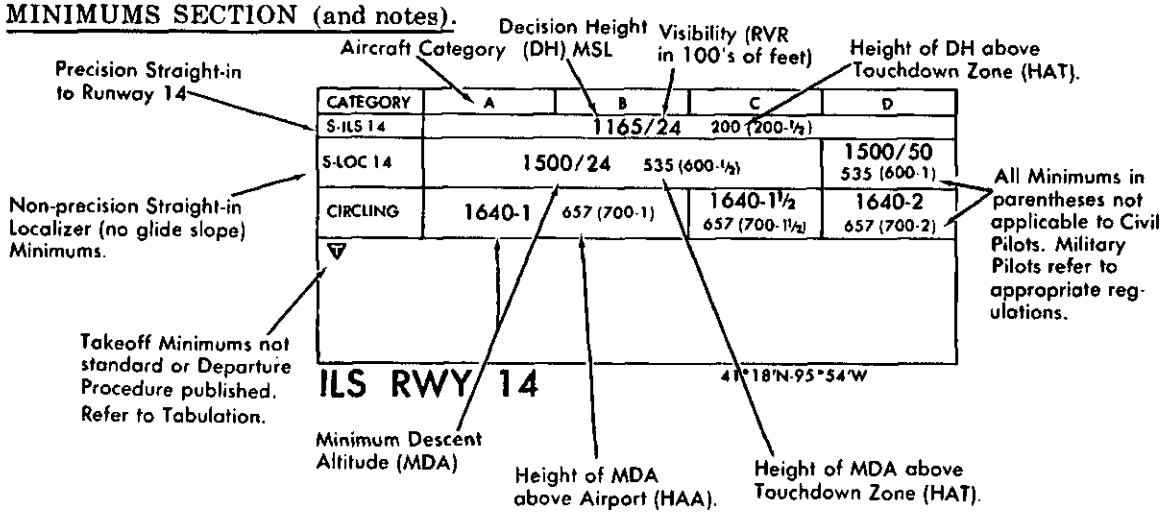


Figure 13

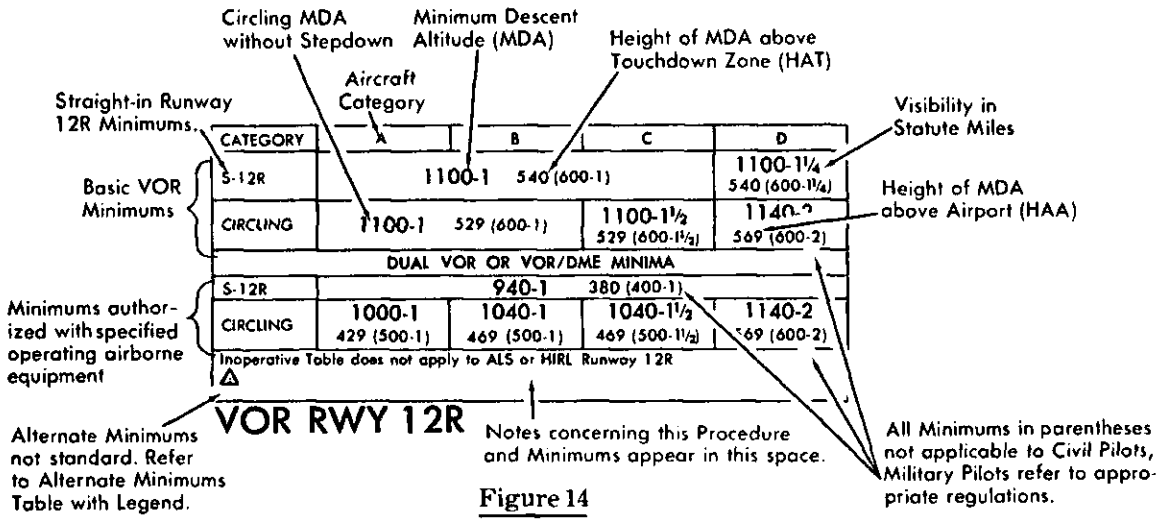


Figure 14

(4) Minimum Section.

(a) The same minimums apply to both day and night operations unless different minimums are specified at the bottom of the minimum box in the space provided for symbols or notes.

(b) The minimums for straight-in and circling appear directly under each aircraft category. When there is no division line between minimums for each category on the straight-in or circling lines, the minimums apply to two or more categories under the A, B, C, or D.

(For figure 13, the S-ILS 14 minimums apply to all four categories. The S-localizer 14 minimums are the same for Categories A, B, and C, and different for Category D. The circling minimums are the same for A and B and individually different for C and D.)

(c) The Nixa, Missouri, Grenzall West Airport, VOR Rwy 12R procedure (figures 12 and 14) authorizes minimums for aircraft with one VOR receiver. Lower minimums are authorized if the aircraft also has DME or dual VOR receivers and St. Barner Intersection is identified. (See figure 14 for dual minimums.)

(5) Aerodrome Data.

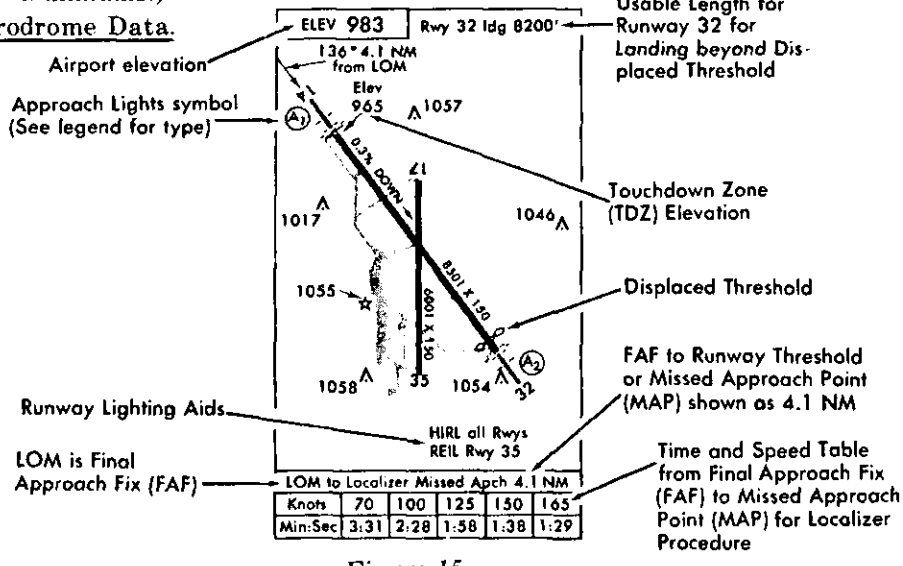


Figure 15

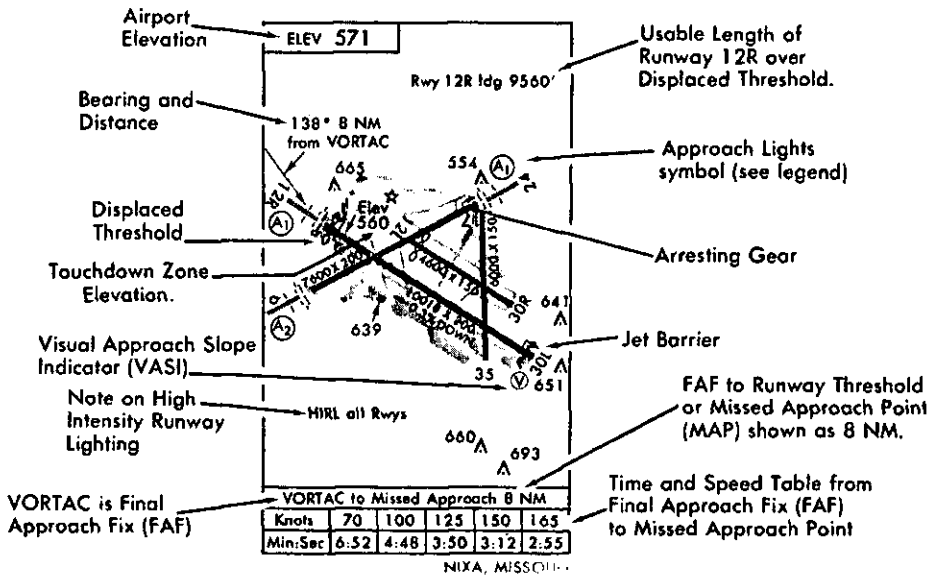


Figure 16

(6) General Information.

(a) During pre-flight planning prior to departure on an IFR flight plan, reference should be made to instrument approach charts to determine:

1 Take-off minimums.

2 Whether an IFR departure procedure for obstruction avoidance has been established.

Instrument approach charts in the old format have take-off minimums and departure procedures published on the chart. Procedures published under the revised format do not contain this information. Take-off minimums are standard (see paragraph 3.b.) unless the symbol ∇ is shown under the minimums box indicating that the separate listing should be consulted. Below is an example of this listing.

INSTRUMENT APPROACH PROCEDURES (CHARTS)
SOUTHEAST UNITED STATES

∇ IFR TAKE-OFF MINIMUMS AND DEPARTURE PROCEDURES

FAR 91.116(c) prescribes take-off rules for FAR 121, 129, and 135 operators and establishes standard take-off visibility minimums as follows:
(1) Aircraft having two engines or less – one statute mile.
(2) Aircraft having more than two engines – one-half statute mile.
Aerodromes within this geographical area with IFR take-off minimums other than standard are listed below alphabetically by aerodrome name. Departure procedures and/or ceiling and visibility minimums are established to assist pilots conducting IFR flight in avoiding obstructions during climb to the minimum enroute altitude.
Take-off minimums and departure procedures apply to all runways unless otherwise specified.

AERODROME NAME	TAKE-OFF MINIMUMS	AERODROME NAME	TAKE-OFF MINIMUMS
CARTER-LATTIVILLE Carter, Nebraska	500-2		

Figure 17

(b) When use of an alternate airport is required in filing an IFR flight plan (FAR 91.83), reference should be made to the instrument approach procedure to be used for the alternate selected to determine alternate airport minimums. Procedures charted in the old format have alternate minimums shown on the chart. Procedures charted in the new format do not contain this information. Alternate minimums are standard (see paragraph 3.c.) unless the symbol Δ is shown under the minimums box indicating that alternate minimums are not standard and that the separate listing should be consulted. If the airport is not authorized for use as an alternate, the letters "NA" will follow the symbol under the minimum box. Below is an example of the Alternate Minimums listing.

NOTE: If the pilot elects to proceed to the selected alternate airport, the alternate ceiling and visibility minimums are disregarded, and the published landing minimum is applicable for the new destination utilizing facilities as appropriate to the procedure. In other words, the alternate airport becomes a new destination, and the pilot uses the landing minimum appropriate to the type of procedure selected.

INSTRUMENT APPROACH PROCEDURES (CHARTS)
WEST CENTRAL UNITED STATES
Δ IFR ALTERNATE MINIMUMS
(Not applicable to USAF/USN)

Standard alternate minimums for nonprecision approaches are 800-2 (NDB, VOR, LOC, TACAN, LDA, VORTAC, VOR/DME or ASR); for precision approaches 600-2 (ILS or PAR). Aerodromes within this geographical area that require alternate minimums other than standard or alternate minimums with restrictions, are listed below. U. S. Army pilots refer to Army Reg. 95-2 for additional application. Civil pilots see FAR 91.83. USAF/USN pilots refer t- appropriate regulations.

AERODROME NAME	ALTERNATE MINIMUMS	AERODROME NAME	ALTERNATE MINIMUMS
NIXA GRENZALL ARPT Nixa, Missouri Categories A, B and C, 1100-2; category D, 1200-2	VOR Rwy 12R		

Figure 18

(c) The tables which appear as samples in (a) and (b) above are printed for area chart books, and should be kept with the Legend pages and Inoperative Components or Visual Aids Table at the front of each area chart book.

(d) Straight-in minimums are shown on instrument approach procedure charts when the final approach course of the instrument approach procedure is within 30° of the runway alignment and a normal descent can be made from the IFR altitude shown on the instrument approach procedures to the runway surface. When either the normal rate of descent or the runway alignment factor of 30° is exceeded, a straight-in minimum is not published and a circling minimum applies. The fact that a straight-in minimum is not published does not preclude the pilot from landing straight-in if he has the active runway in sight in sufficient time to make a normal landing. Under

such conditions and when Air Traffic Control has cleared him for landing on that runway, he is not expected to circle even though only circling minimums are published. If he desires to circle at a controlled Airport, he should advise ATC.

(e) Circling Minimums. The circling minimums published on the instrument approach chart provide adequate obstruction clearance and the pilot should not descend below the circling altitude until the aircraft is in a position to make final descent for landing. Sound judgement and knowledge of his and the aircraft capabilities are the criteria for a pilot to determine the exact maneuver in each instance since the airport design, the aircraft position, altitude and airspeed must all be considered. The following basic rules apply.

1 Maneuver the shortest path to the base or downwind leg as appropriate under minimum weather conditions. There is no restriction from passing over the airport or other runways.

2 It should be recognized that many circling maneuvers may be made while VFR flying is in progress at the airport. Standard left turns or specific instruction from the controller for maneuvering must be considered when circling to land.

3 At airports without a control tower, it may be desirable to fly over the airport to determine wind and turn indicators, and to observe other traffic which may be on the runway or flying in the vicinity of the airport.

(f) When the missed approach procedure specifies holding at a facility or fix, holding shall be in accordance with the holding pattern depicted on the plan view, and at the minimum altitude in the missed approach instructions, unless a higher altitude is specified by ATC. An alternate missed approach procedure may also be given by ATC.

(g) There are various terms in the missed approach procedure which have specific meanings with respect to climbing to altitude, to execute a turn for obstruction avoidance, or for other reasons. Examples:

'Climb to' means a normal climb along the prescribed course.

'Climbing right turn' means climbing right turn as soon as safety permits, normally to avoid obstructions straight ahead.

'Climb to 2400 turn right' means climb to 2400 prior to making the right turn, normally to clear obstructions.

Cancelled See 90-1A

Federal Aviation Agency

AC NO: AC 90-1
AIR TRAFFIC CONTROL AND GENERAL OPERATIONS
EFFECTIVE: 2/25/63

ADVISORY CIRCULAR

SUBJECT: USING THE INSTRUMENT APPROACH PROCEDURE CHARTS

PURPOSE. To clarify the symbols and abbreviations used on Instrument Approach Procedure Charts.

GENERAL. Questions frequently arise which indicate that many pilots are not completely aware of the information contained on Instrument Approach Procedure Charts.

OBJECTIVE.

a. This circular is designed to assist in resolving questions frequently asked about Instrument Approach Procedure Charts. In addition, it is intended to present this information to those pilots who may be unfamiliar with these very important tools.

b. These approach procedures and weather minima are established only after careful analysis by the Federal Aviation Agency. Criteria as to obstruction clearance, terrain features, and other technical considerations are applied. Many flight tests are conducted using a procedure before it is finally forwarded by the FAA for printing and distribution by the Coast and Geodetic Survey. Separate charts are provided for each approved approach on the various navigational and approach facilities at a given airport. In addition to the VOR procedure for Stapleton Airfield illustrated in Figure 1, others are prescribed for using the low frequency radio range, automatic direction finder (ADF), and instrument landing system (ILS).

c. Use of the procedures specified is mandatory on the part of all pilots approaching for landing under Instrument Flight Rules. All prudent pilots pay particular attention to the take-off and landing minima. They have been established as a result of experience gained by thousands of skilled pilots while they accumulated many years of flying experience.

George C. Prill

George C. Prill
Director
Flight Standards Service

Attachment

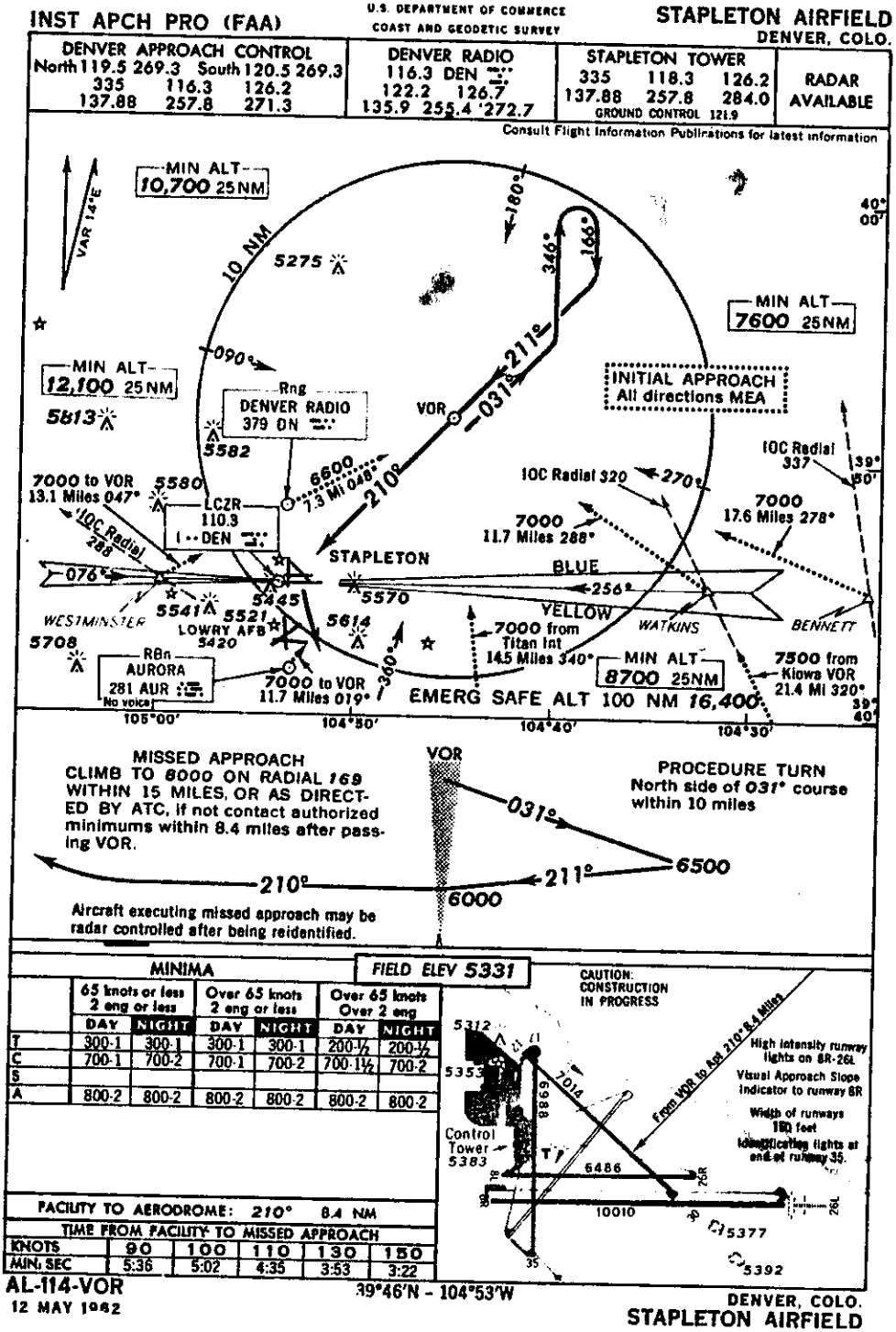
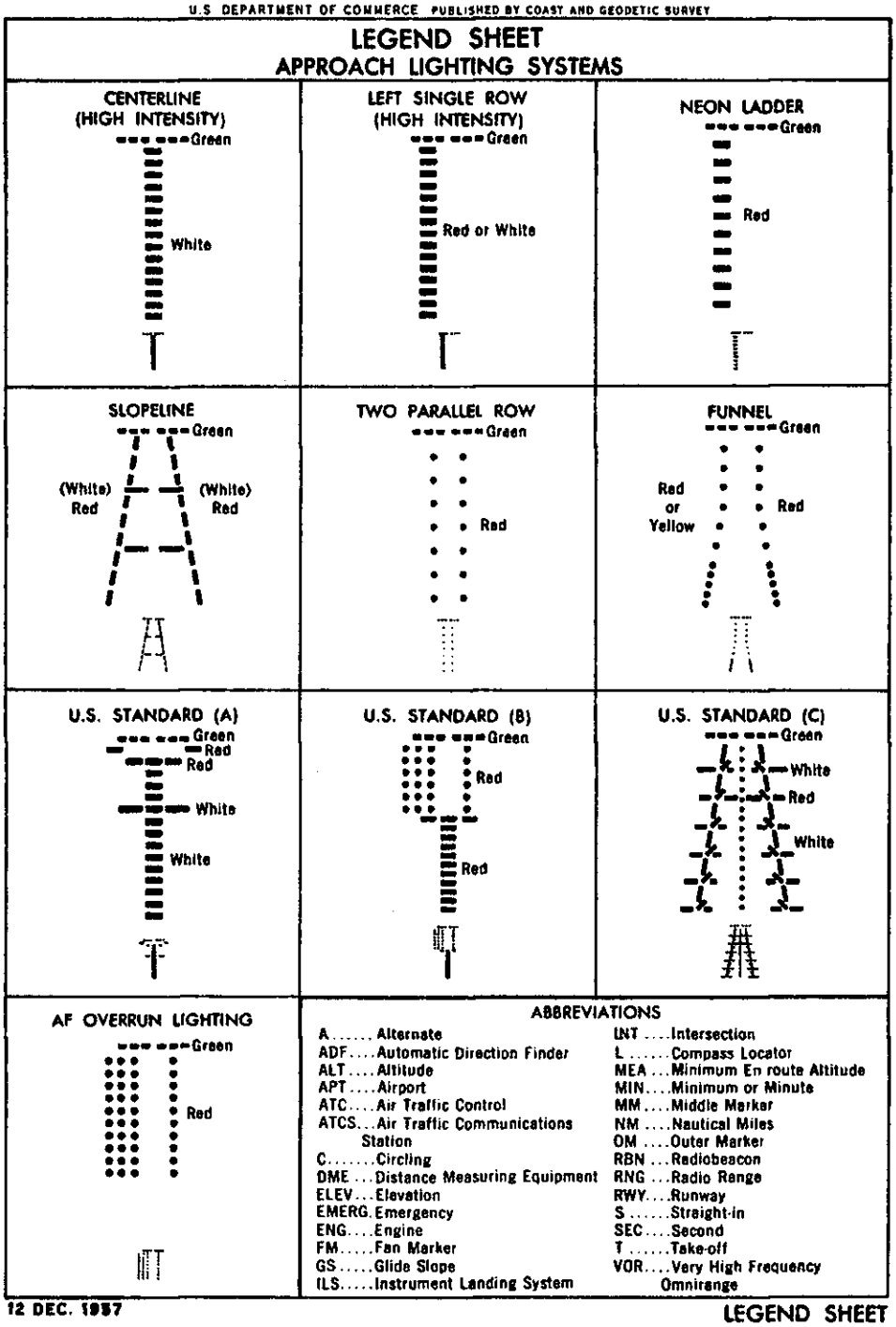


FIGURE 1. INSTRUMENT APPROACH PROCEDURE CHART



NOTE: ATCS is now FSS (Flight Service Station).

FIGURE 10. LEGEND SHEET. APPROACH LIGHTING SYSTEMS AND ABBREVIATIONS LISTING

* U. S. GOVERNMENT PRINTING OFFICE : 1963 O - 679858