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The Perils of Piracy

A Field Study of the original and pirate versions of the Sturmey Archer AW epicyclic hub gear in the 1940s-1960s

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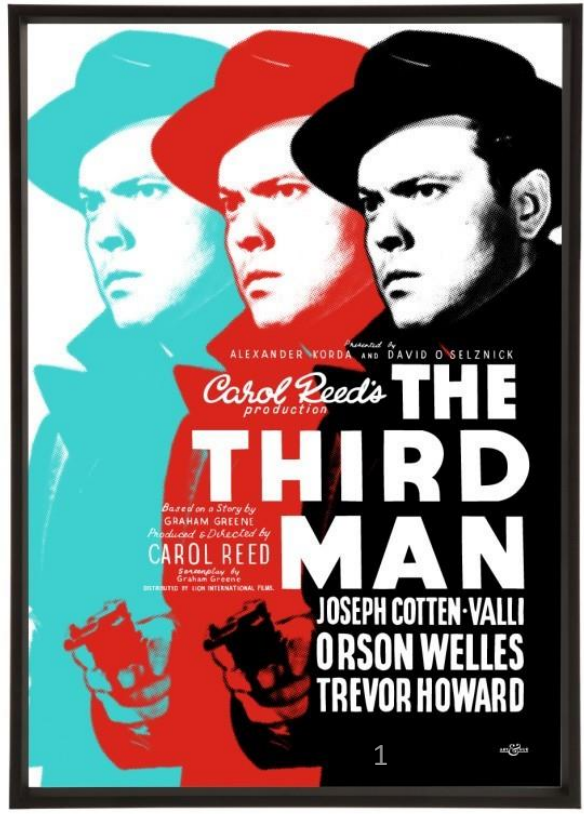
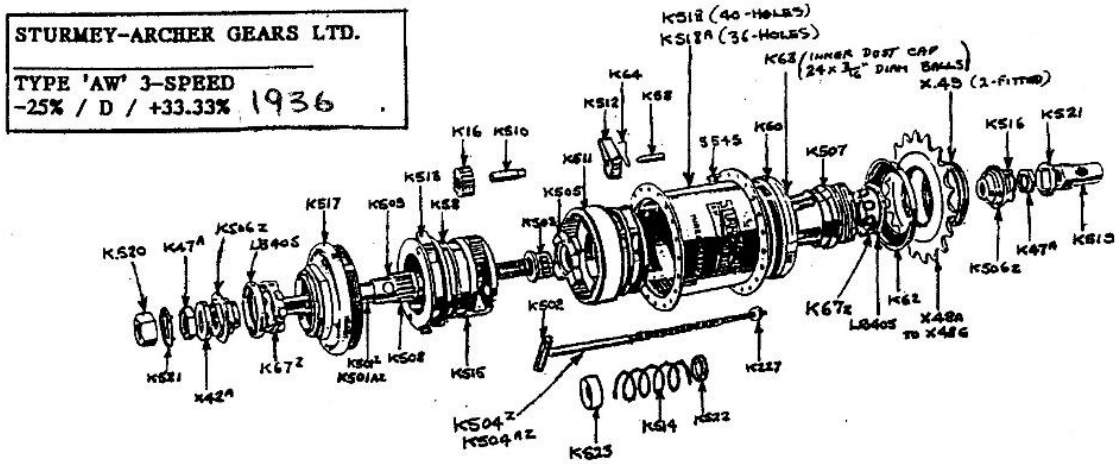


The Original AW three-speed hub



CODE No.	DESCRIPTION
K501Z	Axle complete with Sun Pinion (5¼" long)
K501AZ	Axle complete with Sun Pinion (6¼" long)
K508	Sun Pinion only
K509	Dowel for Sun Pinion
K515	Planet Cage
K503	Clutch Sleeve (SQUARE HOLE)
K505	Sliding Clutch (EARLY TYPE (RAMPED OFF ARMS)
K502	Axle Key (SQUARE TYPE (TAPPED HOLE)
K523	Thrust Ring CAP (PRESSED TIN)
K16	Planet Pinion
K510	Pinion Pin
K511	Gear Ring (2-SEPARATE SETS OF INTERNAL DOGS)
K512	Gear Ring Pawl
K64	Pawl Spring
K58	Pawl Pin
K60	R.H. Ball Ring
329	Ball Bearings, ¼" diam. (per set of 24)
K63	Inner Dust Cap
K514	Clutch Spring
K522	Clutch Spring Cap
K507	Driver (THREADED)
K67Z	Ball Cage with 1" balls
LB405	Outer Dust Cap
K506Z	Axle Cone with Dust Cap
K516	R.H. Cone Locking Washer

CODE No.	DESCRIPTION
K513	Low Gear Pawl
K518	Shell, 40 holes
K518A	Shell, 36 holes
S545	Lubricator
K517	L.H. Ball Cup
K504Z	Indicator for short axle (K501Z)
K504AZ	Indicator for long axle (K501AZ)
K227	Connection Locknut
X42A	Axle Spacing Washer (1" thick)
K47A	Cone Locknut
K521	Axle Washer
K48	Lip Washer (Not illustrated)
X42	Axle Washer (¼" thick) (Alternative to X42A)
K519	R.H. Axle Nut
K520	L.H. Axle Nut
X62	Sprocket Dust Cap
X48E	Sprocket, 16 teeth
X48C	Sprocket, 17 teeth
X48	Sprocket, 18 teeth
X48A	Sprocket, 18 teeth for ½" wide chain
X48D	Sprocket, 19 teeth
X48B	Sprocket, 19 teeth for ½" wide chain
X48F	Sprocket, 20 teeth
X48G	Sprocket, 22 teeth
X49 F	Sprocket Spacing Washer (⅛" thick) (OPTIONAL PART)

Designed in 1936 by William Brown, *Sturmey Archer*, Nottingham.

In full mass-production by 1938

Simply the most successful three-speed hub ever, in terms of production run, robustness, longevity and ease of maintenance

Naturally such success attracted attention from other manufacturers..

Scintilla Solothurn, Switzerland

In 1940, *Sturmey Archer* halted production of bicycle hub gears to focus on the War Effort, making Oerlikon shell fuses under licence from Zurich.

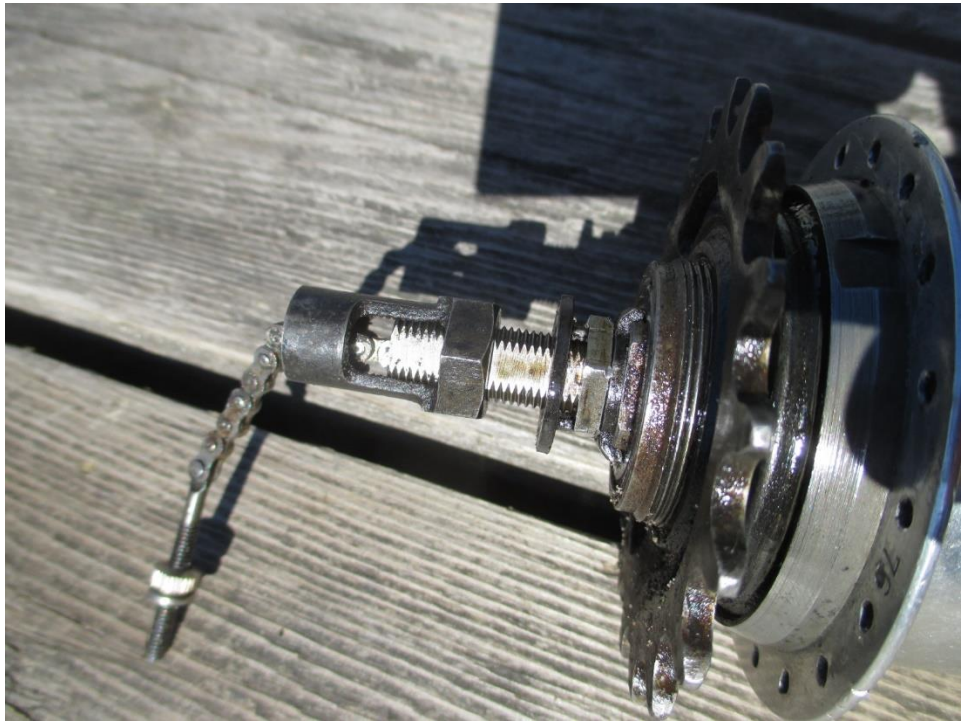
Meanwhile, in Solothurn, Switzerland in 1940:

As Harry Lime said to his friend Holly Martins after riding the Wiener Reisenrad in *The Third Man*:

In Italy, for thirty years under the Borgias, they had warfare, terror, murder and bloodshed, but they produced Michelangelo, Leonardo da Vinci and the Renaissance.
In Switzerland, they had brotherly love, they had five hundred years of democracy and peace – and what did that produce? The cuckoo clock.

Actually they also produced a pirated *Sturmey Archer AW* hub during the Second World War. It was called the *Scintilla Model X,* a cheeky reference to a 1907 *Sturmey Archer* design.

A small thing that is also a big thing..



Even before opening the *Scintilla hub*, the flimsy axle nut with an enlarged indicator chain opening was evident, compared to the round hole sturdy *AW* nut below. Only 5 threads are left on the emaciated 'nut' to hold the rear wheel on the bicycle stays, despite the additional epicyclic gearbox torque. The *Scintilla* nut is noticeably rockable when threaded on the axle, unlike the 8 thread *AW* nut.

Hubris in a young and inexperienced designer – or a company that had never made an epicyclic hub before?

Postwar

In 1949, *Scintilla* and *Sturmey Archer* "regularized" the Pirate situation. *Scintilla* agreed to stop hub production, *Sturmey Archer* bought the existing stock of 80,000 Model X hubs and for a few years continued to produce them. This was for domestic use in Switzerland, through a *Sturmey Archer* subsidiary in Biel, - *Trix SA*.

A second crisis

In 1955 *Sturmey Archer* shut down production of the popular and reliable *AW*, replacing it with the *SW*. This poorly designed and inadequately product tested hub was a complete disaster in the bicycle industry from 1955-1958. In 1958 the *AW* was brought back into mass-production.

A second Pirate from another country saw that the times were ripe to intervene..

Both *Schwinn*, with their Chicago bicycle factory, and *Sears Roebuck*, with their catalog/department stores, were interested, lacking *AW* hub supply from Nottingham at this time.

Styria from Steyr Daimler Puch, Graz, Austria

Austria was a poor and war-devastated country in the early 1950's. The economic miracle was yet to come. From the opening lines of *The Third Man* (featuring Orson Welles), shot in a 1948 gritty Vienna divided into four Allied Occupation Zones:

I never knew the old Vienna before the war…with its Strauss music, its glamour and easy charm. I really got to know it in the classic period of the black market. We'd run anything if people wanted it and had the money to pay. Vienna doesn't really look any worse than a lot of other European cities. Bombed about a bit.

That was Vienna, the capital city. Graz in the province of Styria, where *Steyr Daimler Puch* had their large factory, suffered heavy bombing due to its strategic industries. A Pirate *AW* bicycle hub made in Graz post-war would not seem out of place at the time.

Sears? Made in Austria? "Schwinn Approved"?

The real name *Styria* only appeared on domestic Austrian bicycles.

The fact was that the *SW* hub product failure had disrupted the supply of three-speed hubs to *Schwinn* (making their own bicycles in Chicago) and *Sears Roebuck* (also branded as *J.C.Higgins*) who sold complete English 'Racers' through their Department Store and Mail Order outlets. The Pirate was ready.

The Irony

Scintilla made some critical changes to the pre-war *AW* hub to make it cheaper to produce or to 'improve' it as they thought. They took care to file the patents for these changes only in non-English speaking countries, such as Finland in 1944.

Although *Scintilla* stopped all *AW* production in 1949, it seems *Steyr Daimler Puch* approached them in the mid 1950's to obtain the Pirate Drawings. So now we have a copy of a copy. Needless to say, the *Styria* internals were changed and cheapened further, relative to the *Scintilla*.

We are now getting quite far from William Brown's 1936 *AW* design.

1969 Sears Roadster, made in Austria by *Steyr Daimler Puch* with the *Styria* three-speed hub

US bicycle manufacturer *Schwinn* had a problem with Austrian spelling (below). The ***Styre*** is in fact the ***Styria***. It was the only no-name hub, simply marked *Schwinn Approved*. Did *Schwinn* ever disapprove a 3 speed hub?

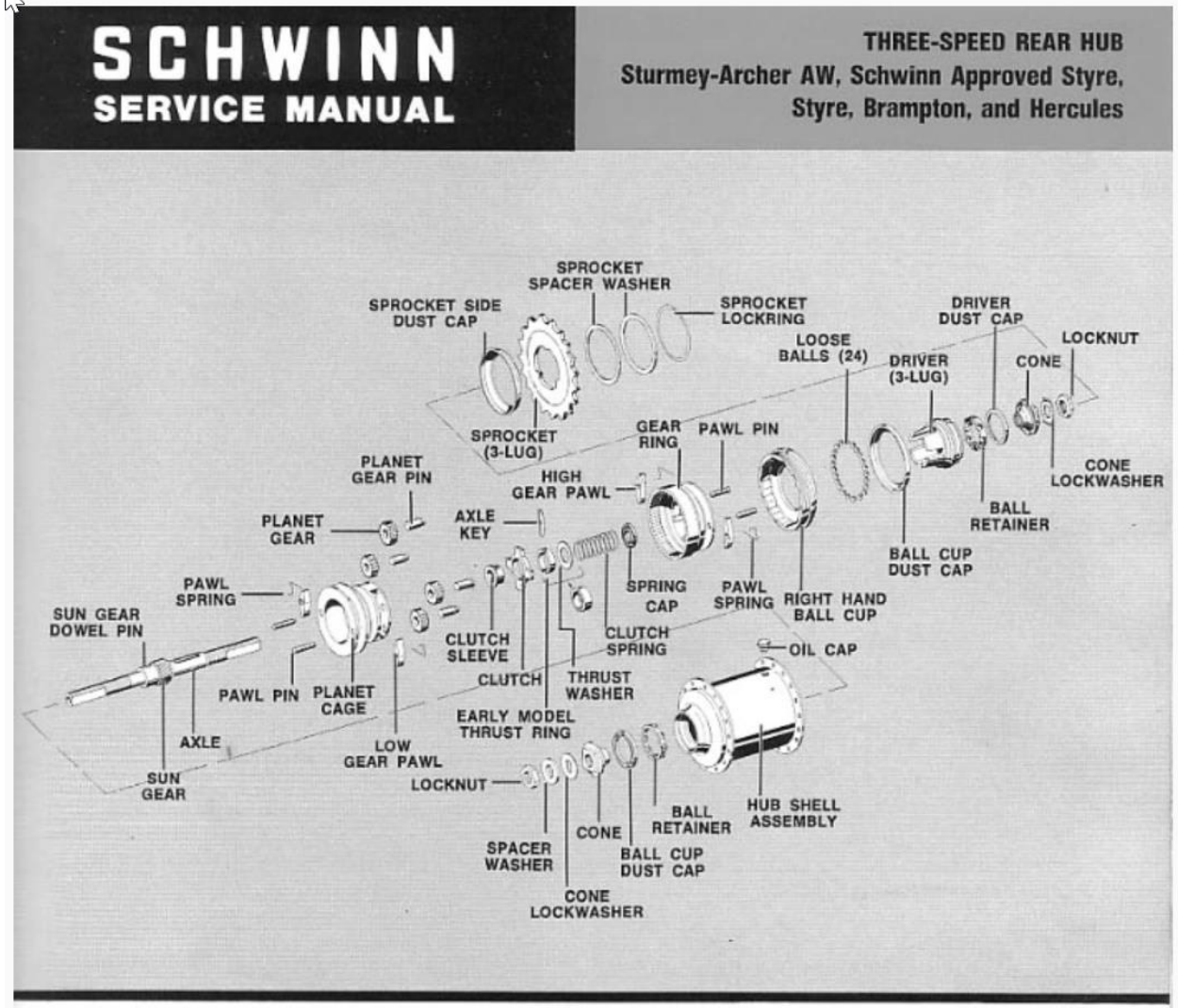


FIGURE 1—EXPLODED VIEW OF STURMEY-ARCHER AW THREE-SPEED REAR HUB

Components for Schwinn Approved Styre, Styre, Brampton and Hercules are interchangeable with Sturmey-Archer components.

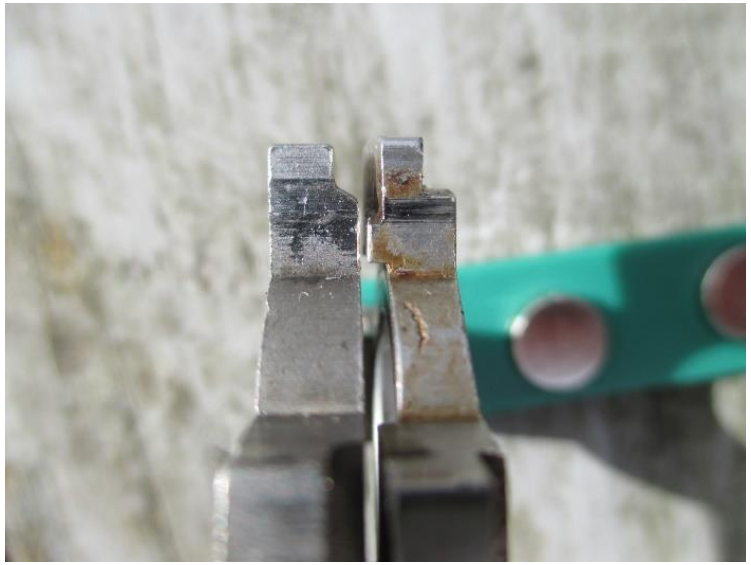
The Internals for the Scintilla 1/2

Scintilla radically changed the critical cruciform clutch assembly, compared to the original *AW*.

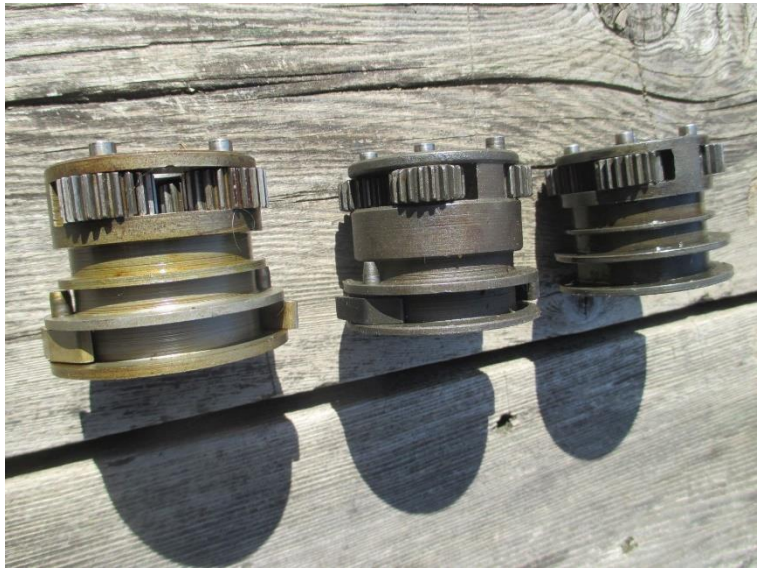
The four clutch engagement teeth which carry all the pedal torque loads in the three gears were thinned and tapered. The clutch key was changed to a clumsy square section, necessitating an increase in hollowing of the axle and a loose fitting clutch sleeve key hole.

Significantly, this clutch key was the one change *Puch Styria* did not copy ten years later from *Scintilla*.

Styria took even more metal off the planet cage armature than *Scintilla*.



Original AW clutch left, Scintilla copy right



Scintilla/AW/Styria planet cages. Styria is skimpiest

Square Scintilla key left, rounded AW key right

Scintilla clutch parts

Scintilla 2/2

Gear ring for Scintilla/AW orig./Styria

AW Gear Ring ledge for top gear clutch guiding

Scintilla/Styria Gear Ring – no ledge

The Gear Ring on the copies is reduced in material compared to the original *AW* in the centre. *Styria* is the skimpiest.

Undercutting of the Gear Ring internal surface on the *Scintilla/Styria* copies means the cruciform clutch is no longer guided into the bore as it moves from top to direct and low gears.

The Internals for the Styria 1/2

Houston, we have a problem
– the Styria Driver

The Sturmey Archer original driver

Styria 2/2

Awkward interior of the corrugated Styria hub

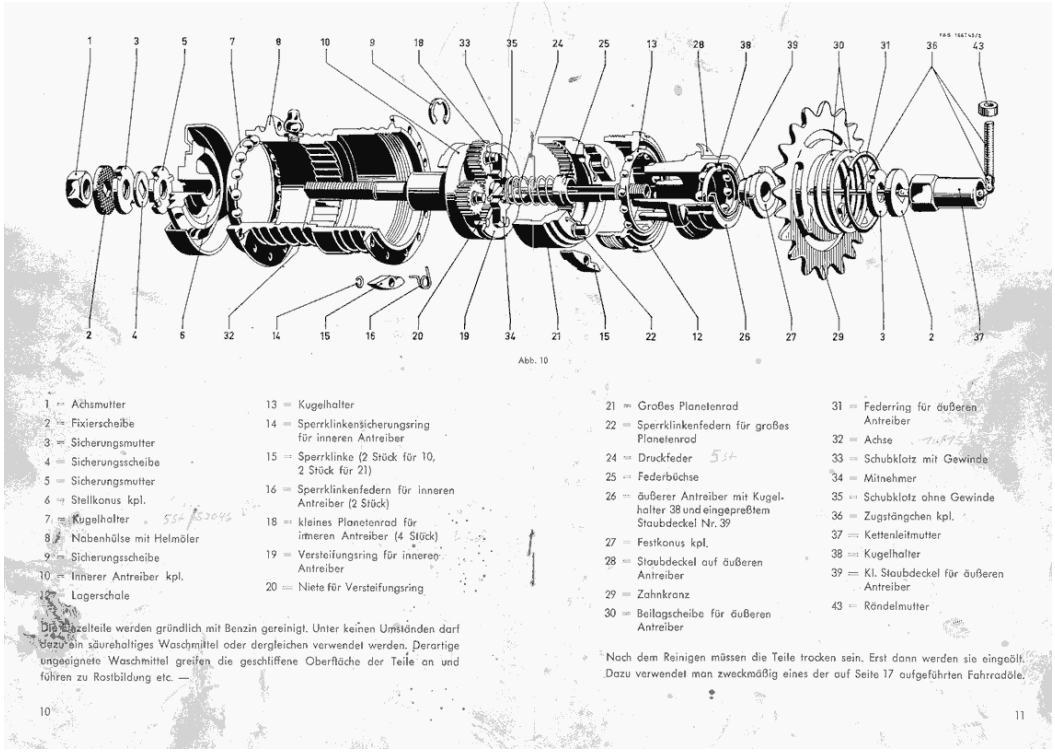
Wrong – the Styria 25 ball race

Right - the AW 24 ball race

Wrong – sloppily drilled planet pins, Styria

Right – properly located planet pins, AW

A side trip to Schweinfurt, West Germany



In 1955, with the patent for the *AW* running out and the hub pulled from production in Nottingham (to make way for the disastrous *SW* design), *Fichtel & Sachs* in West Germany decided to copy the *AW* hub, calling their version the *Modell 55*.
The only mistake was using a 2 lobe clutch instead of the cruciform, this sometimes slipped out under high torque.
The astute Germans kept the rugged stepped driver from the *AW*, unlike the earlier Continental Pirates. A million were made.

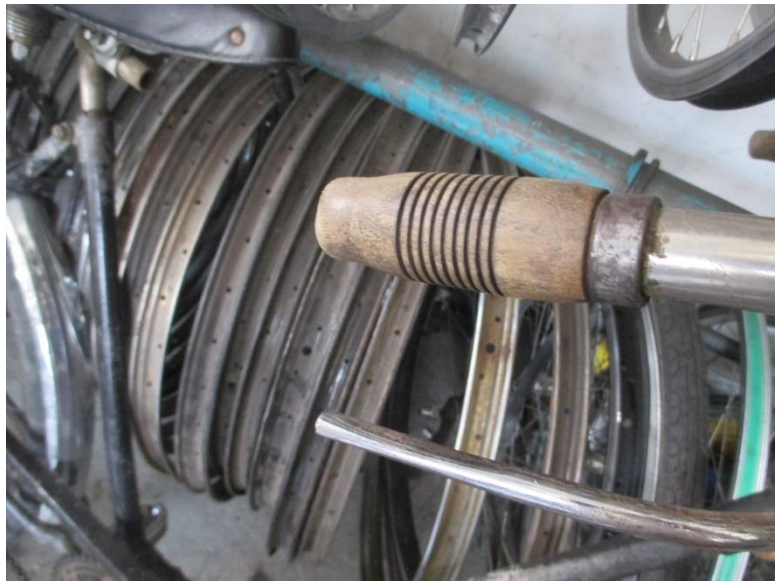
Unlike the Swiss and Austrian Pirates, *Fichtel & Sachs* copied the *AW* concept but did their own engineered solution. No parts interchange. It gained a reputation as the toughest *F&S* 3 speed hub to that date, a subtle compliment to *AW* designer William Brown.

Old times with Styria – the hub, the bicycle, the Austrian province around Graz…

This week I visited the WUK bicycle coop in Vienna at Wahringer Strasse 59. Located in an 1851 former locomotive shop, this is well worth a visit.

They had an amazing old Styria bicycle from between the wars, complete with front tread push brake, wooden handlebar grips and an early cotterless crank.

And, unlike Sears, they spelled Styria right, on the chain wheel.



Steyr Daimler Puch - epilogue

By the 1970's, the Styria pirate hub having been dropped, Steyr Puch were fitting their three speed urban bicycles with the later Fichtel & Sachs hub (type 515), usually with a coaster. Here are some pictures that I took of old Puch roadsters on the streets of Vienna this week.

By 1987, Puch was in difficulties, all 2 wheeler production in Graz finished.

Some thoughts on the three and a half hubs

When I began this paper, I was expecting to find the 'licensed' *Scintilla* hub to be the best, Swiss precision and all that.

After obtaining a **Scintilla** hub from Europe and dismantling it, I was quite surprised to find it was, in many ways, **a cheap Pirate copy**.

Less surprisingly, since the Web already had feedback on the poor reliability of the Austrian hubs, I found that the **Styria was an even cheaper Pirate copy** (after dismantling two examples). The surprise here was that **Styria copied the Scintilla**, rather than the original **AW**. Easier to 'get' the drawings?

In the Land of the Blind, the one-eyed man is King.

The German *Sachs Modell 55* hub of 1955 represented a credible attempt to copy the concept but not the detail design of the *AW* hub.

The Sturmey Archer AW from Nottingham continued to be the most desirable three-speed bicycle hub in the world during this 1940's-1960's period.

Epilogue

This Pirate Hub field work turned out to be a first-rate mystery which I rather enjoyed attempting to solve. It took some teasing out. All the companies involved in the complicated story, except *Sturmey Archer* (now part of *Sunrace*, Taiwan) and *Scintilla* (now a Bosch subsidiary), have vanished– even *Sears*.

The archives at *Sturmey Archer* have not revealed their secrets. I am indebted to Tony Hadland for his great insight, as always, on such matters. Any mistakes are mine, and I would welcome any further insight from the ICHC.

To quote Winston Churchill from October 1939 (referring here to Russia):
*It is a **riddle**, wrapped in a **mystery**, inside an **enigma**; but perhaps there is a key.*

In closing, some final lines from *The Third Man*:

Who was the third man ?
What man would you be referring to, Mr. Martins ?
I was told that a third man helped.
I don't know how you got that idea.
You'll find all about it in the police report
There was just the two of us, me and the Baron.

But there were three hubs after all, and all different inside…

I was initially wrong. It seems one should never judge a hub by its cover.

Thank you all