

MX-5 Short-nose Crankshafts



■ Words: Peter Ferguson

Many will be aware of talk and some issues relating to very early MX-5s and the "short nose crankshaft issue".

WHAT IS THE ISSUE?

On very early "short nose" MX-5s, it is not uncommon for damage to the nose of the crankshaft arising from:

- » Poor servicing, particularly when changing cam belt (this is the most common)
- » "Flogging" of the keyway due to movement of the front pulley in relation to the crank (this can be from poor servicing or simple bad luck)
- » In extreme cases, broken crankshaft nose – arising from unchecked damage to the keyway.
- » Preceding the final point, the car will have been running very badly for a long time due to drifting cam timing.

On very early cars, when taking off the front cam drive pulley from the crank, generally to replace the oil seal at the time of cam belt change or to cure an oil leak, it was/is easy to mis-fit the woodruff key between the shaft and pulley. **Note** the term *mis-fit*.

There is nothing actually wrong with the design but it is somewhat unforgiving and it's easy to stuff up reassembly and, in so doing, allow movement which flogs out the keyway and then allows cam timing to drift, over time.

If the woodruff key is assembled correctly, and the correct torque used on a good (new) bolt, there is minimal issue.

A contributing factor is that the woodruff key is not engaged over its entire length and so if the pulley is not done up to the correct torque, this can also allow movement of the pulley relative to the crank and this can also lead to the keyway flogging out, wear between the crank and the pulley and, ultimately, crank failure.

All of the above said, there are enough "traps for young players" that this issue has led to a number of cases of damage or failure, so it's worth knowing about and being very wary about who you let work on your car, or taking extreme care if you work on it yourself!

WHAT MODELS ARE AFFECTED?

On Australian MX-5s, it begins with the first cars delivered late '89 and runs through to approx. September 1990. So ... about the first 12 months of Australian MX-5s.

Subsequently, in around September 1990, Mazda introduced a production change, referred to by many as the "long nose".

When the model changed in 1993 (to the NA8 with the 1800cc engine), a further production change was made leading to another superior design on the crank end and the issue has been largely a non-issue since.

That said, there are manufacturers that sell kits to apply to later cars to improve them also. See **Amazon crankshaft saver** - <https://www.amazon.com.au/Just-Miata-JMCS01-crankshafts-crankshafts/dp/B00ZGBXE2O> (Thanks to Brendan Beavis for this link.)

So, the problem exists on SOME early NA6s only – *From the investigations made with Club members' cars:

- » the last short-nose car that could be found is VIN (vehicle identification number): **JM0NA306100102522**

while the

- » first long-nose is VIN: **JM0NA306100102536**.

**My thanks to the numerous members who, when approached, went and investigated their cars to establish these facts.*

This leaves 14 "unknown" cars where, it seems, the change was made within this cohort of cars. *This assumes the change follows VIN order.* An assumption is made that it does, and this is borne out by (limited) investigations made on cars with VINs above and below those listed above.

It is interesting that the cars listed were manufactured around September 1990. Information from USA sites talks of mid-1991 cars being the changeover point there.

It would be interesting to hear from owners of cars around these numbers (and in particular BETWEEN these numbers) to verify these facts.

If this article is read by owners of interstate (non-Victorian) MX-5s, it would be really useful if you could let me know your findings.

HOW TO SPOT THE ISSUE FROM OUTSIDE

On NA6 engines only, the early short-nose engines and the later long-nose engines have different arrangements on the front pulley, so it's relatively easy to spot externally whether you potentially have an affected engine. See the illustrations below of the "four-slot" and the "eight-slot" pulleys for reference.

On the "inside" there are two further ways of confirming it's a short nose engine:

1. There is a gap of approx. 12mm from the end of the crankshaft to the rear of the fixing bolt.
2. The diameter of the shank of the fixing bolt is smaller than that of the "long nose".

Some of the following illustrations have been "borrowed" from the article, "**What about those crankshafts?**" by Lance Schall - <https://www.miata.net/garage/crankshaft.html>. Well worth a read (but don't panic!) if you have a four-slot crank pulley.

continued ...

■ **Please note:** All "Tech Talk" information is provided as a guide only. All work is carried out at the owner's risk.

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Photo of a four-slot crank pulley = short-nose crank (C Bray)

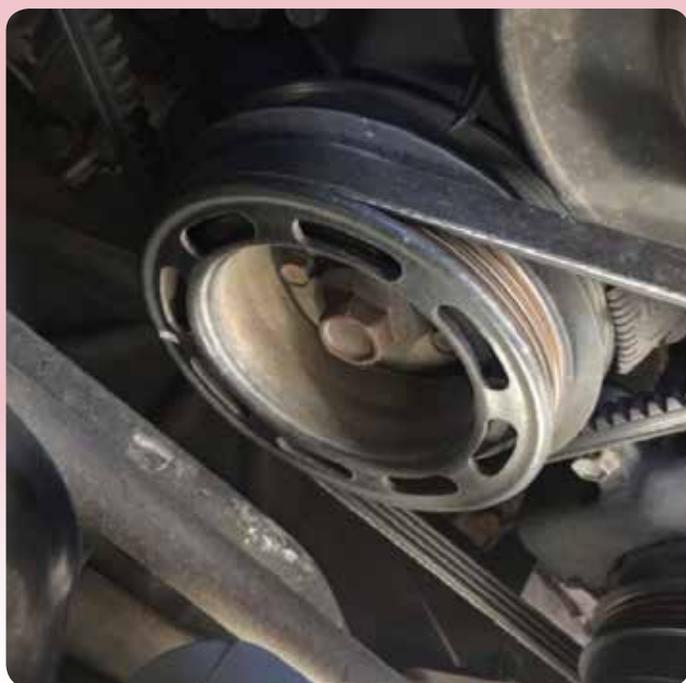
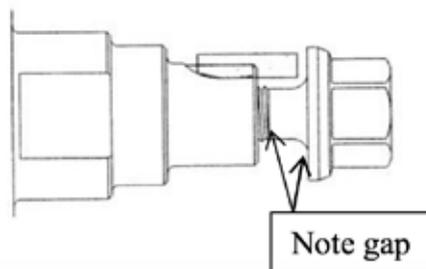
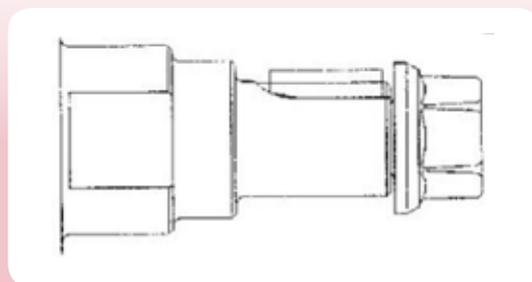


Photo of an eight-slot crank pulley = long-nose crank (P Theodoru)



Sketch of "short-nose" crank showing unsupported part of woodruff key (Schall article)



Detail on the "long-nose" crank – note that crank extends forward to rear of bolt and bolt is 40% larger in cross section. Note also that tightening torque differs to short nose (Schall article)



Flogged out keyway after woodruff key has moved in keyway of crankshaft – note original width at extreme rear, note also that wear is one side only – this is important if doing the "Loctite repair"

continued ...

HOW WILL THE ISSUE SHOW UP IN USE?

- » Erratic running and starting due to cam timing drifting.
- » Wobbling crankshaft pulley (this could also be harmonic balancer wear, so check carefully).
- » Damaged keyway, requiring some form of repair.
- » In the extreme, broken end of crankshaft.

HOW TO FIX

- » **Firstly, don't panic!** If the engine has been serviced by knowledgeable people, you probably won't have an issue!
- » Don't let damage happen to the keyway – if you have to take pulley off (OR if your service centre takes it off), ensure the job is done right the first time.
- » This involves four things:
 1. A careful inspection of the keyway and woodruff key.
 2. Correct re-fitting of the key (use a newie if any sign of wear).

Note the key has a curved or sloping face and this must match the machining in the slot on the crank.
 3. Correct torque settings on re-fitting the bolt (see right).
 4. Consider use of a new bolt on to the crankshaft.

If the car is running OK (without pulley wobble) – even if you are having a timing belt change – if there are no oil leaks on the crank, consider NOT removing the bottom cam belt drive on the crankshaft (note the crank pulley bolts to the cam drive gear).

Remember also that the MX-5s affected are now over 30 years old. So, if they're not affected yet, they are doing well and, if carefully and properly serviced, should go on for many years yet.

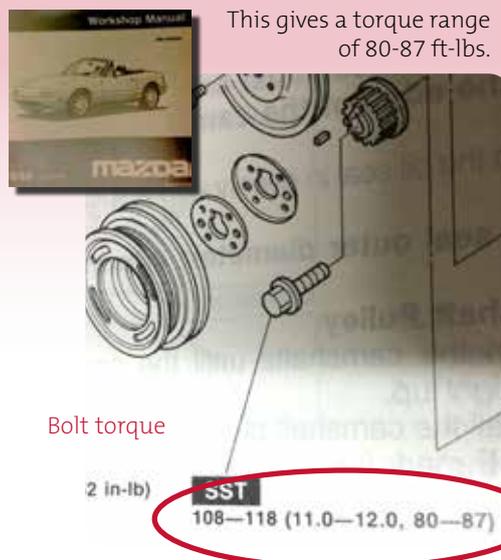
There are other fixes that some have undertaken when finding damage to the keyway:

- » Machine a wider keyway – possible but needs the crank out of the engine.
- » Hand carve a wider keyway with the engine IN the car – it's been done, but it's a *mongrel job* and needs extreme care to ensure cam timing is not compromised. (I know of one case that took 11 hours of painstaking work under the car!)
- » Do the "Loctite fix" (see below).
- » New crank with long nose.
- » I have personal experience from another Mazda, many years ago, of welding the crank and cutting a new keyway – when the end of the crank subsequently fell off due to embrittlement at the weld, I was unimpressed! *Not recommended.*

WHAT TORQUE SETTING?

There are many opinions on what torque to do the crank bolt up to.

I am indebted to Club member Warwick Gibbon who, it turns out, has a copy of the Mazda Workshop Manual released at the same time as the first cars in late 1989.



This gives a torque range of 80-87 ft-lbs.

This agrees with Keith Tanner – see right.

It is important NOT to use the 120 ft-lbs setting that is used on the long-nose crank as the bolt diameter is different – the later unit for the long-nose crank has a 40% greater cross-section.

FURTHER READING

1. The article found at <https://www.miata.net/garage/crankshaft.html> is very much worth a read as it has a LOT of good information.

Take care though; it is based on USA experience, VINs etc. It is still a good resource.
2. A *highly recommended* book to get is **Mazda Miata MX-5 Performance Projects**, by Keith Tanner [ISBN 978-0-7603-1620-7]. Club member Warwick Gibbon recommended this book to me.

I recently purchased the book through Amazon Australia (about \$25 delivered). It has a wealth of info on many things MX-5 and there is a chapter on the short-nose crank issue. Overall, a good investment!

Keith is very forthright on the need to use a new bolt when taking the pulley on and off. He is also very specific on the torque of *84 ft-lbs (see left – "What Torque Setting?") and Loctite 242 on the threads.

If repairing the keyway, he sets out how to measure the wear and what Loctite to use if going this way. If you have this crankshaft issue, it's worth the cost of the book to get his method – it is a multi-stage measure and repair and it involves the use of both *Quick Metal* and *Loctite 242* (243 seems to have replaced 242 now) to:

- (a) repair the slot and
 - (b) close gaps between the cam gear and the crank (these may have arisen due to movement between the two).
3. *YouTube* is also an excellent resource with lots of useful videos but **remember**, it's *YouTube so not everything is correct, authoritative, relevant to the Australian experience or good engineering practice! ■*



Loctite 243 – \$15 at Bunnings



New crank bolt \$30.75 via Mazda dealer (Feb 2021)