

Slaves dials with “seconds hand”:
Is it a seconds slave or slave with pager indicator?
Nebenuhr mit “Secunde Zeiger“: Nebenuhr mit Secunde oder Neberuhr mit Personensuchzeiger?

Introduction

We sometimes hear: “I recently bought a slave with a red seconds hand, but if pulsed it jumps 2,5 seconds on the dial”. This remark is often followed by: This is not what I need, I need a slave with a seconds hand, one second per pulse. And, what could be wrong?

In this case, our clock-friend bought a slave where the “seconds” hand is used for another purpose: signalling to people. This type of slave is part of a paging system (Personensuchanlage). So, typical seconds slaves can be distinguished from the pager slave by the jump of the “seconds” hand: 1 second instead of 2.5 seconds. The paging hand uses modified gearing inside the mechanism of the pager slave and cannot (easily) be modified to act as a seconds hand (although there is second best electronic solution in the paragraph ‘Some practical notes’).

Often it is difficult to identify the difference in function from the outside. They both have two sets of electrical connections. Sometimes the connectors are marked as “Nebenuhr” and “Suchzeiger” (search pointer). Another indication might be different voltages assigned to the connectors.

Occasionally the usually red pager hand looks different e.g. with a large hole in it or a wishbone at the end. Often the pager hand moves *behind* the hour and minute hand, whereas the seconds hand usually is on top.

Paging, an additional functionality for slaves

Personensuchanlage, extra Funktionalität für Nebenuhren

Most common slave dials showing only time move the minute hand forward in minute jumps, but for some applications a more accurate display of time by a seconds hand is required. Often these seconds hand are red but this is not consistent. We can distinguish three types of mechanisms operating a seconds hand:

1. type 1: one mechanism, operated with just a pulse every second from a master clock (second inpulsed slave) (e.g. Siemens);
2. type 2: an additional seconds slave movement is added to a slave dial with a standard minute slave movement. So, for operating this type we need two time signals, minutes and seconds, from the master! (e.g. Wagner, TN, Burk)
3. type 3: a separate synchronous motor drives the seconds hand combined with a standard impulse movement for the minute slave movement (TN, Moser and Baer).

The types 1 and 2 are often described as having “springende Secunde” or “jumping seconds”, The type 3 is referred to as “schleichende Secunde” or “continuous seconds”.

So, the type 2 and type 3 slave units have two distinct mechanisms, with a separate input. Usually in type 2, the voltage for the seconds is the same as for minutes, typically 6-12-24-48 or 60 volts DC and alternating polarity. In type 3 the inputs can be very diverse. The minute slave gets the usual input as type 2. As the seconds hand is moved by a geared synchronous motor, their input will be AC. We have seen mechanisms powered by 24-48-220 volts AC.

Identifying your slave: minute slave with seconds hand or minute slave with the pager indicator hand

So, the slave unit has two distinct mechanisms, both with a separate input. One mechanism drives the minute slave for indicating the time while the other mechanism drives the seconds hand or pager indicator of the paging system. Sometimes the inputs are called: Nebenuhr (time slave) and Suchzeiger (pager) or seconds. If the required inputs are not known try this:

- If you put an impulse on input side 1 of the slave and the minute hand jumps 1 minute, this is the minute part. But if the second hand moves 1 one position on the dial this is the seconds mechanism and you have to put the minute signal on the other input. **You have a slave with a seconds hand.**
- If you put an impulse on input side 1 of the slave and the minute hand jumps 1 minute, this is the clock part. But if the second hand moves 2,5 positions on the dial, this is the pager mechanism and you have to put the minute signal on the other input. **You have a minute slave with pager indicator.**

As these slaves with pager indicator are elements of two separate systems, they sometimes work with different voltages!! The required voltage for the time system is usually 6-12-24-48 or 60 volts DC alternating polarity. Start as low as possible. As the pager system has its own voltage also start as low as possible. Burk, e.g. used 24 volt for the minute slave and 60 volt for the pager. Be careful while testing the unit, above 48 volts it can hurt!

The pager system

The most frequently seen are the slaves of the pager systems of Burk and T&N. The paging system of TN, TriZett, is very well described and illustrated on: <https://www.telefonbau-und-normalzeit.de/Normalzeit-Produkte/Suchuhren-TriZett>. You can also download T&N sales brochure: "Who is Herr Zangli?"

In short the concept of the paging system is as follows:

- The pager indicator in all the slaves are centrally driven by a console with a selector. With the selector you choose one of the 23 positions on the dial. These 23 positions are assigned to persons.
- The system is operated by someone e.g. at the office. If someone needs "Johnson", the person at the desks selects the assigned number to Johnson on the pager console. In *all* connected slaves the pager indicator will move to selected dial position and an acoustic signal will sound. Every person with an assigned pager number will look at the nearest slave clock and know whether his attention is required. Usually Johnson will go to the nearest wired telephone and call the pager operator.
- The paging system needs additional 2 strands of wiring

Some practical notes

- Slaves with pager indicator will run as normal slaves. There is no need to wire the pager mechanism. Eventually you can remove the pager indicator
- On <https://www.telefonbau-und-normalzeit.de/Normalzeit-Produkte/Suchuhren-TriZett> the console is shown. The consoles are very hard to get, but its function is relatively simple.
- The electric scheme of this console can be found on Clockdoc in the T&N folder, in the documentation subfolder and is called "*TN Suchanlage (partly approx 1960).pdf*"
- On <https://www.youtube.com/watch?v=Gltcoukv9Go> you will find an explanation of the console.

- There are enthusiast who have reverse engineered the console and built it in electronics: <https://www.nebenuhrsteuerung.de/SuZe1.htm>. Their system has two options:
 1. Operate the pager indicator as a (kind of) seconds hand, synchronous with the start of the minute. As a result of the other gearing the pager system the electronics have to provide 24 pulses per minute in contrast to the 60 pulses in the seconds slave. Consequently, the meaning of springende secunde or jumping second is an understatement.
 2. With an additional pulse mechanism e.g. an analogue telephone dialler, you can operate your pager slave as it was designed to work: for paging.

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