ORDER

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

6560.10B

5/9/77

SUBJ: RUNWAY VISUAL RANGE (RVR)

1. PURPOSE. This order provides general information on the installation, operation, and utilization of the Runway Visual Range (RVR) system. It further establishes guidelines for installation of transmissometers, RVR systems and retrofit programs for existing installations under the various categories of operation. The operational criteria under which RVR is to be reported to pilots are also included.

2. DISTRIBUTION. This order is distributed to the branch level in the Airway Facilities, Air Traffic and Flight Standards Services, and to the Office of Airports Programs; to the branch level in the centers and to the regional Airway Facilities, Air Traffic, Flight Standards and Airports Divisions; and a normal distribution to all airport traffic control towers, combined station/towers, general NAS sectors, and general aviation, air carrier, flight inspection, and flight standards district offices, and overseas area offices.

3. CANCELLATION. Order 6560.10A is cancelled.

4. BACKGROUND.

a. All-weather instrument approach operations are divided into categories corresponding to different standards of instrumentation in the aircraft and on the ground. For each category, there is a minimum value of specified runway visual range (RVR) below which operations are not permitted. The following table identifies the categories and LOWEST minima associated with each:

Category	Visibility (RVR)
Nonprecision	2400 feet
Category I	1800 feet
Category II	1200 feet
Category IIIa	700 feet
Category IIIb	150 feet
Category IIIc	0

Distribution: WRAF/AT/FS-3; WAP-3; RAS-3; NC-3
FAT-2; FAT-3; FAF-2 (normal)
FFS-1; FFS-2; FFS-4; FFS-7 (normal); M-2

Initiated By: ATF-4

b. The increase in air traffic and importance of meeting schedules, particularly at the larger hubs, gives airport sponsors and aircraft operators an incentive for improving ground and aircraft instrumentation so that operational capability can be maintained and diversions avoided despite low visibility conditions.

c. One of the requirements for runway instrumentation is a system to measure RVR. This system provides a means of electronically measuring the transmission of light through the atmosphere and displaying a runway visibility in terms of feet by determining a runway visibility at a previously selected position or number of positions along the runway.

5. DEFINITION.

a. Runway Visual Range (RVR). In the United States, runway visual range is a value determined by instruments located alongside and about 14 feet higher than the centerline of the runway, based on standard calibrations, that represents the horizontal distance a pilot will see down the runway from the approach end; it is based on the sightings of either high intensity runway lights or on the visual contrast of other targets whichever yields the greater visual range. RVR, in contrast to prevailing or runway visibility, is based on what a pilot in a moving aircraft should see looking down the runway. RVR is horizontal visual range, not slant visual range. It is based on the measurement of a transmissometer made near the touchdown point of the instrument runway and is reported in hundreds of feet.

b. Touchdown RVR System. The touchdown RVR system is that system whose transmissometer is located near the touchdown end of the runway in accordance with criteria stated in Order 6990.3, "Implementation of Standard FAA-STD-008 Siting and Installation Standards for Runway Visual Range Equipment for Category I and II Operation."

c. Mid-RVR System. The mid-RVR system is that system whose transmissometer is located within 1000 feet of half the distance of the length of the runway, and the distance from runway centerline shall conform to standards designated for touchdown and rollout RVR.

d. Rollout RVR System. The rollout RVR system is that system whose transmissometer is located approximately 1000 feet from the rollout end of the runway in accordance with FAA-STD-008.

e. Designated RVR Runway. The designated RVR runway is the runway officially designated by FAA for reporting of ten minute maximum and minimum RVR values in long-line dissemination.

This will normally be the runway having the lowest instrument minima. (This definition is for flight planning purposes.)

6. SYSTEM DESCRIPTION.

a. A full RVR system consists of the following:

(1) Transmissometer projector and related items
(2) Transmissometer receiver (detector) and related items
(3) Analogue recorder
(4) Signal data converter and related items
(5) Remote digital or remote display programmer

b. The transmissometer projector and receiver are each mounted atop 14 foot towers either 250 or 500 feet apart. These towers are located at least 400 feet from the runway centerline on a line divergent from the runway centerline not to exceed 14.5° with the projector light beam directed angularly away from the runway. When an RVR system is installed between parallel runways and serves both runways the baseline of the transmissometer will be parallel to the runway. A fixed known intensity of light is emitted from the projector, intercepted and measured by the receiver. Any obscuring matter; e.g., rain, snow drizzle, dust, smoke, fog, and haze, reduces the intensity of the light received. This measurement is converted to an RVR value by the signal data converter. These values are displayed by digital or light emitting diodes (LED) readout equipment in the associated air traffic control facility and updated approximately every minute for controller issuance to pilots by radio.

c. The signal data converter requires information on the high intensity runway edge light setting in use (either 3, 4 or 5), transmission values from the transmissometer and the existence of day or night conditions. On the basis of this information, it will compute RVR for any one of the three light settings. The RVR value, therefore, is related directly to the runway light setting in use, and the pilot has available a measurement closely approximating the visibility conditions which he will experience on the runway during take-off or landing.

d. An RVR transmissometer system established on a 500-foot baseline is capable of providing digital readouts as low as 1000 feet RVR. In order to provide a lower value (down to 600 RVR), the baselines have been reduced to 250 feet and the readout displayed in 200-foot increments from 600 feet to 3000 feet (to 4000 feet older systems), then RVR values are displayed in 500-foot increments to 6000 feet. Beyond this point, the value of 6000 feet plus RVR is displayed.

e. Reportable RVR values are not necessarily the same as the various weather category limits of RVR. For example, Category IIIa extends down to RVR minimum of 700 feet, yet only 600 and 800 feet are reportable increments. The pulse count break points are based on odd 200-foot values; therefore, the 800-foot reportable values cover a range from 701 feet to as high as 900 feet.

7. REQUIREMENTS.

a. All new and relocated transmissometer equipment will be established with a 250-foot baseline.

b. Siting and installation criteria for transmissometer facilities are contained in FAA-STD-008.

c. A retrofit program for existing installations, including replacement of Runway Visibility Value (RVV) (used as a primary system) with a digital readout, to conform to these requirements should be established as funds become available.

d. RVR shall be specified and published on approach charts as controlling visibility minima for precision and nonprecision approaches when the runway threshold plus 1200 feet of that runway is located within a 2000-foot radius of any transmissometer provided:

(1) The existing RVR system(s) meets FAA-STD-008 siting requirements.

(2) The High Intensity Runway Edge Lights (HIRLs) are required on both the primary and secondary runways and must be set at the same intensity to report the RVR for the secondary runway.

A changeover switch is not required to provide RVR information on the secondary runway when conditions of paragraph 7d(1) and (2) are met.

NOTE: Category II/III runways require associated RVR systems.

e. At those airports with identical low published RVR instrument minima for more than one runway, the Flight Standards Air Carrier representative, in cooperation with the Air Traffic Control Facility Chief, shall determine which runway is to be the "Designated RVR Runway." This designation shall not change unless the RVR landing minima for that runway changes or another runway supports a lower RVR landing minima.

f. The installation of a touchdown recorder is required when RVR systems are provided; however, a temporary failure of the touchdown recorder is not reason for discontinuance of operations.

g. Category I

(1) RVR systems will be installed in accordance with the criteria outlined in Order 7031.2B, Airway Planning Standard Number One - Terminal Air Navigation Facilities and Air Traffic Control Services.

(2) RVR systems presently installed at Category I locations not meeting the above requirements may be retained. Relocation will not be authorized unless the above requirements are met.

(3) When RVR systems are being installed, only a touchdown system will be required and will be installed with a 250-foot baseline. Many of the present Category I RVR locations are installed on a 500-foot baseline; however, modification or relocation of these facilities will not be accomplished just to reduce the baseline to 250 feet.

h. Category II

(1) For operations at 1600 RVR only a touchdown transmissometer system is required.

(2) For authorization below 1600 RVR, transmissometers are required at both the touchdown and rollout ends of the Category II runway. Additionally, a mid-RVR will be required on a Category II runway when the runway length is in excess of 8000 feet.

(3) When a Category I runway is upgraded to a Category II runway, the rollout transmissometer must be on a 250-foot baseline. An existing touchdown transmissometer may be retained on a 500-foot baseline.

(4) Category II runways may be commissioned with RVR as low as 1200 feet without mid-RVR. However, mid-RVR shall be installed on runways more than 8000 feet in length when funds and equipment become available.

i. Category IIIa

(1) For operations below 1200 RVR, touchdown, mid and rollout RVR systems on a 250-foot baseline are required unless it can be shown that two transmissometers (touchdown and rollout) can meet the operational needs for a particular airport. Where three transmissometers are installed, touchdown and mid are controlling, and rollout provides advisory visibility information to pilots. If a runway requires only two transmissometers, touchdown and rollout are controlling.

8. OPERATIONAL CRITERIA. RVR systems are not provided at all Category I locations. All Category II and III systems will be equipped with RVR in accordance with previously stated requirements. Operational use will be predicated on all systems operating normally. RVR data will be disseminated to pilots in accordance with ATC procedures and as requested. Reference Order 6750.24, "ILS and Ancillary Electronic Component Requirements."

a. Arriving Aircraft

(1) Category I Weather Conditions (1800 RVR or greater)

(a) Touchdown RVR - required (controlling)
(b) Mid/rollout where installed - advisory

Note: Minima below 2400 feet will not be authorized unless Touchdown Zone (TDZ) and Centerline Lighting (C/L) are available.

* (2) Category II Weather Conditions (1200 RVR up to but not including 1800 RVR)

(a) Touchdown required (controlling).
(b) Mid - not required for Category II operations but is an FAA system requirement for runways in excess of 8000 feet (see paragraph 7h(2)). Where installed, provides advisory visibility information to pilots.
(c) Rollout - required for operations when RVR is less than 1600 to provide advisory visibility information to pilots.
(d) The mid RVR transmissometer, if installed, may be substituted for an inoperative rollout transmissometer.

(3) Category IIIa Weather Conditions (below RVR 1200 to RVR 700)

(a) Three transmissometers are required unless it can be shown that two transmissometers (touchdown and rollout) can meet the operational needs for a particular airport. Where three transmissometers are installed, touchdown and mid are controlling and rollout provides advisory visibility information to pilots. If a runway requires only two transmissometers, touchdown and rollout are controlling. *

b. Departing Aircraft

(1) Weather Conditions 1600 RVR or greater

(a) Touchdown RVR (controlling).

* (2) Weather Conditions below 1600 RVR to 600 RVR

(a) 500-foot baseline transmissometers installed- touchdown RVR 1200 and rollout RVR 1000, both required and controlling.

(b) 250-foot baseline transmissometers installed - touchdown RVR 700, mid RVR 700 (if installed), and rollout RVR 600, all controlling.

Note 1: Minima below 1600 RVR will not be authorized unless the runways are equipped with C/L lights.

Note 2: Where only two transmissometers are installed, the touchdown and rollout RVRs are required and controlling. If three transmissometers are installed, the failure of any one transmissometer will not affect operations providing the remaining two RVR values are at or above appropriate minima stated in paragraph 8b(2)(b) above. *

c. Action required on RVR failure.

(1) Should any of the required RVR or related systems that affect Category II or III minimums fail, the approach minimums shall be increased appropriately by FDC NOTAM.

(2) The RVR system shall be NOTAMed out of service when the transmissometers or HIRL components fail.

(3) The RVR system shall be restricted to 1800 feet or greater upon failure of components which would result in erroneous remote readout value; i.e., computer, day/night switch, HIRL relay chassis. Reporting of RVR values under these conditions assumes the availability of transmissivity values from the transmissometer which can be converted to RVR values by use of a chart.

(4) There is no restriction on the use of the RVR system if only the recorder or indicator fails and all other components are operational.

d. Reporting 10 Minute RVR Values. (See "Federal Meteorological Handbook No. L (FMH-1) (Abridged), 'Surface Observations.'")

(1) The 10 minute RVR values are reported when the prevailing visibility is one mile or less, or the touchdown RVR values are 6000 feet or less. The 10 minute values are calculated on the basis of light setting 5 and are included in Record and Special observations. The touchdown RVR recorder from which the 10 minute values are obtained is always associated with the system serving the runway having the lowest published instrument minimum.

(2) The 10 minute RVR values are appended to the weather sequence by the weather observation facility and transmitted on Service A. Retention of the recording shall be for a period of 15 days except in the event of an incident when they must be retained indefinitely.

(3) Regions shall insure that facilities comply with the following:

(a) At locations having a designated RVR runway, the 10 minute RVR values will be obtained from the touchdown RVR recorder.

(b) At locations having a designated RVR runway and other RVR runways, all with identical low published RVR instrument minimums, the 10 minute values may be obtained from any one of the touchdown RVR recorders, when the designated RVR runway becomes inoperative. (This requires the installation of two recorders in the weather observing facility.)

(c) At locations having multiple RVR runways, of which one has been selected as the designated RVR runway, an alternate shall be selected to be used in obtaining 10 minute RVR values. The alternate runway shall be the runway having the next to the lowest minimum which permits operations. (This requires the installation of two touchdown recorders in the weather observing facility.)

(d) Once paragraph 8d(3)(a), (b) and (c) have been accomplished, any revision shall be in accordance with paragraph 7e.

(e) The weather observing facility (FSS or National Weather Service) will be notified of the RVR runways selected.

(4) Control towers performing Limited Aviation Weather Reporting Service (LAWRS) are exempted from these longline reporting procedures.

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