Essential Skills Checklist

Chapter 2: Electronic Flight Instruments

Primary Flight Display

1. Correctly interpret flight and navigation instrument information displayed on the PFD.
2. Determine what "fail down" modes are installed and available. Recognize and compensate appropriately for failures of the PFD and supporting instrument systems.
3. Accurately determine system options installed and actions necessary for functions, data entry and retrieval.
4. Know how to select essential presentation modes, flight modes, communication and navigation modes, and methods of mode selection and cancellation.
5. Be able to determine extent of failures and reliable information remaining available, including procedures for restoring function(s) or moving displays to the MFD or other display.

Chapter 3: Navigation

Flight Planning

1. Determine if the FMS is approved for the planned flight operation.
2. Determine if your FMS can be used as a primary navigation system for alternate requirements.
3. Understand how entries are made and canceled.
4. Understand how each unit is installed, and how it is programmed or jumpered for optional functions.
5. Determine which navigation sources are installed and functional.
6. Determine the status of the databases.
7. Program the FMS/RNAV with a flight plan, including en route waypoints, user waypoints, and published instrument procedures.
8. Review the programmed flight route to ensure it is free from error.
9. Find the necessary pages for flight information in the databases.
10. Determine which sources drive which displays or instruments, and where the selection controls are located.
11. Determine and understand how to use and program optional functions and equipment installed with FMS/RNAV basic unit.

En Route

1. Select and monitor the en route portion of the programmed flight route, determining waypoint arrival, approving turn anticipation, and waypoint sequencing.
2. Approve or select the correct course automatically displayed or manually tuned.
3. Determine if the FMS makes fuel calculations and what sensors and data entries are required to be made by the pilot.
4. Ensure that the track flown is that cleared by air traffic control (ATC).
5. Determine that the display CDI sensitivity is satisfactory for the segment being flown.

En Route Modifications

1. Proceed directly to a waypoint in the programmed route.
2. Cancel a programmed or selected waypoint or fix.
3. Select a different instrument procedure or transition.
4. Restart an approach sequence.
5. Immediately find the nearest airport or facility.
6. Edit a flight plan.
7. Enter a user waypoint.

Descent

1. Determine the descent airspeed to be used with concern to turbulence, aircraft descent profile, and powerplant cooling restrictions.
2. Program, observe, and monitor the top of descent, descent rate, and level-off altitude.
3. Plan and fly a descent to a crossing restriction.
4. Recognize and correct deviations from a planned descent path, and determine which factor changed.

Intercept and Track Course

1. Program and select a different course to the active waypoint.
2. Select the nonsequencing waypoint function (OBS, Hold, or Suspend) to select a specified navigation point.
3. Reactivate the sequencing function for route navigation.

Holds

1. Select a preprogrammed holding pattern, or nonsequencing mode.
2. Select and set up a non-preprogrammed holding pattern inbound course.
3. Determine the proper sequence of software commands for the holding pattern, transition to approach, approach, and MAP navigation.

Arcs

1. Select an approach procedure with an arc.
2. Select the course, or determine that automatic course CDI setting will occur.

GPS and RNAV (GPS) Approaches

1. Load and activate a vectored GPS or RNAV (GPS) approach.
2. Select a vectored initial approach segment.
3. Determine the correct approach minimums and identify all pertinent mode transitions.
4. Determine the published missed approach point (MAP), courses, altitudes, and waypoints to fly.
5. Determine how missed approach guidance is selected.

Course Reversals

1. Select a type of course reversal procedure.
2. Determine the correct sequence of mode control actions to be accomplished by the pilot.

Missed Approaches

1. Acknowledge a missed approach procedure.
2. Set the FMS/GPS for a return to the same approach to fly it again.
3. Select a different approach while holding at a missed approach holding waypoint.
4. Program an ATC specified hold point (user waypoint) for selection after the published MAP/hold procedure.

Ground-Based Radio Navigation

1. Select any type of ground-based radio navigation approach.
2. Correctly tune and set up the conventional navigation receiver for the procedure in number 1.
3. Correctly monitor the navaid for proper identification and validity.
4. Correctly select and be able to use the desired navigation source for the autopilot.

Chapter 4: Automated Flight Control

Climbs and Descents

1. Use the FD/autopilot to climb or descend to and automatically capture an assigned altitude.
2. Determine the indications of the ARM or capture modes, and what pilot actions will cancel those modes.
3. Determine if the system allows resetting of the armed or capture modes or if manual control is the only option after cancellation of these modes.
4. Determine the available methods of activating the altitude armed or capture mode(s).
5. Determine the average power necessary for normal climbs and descents. Practice changing the power to these settings in coordination with making the FD/autopilot mode changes.

6. Determine and record maximum climb vertical speeds and power settings for temperatures and altitudes. Ensure the values are in agreement with values in the AFM/POH for the conditions present. Make note of the highest practical pitch attitude values, conditions, and loading. Remember powerplant factors (e.g., minimum powerplant temperature, bleed air requirements) and airframe limitations (e.g., V_A in setting power).

Course Intercepts

1. Use the FD/autopilot to fly an assigned heading to capture and track a VOR and/or RNAV course.
2. Determine if the FD/autopilot uses preprogrammed intercepts or set headings for navigation course interceptions.
3. Determine the indications of navigation mode armed conditions.
4. Determine parameters of preprogrammed intercept modes, if applicable.
5. Determine minimum and maximum intercept angle limitations, if any.

Coupled Approaches

1. Use the FD/autopilot to couple to a precision approach.
2. Use the FD/autopilot to couple to a nonprecision approach.
3. Use the FD/autopilot to couple to an RNAV approach.
4. Determine the power setting required to fly the approaches.
5. Determine the power settings necessary for level-off during nonprecision approaches and go-around power settings for both precision and nonprecision approaches.
6. Determine the speeds available for the minimum recommended powerplant settings (useful for determining if an ATC clearance can be accepted for climbs, altitudes, and descents).

Miscellaneous Autopilot Topics

1. Demonstrate the proper preflight and ground check of the FD/autopilot system.
2. Demonstrate all methods used to disengage and disconnect an autopilot.
3. Demonstrate how to select the different modes and explain what each mode is designed to do and when it will become active.
4. Explain the flight director (FD) indications and autopilot annunciators, and how the dimming function is controlled.

Chapter 5: Cockpit Information Systems

Multi-Function Display

1. Program the multi-function display to show data provided by any aircraft system.
2. Determine how many data displays can be combined in one display.
3. Know how to select the PFD displays on the MFD, if available.
4. Determine which data displays can be overlaid onto the PFD and the MFD.

Glossary

Active waypoint. The waypoint being used by the FMS/RNAV as the reference navigation point for course guidance.

ADAHRS. See air data attitude and heading reference system.

ADC. See air data computer.

ADS-B. See automatic dependent surveillance—broadcast.

Advanced avionics information system. Any cockpit electronic (avionics) system designed to provide information or data to the pilot about aircraft status or position, planned routing, surrounding terrain, traffic, weather, fuel, etc. Advanced avionics systems are generally evidenced by visual displays of integrated information in lieu of mechanical or stand alone instruments for one or two data sets each.

AHRS. See Attitude Heading Reference System.

Air Data Attitude and Heading Reference System (ADAHRS). An integrated flight instrument system that combines the functions of an air data computer (the "AD" short for ADC) and an Attitude Heading Reference System (AHRS) into one unit.

Air Data Computer (ADC). The system that receives ram air, static air, and temperature information from sensors, and provides information such as altitude, indicated airspeed, vertical speed, and wind direction and velocity to other cockpit systems.

Altitude alerting system. The system that allows the pilot to receive a visual and/or auditory alert when the airplane approaches or deviates from a preselected altitude.

Altitude capture. An autopilot function that enables the autopilot to level the airplane at a selected altitude automatically.

Altitude function. An autopilot function that maintains the present altitude of the airplane.

Annunciator panel. Grouping of annunciator lights that is usually accompanied with a test switch, which when pressed illuminates all the lights to confirm they are in working order.

Approach mode/function. An autopilot function or mode that allows the pilot to capture and track any VOR radial or localizer with a higher degree of accuracy.

Area navigation (RNAV). A method of navigation that permits operations along any desired flightpath within the area of coverage of station-referenced navigation aids (e.g., GPS, VOR/DME, DME/DME, eLORAN), or within the limits of a self-contained navigation system (INS, doppler radar), or any combination.

Armed. A system mode or function that is set to become actively engaged at a later time, when certain conditions are met.

Attenuation. See radar attenuation.

Attitude Heading Reference System (AHRS). An integrated flight instrument system that provides attitude, heading, rate of turn, and slip/skid information.

Automatic dependent surveillance—broadcast (ADS-B). A surveillance system in which an aircraft or vehicle to be detected is fitted with cooperative equipment in the form of a data link transmitter. The aircraft or vehicle periodically broadcasts its GPS-derived position and other information (e.g., velocity) over the data link, which is received by a ground-based transmitter/ receiver (transceiver) for processing and display at an air traffic control facility.

Automatic mode change. Any change in mode or system status initiated by the system, rather than by a deliberate mode change action taken by the pilot.

Autopilot. An aircraft flight control system that automatically manipulates the roll, pitch, and, in some cases, the yaw control surfaces of the airplane to capture and track the route programmed into the FMS/RNAV, or altitudes, vertical speeds, headings, and courses selected by the pilot.

Autopilot flight mode annunciator. A display that presents the names of autopilot functions that are either armed or engaged. It is the only reliable source of information about what autopilot functions are in use.

Autothrottle system. A system that automatically manipulates the thrust setting of the airplane to help follow the vertical trajectory portion or selected airspeed of the planned flight route.

Autotrim system. The system that automatically adjusts the pitch trim of the airplane in response to trim commands generated by the autopilot.

Bottom-of-descent point. The end point of the descent, as calculated by the FMS/RNAV.

Broadcast weather service. A weather service that prepares weather products and transmits them to participating aircraft, also known as a data link weather service.

Chapter. Associated group of electronic "pages" of information from databases found in FMS and GPS RNAV units similar in contents, such as airports, VORs, software/ unit settings, and feature selections.

Command bars. A flight director display that presents roll and pitch instructions (generally, V-shaped visual cues) to help the pilot maintain the flightpath/flight track to the selected point. The pilot keeps the airplane symbol aligned with the command bars on the flight director, or centered on the FD crossbars (e.g., older Cessna units).

Crossing restriction. A directive issued or published by air traffic control that instructs the pilot to cross a given waypoint at a specified altitude, and sometimes at a specified airspeed.

Cursor mode. The function offered by the FMS/RNAV that allows data entry into an avionics unit such as the FMS and RNAV.

Data link weather service. See broadcast weather service.

Deceleration segment. A planned portion of a descent designed to permit the aircraft to slow to meet a terminal area speed restriction, crossing restriction, or other speed restriction.

Desired track. The great circle course computed by the FMS/RNAV, it goes from the past waypoint to the next (active) waypoint.

Distance measuring equipment (DME). Line-of-sight limited airborne equipment (transceiver) using paired pulse replies from ground-based transponder to determine slant range distance by time between airborne transmission of pulses and return of pulses from the ground transponder.

DME. See distance measuring equipment.

EHSI. See electronic horizontal situation indicator.

Electronic flight instruments. Flight instruments that use electronic devices to prepare and/or present information such as airspeed, attitude, altitude, and position.

Electronic horizontal situation indicator (EHSI). Electronically generated HSI display, either CRT or LCD type, indicating all standard HSI functions on a video screen instead of using mechanical components.

eLORAN. See long range navigation.

Engaged. A system mode or function that is actively performing its function.

Error-evident display. Any display that presents information in a way that makes errors more obvious and detectable.

FD. See flight director.

Faildown. The substitute display or backup instrument mode available if the primary component fails. In some systems, for example, the MFD can substitute for the PFD if the PFD fails. The PFD information "fails down" to the MFD. In other systems, the substitute for the PFD might be the conventional standby instruments and the standby or secondary navigation CDI.

Flight director. Electronic flight calculator that analyzes the navigation selections, signals, and aircraft parameters. It presents steering instructions on the flight display as command bars or crossbars for the pilot to position the nose of the aircraft over or follow.

Flight management system (FMS). A computer system containing a database to allow programming of routes, approaches, and departures that can supply navigation data to the flight director/autopilot from various sources, and can calculate flight data such as fuel consumption, time remaining, possible range, and other values.

Fly-by waypoint. A waypoint designed to permit early turns, thus allowing the aircraft to roll out onto the center of the desired track to the next waypoint.

Fly-over waypoint. A waypoint that precludes any turn until the waypoint is overflown, and is followed by either an intercept maneuver of the next flight segment or direct flight to the next waypoint.

FMS. See flight management system.

Fuel management system or function. An advanced avionics system that assists the pilot in managing fuel by considering fuel flow, airspeed, and winds to help predict fuel remaining at each waypoint along the programmed route, total endurance, and the viability of alternative routings or diversions. Stand-alone systems may integrate the output data into the FMS/RNAV or provide a discreet display, while the fuel management function is an integral portion of the FMS/RNAV system. In either instance, the fuel data management goals are similar.

Fuel range ring. A graphical depiction of the point at which an aircraft is predicted to exhaust its fuel reserves or reach a point at which only reserve fuel remains.

Glideslope (GS) function. The autopilot function that manipulates the pitch of the aircraft to track a glideslope signal or APV guidance during a precision approach.

Global Positioning System (GPS). A Global Navigation Satellite System (GNSS) navigation system that can determine position and track the movement of an aircraft. A global positioning system (GPS) receiver must be installed on board the aircraft to receive and interpret signals from the satellite-based system.

Global Positioning System Steering (GPSS). The autopilot function that receives signals directly from the GPS/FMS/RNAV to steer the aircraft along the desired track to the active waypoint set in the GPS receiver.

GPS. See Global Positioning System.

GPS overlay approach. A conventional nonprecision approach procedure that can be flown using RNAV equipment.

GPS stand-alone approach. A nonprecision approach procedure based solely on the use of the global positioning system and an IFR-certified FMS/RNAV unit using GPS signals.

GPSS. See Global Positioning System Steering.

Great circle route. The shortest distance between two points when traveling on the surface of the earth; defined by a geometric plane that passes through the two points and the center of the earth.

Ground weather surveillance radar system. Any ground-based facility equipped to gather information about significant weather across a wide area.

Heading function. The flight director/autopilot function that steers the aircraft along a specified magnetic heading.

Highway in the sky (HITS). A type of electronic flight instrument that superimposes a 3-dimensional portrayal of a planned lateral and vertical aircraft trajectory onto an artificial horizon display.

HITS. See highway in the sky.

ILS. See instrument landing system.

Inertial navigation system (INS). Self-contained internal navigation system using sensors to measure changes in motion of aircraft, acceleration and deceleration, airspeed, altitude, and heading to maintain current position of aircraft. Also called "position keeping" because an interruption of the system requires the pilot to initialize or enter the beginning point of aircraft position reference.

INS. See inertial navigation system.

Instrument landing system. A ground-based precision instrument approach system usually consisting of a localizer, glideslope, outer marker, middle marker, and approach lights.

LNAV. Lateral (azimuth) navigation guidance. A type of navigation associated with nonprecision approach procedures or en route navigation.

LNAV/VNAV. Lateral navigation/vertical navigation minimums provided for RNAV systems that include both lateral and vertical navigation (e.g., WAAS avionics approved for LNAV/VNAV, certified barometric VNAV with IFR approach certified GPS). Procedure minimums altitude is published as DA (decision altitude).

Localizer Performance with Vertical Guidance (LPV). Provides lateral containment areas comparable to an ILS localizer and decision heights between those of LNAV/VNAV approaches and Category I ILS approaches. Approach procedure minimums that use WAAS to provide Localizer Performance with Vertical guidance (LPV). WAAS avionics equipment is required to fly to LPV minimums, which are published as DA (decision altitude).

Long range navigation (LORAN). LOng RAnge Navigation ground-based electronic navigation system using hyperbolic lines of position determined by measuring the difference in the time of reception of synchronized pulse signals from fixed transmitters. LORAN-C and eLORAN operate in the 100–110 kHz frequency band. Enhanced LORAN (eLORAN) is planned to operate using more stable timing signals and stations from other chains for greater accuracy than the current LORAN-C system.

LPV. See localizer performance with vertical guidance.

LORAN-C. See long range navigation.

Magnetic flux valve. A type of magnetometer using coils of wire as the transmitting portion of a synchronous repeating system, conventionally used to stabilize and correct a slaved gyroscopic heading (azimuth) indicator by sensing changes in the earth's magnetic field.

Magnetometer. The device that measures the strength of the earth's magnetic field to determine aircraft heading, and similar to the flux valve in function.

MFD. See multi-function display.

Mode awareness. The pilot's ability to monitor how system settings are configured throughout the flight.

Moving map. A graphical depiction of aircraft position, route programmed into the FMS/RNAV, surrounding geographical features, and any other information about the immediate flight environment such as traffic and weather that may be available from other avionics systems.

Multi-function display (MFD). A cockpit display capable of presenting information received from a variety of advanced avionics systems.

Navigation database. The information stored in the FMS/RNAV; contains most of the time-sensitive navigational information found on en route and procedural charts.

Navigation function. An autopilot function that allows you to track the route programmed in the FMS/RNAV or navigation receiver, such as a VOR radial.

Next Generation Radar System. A network of radar stations operated by the National Weather Service used to detect precipitation and wind. These data are used to prepare weather radar products that can be supplied to the cockpit via a broadcast weather service.

NEXRAD. See Next Generation Radar System.

Nonsequencing mode. The FMS/RNAV navigation mode that does not automatically sequence between waypoints in the programmed route. The nonsequencing mode maintains the current active waypoint indefinitely, and allows the pilot to specify desired track to or from that waypoint.

No-further-input prediction. A technique to help pilots maintain awareness of how advanced avionics systems are configured, and of the likely future behavior of the aircraft. No-further-input predictions are made by considering what the aircraft will do if the pilot makes no further entries or commands.

Nuisance alert. A term used to describe a "false alarm" provided by an avionics system designed to detect surrounding hazards such as proximate traffic and terrain.

OBS mode. The name for the nonsequencing mode on some FMS/RNAV units. See nonsequencing mode.

Onboard lightning detection systems. An onboard weather detection system that senses electrical discharges that suggest the presence of thunderstorm cells.

Onboard weather radar. An onboard system capable of detecting significant masses of precipitation. The primary use of weather radar is to aid the pilot in avoiding thunderstorms and their associated hazards.

Page. Any one of a collection of information displays that can appear on the FMS/RNAV unit. Every page has a title and presents information related to a particular navigation topic (e.g., airport elevation, runways, communication frequencies). Pages are usually in divisions called "chapters," which group pages of similar information by topic (e.g., airports, approaches, VORs).

PFD. See primary flight display.

Preprogrammed holding pattern (preprogrammed hold). A hold that is published as a part of an instrument procedure (e.g., approach, missed approach) and has been loaded into the FMS/RNAV. Some FMS/RNAV units automatically enter and fly the holding procedure when it is encountered. Others must be flown around the depicted holding pattern, usually by changing the heading (bug). Some units require switching to the nonsequencing or OBS mode so the active waypoint remains set to the designated holding fix.

Preprogrammed course reversal. A course reversal (commonly called a "procedure turn") that appears as part of an instrument approach procedure that has been loaded into the FMS/RNAV. Many FMS/RNAV units automatically attempt to perform the course reversal procedure when it is encountered. Others require the pilot to navigate the depicted procedural track manually or by using the heading mode to fly the depicted track.

Primary flight display (PFD). An electronic flight display that presents the primary flight instruments, navigation instruments, and other information about the status of the flight in one integrated presentation. Primary-secondary task inversion. Situation in which the pilot ceases to monitor the situation directly and simply listens for system alerts.

RA. See resolution advisory.

Radar attenuation. The absorption or reflection of radar signals by a weather cell, preventing that radar from detecting any additional cells that might lie behind the first cell.

RAIM. See receiver autonomous integrity monitoring. Receiver autonomous integrity monitoring. The self-monitoring function performed by a TSO-129 certified GPS receivers to ensure that adequate GPS signals are being received at all times. The GPS will alert the pilot whenever the integrity monitoring determines that the GPS signals do not meet the criteria for safe navigation use.

Receiver autonomous integrity monitoring. The self-monitoring function performed by a TSO-129 certified GPS receiver to ensure that adequate GPS signals are being received at all times. The GPS alerts the pilot whenever the integrity monitoring determines that the GPS signals do not meet the criteria for safe navigation use.

Resolution advisory (RA). A warning issued by the Traffic Collision Avoidance System (TCAS) indicating an immediate threat of collision with another aircraft. This warning takes the form of a command to perform a vertical avoidance maneuver (e.g., "Climb! Climb!") These commands are products of TCAS II equipment. These commands take precedence over ATC instructions, but must be reported to ATC immediately upon receipt and execution.

Risk homeostasis. A term coined by psychologist Gerald J. S. Wilde, a tendency for humans to seek target levels of risk.

RNAV. See Area Navigation.

RNAV (GPS) approach. An approach procedure based on GPS signals for guidance.

Route discontinuity. A point of uncertainty in a route that has been programmed into an FMS/RNAV. Most systems display this message when there is no routing to connect the last waypoint to the next point, or there is a missing next point. FMS/RNAV units will not plan to go direct unless certain programming parameters are met.

Sequencing mode. The FMS/RNAV mode that automatically sequences along the waypoints in the programmed route. The sequencing mode alerts the pilot to upcoming waypoints, and offers guidance to each successive waypoint in the route.

Stand-alone approach. An instrument approach that relies solely on the use of RNAV equipment. If flown with GPS/WAAS enabled certified equipment in accordance with TSO-C145A or TSO-146A installed in accordance with the provisions of AC 20-130A or 138A, no conventional navigation equipment alternate approach (VOR/ILS) requirements are necessary, as when flying with TSO-C129 certified equipment.

Subpage. An additional page of information about a particular topic that can be displayed on an FMS/RNAV. Many pages require the use of several subpages to show all information pertaining to any one topic.

SUSP. See suspend mode.

Suspend mode. For some FMS/RNAV units, the name used to describe the nonsequencing mode when it has been automatically set by the computer, or pilot.

TA. See traffic advisory.

Tape display. A vertical display format used to portray, for example, airspeed and altitude on many primary flight displays. Also used for vertical speeds and many other value displays such as power settings and powerplant speeds.

TAWS. See terrain awareness and warning system.

TCAS. See Traffic Alert and Collision Avoidance System.

Terminal Arrival Area. The published or assigned track by which aircraft are transitioned from the en route structure to the terminal area. A terminal arrival area consists of a designated volume of airspace designed to allow aircraft to enter a protected area with obstacle clearance and signal reception guaranteed where the initial approach course is intercepted.

Terminal mode. One name used for the FMS/RNAV sensitivity mode in which the aircraft is operating within 30 NM of an airport. In terminal mode, the required navigation performance sensitivity of the course deviation indicator becomes 1 NM. Also called approach arm mode.

Terrain and obstacle database. An electronic database storing details of the significant terrain features and obstacles that could potentially pose a threat to aircraft flight. Some obstructions, especially manmade, may not be in the database, even if it is current. Do not plan a flight based on dependence on the database to keep the aircraft clear of obstacles and obstructions to navigation.

Terrain Awareness and Warning System (TAWS). An onboard system that can alert the pilot to a number of potential hazards presented by proximate terrain such as excessive rate of descent, excessive closure rate to terrain, and altitude loss after takeoff.

Terrain display. A pictorial display that shows surrounding terrain and obstacles that present a potential threat to your aircraft, given your present altitude. Draws terrain information from a terrain and obstacle database.

Terrain inhibit switch. A switch that allows the pilot to suppress all visual and auditory warnings given by a terrain system. Often used to silence nuisance alerts when in deliberate operation in the vicinity of terrain.

Terrain system. Any cockpit system that provides the pilot with a pictorial view of surrounding terrain, and in some cases, visual and/or auditory alerts when the aircraft is operating in close proximity to terrain.

TIS. See traffic information service.

Top-of-descent point. The point that the RNAV computer calculates to be the ideal location at which to begin a descent to the planned crossing restriction, given the descent speed and rate that has been entered by the pilot.

Topographical database. A volume of information stored in an advanced cockpit system that details the topographical features of the earth's surface. Used by several systems to assess aircraft position and altitude with respect to surrounding terrain.

Traffic Advisory (TA). A warning issued by a traffic system that alerts the pilot to other aircraft that have moved within a prescribed "safety zone" that surrounds the aircraft.

Traffic Alert and Collision Avoidance System. An onboard system that detects the presence of some aircraft operating in the vicinity of the airplane by querying the transponders of nearby aircraft and presenting their locations and relative altitudes on a display. Alerts and warnings are issued when nearby aircraft are deemed to be a threat to safety. Traffic advisory systems such as ADS-B are an offshoot of newer technologies, but do not yet offer the reliability or accuracy of proven, certified TCAS units.

Traffic data system. An advanced avionics system designed to aid the pilot in visually acquiring and maintaining awareness of nearby aircraft that pose potential collision threats.

Traffic display. A pictorial display showing any aircraft operating in the vicinity that have been detected by a traffic data system.

Traffic Information Service (TIS). A groundbased advanced avionics traffic display system which receives transmissions on locations of nearby aircraft from radar-equipped air traffic control facilities and provides alerts and warnings to the pilot.

Turn anticipation. The function performed by FMS/RNAV units to advise the pilot when to begin a turn to the next waypoint in the programmed flight route to avoid overshooting the programmed track.

Vectors to final. A function of FMS/RNAV units allowing the pilot to perform a vectored approach procedure without being required to switch to the nonsequencing mode manually and set the active waypoint and course.

Vertical speed mode. An FD/autopilot mode that allows constant-rate climbs and descents by selecting a vertical speed on the flight director or autopilot control panel.

Very high frequency omnidirectional range (VOR). Ground-based electronic navaid transmitting 360° azimuth signals on assigned frequencies ranging from 108.0 to 117.9 mHz to serve as the basis for the National Airspace System (NAS). The signals are identified by discreet Morse code identifiers and may have voice capabilities for ATC and FSS/AFSS communications.

VOR. See very high frequency omnidirectional range.

WAAS. See Wide Area Augmentation System.

Waypoint. A named geographical location used to define routes and terminal area procedures. Modern advanced navigation avionics such as FMS/RNAV units are able to locate and follow courses to and from waypoints that occur anywhere in the airspace.

Waypoint alerting. The function performed by the FMS/RNAV to alert the pilot at some time or distance prior to, or when reaching, the active waypoint.

Waypoint sequencing. The action performed by the FMS/RNAV when the aircraft effectively has reached the active waypoint, and then automatically switches to the next waypoint in the programmed route. (See turn anticipation.)

Wide Area Augmentation System (WAAS). A ground and satellite integrated navigational error correction system that provides accuracy enhancements to signals received from the Global Positioning System. WAAS provides extremely accurate lateral and vertical navigation signals to aircraft equipped with GPS/WAAS-enabled certified equipment in accordance with TSO-C145A or TSO-146A installed in accordance with the provisions of Advisory Circular (AC) 20-130A or AC 20-138A.