USAAVNS PT 131

PROGRAMED TEXT

INSTRUMENT LANDING SYSTEM

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UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

DEPARTMENT OF THE ARMY
UNITED STATES ARMY AVIATION SCHOOL
FORT RUCKER, ALABAMA

PROGRAMED TEXT

TITLE: Instrument Landing System

SCOPE: Characteristics of the components in an Instrument Landing System. Operation and tuning of ILS receiver equipment. Interpreting ILS approach charts and enroute chart symbols. Interpreting indications of the ID-453. Operation and use of the marker beacon receiver for ILS approaches.

INSTRUCTOR'S REFERENCE: TM 1-225, "Airman's Information Manual, Part 1."

MATERIAL REQUIRED: None.

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CONTENTS

	Page	Frame
Preface	iii	
Objectives	iv	
ILS Components	1	1
Localizer Transmitter	7	3
Operation of ILS Localizer Receivers (ARN-30 A, D, E)	21	10
ILS Cockpit Indicator (ID-453)	37	18
Characteristics of Localizer Beam	43	21
Interpreting Localizer Beam Indications (Front Course)	59	29
Interpreting Localizer Beam Indications (Back Course)	81	40
Use of Localizer Beam for Instrument Departures	99	49
Location and Characteristics of Glide Slope Transmitter	117	57
Tuning Glide Slope Receivers	5	61
Interpreting Glide Slope Indications	19	68
Identifying and Tuning to Receive Marker Beacons (OM and MM)	45	80
Compass Locators	77	96
Final Descent and Missed Approach	103	109
Approach Lights	109	111

PREFACE

In this unit, you will learn about the instrument landing system. This system is one of the most precise instrument approach systems available to you. This unit will prepare you to interpret ILS approach procedures and tune the various receivers required for making this approach. In addition, you will practice interpreting diagrams of instrument indications that might be received during typical ILS approaches. When you have completed the unit, you should understand the principles of ILS well enough to take an ILS approach chart, plan your approach, and execute a practice ILS in the synthetic trainer.

PROGRAM OBJECTIVES

At the end of this program, the student will be able to—

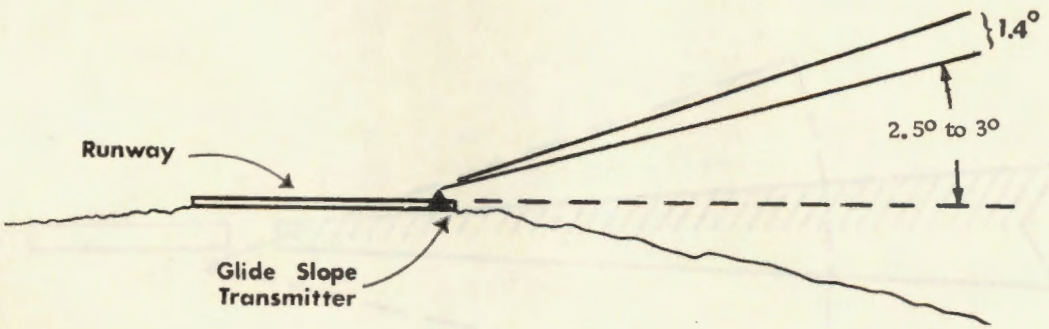
1. List the components of an instrument landing system.
2. Write the broadcasting frequencies of localizer transmitters.
3. Describe how to tune the two types of ILS receivers.
4. Interpret localizer beam information presented by the course indicator.
5. Write the elevation of the glide slope indicator beam.
6. Describe how to tune different glide slope receivers.
7. Write a general rule for staying on the proper glidepath using ID-453 indications.
8. Recognize symbols and write identifiers for outer markers, middle markers, and compass locators.
9. Write the distance of markers from the end of the runway in a typical ILS installation.
10. Write two indications of marker beacon passage.
11. Interpret FLIP ILS approach charts.
12. Specify which receiver is used to identify compass locators.
13. Describe the location of outer marker and middle marker with respect to final descent and execution of missed approach.
14. Write the function of approach lights associated with the ILS.

FRAME 1

The instrument landing system is an accurate system whereby the pilot can execute an approach using _____ indications in the cockpit to make a safe _____. This system is usually referred to by its three initials _____.

FRAME 59

As seen from the side, a typical glide slope signal is elevated _____° above the horizontal.



1a.

Answer: instrument

landing

ILS

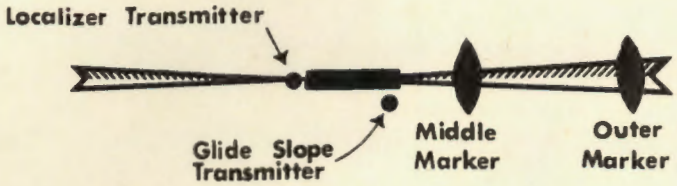
59a.

Answer: 2.5° to 3°

FRAME 2

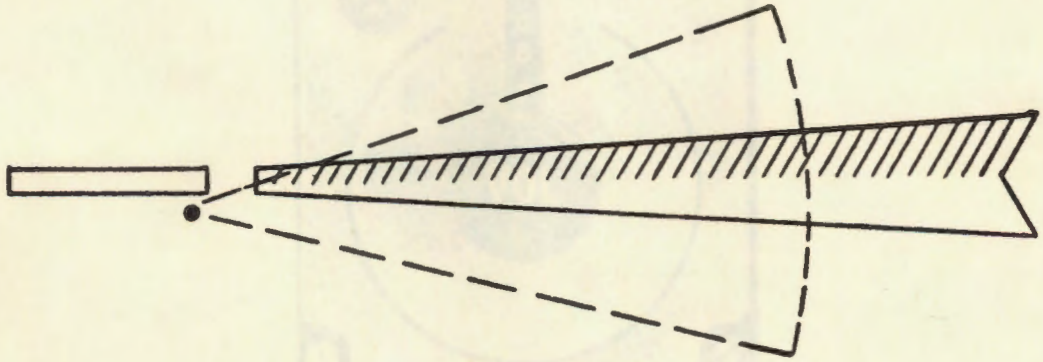
The four main components of a typical ILS are shown in the diagram below. They are—

1. _____.
2. _____.
3. _____.
4. _____.



FRAME 60

Because of its location with respect to the runway, the glide slope transmitter can be used only during an ILS _____ _____ approach.



2a.

Answer: 1. Localizer transmitter

2. Glide slope transmitter } either order

3. Middle marker beacon } either order

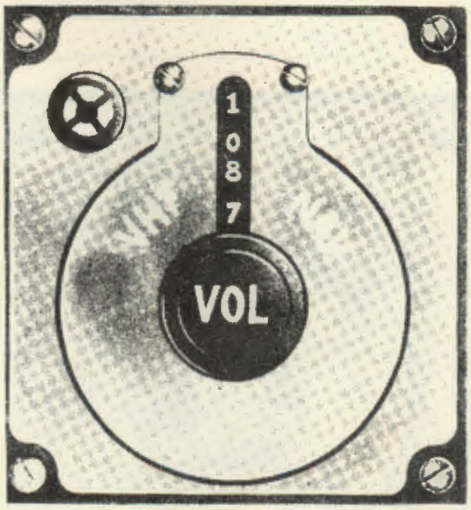
4. Outer marker beacon

60a.

Answer: front course

FRAME 61

In aircraft equipped with the ARN-30A or the ARN-30D receiver, the signal from the glide slope transmitter must be tuned separately on the _____.



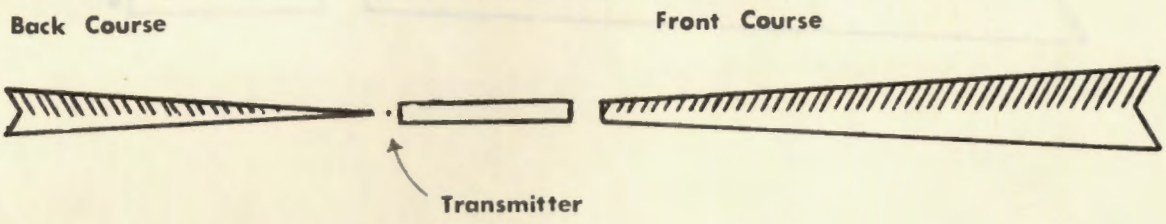
GLIDE SLOPE RECEIVER

61a.

Answer: glide slope receiver

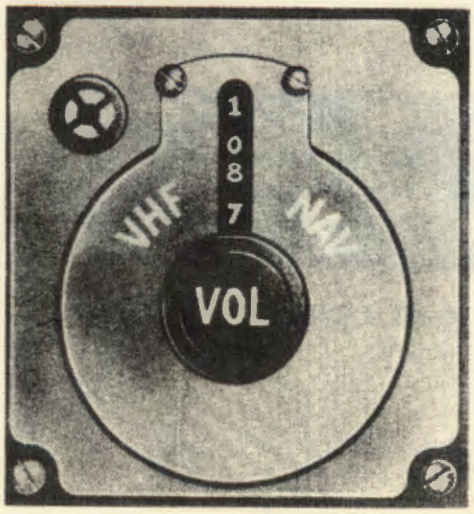
FRAME 3

The most important component of the ILS is the localizer transmitter. It produces two courses which provide directional guidance for aircraft. They are called the _____ and _____.



FRAME 62

The ARN-30A associated with the receiver below is tuned to 108.7 mc. The glide slope receiver must be tuned to the _____ frequency as the ILS _____ receiver.



3a.

Answer: front course
back course
} either order

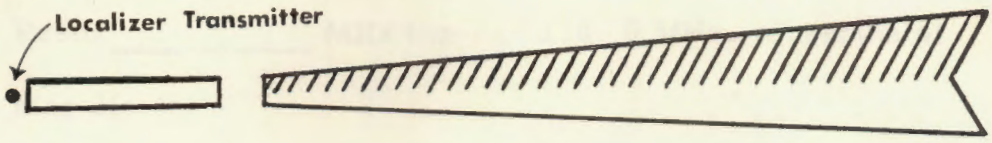
62a.

Answer: same

localizer

FRAME 4

The signal which tells the pilot where he is in relation to the runway centerline is transmitted by the _____.



FRAME 63

When the aircraft is equipped with the _____ receiver, tuning the odd tenths of megacycles between 108.1 and 111.9 mc automatically _____.

ARN-30E TUNING HEAD

4a.

Answer: localizer transmitter

63a.

Answer: ARN-30E

properly tunes the glide slope receiver

FRAME 5

You should remember that VOR stations broadcast on the following frequencies:

1. From _____ MHz through _____ MHz, only the _____ tenths of MegaHertz, and
2. From _____ MHz through 118, 0 MHz, all tenths of MegaHertz.

FRAME 64

You will never hear any glide slope signal; the information is available visually only. Unlike the localizer transmitter, the glide slope transmitter _____(can/cannot) be used for voice transmissions.

5a.

Answer: 1. 108.0

112.0

EVEN

2. 112.0

64a.

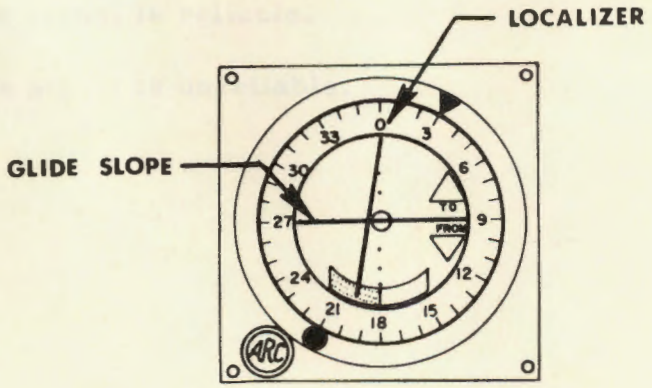
Answer: cannot

FRAME 6

In the lower part of this frequency range, ILS localizer transmitters use the frequencies not used by VOR stations or the _____ tenths of MegaHertz from _____ MHz to _____ MHz.

FRAME 65

The vertical needle of the course indicator shows deviations to the right or left of the localizer beam. The horizontal needle shows deviations _____ or _____ the _____.



6a.

Answer: ODD

108.0

112.0

65a.

Answer: above } either order
below }

glide slope

FRAME 7

Place a checkmark beside each frequency which is reserved for ILS localizer transmitters.

___ 108.0.
___ 108.1.
___ 109.0.
___ 109.7.
___ 110.5.
___ 111.1.
___ 111.8.
___ 112.3.

FRAME 66

You are already familiar with the "OFF" flag associated with the vertical needle. There is also an "OFF" flag associated with the _____, which disappears when the

___ glide slope signal is reliable.

___ glide slope signal is unreliable.

7a.

Answer: ✓ 108.1. ✓ 110.5.

✓ 109.7. ✓ 111.1.

66a.

Answer: horizontal needle

✓ glide slope signal is reliable.

FRAME 8

A localizer broadcasts its own code identification—the letter "I" followed by the identifier of the associated airport. The ILS localizer at Cairns AAF (OZR) broadcasts "_____."

FRAME 67

REVIEW

The glide slope receiver is tuned automatically when you tune the _____ receiver to the localizer frequency, but the other receivers have separate _____. The course indicator will show the glide slope signal is reliable by _____.

8a.

Answer: IOZR

67a.

Answer: ARN-30E

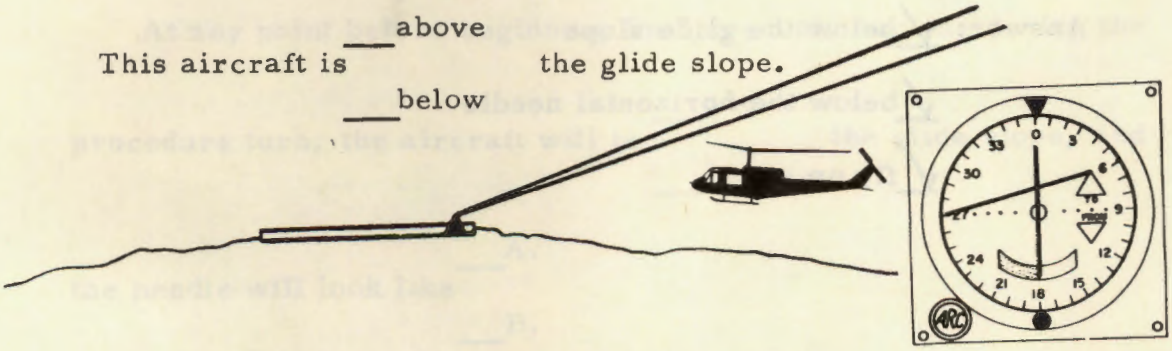
tuning heads

disappearance of the horizontal needle "OFF" flag

FRAME 9

You should remember that a VOR station can transmit voice messages. The ILS localizer transmitter can also _____ _____.

FRAME 68



This aircraft is ___above ___below the glide slope.

The dotted line in the center of the aircraft course indicator is ___above ___below the horizontal needle.

To get on the glide slope, the pilot would ___fly up. ___fly down.

9a.

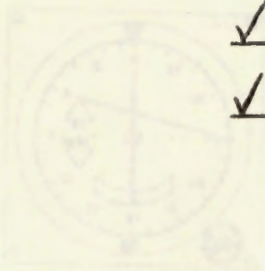
Answer: transmit voice messages

68a.

Answer: ✓ below the glide slope

✓ below the horizontal needle

✓ fly up.

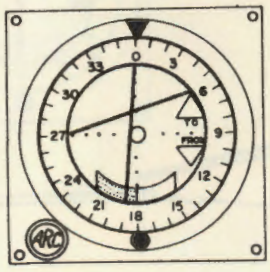


FRAME 10

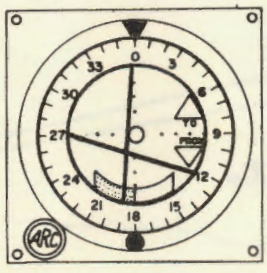
Since VOR stations and ILS localizer transmitters share the same range of frequencies, you would expect to be able to receive a signal from either station on the same _____.

FRAME 69

At any point before beginning final descent, such as during the procedure turn, the aircraft will be ___above ___below the glide slope, and the needle will look like ___A. ___B.



A



B

10a.

Answer: receiver

69a.

Answer: ✓ below

✓ A.

FRAME 11

An ILS localizer signal can be received by the _____

or the _____ receiver.

ARN-30A TUNING HEAD

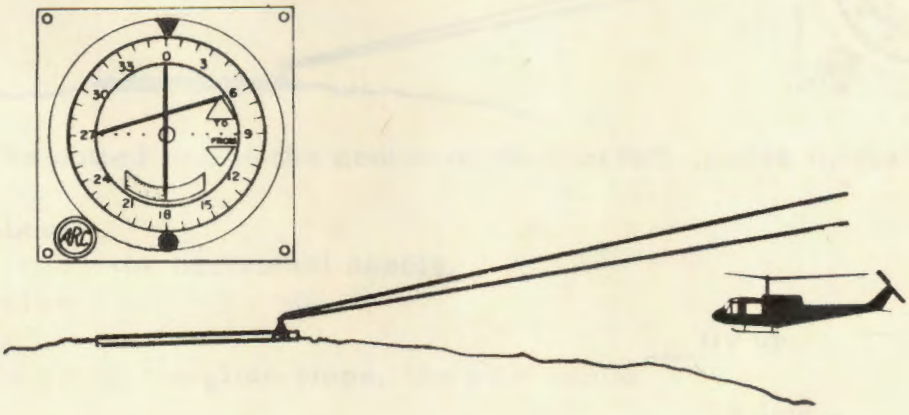
ARN-30 D OR E TUNING HEAD

FRAME 70

To intercept the glide slope, the pilot can either fly up from

his present position or hold his altitude and _____

_____.



11a.

Answer: AN/ARN-30A
AN/ARN-30 D or E
} either order

70a.

Answer: intercept the glide slope nearer the runway

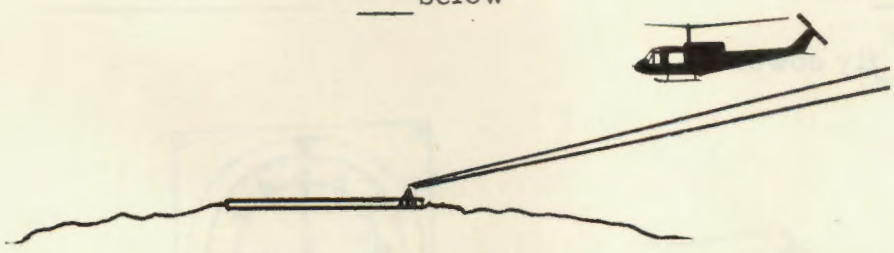
FRAME 12

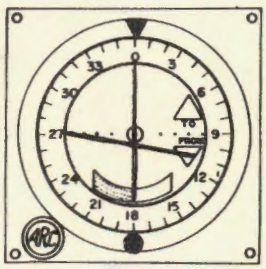
To receive VOR signals, you recall, the OMNI-VAR LOC switch on the ARN-30A is set to "_____." For ILS signals, however, the switch must be set to "_____."

ARN-30A TUNING HEAD

FRAME 71

This aircraft is ___above ___below the glide slope.





The dotted line in the center of the aircraft course indicator is ___above ___below the horizontal needle.

To get on the glide slope, the pilot would ___fly up. ___fly down.

12a.

Answer: OMNI

VAR LOC

---

7 1a.

Answer: ✓ above

✓ above

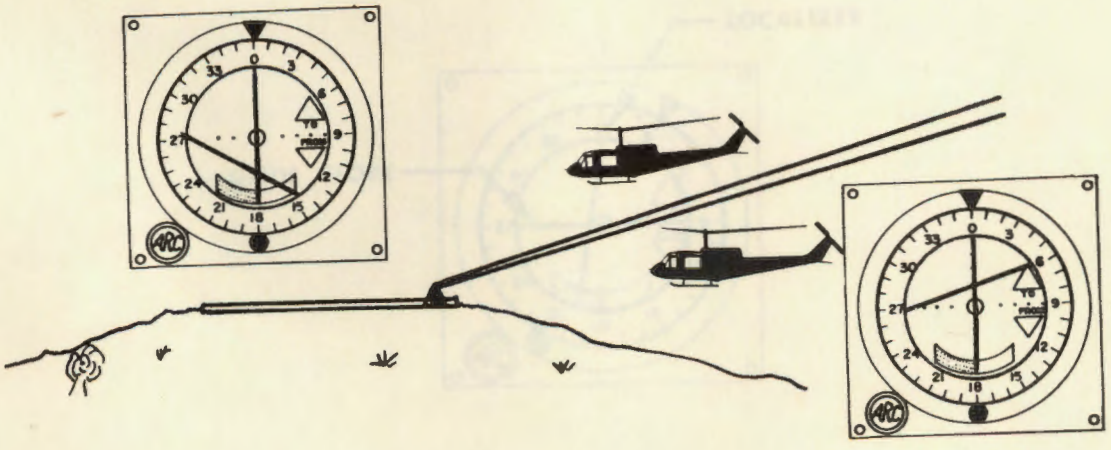
✓ fly down.

FRAME 13

Remember that when you are tuned to the localizer transmitter, the switch must be in the position marked "VAR _____."

FRAME 72

In each case, to intercept the glide slope, the pilot must fly _____ the needle.



13a.

Answer: LOC

72a.

Answer: toward

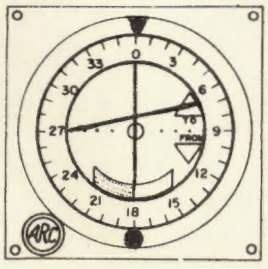
FRAME 14

In the ARN-30D or ARN-30E receiver, the change from VOR to localizer function is automatic as you _____ _____ appearing in the window marked " _____ ."

ARN-30D or E TUNING HEAD

FRAME 73

If you wanted to intercept the glide slope and you had this instrument indication, you could either _____ or _____.



14a.

Answer: tune the frequency (change the numbers)

MC

73a.

Answer: fly up or climb

hold altitude until you flew into the glide slope

FRAME 15

REVIEW

Briefly describe the radio frequencies reserved for ILS localizer transmitters. _____

_____

FRAME 74

On final approach, you will usually be tracking the localizer beam inbound at a constant altitude. In this case, glide slope interception would best be accomplished by _____

_____.

15a.

Answer: All odd tenths of MegaHertz from 108 to 112 MHz.

74a.

Answer: holding altitude until the horizontal needle centers and then descending to maintain centered needle

FRAME 16

REVIEW

You are making an ILS approach to an airfield whose identifier is ABC. What is the identifier of the localizer transmitter? _____.

FRAME 75

After glide slope interception, an aircraft with an airspeed of 70 knots will stay on the glide slope with a rate of descent of about _____.

16a.

Answer: ∠ABC

75a.

Answer: 300 feet per minute

FRAME 17

REVIEW

What is the difference between these two VHF NAV receivers with respect to tuning an ILS signal?

ARN-30A TUNING HEAD

_____.

_____.

ARN-30D OR E TUNING HEAD

_____.

_____.

FRAME 76

During a front course approach, an aviator might see any of the indications shown below.

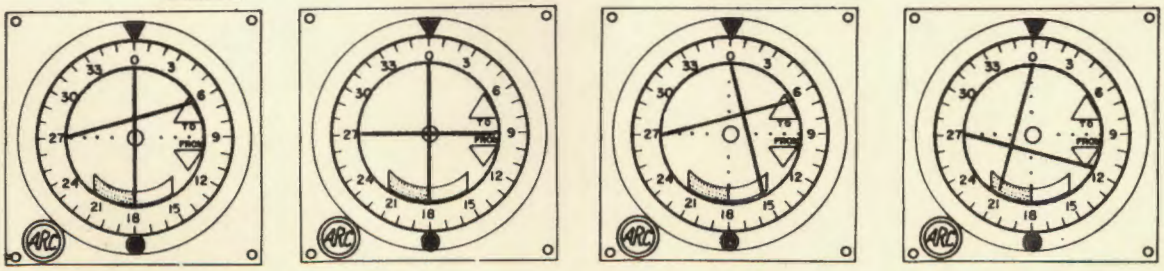
Match their letters with these descriptions.

____ Below glide slope, left of centerline.

____ Below glide slope, on centerline.

____ Above glide slope, right of centerline.

____ On glide slope, on centerline.



A B C D

17a.

Answer: AN/ARN-30 D or E, the change is automatic

AN/ARN-30A must have switch set to "VAR LOC."

76a.

Answer: C

A

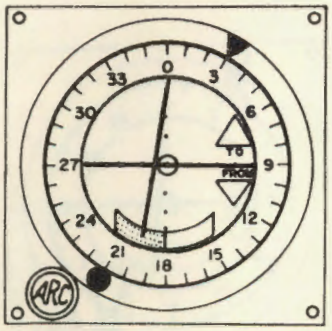
D

B

FRAME 18

Indications from either a VOR station or an ILS _____ transmitter are displayed on the ID-453 _____.

COURSE INDICATOR



FRAME 77

REVIEW

During an ILS front course approach, to get to the center of the localizer beam or the center of the glide slope, the aviator should fly _____ of the course indicator.

18a.

Answer: localizer

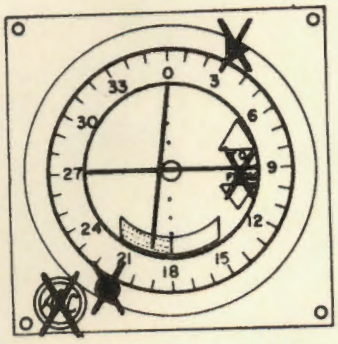
course indicator

77a.

Answer: toward the appropriate needle

FRAME 19

When the ID-453 is used to display information from an ILS localizer, two components do NOT operate. They are the _____ _____ and the _____.



FRAME 78

REVIEW

During an ILS back course approach, to get to the center of the localizer beam, the aviator should fly _____ _____ of the course indicator.

19a.

Answer: to-from indicator
course selector
} either order

78a.

Answer: away from the vertical needle

FRAME 20

We will return to the course indicator soon. First,we must examine the pattern of the signal broadcast by the _____ transmitter.

FRAME 79

REVIEW

During any type of ILS approach, the aviator should disregard needle indications when _____

_____.

20a.

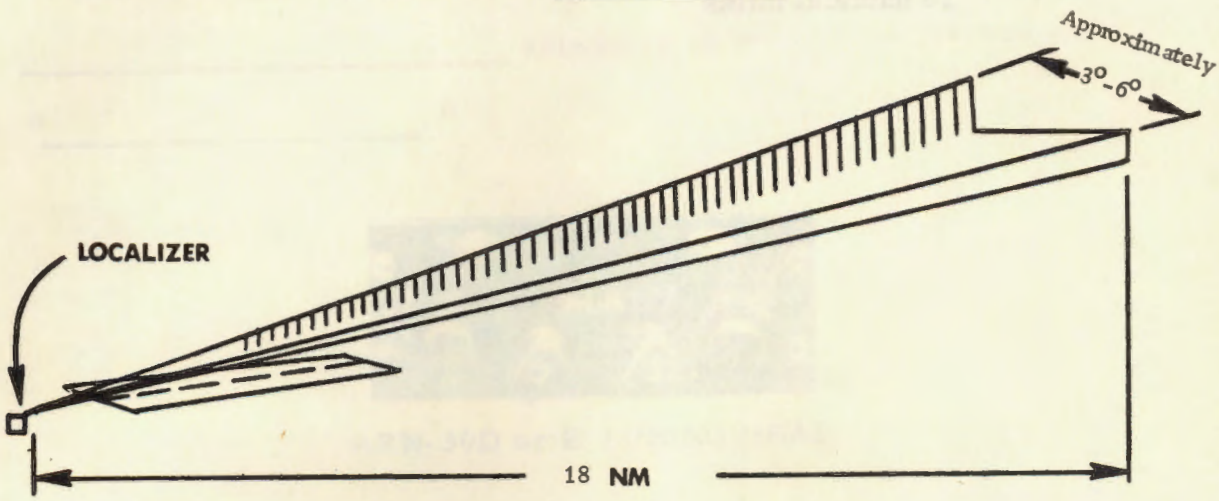
Answer: localizer

79a.

Answer: the corresponding "OFF" flag is visible

FRAME 21

The localizer transmitter is located at the opposite end of the runway from normal incoming traffic and transmits a beam _____ wide, out to a range of at least _____.



ILS MARKER BEACONS

OUTER MARKER

MIDDLE MARKER

COMPASS LOCATOR

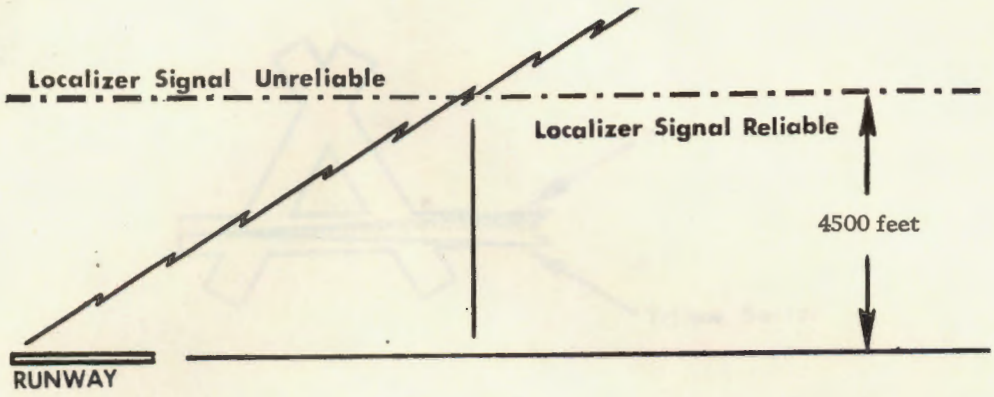
21a.

Answer: 3^{o} to 6^{o}

18 nautical miles

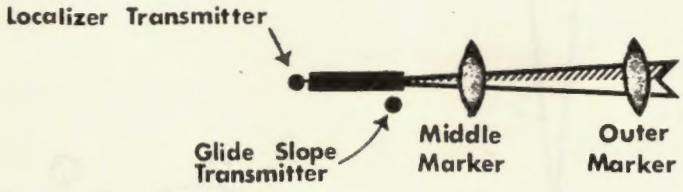
FRAME 22

The localizer beam is reliable up to an altitude of _____ above the _____, within a distance of at least _____ of the airport.



FRAME 80

Two components of the ILS which help to fix position on the localizer beam are the _____ and the _____.

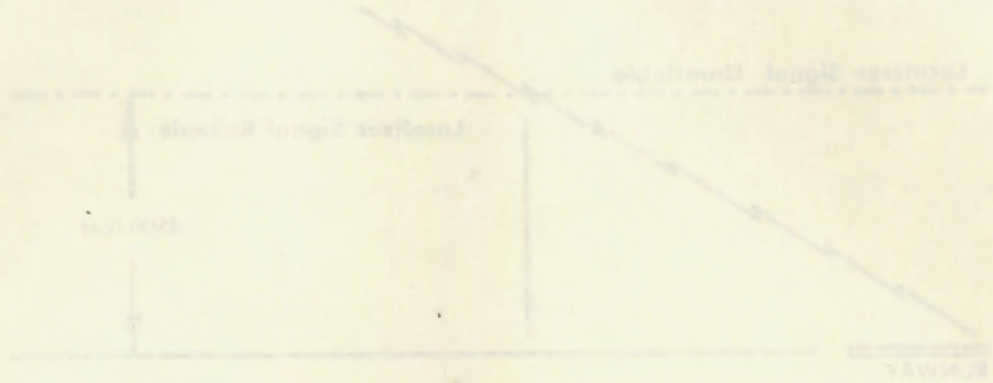


22a.

Answer: 4500 feet

airport, runway, ground

18 miles

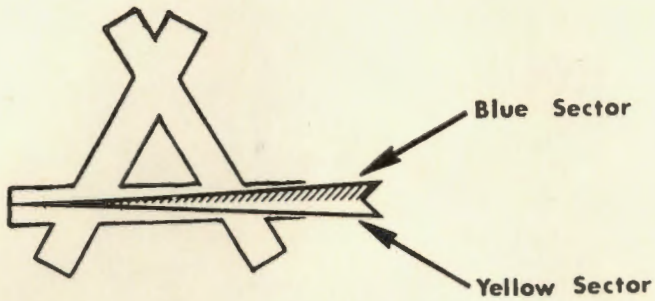


80a.

Answer: middle marker
outer marker
} either order

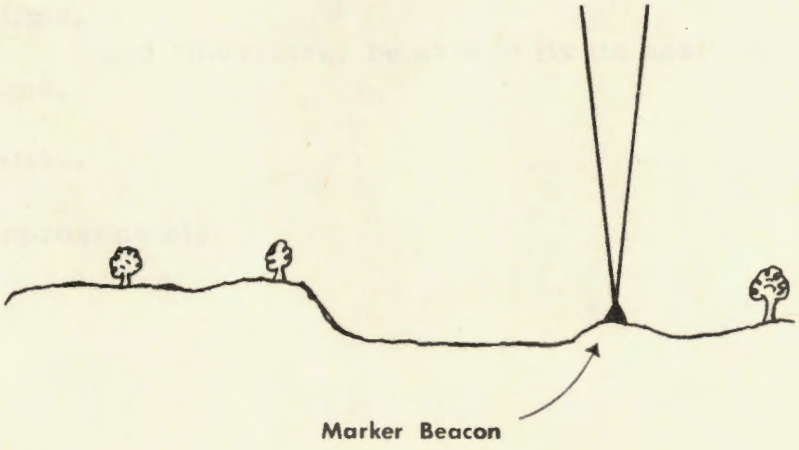
FRAME 23

The localizer beam is divided into two parts, called the _____ sector and the _____ sector. The dividing line between the two is lined up with the _____.



FRAME 81

The outer marker and the middle marker are sometimes called marker beacons. A radio beam directed straight up is characteristic of a _____.



23a.

Answer: blue
yellow } either order

runway centerline

81a.

Answer: marker beacon

FRAME 24

Because colors cannot be represented well on FLIP charts, the blue sector of the localizer beam is shaded so that it is _____ than the yellow sector.

FRAME 82

Because a marker beacon beam is relatively thin, an aircraft would pass through it fairly ____ slowly, ____ quickly, receive its signal for a ____ short time, ____ long time, and, therefore, be able to fix its position ____ accurately. ____ only approximately.

24a.

Answer: darker

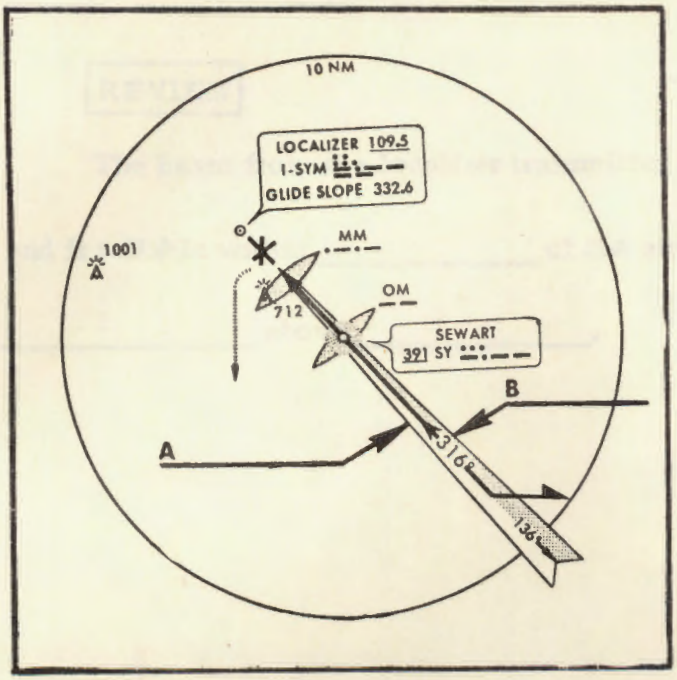
82a.

Answer: ✓ quickly

✓ short time

✓ accurately.

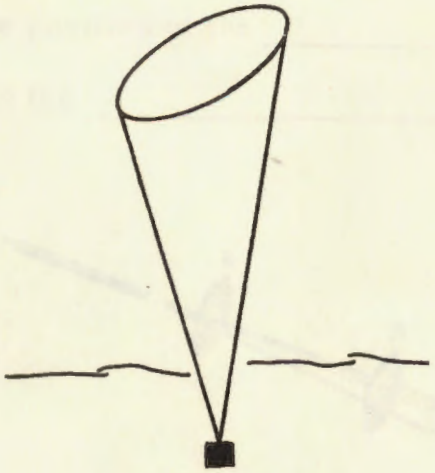
FRAME 25



Label the two sectors of the localizer beam on this FLIP chart.

FRAME 83

When seen from above, the marker beacons used with the ILS have an _____.



Elliptical Pattern

25a.

Answer: Yellow

Blue

83a.

Answer: elliptical pattern

FRAME 26

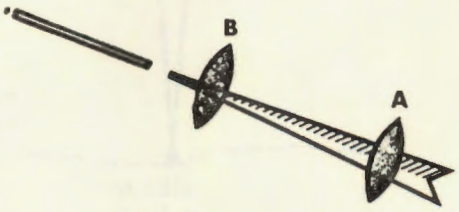
REVIEW

The beam from the localizer transmitter is _____° to _____° wide and is reliable within _____ of the airport up to an altitude of _____ above _____.

FRAME 84

REVIEW

Marker beacons are installed along the localizer beam shown below. A indicates the position of the _____; B shows the position of the _____.



26a.

Answer: 3° to 6°

18 nautical miles

4500 feet

the airport (runway, transmitter)

84a.

Answer: outer marker

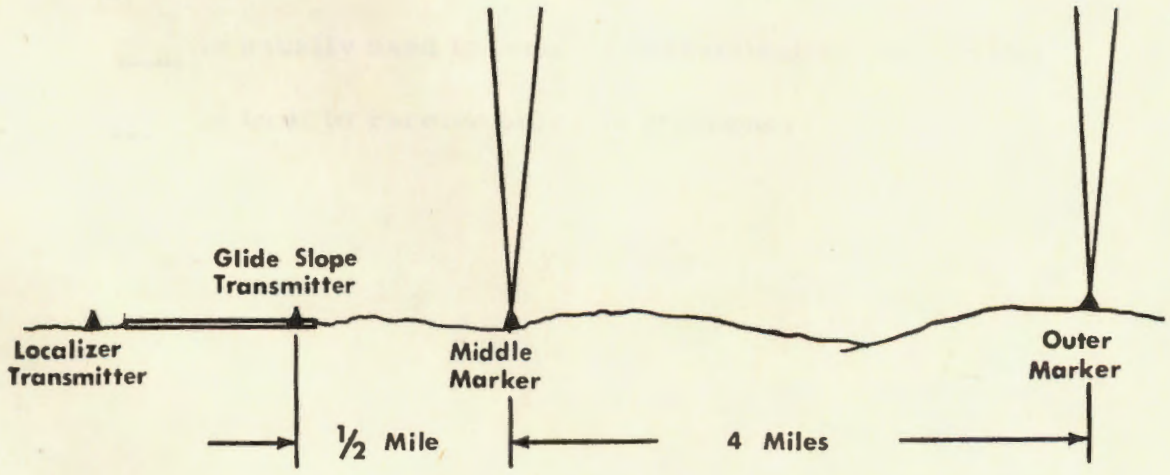
middle marker

FRAME 27

You are already familiar with the ID-453 course indicator as used in VOR tracking. An angular displacement from a specific course is indicated by _____.

FRAME 85

Although individual installations will vary, the ideal distance from the end of the runway to the middle marker is _____, and from the middle marker to the outer marker, _____.



27a.

Answer: deflection of the vertical needle (the vertical needle)

85a.

Answer: 1/2 mile

4 miles

FRAME 28

REVIEW

With the receiver properly tuned to an ILS localizer, the two components of the course indicator used in VOR tracking that do NOT operate are the _____ and the _____.

FRAME 86

Marker beacons always broadcast on one, and only one, frequency. Their signals are picked up by a separate _____, which ____ receives all localizer frequencies.

____ is usually used to monitor transmissions from ATC.

____ is built to receive only one frequency.

28a.

Answer: course selector
to-from indicator
} either order

86a.

Answer: receiver

✓ is built to receive only one frequency.

FRAME 29

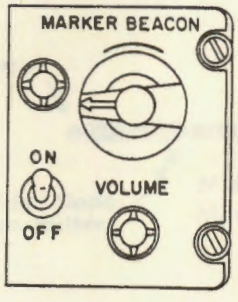
When the receiver is properly tuned to an ILS localizer, the course indicator sensitivity also changes. Because ILS is more exact than VOR, the needle sensitivity

____ decreases.

____ increases.

FRAME 87

One type of marker beacon receiver control panel has only two controls; they are _____ and _____.



29a.

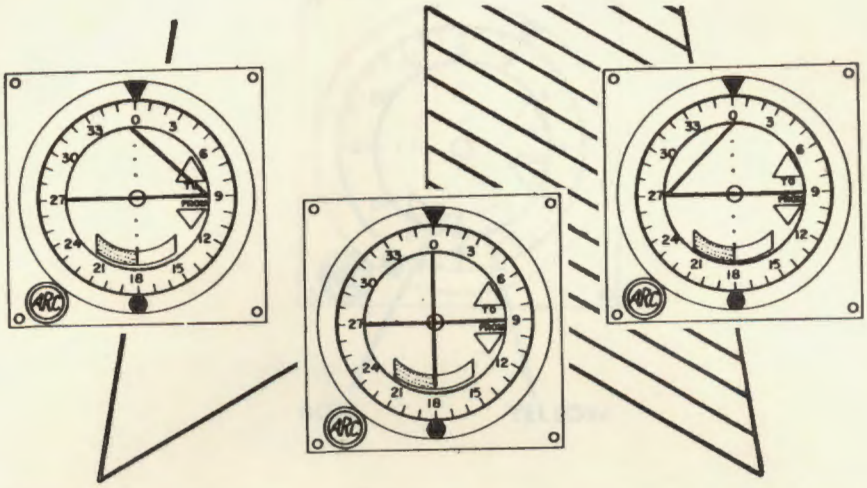
Answer: ✓ increases.

87a.

Answer: an off-on switch
a volume control
} either order

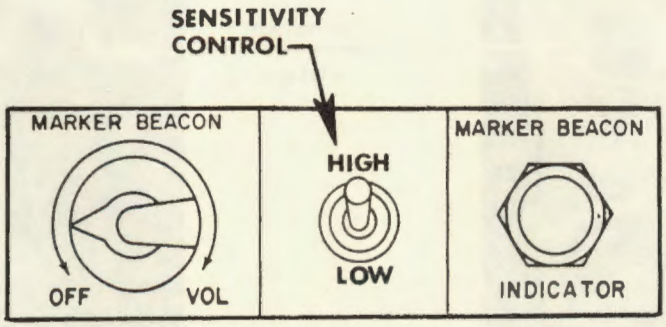
FRAME 30

The ILS localizer beam is _____° to _____° wide. Full-scale deflection of the course indicator needle in either direction is $2\frac{1}{2}$° from center; therefore, full-scale deflection indicates that the aircraft is at least _____ off course.



FRAME 88

Another type of marker beacon receiver has a switch to control sensitivity and a combined _____ control.



30a.

Answer: 3^{o} to 6^{o}

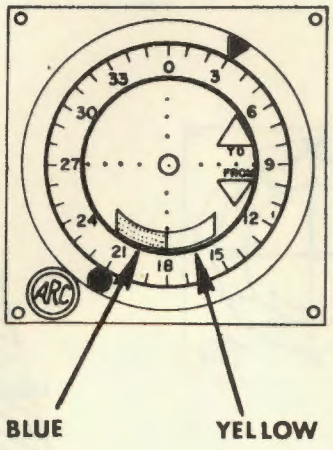
$2\frac{1}{2}^{o}$

88a.

Answer: off-on volume

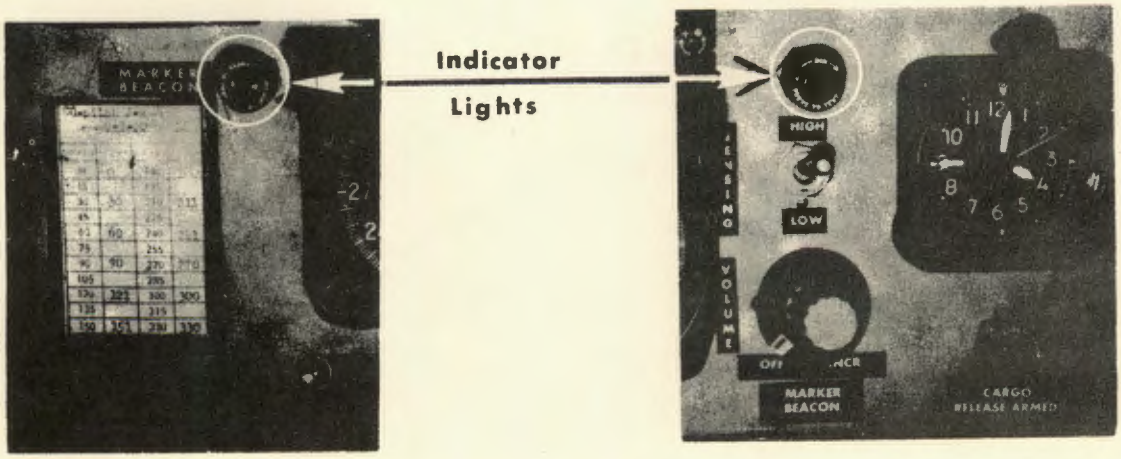
FRAME 31

As shown by the picture, the circular segment near the bottom of the instrument fact is colored _____ and _____.



FRAME 89

No matter what type of receiver is installed in the aircraft, there will always be an _____ located on the _____.



31a.

Answer: blue
yellow
} either order

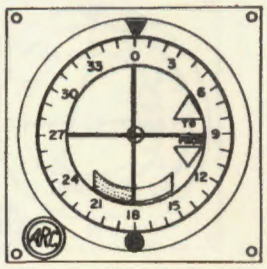
89a.

Answer: indicator light

instrument panel

FRAME 32

When the aircraft is flying straight down the center of the localizer beam, the vertical needle of the course indicator is _____ _____.



FRAME 90

Passage of a marker beacon is indicated by a signal you can _____ as well as a signal you can _____.

32a.

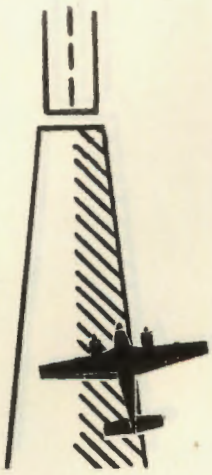
Answer: centered (straight up and down, on the dividing line between blue and yellow sectors)

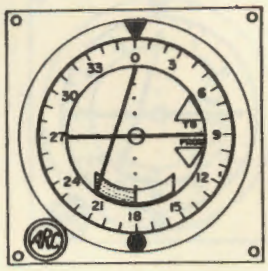
90a.

Answer: see } either order
hear }

FRAME 33

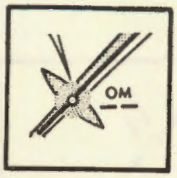
The drawing shows that the aircraft has drifted into the _____ (color) sector of the localizer beam. The vertical needle of the course indicator points to the _____ (color) segment.





FRAME 91

As indicated on the ILS approach chart, the code identifier of the outer marker consists of a continuous series of _____.



33a.

Answer: blue

blue

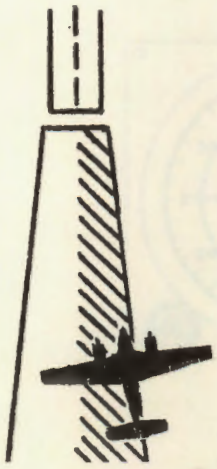
91a.

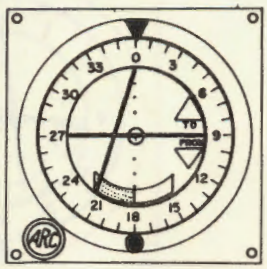
Answer: dashes

FRAME 34

The aircraft and the vertical needle are both in the _____ sectors. To return to the center of the localizer beam, the pilot must turn ____ toward the needle.
____ away from the needle.

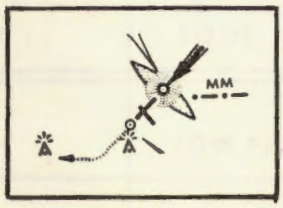
Front
Course





FRAME 92

The ILS approach chart also shows that the code identifier of the middle marker consists of a continuous series of alternating _____ and _____.



34a.

Answer: blue

✓ toward the needle.

92a.

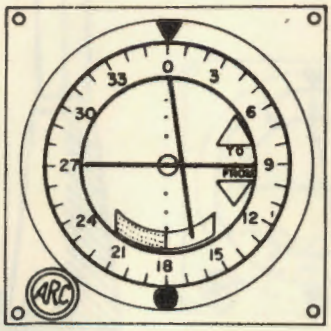
Answer: dots

dashes

FRAME 35

This instrument indication means that the aircraft has _____

_____.



FRAME 93

The code identifiers of the marker beacons sound different, too. The outer marker has a _____ tone, while the middle marker has a _____ tone.

MARKER	TONE
OUTER	LOW PITCHED
MIDDLE	MEDIUM PITCHED

35a.

Answer: drifted into the yellow sector of the localizer beam

93a.

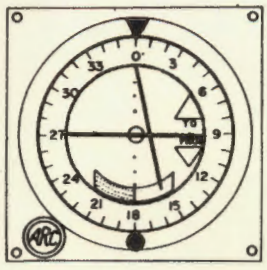
Answer: low-pitched

medium-pitched

FRAME 36

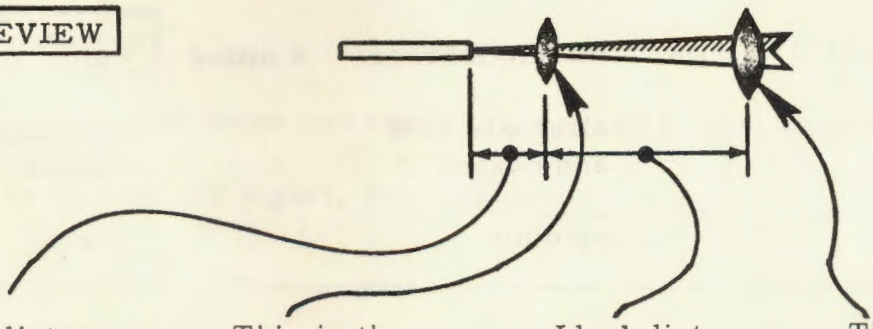
The aircraft and the vertical needle are both in the _____ sectors. To return to the center of the localizer beam, the pilot must turn ____ away from the needle.
____ toward the needle.

Front Course



FRAME 94

REVIEW



Ideal distance is _____.

This is the _____.

Its code identifier is _____

_____ broadcast in a _____-pitched tone.

Ideal distance is _____.

This is the _____.

Its code identifier is _____

_____ broadcast in a _____-pitched tone.

36a.

Answer: yellow

✓ toward the needle.

94a.

Answer:	1/2 mile	middle marker	4 miles	outer marker
		alternate dots and dashes		continuous dashes
		medium		low

FRAME 37

On a front course ILS approach, if the vertical needle of the course indicator drifts off to one side, to return the aircraft to the center of the beam, the pilot must _____

_____.

FRAME 95

REVIEW

You can tell when you cross the marker beacon because, in addition to hearing the signal, you can _____

_____.

37a.

Answer: turn toward the needle

95a.

Answer: see the flash of the indicator lights on the instrument panel

FRAME 38

The instrument indication below tells a pilot that he is about

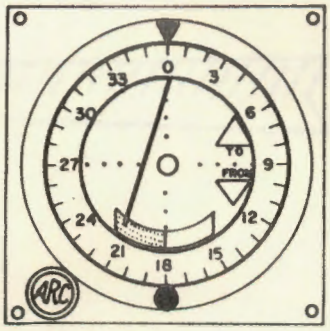
____1°

____2-1/2° off course; and to return to the center of the localizer beam

____5°

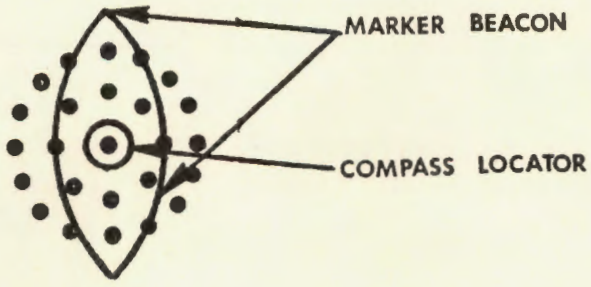
(front course), he should turn _____ right.

_____ left.



FRAME 96

Associated with almost every locator outer marker beacon is a nondirectional beacon called a _____.



38a.

Answer: ✓ 1°

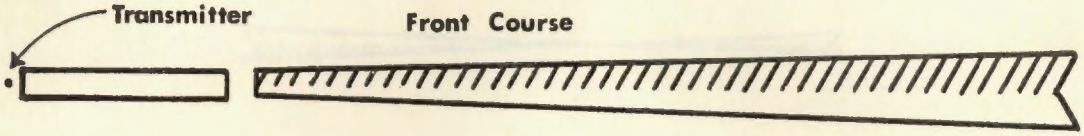
✓ left.

96a.

Answer: compass locator

FRAME 39

So far we have been considering a normal ILS approach, or the one most commonly used at a given airport. It uses the _____.



FRAME 97

You remember that a marker beacon transmits a narrow beam straight up and may be difficult to find. A compass locator helps you

_____

_____.

39a.

Answer: front course

97a.

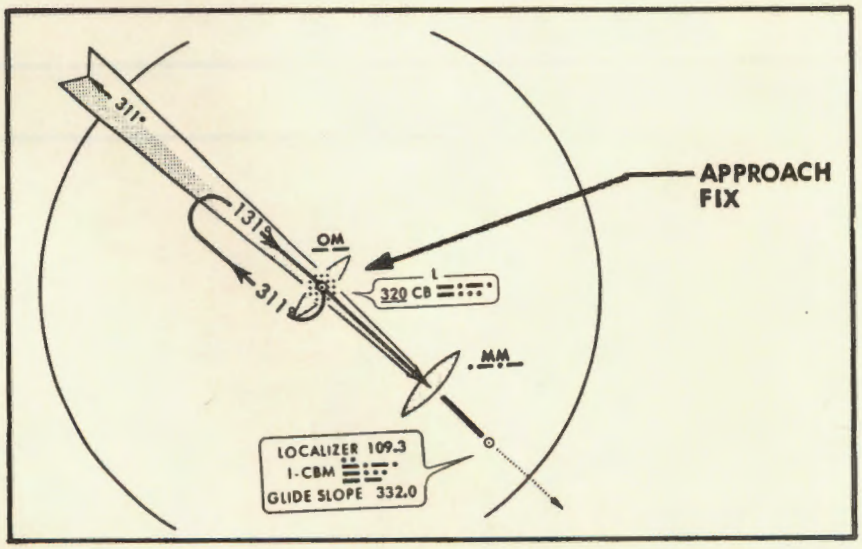
Answer: locate a marker beacon

FRAME 40

The localizer transmitter also transmits a beam in the opposite direction from the front course. This second beam is known as the _____ course.

FRAME 98

For most ILS approaches, the nondirectional beacon (called the _____) may also serve as an _____ _____.



40a.

Answer: back

98a.

Answer: compass locator

approach fix

FRAME 41

The transmitted patterns of the front course and the back course are very similar. Although the front course is normally used for an instrument approach, the _____ can also be used for an _____.

FRAME 99

Because both the compass locator and the marker beacon are located in the same place, if your marker beacon receiver went out, you could _____ _____.

41a.

Answer: back course

instrument approach

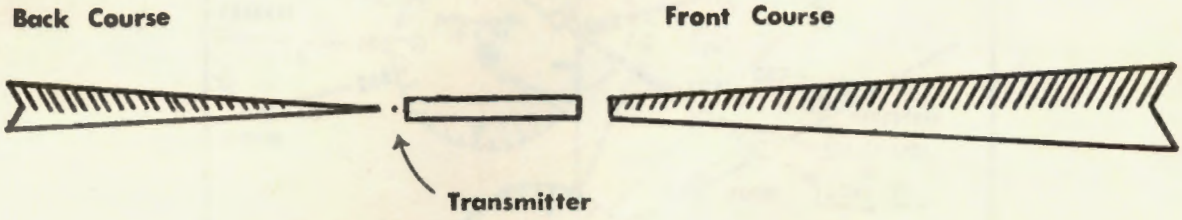
99a.

Answer: use the compass locator to show passage of the marker

beacon

FRAME 42

The drawing below shows the relationship between front course, back course, and runway. Both blue sectors are on the _____ side of the runway.



FRAME 100

If you were using the compass locator as a backup for the marker beacon, station passage would be indicated by _____ _____.

42a.

Answer: north (same)

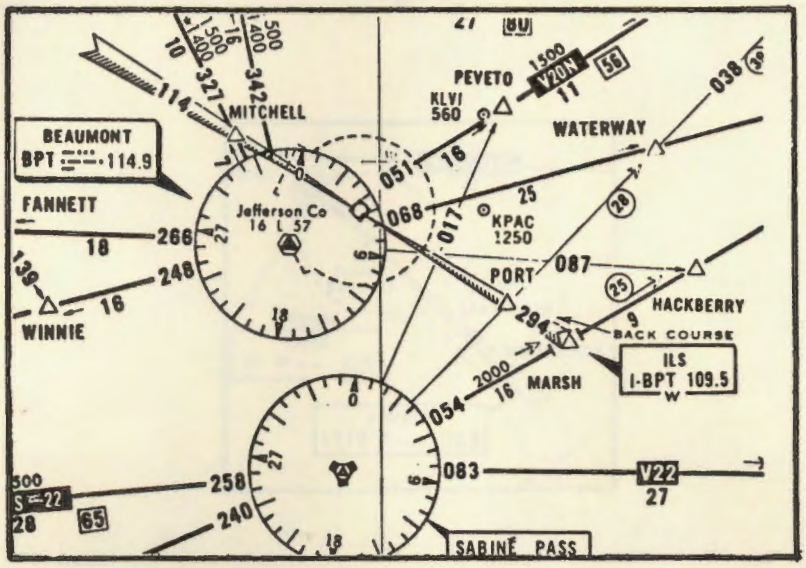
100a.

Answer: reversal of the No. 1 (ADF) needle of the RMI

FRAME 43

Wherever a back course appears on a chart, it will be labeled.

The ILS back course approach to the Jefferson County Airport is ____°.



FRAME 101

The combination of a compass locator and a marker beacon is usually called by its three initials.

A locator and an outer marker is an _____.

A locator and a middle marker is an _____.

43a.

Answer: 294

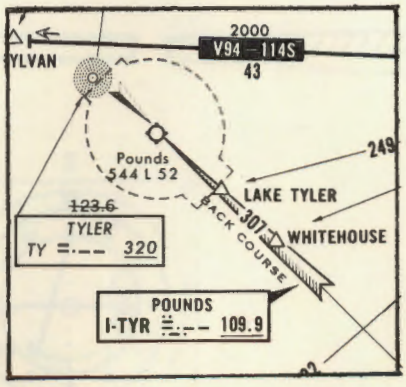
101a.

Answer: LOM

LMM

FRAME 44

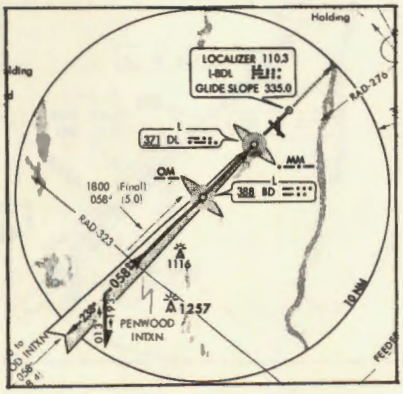
For landing at Pounds Airport, you could make an ILS approach on the _____ using an inbound course of _____.



FRAME 102

The code identifier broadcast by the Bradley International Airport is BDL.

The ILS localizer broadcasts _____.
The locator outer marker broadcasts _____.
The locator middle marker broadcasts _____.



44a.

Answer: back course

307

102a.

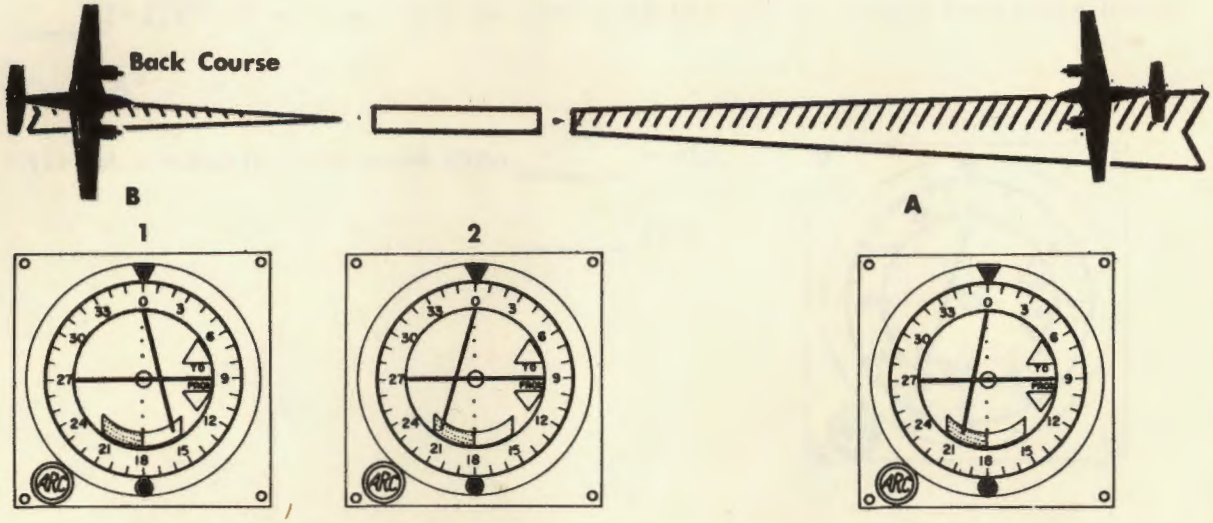
Answer: I-BDL

BD

DL

FRAME 45

Aircraft A is inbound on the front course with the instrument indication shown. Aircraft B is inbound on the back course. What is B's instrument indication? ____1 or ____2.



FRAME 103

You can write the general rule for compass locator identification.

The LOM broadcasts the _____ letters of the airport identifier; the LMM broadcasts the _____.

45a.

Answer: ✓ 2.

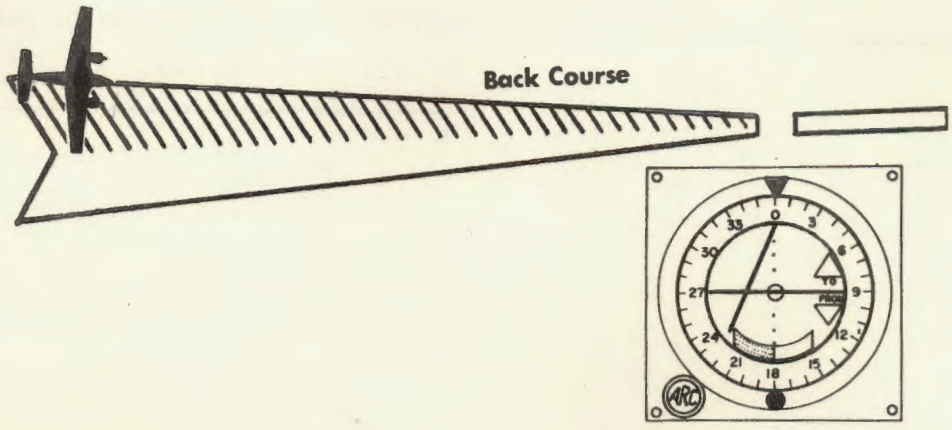
103a.

Answer: first two

last two letters

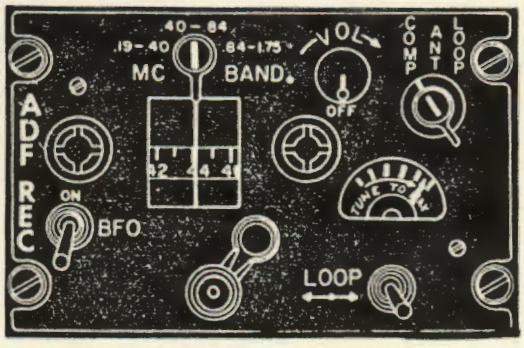
FRAME 46

This aircraft is inbound on the back course with the instrument indication shown. To get to the center of the localizer beam, the pilot must turn ____ right or ____ away from the needle.
____ left ____ toward the needle.



FRAME 104

Since compass locators broadcast in the low frequency band, you would expect to receive a compass locator signal on the _____ receiver.



ARN-59

46a.

Answer: ✓ right

✓ away from the needle.

104a.

Answer: ARN-59 (ADF)

FRAME 47

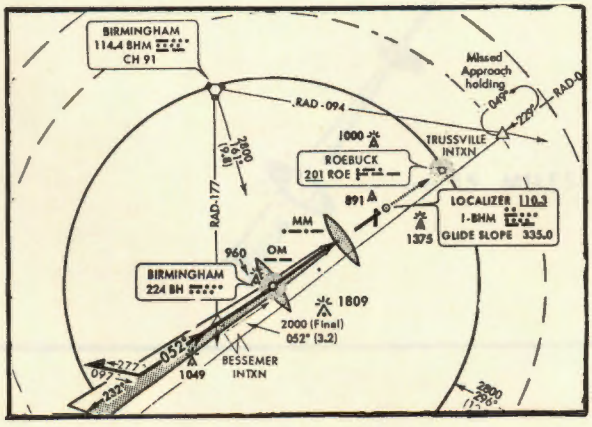
REVIEW

During a normal approach on the front course, if the vertical needle of the course indicator drifts off to one side, to return the aircraft to the center of the beam, the pilot must _____ _____.

FRAME 105

REVIEW

Sometimes a compass locator may be capable of voice transmissions. Which compass locator has a frequency that is not underlined _____ (BH) or _____ (ROE)? Therefore, that locator is capable of _____.



47a.

Answer: turn toward the needle

105a.

Answer: ✓ (BH)

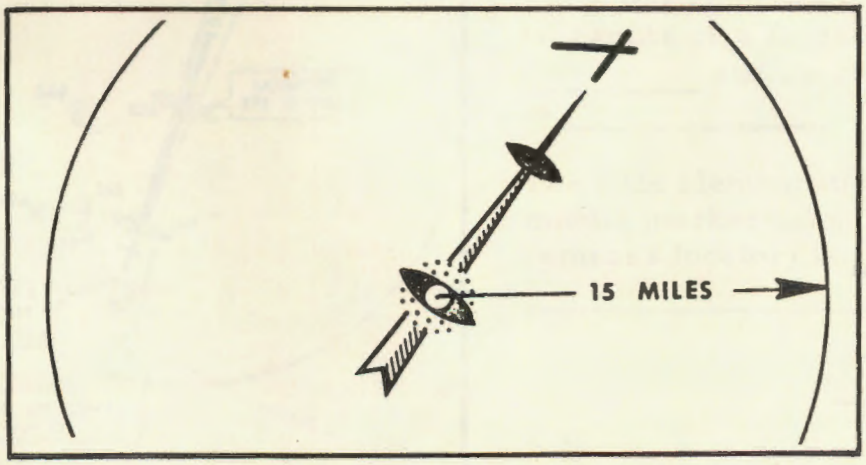
voice transmissions

FRAME 48

The pilot must turn away from the needle to return to the center of the localizer beam if he is making an approach on the _____ _____.

FRAME 106

The compass locator can be received within a distance of about _____.



48a.

Answer: back course

106a.

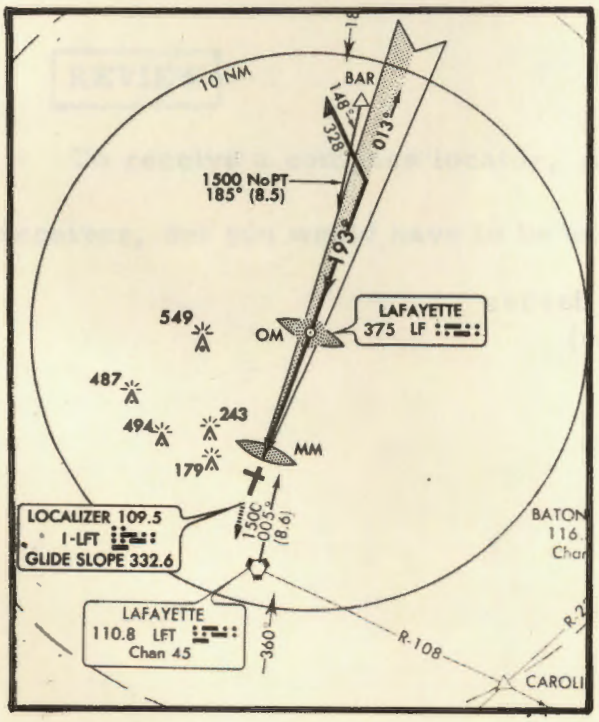
Answer: 15 miles

FRAME 49

Use of the ILS localizer beam is not limited to approaches. Instead of tracking a VOR radial outbound, you may sometimes find it necessary to _____

_____.

FRAME 107



This localizer transmits on a frequency of _____, and its code identifier is _____.

The outer compass locator transmits on a frequency of _____ and its code identifier is _____.

The code identification of the middle marker beacon (not the compass locator) is _____

_____.

49a.

Answer: track outbound on an ILS localizer beam

107a.

Answer: 109.5 MHz
ILFT

375 kHz
LF

Alternating dots and dashes
(medium-pitched tone)

FRAME 50

When utilizing ILS for an instrument departure, you could track _____ on either the _____ or the _____.

FRAME 108

REVIEW

To receive a compass locator, you would use your _____ receiver, but you would have to be within _____ miles of the station.

50a.

Answer: outbound
front course } either order
back course

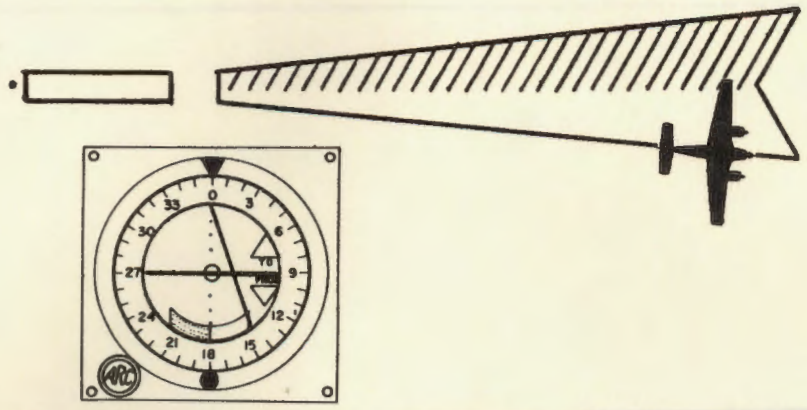
108a.

Answer: ARN-59 (LF/MF) (ADF)

15

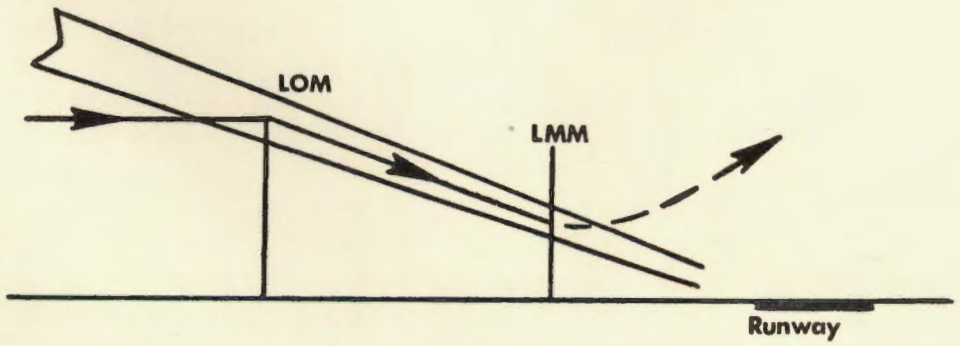
FRAME 51

This aviator is tracking outbound on the front course. He has drifted into the _____ sector. To return to the center of the localizer beam, he must turn _____ or _____ the needle.



FRAME 109

As a general rule, the pilot will cross the outer marker inbound at the same time that he should _____ _____, and he will cross the middle marker at the same time at which he should _____.



51a.

Answer: yellow

left

away from

109a.

Answer: begin final descent (intercept the glide slope)

execute missed approach if he doesn't have the runway in sight

FRAME 52

REVIEW

During a normal ILS approach (inbound on the front course) to return to the center of the localizer beam, you must turn _____ _____.

FRAME 110

Always consult the published chart for any approach. Usually, you can count on starting your final descent near the _____ and execute a missed approach near the _____.

52a.

Answer: toward the needle

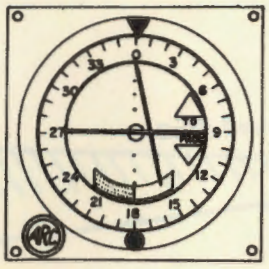
110a.

Answer: LOM

LMM

FRAME 53

You are inbound on an ILS front course and your ID-453 looks like this.



To return to the center of the beam, turn ____ right.
____ left.

APPROACH LIGHTS

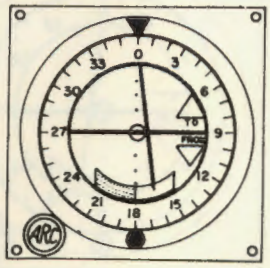
NOTE: Approach lights are not one of the components of the ILS system but an aid.

53a.

Answer: ✓ right.

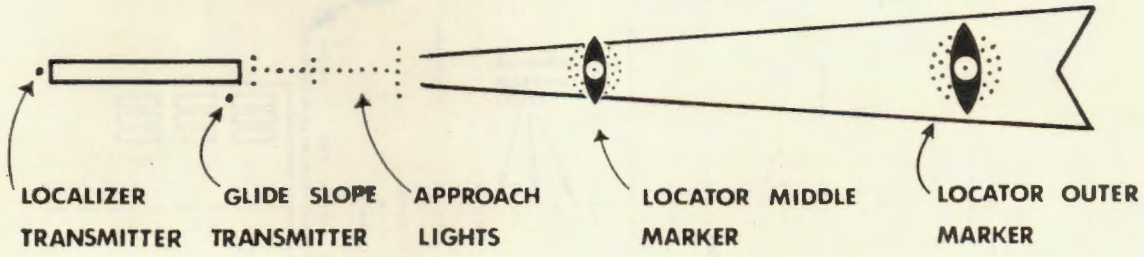
FRAME 54

You are outbound on an ILS front course, and your ID-453 looks like this.



To return to the center of the beam, turn ____ right.
____ left.

FRAME 111



A visual aid normally associated with the ILS system is the

_____.

54a.

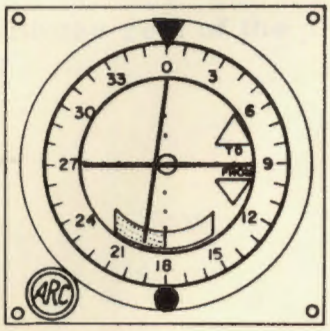
Answer: ✓ left.

111a.

Answer: approach lights

FRAME 55

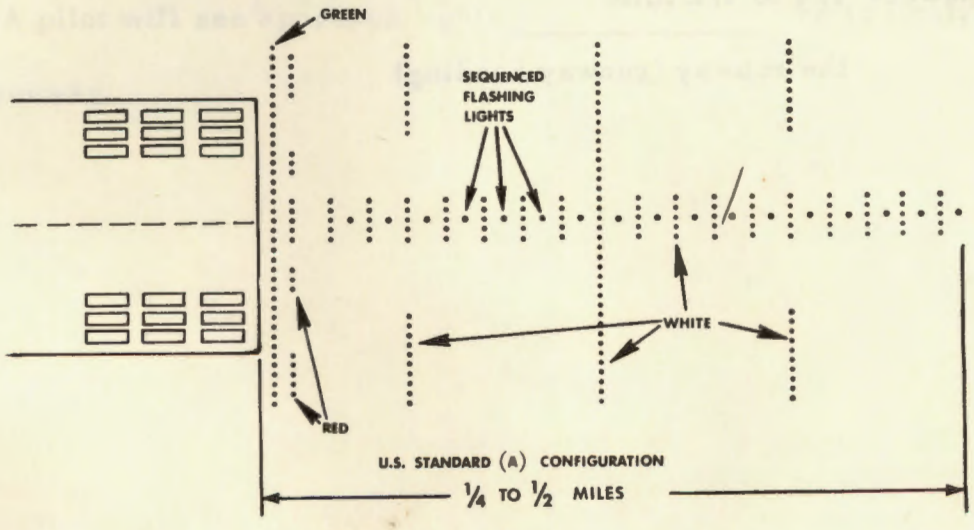
You are inbound on an ILS back course, and your ID-453 looks like this.



To return to the center of the beam, turn ____ right.

____ left.

FRAME 112



Approach lights are placed in the final approach path, extend _____ back along the approach path, and are lined up with _____.

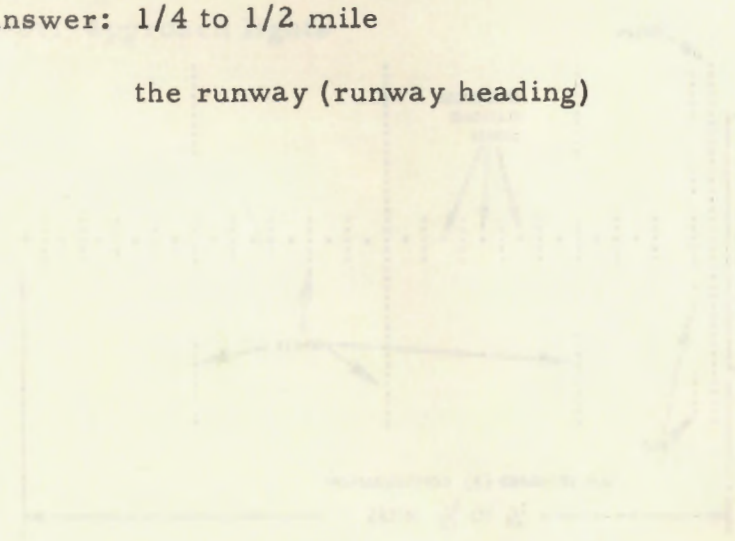
55a.

Answer: ✓ right.

112a.

Answer: 1/4 to 1/2 mile

the runway (runway heading)



FRAME 56

The instrument landing system should be covered in one session. However, we suggest you take a break of about 10 minutes at this point before continuing with the rest of the program.

FRAME 113

A pilot will see approach lights _____ he is likely to see the runway.

56a.

Answer: No written response required.

113a.

Answer: before

FRAME 114

A pilot must establish visual contact with the ground before landing.

The sole purpose of approach lights is to help him _____

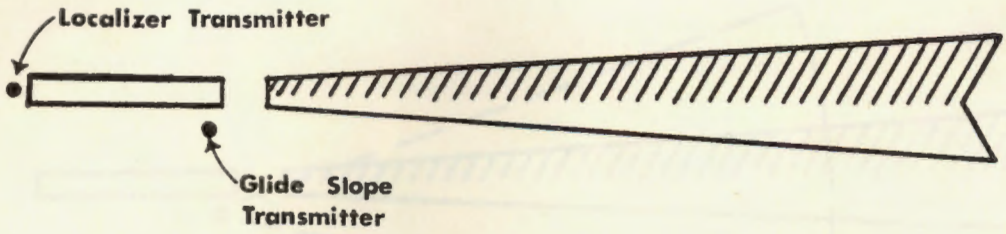
_____.

114a.

Answer: establish visual contact with the ground

FRAME 57

Another component of the ILS which transmits a signal to incoming aircraft is the _____.



FRAME 115

There are many different types of approach lighting systems. For specific information about lights, you should refer to the _____ _____ for the approach you are making.

57a.

Answer: glide slope transmitter

115a.

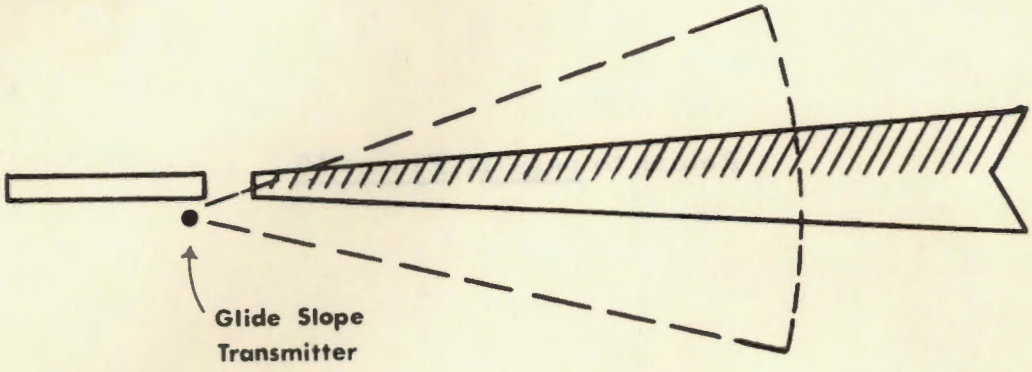
Answer: approach charts (instrument approach procedures)

FRAME 58

The glide slope transmitter signal is shaped like a _____ _____ and extends on the same end of the runway as the localizer

____ front course.

____ back course.



FRAME 116

The final objective of any instrument approach procedure is to get you to the point where you can establish _____ _____.

58a.

Answer: fan, piece of pie (sector of a circle)

✓ front course.

Return to page 1, Frame 59.

116a.

Answer: visual contact with the ground or approach lights