

DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
IFR PILOT EXAM-O-GRAM* NO. 17

THE RADAR SUMMARY CHART

In addition to the WEATHER DEPICTION AND SURFACE PROGNOSTIC CHARTS (covered in INSTRUMENT PILOT EXAM-O-GRAMS 15 and 16), the RADAR SUMMARY Chart is used to present weather situations in Instrument Pilot Written Tests. The RADAR SUMMARY Chart deals primarily with weather of a potentially hazardous nature and, for this reason, it is important in pilot weather briefing. Anything shown on this chart along or near a pilot's route of flight must be taken into account and considered carefully.

Complete RADAR SUMMARY Charts are transmitted at 3-hour intervals. However, sections of the chart may be sent at 1-hour intervals when strong or significant radar echoes are observed. The analysis east of the Rocky Mountains is based on radar observations taken at over 90 weather radar locations. In western mountain regions, the analysis is based on observations taken by Weather Service Radar Meteorologists using FAA's Air Traffic Control Radars.

The charts show actual areas of radar echoes which are produced by a concentration of liquid or frozen water drops. These echoes represent the interior regions of moisture laden clouds and, the greater the concentration and size of the drops (as in cumulonimbus clouds), the stronger the echoes and the greater the probability of hazards.

Unlike the WEATHER DEPICTION Chart, which shows areas of low cloud cover and heights of cloud bases, the RADAR SUMMARY Chart shows precipitation areas and usually only the heights of echo tops. The RADAR SUMMARY Chart also distinguishes between gentle precipitation and the more hazardous showers and thunderstorms. Together, these two charts provide a three-dimensional picture of clouds and precipitation.

The echo pattern of the RADAR SUMMARY Chart is the arrangement of echoes. A pattern may be (1) a line of echoes, (2) an area of echoes, or (3) an isolated cell. A cell is a solid convective mass normally 20 nautical miles or less in diameter. Echo coverage indicates the extent of precipitation echoes within an area or line.

Movement of individual storms within a line or area often differs from the movement of the overall storm pattern. The movement of an isolated cell or individual echoes is shown by a direction arrow and a number representing speed in knots. Movement of a line or area is shown by an arrow with flags, a full flag for 10 knots, and a half flag for 5 knots.

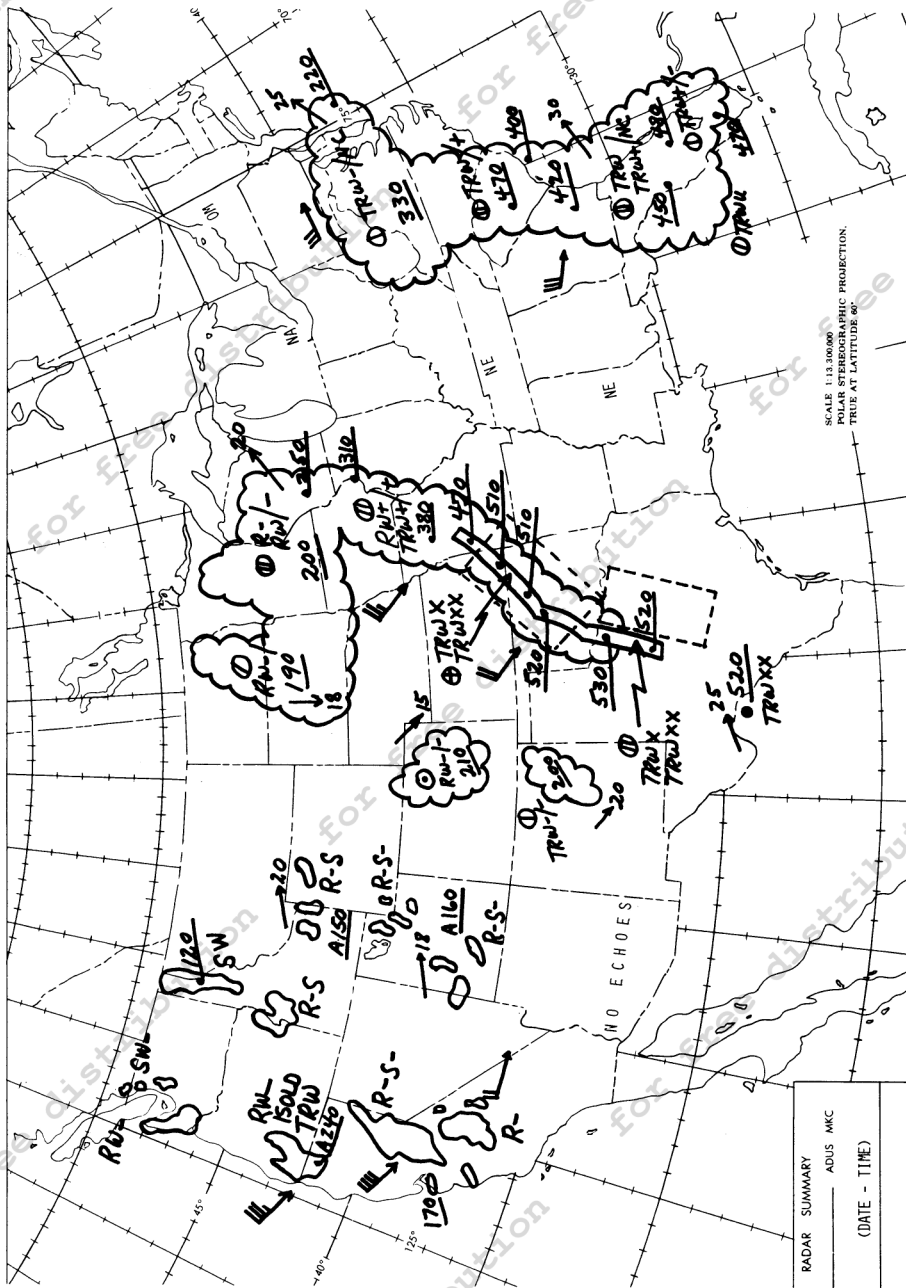
A list of symbols used on the Radar Summary Chart appears on page 3. Symbols in the left and middle column are common to all plotted radar weather reports. Those in the top right column are used mostly east of the Rocky Mountains, and those in the lower part of the column are used with ARTCC Echo Reports.

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* Exam-O-Grams are non-directive in nature and are issued solely as an information service to individuals interested in Airman Written Examinations.

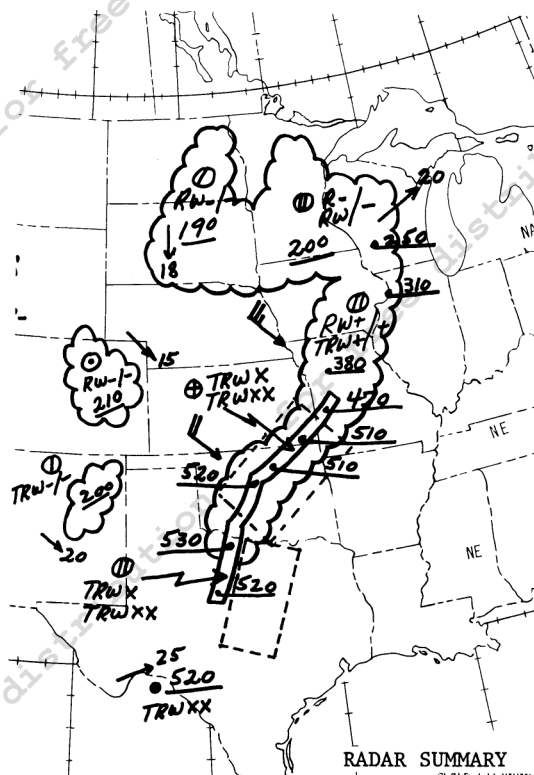
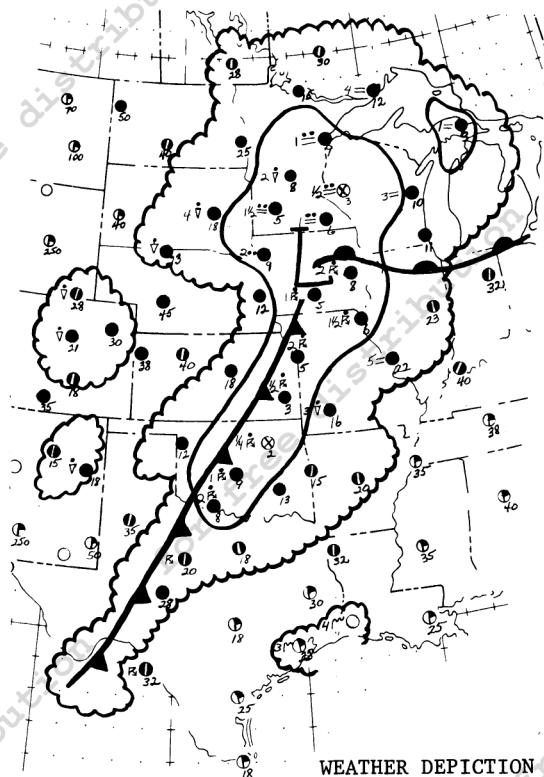
Rev. 1/77

RADAR SUMMARY CHART



RADAR CHART LEGEND

SYMBOLS COMMON TO ALL PLOTTED RADAR WEATHER REPORTS	HEIGHTS OF ECHO BASES AND TOPS	SYMBOLS USED WITH WEATHER SURVEILLANCE RADAR
<p style="text-align: center;"><u>WEATHER SYMBOLS</u></p> <p>A Hail R Rain RW Rain Showers S Snow SW Snow Showers</p> <p>IP Ice Pellets L Drizzle ZL Freezing Drizzle ZR Freezing Rain T Thunderstorm</p>	<p style="text-align: center;"><u>HEIGHTS OF ECHO BASES AND TOPS</u></p> <p>Heights in hundreds of feet MSL are entered above and/or below a line to denote echo tops and bases respectively. Examples are:</p> <p><u>450</u> Average tops are 45,000 feet. <u>200</u> <u>80</u> Tops 20,000 feet; bases 8,000 feet. <u>350</u> Top of individual cell, 35,000 feet. <u>620</u> Maximum tops, 62,000 feet.</p> <p><u>A250</u> Tops 25,000 feet, reported by aircraft. Absence of a figure below the line indicates that echo base was not reported. Radar detects tops more readily than bases, since precipitation usually reaches the ground. Also, curvature of the earth prohibits the detection of bases of distant precipitation. Information from ATC radar shows tops only when reported by aircraft.</p>	<p style="text-align: center;"><u>SYMBOLS USED WITH WEATHER SURVEILLANCE RADAR</u></p> <p> A line of echoes  An area of echoes  Isolated cell  Strong cell detected by one radar  Strong cell detected by two or more radars  Over 9/10 coverage  6/10 thru 9/10 coverage  1/10 thru 5/10 coverage  Less than 1/10 coverage</p>
<p style="text-align: center;"><u>ECHO INTENSITY</u></p> <p>Weak X Intense Moderate XX Extreme Strong U Unknown Very Strong</p> <p>++ Separates intensity from Solidus (/) intensity trend</p>	<p style="text-align: center;"><u>SYMBOLS INDICATING NO ECHOES</u></p> <p>NE No echo (equipment operating but no echoes observed). NA Observation not available. OM Equipment out for maintenance.</p>	<p style="text-align: center;"><u>SYMBOLS USED WITH ARTCC ECHO REPORTS</u></p> <p> (Solid line) Echo boundary from ARTCC scopes.  Line of echoes--possible squall line.</p>
<p style="text-align: center;"><u>TREND</u></p> <p>+ Increasing NC No Change - Decreasing NEW New</p> <p>Examples of Precipitation Types, Intensity, and Trend</p> <p>TRM+/- Thunderstorm, heavy rainshower, decreasing in intensity. R-/NC Light rain, no change in intensity. TRM-/NEW Thunderstorm, light rain shower, newly developed. S Snow (No intensity or characteristic is shown for frozen precipitation.)</p>	<p style="text-align: center;"><u>MOVEMENT OF ECHOES</u> (Examples)</p> <p> Northeast at 15 knots. (Individual Echo)  East at 25 knots. (Line or area movement)</p>	



From the excerpts above, you can see that the Weather Depiction Chart and the Radar Summary Chart complement each other--it takes both charts to obtain a three-dimensional picture.

The Weather Depiction Chart shows where the fronts are; a warm front extends east from the Low, and a cold front runs southwest. Thunderstorms are indicated ahead of the cold front, but from this chart we cannot determine the height of the buildups or the intensity. The Radar Summary Chart shows a solid line of thunderstorms just ahead of the front with buildups to 53,000 feet. The symbols on the chart indicate that the thunderstorms are intense to extreme along this line of echoes.

From the Weather Depiction Chart, you can see that north of the Low is an IFR area with both low ceilings and visibilities (ceilings from 3 to 9 hundred; visibilities 1 to 2 miles). The Radar Summary Chart indicates that the area of echoes northwest of this Low covers not more than five-tenths nor less than one-tenth of the area, and that the average tops of the echoes is 19,000. Also, only light rain showers are indicated. Notice that the area of thunderstorms is moving to the southeast at 20 to 25 knots. Also notice that no general movement is indicated for the area of showers north of the low. However, individual cells over the Dakotas are moving to the south at 18 knots, while over Wisconsin cell movement is toward the northeast at 20 knots.

By studying both charts, one can obtain a fair picture of the conditions to expect in a given area and especially the areas to be avoided.

For another example of how one chart complements the other, observe that the Weather Depiction Chart shows the area ahead of the front in central Texas to have VFR and MVFR weather conditions; but from the Radar Summary Chart, one can see there is a severe weather watch in this area.

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