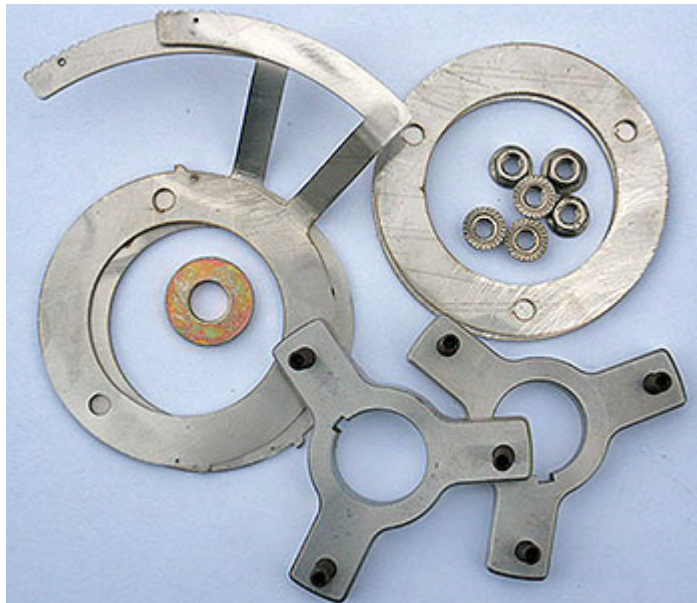


# PORSCHE

## 928

### 16V TO 32V CAM GEAR CONVERSION INSTRUCTIONS



For all 16V engines: USA 78-84, Euro 77-86

2.0

[cams@mrtubby.net](mailto:cams@mrtubby.net)

## Required parts not included in kit

(2) HTD 32V cam gears - sprocket – 928.105.530.01 *or* 928.105.530.00

### 1978-1982 require HTD (round tooth) crank and oil pump gears and belt

(1) HTD oil pump gear - oil pump sprocket – 928.107.107.13

(1) HTD crankshaft gear - crank sprocket – 928.105.125.12

(1) HTD timing belt – timing belt – 928.105.157.50

## Tools

Breaker bar with 27mm socket

3/8” torque wrench with 17mm socket

8mm, 17mm, 32mm *or large adjustable* wrench

## Conventions used in text

Left is USA drivers side, right is passenger side.

Author assumes that reader has access to workshop manuals and has the basic knowledge, tools, and skills to change a timing belt.

*Notes are in italic font.*

## Warnings

Do not run engine with pointers or spacer installed!

Always counter hold the cam bolt shoulder washer with 32mm wrench while loosening or tightening cam bolt.

Turn crankshaft clockwise.

For off road use only!

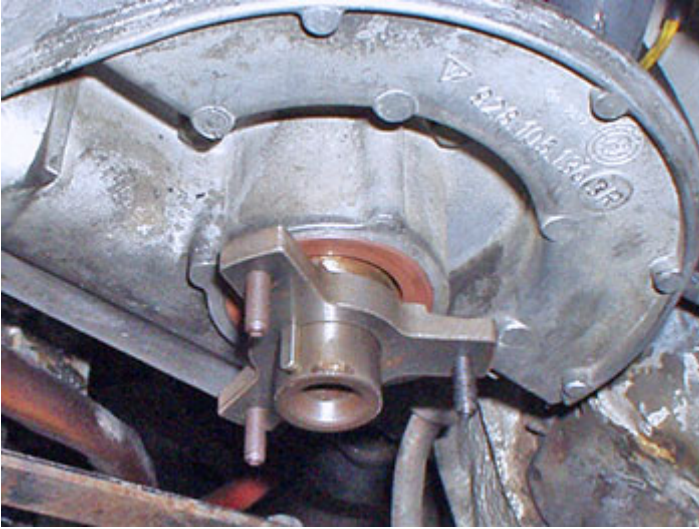
## Post adjustment notes

Attach timing light and adjust ignition timing. *Ignition timing will be changed anytime a cam adjustment is made on the left camshaft. Euro engines with dual distributors do not require ignition timing adjustments.*

A final check with the pointers should be performed when the engine has been fully warmed up, as the expansion of the engine may change the advance/retard on one or both banks.

Cam timing should also be checked whenever timing belt tension is adjusted

## Installation Notes



### Hub Preparation

Lubricate cams and face of hubs with 90W gear oil or similar before installing hubs.

Slide hubs on cams.

*A dab of white paint on the housing marks will make setup easier.*

*Writing the cam bolt torque setting on the gear face is also helpful.*

### Cam Gear Installation

Install cam gears on hubs, loose fit the 17mm cam bolts and shoulders. Center hub studs in gear slots. Install big washer and hand tighten 8mm nuts.

*One hub stud is offset, so the gear (and washer) will fit in one position only.*



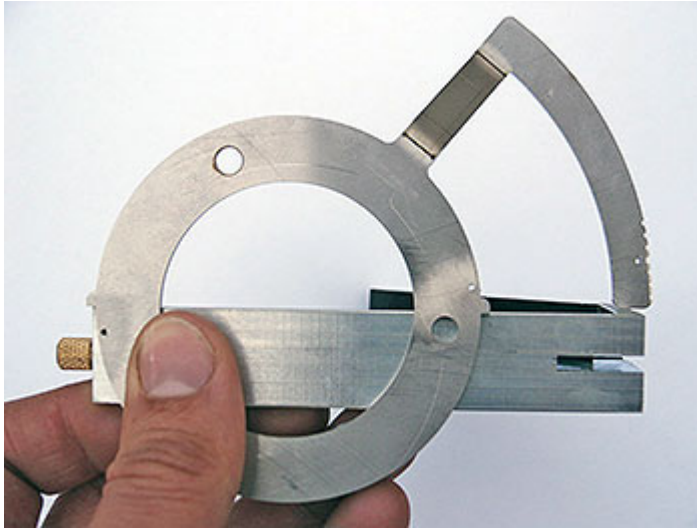
*Counter hold the shoulder washer with 32mm wrench while loosening or tightening cam bolt.*



Install timing belt as per workshop manual. Run engine to seat timing belt and recheck belt tension.

## Pointer Check

Position the pointer on a (preferably machined) flat surface.



*For this demonstration, the handle of a 12" combination square is shown.*

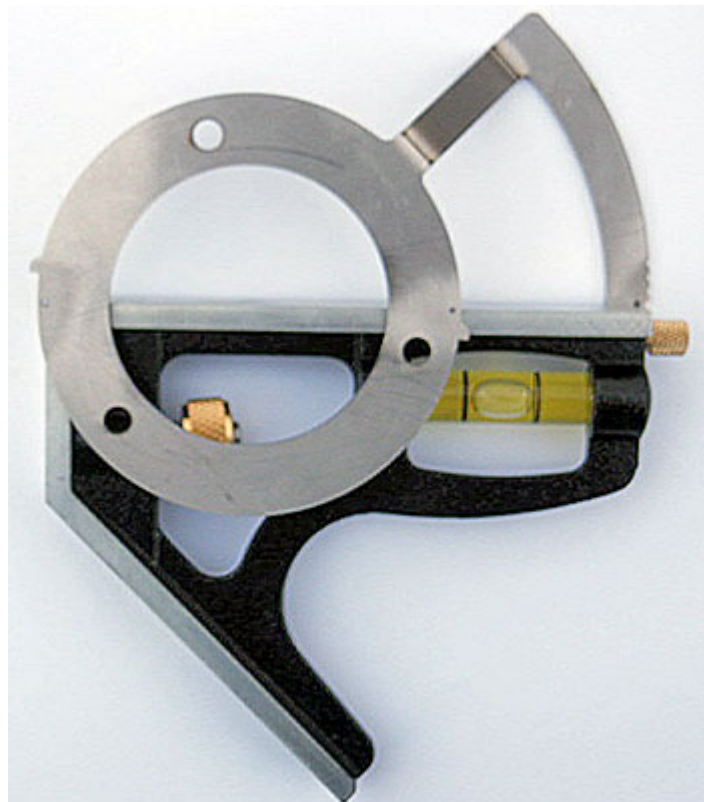
Using a caliper, verify that the inside faces of the ring and the arm are **20mm** (+-0.25) apart.

*If the tip is not within tolerance, carefully push or pull the tip so that the correct measurement is obtained. A distance other than the given tolerance will change the angle measured.*

With the tip of the arm resting on the horizontal plane, and the ring pressed against the vertical plane, verify that the flat of the two 'nubs', on either side of the ring, line up with the horizontal plane. A sliver of light visible under the 'nubs' is acceptable.

A secondary check can be performed if the pointer is positioned over a flat surface which fits between the tip and the ring.

When viewed straight across the horizontal plane, the two holes in the ring, and the zero hole in the arm should all be half filled.



## Pointer Installation



Turn crankshaft clockwise past TDC until notches on cam gear are straight up.

*Left pointer cannot be installed when cam gear notch is aligned with housing mark.*

Loosen 8mm nuts and remove nuts and big washer.

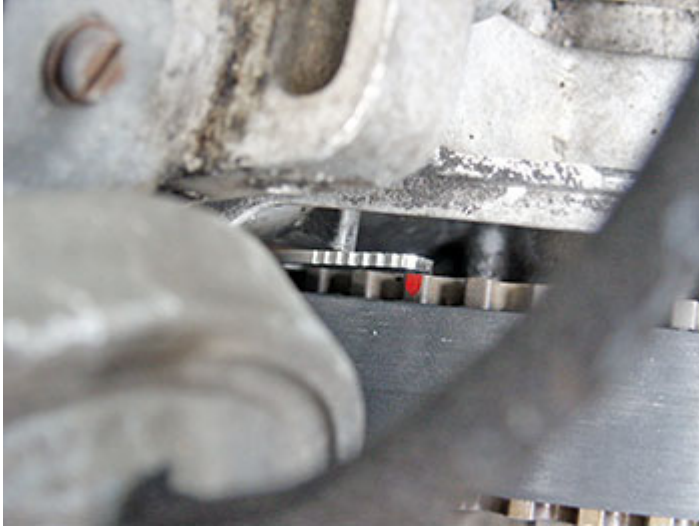
Carefully rotate pointer through hole as shown and align all three 5mm holes with studs.

Tap pointer gently over studs until pointer rests against cam gear.



Install 8mm nuts and hand tighten.

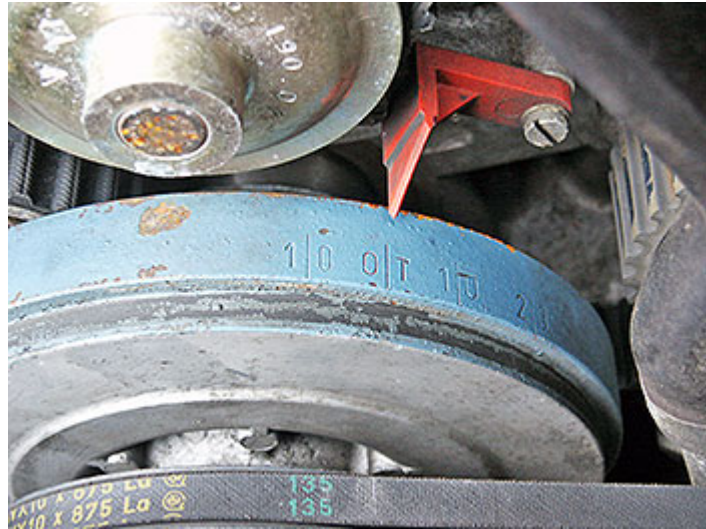
Install right pointer in same fashion.



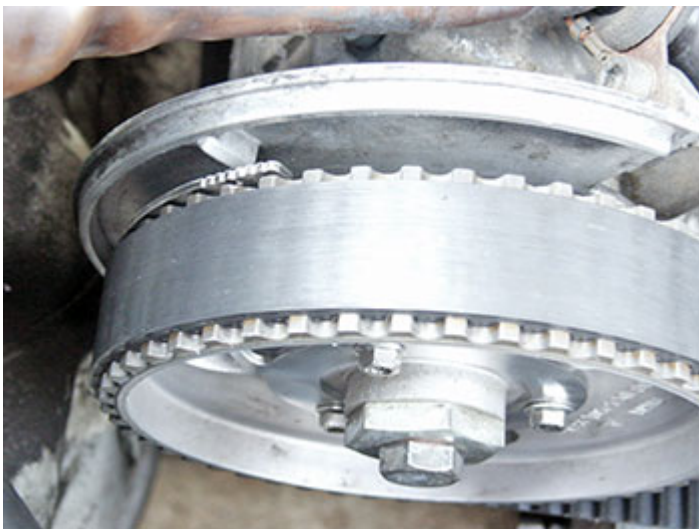
Turn crankshaft clockwise slowly until **0 | T** is indicated on balancer and pointers are aligned with housing marks.

*As you approach TDC the left pointer tip will slide against housing mark, this is normal.*

*Rotate engine especially slowly at this point.*



*Right pointer at mark.*



The slightly larger notch on the pointer arm is zero. Each notch is 2 degrees. Clockwise advances, counter-clockwise retards.

## Cam Gear Adjustment



Loosen and remove 17mm cam bolt and shoulder washer.

Reinstall with spacer, and using torque wrench, tighten to specification.

Loosen, but do not remove, the 8mm nuts.

Using a 17mm wrench on cam bolt, adjust cam until cam housing mark is in line with the desired advance or retard.

*Each mark is 2 degrees, rotating clockwise advances, counter-clockwise retards.*



Tighten 8mm nuts. Remove and reinstall cam bolt **without** spacer and using torque wrench, tighten to specification.

*Never run engine with spacer or pointer installed!*

*If you cannot turn any farther, and there are still marks on the pointer, the cam gear may have been installed one tooth off.*



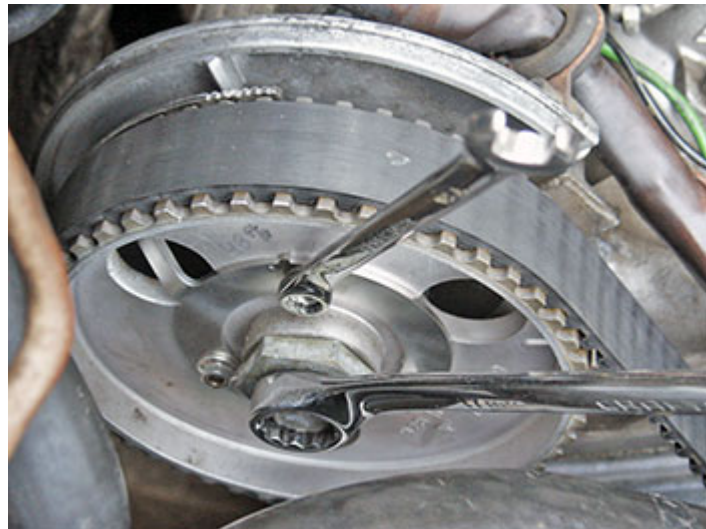
Repeat adjustment procedure on right cam.

*Right spacer installation.*

*The right cam may spring out of adjustment if not held by the 17mm wrench. When adjustment is correct, tighten 8mm nuts while holding with 17mm wrench.*

*The left cam may also do this to a lesser extent.*

*Never run engine with spacer or pointer installed!*



Rotate crankshaft two revolutions until **O | T** is again indicated. Check adjustment. Repeat as necessary.

Remove pointers and install big washers. *Big washers fit only one way.* Install and hand tighten 8mm nuts.

*Verify that spacer is removed and cam bolts are torqued to specification before starting engine.*