Architecture:

Original SWF and SHO Semaphores

(By: Matthew Ross and John Henry)

	SWF Ribbed- Pre: late 1949	SWF Ribbed Post: late 1949	SWF smooth AL, B and D series	SWF smooth F series	SWF Convertible	SHO Grooved	SHO smooth A and C series	SHO smooth E series
Housing	Unique but can be used for later ribbed There is a slot for wire clearance in floor of housing under coil.	Unique but can be used for earlier ribbed	Same for Al, B, D series	Unique	Unique	Same for grooved and SHO A and C series Early (AL)coil end support plate is separate, later it is welded to the body	Same for grooved and SHO A and C series	Unique to E series
Outside arm	Unique to Pre: late 1949 + left and right handed + inside and lens bulb holder integrated into arm	Unique to SWF ribbed Post: late 1949 Two versions: 2 bolts showing & 1 bolt showing Unique version dubbed "Longnose" See *******	Same for all SWF smooth, inside lens bulb holder integrated into arm	Same for all SWF smooth, inside bulb holder integrated into arm	Unique, longer and narrower than sedan SWF. Inside bulb holder integrated into arm	Unique to SHO grooved Some arms have a "6V" stamp	Same for SHO smooth	Same for SHO smooth

Inside short/pivot arm	Unique to Pre: late 1949	Unique to SWF ribbed Post: late 1949 Two versions, one with "wings" and one without	None	None	None	Unique to SHO grooved Later version has brass pin bushings	Same for all SHO smooth	Same for all SHO smooth
	SWF Ribbed- Pre: late 1949	**SWF Ribbed Post: late 1949**	**SWF smooth AL, B and D series**	**SWF smooth F series**	**SWF Convertible**	**SHO Grooved**	**SHO smooth A and C series**	**SHO smooth E series**
Piston	Unique to Pre: late 1949 Has big hook on end	Post: late 1949 ribbed same as all smooth *	Late ribbed same as all smooth *	Late ribbed same as all smooth *	Late ribbed same as all smooth *#	Same for Al, B, D series	Same for all SHO	Same for all SHO
Inside long bulb holder	NONE	Unique to SWF Post: late 1949 ribbed	NONE	NONE	NONE	N/A	Same for all SHO	Same for all SHO
Lens (See detailed lens Guide for all variances)	Unique, left and right handed	Unique to SWF late ribbed Unique version dubbed "Longnose" See *******	Same for all SWF AL, B, D and F	Same for all SWF AL, B, D and F	Unique, longer, narrower and shallower than SWF smooth	Unique to SHO grooved	Same for all SHO A, C and E series	Same for all SHO A, C and E series
Lens Bulb holder	NONE	Late ribbed is same as all smooth** **Longnose see *******	Late ribbed is same as all smooth**	Late ribbed is same as all smooth**	Late ribbed is same as all smooth**	Unique	Same for all SHO smooth	Same for all SHO smooth
Coil	Unique to SWF	Unique to SWF	Same for	Same for	Unique	Unique but	Same for	Unique to

	ribbed. Rubber bumper mount is taller than smooth.	ribbed. Rubber bumper mount is taller than smooth.	Al, B, D series	Al, B, D series		can substitute SHO A and C series Rubber bumper tab on grooved coil is narrower.	SHO smooth A and C series. .	SHO E series
Contact Plate with wire terminals	Same for all SWF except smooth F series & vert Fastened with steel rivet, no PVC Sleeve over wires along board	Same for all SWF except smooth F series & vert Fastened with brass rivet, Black PVC Sleeve over wires along board	Same for all SWF except smooth F series & vert	Unique	Unique	Same for Grooved, AL, B, D series ****** Two types, single and later dual contact for dash pod light contact pin	Same for Grooved, AL, B, D series ******	Same for Grooved, AL, B, D series ******
Wire terminal bolts	3.5MM slotted bolts Most often steel	3.5MM slotted bolts Plated brass	3.5MM slotted bolts	3.5MM slotted bolts	3.5MM set screws/bolts	3MM slotted	3MM slotted	3MM slotted
Rubber bumper (Lens stop)* **	Same for all SWF sema4s except SWF F series	Same for all SWF sema4s except SWF F series	Same for all SWF sema4s except SWF F series	Unique	Unique	Unique	Unique	Unique
Return Spring (Coils around hinge pin)	Same for all SWF	Same for all SWF	Same for all SWF	Same for all SWF	Same for all SWF	Unique but can use SHO smooth. Both types used on grooved in production	Same for all SHO smooth	Same for all SHO smooth
Piston to arm	Unique to SWF	Late SWF ribbed	Late SWF	Late SWF	Late SWF	SHO	SHO	SHO

or short arm spring	Pre: late 1949	smooth and convertible are the same	ribbed and SWF smooth are the same	ribbed and SWF smooth are the same	ribbed and SWF smooth are the same	grooved and smooth are the same	grooved and smooth are the same	grooved and smooth are the same
Hinge Pin*****	Unique to both SWF ribbed	Unique to both SWF ribbed	Same for SWF AL, B, D, F and vert	Same for SWF AL, B, D, F and vert	Same for SWF AL, B, D, F and vert. July 2022: an NOS set had same hinge pin as ribbed. Very unusual.	Same for all SHO	Same for all SHO	Same for all SHO
	SWF Ribbed- Pre: late 1949	**SWF Ribbed Post: late 1949**	**SWF smooth AL, B and D series**	**SWF smooth F series**	**SWF Convertible**	**SHO Grooved**	**SHO smooth A and C series**	**SHO smooth E series**
Bolts/Rivets for arm/lens assembly	Two unique bolts, 3.5MM, thru top of arm and lens and thread into short arm. Steel, often "dog point" screw same as on terminal board	Two 3.5MM by 11MM bolts thru top of arm, inside long bulb holder, short arm and lens. Plated brass may, or may not be painted Nut sits in recess on underside of lens	One bolt with washer through underside of lens to threaded piece on underside of arm	One bolt with washer through underside of lens to threaded piece on underside of arm	One bolt with washer through underside of lens to threaded piece on underside of arm	Two rivets of varying length thru arm, short arm, and lens and crimped over on underside of lens	Two 3MM X 10MM bolts through underside of lens into threads on underside of inside log bulb holder	Two 3MM by 10MM bolts through underside of lens into threads on underside of inside log bulb holder
Fastener(s) for contact plate thru	One: Steel rivet Interchangeable for all SWF	One: Brass rivet Interchangeable	One: Same for all SWF	One: Same for all SWF	One and its UNIQUE	Two: one short one for coil foot	Same as SHO grooved	Same as SHO grooved

foot of coil through housing	except VERT	for all SWF except VERT	except VERT	except VERT		to housing and one long thru everything		
Elongated U-shaped Spring and pin for piston linkage to swivel on	UNIUE with washers Riveted/integrated into short arm	Pin is short with slots and is removeable	Pin is long	Pin is long	Pin is long	NONE	NONE	NONE
Date stamps/codes	Two letter stamp month/year on short arm	Two letter stamp month/year on short arm	Two letter stamp on housing near hinge pin	Two letter stamp on housing near hinge pin	Two letter stamp on housing near hinge pin	Two number stamp month/year on underside of stop plate	Two number stamp month/year on underside of stop plate	Two number stamp month/year on underside of stop plate

*Except for length of sprung needle – it is shorter in late production smooth and convertible.

*There are two small variances for F style pistons in smooth and vert semaphores

**All ribbed and smooth and vert SWF lens bulb holders are interchangeable in terms of fit. There are minute differences relating to the scripts for Auf, Zu and the arrows written/stamped on the lens bulb holders.

***Small variances

**** BOTH SHO and SWF hinge pins of all types vary slightly in diameter and SHO are slightly wider than SWF. All hinge pins (EXCEPT SWF RIBBED) have a step (narrower diameter) in them at either end to slip into holes in housings and are then peened over. Both holes are the same diameter.

*****BOTH Pre and Post 1949 ribbed housings have hinge pin holes of different diameters. One side (large hole) is the same diameter as the inside diameter of the hinge pin sleeve. The other side has a narrower hole (snail spring side). The hinge pin has a large head on the side where the housing hole is large. The narrow end of the hinge pin slides through the large housing hole, all the way through the short arm hinge pin sleeve and through the small hole in the other side of the housing, and then is peened over. Update: June 2022: **In July 2022 I worked on an NOS set of early Convertible smooth** semaphores with dark orange lenses. This pair had the same hinge pins as early ribbed semaphores. I have worked on many vert semaphores and never encountered this before.

****** There are minute and functionally irrelevant differences between earliest SHO contact plates and later ones (single vs. dual contact)

*******Note: I purposefully omitted two rare and unique semaphores as follows:

- SWF ribbed Post: late 1949, sometimes referred to as “Longnose” with an outside arm that loops much longer around a unique lens where the inside and outside bulb holder is riveted to the end of, and inside, of the lens, and arms and lenses are not available!
- A convertible semaphore that has an arm that loops all away around the lens and the lens consists of two flat pieces of plastic.

Semaphore Reference Guide and FAQ

This guide was prepared as a reference for the make, model, part number, lens color and arm style to:
* Identify which semaphores you have, or
* Determine the correct semaphore for your vehicle.

Year	Model and Part Number	Brand	Lens Color	Arm
1940-1943	19290-left hand		Orange	Ribbed
1940-1943	19294-right hand		Orange	Ribbed
1943-1946	20 953 021-left hand		Orange	Ribbed
1943-1946	20 953 022-right hand		Orange	Ribbed
1946-July 1949	AL 142.001 Right and Left or L143.001-2 Right and Left	SWF	Orange	Ribbed
July 1949 -December 1953	AL.143.001.1 or L.143.001-2 or 111 953 021	SWF	Orange	Ribbed
July 1949 -December 1953	111 953 021	SHO	Orange	Grooved
January 1954 -August 1957	AL 143.001.1 or 111 953 021B	SWF	Orange	Smooth
January 1954 -August 1957	111 953 021A	SHO	Orange	Smooth
September 1957 to August 1959	111 953021D	SWF	Yellow	Smooth
September 1957 to August 1959	111 953 021C	SHO	Yellow	Smooth
September 1959-August 1961	111 953021F	SWF	Yellow	Smooth

September 1959-August 1961	111 953 021E	SHO	Yellow K20605/1	Smooth
Convertible	151 953 021 A or 151 953 021 B or 15.143.001.1	SWF	Orange	Smooth

Semaphore FAQ - General

How do they work?

Semaphores are operated by a push/pull solenoid/coil that pulls (magnet) on a piston connected to the arm and lens assembly.

The upward rise of the arm is cushioned by a spring so that the action is not too strong. When the semaphore is completely extended from the side of the car, the pointed end of the piston touches a metal contact sending a signal to the light bulb inside your speedometer confirming that your turn indicator is on.

The semaphore arm retracts into its pocket in the side of the car under the force of gravity and a small return spring when the turn signal switch is
turned off.

Both SWF and SHO semaphores have a “stop mechanism” designed to prevent the semaphores from rising while driving, especially at speed, because wind forces will suck them upwards. It is directly underneath the bottom tip of the hinge part of the piston assembly. Ideally, the angle between the piston and the hinge section is less than 90 degrees with a fraction of a MM space between the stop place and hinge piece tip for it to work effectively.

What color should the arms be?
Well, there is certainly some debate on this topic so this information is not definitive. It is thought that on the ribbed and grooved semaphores, they were black from the factory. This is for the simple reason that there is only one part number for them. Some dealerships that had body shops may have painted the SWF ones. SHO ones are very hard to paint as they have to be masked off after the lens is riveted on and there is NO way the VW production line was doing this. On later smooth semaphores the arms were painted body color; however, the arms of replacement semaphores purchased at the dealership were black.

What is the difference between SWF and SHO?

SWF and SHO are two different manufacturers of semaphores. Parts are not interchangeable.

What is the difference between ribbed and grooved semaphores?
Ribbed semaphores were made by SWF and grooved semaphores by SHO. These two types are often confused but you can tell the difference by the:
* SWF or SHO logos on the underside of the body and/or on the lenses.
* Part numbers on the underside of the body and/or on the lenses and referring to the chart above.
* Look of the arm. For ribbed semaphores, visualize a flat surface. On the outside edges of the ribbed arm material has been added (a rib) above the flat surface of the arm. For grooved semaphores, visualize a flat surface. On the outside edges of the grooved arm material has been removed (a groove or channel) from below the flat surface of the arm.

Semaphore FAQ - Troubleshooting

Why don't my semaphores rise properly? (They rise slowly, bind or don't rise at all).
Recommended steps:
1. Ensure that the semaphore is centered in the semaphore post. It may bind by rubbing on the side of the body post (not centered left to right) or may bind on the bottom or top of the post (not centered top to bottom).
2. Remove semaphore and inspect the piston-it may be rusty or very dirty-if so, it must be replaced or cleaned.
3. Check tension of return spring because it may be too great. This is the spring that is on the side of the semaphore and winds around the hinge pin. You can test by disconnecting the spring and seeing if the semaphore rises quickly with no return spring tension. If it does, you can lesson the tension.

4. Check all moving parts and linkages by slowly moving the arm up and down to see if any part is binding or catching. You can release the locking mech with your finger. Also, you can “force” a semaphore up and out of the pocket when installed in a car without breaking it.

Sometimes the pin that goes through the tail of the piston is offset and catches, other times the link between the piston and the piston tail is bent and catches or binds.

5. The stop/locking mech might be mis-adjusted.

6. With the semaphore activated, measure voltage at power pin with meter grounded AT THE BATTERY, and with the car idling. Less than 6 volts, and you have a voltage drop somewhere. Then measure voltage at power pin with meter grounded to the semaphore body. If different from first test, you have a semaphore grounding issue. A perfect semaphore will snap up to full height quickly with 5.5 volts at the terminal and amperage at 6.

Can I operate semaphores on 12 volts?
--This topic is covered in an article in the June 1997 issue of "Hot VWs". We strongly disagree with advice that you can run 6V semaphores on 12V. You can cook a coil with 12 volts in 10 or so seconds. Copper enamel is degraded even if it “still works”.
-- Install a 12-volt to 6-volt step down reducer. A key drawback is the heat produced by the device. It must be safely mounted well away from any other wiring, parts or person that could be damaged or hurt by the heat KYMCO Motorsports in Costa Mesa, California carries reducers including a step down adjustable type reducer.