

BOOK REVIEW

JUGOSLAVIA'S EXCELLENT NEW STAR FINDER

by Captain V. A. MOITORET, U.S. Navy (Ret.)

Directing Committee, IHB

The International Hydrographic Bureau has received from Captain Rade STIJELJA, Director of the Hydrographic Institute of the Yugoslav Navy, a copy of the recently published "Novi Identifikator Zvijezda (New Star Finder)" published in 1967. The author, who holds the copyright for this official publication of the Institute, is Mr. Stjepo M. KOTLARIĆ, Nautical Scientist in that organization, and well known to the world's hydrographers through his extremely active participation in International Hydrographic Conferences.

Mr. KOTLARIĆ described his new publication even before it came into existence in an article in the January 1963 number of the *International Hydrographic Review*, at which time he referred to it as the S3a. As finally produced, however, it now carries the identification HI-N-46, and there have been significant changes and improvements. The resulting product deserves close attention and should win universal praise from hydrographers and navigators around the world. It represents an outstanding improvement over the previous version, HI-N-45, published by the Yugoslav Hydrographic Institute in 1956.

This new star finder is, indeed, a bi-lingual book, including English versions of the table of contents, introductory note, explanations for use, and sample star chart with annotations, which insures that anyone with a command of English will be able to use the book without any difficulty whatever.

One only needs to follow the clear and precise instructions and work out one or two problems to begin to recognize immediately and to admire the care and work that have gone into the preparation of this tool. Not only is the author *to be congratulated*, but a large share of credit must also be given to the printing facilities of the Hydrographic Institute of the Yugoslav Navy — for this is not only a most *useful* product, it is also a very attractive one. The text matter has all been re-set in an improved clear and legible typeface, the star charts are printed on high quality paper stock with careful choice of overall design for legibility, and the extremely close color registration of the printing is an indicator of a high order of production craftsmanship.

Although it was indicated in the pre-publication description that this New Star Finder would have 9 pairs of star charts, in fact it has been produced with 18 pairs of charts, one pair for each 20 degrees of LHA of the First Point of Aries, with entering arguments centered around every odd 10-degrees, from 10° to 350°. Where the original 1956 edition used only two colors, this new version employs four colors, and makes full and, indeed, clever use of the possibilities afforded by color differentiation. For example, the star charts for LHA of Aries equal to 60°-80° actually use the same printing plates as those for the pair of

charts for LHA of Aries equal to 240° - 260° (with the directions of the two halves of the celestial hemisphere from the observer reversed in azimuth, of course). But they are printed in different colors, so that the red version will always correspond with the azimuth from 180° through the west to 360° and the black with the easterly azimuths. This means that there is very little chance for the user to make any mistake, for the same red/black color code applies to the azimuth figures printed on the transparent template which the user orients over the star charts according to his own latitude.

Another advantageous use of color : yellow has been added, in solid lines connecting the stars in familiar constellations, and in dashed lines for those alignments which are the relationships well known to experienced navigators (like the "pointers" in the Big Dipper leading to Polaris, or the extension of the curve of the handle of the Dipper leading to Arcturus and then on to Spica). While these yellow lines are not, certainly, a vital necessity, they will be of great help to less experienced navigators, and even the old-timers will appreciate this addition, because it gives them an immediate orientation through instant recognition of the already familiar patterns.

More subtle is the use of two colors, for example, in the printing of the name of a star on the charts. If the name is in one color, it has one meaning as to where one will find it in various nautical almanacs; if in a different color, another meaning is conveyed; if the first letter of the star's name is one color and the remainder a second color, we have a third meaning; and if the first two letters are one color and the balance a second color, a fourth meaning results.

The star charts themselves include a total of 182 stars, which should cover almost any star a navigator might have occasion to use. And with its attention to other nautical almanacs than just that of Yugoslavia, this New Star Finder comes close to being an ideal international tool. Unfortunately it stopped short of being completely universal. The distinctions mentioned above for conveying information to the navigator as to which almanacs provide information on which stars is both slightly misleading and not quite complete. The alphabetically arranged listing of the stars in the star finder volume itself, together with each one's sidereal hour angle (SHA) and declination, both to the closest whole degree, is most useful, since the stars are listed both by name and by their astronomic name within a constellation; many are listed by alternate names as well. Only a small expansion of this list would have made it universally applicable to all of the nautical almanacs in existence, as will be demonstrated.

As it now stands, this index covers every star listed in the Yugoslav nautical almanac, of course, and mariners who might be using the Italian almanac with its 72 stars in the selected listings and the additional 72 in a supplementary list would find all 144 stars in this index. In the same way, users of the Japanese almanac with its 45 stars would find every one of them in the index list of this star finder.

On the other hand, if one were using the Argentine nautical almanac, there are two stars whose names would be found to be missing from the Yugoslav index list : *Alhena* (mag. 1.9) and *Mimosa* (mag. 1.5). Actually, it should take the user only a short time to deduce that these two stars really *are* in the index, listed under their astronomic designations of Geminorum γ and Crucis β , respectively. But the names *Alhena* and *Mimosa* are not peculiar to Argentina alone; one finds the same two names in the star lists in the almanacs published by Brazil, Indonesia, Norway, Spain, the U.S.A., and the U.K., for example. These same six almanacs would also contain the following stars whose names do not figure in the index of the Yugoslav "New Star Finder" : *Alderamin*, *Alcyone*, *Alnitak*, *Menkalinan*, *Muhlifain*, *Mirzam*, and *Wezen*, although in each case the

same star is listed by its constellation designation, so it is possible to locate the star on the star charts through this means.

The same observation would apply in the case of all but the Spanish almanac for three more stars: *Algeiba*, *Phecda*, and *Sheratan*. Thus, adding a total of 12 star names to the index list and star charts would have made them completely universally adoptable to the almanacs of at least 7 other nations. (It should be repeated that the stars themselves are already shown on the charts; it is only these names which are lacking).

To be completely in line with the 99 stars carried in Spain's nautical almanac, in addition to the points previously noted, three more stars would have to be added to both index and the star charts. These are ζ Hydrae, γ Hydrae, and 40 Lyncis, each having a magnitude of 3.3.

A user of the German nautical almanac would find the need for four alternative spellings or names of stars already named in the index: *Sirrah* for *Sirah*, *Beteigeeze* for *Betelgeuse*, *Wega* for *Vega*, and *Nordstern* for *Polaris*. The German almanac also lists *Alcyone* and *Alderamin*, which have already been noted for other countries above, but in addition shows only three other names that have not yet been mentioned: *Unuk*, *Vindemiatrix*, and *Zubeneschemali*. Again, these three are in the index and on the charts using only their equivalent astronomic designations. So, once more, a very small addition to the index listings would have covered all of the 80 stars in the German almanac.

It is because of the facts brought out above (without extending this study to every almanac) that one must say that the explanation diagram printed with the star charts in the Yugoslav star finder is misleading. When it uses a particular symbol to mean that such stars are "only in the Yugoslav nautical almanac" or another symbolization to show names of stars which are, assertedly, "added only in the Italian nautical almanac", these statements are not literally true.

These criticisms (or suggestions for improvement), however, are not intended to detract from the initial evaluation of this new star finder as a truly exemplary product. It is easily the best star finder that this reviewer has ever seen. I not only worked out the sample problems given in the explanatory text, but I also tried it with the problems available in the *American Practical Navigator* (Bowditch), and in every case I quickly derived an accurate answer.

One can compare this star finder, for example, with that which is in use in the U.S. Navy and probably in a great part of the U.S. merchant marine as well, known as H.O. 2102-D. I am indebted to Mr. K. ACKERMAN and Mr. John H. BLYTHE of the Navigational Science Division of the U.S. Naval Oceanographic Office for their comments on the written advance description of Mr. KOTLARIĆ's new device as it first appeared in the *I.H. Review*, which I have considered in arriving at my own judgments.

H.O. 2102-D consists of a dual star base (the equivalent of one pair of star charts in the Yugoslav "New Star Finder") in only one color, and 10 transparent templates. The Yugoslav device has 18 pairs of star charts in four colors and a single template. Thus one would expect that production costs for the Yugoslav star finder would be higher, but a comparison of selling prices is not possible, since there is no indication given of the price of Mr. KOTLARIĆ's book.

H.O. 2102-D is constructed on the azimuthal equidistant projection, with the center of the device representing the observer's zenith, while the HI-N-46 uses the equatorial stereographic projection, so that the observer's zenith lies on the circumference of the circle. Orientation of the star pattern to the observer's latitude is accomplished in the American finder by the use of the different templates and in the Yugoslav finder through rotating the single template. This

difference of approach means that there is one advantage to the U.S. product : that is, the user can see the entire celestial hemisphere above his own horizon displayed for him at one time, instead of finding it in two half-hemispheres as in the Yugoslav device in two steps. This would make pre-selection of a limited number of stars spread roughly equally in azimuth somewhat easier to accomplish with H.O. 2012-D.

There is no question about which of the two devices shows more stars. The American one shows only the 57 selected "navigational" stars which are carried on the daily pages of the U.S. nautical almanac. The Yugoslav star finder shows all of these plus another 125 stars, for a total of 182. This might cause some undesirable clutter, but this has been overcome through the differentiation available in the use of colors. It might be noted here, though, that a considerable number of additional stars were shown on the earlier versions of the American star finder, H.O. 2102-A and 2102-B, with the decision finally reached that only those from the primary star list in the almanac would be included, on the basis that in most cases these would prove to be adequate. That may be true, but, like some extra blades on a folding pocket knife, however, which, though seldom used, may prove most helpful in certain cases, the additional stars in the Yugoslav finder are certainly an asset, and I would appreciate having them were I navigating.

In the matter of accuracy, there can be no doubt but that the new Yugoslav star finder is more accurate than H.O. 2102-D. (Whether there is a real need for more accuracy in a star finder is a subject which is, admittedly, open to some debate). The lines, half-broken and half-solid, which, in the Yugoslav star charts, portray the movement of the stars during each 20° change in the LHA of Aries permit a close degree of interpolation to adjust to the observer's actual LHA of Aries. They have an added advantage of making the device more realistic, and so give a feeling of dynamism that is lacking in most printed reproductions of the heavens.

To use either star finder with planetary bodies, one must compute the correct position and then plot the planet in for the particular time involved. This plotting function appears to be simpler using H.O. 2102-D where the body may be directly plotted on the single base, but frequent enough practice with the HI-N-46 in plotting planets relative to the position of the closest star would probably greatly reduce this apparent advantage of the American device for this special purpose.