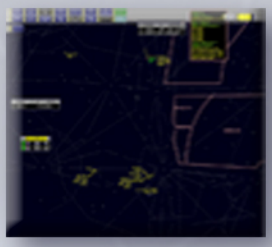
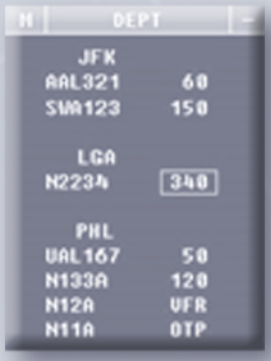
FAA Lesson Plan



En Route Stage 4
Radar Controller Training



Student

Radar Identification
Lesson 6

55055
V.1.06

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LESSON PLAN DATA SHEET

COURSE NAME:	RADAR CONTROLLER TRAINING
COURSE NUMBER:	55055
LESSON TITLE:	RADAR IDENTIFICATION
DATE REVISED:	2014-04
VERSION:	V.1.06
REFERENCES:	JO 7110.65V, Air Traffic Control; JO 7110.311B, Procedural Guidance for FAA Order JO 7110.65 following En Route Automation Modernization (ERAM) Implementation; TI 6110.100, En Route Automation Modernization (ERAM) Air Traffic Manual (ATM): R-Position User Manual; TI 6110.141, En Route Automation Modernization (ERAM) System Adaptation Manual (SAM): Local Data Panels; ERAM EDSM SRS 210.01 V1B1, En Route Automation Modernization (ERAM) En Route Display Management (EDSM) R-Position and General EDSM Requirements, Volume 1, Book 1; ERAM EDSM SRS 210.01 V1B1, En Route Automation Modernization (ERAM) En Route Display Management (EDSM) R-Position and General EDSM Requirements, Volume 1, Book 2; ERAM SIG 1063, Force Pairing On Other Beacon Code
HANDOUTS:	NONE
EXERCISES:	YES, SCENARIO-BASED EXERCISE TO BE COMPLETED AFTER LESSON 8
END-OF-LESSON TEST:	YES
PERFORMANCE TEST:	NONE
MATERIALS:	NONE
OTHER PERTINENT INFORMATION:	THIS LESSON IS BASED ON ERAM BUILD EAC1500. THE LESSON HAS BEEN REVIEWED AND REFLECTS CURRENT ORDERS AND MANUALS AS OF APRIL 2014.

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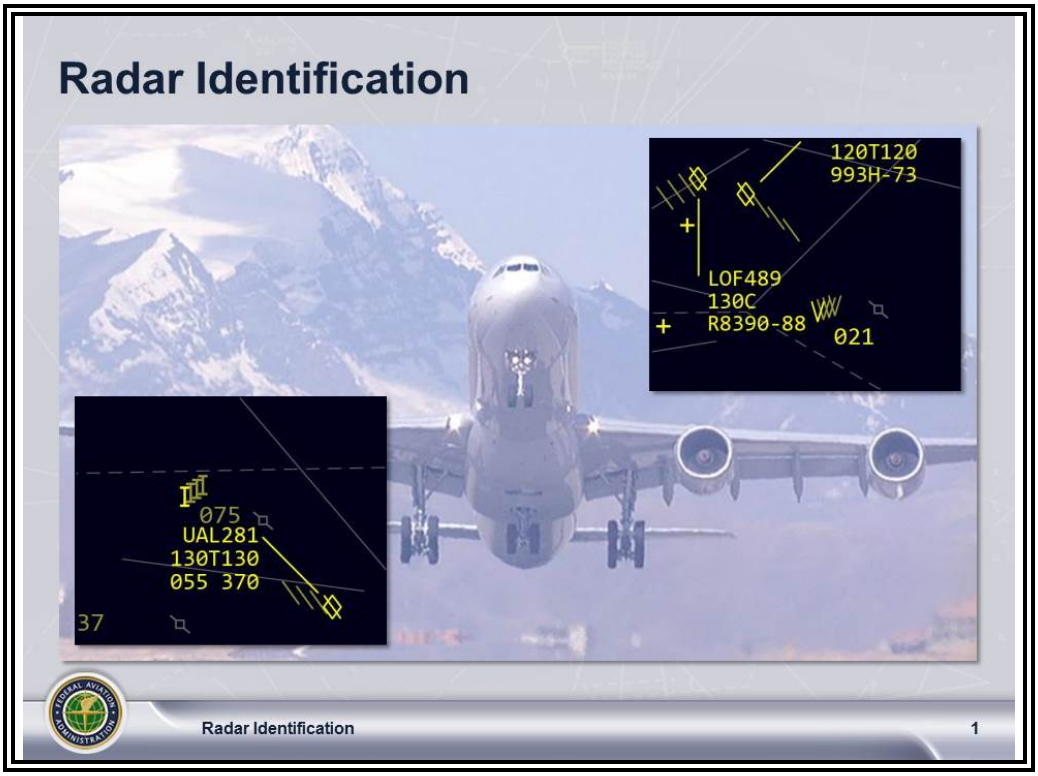
INTRODUCTION



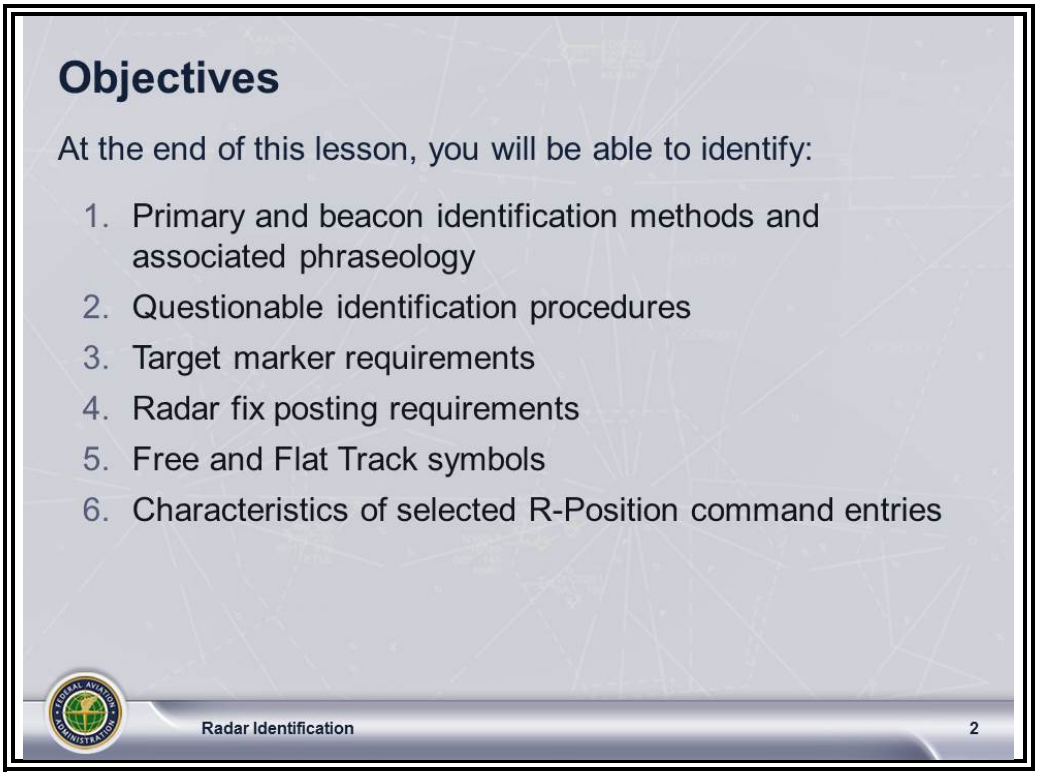
The Air Traffic Control System depends on radar identification and cooperation between controllers and pilots. Each must understand what the other is attempting to do. Learning the procedures and phraseology presented in this lesson will help you understand how the system works. Your knowledge of this material will be essential when you enter radar On-the-Job Training (OJT).

Purpose

This lesson covers the criteria for establishing and maintaining radar identification of an aircraft, along with the appropriate command entries.

INTRODUCTION *(Continued)*

Objectives

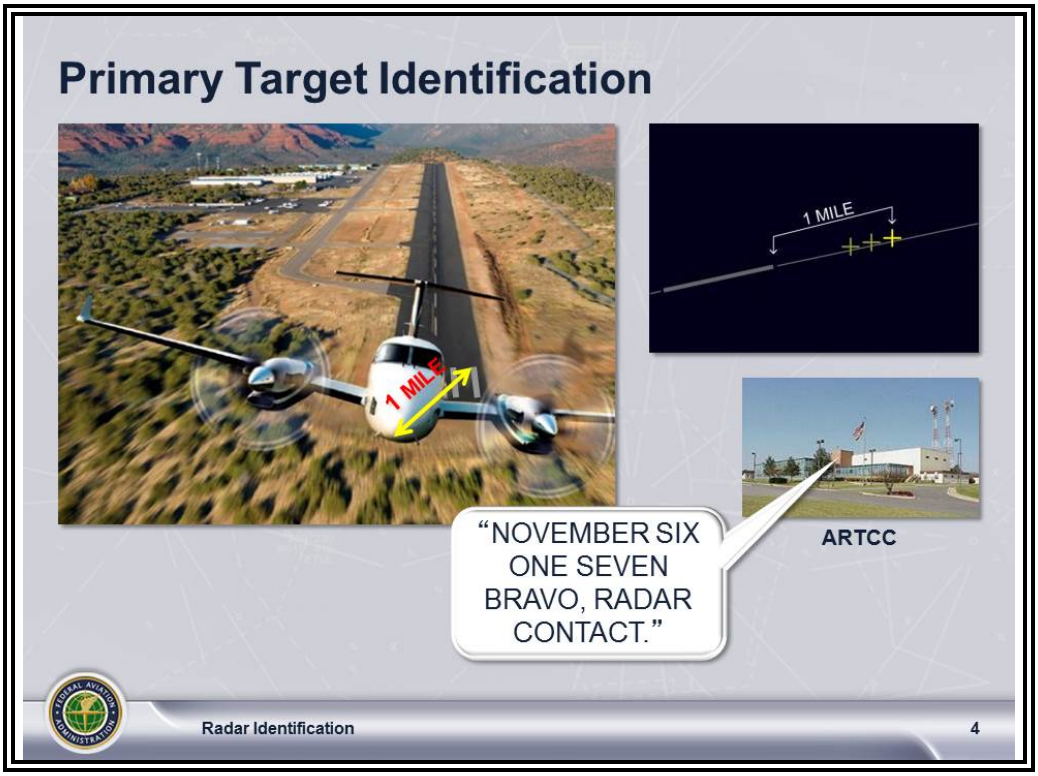


OVERVIEW

Providing Radar Service
JO 7110.65, pars. 5-3-1, 5-3-5, 5-3-7

PRIMARY RADAR IDENTIFICATION

Primary Target Identification
JO 7110.65,
pars. 5-3-2, 5-3-7



- Primary radar identification methods are not limited to primary targets, but can also be applied to beacon targets.
- Identify a primary or radar beacon target using one of three methods, as follows:
  - **Method One:** Observe departing aircraft within 1 mile of takeoff runway end, provided:
    - The airport has an operating control tower.
    - Proper coordination is accomplished by either a verbal or nonverbal rolling or boundary notification for each departure.
    - The runway is depicted on the Situation Display.

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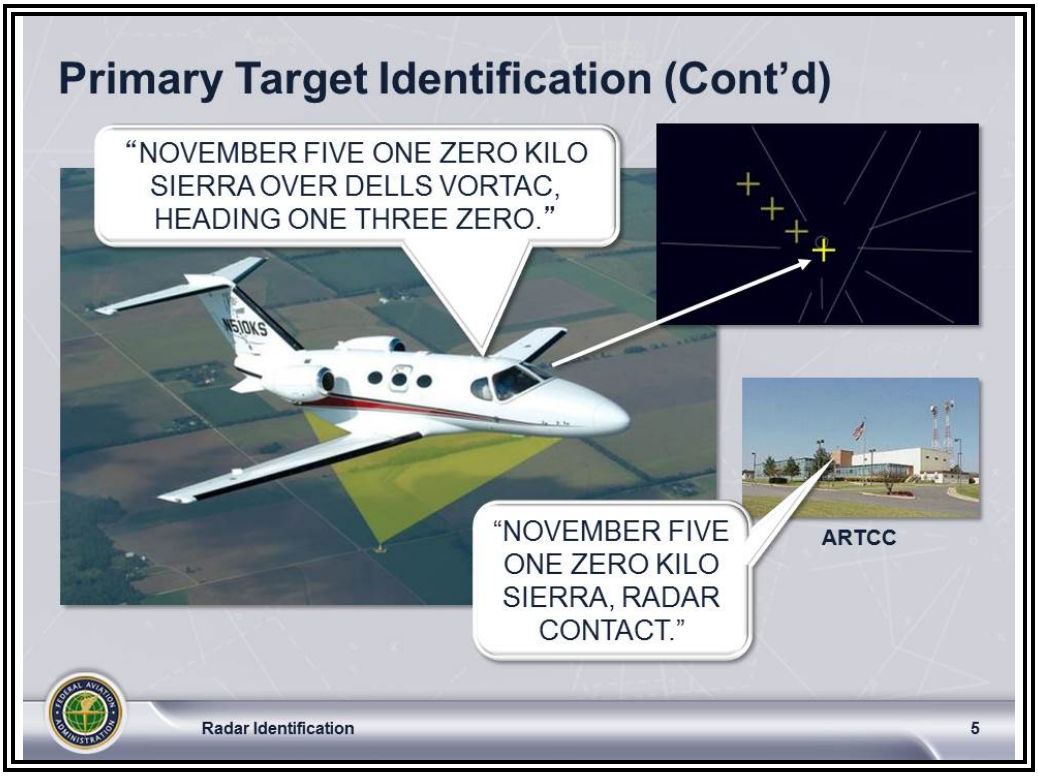
PRIMARY RADAR IDENTIFICATION *(Continued)*

Primary Target Identification (Cont'd)
JO 7110.65,
pars. 5-3-2, 5-3-7



- **Method Two:** Observe a target that meets the following criteria:
  - Position with respect to a fix or visual reporting point corresponds with a direct position report received from the aircraft.
  - Fix must be displayed on the Situation Display, scribed on the map overlay, or displayed as a permanent echo.
  - Visual reporting point must have a fix range and azimuth that is determined by supervisory personnel, and its position information made available to you, as the controller.
  - Track is consistent with the reported heading or route of flight.

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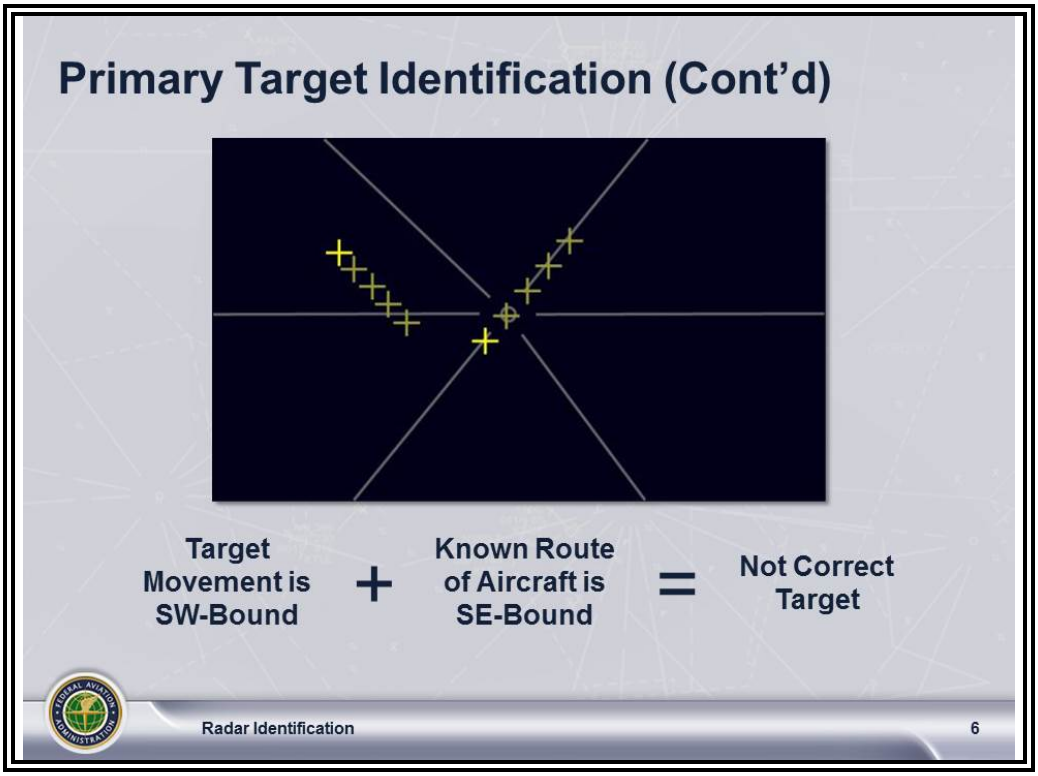
PRIMARY RADAR IDENTIFICATION *(Continued)*

Primary Target Identification (Cont'd)
JO 7110.65, par. 5-3-2



Example: In the illustration above, the aircraft reports over the VOR, but the only observed target is tracking a direction **not** consistent with known route. Observed target is **not** correct target.

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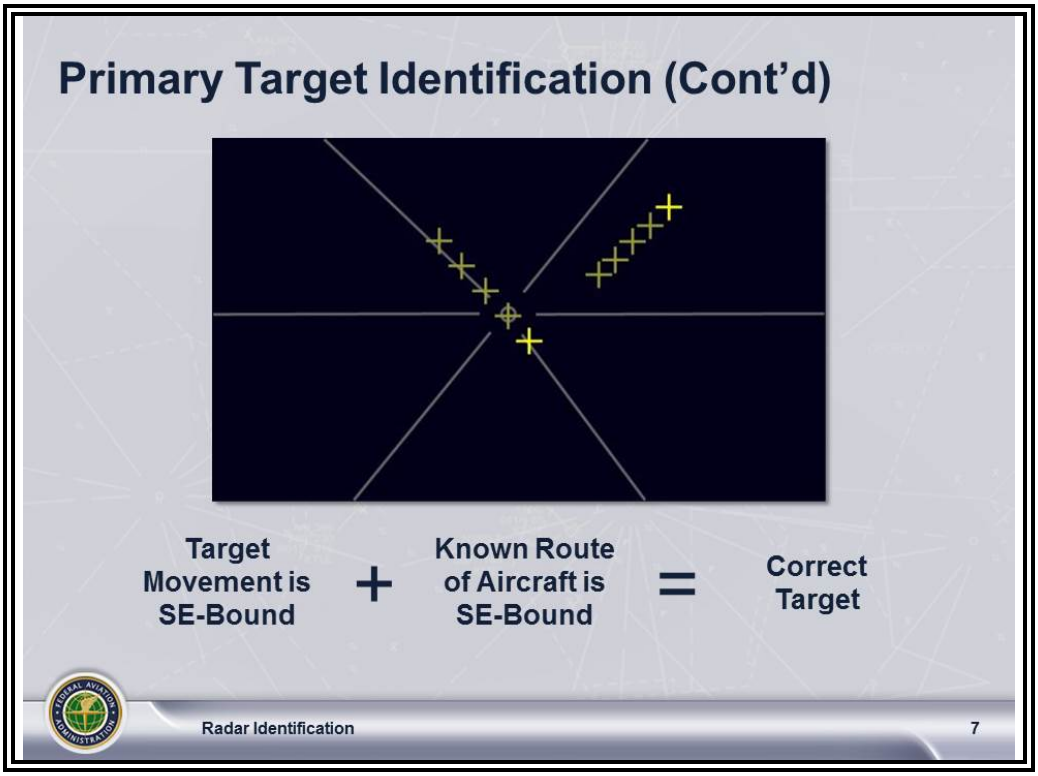
PRIMARY RADAR IDENTIFICATION *(Continued)*

Primary Target Identification (Cont'd)
JO 7110.65, par. 5-3-2



Example: In the illustration above, the aircraft reports over the VOR and is tracking in the correct direction; you have the correct target.

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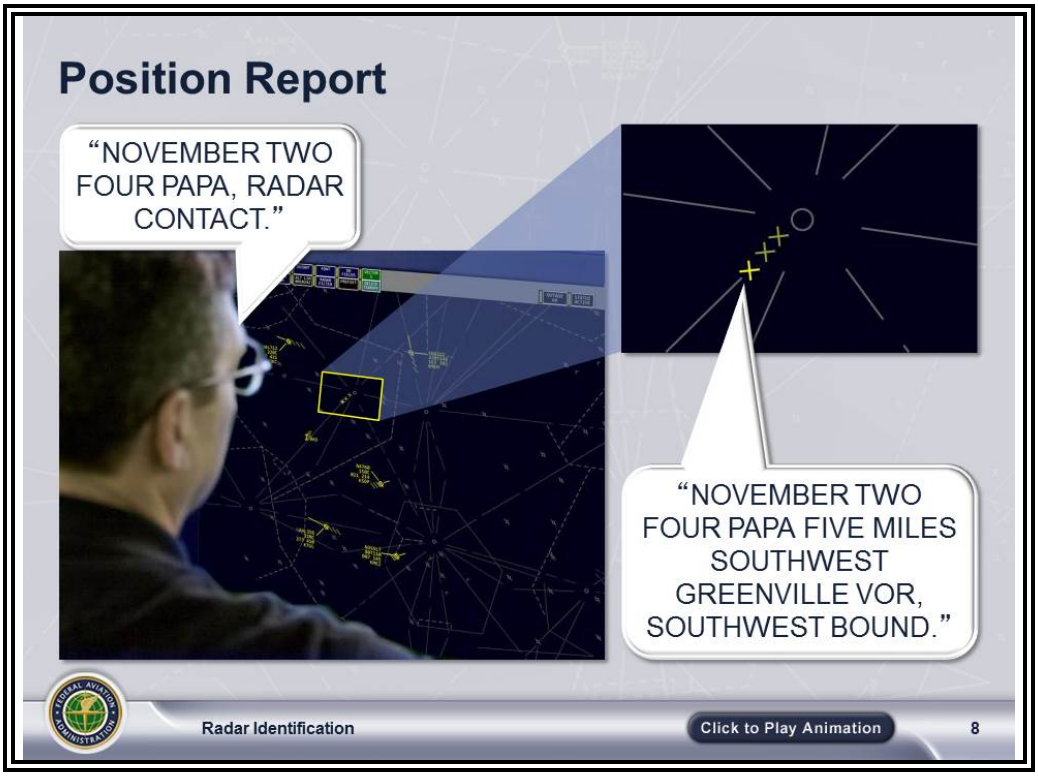
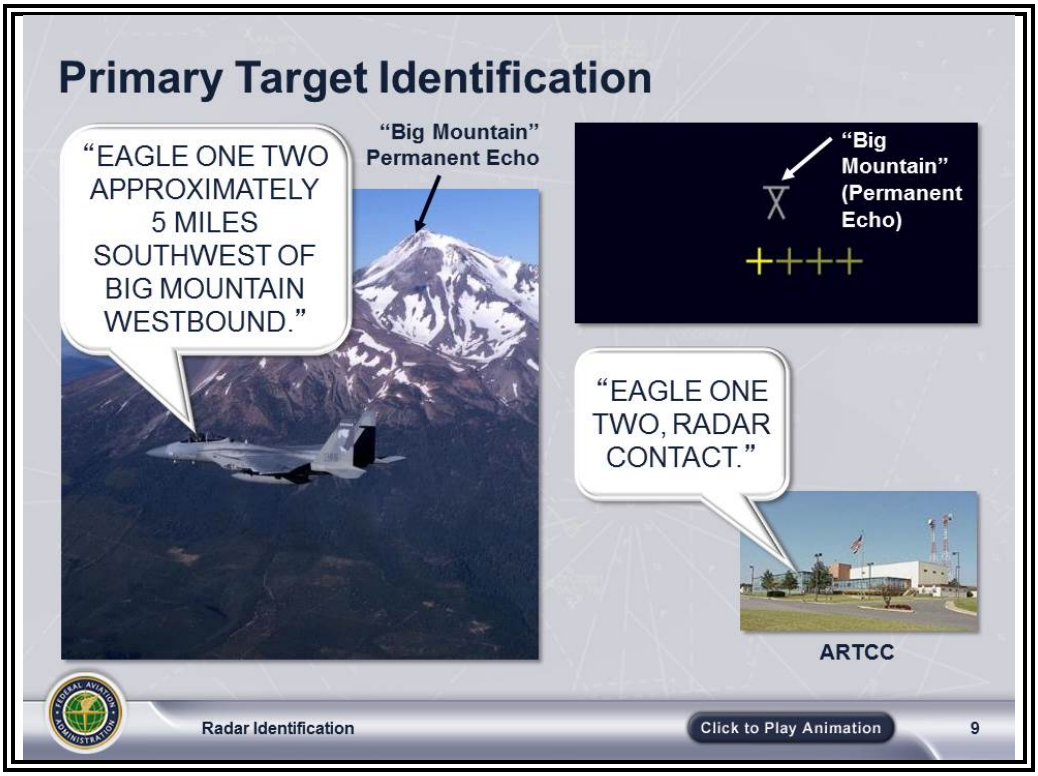
PRIMARY RADAR IDENTIFICATION *(Continued)*

Primary Target Identification (Cont'd)
JO 7110.65,
pars. 5-3-2, 5-3-7





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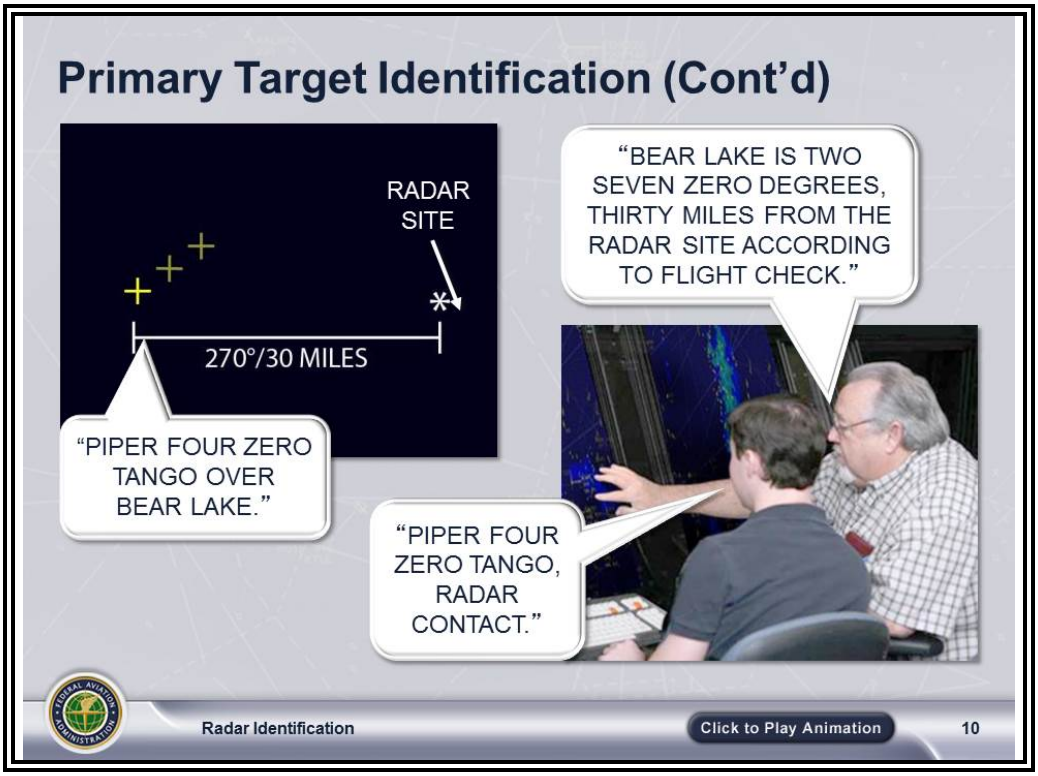
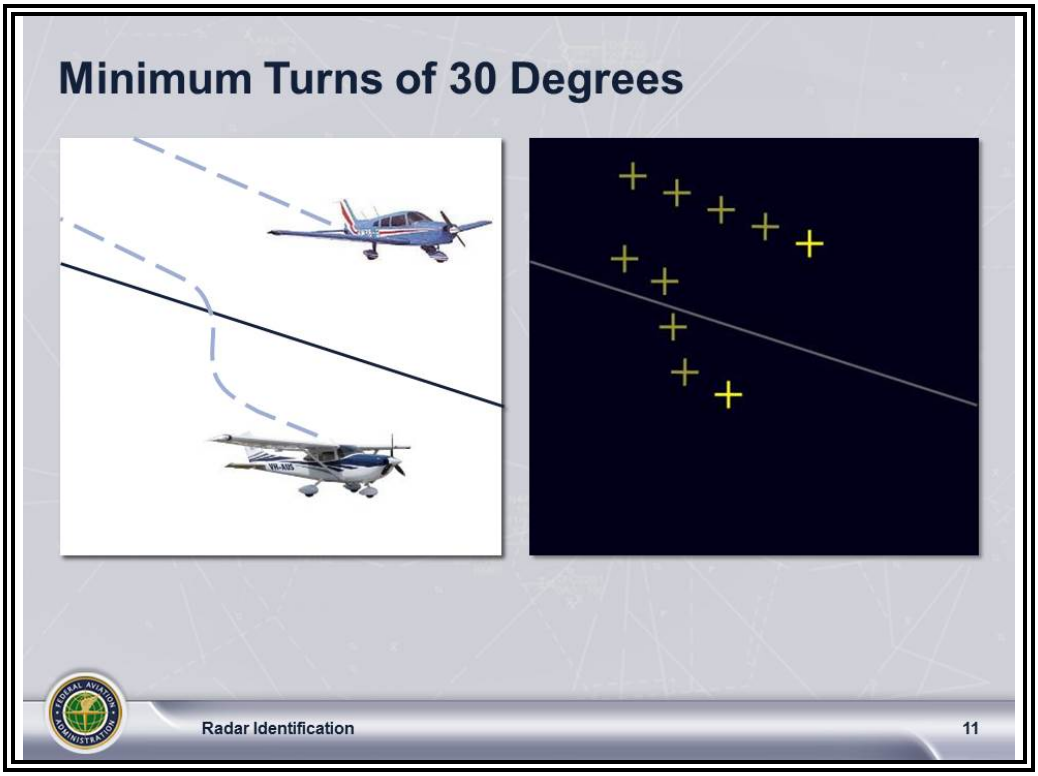
PRIMARY RADAR IDENTIFICATION *(Continued)*

Primary Target Identification (Cont'd)
JO 7110.65,
pars. 5-3-2, 5-3-7



PRIMARY RADAR IDENTIFICATION *(Continued)*

Identifying Turns
JO 7110.65, par. 5-3-2



- **Method Three:** Observe a target making identifying turn(s) of a minimum of 30 degrees provided:
  - You have a report assuring that the aircraft is within radar coverage (except lost aircraft).
  - Only one aircraft is observed making turn(s).
- For aircraft operating in accordance with an IFR clearance, do one of the following:
  - Issue a heading away from an area that will require an increased minimum IFR altitude due to terrain or obstructions.
  - Have the aircraft climb to the highest minimum altitude in your jurisdiction before issuing a heading.

NOTE: Use of identifying turns or headings that would cause the aircraft to follow normal IFR routes or known VFR flight paths might result in misidentification. When these circumstances cannot be avoided, additional methods of identification may be necessary.

PRIMARY RADAR IDENTIFICATION *(Continued)*

Review

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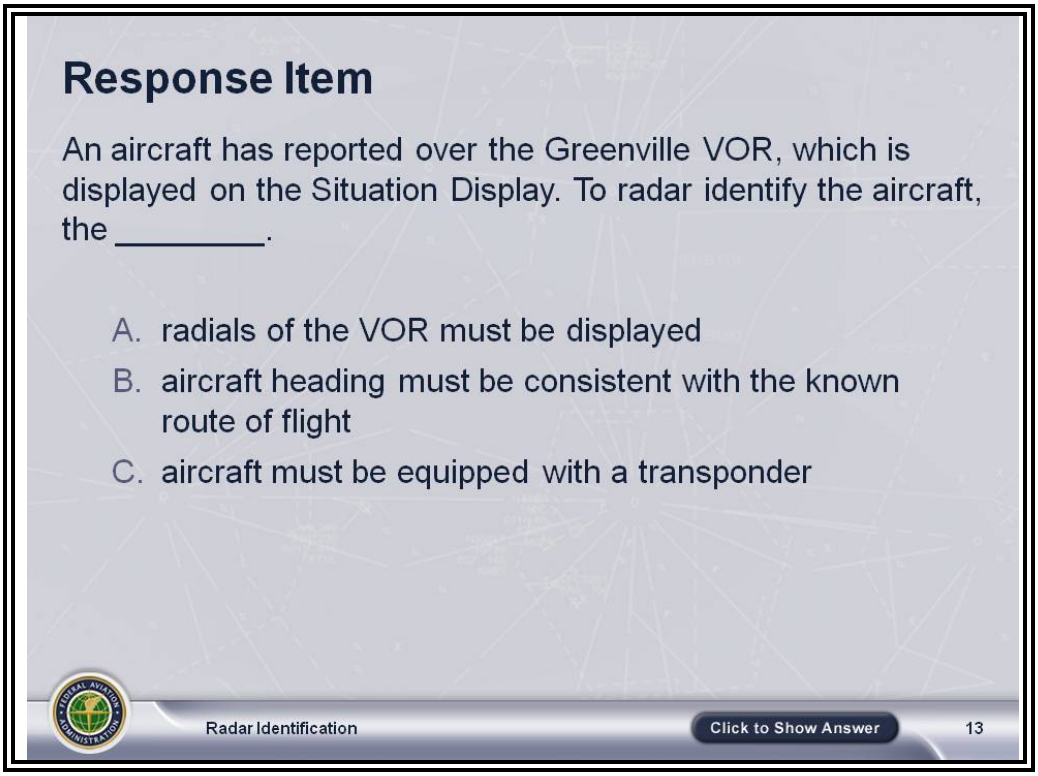
PRIMARY RADAR IDENTIFICATION *(Continued)*

Review



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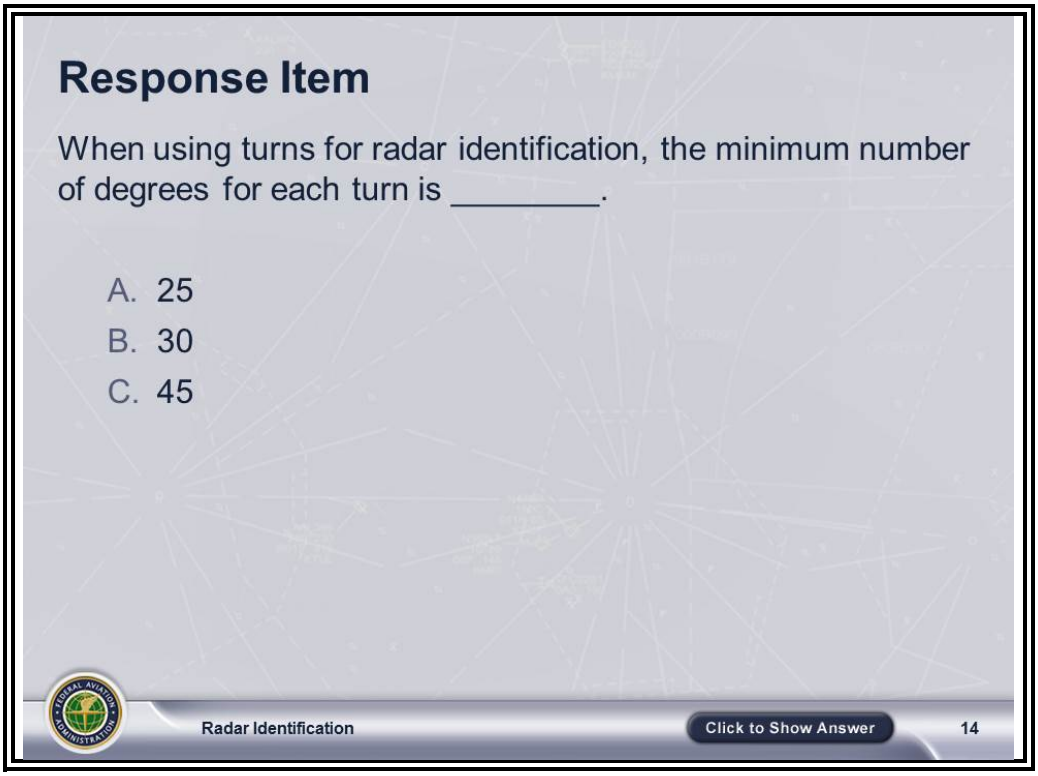
PRIMARY RADAR IDENTIFICATION *(Continued)*

Review



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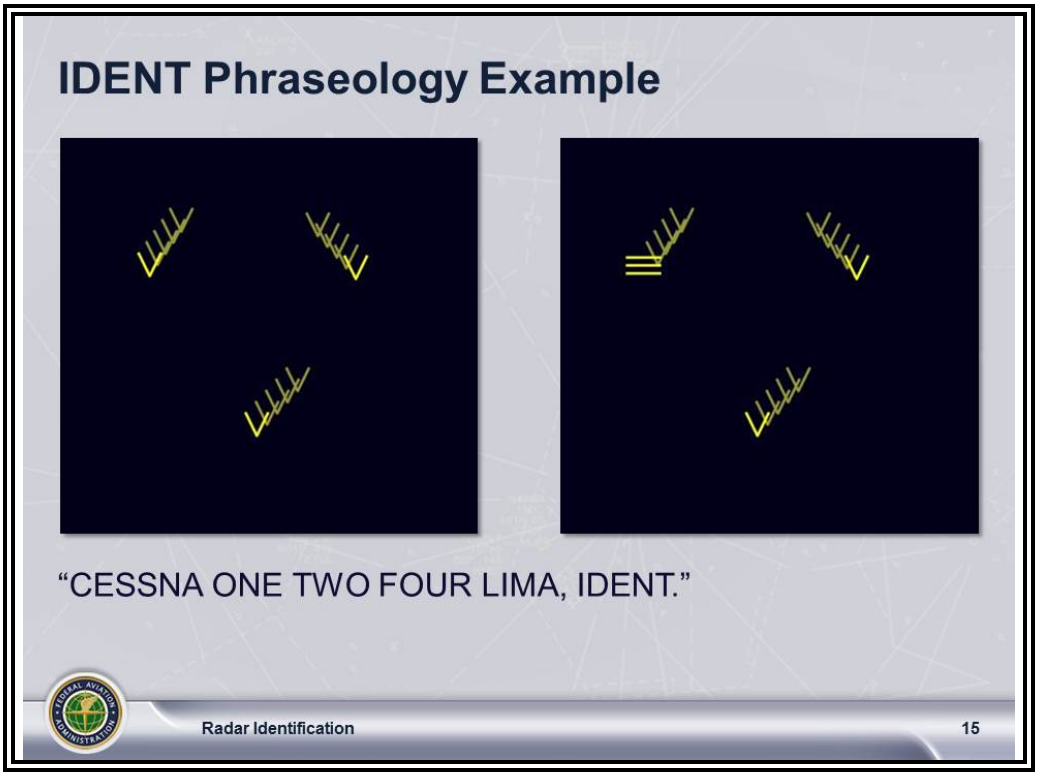
BEACON TARGET IDENTIFICATION

IDENT
JO 7110.65,
par. 5-3-3



⊙ When using only Mode 3/A radar beacon to identify a target, use one of the following methods:

- Request a pilot to ident and observe the display change.

✈ **Phraseology**

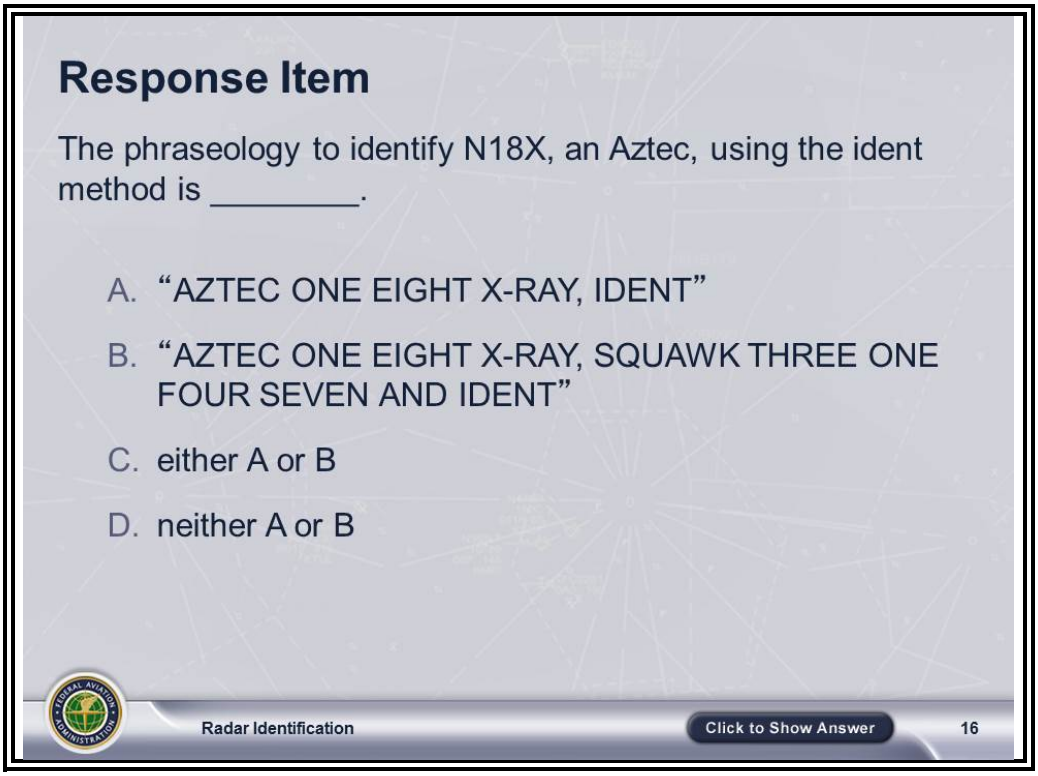
"IDENT,"

or

"SQUAWK (code) AND IDENT."

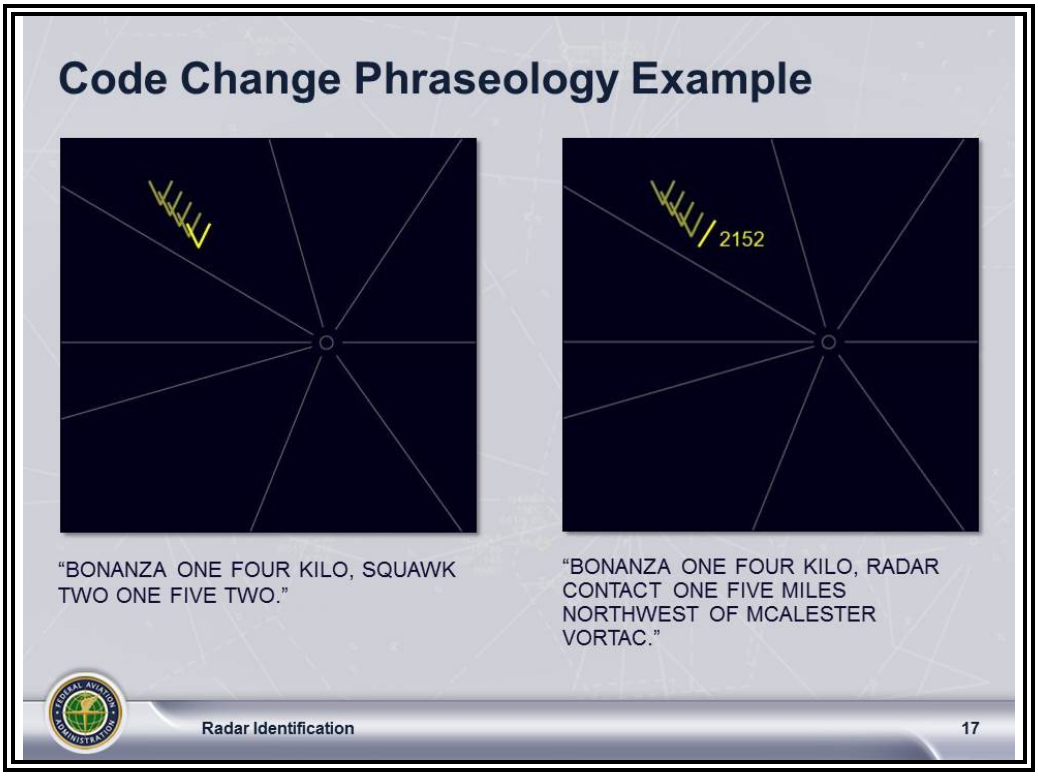
BEACON TARGET IDENTIFICATION *(Continued)*

Review



BEACON TARGET IDENTIFICATION *(Continued)*

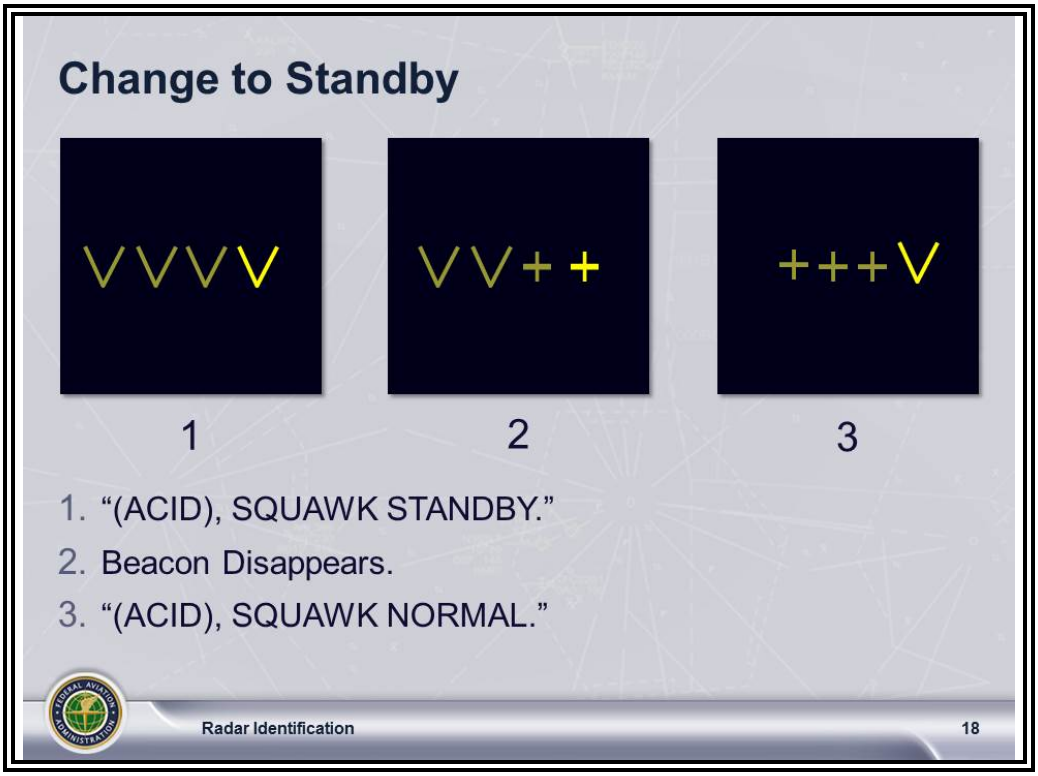
Code Change
JO 7110.65,
pars. 5-3-3, 5-3-7



- Change aircraft to a specific discrete or nondiscrete code and observe change.

BEACON TARGET IDENTIFICATION *(Continued)*

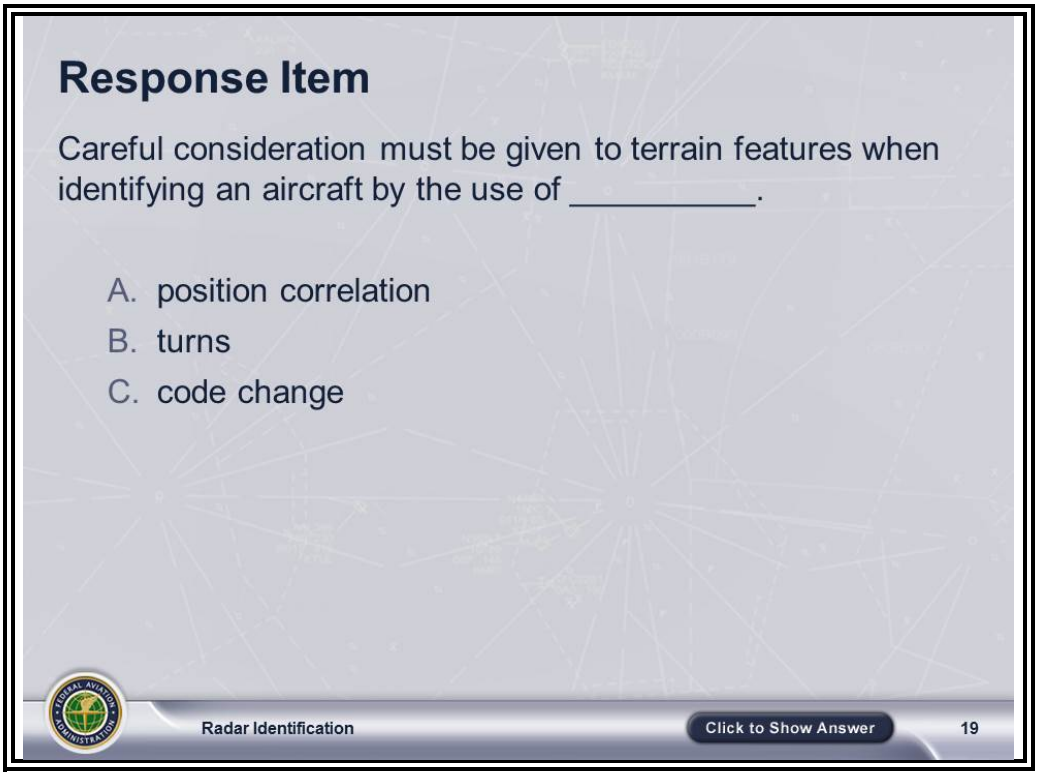
Change to Standby
JO 7110.65, par. 5-3-3



- Request the aircraft change the transponder to standby, then return transponder to normal operations, and observe the beacon disappear and reappear.

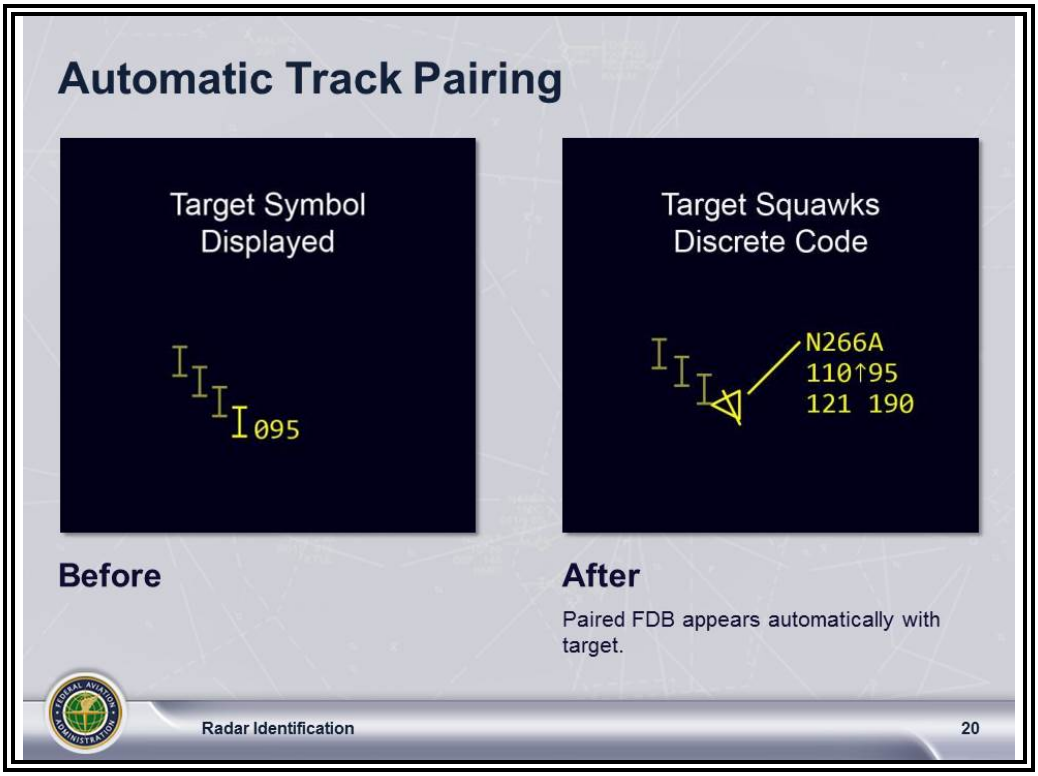
BEACON TARGET IDENTIFICATION *(Continued)*

Review



BEACON TARGET IDENTIFICATION *(Continued)*

Automatic Track Pairing
JO 7110.311B, par. 5-3-3



- An aircraft may be considered identified when the full data block is automatically associated with the beacon target symbol of an aircraft that is squawking a discrete code assigned by the computer.

✈ **Phraseology**

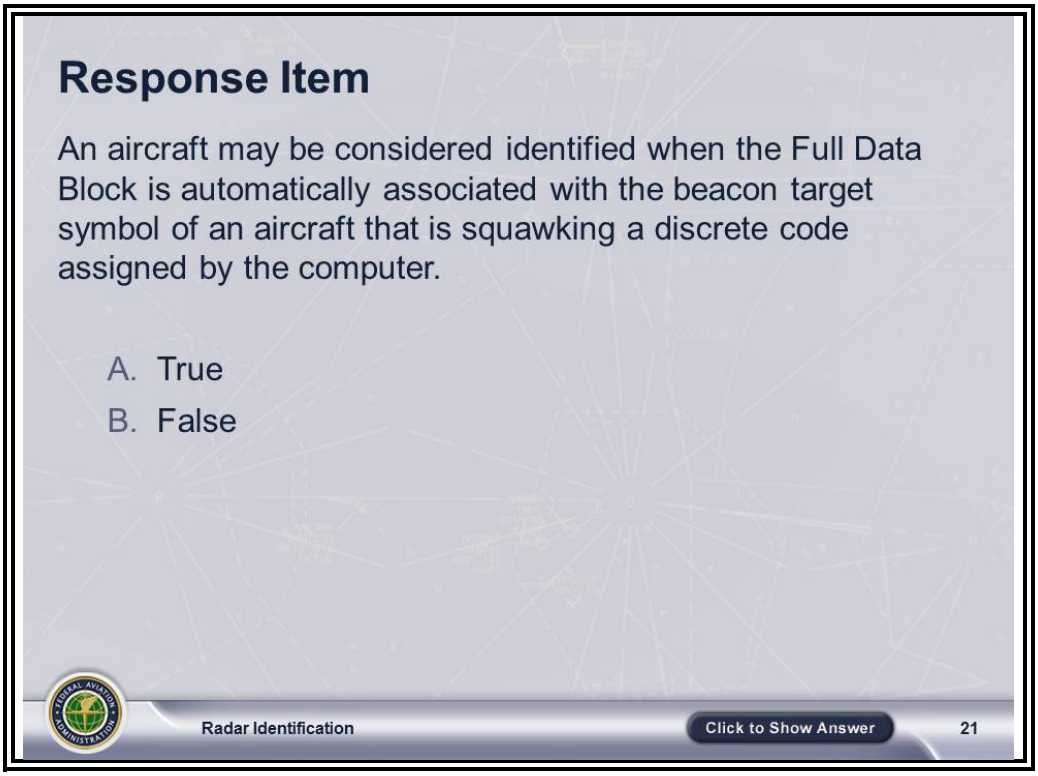
"(ACID), SQUAWK (4-digit discrete code),

or

"(ACID), SQUAWK (4-digit discrete code), AND IF YOUR ALTITUDE REPORTING EQUIPMENT IS TURNED OFF, SQUAWK ALTITUDE."

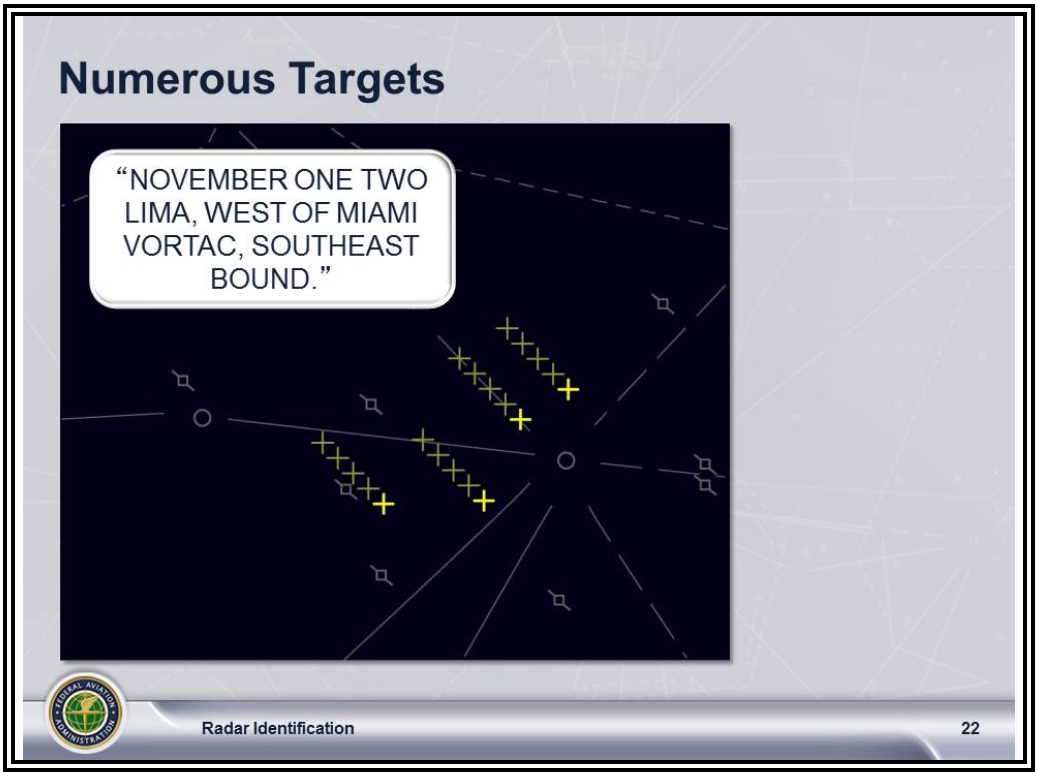
BEACON TARGET IDENTIFICATION *(Continued)*

Review



QUESTIONABLE IDENTIFICATION

Circumstances Leading to Questionable Identification
JO 7110.65,
par. 5-3-5



⊙ There are a number of circumstances that could lead to questionable identification. These include:

- Numerous targets in the same vicinity

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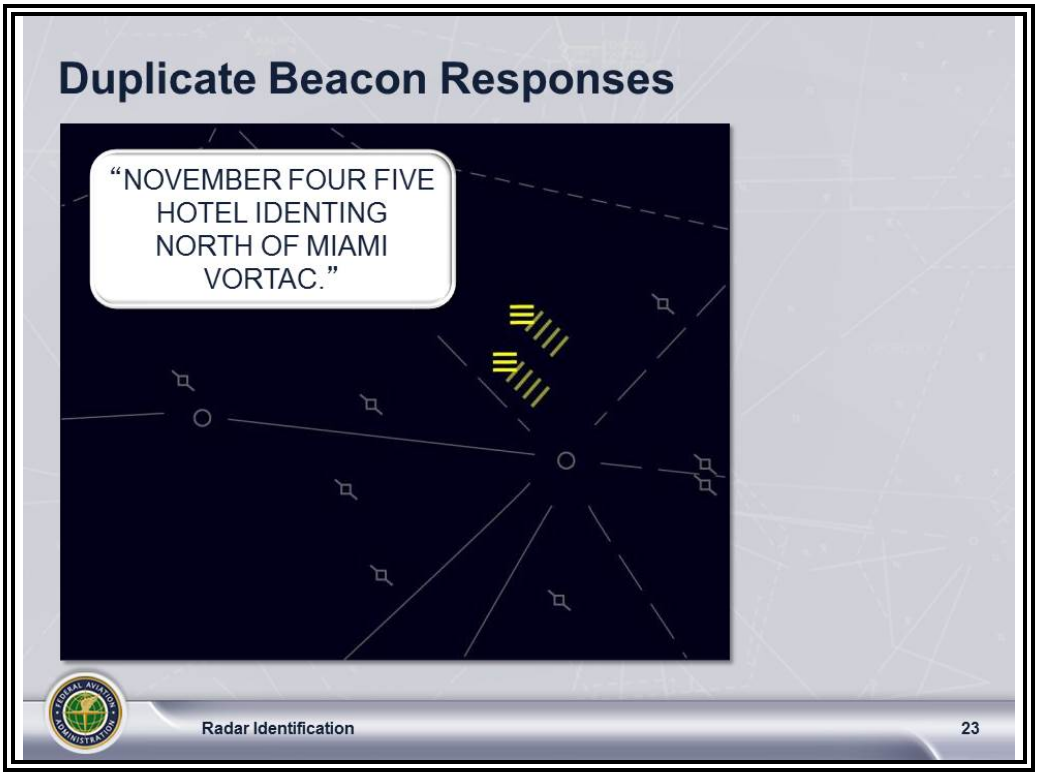
QUESTIONABLE IDENTIFICATION *(Continued)*

Circumstances Leading to Questionable Identification (Cont'd)
JO 7110.65, par. 5-3-5



- Duplicate beacon responses

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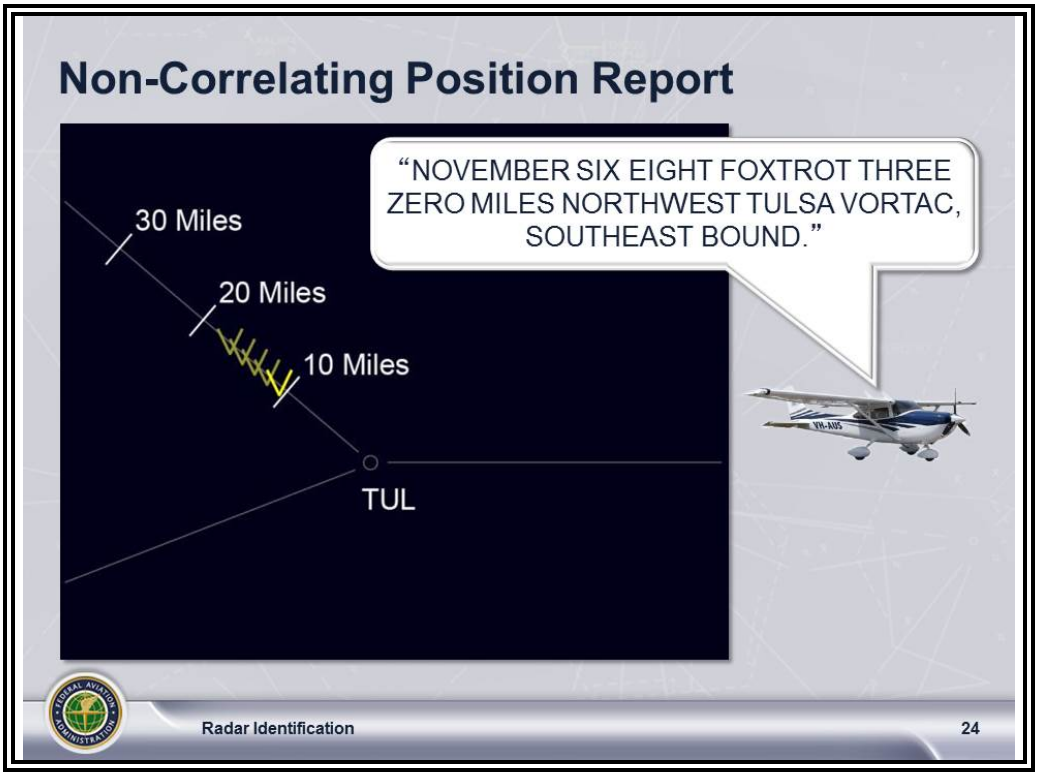
QUESTIONABLE IDENTIFICATION *(Continued)*

Circumstances Leading to Questionable Identification (Cont'd)
JO 7110.65, par. 5-3-5



- Non-correlating position report

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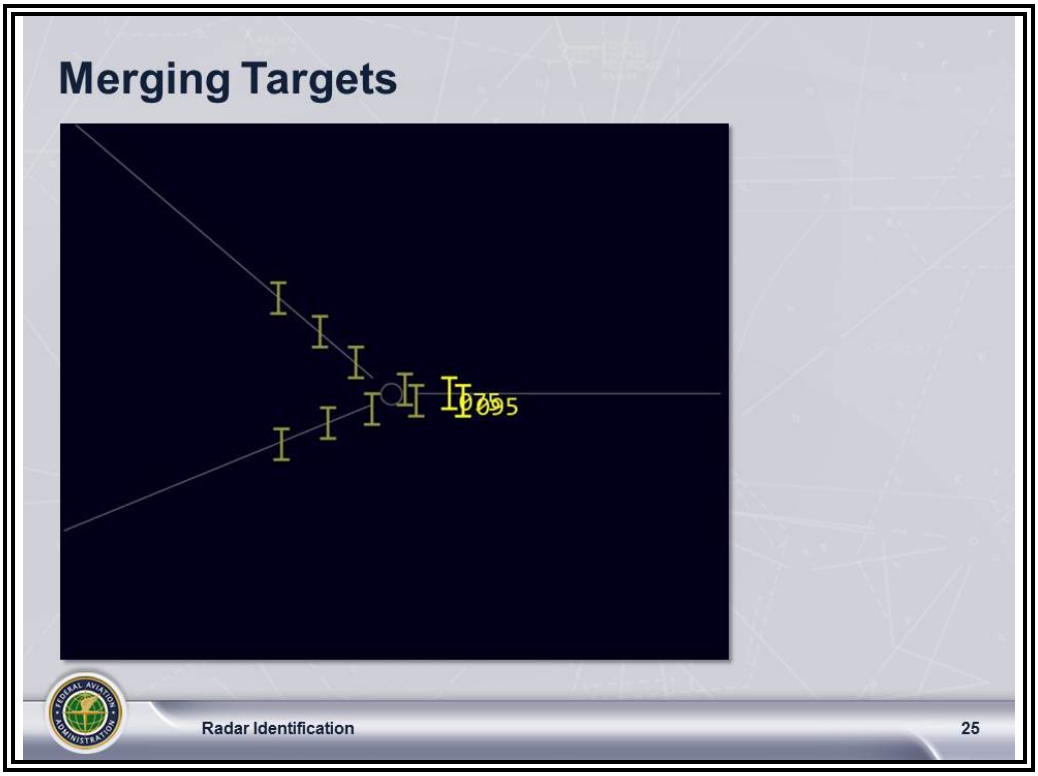
QUESTIONABLE IDENTIFICATION *(Continued)*

Circumstances Leading to Questionable Identification (Cont'd)
JO 7110.65, par. 5-3-5



- Merging targets

Ensuring Correct Identification
JO 7110.65, pars. 5-3-2, 5-3-3, 5-3-5

⊙ When identification is in doubt for any reason, in accordance with FAA Order JO 7110.65, pars. 5-3-2 and 5-3-3:

- Use more than one identification method.
- Re-identify or terminate radar service.
- Ensure that all primary targets are displayed when radar identification is lost or is questionable.

IDENTIFICATION STATUS

Overview
JO 7110.65,
par. 5-3-7

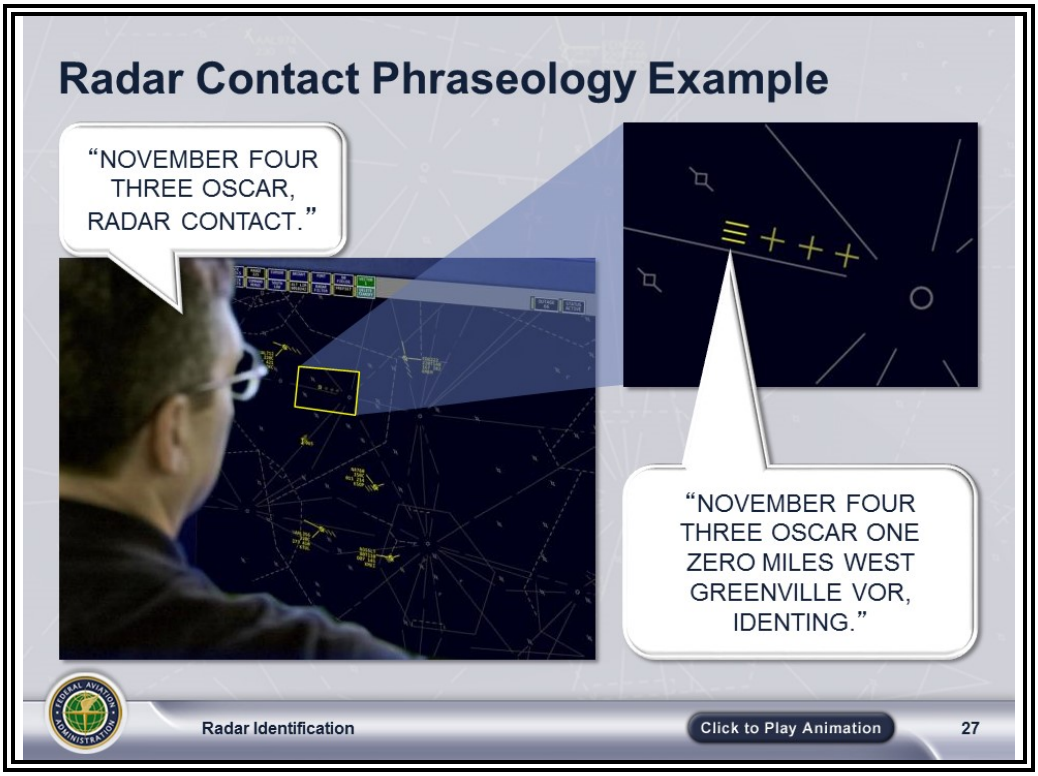
⊙ Inform an aircraft of radar contact when:

- Radar contact is established.
- Radar contact is lost.

NOTE: Radar service can also be terminated.

IDENTIFICATION STATUS *(Continued)*

Radar Contact
JO 7110.65,
par. 5-3-7



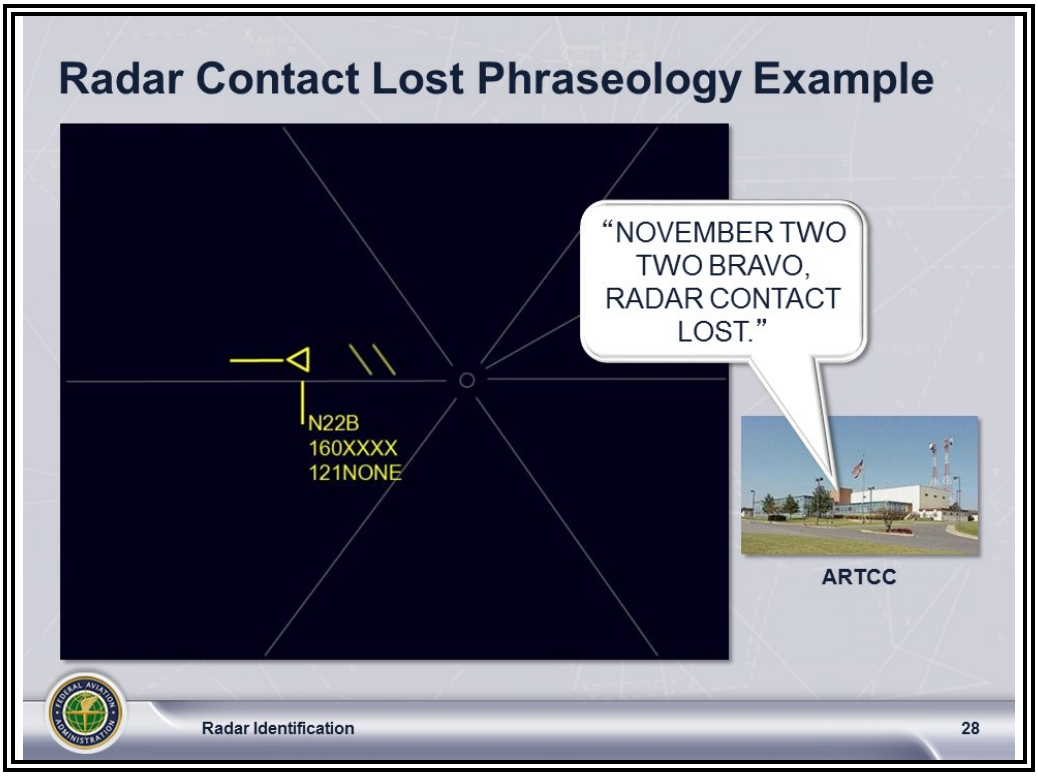
- Aircraft are considered to be in **radar contact** when:
  - Initial radar identification has been established.
  - Radar identification is reestablished.

✈ **Phraseology**

"RADAR CONTACT (position, if required)."

IDENTIFICATION STATUS *(Continued)*

Radar Contact Lost
JO 7110.65,
par. 5-3-7



⊙ Inform an aircraft **Radar Contact Lost** when:

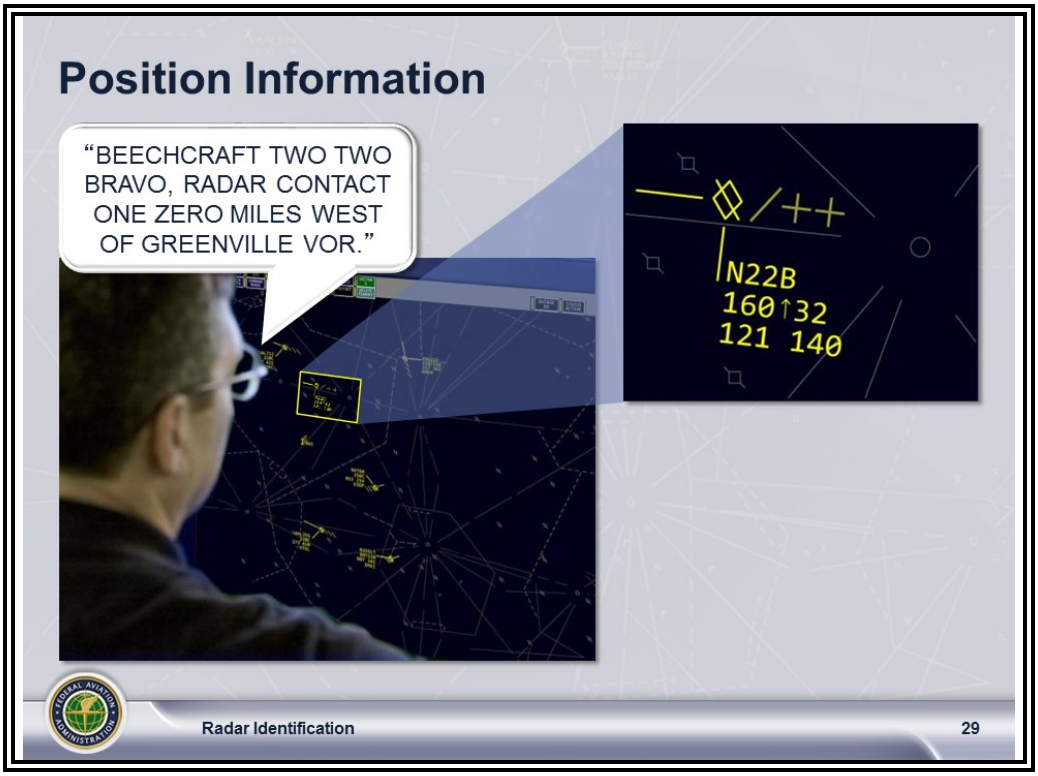
- Identification is still desired, but is lost due to an uncontrollable situation; for example:
  - Radar failure
  - No target return

✈ **Phraseology**

"RADAR CONTACT LOST, (alternative instructions, when required)."

POSITION INFORMATION

Requirements
JO 7110.65,
par. 5-3-6



⊙ Inform the aircraft of its position when identified by:

- Beacon methods or (see next slide)

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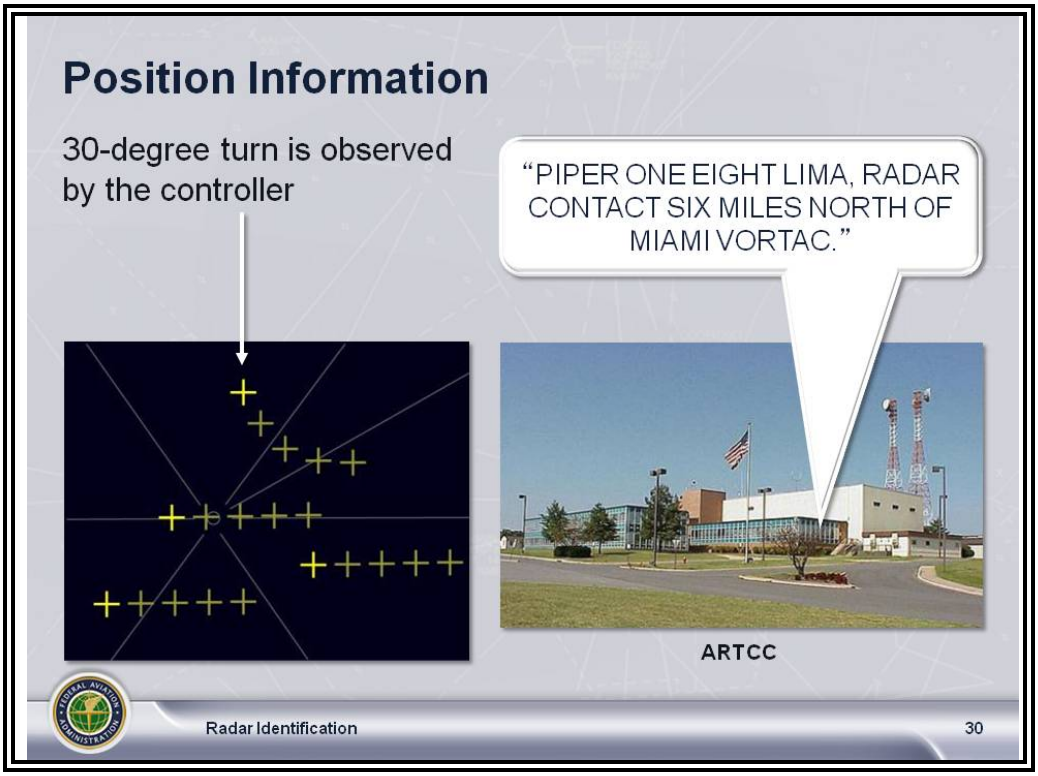
POSITION INFORMATION *(Continued)*

Requirements (Cont'd)
JO 7110.65, par. 5-3-6



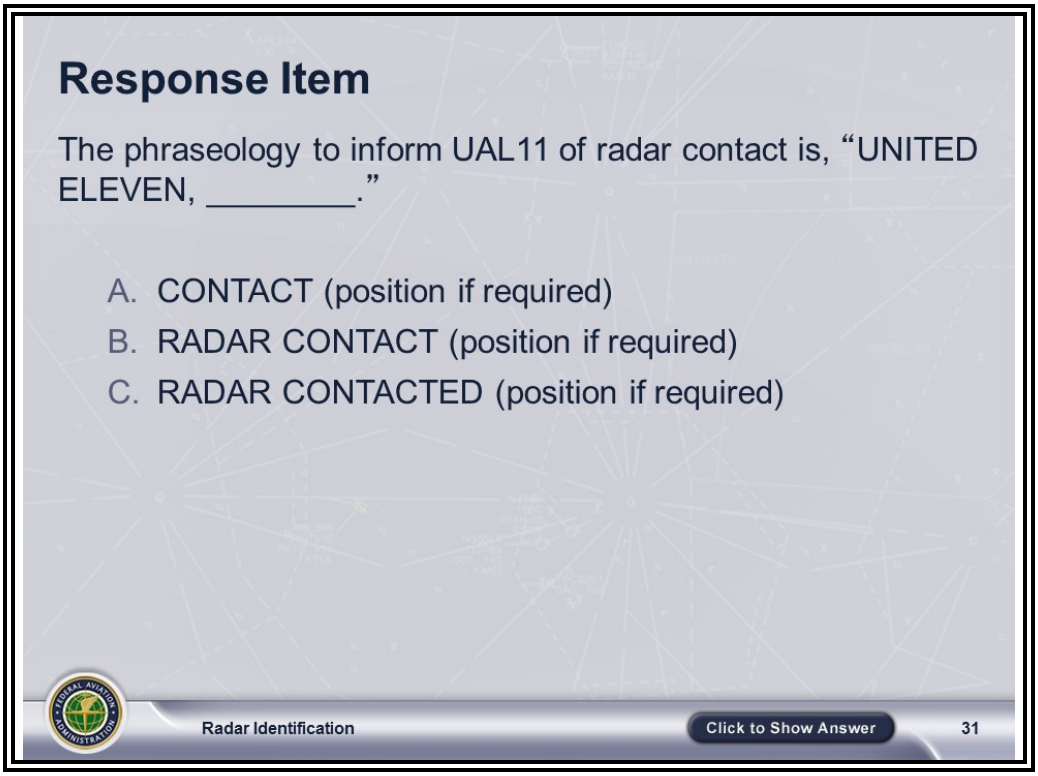
- Turns

⊙ You need **not** inform an aircraft of its position when identification is established:

- By position correlation, or
- When a departing aircraft is identified within 1 mile of the takeoff runway end

POSITION INFORMATION *(Continued)*

Review



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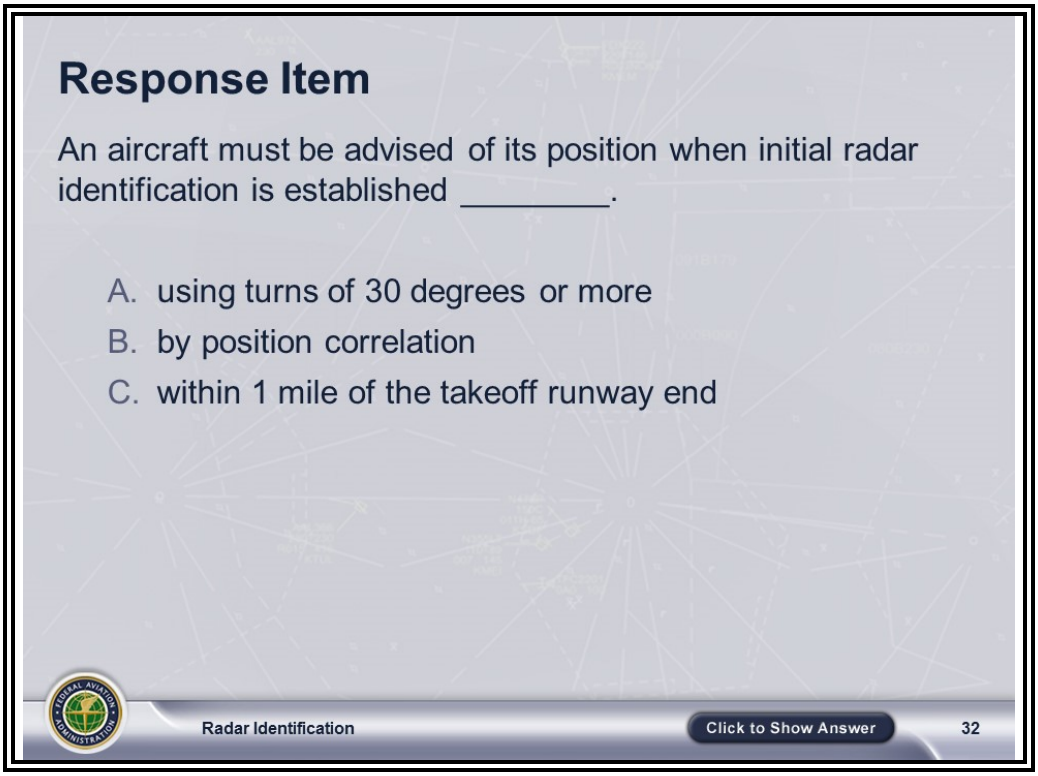
POSITION INFORMATION *(Continued)*

Review (Cont'd)



RADAR SERVICE TERMINATION

Radar Service Termination
JO 7110.65,
par. 5-1-13

- Inform the aircraft when radar service is terminated because identification is no longer:
  - Necessary
  - Possible

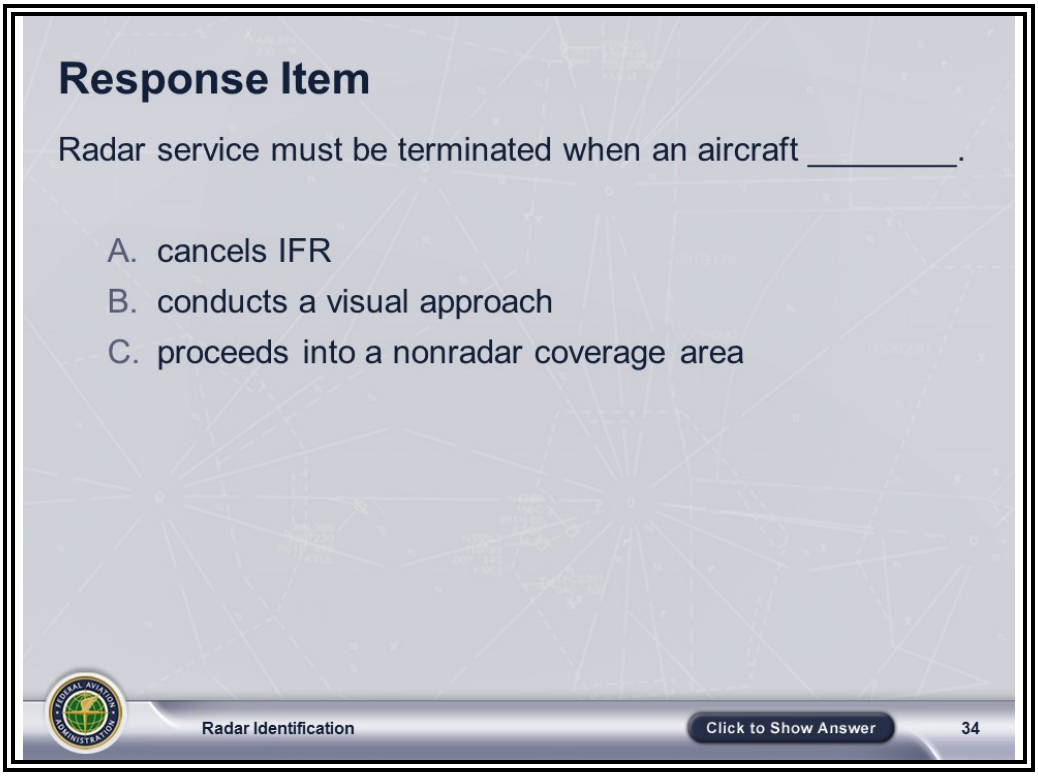
✈ **Phraseology**

"RADAR SERVICE TERMINATED, (nonradar routing, if required)."

- Radar service is automatically terminated and aircraft need **not** be advised when:
  - Aircraft cancels IFR, except within Class B or C airspace
  - An aircraft conducting an instrument, visual, or contact approach has:
    - Landed, or
    - Been instructed to change to advisory frequency
- At tower controlled airports (where radar coverage does **not** exist to within ½ mile of the runway end):
  - Inform arriving aircraft when radar service is terminated.

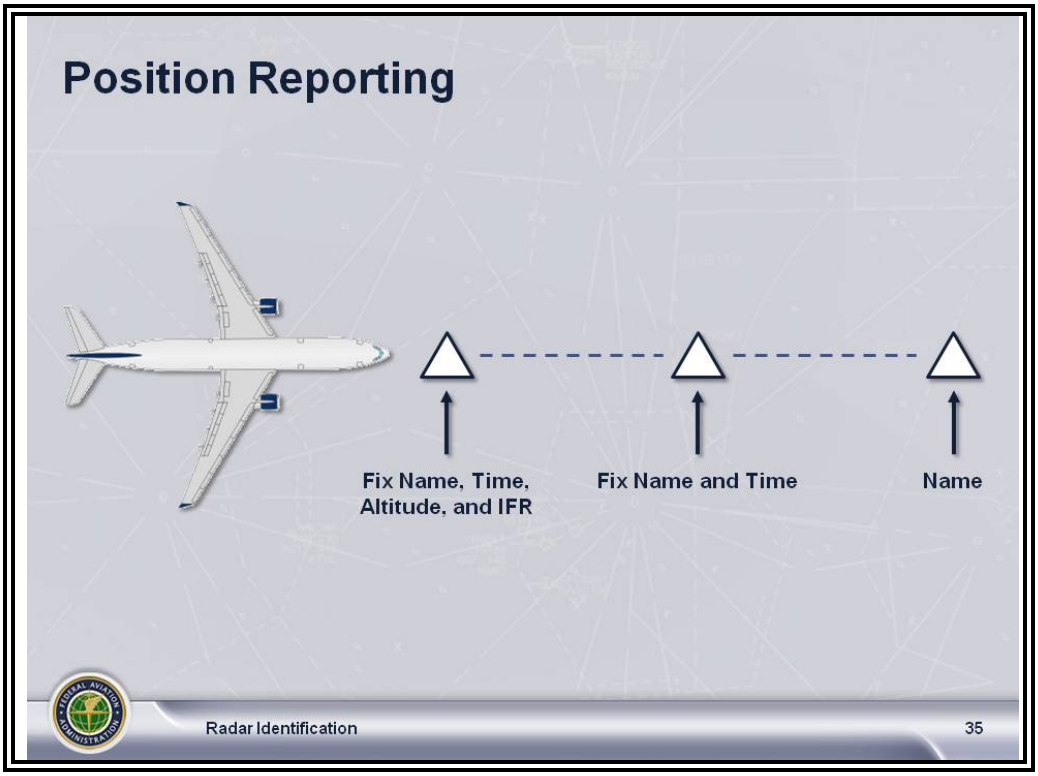
RADAR SERVICE TERMINATION *(Continued)*

Review



POSITION REPORTING

Requirements
JO 7110.65,
par. 5-1-12



⊙ Position Reporting:

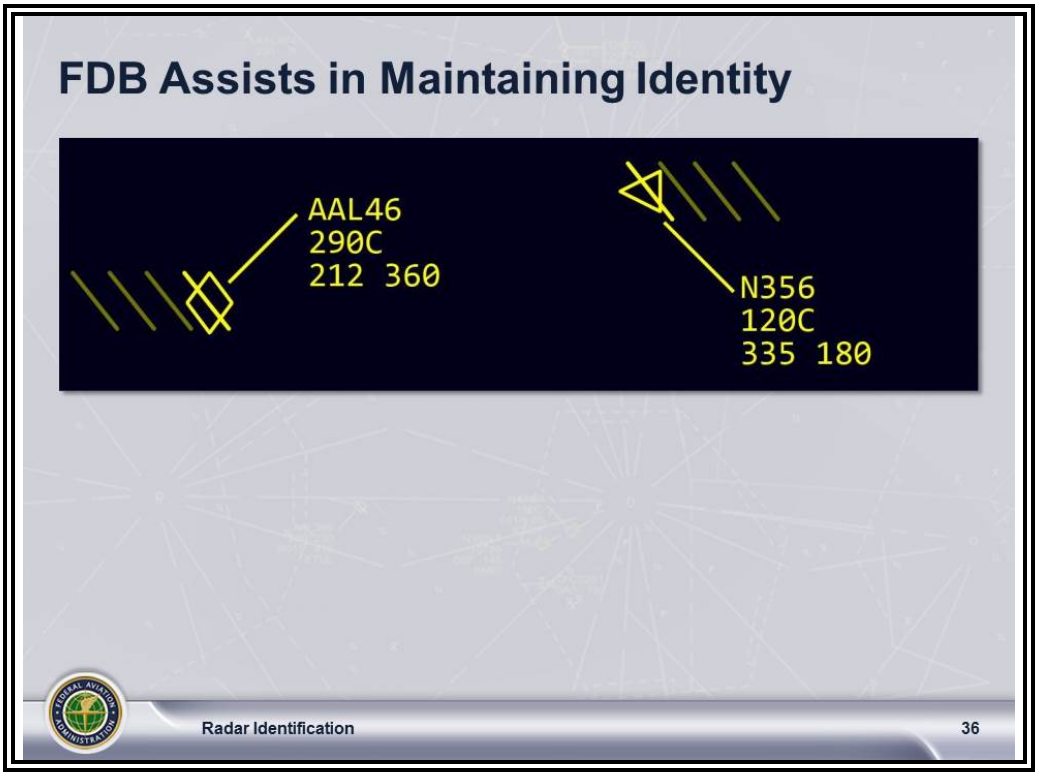
- If necessary, request aircraft to provide an estimate or report over a specific fix.
- When an aircraft is issued “RADAR CONTACT,” the pilot will discontinue reporting compulsory reporting points until advised:
  - “RADAR CONTACT LOST,” or
  - “RADAR SERVICE TERMINATED.”
- When required, inform an aircraft of its position with respect to a fix or airway.

Review

QUESTION: N127LP, a C172 has been identified solely by observing a code change. The radar controller advised N127LP “RADAR CONTACT.” Is this all that is required on the part of the controller? Explain.

TARGET MARKERS

Maintaining Identity
JO 7110.65, par. 5-3-8;
JO 7110.311B, par. 5-3-8

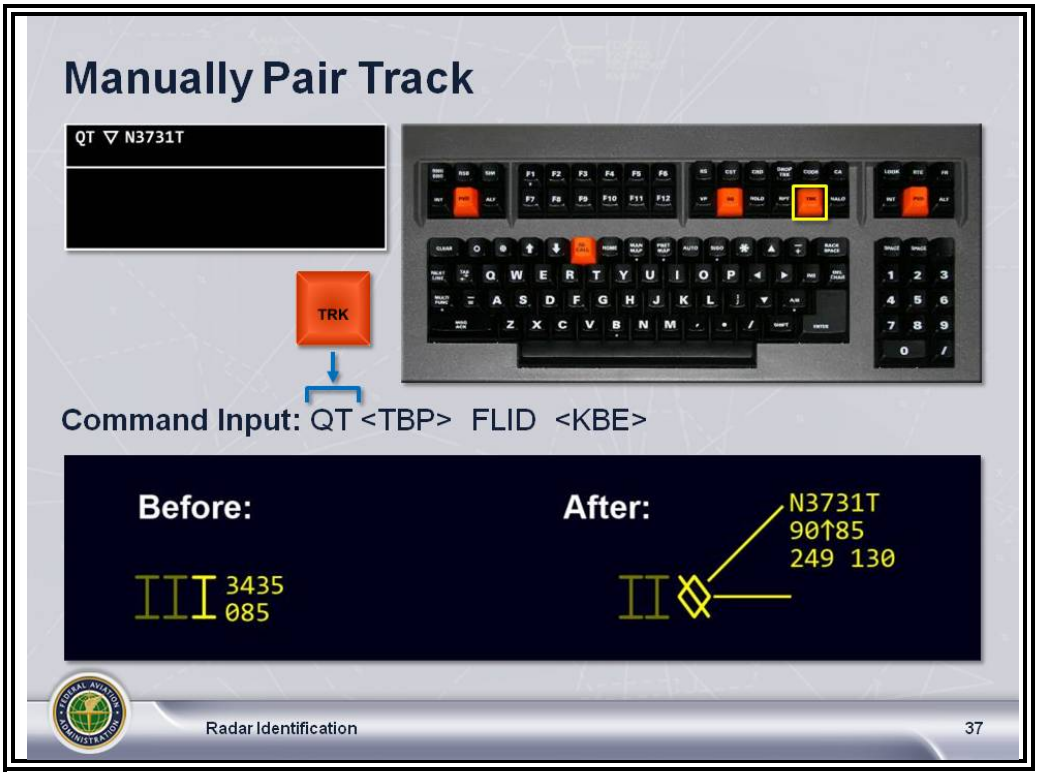


- When you have separation responsibility for an aircraft and a paired track exists, display a Full Data Block (FDB).
- Retain the FDB that is associated with the appropriate target symbol in order to maintain continuous identity of aircraft.
  - Retain the FDB until the aircraft has exited the sector or delegated airspace, and all potential conflicts have been resolved.
    - Including an aircraft that is a point out
    - The displayed altitude may be assigned, interim, or reported.

Continued on next page

PAIRING

Manually Pair Track
ERAM EDSM SRS 210.04 V1B2, Sections C.1, C.2 and C.8;
ERAM SURV SRS 210.24, par. 3.2.2.5

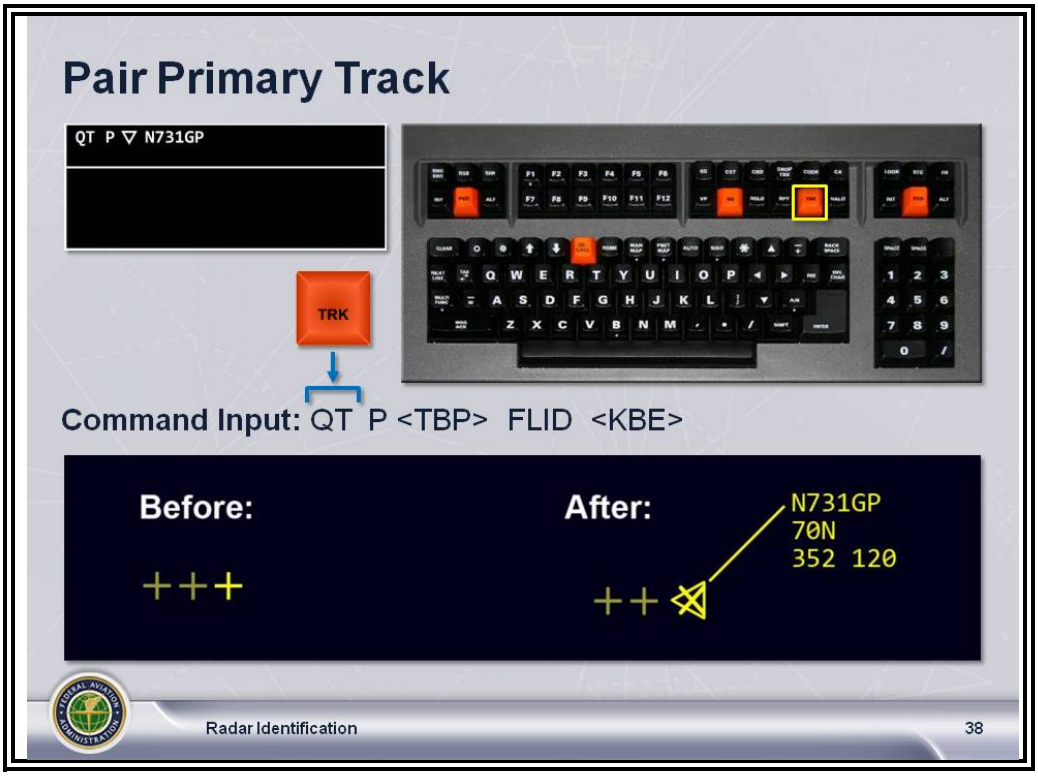


- The QT command identifies a target for manual pairing and creates a FDB.
  - Syntax: QT <TBP> FLID <KBE>
  - Adds the target's code to the Beacon Code View (if not already there)
- Basic procedure:
  - Identify target.
  - Press Track Function Key.
  - Slew trackball cursor over target.
  - Trackball Pick (TBP).
    - From the RA position, // followed by a fix (no space between)
  - Enter Flight Identification (FLID).
  - Press Keyboard Enter key.
- Optional fields (Manually Pair Track)

Continued on next page

PAIRING *(Continued)*

Manually Pair Track (Cont'd)
TI 6110.101; ERAM EDSM SRS 210.04 V1B1; ERAM EDSM SRS 210.04 V1B2, Appendix C.8 Table 29



- The QT P command allows you to manually pair a beacon-equipped flight to a primary track.
  - Syntax: QT P <TBP> FLID <KBE>

NOTE: This command allows pairing on a flight with an equipment qualifier specifying a transponder when only a primary target is visible. The P field is not needed on flights without transponders, e.g., /X, /D, /M, /Y, /V, /H.

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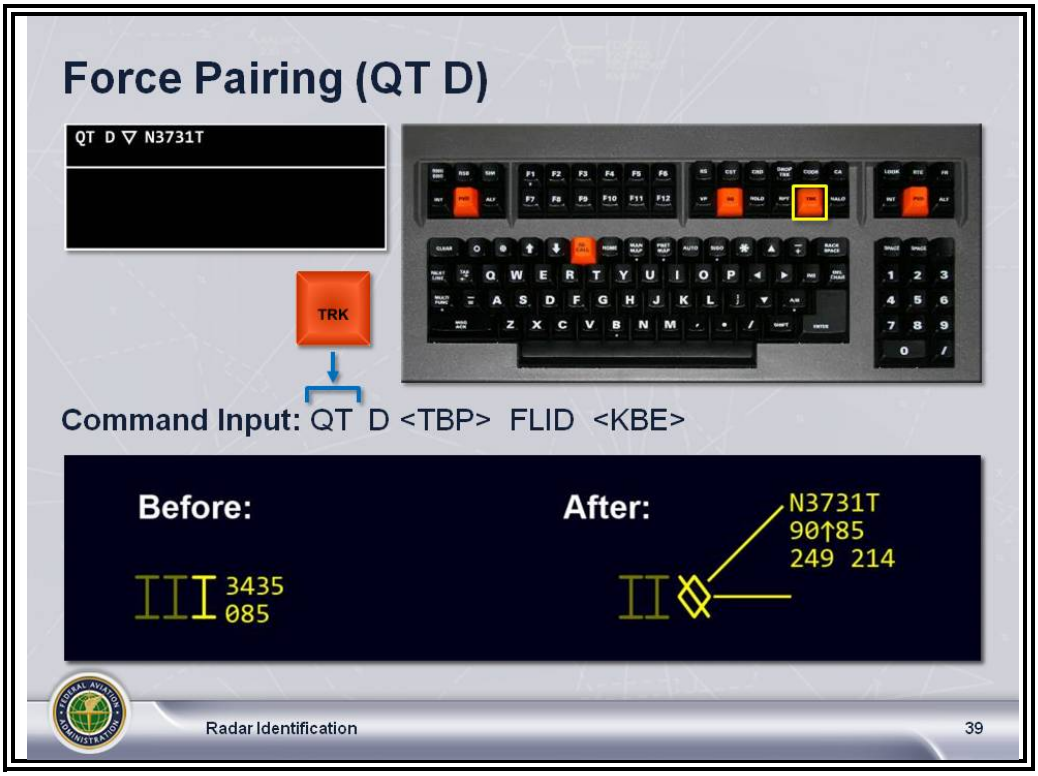
PAIRING *(Continued)*

Manually Pair Track (Cont'd)
SIG 1063



- The QT D command allows you to manually pair an FDB to a target replying on an incorrect beacon code.
  - Syntax: QT D <TBP> FLID <KBE>
    - The beacon code would time share in field E of the data block.
  - If you pick an unpaired target, it will create and pair the FDB immediately.
  - If no target is found, it will place the FDB at the pick point.
  - QT D is rejected if the aircraft is not beacon equipped unless it is a tentative flight plan with no equipage specified.
- You can manually pair an FDB to a target even when:
  - The displayed code does not match the flight's assigned code.
  - A target is supported by beacon data but is ineligible for automatic pairing, i.e.:
    - Aircraft has a stuck transponder.
    - Transponder has been inadvertently changed.

Continued on next page

PAIRING *(Continued)*

Manually Pair Track (Cont'd)
TI 6110.101;
TI 6110.141;
ERAM EDSM SRS 210.04 V1B1

⊙ **Examples**

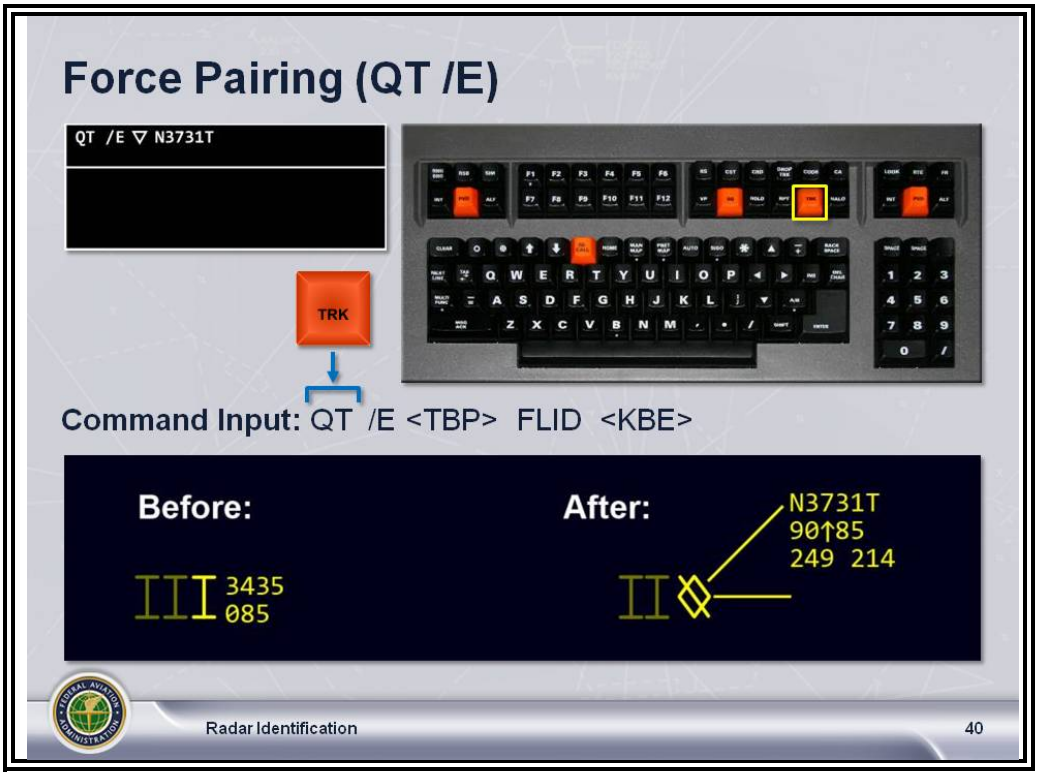
- Aircraft enters sector from ATOP squawking a non-discrete BCN code, e.g., 2000
- Able to pair aircraft before establishing communication
- Established beacon code does not match flight plan beacon code due to:
  - Stuck transponder
  - Transponder having been inadvertently changed
- Aircraft violate airspace and are not in communication with ATC, e.g., mode C intruder
- Controller observes an unpaired target that matches a flight plan
  - Aircraft in STV (Surface Tracking Volume) want to pair the aircraft early

NOTE: STV - A Surface Tracking Volume is a vertical cylinder centered at the airport location within which new tracks are not established and existing tracks, if they do not exceed an adapted speed, are terminated.

Continued on next page

PAIRING *(Continued)*

Manually Pair Track (Cont'd)
ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.3.2.1; ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2



- The QT /E command allows you to:
  - Pair to an external beacon code.
  - Specify an external beacon for the flight.
- Syntax: QT /E <TBP> FLID <KBE>
  - The beacon code would time share in field E of the data block.

Continued on next page

PAIRING *(Continued)*

Manually Pair Track (Cont'd)
ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2

- Anytime a QT command is used and no flight plan exists, a tentative flight plan is created consisting of the FLID, beacon code, and CID.
- Optional fields include:
  - Altitude (if included, creates a tentative flight plan with an assigned altitude)
  - Heading
  - Speed
  - Primary track indicator
  - Trackball coordinates

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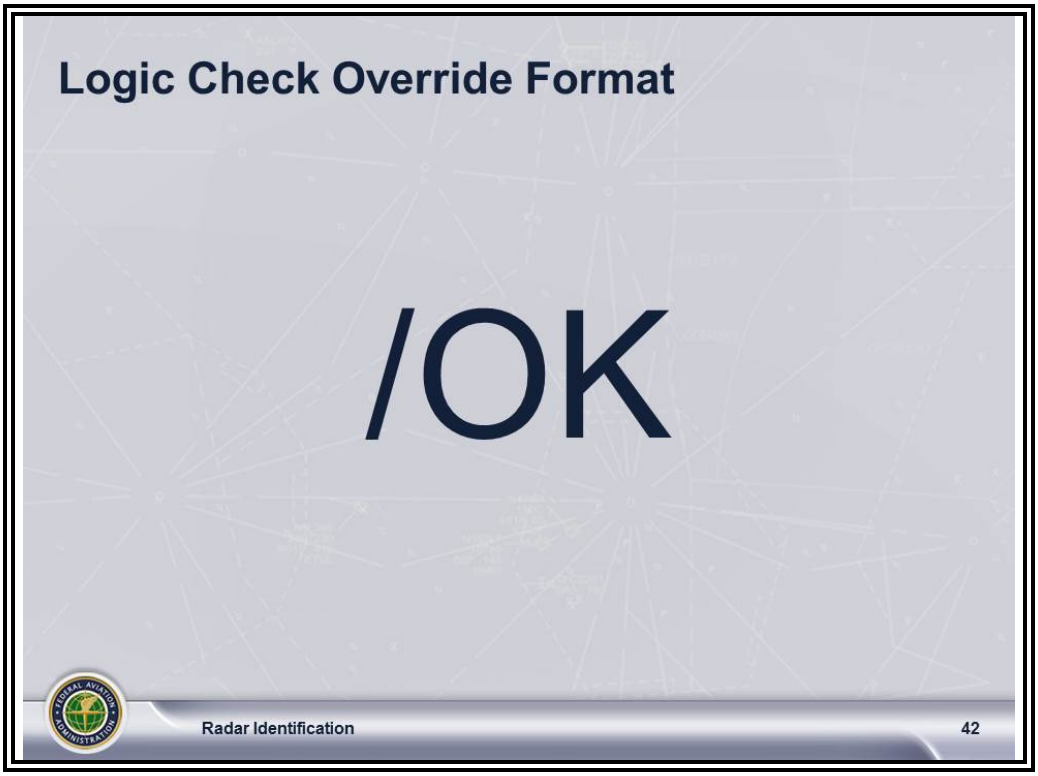
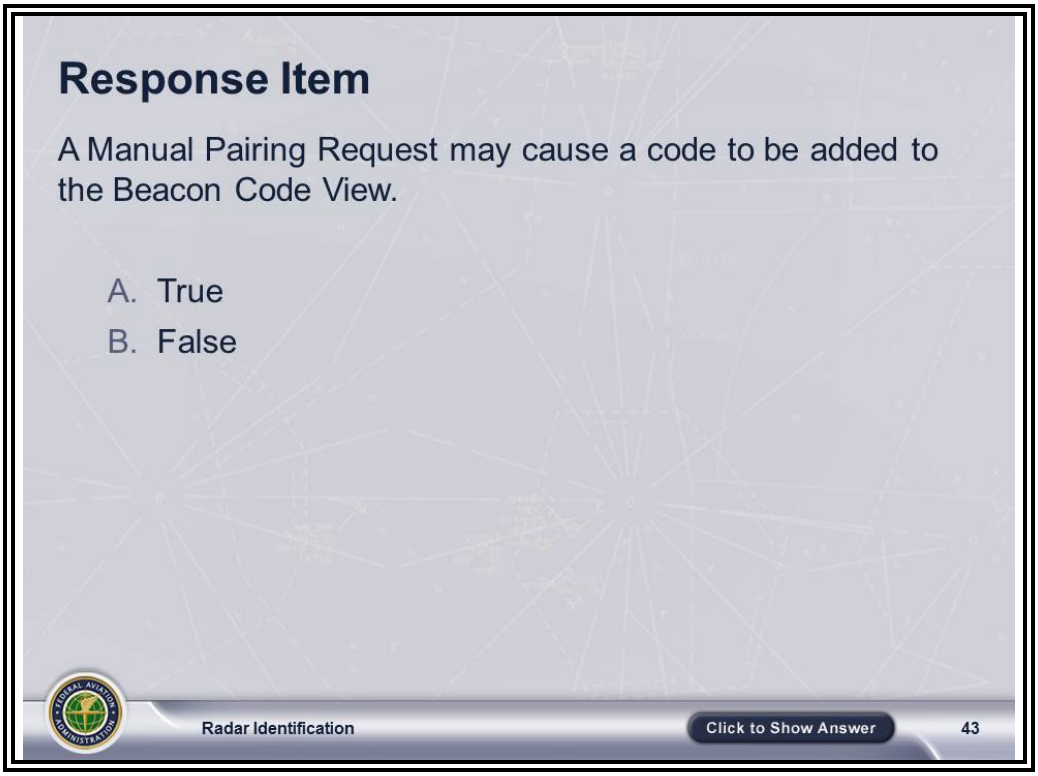
Manually Pair Track (Cont'd)
JO 7110.65, par. 5-14-6;
TI 6110.101;
ERAM EDSM SRS 210.04 V1B2, Section C1 and C2



- The use of the /OK function is allowed to override sector eligibility only when one of the following conditions is met:
  - Prior coordination is affected.
  - The flight is within control jurisdiction of the sector.

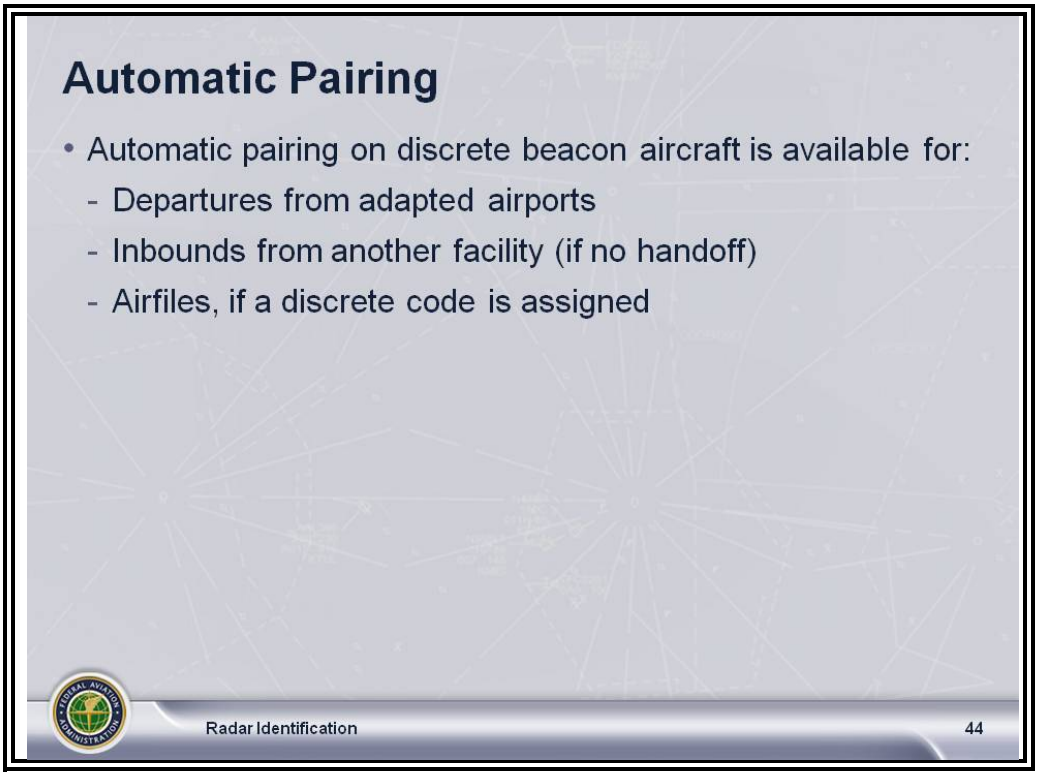
PAIRING *(Continued)*

Review

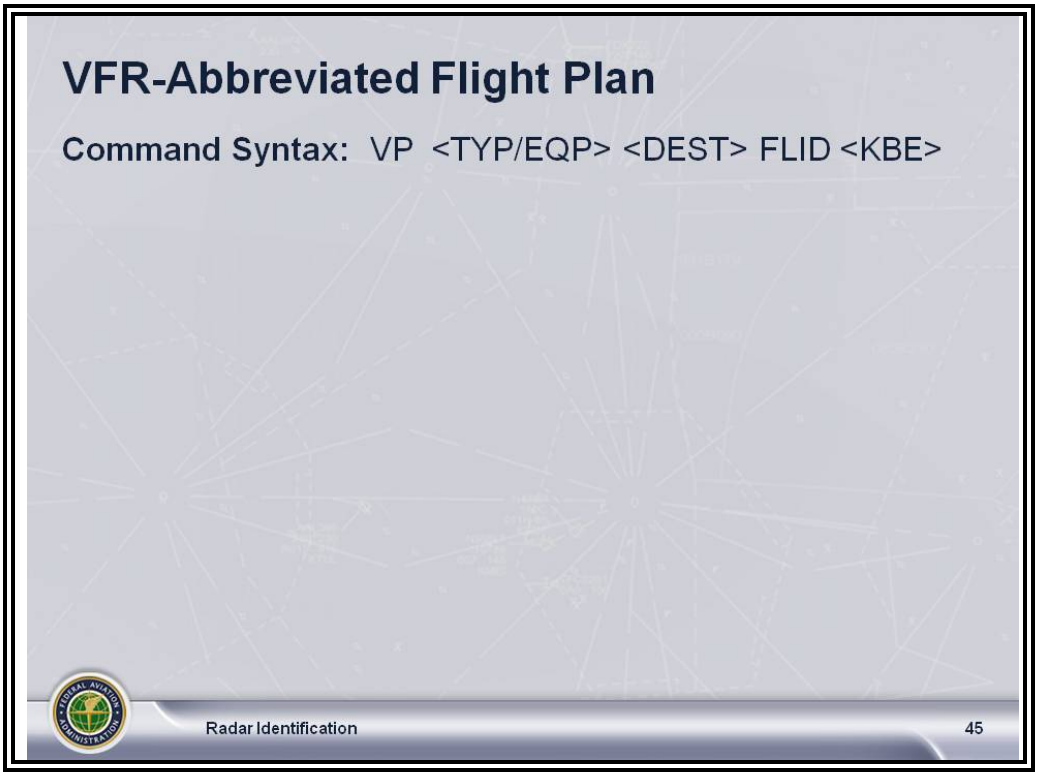


PAIRING *(Continued)*

Automatic Pairing on Discrete Beacon Aircraft
ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.3



VFR Abbreviated Flight Plan
ERAM EDSM SRS 210.2 V1B2, Tables 22, 23, and 29

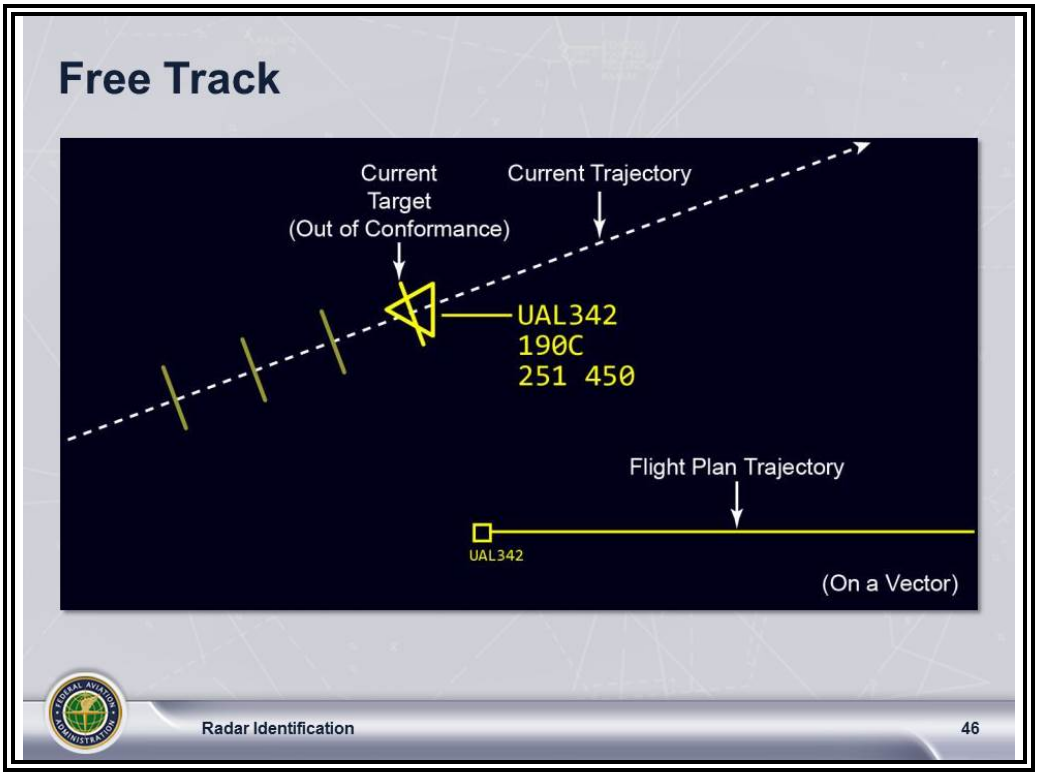


⊙ Flight plan entry for radar flight following to VFR aircraft

- After the track has paired or a data block is placed on the Situation Display, enter the abbreviated flight plan:
  - Syntax: VP <TYP/EQP(Optional)> <DEST> FLID <KBE>
  - Flight ID can be:
    - → Trackball entered over the position symbol, or
    - → CID, or
    - → AID
- Route of flight may be entered in the message by including fixes only and separating them with periods.

COMPUTER RADAR TRACKING

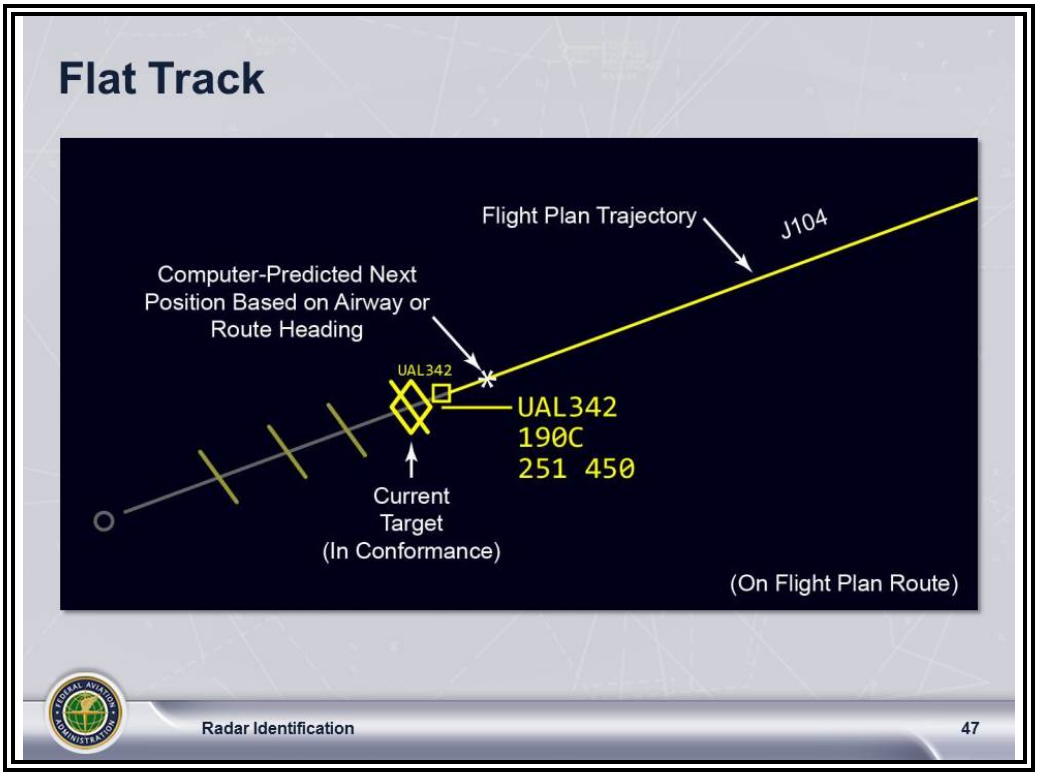
Free Track
ERAM EDSM SRS
210.04 V1B1



- Data block is initially displayed oriented relative to initial direction of track based on radar data
- Utilizes latest ground speed and heading information

COMPUTER RADAR TRACKING *(Continued)*

FLAT Track
ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.3.2.1



- Free Track process plus information from flight plan
- Based on airway or route heading in flight plan

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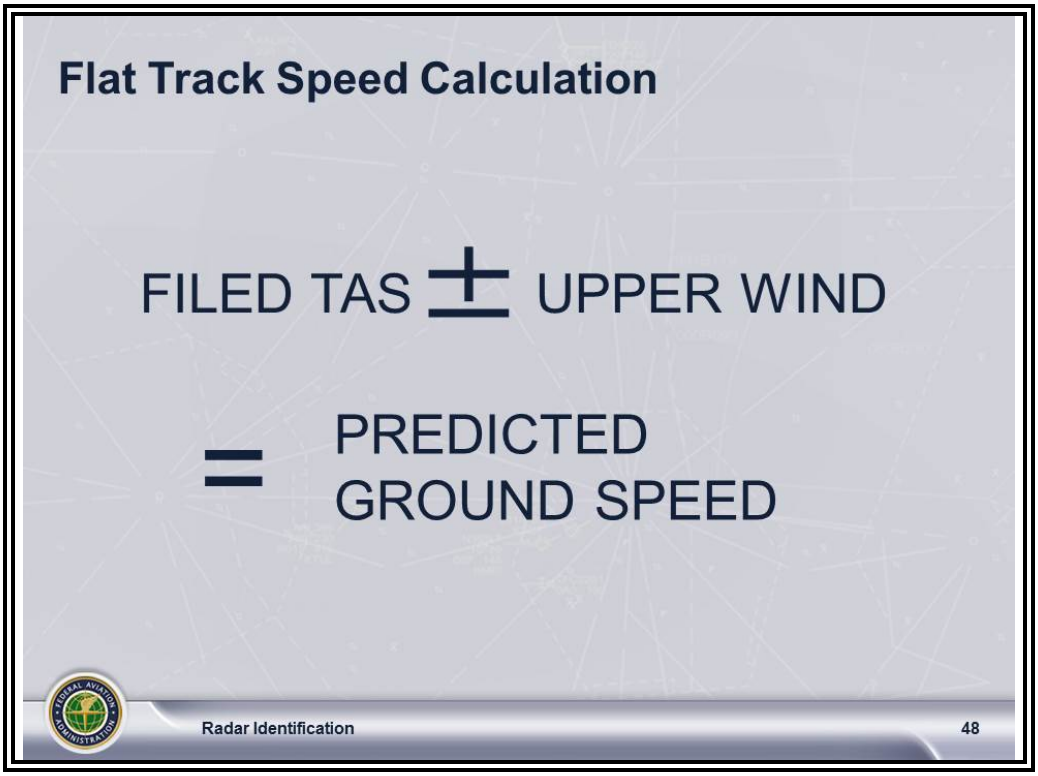
COMPUTER RADAR TRACKING *(Continued)*

FLAT Track (Cont'd)
ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.3.2.1



- Speed must be consistent with flight plan speed.
  - Filed true airspeed (TAS) determines ground speed prediction.
  - Reported, or when unavailable, forecasted upper winds are taken into consideration.
- Planned maneuvers
  - Prediction based on planned route changes

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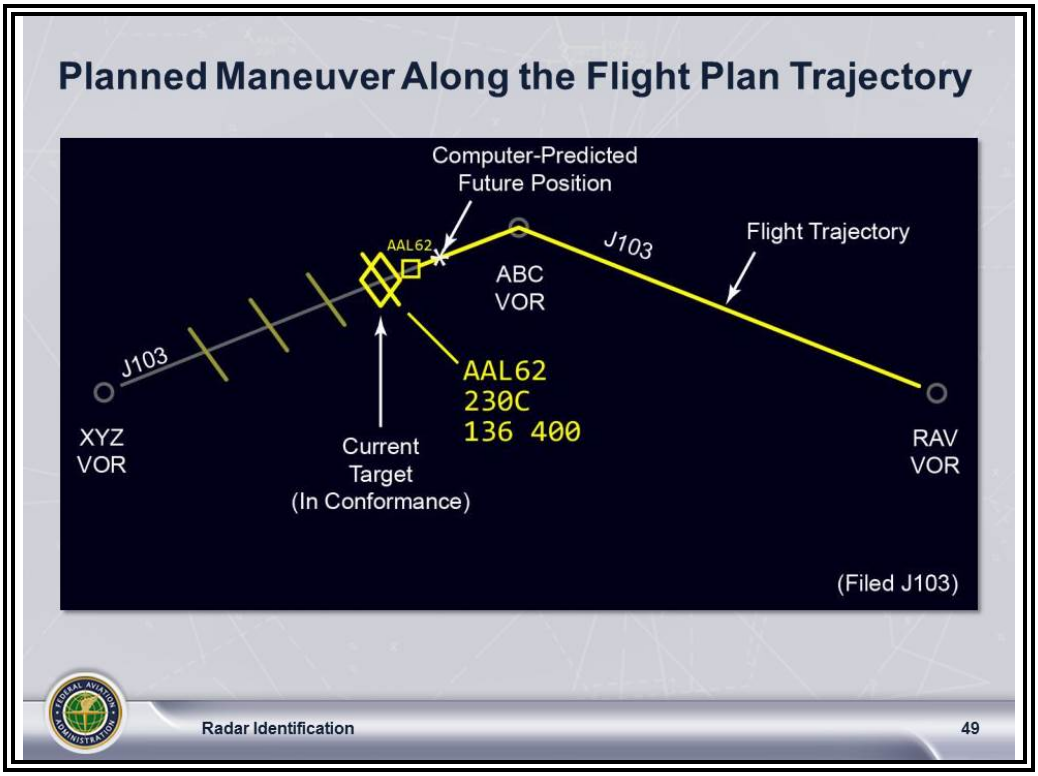
COMPUTER RADAR TRACKING *(Continued)*

FLAT Track (Cont'd)
ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.3.2.1



COMPUTER RADAR TRACKING *(Continued)*

Track Determination
ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.3.2.1

- Type of track is determined by computer.
  - FLAT Track is the first choice.
  - Lateral and longitudinal tolerances are adaptable locally.
- If aircraft is in lateral tolerance but out longitudinally, the computer will:
  - Calculate new flight plan position.
  - Issue updated times.
  - Remain in FLAT Track.
- If aircraft is out of lateral tolerance, the computer will change to Free Track until it returns within lateral tolerance.
- For vectors, weather deviations, and other changes in route of flight, you must enter an amended route for the aircraft to remain in FLAT Track.
- If the aircraft is obviously on a track that will cause it to deviate from its protected airspace:
  - Inform the pilot.
  - Assist in returning.

COMPUTER RADAR TRACKING *(Continued)*

Advantages of FLAT Track Over Free Track

⊙ Advantages of FLAT Track include:

- Auto handoffs
- Auto position time updates
- Coast tracking using Flight Plan (FP) data
- More accurate track prediction
- Forced FDB if handoff is not made
- Conflict Probe more accurate

Typical Sequence of Events

⊙ Track is started (FLAT).

⊙ Track exceeds parameter limits (Free).

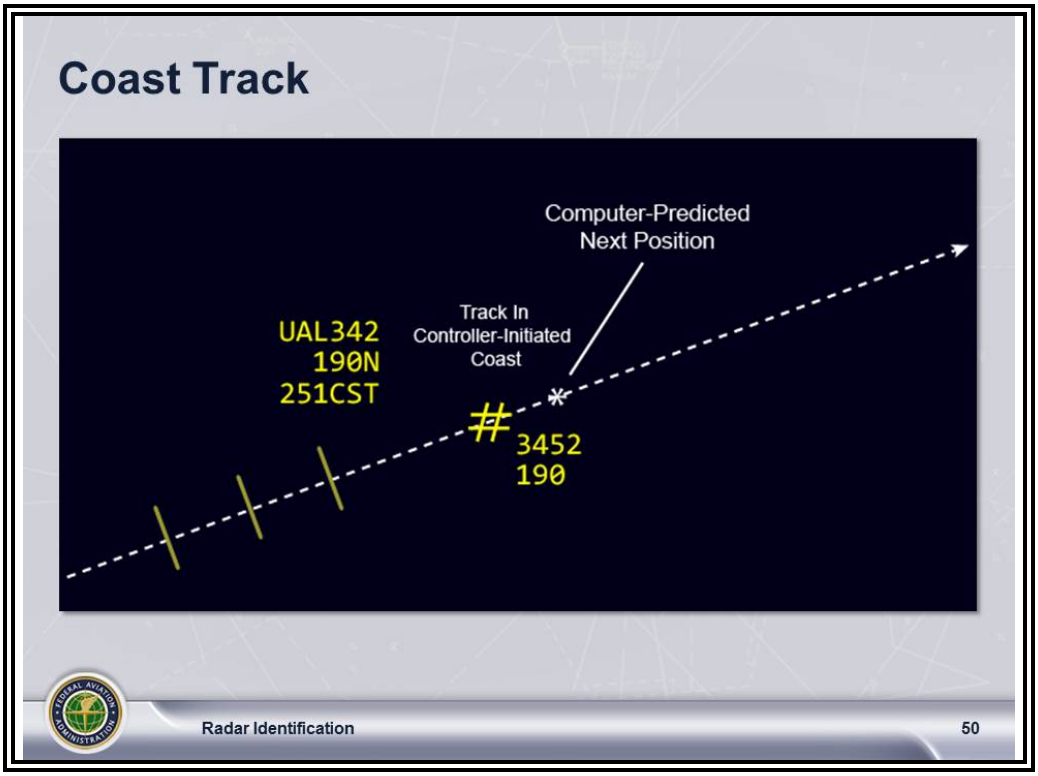
⊙ Route amendment is entered (FLAT).

⊙ Track deviates from route due to weather exceeding parameters (Free).

⊙ Track returns to route (FLAT).

COMPUTER RADAR TRACKING *(Continued)*

Coast Track (CST)
TI 6110.100, 4.3.3; ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2



- There are two types of coast tracks:
  - Controller-initiated, or Commanded Coast Track
  - Un-commanded Coast Track
- Controller-initiated or Commanded Coast Track:
  - **From Flat Track** - The FDB with a Coast Track position symbol (#) will follow the cleared route at the current speed until the trajectory reaches the destination.
  - **From Free Track** – The FDB with a Coast Track position symbol (#) will continue to move on present heading at current speed indefinitely.
    - Optional fields include:
      - → Heading
      - → Speed
      - → Primary track indicator
      - → Positional information (Fix, FRD, trackball coordinates <TBP> or latitude/longitude)

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Coast Track (CST) (Cont'd)
TI 6110.100, 4.3.3; ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2

– If positional information is entered:

→ If your QT command was within tolerance, and no speed/heading entered, the FDB follows the FP at an offset distance equal to the distance from the route when you entered the command.

→ If your QT command was within tolerance, and you DID enter speed/heading, the FDB follows the controller-entered speed/heading.

→ If your QT command was NOT within tolerance, the FDB will follow the last known heading/speed.

NOTE: The tolerance above is the pending pairing adapted distance, defaulted to 32 NM and facility adaptable

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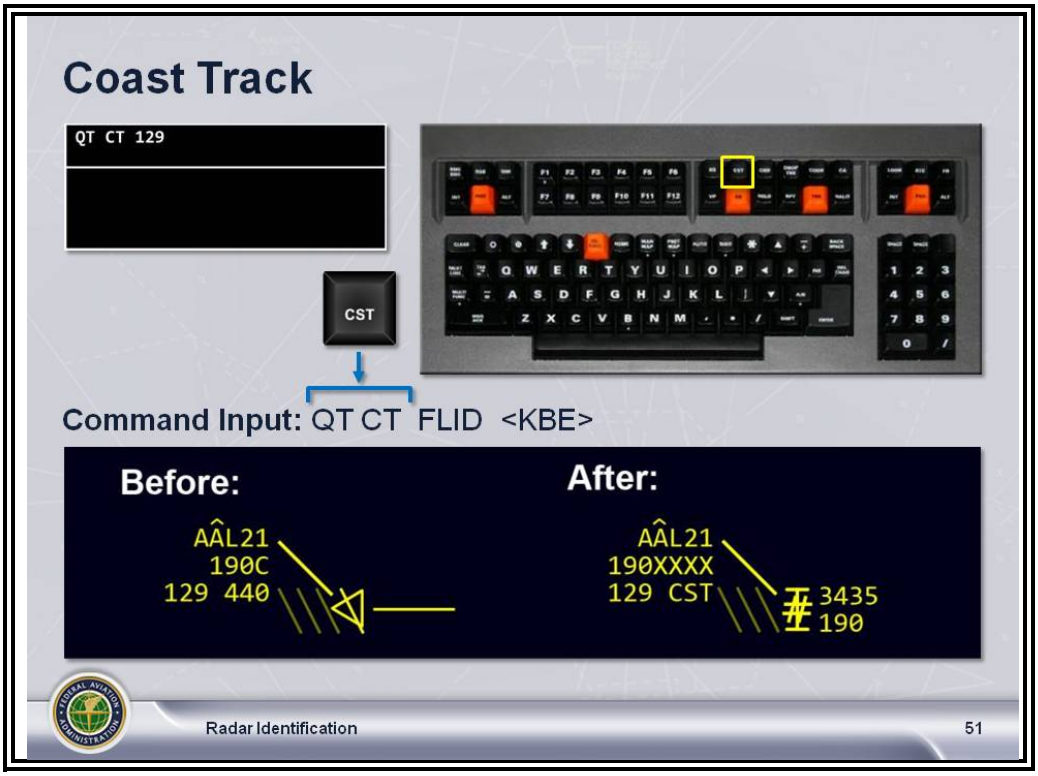
COMPUTER RADAR TRACKING *(Continued)*

Coast Track (CST) (Cont'd)
TI 6110.100, 4.3.3; ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2



- Un-Commanded Coast Track:
  - Caused by a loss of surveillance information or by an un-pairing of the flight plan
  - For an adapted period of time (15 - 60 seconds), the position of the FDB and track symbol, either flat or free, will be based on the track history.
  - For an additional adapted period of time (15 – 60 seconds):
    - The track symbol will change to a Coast Track symbol (#).
    - CST will blink in Field E.
    - The position of the FDB and track symbol will continue to move.
    - At the end of this additional time, the FDB and track symbol will freeze in place.

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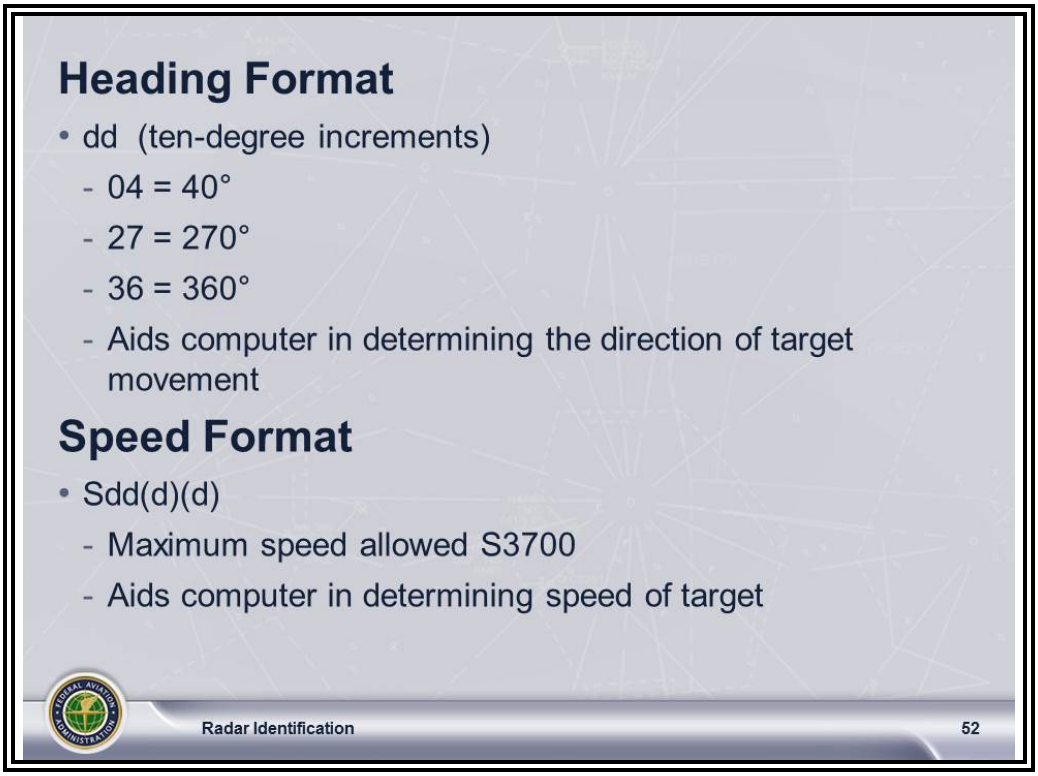
COMPUTER RADAR TRACKING *(Continued)*

Coast Track (Cont'd)
ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2



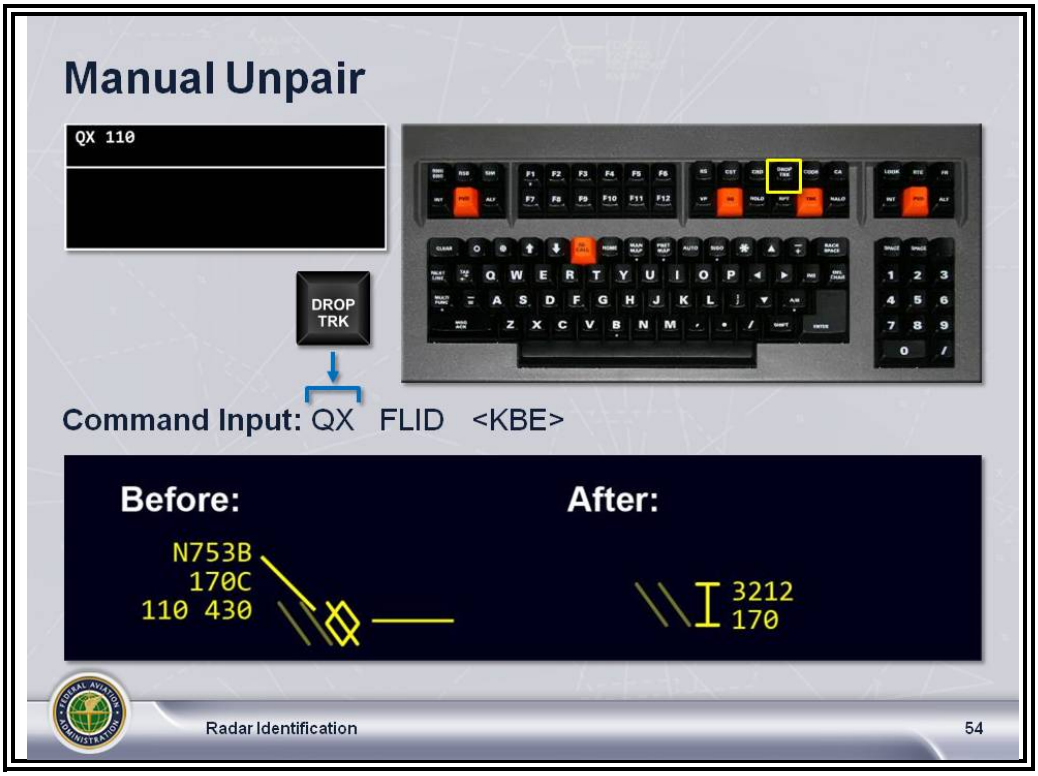
TRACK COMMAND ENTRIES

Remove Strip Command
ERAM MONF 3.2.2.2.1.2.1; ERAM EDSM SRS 210.04 V1B2, Section C1 and C2

- The Remove Strip Command:
  - Removes the FDB
  - Unpairs the target and removes the FP from the computer; FP will gray-out on ACL
  - Deletes code from Beacon Code View
  - Sent to appropriate facilities/sectors

TRACK COMMAND ENTRIES *(Continued)*

Manual Unpair Command
ERAM MONF, 3.2.2.2.1.2.1; ERAM EDSM SRS 210.04 V1B2, Section C.1 and C.2



- The Manual Unpair Command:
  - Removes the FDB
  - Unpairs
  - Retains the FP in the computer (except tentative FPs)
  - Deletes code from Beacon Code View

RADAR FIX POSTING

Requirements
JO 7110.65,
par. 5-1-11

- Radar fix posting is required only when the flight progress recording components of the EAS FDP are **NOT** operational.
- For each controlled aircraft in the sector of responsibility, manually record the:
  - Aircraft's position at least once in each sector
  - Observed or reported time over a fix

CONCLUSION

Summary

- Primary target identification methods and associated phraseology
- Beacon target identification methods and associated phraseology
- Questionable identification procedures
- Target marker requirements
- Radar fix posting requirements
- Free and flat track symbols
- Pairing commands (remove strip; manual unpairing request)

End-of-Lesson Test

- Your instructor will now administer the End-of-Lesson Test.