

Facelift: Jeppesen SID/STAR Charts Having “A Little Work Done”

by Matthew McDaniel

Instrument procedure charts are not the sole domain of Jeppesen (now a Boeing company). Various governmental agencies and private companies have produced competing charts for decades. Yet, Jeppesen (Jepp) charts have long been the gold standard in Instrument Flight Rules (IFR) procedure publications for turbine aircraft operators the world over. They’ve always presented the detailed textual information and complex graphic depictions inherent to such procedures in well-organized formats that pilots appreciate. While minor tweaks to the basic formats have occurred regularly over the years, major redesigns have been infrequent. However, times are changing and traditional paper charts have now been mostly supplanted by Electronic Flight Bags (EFBs), various tablet apps, and even on-board Multi-Function Displays (MFDs). The full gamut of charting needs can now be neatly stored in such portable and/or installed computer devices. The advantages of quick electronic revisions and pounds of paper removed from the cockpit cannot be overstated. But, charts designed in the era of paper and ring-binders have sometimes suffered from less than ideal formatting when viewed on modern MFDs, EFBs or tablet devices. This is just one of the major issues that Jepp has addressed in their recent redesign of SID/STAR charts; a project that is now several months into a two-year rollout phase.

Coming to a Device Near You

I first became aware of the newly formatted Jepp SID/STAR charts on a January flight into New York’s JFK only two days after their introduction. That there had been a formatting change was immediately obvious, but the extent of the changes was less noticeable while completing the chores of a complex STAR into one of the world’s busiest airports. Further investigation was definitely in order.

The new format first appeared in the U.S. within the January 13, 2017 revision cycle, but only at five U.S. airports – Chicago’s O’Hare Int’l (ORD) and Midway Int’l (MDW) and New York City’s “Big Three” of Newark Liberty Int’l (EWR), La Guardia Airport (LGA), and Kennedy Int’l (JFK). Throughout the remainder of 2017 and 2018, the new format will be introduced incrementally across the

company’s worldwide database of nearly 20,000 SID/STAR procedures. Jeppesen has also already applied the new format to several airports outside the U.S., and for familiarization and training purposes. One transition aspect that Jepp is committed to, is ensuring that charts for a given airport will all be upgraded concurrently to avoid having a mix of new and old formats at a single airport. Undoubtedly, with each subsequent revision cycle, your odds of being confronted with a redesigned SID/STAR chart will increase (Figure 1).

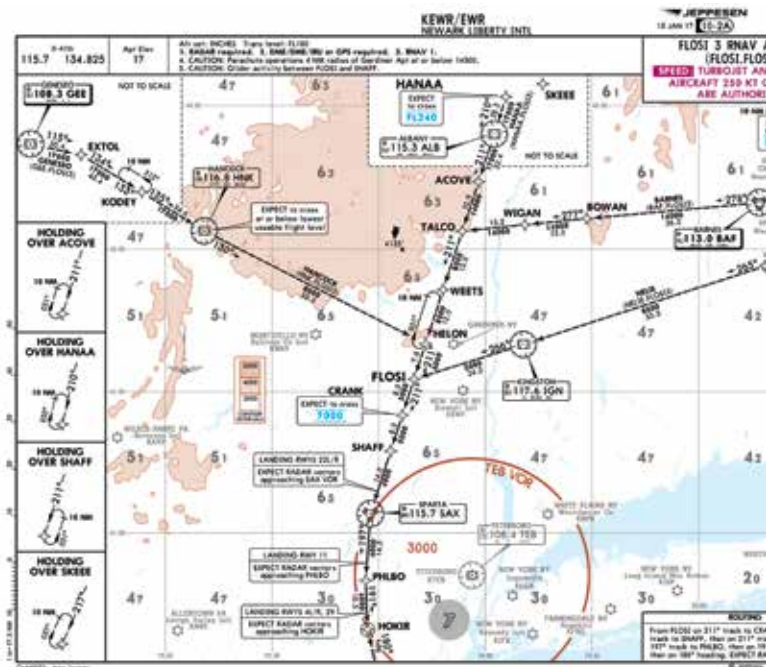


Figure 1: The FLOSI3 RNAV Arrival into Newark, New Jersey (KEWR) was in the initial batch of SID/STAR charts to be released in the new format.

Own-Ship Display Capabilities

One of the biggest changes Jeppesen has made is the use of a depicted-to-scale format. This change is not simply a matter of making the plan view map more user-friendly. Of course, the distances between fixes, navaids, courses and terrain/obstructions is far more meaningful when drawn to scale. However, scale drawing also allows modern electronic charting to overlay moving aircraft symbology on the chart. Anyone who has used this

feature on electronic en route maps or approach plates knows the situational awareness advantage it provides. Obviously, the software being used for electronic charts must incorporate own-aircraft capabilities, along with some sort of present-position navigational source input (and appropriate certification, when/where required). With those tools in place, the new scaled format of Jepp's SID/STAR charts is just the sort of safety enhancement that pilots crave. As with approach plates, there are situations that preclude scale depictions of some portions of the chart. In such cases, the non-scaled portion(s) will be outlined with a dashed-line and labeled "NOT TO SCALE."

Consolidating Textual Data

When looking at a paper SID/STAR chart, at least in most cases, the entirety of the chart is in front of the pilot when referenced. When using electronic means of chart viewing, that is not always the case. Many tablets and EFBs allow easy zooming, panning, and pinching of the chart for easier viewing of one area versus another (a feature that many pilots with aging eyesight appreciate). The problem this can create is that critical textual data, restrictions, and/or limitations are often moved out of view and forgotten. Or, to be referenced, the pilot must pan and swipe while searching for the pertinent information which may be distributed around the edges, corners, or in otherwise uncluttered areas of the chart. To alleviate this problem, Jepp's new format declutters the plan view by consolidating as much of the textual data as feasible into a single panel at the edge of the chart, most often on the chart's right side. This allows quicker location of the information initially and eliminates the need to search in multiple locations to gather all the data. While the "briefing strip" that Jepp users are already familiar with remains, even it has been enhanced by always being aligned with the orientation of the procedure itself, which was not always the case in the past (Figure 2).

Jepp's Top Ten List

Jeppesen's press releases and online training resources point out that the new format was generated through an Operational Risk Assessment (ORA), pilot research, customer feedback and human factors testing to "improve situation

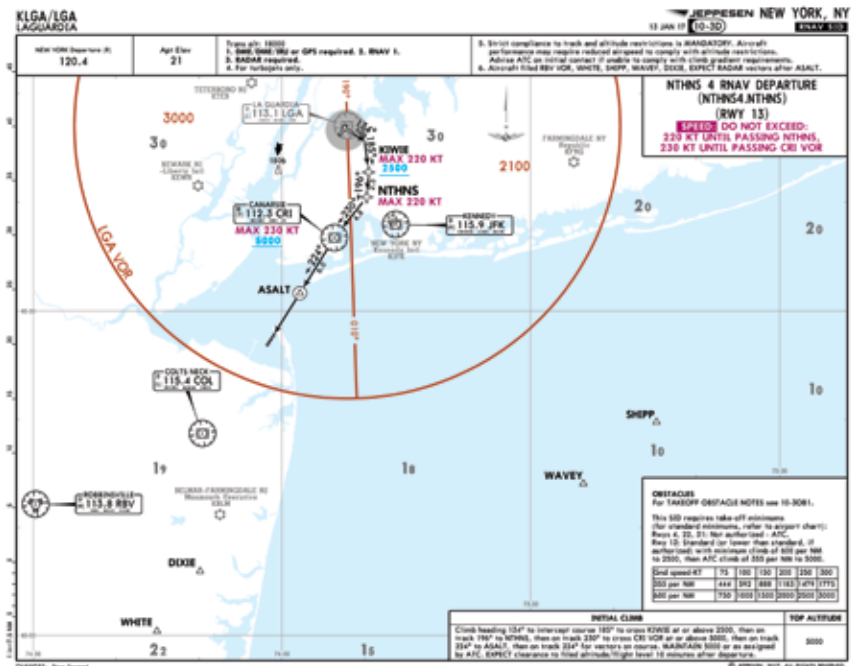


Figure 2: The NTHNS4 RNAV Departure for New York's La Guardia Airport (KLGA) is one of the current examples utilizing the new standard format of consolidating the textual data along the chart's right side. Also of note on this chart is the obvious division of the MSA circle into two quadrants, separated by the 010°/190° Bearing to the LGA VOR.



Professional Aviation ASSOCIATES
A GREENWICH AIRGROUP COMPANY



YOUR PARTS. ON HAND.

We know and appreciate Beechcraft parts and avionics. In fact, our 30+ years of Beechcraft sales and service experience provides us with an unparalleled knowledge that distinguishes us from others.

For more information on all of our parts, avionics and services call 800.283.2105 or visit us at kingairparts.com.





BEECHCRAFT KING AIR SERIES
BEECH 1900 | HAWKER | C-12 | T-44 | BEECHJET
AVIONICS
(MULTIPLE FLEET TYPES)

Professional Aviation Associates | 105 Southfield Pkwy, Suite 300 | Forest Park, GA 30297
800.283.2105 | 404.767.0282 | sales@proaviation.com | proaviation.com

awareness, reduce heads down time and increase safety.” They highlight ten main bullet points of the redesign. Other minor changes were incorporated, as well (as noted elsewhere in this article).

Topography: Color-coded topographical information is now included. The depiction is similar to that of Jepp approach plates, using a muted color palette that clearly distinguishes rising terrain without interfering with the readability of overlying critical data, such as altitude restrictions and course information. Large or prominent bodies of water are also shown. A chart Contour Intervals Scale is also depicted, when multiple elevation contours dictate. As on Jepp approach plates, the highest point on the chart (be it a man-made obstruction or natural terrain) is depicted using a bold, black, high-point arrow.

Grid Minimum Off-Route Altitudes (Grid MORAs): A subtle grid of latitude/longitude lines now cover the charts similar to what instrument pilots are used to seeing on enroute charts. Inside each rectangle making up the grid is a **GREY** number representing the minimum off-route altitude within that sector (in hundreds of feet). This altitude should ensure 1,000-feet of vertical separation from obstacles and terrain (2,000-feet in mountainous areas).

■ **Altitude Restrictions:** For easier and quicker identification, altitude restrictions are now color-coded **BLUE** and use a less cluttered format to represent

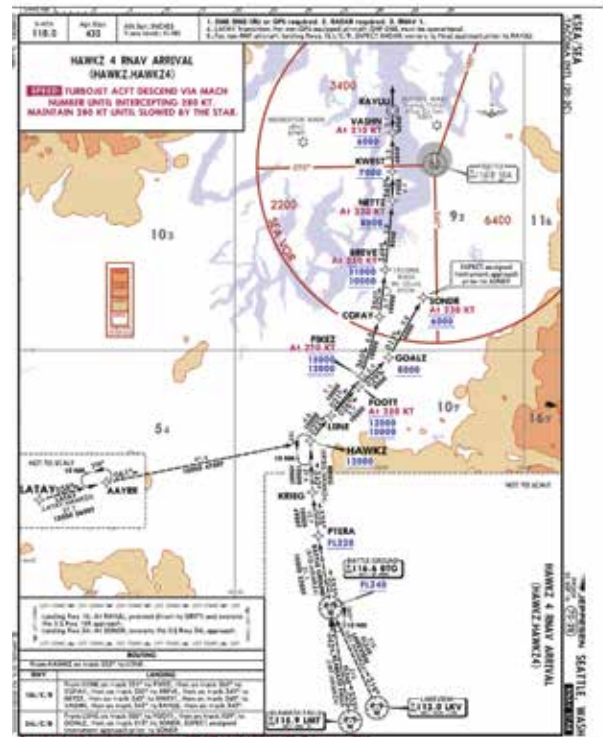


Figure 3: Seattle Tacoma International's (KSEA) HAWKZ4 RNAV Arrival displays most of Jepp's major forming changes in a single chart. Blue altitude restrictions exist in minimum, between, and mandatory versions. Several magenta speed restrictions are displayed, as well as multiple MSA sectors (also in magenta). Terrain and water features, the scale bar and areas drawn NOT TO SCALE are obvious, as well.



Main wheel & brake/ Rodas e freios principais
Kit P/N 199-90

Together, we can support all your King Air braking needs, one landing at a time.

Juntos podemos apoiar todas as suas necessidades de freio King Air, um pouso de cada vez.

The following King Air 90 models are now certified under European approval EASA #10039114 and Brazilian approval ANAC #9210-04:

Os seguintes modelos King Air 90 são agora certificados sob aprovação europeia EASA N°10039114 e aprovação brasileira ANAC N°9210-04:

• 65-90	• B90	• C90-1	• C90B	• C90GTi
• 65-A90	• C90	• C90A	• C90GT	• C90GTx

Cleveland
Wheels & Brakes

1-800-BRAKING (1-800-272-5464)
Visit our website to see our full list of King Air conversion kits and more
www.parker.com
www.clevelandwheelsandbrakes.com



mandatory, minimum, maximum or recommended altitudes. Gone are the words “At,” “At or Below,” “At or Above,” “Between” and “Recommended,” and they are replaced by the same ICAO-standardized symbology utilized in Jepp approach plate profile views. A line above *and* below an altitude indicates a mandatory altitude, while a line above *or* below represents at/above (minimum) or at/below (maximum) altitudes, respectively. Altitude windows (between altitudes) are depicted with stacked top and bottom altitudes sandwiched between minimum and maximum lines. Recommended altitudes are presented without minimum or maximum lines. Altitudes to be expected or as assigned by ATC are still presented using adjacent “EXPECT” or “or by ATC” notations (Figure 3 and Table 1).

■ **Speed Restrictions:** For easy reference and to avoid confusion

8000	FL80	➤	Mandatory Altitude Restriction
10000 8000	FL100 FL80	➤	Between Altitude Restriction
8000	FL80	➤	Minimum Altitude or At-or-Above or Above Altitude Restriction
10000	FL100	➤	Maximum Altitude or At-or-Below or Below Altitude Restriction
8000	FL80	➤	Recommended Altitude
10000 or by ATC	FL100 or by ATC	➤	Altitude Restriction with an "or by ATC" notation to indicate this restriction may be amended by ATC.
EXPECT 80000	EXPECT FL80	➤	Altitude Restriction to be expected for planning purposes, though it only becomes mandatory when assigned by ATC.

Table 1: Examples of the various altitude restriction symbols with the new Jepp SID/STAR format.

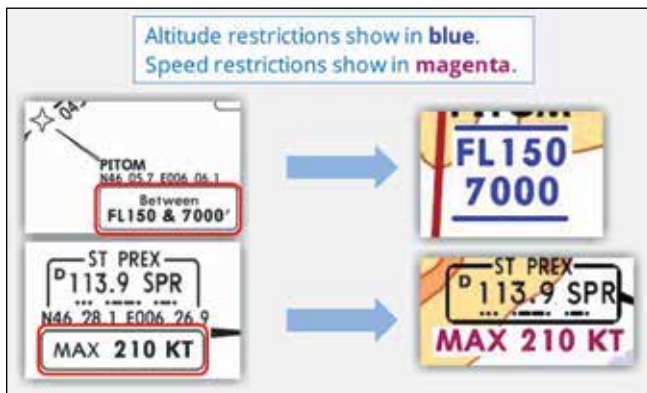


Table 2: A side-by-side comparison of the old and new formatting for both Altitude and Speed Restrictions.

with altitude restrictions, speed restrictions are now color-coded **MAGENTA**, both in the procedure's header (title) information and within the chart's plan view (Table 2 and Figure 3).

■ **Minimum Sector Altitude (MSA):** The MSA now overlies the chart's plan view, rather than being depicted in a separate box, off in one corner. The overlying MSA circle is color-coded **MAGENTA**, as are the bearings separating sectors of the MSA circle and the altitudes depicted within each sector. The center point defining the MSA circle is identified (both at the point itself and on the MSA circle), as is the MSA diameter when it differs from the standard 25 NM. The minimum altitudes are expressed in whole numbers, but rounded up to the next one-hundred-foot increment (Figure 2).

■ **Nav aids:** Navaid symbology has been changed to conform with Jepp enroute charts and ICAO standards. These easily recognizable symbols, along with the removal of associated lat/long information, help in Jeppesen's efforts to declutter the chart. Since modern GPS and FMS databases are generally programmed via a navaid's two- or three-letter identifier and already have said navaid's associated latitude/longitude stored, the

information was certainly contributing to clutter that modern IFR pilots seldom (if ever) use in the terminal environment.

■ **Holding:** Published hold depictions which are based on nautical mile distances or DME leg lengths are now depicted to scale, while holds based on flight time will be noted as "NOT TO SCALE." Maximum holding speeds are noted at the top of the textual information for the hold. Still included (where appropriate) are the minimum and maximum holding altitudes, MHA and MAX, respectively, below the speed depiction. A "by ATC" notation will appear, as appropriate.

■ **Secondary IFR Airports:** Not included in the previous formats, these airports are now depicted in a subtle **GREY** color, similar to how they appear on Jepp approach plates. In the U.S., when a single SID or STAR procedure serves multiple airports, the "Also Serves" airports are depicted in **BLUE**.

■ **Waypoints:** The latitude/longitude coordinates associated with depicted waypoint names have also been removed to declutter the chart's plan view.

■ **Scale Bar:** It only makes good sense that since these redesigned charts are depicted to scale, that a reference to the specific scale being utilized would be added. Along the left or top edge of the chart, depending upon chart orientation, a scale bar provides inch-to-NM scale information.

Cutting the Clutter

All in all, Jeppesen has done an admirable job of decluttering their SID/STAR charts. Moving the textual data from random placement within the plan view to a dedicated reading pane has created a far cleaner presentation of the critical route, altitude and speed information. Removal of extraneous latitude/longitude data also really helped to clean up the plan view, especially in complex SID/STARs that have a half-dozen or more fixes and navaids depicted. In their quest to declutter, Jepp even went so far as to shorten its naming conventions for the procedures. Now, rather than spelling out the names in long-form, they are presented in a shorter (but just as easy to read) form, along with the proper flight plan formatting in parenthesis. For example, the HAWKZ FOUR RNAV ARRIVAL would appear as “HAWKZ 4 RNAV ARRIVAL (HAWKZ.HAWKZ4).”

Night Mode and Right-Sizing

A problem presented to early adopters of electronic charting was night viewing. The mostly white charts were overly bright for night viewing and negatively impacted night vision. Eventually, software evolved to incorporate a “night mode” that essentially worked on the principal of negative imaging – swapping the bright white areas of the chart to black and the black text to white. The




Figure 4: A screen shot of the HAWKZ4 Arrival in “Night Mode.” Note that while the speed restrictions are still displayed in magenta, the normally-magenta MSA sectors become amber. Terrain and water features remain equally obvious in night mode, as does the Contours Intervals scale.

results were generally far easier on the eyes at night. Since Jepp’s new format is designed with electronic reading in mind, their chart’s “night mode” seems a bit more refined. While negative imaging is still the basic principal, blue altitude restrictions and magenta speed restrictions remain unchanged. Magenta MSA data, however, is changed to AMBER. The author did note some slight color variations in night mode across different electronic charting devices and Jepp’s online examples (Figure 4).

Finally, the charts no longer need to conform to a universal sizing model meant to coincide with being housed in a binder; as few now are and even less will be into the future, as users continue the steady transition to electronic charting devices. Instead, the redesigned charts can be custom-sized in order to accommodate the to-scale depiction in the most user-friendly manner. This can result in portrait or landscape orientation, square, or variations of each. Of course, with electronic chart viewing software, this is a non-issue, as charts can be rotated to any orientation and panning and zooming can be used as necessary for optimum viewing.

More to Learn

Jeppesen has already created an extensive variety of training resources online. You can learn more, view videos, work through e-learning presentations and documents, and participate in interactive training (including quizzes to test your knowledge and understanding afterwards) via:

- Main Training Website: www.jeppesen.com/charts
- Chart Enhancement Training: <http://www1.jeppesen.com/aviation/microsite/chart-enhancement-training/index.jsp>
- Webinar: <https://cc.readytalk.com/cc/playback/Playback.do?id=7xcia7>
- More Examples: <http://www1.jeppesen.com/aviation/microsite/chart-enhancement-training/examples.jsp> 

NOTE: All graphics are used with permission from Jeppesen and are not intended for navigational use.

Matthew McDaniel is a Master & Gold Seal CFII, ATP, MEI, AGI and IGI. In 27 years of flying, he has logged over 16,500 hours total, over 5,500 hours of instruction-given, and over 2,500 hours in the King Air and BE-1900. As owner of Progressive Aviation Services, LLC, (www.progaviation.com), he has specialized in Technically Advanced Aircraft and Glass Cockpit instruction since 2001. Currently, he also flies the Airbus A-320 series for an international airline and holds eight turbine aircraft type-ratings. Matt is one of less than 25 instructors in the world to have earned the “Master Certified Flight Instructor” designation for seven consecutive two-year terms. Mr. McDaniel can be contacted at (414) 339-4990 or matt@progaviation.com.

Copyright 2017, Matthew McDaniel.

First publication rights granted King Air magazine via the Village Press. All other rights reserved by copyright holder.