

A review of the 20c steel patterns of 1988

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INTRODUCTION

Hern's coin catalogue (page 426 in the 2014/2015 edition) describes a number of 20c patterns (TA1 – TA20) of a type similar to the 20c nickel coin of the second decimal series. The author was fortunate to have examined a hoard of these TA14 (246B) patterns recently. These patterns are almost never offered for sale and their mass and dimensions are not known. Owing to a lack of information at the time, these patterns were also not described in the 2013 book *"History of the Nickel Coins of South Africa"*. As far is known, these 20c patterns is the only design of the second decimal series that was used in experiments to determine suitable materials and processes for the third decimal series. This is in sharp contrast to the period when the authorities investigated the introduction of the nickel coins series (the second decimal series) in the 1960's. A large number of different pattern types were struck using the designs of the older first decimal coin series during this period. These patterns were described by Mitchel (1971). Owing to the lack of information regarding the more recent patterns, a review of these interesting 20c patterns is overdue and it is described in this paper.

According to Hern, the 20c patterns were struck with 1988 type dies, but have a code number in place of the date. These were part of the experiments conducted for the present method of coinage and metals. The metal composition is not known and the numbering system is intriguing as there are duplicate numbers with the lettering "A" or "B" added (e.g. 246A and 246B). There are two numbers (282 and 344) without the "A" or the "B". The code RNI apparently refers to a pattern struck in nickel. The Hern numbers are given in Figure 1.

Hern's catalogue includes a photograph of the TA20 pattern with the code number 282. This coin was apparently auctioned in 1998 and sold for R2,500. The author

interviewed the person who bought the coin in 1998 and the price paid was apparently R2,750 and not R2,500. This coin was slabbed in 2015 and sold to a new owner for R8,000. A recent photograph of the coin is shown in Figure 2. Some of the other varieties are shown in Figure 3.

No	Denom	Code	Edge	Axis	Language	Dia	Mass
TA1	20c	250B	smooth	medal	bilingual	?	?
TA2	20c	250A	smooth	medal	bilingual	?	?
TA3	20c	251B	smooth	medal	bilingual	?	?
TA4	20c	251A	smooth	medal	bilingual	?	?
TA5	20c	252B	smooth	medal	bilingual	?	?
TA6	20c	252A	smooth	medal	bilingual	?	?
TA7	20c	253B	smooth	medal	bilingual	?	?
TA8	20c	253A	smooth	medal	bilingual	?	?
TA9	20c	254B	smooth	medal	bilingual	?	?
TA10	20c	254A	smooth	medal	bilingual	?	?
TA11	20c	RNI	smooth	medal	bilingual (nickel)	?	?
TA12	20c	344	smooth	medal	bilingual	?	?
TA13	20c	250B	smooth	medal	bilingual	?	?
TA14	20c	246B	smooth	medal	bilingual	?	?
TA15	20c	246A	smooth	medal	bilingual	?	?
TA16	20c	247B	smooth	medal	bilingual	?	?
TA17	20c	247A	smooth	medal	bilingual	?	?
TA18	20c	248B	smooth	medal	bilingual	?	?
TA19	20c	248A	smooth	medal	bilingual	?	?
<i>No Denom</i>		TA1 to TA19					
<i>Date</i>		SPECIAL					
<i>Mintage</i>		Unknown					
<i>P/ mintge</i>		NIL					
<i>Prf</i>		NONE					
<i>Unc</i>		R7,500 ea					



TA20. A similar piece to TA1 (to TA19) but with the figure 282 in place of the date, was auctioned in 1998 and sold for R2,500. Obviously there are many more than the 20 pieces mentioned here!!

Figure 1. Description of the 20c steel patterns in Hern’s catalogue (reproduced with permission from Brian Hern).



Figure 2. A recent photograph of the same TA20 pattern coin illustrated in Hern’s catalogue on page 426 (see Figure 1).



Figure 3. Examples of the 20c steel patterns. These coins are currently housed in an overseas collection.

INFORMATION RELATED TO THE DEVELOPMENT OF THE THIRD DECIMAL SERIES

An internal report was produced by the Mint in 1988 (Van Tonder, 1988) on the proposed new coin series. It states in the report that the Mint will make a potential loss of R28 million in 1989 if the current coin series was left unchanged. The report contained proposals on a new coin series with the focus on the choice of metals, coin weights and colour of the coins. The preference was to manufacture coins consisting of a core such as soft steel and then using plating technology to produce coins of the correct colour and aesthetic appeal. The report specifies that the core of the 1c – 50c should be made from “soft steel”, but no further specification for the type of steel is given.

MINTEK RESEARCH STUDY

Significant information on the composition of the patterns can be found in a research paper published in the Journal of the South African Institute of Mining and Metallurgy (SAIMM). A team of researchers (Wolff et al., 1993) conducted a study on the development of soft ferritic stainless steels for coin manufacture. The Chromium Centre commissioned part of the study and the South African Mint assisted with the minting of the patterns. A number of tests were conducted on 17% Cr (chromium) steel alloys. As they state in the paper: *“The design of the old South African 20-cent coin with the protea pattern was selected for the coining trials owing to its intricate motif and size.”* A series of 17% Cr alloys with varying carbon contents were manufactured. Two standard commercial grades of AISI 430 steel (provided by Columbus Stainless) were included for comparison. The composition of the batches of steel is given in Table 1. Note that the numbers of these batches correspond to the numbers on the patterns. For the commercial grades of steel (1237**344** and 795**282**), only the last 3 numbers were used on the patterns (indicated in bold). Note that there is a Melt no. 249 in the list that does not appear in the Hern catalogue as a pattern. These coins nevertheless exist and the quality of the striking of the 249 patterns was considered amongst the best by the researchers.

Table 1. Composition of the experimental and commercial 17%Cr steel alloys (in percentage by weight) (after Wolff et al., 1993)

Melt no.	C	S	P	N	Si	Mn	Cr
246	0.005	0.013	0.002	0.002	0.26	0.19	17.0
247	0.002	0.011	0.002	0.002	0.20	0.21	17.1
248	0.002	0.010	0.002	0.001	0.27	0.24	17.1
249	0.002	0.011	0.001	0.002	0.26	0.20	17.0
250	0.012	0.010	0.002	n/a	0.17	0.29	16.7
251	0.018	0.009	0.002	n/a	0.28	0.24	17.1
252	0.019	0.013	0.001	0.002	0.21	0.23	18.4
253	0.027	0.011	0.001	0.002	0.30	0.32	17.5
254	0.046	0.011	0.001	0.002	0.27	0.26	17.5
1237344	0.060	0.003	0.027	0.037	0.68	0.57	16.5
795282	0.064	0.005	0.024	0.040	0.71	0.61	16.6

Regarding the “A” and “B” designation, the manufactured ingots were hot-rolled to a thickness of 5 mm (designated A). A final reduction in thickness required for the blanks preceded the blanking process. Alternatively, the ingots were cold-rolled to 2 mm thickness (designated B). The commercial grades of steel did not undergo this process and therefore the patterns 344 and 282 are found without the A and B designation.

Coinage was carried out at a striking load of 70 t for comparative purposes. A sample of 5 coins from each batch were evaluated and graded on a scale of 0-9 according to the quality of the striking. Of interest is that 282 received the worst rating of the various types. Figure 4 compares the obverse of the 282 pattern in Figure 1 with one of the 246B patterns from the hoard described below. Note that the fine detail of the proteas is much better on the 246B pattern.

Table 2. Results of the coining trails (after Wolff et al., 1993).

Melt no.	Hardness (HV20) before striking		Grain size μm		Grading (0 = good, 9 = poor)	
	A	B	A	B	A	B
246	116	119	32	27	2	4
247	118	115	38	27	3	1
248	118	117	38	27	3	4
249	121	118	45	32	1	0
250	117	119	75	32	2	6
251	121	122	75	27	6	6
252	124	129	55	38	7	7
253	121	129	27	32	4	8
254	138	131	32	32	8	5
1237344	150	150	27	27	5	5
795282	150	150	27	27	9	9



Figure 4. Comparison of the reverse of a TA20 (282) pattern (left) and a TA14 (246B) pattern (right). Note the difference in quality of striking (e.g. the protea above the “20” is much better defined for the coin on the right). This agrees with the rating in Table 2 where 246B (right) is considered a better striking than 282 (left).



Figure 5. Comparison of the obverse of a TA20 pattern (left) and a TA14 pattern (right). The difference in quality of striking is less obvious on the obverse compared to the reverse (see Figure 4).

THE 246B HOARD

In 2015, the author was fortunate to examine a bag containing a number of patterns of the 246B variety. The coins were stored in a thick transparent plastic bag with “246B” written with a permanent marker on the bag. There were 29 minted patterns as well as a number of planchets in this hoard. The patterns and planchets are shown in Figure 6. The collection shown in Figure 3 also contains a 246B coin, so it is estimated that 30 patterns of this variety exists. It is considered reasonable to conclude that at least 30 of each of the other varieties of patterns were also struck.

Of interest was that many of the patterns had spots of corrosion visible (Figures 6 and 7). A number of the patterns also had an almost “perfect” fracture on the edge around the periphery (Figure 7). The fracture on the periphery seemed to be splitting the pattern into two halves. This may possibly be the result of the 246B alloy being cold rolled which resulted in stress in the steel. The corrosion and fracture visible on some coins greatly diminished the number of patterns in a good condition. Probably less than 5 coins could be classified as “as struck” with no damage (e.g. the example in Figure 9). If this is also the case with the other melt numbers, the number of collectible patterns in good condition from this series will be very small.



Figure 6. Planchets and 246B 20c patterns from the hoard examined by the author. The minted patterns are on the yellow cloth and the rest are planchets. Four of the patterns from this hoard are not shown in this photograph.



Figure 7. Damage was visible on some of the patterns in the hoard. The “edge” fracture seen on a number of coins is shown in this figure. Also note the spots of corrosion.



Figure 8. Typical condition of the steel planchets in the 246B hoard.



Figure 9. Obverse of one of the better 246B 20c patterns from the hoard.

DIMENSIONS AND MASS OF THE PATTERNS

The patterns in Figure 3 are housed in a collection overseas and their mass and dimensions could not be determined. The 282 pattern in Figure 2 is encapsulated and it could therefore also not be weighed and measured (a drawback of slabbing). The weights of all the 246B coins and planchets in the hoard varied between 5.0 and 5.1 grams. This is in contrast with the weight of the circulation 20c nickel coins weighing 6 grams. A summary of all available data is given in Table 3.

Table 3. Known dimensions and mass of some of 246B pattern compared to a circulation 20c nickel coin.

Coin	Diameter (mm)	Thickness (mm)	Mass (g)
246B Planchet	23.97	1.81	5.1
246B (1)	24.14	1.82	5.1
246B (2)	24.13	1.71	5.1
246B (3)	24.11	1.70	5.0
20c Nickel	24.21	1.84	6.0

YEAR OF STRIKING

The exact year of the striking of the patterns could not be determined from information supplied in the SAIMM research paper. The paper was published in 1993, although it was first received by the SAIMM in June 1992. The first coin of the third decimal series with a steel centre was the 5c released in February 1990 (the R2 released in 1989 had a copper centre). The coining experiments were therefore definitely conducted before 1990. Nickel 20c coins were still struck in 1989, so it is not clear why Hern suggested that 1988 dies were used and not possibly the 1989 dies. An internal report from the South African Mint (Van Tonder, 1988), however, refers to the proposed new coin series (with the 1c – 50c consisting of a soft steel core) and it recommends that the proposals be accepted before 1 September 1988. It is therefore likely that the TA1-TA20 20c steel patterns were indeed struck during 1988 with dies from that year.

SUMMARY

A number of 20c steel patterns were struck in the late 1980's to assist with the selection of suitable steel for manufacturing of the third decimal series. The patterns seems to be rare as very few have been offered for sale after a TA20 variety was auctioned in 1998. Based on this rarity, catalogues possibly recommends too low a price for these patterns.

A research paper published in 1993 in the Journal of the South African Institute of Mining and Metallurgy (SAIMM) describes the reason for minting these patterns. The key objective was the development of soft ferritic stainless steels for coining. The 20c patterns were mostly struck using 17% Cr (chromium) steel alloys and for certain steel compositions, a good striking was obtained in the coining trials. The old 20c coin with the protea design was selected for the coining trails owing to its intricate motif and size.

The author recently examined a hoard of 246B patterns and it is concluded that the number of patterns struck of each type was probably 30. Some of the patterns and planchets in the hoard were affected by corrosion. If this is also the case for the other pattern types, the number of good collectible specimens will be greatly diminished.

The weight of the 246B pattern is 5.0 - 5.1 grams, the thickness is 1.7 – 1.8 mm and the diameter is 24.1 mm. It therefore has approximately similar dimensions to the 20c nickel circulation coins, but its mass is 1 gram less. This is caused by the density of nickel being 8.9 g/cm^3 while it is only 7.8 g/cm^3 for 17% Cr stainless steel.

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