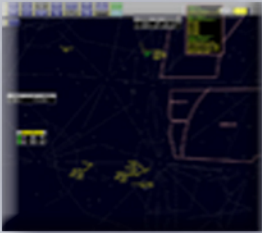




# FAA Lesson Plan

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## En Route Stage 4 Radar Controller Training

H	DEPT	
JFK		
AAL321	60	
SWA123	150	
LGA		
N2234	340	
PHL		
UAL167	50	
N133A	120	
N12A	UFR	
N11A	0TP	

## Instructor

## Radar Data Display Lesson 2



**55055**  
**V.1.06**



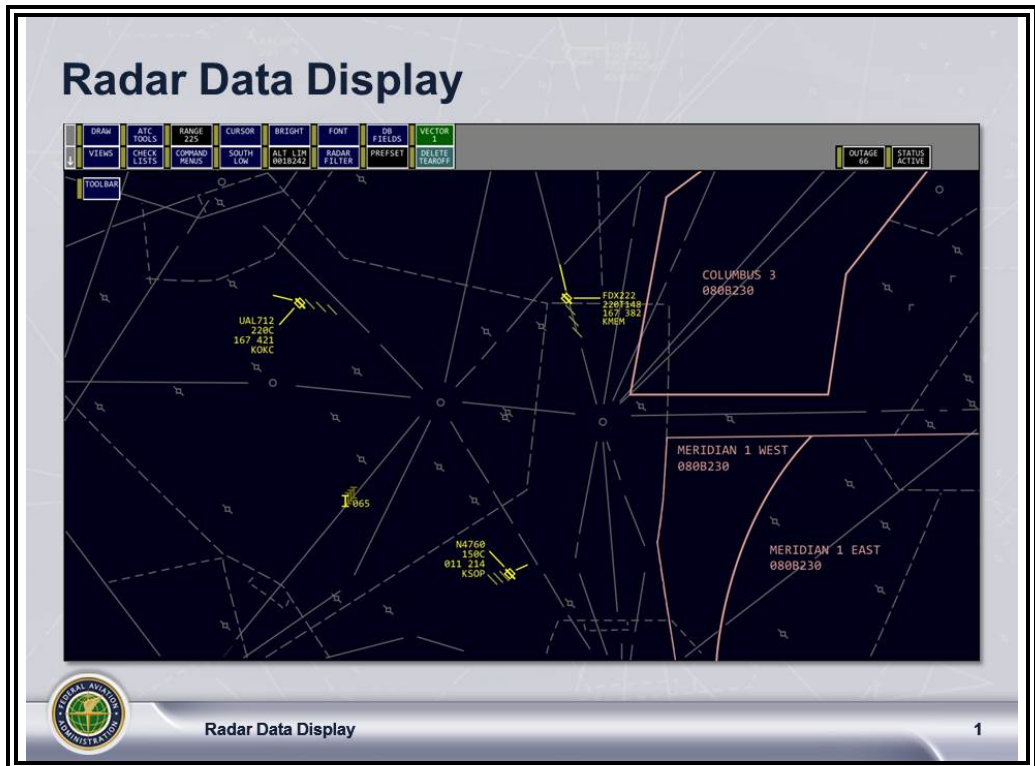
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## LESSON PLAN DATA SHEET

<b>COURSE NAME:</b>	RADAR CONTROLLER TRAINING
<b>COURSE NUMBER</b>	55055
<b>LESSON TITLE:</b>	RADAR DATA DISPLAY
<b>DATE REVISED:</b>	2014-04
<b>VERSION</b>	V.1.06
<b>REFERENCES:</b>	TI 6110.100, En Route Automation Modernization (ERAM) Air Traffic Manual (ATM): R-Position User Manual; JO7110.311B, Procedural Guidance for FAA Order JO 7110.65 following En Route Automation Modernization (ERAM) Implementation; JO 7110.65V, Air Traffic Control; ERAM EDSM SRS 210.04 V1B1, En Route Automation Modernization (ERAM) En Route Display Management (EDSM) R-Position and General EDSM Requirements Volume 1, Book 1; ERAM EDSM SRS 210.04 V1B2, En Route Automation Modernization (ERAM) En Route Display Management Appendices for R-Position and General EDSM Requirements Volume 1, Book 2; ERAM SURV SRS 210.24, En Route Automation Modernization (ERAM) Surveillance (SURV); PRED 1370 (PR E65313), Remove UBC from FDB and Set AHI Caret Regardless of UBC Status
<b>HANDOUTS:</b>	55055-HO2, REFERENCE GUIDE  <i>DISTRIBUTE HANDOUT PRIOR TO THE START OF THE LESSON. REFER TO 55055-HO02B.PDF [BLACK/WHITE] OR 55055-HO02C.PDF [COLOR.]</i>
<b>EXERCISES:</b>	NONE
<b>END-OF-LESSON TEST:</b>	YES ( <i>REFER TO 55055-ELT02B.PDF [BLACK/WHITE] OR 55055-ELT02C.PDF [COLOR.]</i> )
<b>PERFORMANCE TEST:</b>	NONE
<b>MATERIALS:</b>	NONE
<b>OTHER PERTINENT INFORMATION:</b>	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



## Purpose

The Situation Display conveys important information to you through the use of numerous symbols.

## Job Relevance

- ⦿ As a radar controller, you will be responsible for the safe, orderly, and expeditious movement of all air traffic in your sector.
  - To do this, you must be able to use the Situation Display effectively and to read and interpret all the data on the Situation Display and associated equipment.

# INTRODUCTION *(Continued)*

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## Objectives



### Objectives

At the end of this lesson, you will be able to identify selected data on the Situation Display, including:

1. Radar Symbols
2. Full Data Block (FDB)
3. Limited Data Block (LDB)
4. Weather Displays
5. Miscellaneous Displays
6. Outages



Radar Data Display

2

☞ **NOTE:** Review the lesson objectives.

---


# RADAR SYMBOLS

## Map Symbols

TI 6110.100, par.  
3.2; ERAM EDSM  
SRS 210.04 V1B2,  
Appendix A.8



Map Symbols	
Map Symbol	Description
○	VOR
⊙	TACAN
+	Intersections and Waypoints
□	Major Airport
└	Satellite Airport
⏏	Emergency Airport
✕	Obstructions

 Radar Data Display 3

- ⦿ You can adjust the brightness of the various map elements and features. You will learn how to do this in a later lesson.

## RADAR SYMBOLS *(Continued)*

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### Tracking and Pairing

#### Terminology

ERAM EDSM SRS  
210.04 V1B1, par.  
3.2.2.1; ERAM  
SURV SRS  
210.24, par. 5.3

- ⊙ **Target:** An object present in a volume of airspace that is detected and reported by a surveillance source. An aircraft is one example of a target.
  - ⊙ **Track:** A collection of reported and derived information associated with a sequence of surveillance reports from the same aircraft.
    - Track data includes position, and if available, Mode C altitude and beacon code.
  - ⊙ **Pairing:** Automatic or manual association of flight data within a track.
  - ⊙ **Track-All Tracker:** The tracker resolves targets into tracks independently from the presence of flight data, and in that sense tracks everything it sees.
-


## RADAR SYMBOLS *(Continued)*

### Target Symbols

TI 6110.100, par. 4.1; ERAM EDSM SRS 210.04 V1B1, par. 3.2.2.1



Target Symbols	
Target Symbol	Description
X	Primary target paired to a flight plan
●	Beacon target paired to a flight plan, eligible for reduced separation
/	Unpaired beacon or unpaired beacon not MCI eligible
\	Beacon target paired to a flight plan
+	Primary target of good quality, not paired to a flight plan
•	Primary target not of good quality, not paired to a flight plan
≡	Identifying beacon
V	1200 beacon code paired or unpaired to a flight plan not eligible for MCI alert
I	Beacon target not paired to a flight plan and eligible for MCI alert

 Radar Data Display 4






- ⦿ Nine target symbols are used to display radar data.


# RADAR SYMBOLS *(Continued)*

## Position Symbols

TI 6110.100,  
par. 4.3.3



Position Symbols	
Position Symbol	Description
	<b>Flat Track</b> – Used to indicate a flight is paired to a track that is receiving radar data, not in hold and in conformance with its flight plan
	<b>Free Track</b> – Used to indicate a flight is paired to a track that is receiving radar data, not in hold and not in conformance with its flight plan
	<b>Coast Track</b> – Used to indicate that radar data is not being received for a flight, the flight is unpaired or manually entered into coast status
	<b>Frozen Track</b> – Used to indicate an FDB or suppressed format FDB that is eligible for display has been commanded frozen
	<b>Hold Track</b> – Used to indicate a flight that is in hold and is receiving radar data

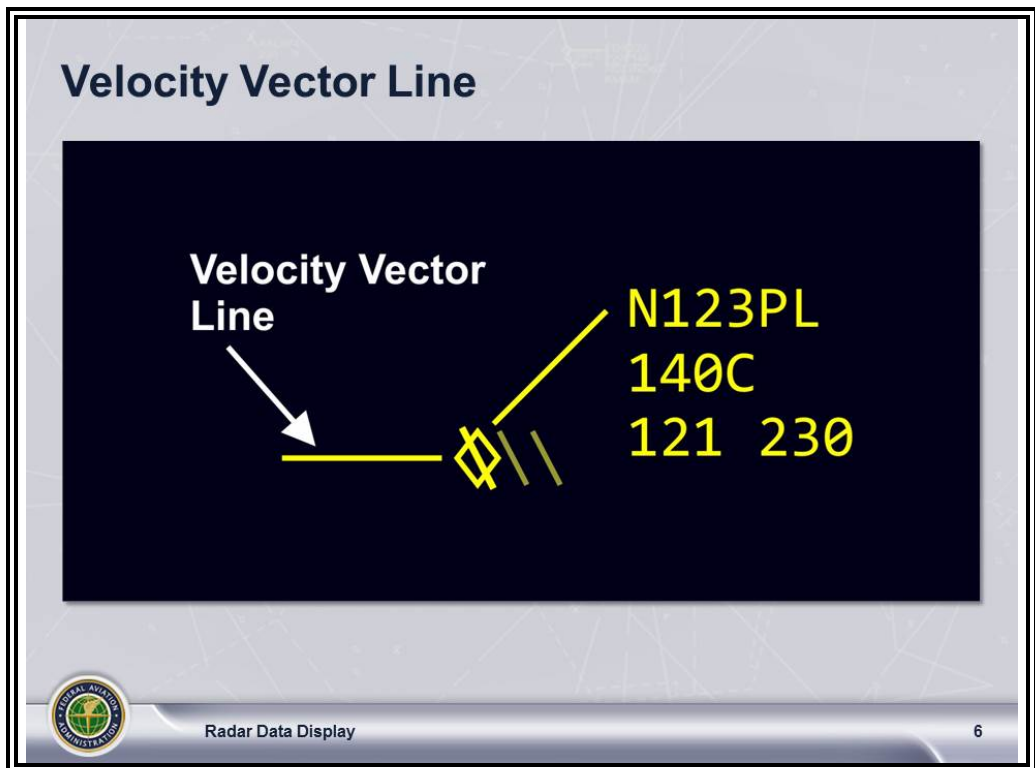
 Radar Data Display 5

- ⦿ Position symbols are used only with Full Data Blocks (FDBs).

# RADAR SYMBOLS *(Continued)*

## Velocity Vector

TI 6110.100,  
par. 4.13



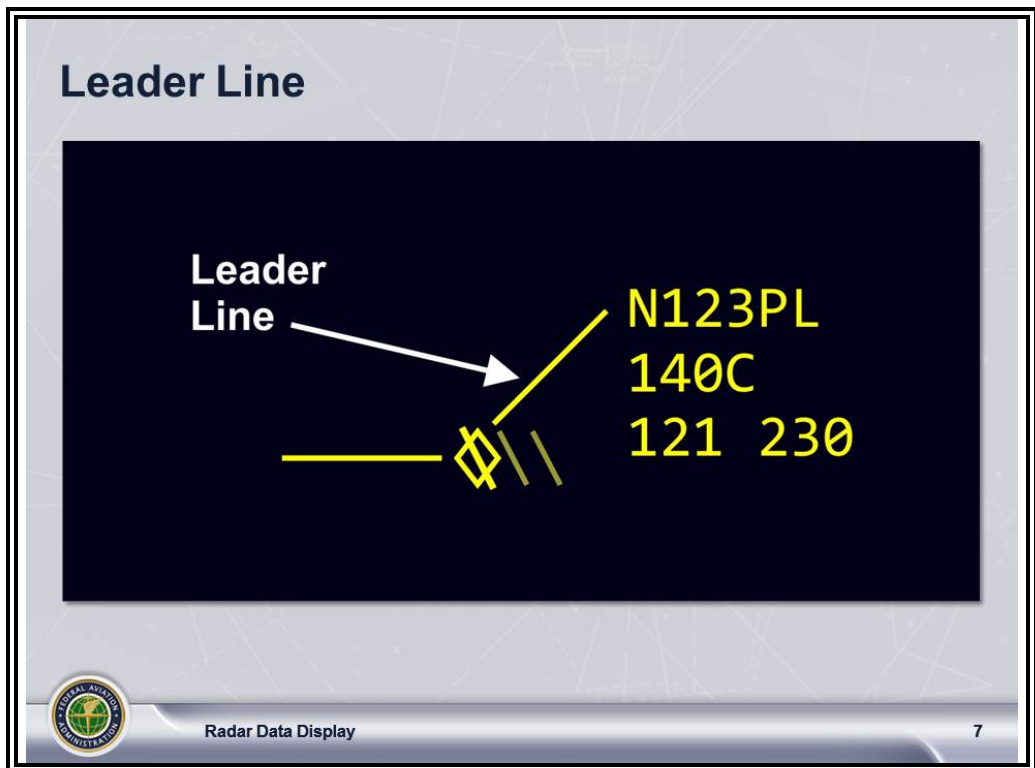
- ⦿ Represents the distance and direction of travel
  - Locally adaptable to be either minutes of 0, 1, 2, 4 or 8, or miles of 0, 5, 10, 20 or 40
  - Based on computer ground speed and track
    - Line is plotted in proportion to aircraft speed rounded to the nearest 15 knots

👉 **NOTE:** Discuss smoothing and how it affects the velocity vector line.

# RADAR SYMBOLS *(Continued)*

## Leader Line

TI 6110.100,  
par. 4.13



- ⦿ Connects the position symbol with the Full Data Block (FDB)
  - You can control leader line length and offset for data blocks.
  - FDBs can be offset to any of eight compass directions; NW=1, N=2, NE=3, W=4, E=6, SW=7, S=8, SE=9.
  - The format for requesting a FDB offset is d space FLID ENTER.
  - /d determines the length of the leader. Leader length options are:
    - /0 - No leader
    - /1 - .625 inches
    - /2 - 1.25 inches
    - /3 - 2.5 inches
  - d/d offsets the data block and changes the leader length simultaneously.

# RADAR SYMBOLS (Continued)

## Review

❓ **QUESTION:** Describe the meanings of track and pairing.


**ANSWER:** A track is a collection of reported and derived information associated with a sequence of surveillance reports from the same aircraft. Pairing is the automatic or manual association of flight data within a track.



### Response Item

The ◁ is a \_\_\_\_\_ symbol.

- A. position
- B. radar
- C. target

Radar Data DisplayClick to Show Answer8

**SLIDE ANSWER:** A

*Continued on next page*

## RADAR SYMBOLS *(Continued)*


Review  
(Cont'd)



### Response Item

The symbol for a paired primary target is \_\_\_\_\_.

- A. •
- B. X
- C. +

Radar Data DisplayClick to Show Answer9

**SLIDE ANSWER:** B

*Continued on next page*

## RADAR SYMBOLS *(Continued)*

Review  
(Cont'd)



### Response Item

An unpaired primary target is displayed as \_\_\_\_\_.

- A. /
- B. X
- C. +



Radar Data Display

[Click to Show Answer](#)

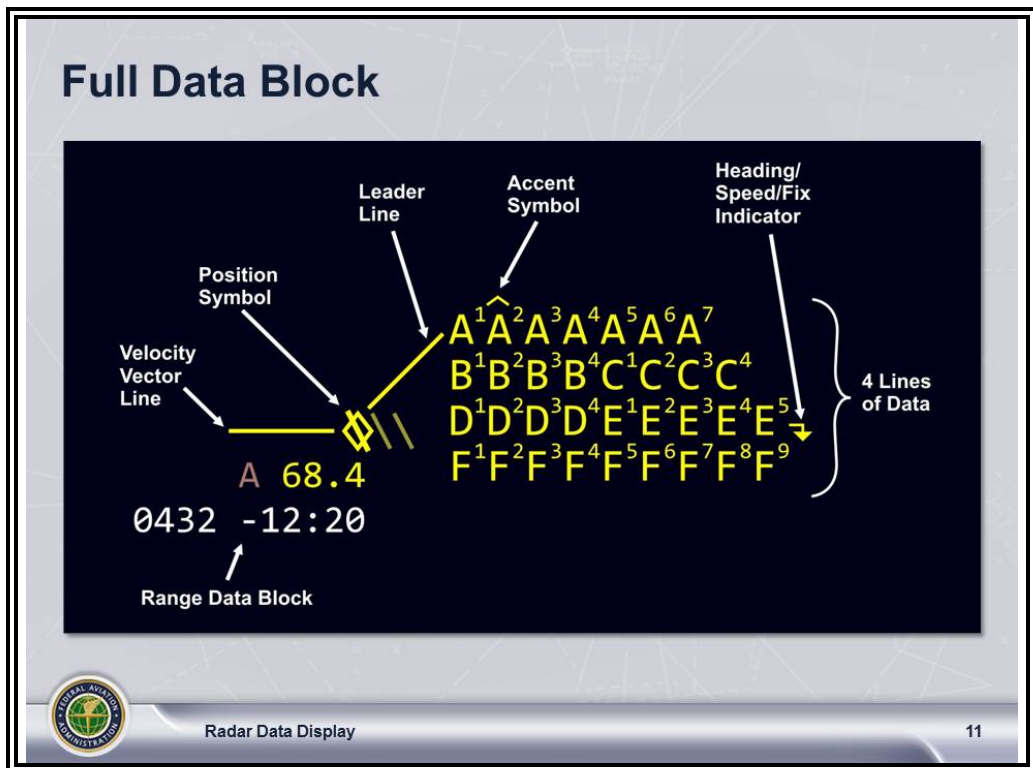
10

**SLIDE ANSWER: C**

# FULL DATA BLOCK (FDB)

## Full Data Block

TI 6110.100, par.  
4.3; ERAM EDSM  
SRS 210.04 V1B2  
Appendix E.2



### Full Data Block:

- A four line by 11 character array
- First line displays Aircraft Identification (AID)
- Second line displays altitude information:
  - Interim altitude indicated by a T
  - Local interim altitude (if present) indicated by an L
- Third line displays the Computer Identification (CID), Field E-type data and the Heading/Speed/Free Form Text (HSF) Indicator
- Fourth line displays HSF, aircraft and destination data
- Has a position symbol, leader line and velocity vector
- Displayed at FDB brightness

*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

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### **Full Data Block (Cont'd)**

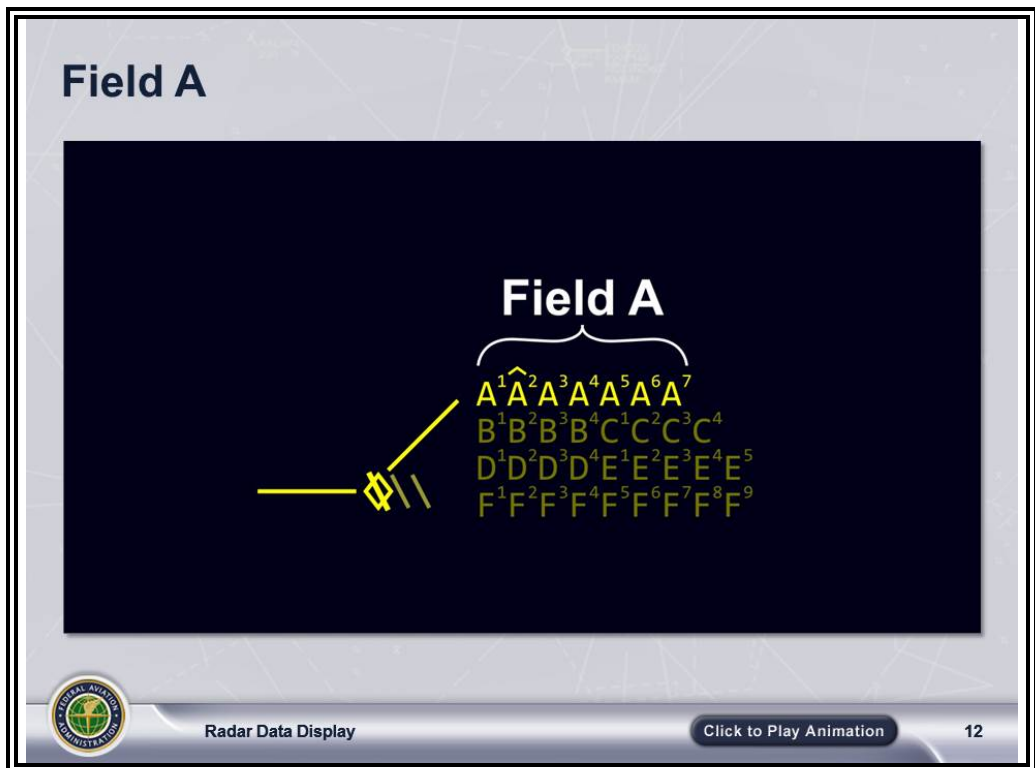
TI 6110.100, 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2  
Appendix E.2

- Provides access to Altitude, Speed and Heading pop-up menus
  - Can display a Range Data Block (RDB) below the target symbol
    - May include Non-ADS-B, CRR and STA/DCT indicators
  - ⦿ The FDB text array, including the leader line, velocity vector and the track position symbol, blinks when the flight is eligible for conflict alert display at the sector.
-

# FULL DATA BLOCK (FDB) (Continued)

## Field A

TI 6110.100,  
pars. 4.3.1, 4.3.9;  
PRED 1370  
(PR E65313)



- ⦿ Field A is located on the 1st line of the data block and may be up to 7 characters long.
- ⦿ Contains the Aircraft Identification (AID)
- ⦿ An accent symbol (^) is displayed over the second character:
  - If the flight object indicates that automatic handoff initiation has been inhibited
- ⦿ Field A will blink on Mode C Intruder Conflict Data Blocks.

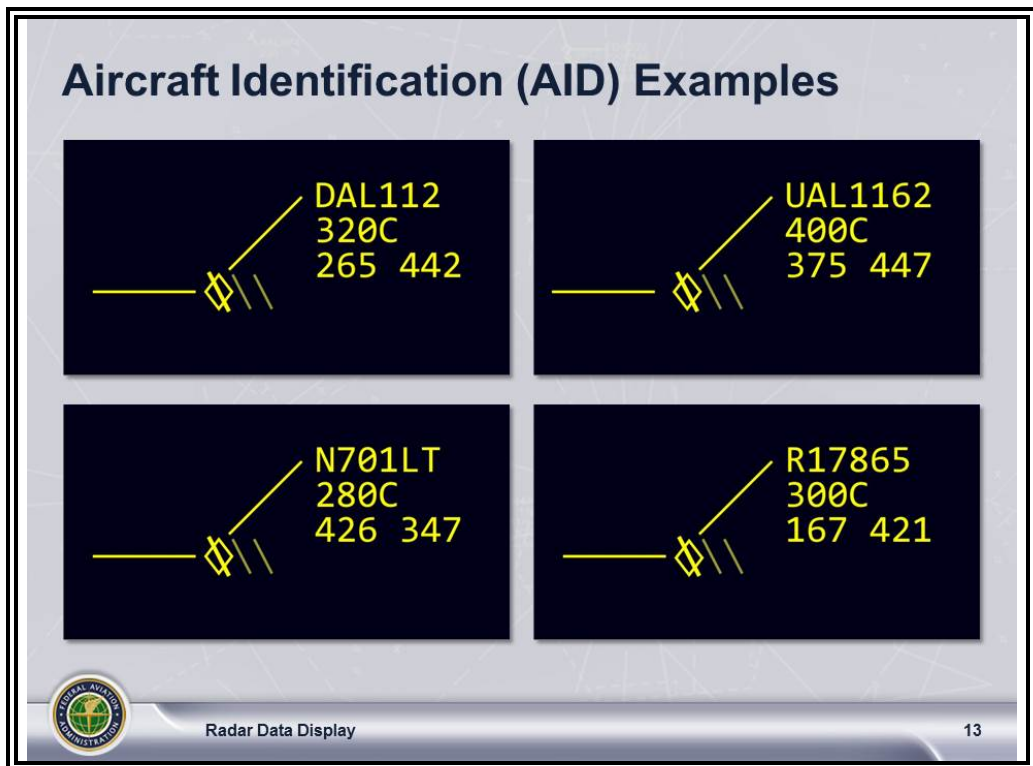
*Click to display  
accent symbol.*

*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

### Field A (Cont'd)

TI 6110.100,  
pars. 4.3.1, 4.3.9;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



# FULL DATA BLOCK (FDB) (Continued)

## Field B

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



- ⦿ Field B is located on the 2nd line of the data block and may be up to four characters long.
  - Characters B1 through B3 contain either:
    - Assigned altitude information (digits representing hundreds of feet), or
    - The letters OTP, VFR or ABV
  - B4 contains one of the computer generated altitude qualifiers on the slides that follow.

*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

### Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



### Field B (Cont'd)



Controller-entered reported altitude equals single assigned altitude.

(Field C will be vacant.)



Radar Data Display

15



### Field B (Cont'd)



No controller or Mode C reported altitude has been received for aircraft.

(Field C will be vacant.)



Radar Data Display

16

*Continued on next page*

# FULL DATA BLOCK (FDB) *(Continued)*

## Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



## Field B (Cont'd)



Controller-entered or Mode C reported altitude is below assigned altitude when flight is climbing.



Radar Data Display

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## Field B (Cont'd)



Non-RVSM indicator is a coral box around the B4 character.



Radar Data Display

18

*Continued on next page*

# FULL DATA BLOCK (FDB) *(Continued)*

## Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



## Field B (Cont'd)



Controller-entered or Mode C reported altitude is above assigned altitude when flight is descending.



Radar Data Display

19



## Field B (Cont'd)



Mode C reported altitude is within  $\pm 200$  feet of single assigned altitude.

(Field C will be vacant.)



Radar Data Display

20

*Continued on next page*

# FULL DATA BLOCK (FDB) *(Continued)*

## Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



## Field B (Cont'd)



Mode C previously reported aircraft at assigned altitude, and either:

- Aircraft has deviated 300 feet or more above assigned altitude, or
- Controller-entered reported altitude is above assigned altitude



Radar Data Display

21



## Field B (Cont'd)



Mode C previously reported aircraft at assigned altitude, and either:

- Aircraft has deviated 300 feet or more below assigned altitude, or
- Controller-entered reported altitude is below assigned altitude



Radar Data Display

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*Continued on next page*


## FULL DATA BLOCK (FDB) *(Continued)*

### Field B (Cont'd)


TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



### Field B (Cont'd)



Mode C reported altitude is within  $\pm 200$  feet of upper or lower limit of the block altitude or the controller-entered reported altitude is within the block altitude.  
(Field C will contain the upper limit.)

 Radar Data Display 23

**NOTE:** An aircraft climbing or descending to a block altitude will display the highest altitude of the block when climbing and the lowest altitude of the block when descending, until the aircraft is in the block.

*Continued on next page*


## FULL DATA BLOCK (FDB) *(Continued)*

### Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2




### Field B (Cont'd)



The diagram shows a radar data display with a dark background. A yellow line represents an aircraft track, ending in a yellow diamond symbol. To the right of the track, the following text is displayed in yellow: **N390GW**, **130F** (with a white arrow pointing left to it), and **175 160**.

Controller-entered or beacon-reported altitude indicates either the aircraft has reached the first altitude or Mode C reported altitude is within  $\pm 200$  feet of the first altitude.

If the aircraft has been cleared altitude/fix/altitude, the first altitude will be displayed in fields B1 to B3.

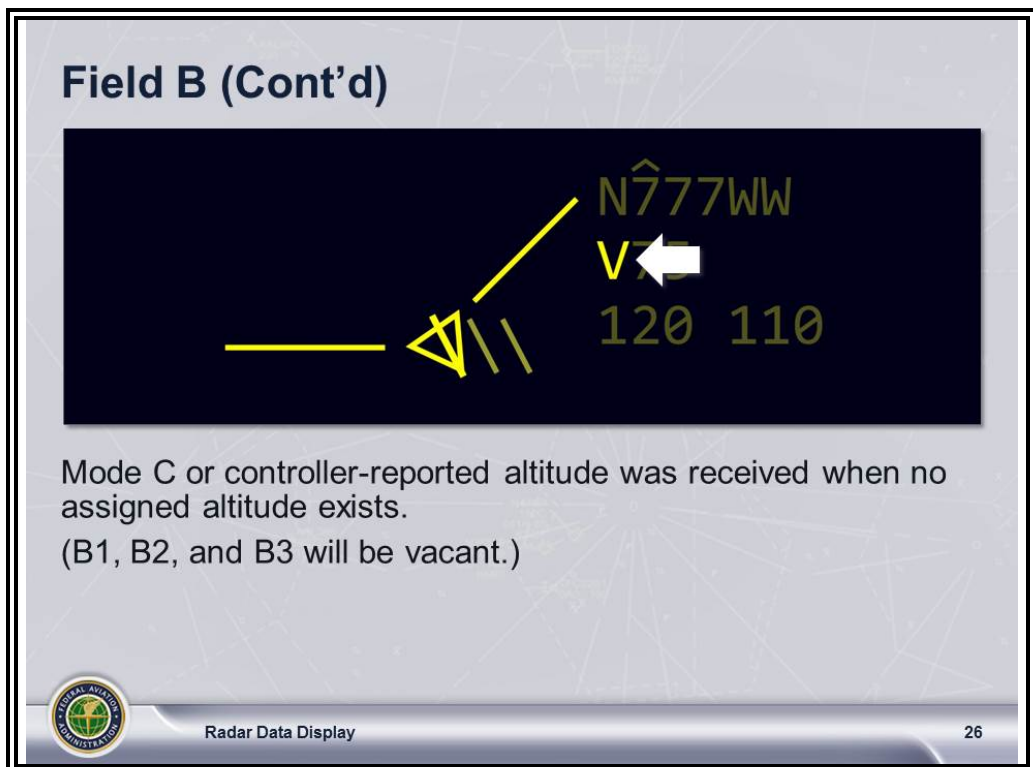
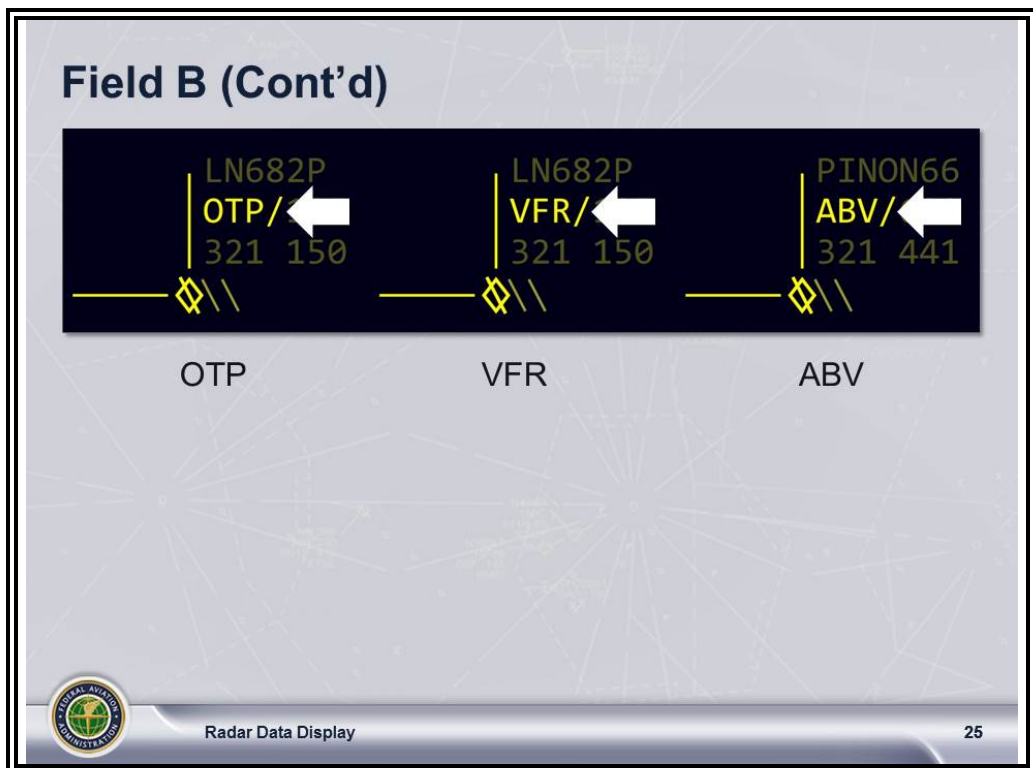
Radar Data Display24

*Continued on next page*

# FULL DATA BLOCK (FDB) (Continued)

## Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2  
Appendix E.2



Continued on next page

# FULL DATA BLOCK (FDB) *(Continued)*

## Field B (Cont'd)

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



### Field B (Cont'd)



Mode C is unreliable or not being received for an aircraft that had previously been radar-beacon reported at an altitude.



Radar Data Display

27



### Field B (Cont'd)



Interim altitude is displayed in B1, B2, and B3.



Radar Data Display

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*Continued on next page*


## FULL DATA BLOCK (FDB) *(Continued)*

### Field B (Cont'd)


TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



### Field B (Cont'd)



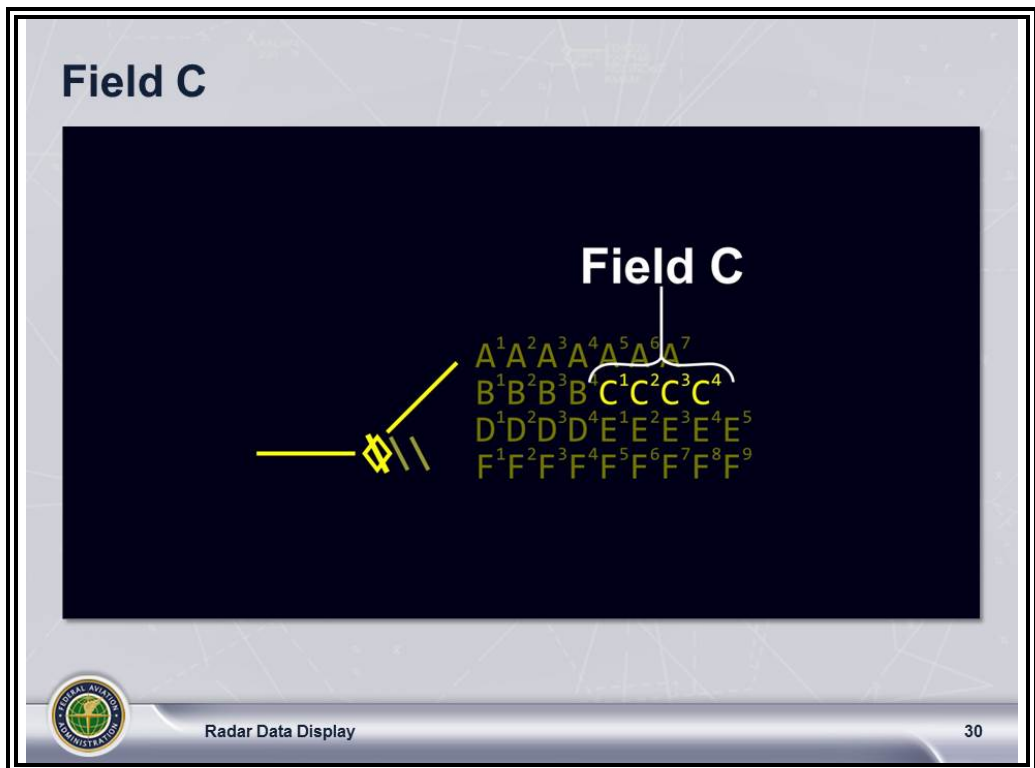
Local interim altitude is displayed in B1, B2 and B3.

 Radar Data Display 29

## FULL DATA BLOCK (FDB) (Continued)

### Field C

TI 6110.100,  
par. 4.3.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



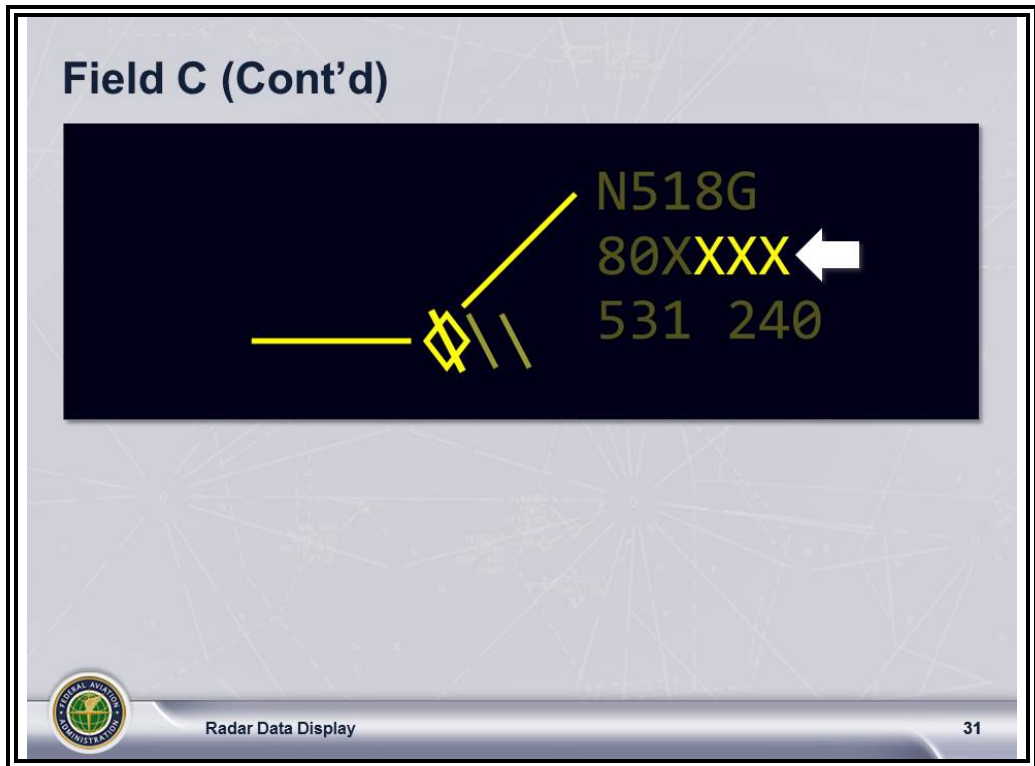
- ⦿ Four character positions
  - C1 through C3 contain:
    - Mode C or controller-reported altitude
    - Upper altitude of a block altitude

*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

### Field C (Cont'd)

TI 6110.100,  
par. 4.3.7



- ⦿ Four Xs (XXXX) indicate Lost Mode C (B4, C1-3).
  - Displayed for an aircraft that previously had Mode C when an adapted number of returns have been received with no Mode C
  - Removed once Mode C is received

*Continued on next page*


## FULL DATA BLOCK (FDB) (Continued)

### Field C (Cont'd)


ERAM EDSM SRS  
210.04 V1B2  
Appendix E.2



### Field C (Cont'd)



Controller-entered reported altitude does **NOT** equal single assigned altitude.

 Radar Data Display 32

- ⦿ C4 position contains a pound sign (#) to indicate:
  - Aircraft is **NOT** responding with Mode C altitude.
  - Controller-entered altitude does **NOT** equal the single assigned altitude.
- ⦿ If Mode C is being received, CERA entry has to be within an adapted parameter or it will not be overridden by Mode C.

*Continued on next page*


## FULL DATA BLOCK (FDB) (Continued)

### Field C (Cont'd)


TI 6110.100,  
par. 4.3.8;  
JO 7110.311B,  
par. 5-2-17



### Field C (Cont'd)



"X" is displayed when the aircraft's vertical rate of climb or descent exceeds the adapted value for the aircraft performance characteristics.

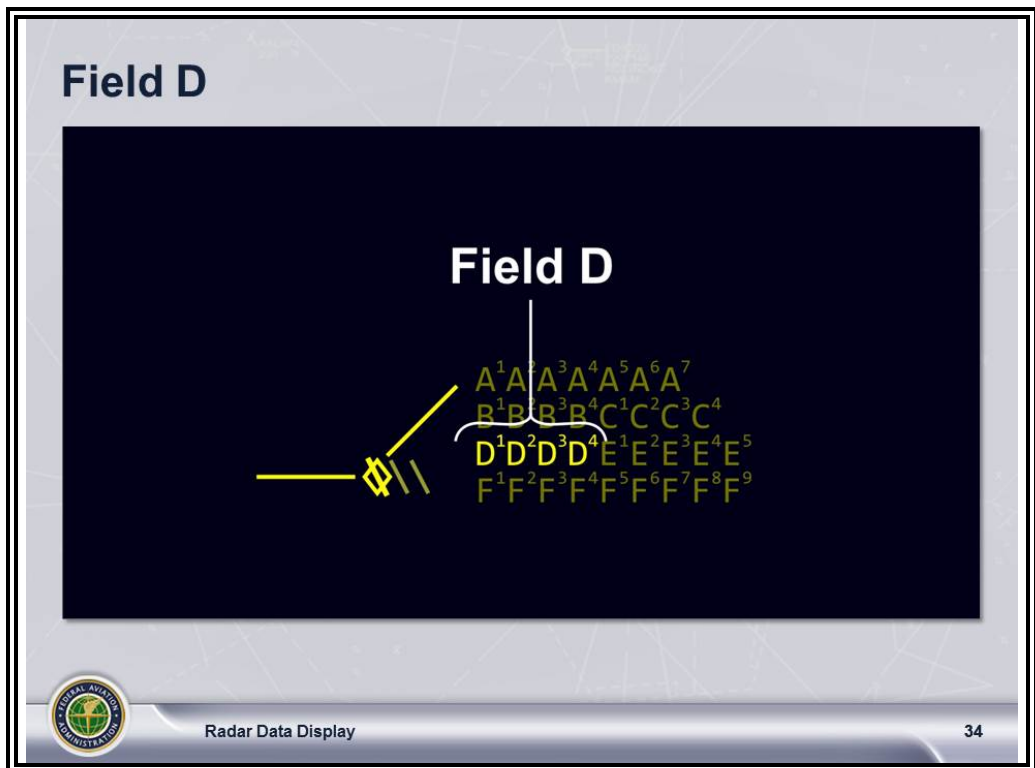
 Radar Data Display 33

- ⦿ A single X following the Mode C altitude value serves as the Exceptional Vertical Rate Indicator (EVRI):
  - Indicates the aircraft's vertical rate of climb or descent exceeds the adapted value for the aircraft performance characteristics
  - Once the aircraft returns to its expected climb or descent rate, the EVRI will be removed
- ⦿ The display of the EVRI is an invalid Mode C and cannot be used for separation.
- ⦿ The Mode C altitude readout must be validated after the X is no longer displayed in the data block.
- ⦿ Field C is blank if Mode C or controller-entered altitude equals assigned altitude.

## FULL DATA BLOCK (FDB) (Continued)

### Field D

ERAM EDSM SRS  
210.04 V1B1,  
par. 3.2.2.3.2.1;  
ERAM EDSM SRS  
210.04 V1B2,  
Section C.1



⊙ Four character positions, D1 through D4, contain:

- Computer Identification (CID)

**NOTE:** CID format is 'ddd' or 'daa' where 'd' is a digit and 'a' is an alphanumeric (letter or digit).

- R in position D1 indicates the sector does not have track control.

*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

### Field D (Cont'd)

ERAM EDSM SRS  
210.04 V1B1,  
par. 3.2.2.3;  
ERAM EDSM SRS  
210.04 V1B2,  
Appendix E.2



### Field D (Cont'd)

Your sector does **NOT** have track control.

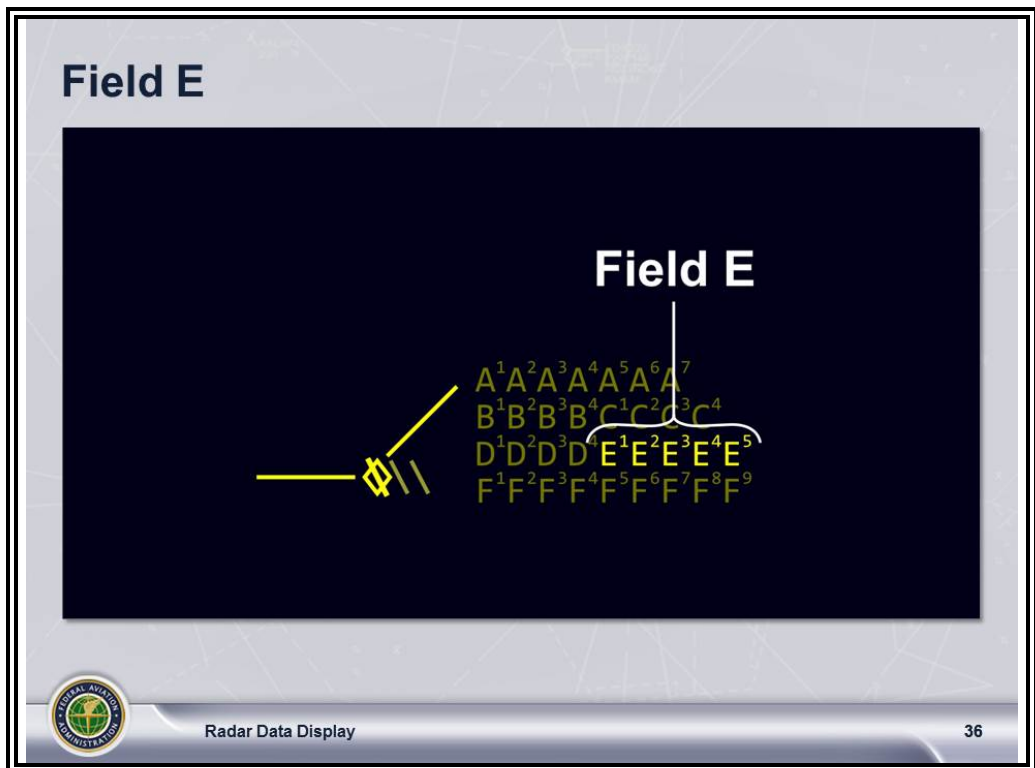
Your sector has track control.

Radar Data Display 35

## FULL DATA BLOCK (FDB) *(Continued)*

### Field E

TI 6110.100,  
par. 4.3.4;  
ERAM EDSM SRS  
210.04 V1B1,  
3.2.2.3.2.1



- ⦿ Field E data may contain up to five characters.
- ⦿ Certain display objects blink on and off.
- ⦿ The Heading/Speed/Free Form Text (HSF) Indicator follows Field E.

*Continued on next page*

## FULL DATA BLOCK (FDB) (Continued)

### Field E (Cont'd)

TI 6110.100,  
par. 4.3.4



### Field E (Cont'd)



Certain display objects in Field E blink for the duration of the condition:

- Alert Beacon Codes 7700 (EMRG) and 7600 (RDOF)
- Two adapted special beacon codes

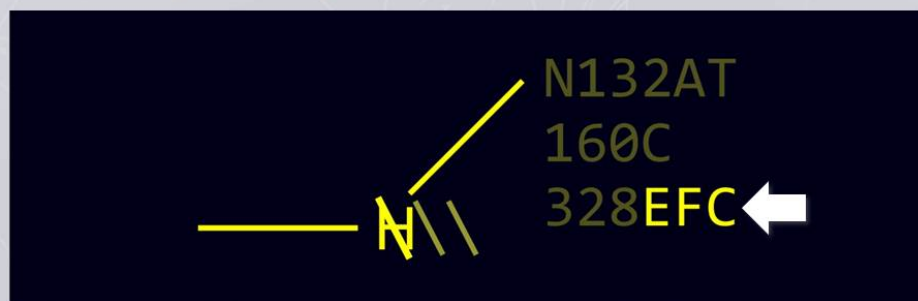


Radar Data Display

37



### Field E (Cont'd)



EFC displays for an aircraft in Hold when the EFC is within a locally adapted number of minutes.



Radar Data Display

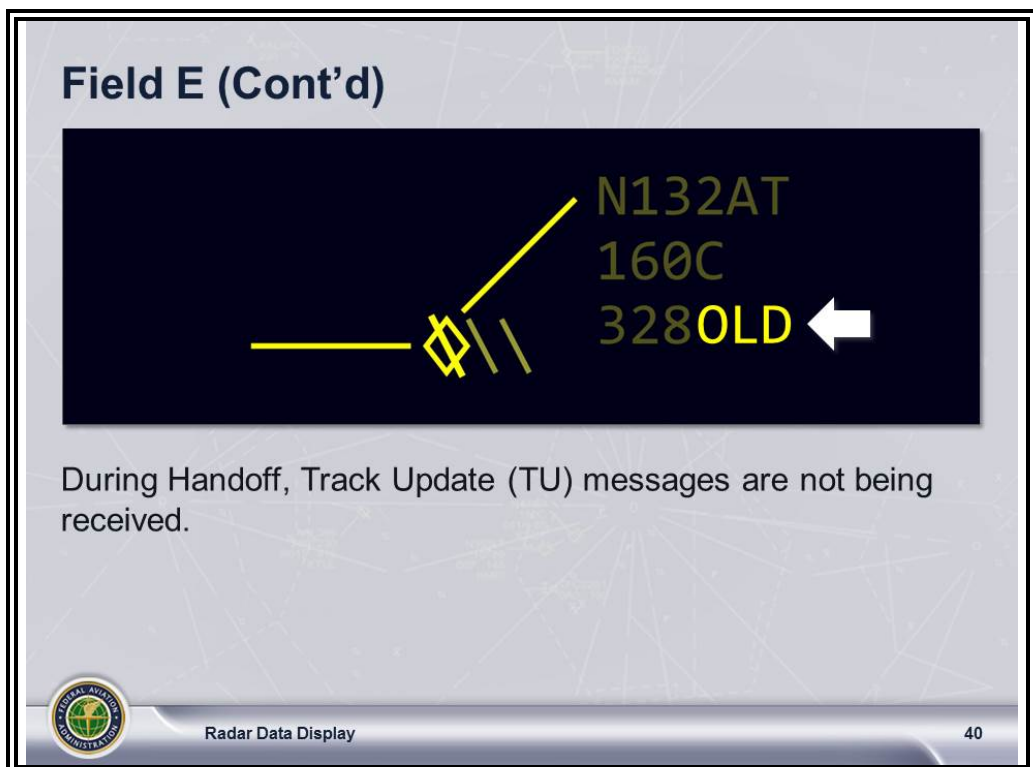
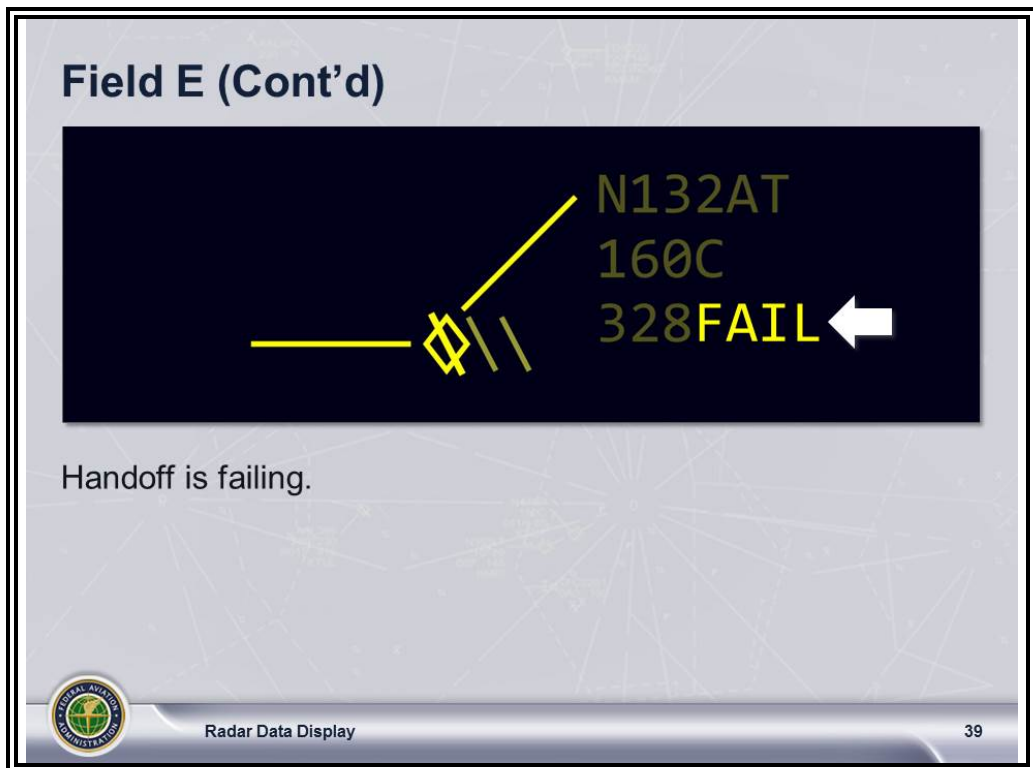
38

Continued on next page

## FULL DATA BLOCK (FDB) *(Continued)*

### Field E (Cont'd)

TI 6110.100,  
par. 4.3.4



*Continued on next page*


## FULL DATA BLOCK (FDB) *(Continued)*

### Field E (Cont'd)

TI 6110.100,  
par. 4.3.4




**Field E (Cont'd)**



N132AT  
160C  
328MIF ←

E-MSAW alert is indefinitely suppressed.




Radar Data Display

41




**Field E (Cont'd)**



N132AT  
160C  
328MOFF ←

E-MSAW alert is suppressed on a track for a specific alert.



Radar Data Display

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*Continued on next page*

# FULL DATA BLOCK (FDB) (Continued)

## Field E (Cont'd)

TI 6110.100,  
par. 4.3.4



### Field E (Cont'd)







E-MSAW alert for aircraft.

 Radar Data Display 43



### Field E (Cont'd)

		
<b>H-dd</b> Track is being handed off to sector in same center.	<b>O-dd</b> Handoff has been accepted by sector in same center.	<b>K-dd</b> Handoff has been accepted or "stolen" with /OK.

 Radar Data Display 44

Continued on next page


# FULL DATA BLOCK (FDB) (Continued)

## Field E (Cont'd)


TI 6110.100,  
par. 4.3.4



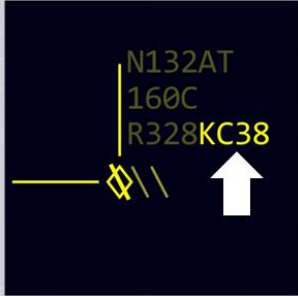
### Field E (Cont'd)




**HLdd**  
Track is being handed off intercenter or from an ARTS facility.



**OLdd**  
Handoff has been accepted or retracted.



**KLdd**  
Handoff has been accepted or "stolen" with /OK.




Radar Data Display


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### Field E (Cont'd)



**HLLL**  
Track is being handed off to ARTS facility.



**OLLL**  
Handoff has been accepted by ARTS facility.



Radar Data Display

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Continued on next page


# FULL DATA BLOCK (FDB) *(Continued)*

## Field E (Cont'd)


TI 6110.100,  
par. 4.3.4



### Field E (Cont'd)



HL  
Automated handoff being made to another center.

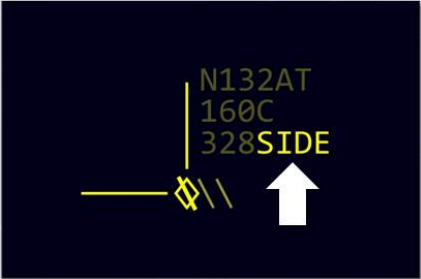


Radar Data Display

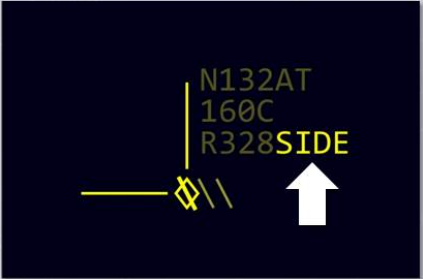
47




### Field E (Cont'd)



SIDE  
Side Stream handoff being made to another facility.



SIDE  
Side Stream handoff has been accepted by the other facility.



Radar Data Display

48

*Continued on next page*

# FULL DATA BLOCK (FDB) (Continued)

## Field E (Cont'd)

TI 6110.100,  
par. 4.3.4



### Field E (Cont'd)

N132AT  
160C  
328HUNK

N132AT  
160C  
R328OUNK

#### HUNK

Track is being handed off to an unknown facility.

#### OUNK

Handoff has been accepted by an unknown facility.

Radar Data Display

49



### Field E (Cont'd)

N132AT  
160C  
328HT3A

N132AT  
160C  
R328OT3A

N132AT  
160C  
R328KT3B

#### HLdL

Track is being handed off to a specific position dL in an ARTS facility.

#### OLdL

Handoff has been accepted by a position dL in an ARTS facility.

#### KLdL

Handoff has been accepted by a position LdL (different from the position addressed in handoff) in an ARTS facility.

Radar Data Display

50

Continued on next page




# FULL DATA BLOCK (FDB) (Continued)


## Field E (Cont'd)

TI 6110.100, par.  
4.3.4; ERAM EDSM  
SRS 210.04 V1B2,  
Appendix E.2






### Field E (Cont'd)


		
<b>HLLdL</b> Track is being handed off to a specific position dL in an ARTS facility (first L).	<b>OLLdL</b> Handoff has been accepted by ARTS where LL is the ARTS ID and dL is the position.	<b>KLLdL</b> Handoff has been accepted by ARTS where LL is the ARTS ID and dL is the position that accepted the handoff.


Radar Data Display
51



### Field E (Cont'd)

		
<b>HLLx</b> Track is being handed off to a position x in an ARTS facility LL.	<b>OLLx</b> Handoff has been accepted by a position x in an ARTS facility LL.	<b>KLLx</b> Handoff has been accepted by position x (different from the position addressed in handoff) in an ARTS facility LL.


Radar Data Display
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Continued on next page


## FULL DATA BLOCK (FDB) *(Continued)*

### Field E (Cont'd)


TI 6110.100,  
par. 4.3.4



### Field E (Cont'd)




Aircraft is in hold status.


 Radar Data Display 53



### Field E (Cont'd)



Aircraft is in coast status, radar data is not being received, or the flight is unpaired.

 Radar Data Display 54

*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

### Field E (Cont'd)

TI 6110.100,  
par. 4.3.4



### Field E (Cont'd)



Aircraft has an assigned beacon code, but the code received is not the proper code.

(Field E will display the code received.)



Radar Data Display

55



### Field E (Cont'd)



Aircraft has an assigned beacon code, but none is received.



Radar Data Display

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*Continued on next page*

## FULL DATA BLOCK (FDB) *(Continued)*

### Field E (Cont'd)

TI 6110.100,  
par. 4.3.4; ERAM  
EDSM SRS 210.04  
V1B2, Table 53



### Field E (Cont'd)



Ground speed displayed to the nearest knot (ddd).



Radar Data Display

57



### Field E (Cont'd)



Interfacility transfer when there is a discrepancy in the target position between the two facilities.



Radar Data Display

58

*Continued on next page*


## FULL DATA BLOCK (FDB) *(Continued)*

### Field E (Cont'd)


TI 6110.100,  
pars. 4.3.4, 4.3.6



### Field E (Cont'd)




Interfacility transfer of FDB when either a transferring or receiving facility or both do not have radar data.


 Radar Data Display 59



### Field E (Cont'd)



Displayed when the data block is in frozen (FRZN) status indicating that the data block is unpaired from the target.

 Radar Data Display 60

## FULL DATA BLOCK (FDB) *(Continued)*

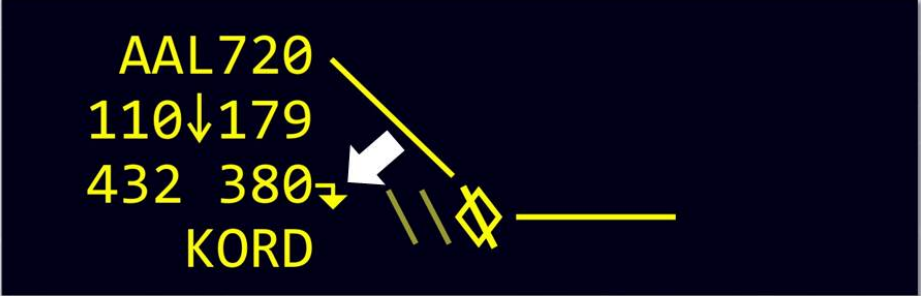
### Field E (Cont'd)

TI 6110.100,  
pars. 4.3.4, 4.3.6




*Click to toggle  
HSF.*

### Field E (Cont'd)



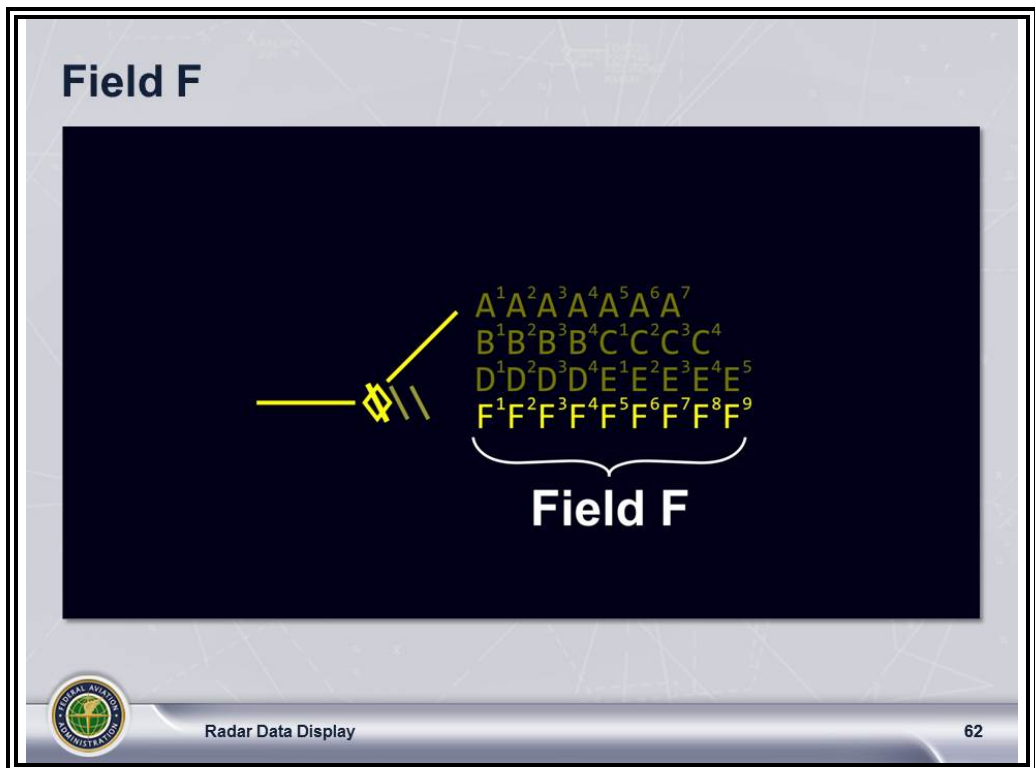
The HSF indicator toggles the heading, speed, and free form text in the associated FDB.

 Radar Data Display [Click to Play Animation](#) 61

## FULL DATA BLOCK (FDB) *(Continued)*

### Field F

JO 7110.65,  
pars. 2-6-4,  
5-4-11;  
TI 6110.100,  
pars. 4.3.1, 4.9,  
4.22



- ⦿ Field F is located on the 4th line and may contain up to 9 characters.
  - Can display the following data items:
    - Heading
    - Speed
    - Both heading and speed
    - Free Form Text
    - Aircraft data (aircraft type and equipment suffix)
    - Destination

*Continued on next page*


## FULL DATA BLOCK (FDB) (Continued)

### Field F (Cont'd)

JO 7110.65,  
pars. 2-6-4,  
5-4-11;  
TI 6110.100,  
pars. 4.3.1, 4.9,  
4.22



Field F (Cont'd)	
Fourth Line Data Examples	
Heading	H140, PH, 20R, 35L
Speed	S300, S230+, S250- M78, M80+, M82-
Heading and Speed	H240 M75
Weather Deviations	D20L, D080+120, DL/ATL D20R/ONL, D090/F

 Radar Data Display 63

- ⊙ The following Field F entries are approved for use without verbal coordination:

- Headings - the letter H followed a three-digit number
- Present Heading - the letters PH

**Examples:** H050, PH, H180/JAX, H300/J79, H240/V157, PH/CHA

- Assigned Speeds - the letter S followed by a three-digit number, or M (Mach) followed by the two-digit assigned value
  - The symbol ( + ) (maintain a specified speed or greater), or the symbol ( - ) (maintain a specified speed or less) may follow the assigned speed or Mach number.

**Examples:** S250, S210+, S230-, M82, M76+, M80-

*Continued on next page*

# FULL DATA BLOCK (FDB) *(Continued)*

---

## Field F

### (Cont'd)

JO 7110.65,  
pars. 2-6-4,  
5-4-11;  
TI 6110.100,  
pars. 4.3.1, 4.9,  
4.22

- Weather deviations:
  - Must use the designated characters:
    - D – deviation
    - L – left
    - R – right
    - N – north
    - E – east
    - S – south
    - W – west
    - /F - direct next NAVAID/waypoint
    - D+2 headings - deviate between
  - Two digits specify turns in degrees and must include direction characters. Three digits specify headings.

**Examples:** DN, D20L, D080+120

- The inclusion of a /NAVAID, /waypoint, or /F indicates that the pilot has been authorized to deviate for weather and must rejoin the route at the next NAVAID, waypoint, or fix in the route of flight.

**Examples:** DL/ATL, D20R/ONL, D090/F

- The absence of a NAVAID, waypoint, or /F indicates that the pilot has been authorized to deviate for weather only, and the receiving controller must provide a clearance to rejoin the route.

**NOTE:** If the weather deviation instructions exceeds the nine characters limit, verbal coordination is required.

- Aircraft authorized to conduct celestial navigation

**Example:** CELNAV

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*Continued on next page*


## FULL DATA BLOCK (FDB) (Continued)

### Field F (Cont'd)

JO 7110.65,  
pars. 2-6-4,  
5-4-11;  
TI 6110.100,  
pars. 4.3.1, 4.9,  
4.22



Field F (Cont'd)	
Fourth Line Data Examples	
Free Form Text	H090/FSM, PH/CHA, RQ/WENDY, RQ090, RQ270, CELNAV
Aircraft Data	B737/L
Destination	KORD

 Radar Data Display 64

- Request for altitude change – the letters RQ followed by the requested altitude in three-digits

**Examples:** RQ090, RQ150, RQ350

- Request for route change – the letters RQ, followed by a slant (/), followed by a specific fix identifier

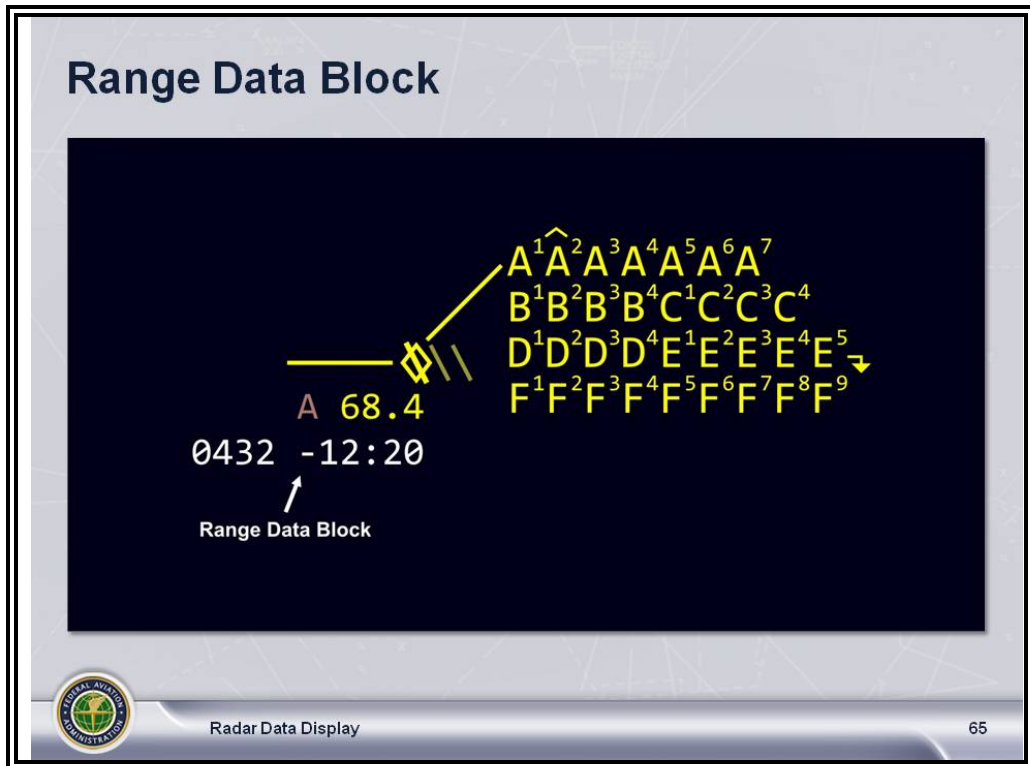
**Examples:** RQ/ICT, RQ/TUL, RQ/TRUMP

- ⦿ Free Form Text Area may be used by individual sector teams for recording any additional information the team deems appropriate for managing the sector.
  - Must be removed prior to initiation of identification transfer
- ⦿ Free Form Text Area must be used for coordination purposes only in association with radar identified aircraft.

# RANGE DATA BLOCK (RDB)

## Range Data Block

TI 6110.100,  
par. 9.6

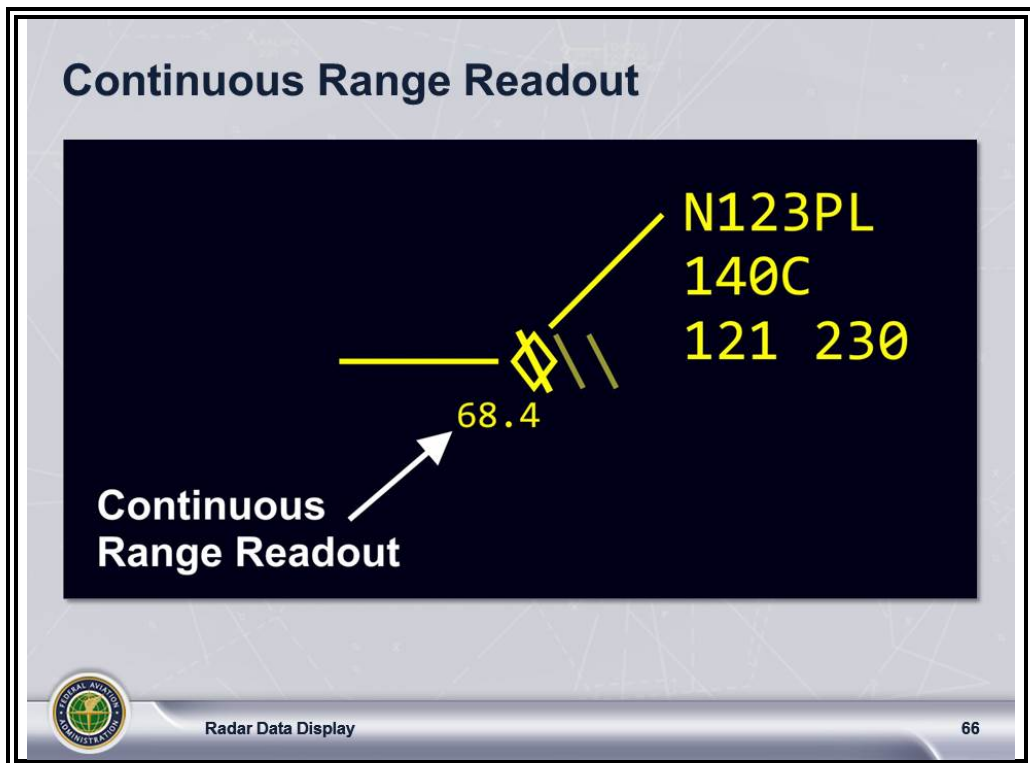


- ⦿ The Range Data Block (RDB) is a special data block linked to the target position symbol that provides continuous range read-out data.
- ⦿ Other information can also be displayed, including Non-ADS-B Indicator, Scheduled Time of Arrival (STA) and/or Delayed Countdown Time (DCT).

## RANGE DATA BLOCK (RDB) *(Continued)*

### Continuous Range Readout

TI 6110.100,  
par. 9.6

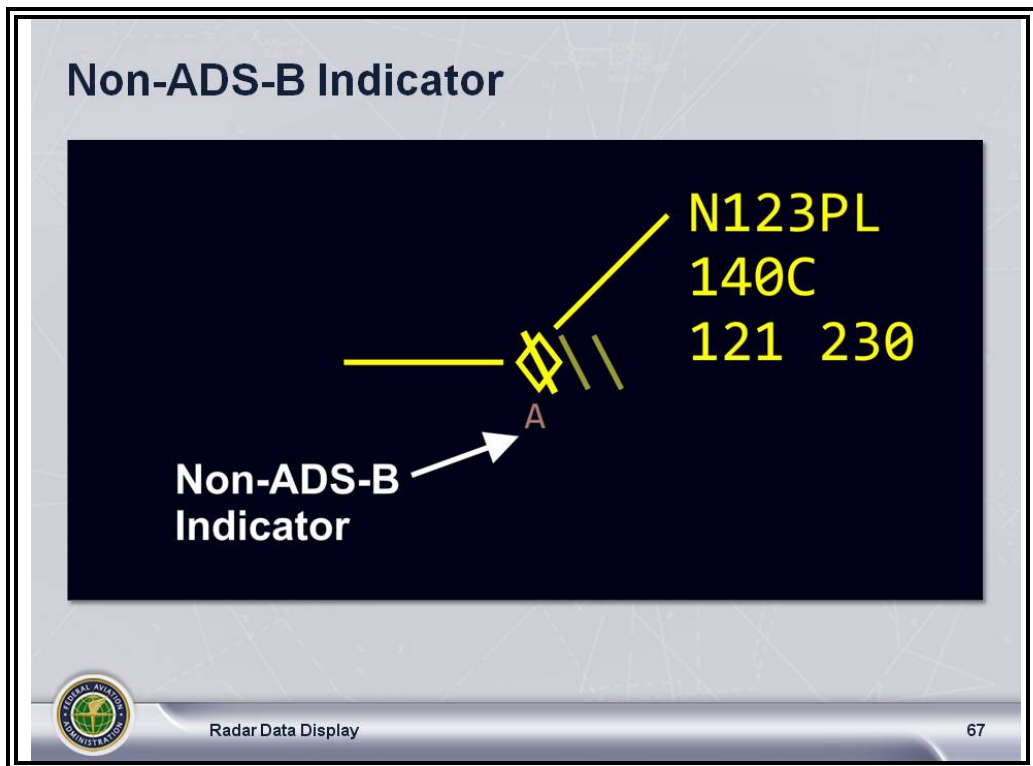


- ⦿ Continuous Range Readout (CRR) indicates the distance in nautical miles from the selected target to a controller determined fix.
  - Displays in Range Data Block (RDB) next to the target symbol of the aircraft
  - Displays only in FDBs, not in LDBs or ELDBs
- ⦿ Left/middle-click the CRR RDB button in the DB Fields Toolbar to toggle on/off the display of CRR in the FDB.

## RANGE DATA BLOCK (RDB) (Continued)

### Non-ADS-B Indicator

ERAM EDSM SRS  
210.04 V1B1,  
3.2.2.3.2;  
TI 6110.100,  
par. 4.2.5

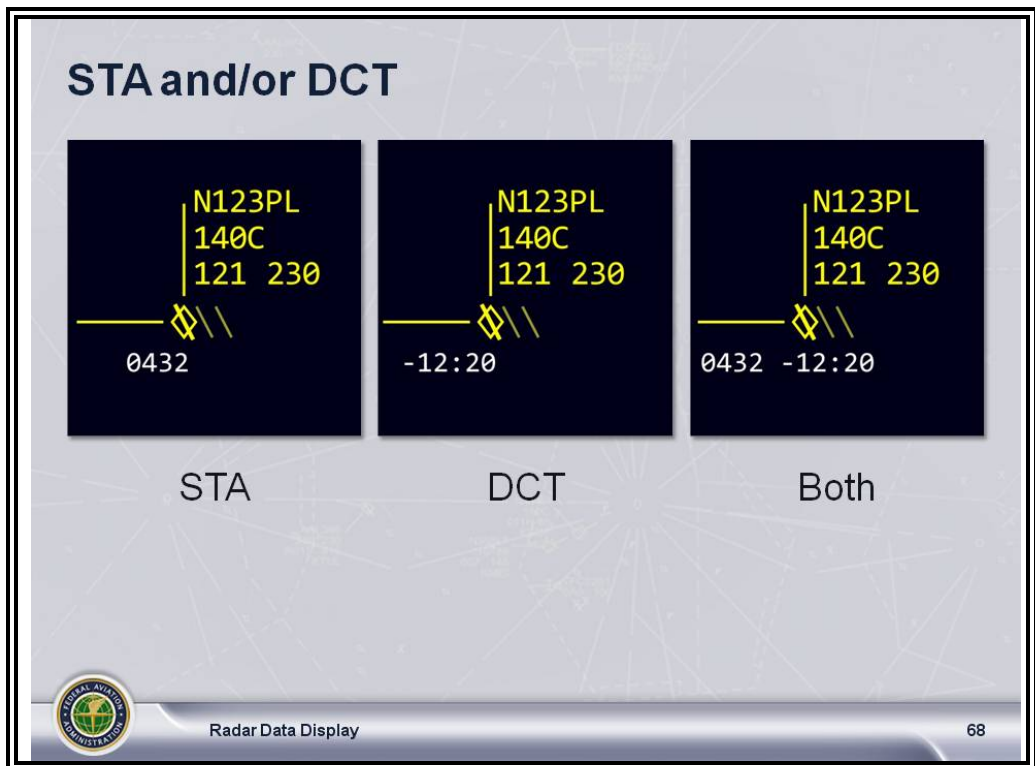


- ⦿ The Non-ADS-B Indicator indicates that an aircraft is not ADS-B (Automatic Dependent Surveillance Broadcast) equipped or that its ADS-B equipment is not operating properly, and that the target position is based on radar data, not ADS-B data.
  - Displays only in RDB of FDBs, not in LDBs or ELDBs
  - Brightness controlled by the NON-ADS-B button in the DB Fields Toolbar
- ⦿ If ADS-B is operating for all participants, no indicator displays.

## RANGE DATA BLOCK (RDB) (Continued)

### STA and/or DCT

TI 6110.100,  
par. 9.6



- ⦿ The Range Data Block can display Scheduled Time of Arrival (STA) and/or Delayed Countdown Time (DCT).
  - Display only in FDBs, not in LDBs or ELDBs
  - DCT displays in minutes and tens of seconds
    - Display of tens of seconds is facility adaptable
    - Minus sign indicates a negative delay time
    - Zero indicates delay time is less than one minute
- ⦿ Left/middle-click STA RDB and/or DELAY button in the DB Fields Toolbar to toggle on/off STA and DCT respectively.

# REVIEW: FDB AND RDB

---

## Review

◆ **QUESTION:** How many feet must an aircraft deviate from its assigned altitude before the deviation is indicated in fields B4 and C?

**ANSWER:** 300

◆ **QUESTION:** What data block information indicates that Mode C is unreliable or not being received?

**ANSWER:** Fields B4 and C will display X XXX.

◆ **QUESTION:** When an aircraft has a computer-assigned beacon code but the received code is not the one assigned, how is this indicated and in what field?

**ANSWER:** Field E will display the code received.

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*Continued on next page*

## REVIEW: FDB AND RDB (Continued)

### Review (Cont'd)



Click 12 times  
to display all of  
the altitude  
qualifiers.

### Review

Identify these computer-generated altitude qualifiers in Field B4.

↑
B
+
V

↓
C
-
/

A
F
N
T
L

Radar Data Display

[Click to Play Animation](#)

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### ANSWERS:

↑	Controller-entered or Mode C reported altitude is below assigned altitude when flight is climbing.
B	Mode C reported altitude is within ±200 feet of upper or lower limit of block altitude, or the controller-entered reported altitude is within the block altitude
+	Mode C has previously reported the aircraft at assigned altitude, and either the aircraft has deviated 300 feet or more above assigned altitude or controller-entered reported altitude is above assigned altitude.
V	Mode C or controller reported altitude was received when no assigned altitude exists.
↓	Controller-entered or Mode C reported altitude is above assigned altitude when flight is descending.
C	Mode C reported altitude is within ±200 feet of single assigned altitude.
-	Mode C has previously reported the aircraft at assigned altitude, and either the aircraft has deviated 300 feet or more below assigned altitude or controller-entered reported altitude is below assigned altitude.
/	Flight type is OTP or VFR

Continued on next page

## REVIEW: FDB AND RDB (Continued)

Review  
(Cont'd)

### ANSWERS (Cont'd):


<b>A</b>	Controller-entered altitude equals single assigned altitude.
<b>F</b>	Controller-entered or beacon-reported altitude indicates either the aircraft has reached the first altitude or Mode C reported altitude is within $\pm 200$ feet of the first altitude.
<b>N</b>	No controller or Mode C reported altitude has been received for aircraft.
<b>T</b>	Interim altitude is displayed in B1, B2, and B3.
<b>L</b>	Local interim altitude (if present) is indicated by an L.

 **NOTE:** Use the following examples to review FDB and RDB.

Review  
(Cont'd)





### FDB Examples



UAL431  
240↑225  
204 431↘  
DL/STL


A26942  
250↑227  
204 457↘  
M75+






N707HT  
350C  
321 250↘  
S250-

AAL720  
110↓179  
432 380↘  
PH/GEP





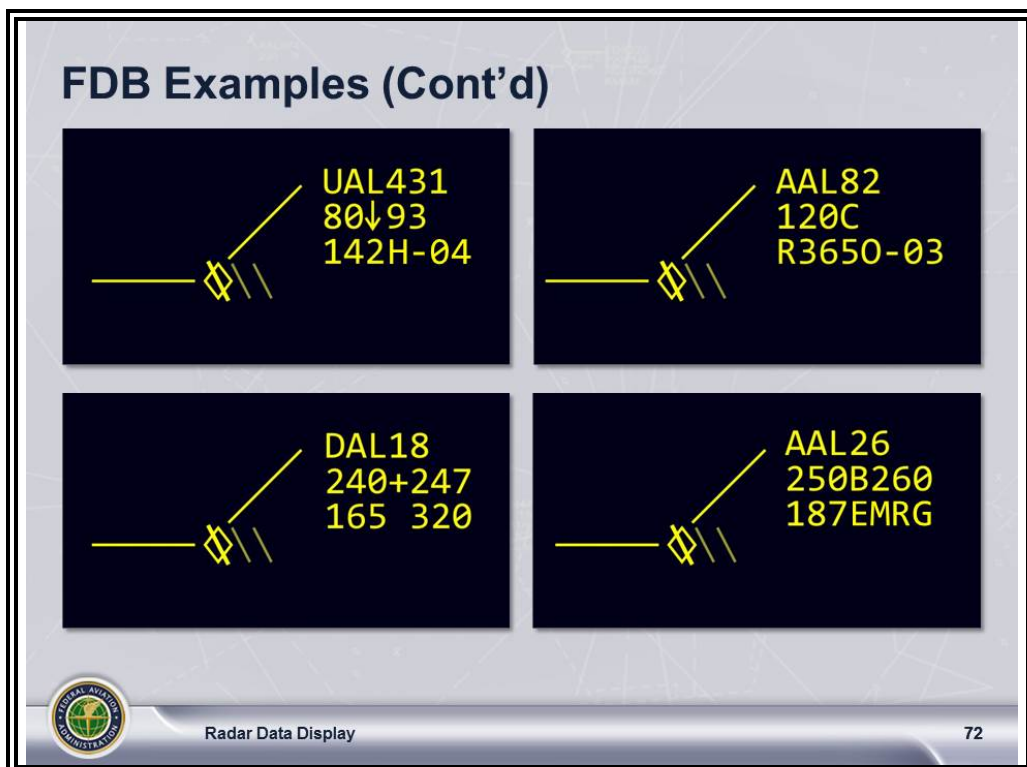
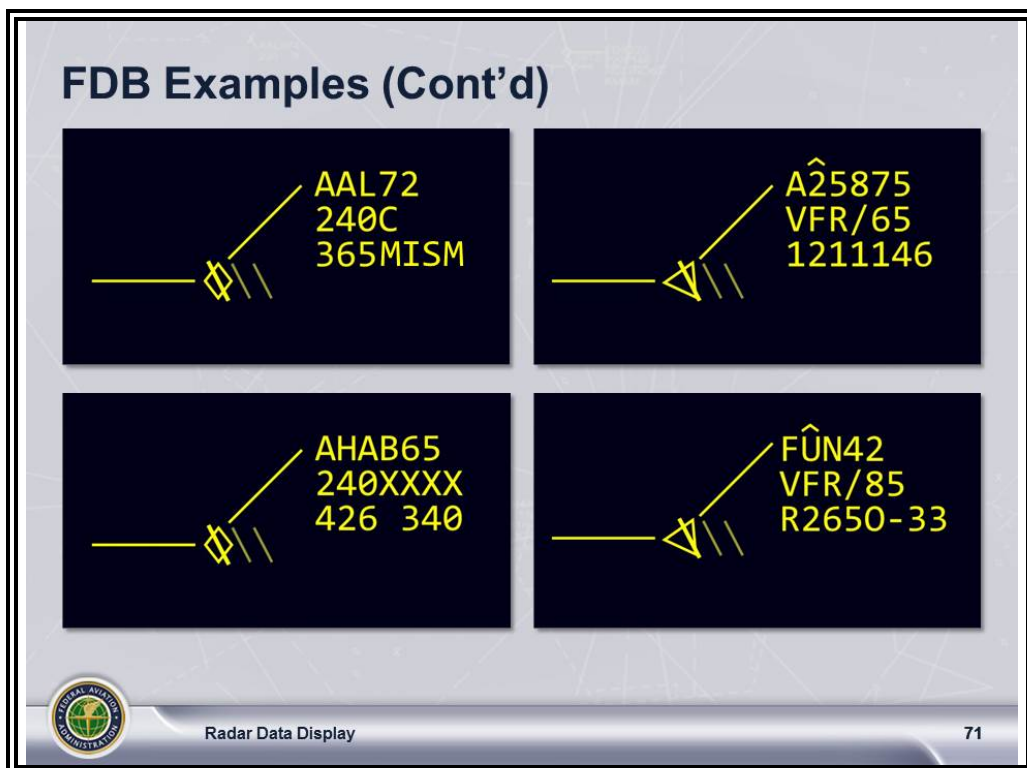
Radar Data Display

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Continued on next page

## REVIEW: FDB AND RDB (Continued)

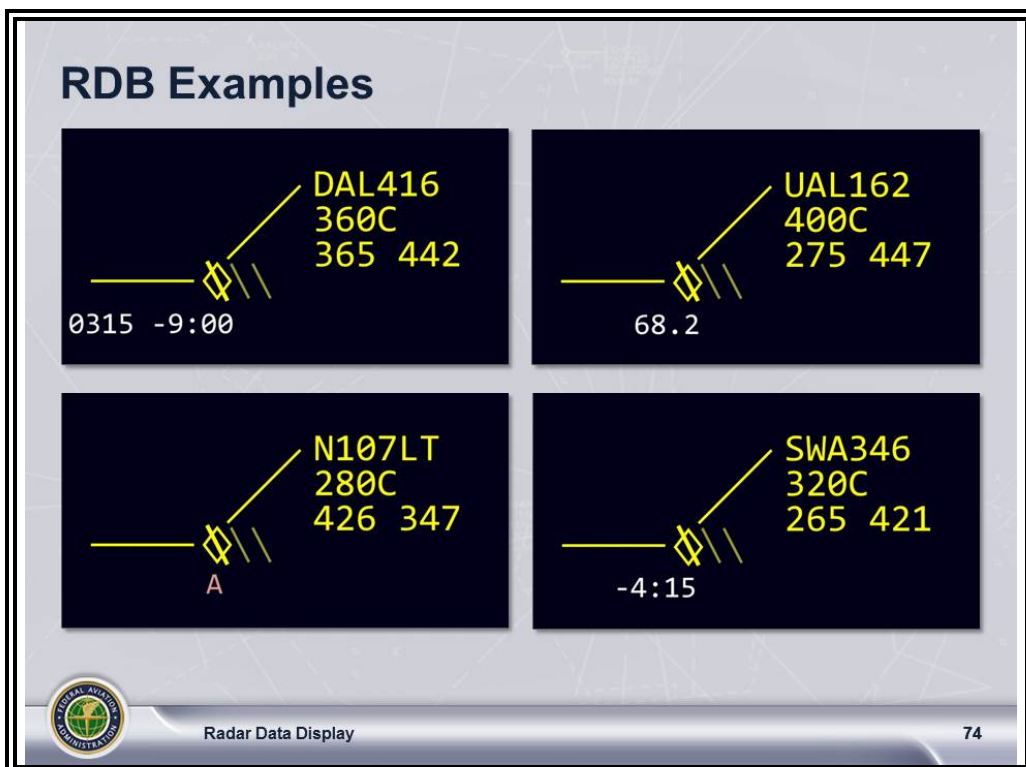
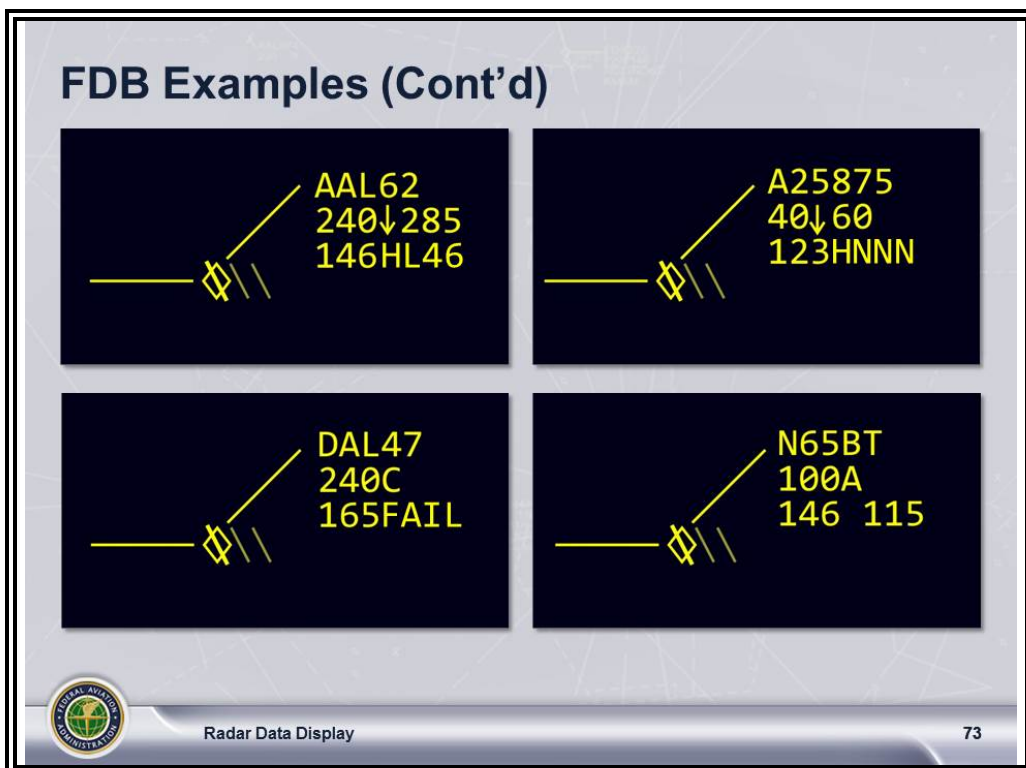
Review  
(Cont'd)



Continued on next page

## REVIEW: FDB AND RDB (Continued)

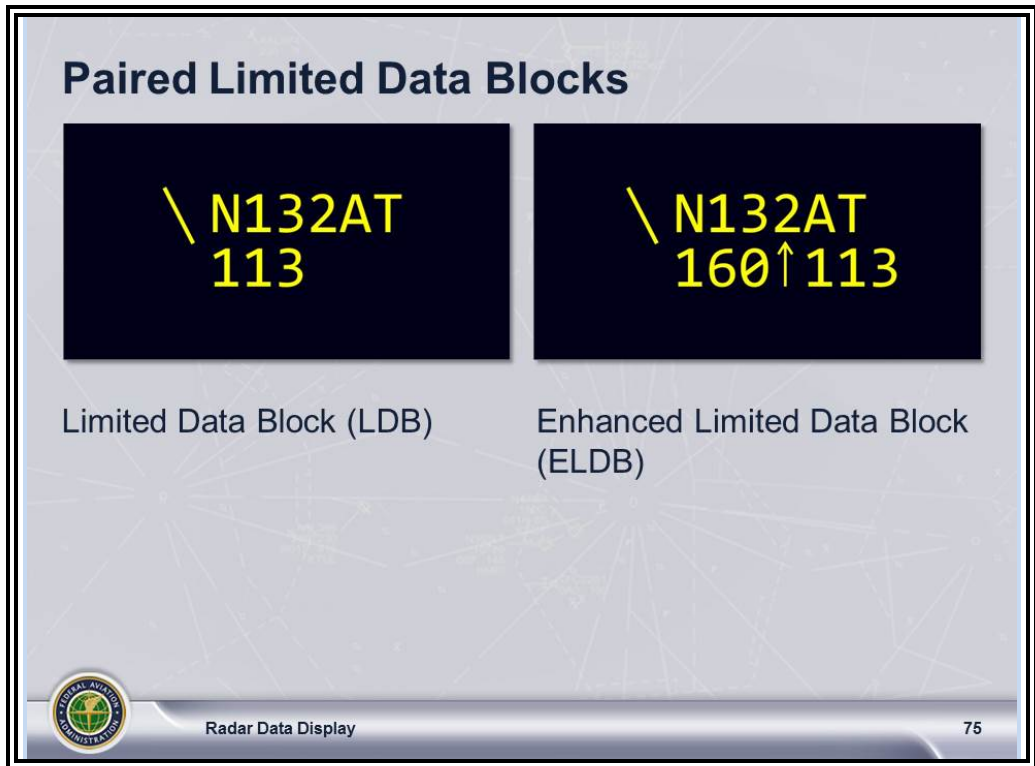
Review  
(Cont'd)



# LIMITED DATA BLOCK (LDB)

## Paired Limited Data Blocks

TI 6110.100,  
pars. 4.3, 4.3.2



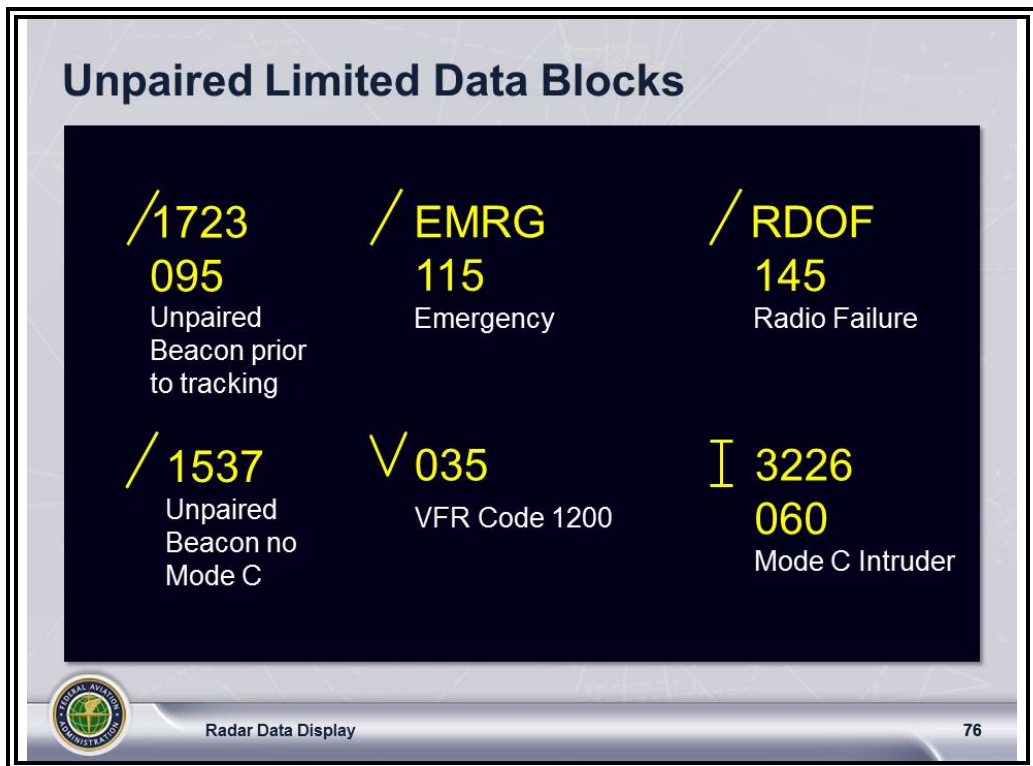
### ⦿ Paired Limited Data Blocks:

- Display Aircraft Identification (AID) and Mode C altitude
- NO position symbol, leader line, or velocity vector line
- Display at LDB brightness

## LIMITED DATA BLOCK (LDB) *(Continued)*

### Unpaired Limited Data Blocks

TI 6110.100,  
pars. 4.3, 4.3.2



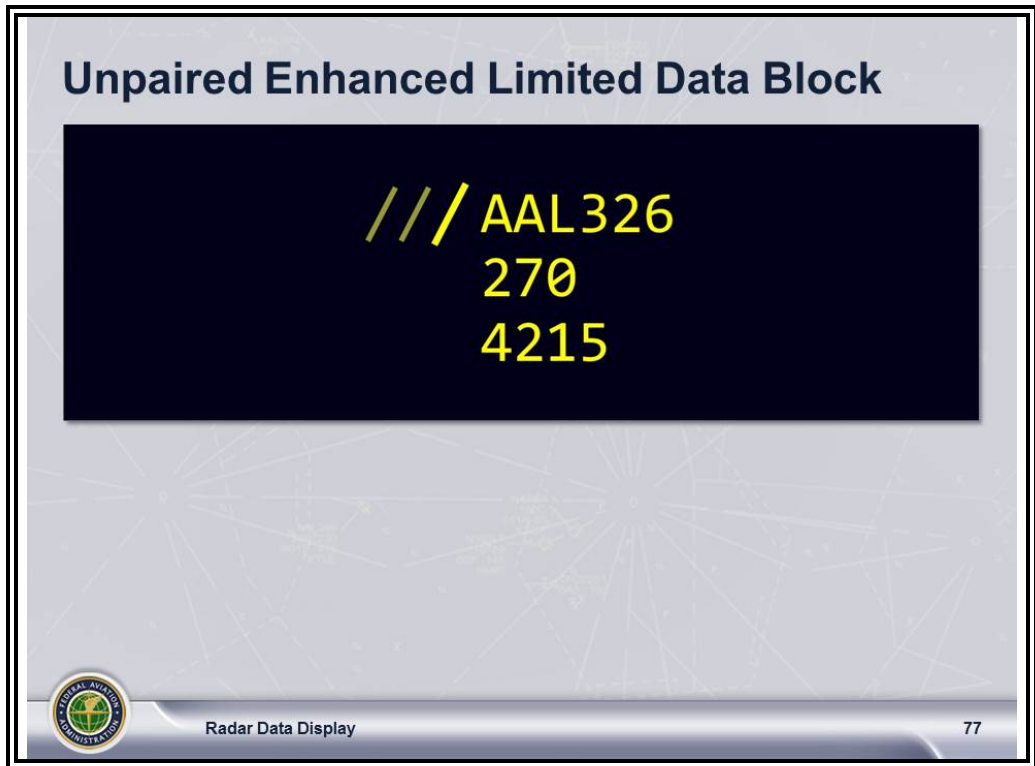
#### ⦿ Unpaired Limited Data Blocks:

- Display beacon code and Mode C altitude
- NO position symbol, leader line, or velocity vector line
- Displayed at LDB brightness

## LIMITED DATA BLOCK (LDB) *(Continued)*

### Unpaired Enhanced Limited Data Blocks

TI 6110.100,  
par. 4.3.2



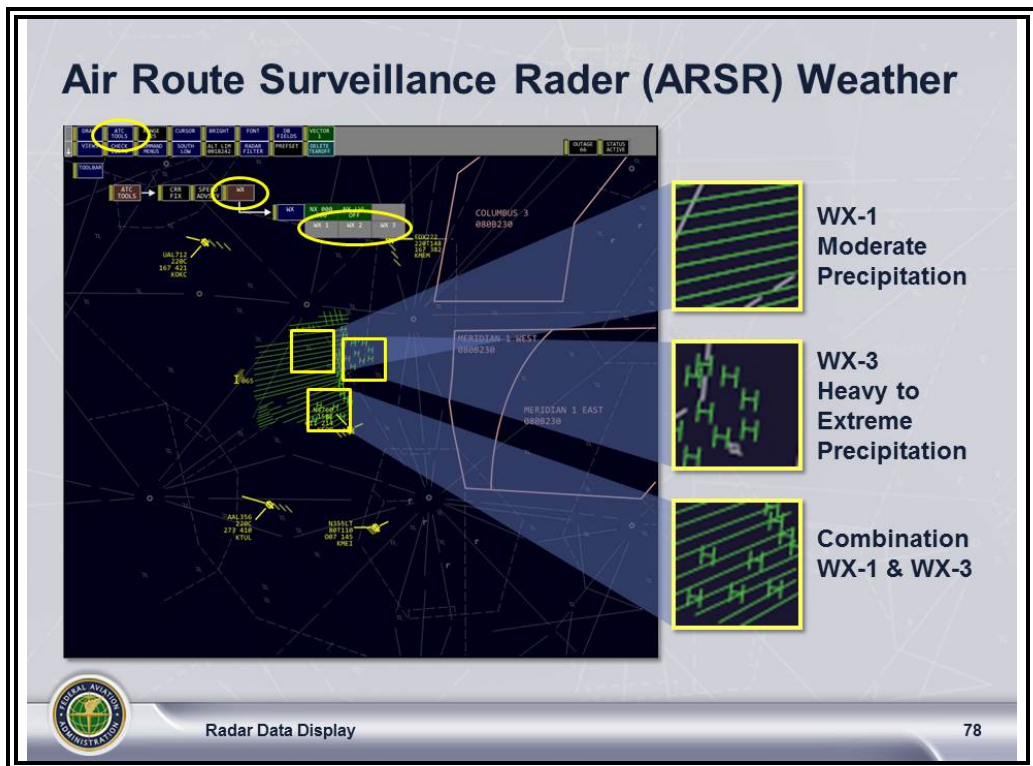
#### ⦿ Unpaired Enhanced Limited Data Blocks:

- The user has requested Enhanced format for the LDB (i.e., the BCAST FLID display filter setting is selected).
- The aircraft is ADS-B equipped, under ADS-B surveillance and broadcasting its flight ID.

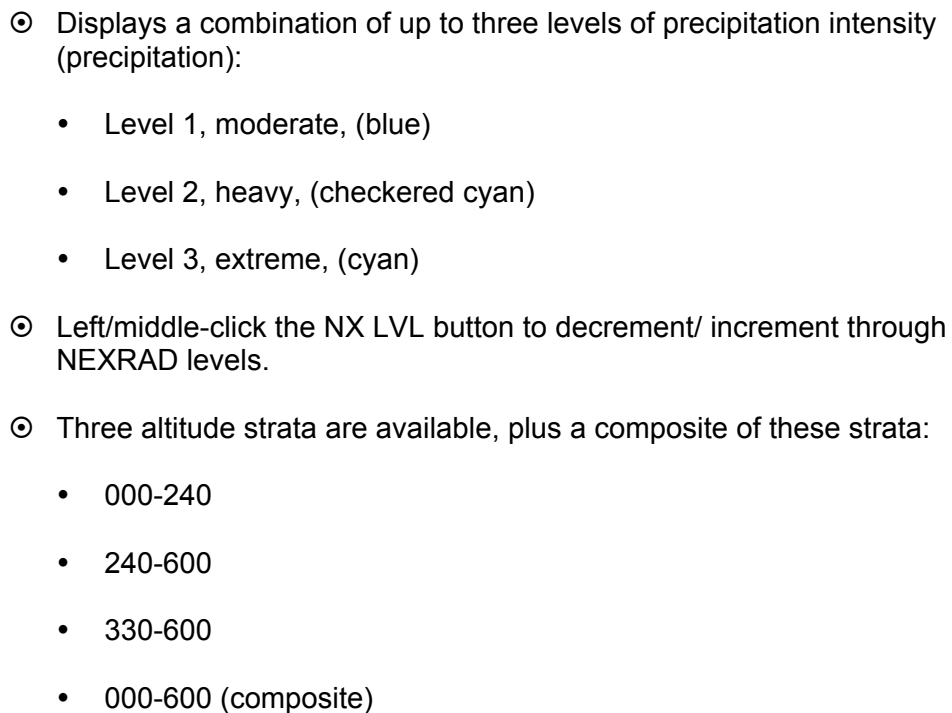
# WEATHER DISPLAYS

## Weather Displays

TI 6110.100,  
par. 3.4;  
JO 7110.65,  
par. 2-6-4



- ⦿ You can adjust the display for weather; this includes NEXRAD altitudes and levels, and Air Route Surveillance Radar (ARSR) weather intensities.
  - Lines depict areas of low-intensity weather.
  - The letter H depicts areas of high-intensity weather.



# MISCELLANEOUS DISPLAYS

## Time View

TI 6110.100,  
par. 3.5;  
ERAM EDSM SRS  
210.04 V1B1,  
par. 3.2.3.1.2.22



- The Time View displays the current Coordinated Universal Time (UTC).
- The Time View can be customized and located anywhere on the Situation Display, but cannot be suppressed.

👉 **NOTE:** Point out that views are presented later in Stage 4 training.

# MISCELLANEOUS DISPLAYS

## Time View (Cont'd)

TI 6110.100,  
par. 3.5;  
ERAM EDSM SRS  
210.04 V1B1,  
par. 3.2.3.1.2.22



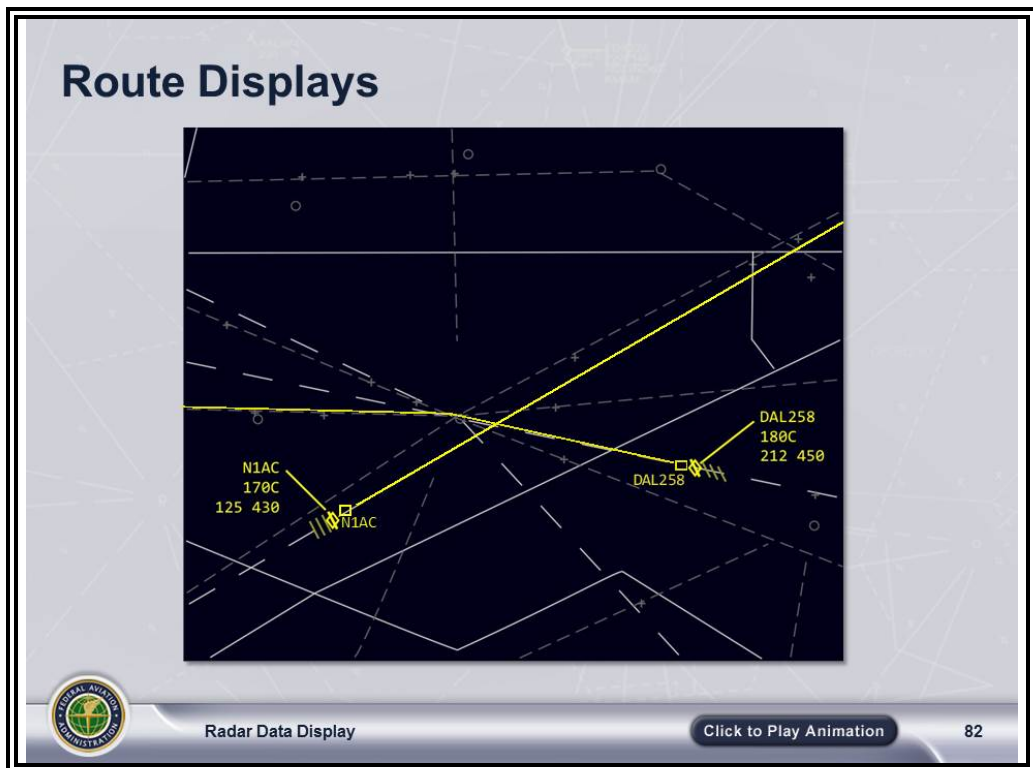
- ⊙ A sector message can be sent from the AT Specialist workstation to an individual R-Position Situation Display or all R-Position Situation Displays.
- ⊙ The Sector Message Notification Area appears automatically below the Time View.
  - The message contains free text information that may affect your sector.
  - When the message first appears, it will be underlined and yellow to indicate that it needs to be acknowledged.
- ⊙ Click on the message to acknowledge it.
  - The message will turn white.
  - If you don't accept the message in an adapted period of time, the message will turn white automatically (default is 10 seconds).

*Click to  
acknowledge  
message.*

## MISCELLANEOUS DISPLAYS *(Continued)*

### Route Displays

ERAM EDSM SRS  
210.04 V1B1,  
par. 3.2.2.4.2



- ⦿ The route display program displays the route of a flight on the radar display, beginning with the position of the aircraft specified in the route display keyboard entry, and ending with the point on the route segment, which consists of keyboard-entered minutes, or a facility parameter amount of time in the future.

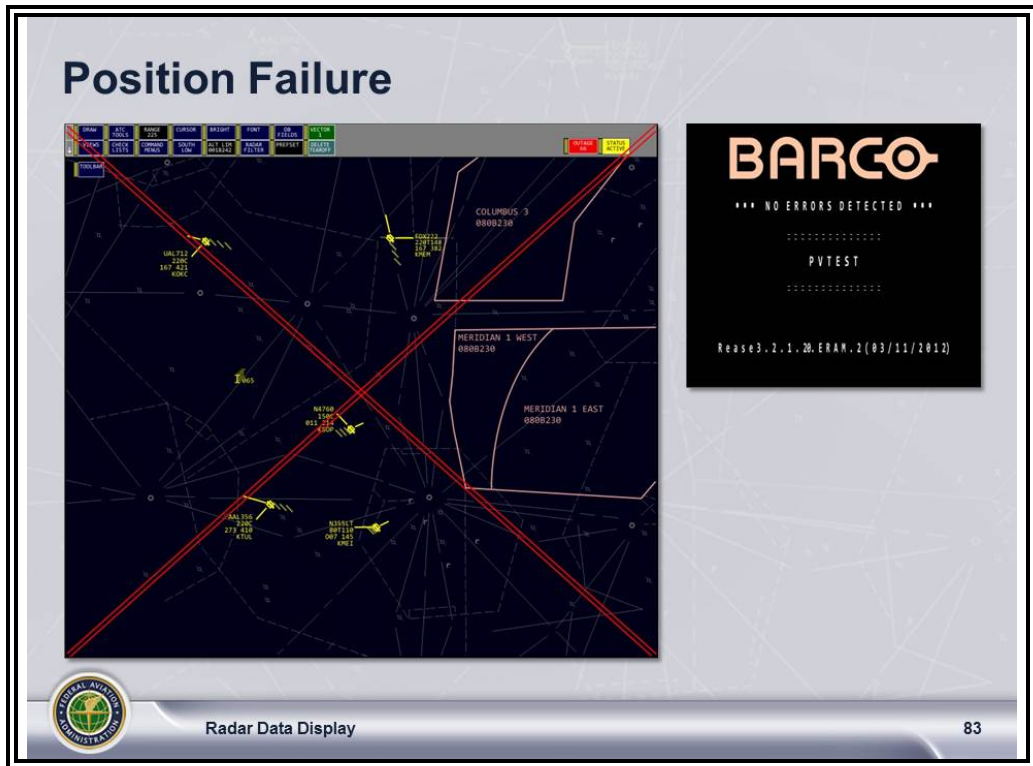
*Click 1 to  
display route  
for DAL258.*

- The route is depicted by a sequence of line segments beginning with the flight plan position symbol (□).
- The aircraft identification is displayed immediately below the position symbol.
- A number of routes can be displayed simultaneously on a radar display.

*Click 2 to  
display route  
for N1AC.*

# OUTAGES

## Outages TI 6110.107



### ⦿ Controller Responses to Outages

- Controller responds immediately to the four outages presented in this lesson without FLM/CIC guidance using *Full ERAM Job Aid* (TI 6110.107)

## Position Failure TI 6110.107

### ⦿ Position Failure

- A red X, blank screen, or BARCO screen indicates a single R-Position failure.
  - *Settings Not In Sync* displayed on other channel
  - No updates on display and no command inputs accepted on channel with the failure
- Switch immediately to backup channel and report outage. (Press and hold MULTI-FUNC and select A/B.)

*Continued on next page*

# OUTAGES (Continued)

## Not Receiving Surveillance Data

TI 6110.107



### ⦿ Not Receiving Surveillance Data

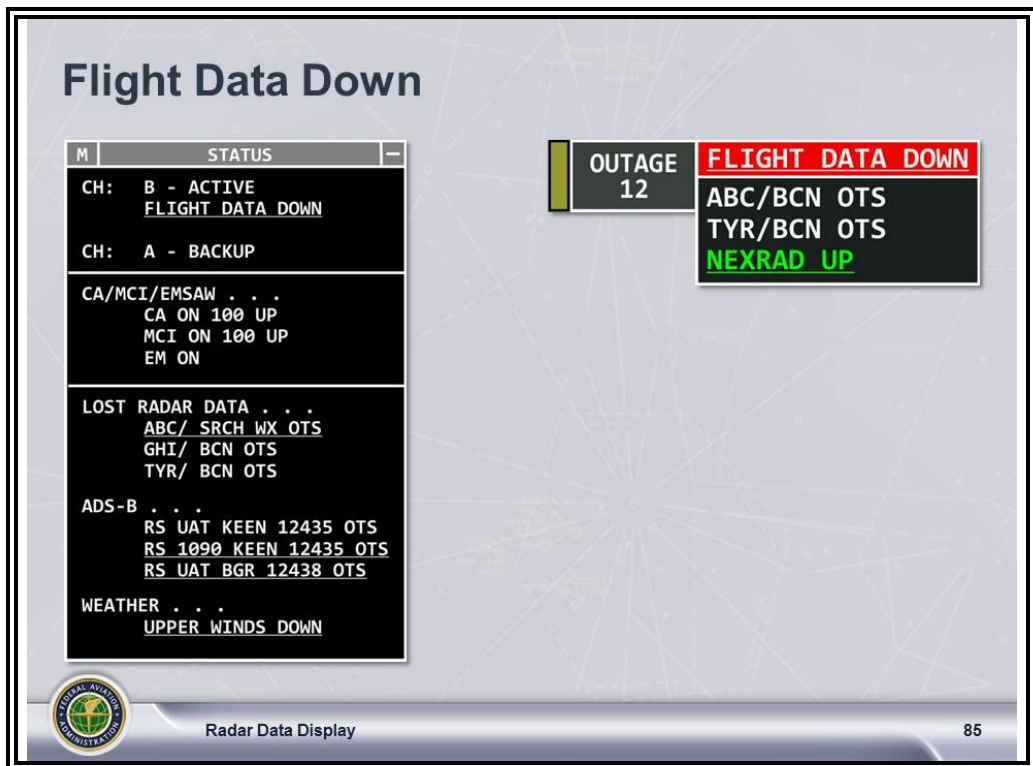
- A red banner is displayed on the Situation Display.
- SURV Down, CA Down, MCI Down, EM Down are displayed in the STATUS View.
- All targets are removed from R-Position display. Data blocks un-pair, flash CST, and remain at last known location.
  - On the Backup Channel, previously paired tracks remain paired, but new tracks will not auto-pair and manual pairing is not available.
  - Automated handoffs will fail regardless of channel.
- Switch immediately to backup channel and report outage. (Press and hold MULTI-FUNC and select A/B.)

*Continued on next page*

# OUTAGES (Continued)

## Flight Data Down

TI 6110.107



### ⦿ Flight Data Down

- Coding is displayed in the Outage and Status Views.
- Flight data processing is lost until the Backup Channel is promoted to Active.
- Auto pairing and manual pairing are not available.
- Automated handoffs and point-outs are unavailable.
- Flight data cannot be entered or updated.
- Data blocks cannot be changed or started.
- Switch immediately to backup channel and report outage. (Press and hold MULTI-FUNC and select A/B.)
  - FDP available once Tech Ops promotes Backup to Active.
  - *Flight Data Standby* will be displayed in the Outage and Status Views until Backup is promoted to Active.

*Continued on next page*

## OUTAGES (Continued)

CA/MCI/EM  
Down  
TI 6110.107



### CA Down and/or MCI Down and/or EM Down

M	STATUS
CH: B	- ACTIVE
CH: A	- BACKUP


CA/MCI/EMSAW . . .  
CA DOWN  
MCI DOWN  
EM DOWN

LOST RADAR DATA . . .  
ABC/ SRCH WX OTS  
GHI/ BCN OTS  
TYR/ BCN OTS

ADS-B . . .  
RS UAT KEEN 12435 OTS  
RS 1090 KEEN 12435 OTS  
RS UAT BGR 12438 OTS

WEATHER . . .  
UPPER WINDS DOWN

STATUS  
ACTIVE

Radar Data Display86

- ⦿ Conflict Alert (CA), Mode C Intruder (MCI) and/or E-MSAW (EM) processing down
  - Coding appears only in the Status View (no indication in the Outage View).
  - Safety alerts will not update.
    - No new alerts, including immediate alerts
    - Active alerts at time of failure continue to flash, even when no longer applicable
  - Switch immediately to backup channel and report outage. (Press and hold MULTI-FUNC and select A/B.)

*Continued on next page*

# OUTAGES *(Continued)*


## Outage Reminders TI 6110.107



### Outage Reminder

If you see these outages you should take action prior to receiving direction from the FLM/CIC.

- BIG RED **X** or BARCO Screen – R-position Display Application Failure
- Not Receiving Surveillance Data
- Flight Data Down
- CA DOWN / MCI DOWN / EM DOWN

Radar Data Display87

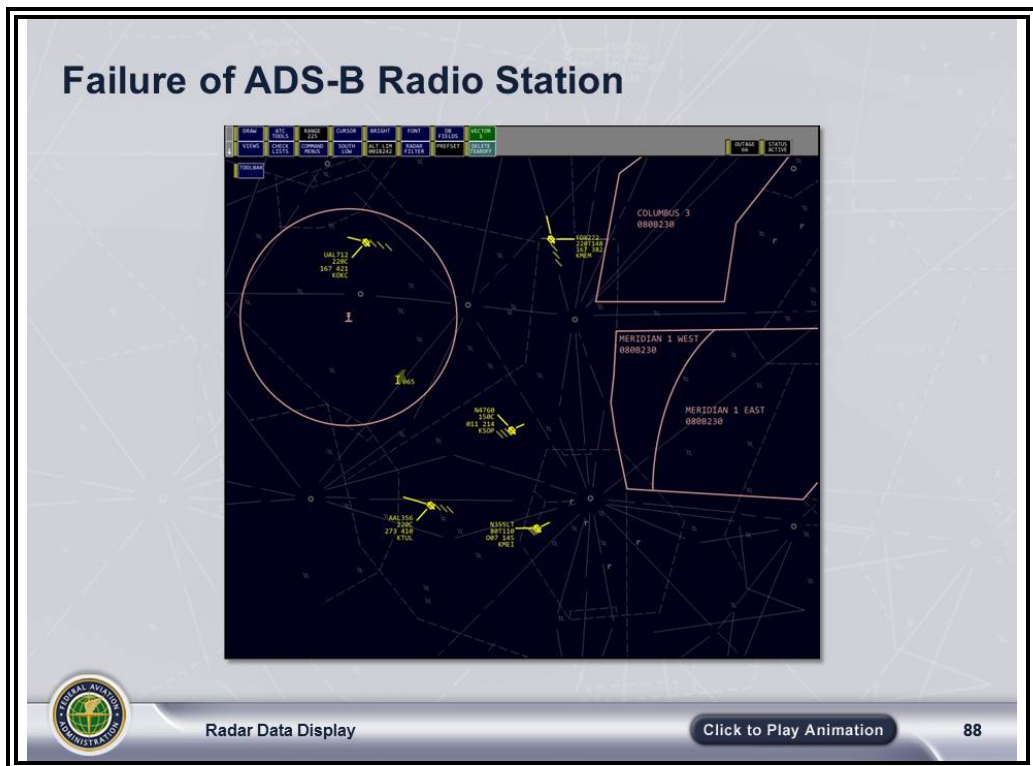
- ⦿ Acknowledge and report your outages.
  - Relatively minor outages, if left unresolved, can have major impacts to the system.
  - Do not assume:
    - Someone else has reported the outage.
    - Tech Ops is already aware of the outage.
  - Keep your Outage View up-to-date so that you will know when a new outage occurs.
- ⦿ When one of the "Big 4" outages occurs, take immediate action.
  - Switch immediately to backup channel and report outage to the FLM/CIC. (Press and hold MULTI-FUNC and select A/B.)


*Continued on next page*

## OUTAGES *(Continued)*

## Failure of ADS-B Radio

TI 6110.100,  
par. 14.2;  
ERAM EDSM SRS  
210.04 V1B1,  
pars. 3.2.2.1.3.3,  
3.2.2.1.3.4



- ③ The telephone pole symbol () is the ADS-B Radio Station Outage Indicator on the Situation Display.
  - The indicator is forced to the Situation Display if an outage for that station exists and the ADS-B Service Volume is up.
  - An outage for the station occurs with one of the following conditions:
    - The Universal Access Transceiver (UAT) link is down
    - UAT link status is unknown
    - 1090ES link is down
    - 1090ES link is degraded
    - 1090ES link status is unknown

Click to display  
circle.

- Select the ADS-B Radio Station Outage Indicator with the trackball to toggle the display of the radio station coverage area circle for the radio station.

# OUTAGES *(Continued)*

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## Outages TI 6110.107

- ⦿ There are additional outages where the FLM/CIC will guide controller responses:
    - FLM/CIC coordinates with Operations Manager (OM)
    - FLM/CIC guides controller response using *Full ERAM Job Aid* (TI 6110.107)
  - ⦿ For all other outages, controller action is to inform the FLM/CIC
- 


## Review



### Response Item

How many outages require immediate action from the controller?

- A. Two
- B. Four
- C. Five
- D. Seven

Radar Data DisplayClick to Show Answer89


**SLIDE ANSWER:** B

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# CONCLUSION

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## Summary

 **NOTE:** Review and elaborate briefly on the following:


- ⦿ Radar Symbols
- ⦿ Full Data Block (FDB)
- ⦿ Range Data Block (RDB)
- ⦿ Limited Data Block (LDB)
- ⦿ Weather Displays
- ⦿ Miscellaneous Displays
- ⦿ Outages

 **NOTE:** Ask students if there are any questions.

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## End-of-Lesson Test

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

 **NOTE:** Distribute and administer the End-of-Lesson Test located in 55055-ELT02.

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