

# A Little-known Accessory to the Zeiss Standard Microscopes

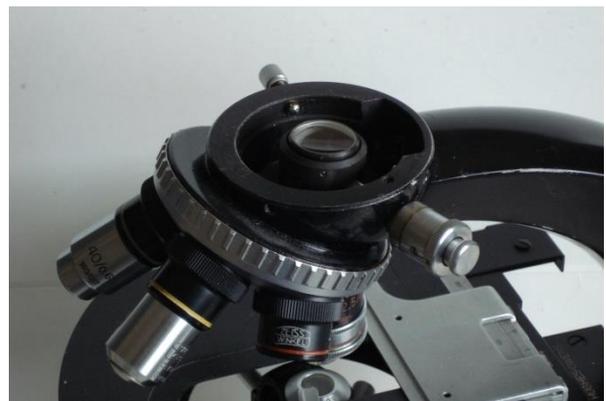
by Fritz Schulze, Canada

There is a little-known accessory to the Zeiss Standard Microscope series: the **magnification changer 1.6x**. This little optical accessory is either originally installed when the microscope is bought or can be added as a retrofit later on provided the microscope in question is appropriately equipped. This can be ascertained by looking for a small plug on the side of the



tube head.

This magnification changer is, so to speak, the poor man's Optovar with only one more step of magnification instead of 2 or 3. It is very convenient to increase the magnification quickly in



order to judge, for example, whether employing a higher power objective would be of benefit. It also saves the cost of an extra pair of eyepieces and having to exchange them frequently.

The left illustration shows a Gfl tube head with the control knob of the magnification changer installed. The illustration on the right has the optical component added. The small concentric screw fixes the optics to the shaft, the larger knurled knob, when turned 90°, brings the active optics into the light path.

There is one important consideration to be observed: the optics protrudes into the space of the binocular dovetail which is suitably dimensioned. The Telan lens of any intermediary tube such as a fluorescence filter changer or a discussion tube (or an Optovar), however, would clash with the magnification changer which excludes their use in this combination.

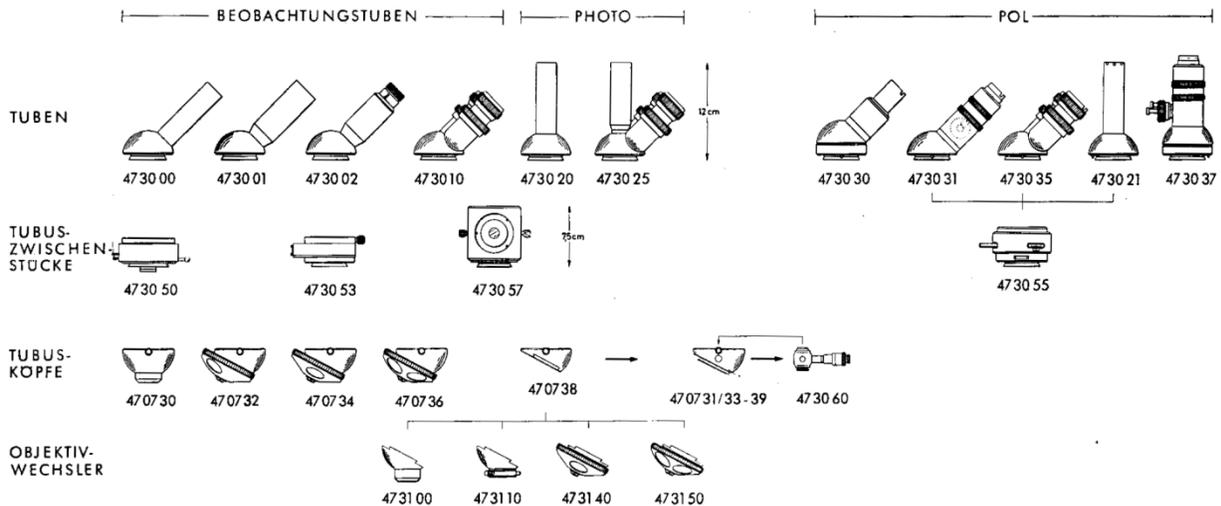


You can see that there is ample space within the circular dovetail to allow for free movement of the optics of the magnification c hanger.

Instead of the optics one can also attach a filter changer to the operating shaft. This is shown in the next illustration.



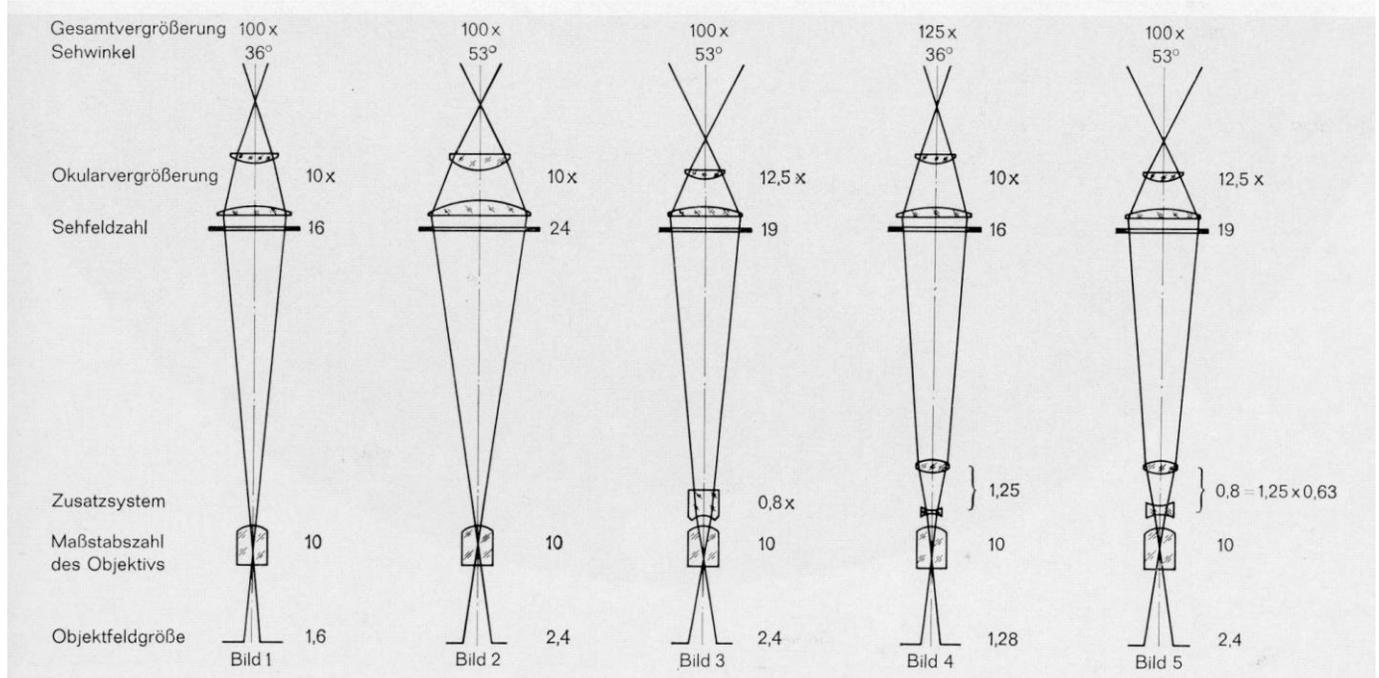
This is the magnification changer **0.8x** which I shall explain later on. The filter holder accepts standard 18mm dia filters. This could be a fluorescence barrier filter, an analyser or a neutral density filter. (I don't have a 1.6x changer nor a suitable photo, hence the 0.8x)



**Legend:** Beobachtungstuben = tubes for observation; Tuben = tubes; Tubuszwischenstücke = intermediate tubes; Tubusköpfe = tube heads (magn changer 47 30 60 last in line, with a tube head with dovetail for interchangeable nosepieces); Objektivwechsler = objective changers for tube head with dovetail.

The above schematic illustrates the choice of tube heads and nosepieces including the magnification changer which can be combined with either a standard tube head or with one for interchangeable revolving nosepieces.

**Large field Microscopy** was introduced by Leitz with much clamor in the late 60s as the latest great invention in microscopy so much so that they even designed a special microscope, the Grossfeld-Orthoplan, for it. What it meant was that it increased the visible field diameter by 25%. The field stop of the normal eyepiece is limited to 19mm by the mechanical inner diameter of the tube. The Grossfeld-Orthoplan had special binocular tubes with tube sleeves of 30mm ID and special eyepieces with a field stop of 24mm. While I agree that it is sometimes useful to have a very large field of view when searching for a small item, it can be tiring to roll your eyes all over a large field, no wonder, the new method did not catch on to the expected extent. Still, Zeiss felt at a momentary disadvantage and their scientists came up with an as ingenious as simple solution: *reduce* the magnification of the intermediate image and *increase* the eyepiece magnification by the same factor.



**Legend:** Gesamtvergrößerung = total magnification; Sehwinkel = visual angle; Okularvergrößerung = eyepiece magnification; Sehfeldzahl = field of view number (diameter of eyepiece diaphragm); Zusatzsystem = intermediate optics; Maßstabszahl des Objektivs = objective magnification; Objektfeldgröße = size of object field; Bild = picture.

Bild 1 represents a normal microscope. The eyepiece stop is 16mm dia, the viewing angle entering the eye is 36°, the observed field is 1.6mm dia. Bild 2 is the Leitz version: the eyepiece stop is 24mm dia, the viewing angle is 53°, the observed field is 2.4mm dia. Bild 3 is a Zeiss Standard Gfl with a **0.8x** magnification changer in combination with a **12.5x wide angle eye piece with 19mm eyepiece stop** yielding also a viewing angle of 53° without the

need of a special tube! In both cases the object field is 2.4mm dia. Bild 5 is a Photomicroscope with a special revolving nosepiece with a 0.63x reducing lens in combination with the Optovar position 1.25 (or a Standard microscope with a special Optovar that has the range **0.8** - 1.0 - 1.25 - 1.6x.). Again the same object field of 2.4mm is achieved.



Users of Standard microscopes who wish to have the benefit of this large field can combine the small magnification changer 0.8x shown on page 3 or screw this 0.8x reducing system into their binocular tube which has, conveniently a 28x0.5 metric thread within the dovetail (compare the illustration of the binocular tube on page 2), or, as mentioned already, acquire the special Optovar with 0.8x as lowest factor. In each case a pair of Kpl 12.5x wide angle eyepieces completes the set-up.



Zeiss Kpl 12.5x wide angle eyepiece (1971 version) and a 0.63x revolving nosepiece for Universal or Photomicroscope.

Prerequisite in all these cases is, of course, the use of **plan-objectives**, be they planchromats or planapochromats. Only for the very low magnification Zeiss offered a special Planachromat 2.5x, all other plan-objectives can be used for Large Fields.

References: Zeiss Information # 27, 1958 and Zeiss Information # 63, 1967. Both schematics from Carl Zeiss Oberkochen.

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