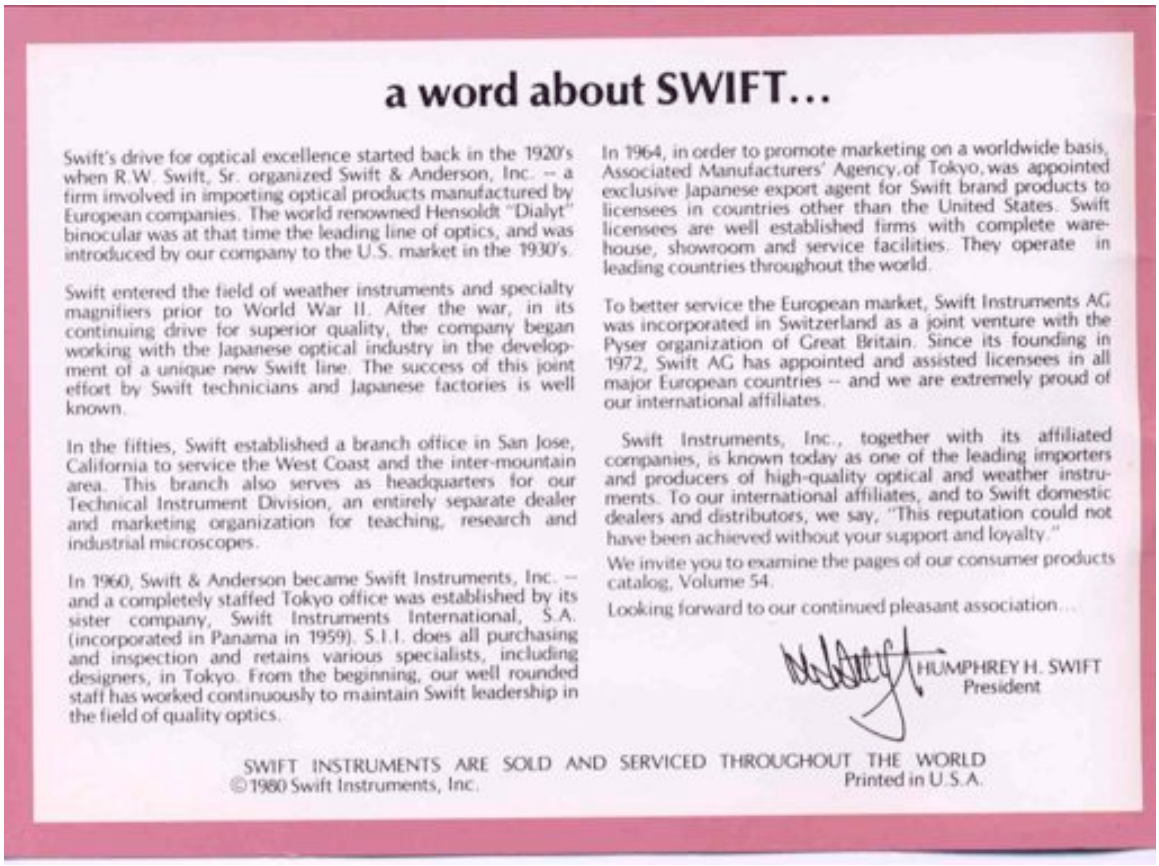
The Inimitable Swift Model 804 Audubon Binoculars: Design and Marking Variations

by Edward M. Huff[1] and Renze de Vries

Swift Optics, until recently known as Swift Instruments, Inc., is an old American company that has been in business since 1926. It introduced the Model 804 8.5x44 Audubon binocular in the early 1960s and continued its production until 1999. With the turn of the millennium this venerable 40-year-old product was supplanted by the new waterproof Model 820 Audubon, which clearly carries on the porro-prism tradition of the original, and has received justifiable praise. Nonetheless, many users of the older versions look back fondly on the stalwart No. 804. This historical review is provided for them, as well as for Swift collectors who still marvel at the relaxed view provided by this superb birding machine.

Swift's 804R Audubon (Type 4a)

[1] aka Elkcub



a word about SWIFT...

Swift's drive for optical excellence started back in the 1920's when R.W. Swift, Sr. organized Swift & Anderson, Inc. -- a firm involved in importing optical products manufactured by European companies. The world renowned Hensoldt "Dialyt" binocular was at that time the leading line of optics, and was introduced by our company to the U.S. market in the 1930's.

Swift entered the field of weather instruments and specialty magnifiers prior to World War II. After the war, in its continuing drive for superior quality, the company began working with the Japanese optical industry in the development of a unique new Swift line. The success of this joint effort by Swift technicians and Japanese factories is well known.

In the fifties, Swift established a branch office in San Jose, California to service the West Coast and the inter-mountain area. This branch also serves as headquarters for our Technical Instrument Division, an entirely separate dealer and marketing organization for teaching, research and industrial microscopes.

In 1960, Swift & Anderson became Swift Instruments, Inc. -- and a completely staffed Tokyo office was established by its sister company, Swift Instruments International, S.A. (incorporated in Panama in 1959). S.I.I. does all purchasing and inspection and retains various specialists, including designers, in Tokyo. From the beginning, our well rounded staff has worked continuously to maintain Swift leadership in the field of quality optics.

In 1964, in order to promote marketing on a worldwide basis, Associated Manufacturers' Agency, of Tokyo, was appointed exclusive Japanese export agent for Swift brand products to licensees in countries other than the United States. Swift licensees are well established firms with complete warehouse, showroom and service facilities. They operate in leading countries throughout the world.

To better service the European market, Swift Instruments AG was incorporated in Switzerland as a joint venture with the Pyser organization of Great Britain. Since its founding in 1972, Swift AG has appointed and assisted licensees in all major European countries -- and we are extremely proud of our international affiliates.

Swift Instruments, Inc., together with its affiliated companies, is known today as one of the leading importers and producers of high-quality optical and weather instruments. To our international affiliates, and to Swift domestic dealers and distributors, we say, "This reputation could not have been achieved without your support and loyalty."

We invite you to examine the pages of our consumer products catalog, Volume 54.

Looking forward to our continued pleasant association...

HUMPHREY H. SWIFT
President

SWIFT INSTRUMENTS ARE SOLD AND SERVICED THROUGHOUT THE WORLD

Printed in U.S.A.

(Swift, 1980)

History of Model 804 Audubon

Reconstructing the story from the incomplete and still puzzling oral/verbal record, development of the original Model 804 resulted from a survey of ornithologists' needs conducted by Swift, which we presume occurred in the late 1950s. As stated recently in the *Photo Industry Reporter* (Reporter, 2005) and elsewhere:

> "The first Swift Audubon was designed by Mr. Tamura of Tamron Optical Company from specifications gleaned from a Swift survey of the world's leading ornithologists. Since then there have been three Swift Audubons produced using the same formula … this optical formula, which has a 5-lens ocular system, BaK4 prisms and fully multicoated optics …"

This informative statement probably originated with Swift. Although tantalizingly brief, it allows us to draw several important insights. First, Mr. Uhyoue Tamura, a prominently recognized optical designer of Tamron Optical Co., Japan (Tamron, 2005) designed the

binocular for Swift. In addition, from the beginning the formula always involved a 5-element (i.e., Erfle) ocular and BaK4 prisms. Finally, there were *three* Swift Audubon versions produced using the same optical formula up until the introduction of the new Model 820.

Japanese 804 Manufacturers: One aspect can be expanded immediately with regard to Tamron Optical Co. The first author's 804 Type 1c, shown below, was made between 1968 and 1970, and marked JL E-45 on the front hinge. According to Japanese Binocular Inspection Institute documentation (Abrahams, undated), "JL" (depicted J—) indicates this export product met the highest Japanese Govt. inspection standards, and E-45 indicates that none other than Tamron Co, Ltd, Tokyo made the metalwork. So, we know that Tamron Optical was not only involved with the original 804 Type 1 design, but also manufactured it for at least the first decade. The Type 4a specimen pictured on the first page was manufactured between 1985 and 1991, and is marked JL B-56, indicating that a different company, Hiyoshi Kogaku, Ltd., produced it. A Type 3a examined by the second author is also marked JL B-56, as well as one discussed by Julian Bosley on Bird Forum. Fan Tao and others (Tao, 2001) show evidence that Hiyashi Kogaku, Ltd. also made Type 2 Audubons. Thus, the weight of evidence indicates that Swift only changed the 804's Japanese manufacturer once during its lifetime.

US Patent on Name: Based on brief discussions with Mr. Steve Carter[i], Swift Customer Service, the company patented "Audubon" as a product name, which may have been done in conjunction with marketing the first version in the early 1960s. At some point later on, either Robert Swift or Humphrey Swift entered negotiations with the National Audubon Society, and Model 804 was to become the *first* binocular to obtain the Society's endorsement. Curiously, only scant evidence for this was found in the 1982 advertising materials. However, as far as we can tell the Audubon Society's logo was never stenciled on the binoculars' cover plate.

If this historical sleuthing is correct, therefore, nearly two decades passed before the Model 804 Audubon actually became associated with The Audubon Society, and then only briefly. Nonetheless, this may have played a critical role in the design of the *revised* Type 4a (the 804R shown above) that first appeared c. 1985. Again, according to the sketchy oral/verbal record, several field directors of the Society reviewed or advised Swift about the binocular. As history would prove, they got it right!

An Audubon by Any Other Name: The relationship between Swift and the Society was not without strife, however, as evidently the endorsement applied *only* to the 8.5x44 Audubon, and not to it's big brother, the 10x50 Model 826 Audubon that bore the same product name. According to expert repairman Wim de Boer[ii], "… when Swift was forced to rename their 10x50 Audubon to the 'Kestrel,' customers were so disappointed they demanded to have the old lids put on them." Eventually, however, the Society's licensing agreement expired, as apparently did Swift's control of the Audubon product name. Thus, "Audubon" passed into the public domain, and, being no further restrictions imposed by the

Society, several Swift porro- and roof-prism Audubons subsequently appeared.[2] The latter are discussed at the end of the paper in the context of what the competition was doing in the roof-prism domain from the mid-1980s.

Survey Materials

Except for an original copy of the 1980 Swift Catalog, Vol. 54, a great deal of historical material in this report was taken from black and white Xerox copies of advertising brochures, which were kindly provided by Swift's customer service in San Jose, CA. Not every year was represented in their archive, and in several instances it was not possible to determine the exact years a particular brochure was published or in circulation. Unfortunately, this was the case at several design change points, making it difficult to pin down the exact year a new model type was introduced. The dates indicated below, therefore, should only be considered approximate. An additional complication is that two or more design types may have been marketed during overlapping periods in different parts of the world. For example, based on eBay photos, one distinct design (Type 3) had to be added to what was found from Swift's San Jose records. We initially characterized this as a short-lived transitional model that appeared between 1983 and 1984, during a gap in Swift's records. However, based on curious eyecup variations seen in several eBay photos, which in some cases are similar to Type 1, plus the fact that European distributors were allowed to have direct influence on the design and markings, there is a strong presumption that Type 3 was actually developed for the British/European market. If so, it was no doubt sold in parallel with Type 2 in America.

For this historical report, digitally scanned pictures were obtained from selected portions of Swift's advertising materials dated 1961-3, 1965, 1968, 1971, 1974, 1976, 1978, 1980, 1982, 1985-87, 1989, 1991, 1993, 1996, and 1999. Several eBay auction photos and insightful seller comments were also downloaded where it seemed reasonable to fill in gaps. Finally, photos were obtained off the Internet from published binocular collections. To the greatest extent possible, all materials included in this survey have the owner's permission.

General Features of the Model 804

Mark II Label: Swift 804 Audubon binoculars were always, part of a premium quality "Mark II" product lineup, referred to as "Swift's finest binoculars!"[iii] For this reason, the Mark II designation itself does not distinguish one 804 specimen from another. Mark I's were a moderately priced product line of porro prism binoculars, and Mark III's constituted the roof prism "Trilyte" lineup (Swift, 1980). Whether or not the phrase Mark II, or Mk II, is shown on the cover plate, therefore, is only useful for sub-type recognition.

[2] The Audubon® registration mark, however, appeared in all of Swift's #804 ads through 1999.

Premium Quality Characteristics: As stated in Swift's original 1961—1963 ads, and many thereafter, the "PREMIUM QUALITY — SPECIAL FORMULA" characteristics of the Mark II series were:

(1) Prisms of "center-pot" barium crown glass.
(2) Prisms anchored with phosphor-bronze clamps.
(3) All air-to-glass surfaces coated with specially formulated, ultra hard lens coating.
(4) Seamless, monobloc body casting of ultra-light magnesium metal.
(5) Neoprene-gasketed to seal out dust and moisture.
(6) Objectives are coated with Ultra-Violet inhibitor to protect the eyes. [Feature added in 1968]

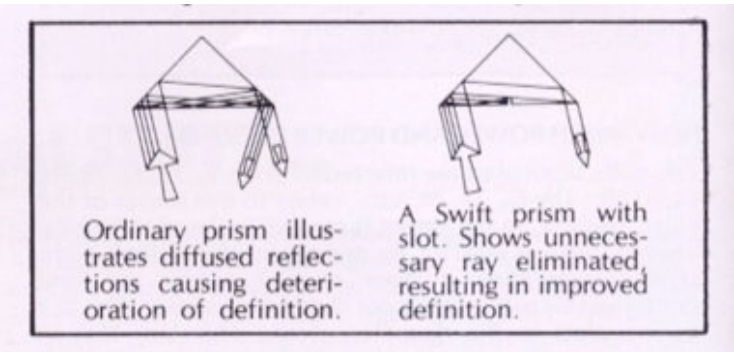
The 5-Element Ocular System: As discussed above, the oral/verbal record indicates that Mr. Tamron's late-1950s optical formula involved a 5-element, Erfle type, ocular system. Looking backwards in time, however, the first mention of a 5-lens ocular system appeared in Swift's 1978 advertisement, and was touted as a common feature for *all* Mark II binoculars. Since this was a Type 2 version, which began production in 1971, it may be assumed that the 5-element ocular went back at least that far, and was simply not mentioned in the original ads. Moreover, since the basic specifications of Type 1, including close focus, field of view, and weight, were the same as for Type 2, there is little risk in assuming that *all* Audubons used a 5-element ocular from the beginning. Thus, the two lines of evidence converge to the same conclusion, which is further supported by observing reflection patterns within the oculars. Apparently, Swift simply did not seize upon the value of marketing a "5-element ocular system" right away, perhaps because Erfle eyepieces were commonly used in wide-field binoculars during the 1950s (Link, 2005; Paul, 1964). Nonetheless the 5-element eyepiece did set the Mark II series apart from standard view Mark I's, which used a three- or four- part Kellner system (Swift, 1980)

Lens Coatings: Standard lens coating terminology is as follows: "Coated (C): a single layer on at least one element. Fully coated (FC): a single layer on all elements. Multi-coated (MC): multiple layers on at least one element. Fully multi-coated (FMC): multiple layers on all air-to-glass surfaces. The better the coating, the better it will reduce glare and reflection for higher contrast and clarity, plus enhanced light transmission." (Shutterbug, 2001)

Based on advertising materials, Type 1 Audubons were FC and used an "ultra hard" coating. Beginning with Type 2, they had "…hard amber *and* magenta coating," but were only labeled FC. An ultraviolet coating was also added to the objective lenses at that time. We have seen one example (see Type 3c below) clearly showing Type 3 was FC like Type 2, but the blue/gold ribbon versions were apparently not so labeled. Type 4a, the 804R, is labeled "Multi-Coated Optics" on the cover plate (see pg. 1). However, the 1986 ad refers to "… a new hard amber coating, *plus* multi-coating," and the 1987 ad states "All air-to-glass surfaces have the latest hard amber, magenta, and/or multi-coating." Although ambiguous, Mr. Carter, Swift, San Jose believes they were fully multi-coated (FMC) "from the get-go." The original Type 4b(1), given the designation HR/5, was similarly labeled "Multi-Coated Optics" on the cover plate and had the same pale blue coating as the 804R. However, the

last version, Type 4b(2), was labeled "Fully Multi-Coated" (FMC), and had darker green coatings as also seen in Type 4c, the Extra Low Dispersion 804ED HR/5.

Transmission Efficiency: The 1968 ad (Type 1) makes the first mention of "slotted-prisms" being used, and the 1980 catalog (Type 2) includes the following diagram and description of the benefits:



It is notable that with the surreptitious appearance of the 804R (Type 4) in 1985, the ad referred to "chamfered" rather than "slotted" prisms, and the 1987 ad included an ambiguous statement about "slotted or chamfered prisms." Apparently slotted prisms were used in all Model 804 production.

Swift originally advertised the RLE, or relative light efficiency, of the Audubon as being 44.0. This number was stenciled on the right objective cap of Type 1 binoculars (see below), in such a way as to be easily confused with the objective size, i.e., 44mm. As discussed by Dr. Henry Paul (Paul, 1964), RLE = 2 x RB x LT, where RB is the relative brightness and LT is the percentage of light transmitted. Since RB is simply the square of the exit pupil diameter (i.e., 5.18^2) the light transmission would compute to 82.1%. This is a reasonable approximation, taking into account the fully coated lenses as well as the use of BaK-4 glass. It is generally recognized, however, that the use of RLE values was more of a numerical artifice than an accurate reflection of measured transmission (Link, 2005). Starting with Type 2 in 1971, for example, the RLE of the Audubon was increased from 44.0 to 44.2, for an improvement of merely .5%. All subsequent types through 1999 posted the same RLE value of 44.2, including the Fully Multi-Coated 804 HR/5 and 804ED. So, there is little doubt that the RLE had simply become a quaint tradition.

Maintainability: Returning to the "special formula" characteristics of the Mark II series mentioned above, it is interesting to note how much emphasis Swift placed on mechanical design, and especially the materials used in their products. This goes a long way to account for 804's legendary durability. In addition to the advertised qualities mentioned above, recent comments by Bill Cook (Cook, 2005) a well-known repairman, reveal that the large body models (c. 1961—1984) employed a steadfast eccentric-ring collimation system. This was by no means unique for that era, but even though it was quite robust it was also difficult to maintain except by well-trained and experienced technicians. Starting with the small body Type 4 (c. 1985—1999), a less skill-intensive method was incorporated allowing

access to prism adjustment screws located under flaps in the synthetic leather covering. At this point, the binoculars were also improved by the addition of shock-absorbing objective caps that protected the front end from damage and further helped to reduce glare.

Classification of 804 Types

Weighty Distinctions. Examining occasional specimens of Model 804, and looking at auction pictures on eBay, one is struck by its familiar (if not handsome) profile, a variety of functional differences, as well as a plethora cover plate variations. Some are larger and heavier than others, some have strap rings and not lugs, some have a wider field of view, and so forth. So it poses an interesting challenge to reconstruct the stages of Model 804's evolution to identify when real engineering improvements were introduced vs. when marketers simply spruced up its appearance.

Model 804 Audubons fall into two major categories based on the size and weight of their seamless magnesium body castings. We simply refer to these as *Large* and *Small* body types. Ironically, for unknown reasons, large body Types 1 and 2 are marked *"Feather Weight."* Large body Type 3 was developed for England/Europe and is typically marked with blue or gold ribbons. Those that have no ribbon have *"Feather Weight"* on the left cover plate. The Small body category is limited to Type 4, which was first introduced in 1985 as the 804R, and then continued through the end of production in 1999 as the 804 HR/5.

As is evident from the discussion, we found it necessary to designate four basic types, *not* three—because there are four identifiable mechanical configurations. The main difference between Types 2 and 3 (c. 1971—1985) appears to be the location of the focusing wheel. Taking into consideration that they were both made by Hiyoshi Kogaku, Ltd. (JL B-56) it is assumed that they share the same internal optics, although we have not had an opportunity to make direct comparisons. If true, this would make our four-category classification consistent with the opening quotation (which no doubt originated with Swift), that there were *three* Swift Audubons using the same basic optical formula.

Starting with Type 1, three successive variations with different field-of-view and near-focus specifications appear in Swift's ads, and are classified 1a, 1b, and 1c. For Type 2, two successive cover plate variations produced Types 2a and 2b, but we don't know if optical improvements occurred. Type 3, which we thought to be a transitional type, has been confirmed by Swift to be developed separately for the British/European market — leaving many undiscovered variations to be classified in the future. Most examples sport blue or gold ribbons on the left cover plate, and were accordingly designated 3a and 3b. An unusual Type 3 was found recently, sans ribbon, that is designated Type 3c. For the small body types, 4a and 4b(1) appear to be the same product that was given new markings when the gold dot series was first introduced about 1989-1990. Type 4b(2), probably introduced about 1992 along with the 804ED, is marked Fully Multi-Coated (FMC). Types 4b(1,2) and 4c are each marked "HR/5," which is probably Swift's shorthand for "High Resolution 5-Element" ocular, although this is unconfirmed.

LARGE BODY TYPES

Type 1a: 804 Audubon Mark II (the original).

1961–1963	
Focus Knob: between hinges, metal.	
Eyecups: Metal "retractable."	
Strap attachment: lugs on back.	
Tripod attachment: Center hinge.	
Objective Cap: Hard, thin white band.	
Field of View (ft.): 420.	
Eye relief (mm): unknown (9-12mm est.).	
Close Focus (ft.): 12.	
Weight (oz.): 38.4	
Cover Plate: R) AUDUBON Mark II; L) Swift bulls eye (white), "Feather Weight."	
MSRP: $130.00	
Made by: Tamron Optical Co. JL E-45.	

Dr. Henry Paul's *Binoculars and All-Purpose Telescopes* (Paul, 1964), confirms that the initial FOV of Model 804 (photo above) was 420'. Note the long, brightly knurled focusing wheel between the main hinges, and the tripod attachment at the front of the hinge pin. Interestingly, the threaded eyecups were mechanically retractable even way back then — but only by 3mm. Still, it was a start.

(Photos below of Type 1c by author EMH)

Type 1b: 804 Audubon Mark II W.A.

1964—1967	
Focus Knob: between hinges, metal.	
Eyecups: Metal, "retractable."	804 **AUDUBON MARK II W.A.** 8.5X,44—C.F.—(445 ft.)—38.4 oz.—RLE 44.0
Strap attachment: lugs on back.	
Tripod Attachment: Center hinge.	
Objective Cap: Hard, medium white band.	
Field of View (ft.): 445.	
Eye relief (mm): 10-12	
Close Focus (ft.): 9 (probably misprint)	
Weight (oz.): 38.4	
Cover Plate: R) AUDUBON Mark II; L) Swift bulls eye (white), "Feather Weight."	
MSRP: $139.95	
Made by: Tamron Optical Co. JL E-45.	

Type 1b appears to have been given a larger field-stop to increase the FOV to 445'. Accordingly, eye relief was probably slightly shorter than Type 1a — and there was an 8% price increase. Both types tipped the scales at 38.4 oz. or 2.4 lbs. But were called "Feather Weight" anyway.