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MSS54

module description overrun cut-off / restart

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1st OVERHEAT STOP

The process from the detection of the activation condition for thrust cutting to the
The injection is suppressed in three stages:

- Level 1: SA triggering
 - Detecting the trigger condition for overrun cut-off
 - Start of time measurement for SA delay time
- Level 2: SA readiness
 - delay time expired
 - Reduction of engine torque via filling and ignition
- Level 3: SA activation
 - Engine torque is reduced
 - injection suppression

1.1. SA-TRIGGERING

Condition for detection on SA triggering:

B_LL	operating state = idle
and n > sa_n40 and tkat	engine speed > shutdown speed
> K_SA_TKAT and md_fw_filter <	Cat temperature > threshold
K_SA_MD_HYS and ! B_MSR and sa_msr_sperrzeit	Driver's desired torque < threshold
== 0 and !	no MSR intervention
B_FGR_SA_SPERRE !	Lockout time expired after MSR intervention no
B_SMG_SA_SPERRE and	FGR lockout
	no SMG ban


Actions when SA is triggered:

When an SA trigger is detected for the first time, a timer is started, which implements a waiting time for the SA readiness to be triggered.

Signaling:

Bit 0 set in sa_we_st.

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1.2. SA-READINESS

Condition for detection of SA readiness:

Since the SA was triggered, the time sa_trigger_delay - from KF_SA_TIME_TMOT_N40 = f(tmot, n40) has elapsed.

Actions during SA readiness:

The torque manager's dynamic filter is used to ramp down the target torque for the ignition angle path to zero. The steepness of the ramp depends on the type of SA dynamics - hard or soft - and the current gear. This means that the charge is first reduced to a permitted minimum. The charge torque can then no longer follow the torque specification, so that an ignition angle intervention must now be carried out to further reduce the torque.

There are two mechanisms for implementing the ignition angle intervention. Firstly, the ignition timing can be retarded using the torque manager. Secondly, it is possible to include the ignition timing intervention directly in the ignition path using an offset ignition angle. The exact description of both options can be found in the corresponding module descriptions "Torque manager" and "Ignition".

Signaling:

Bit 1 set in sa_we_st.

1.3. SA-AKTIV

Condition for detection on SA-Active:

! B_MSR no MSR intervention
and (md_ind_ne < K_SA_MD_NE_MIN actual torque < threshold or tz_md_mittel < tz_min +
K_SA_TZ_MIN_HYS
or tz_sa_flag)

mean pressure angle later than
minimum ignition angle + hysteresis
direct TZ intervention to a minimum


Actions when SA is triggered:

shutdown of the injection

Signaling:

Bit 3 in sa_we_st set.

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1.4. SPECIAL FEATURES OF SA

DIRECT TRIGGERING OF SA-AKTIV

In order to prevent the engine from continuing to rev during rapid gear changes, the overrun cut-off can also be triggered directly and without additional waiting or cut-off times.

For this, all conditions for SA readiness must be met with the exception of B_LL. If the conditions

! B_KRAFTSCHLUSS and	no traction
wdk >= K_SA_WDK are met, the	DK position > threshold

injection is switched off immediately.

Blocking the SA after MSR interventions

After an MSR intervention, a renewed triggering of the SA is prevented for the time K_SA_MSR_SPERRZEIT.

1.5. REINSTALLING

Condition for reinstatement:

B_SA	SA is already active
and (Engine speed below restart speed
n < sa_n40_we	== passive reinsertion
or md_fw_filter > K_WE_MD_HYS or B_MSR or	desired moment > threshold
B_SMG_MD_EINGRIFF	MSR procedure
)	SMG requirement

Actions upon reinstatement:

- Reactivate injection
- Adjust the torque requirement for the ignition angle path from zero to the desired torque
- Adjust torque requirement for filling to md_ind_min_ges + md_fw_filter

Signaling:

- Bit 0 to 3 in sa_we_st deleted
- Bit 5 in sa_we_st set (bit is trigger for TI module and is only set briefly)

1.6. SPECIAL FEATURES OF WE

During passive re-engagement, soft or hard BA dynamics are detected depending on the gradient of the engine speed. The gradient threshold for distinguishing between hard and soft is K_WE_DN40_HARD.

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1.7. CALCULATION OF THE RPM THRESHOLDS

Image: Calculation of the restart speed sa_n40_we:

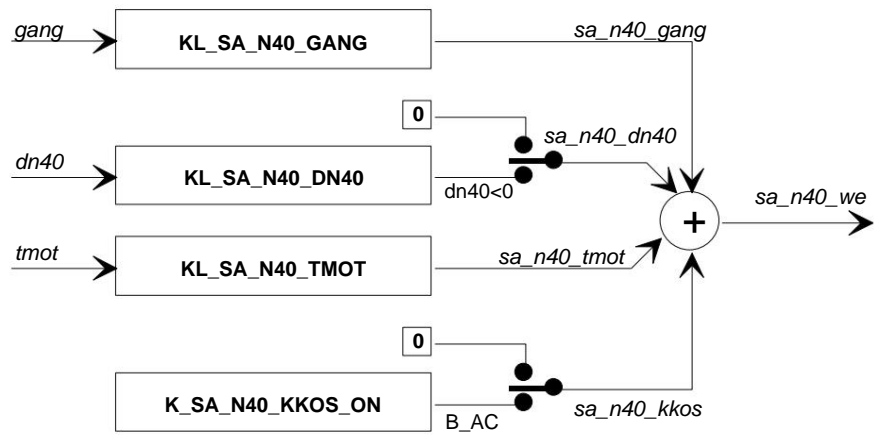
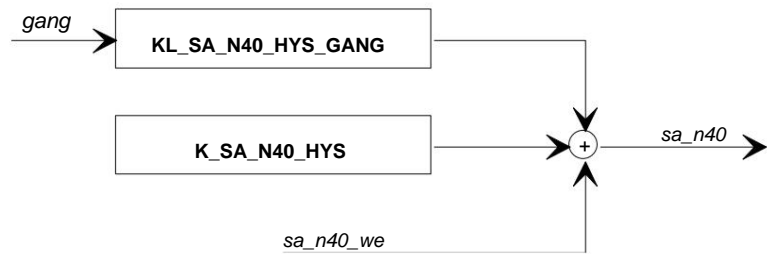
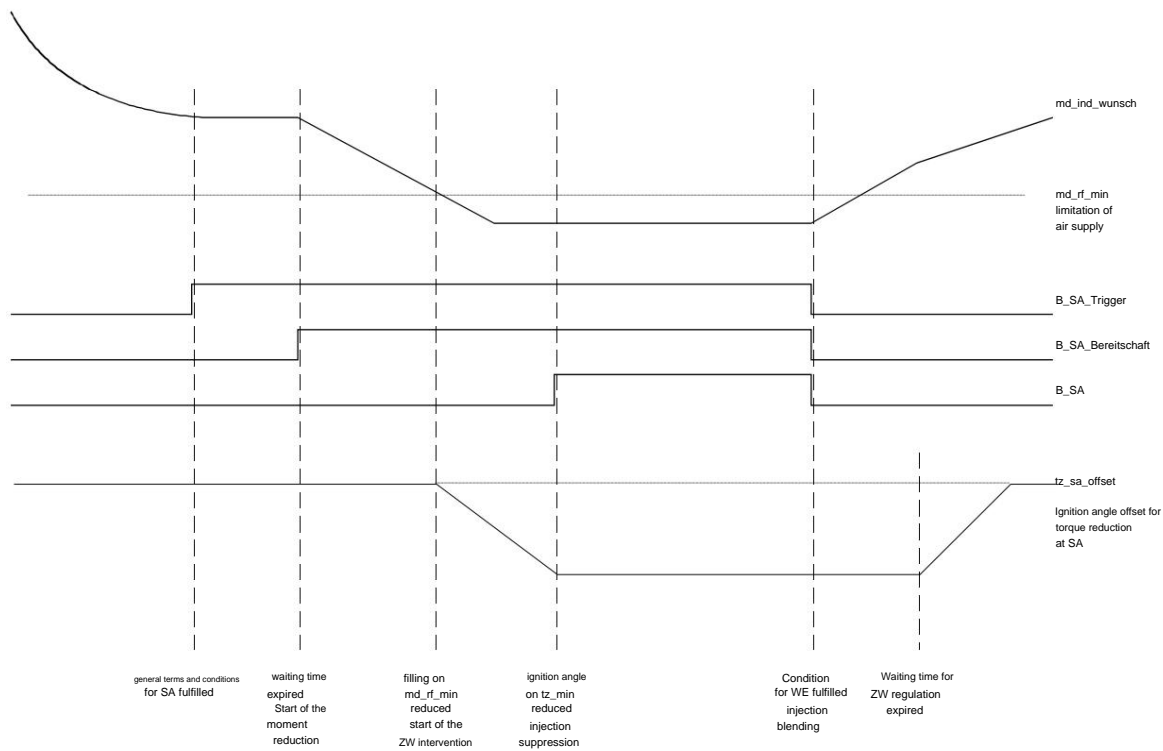


Figure: Calculation of the speed threshold for overrun cut-off sa_n40:




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1.8. OVERVIEW: PROCESS FOR SWITCHING OFF /RESTITUTION OF OVERSIZED GEAR



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1.9. DATA OF THE MODULE SA/WE

constant	Meaning
K_SA_MD_HYS	torque threshold for detection of SA activation
K_SA_MSR_SPERRZEIT	Locking time for renewed SA triggering after MSR intervention
K_SA_N40_KKOS	Offset for restart speed at climate readiness
K_SA_TKAT	Cat temperature threshold for detection on SA triggering
K_SA_TZ_MIN_HYS	Ignition angle hysteresis for detection of SA activation
K_SA_WDK	WDK threshold for immediate release
K_WE_DN40_HARD	Speed gradient for hard passive re-engagement
K_WE_MD_HYS	torque threshold for detection on WE
KF_SA_TIME_TMOT_N40	Delay time for SA readiness
KL_SA_DWDK_N40	Throttle valve gradient below which overrun cut-off is immediately detected - Caution: Gradient is negative
KL_SA_N40_DN40	N-gradient-dependent offset for the restart speed
KL_SA_N40_GANG	Gear-dependent hysteresis for the restart speed
KL_SA_N40_HYS_GANG	additional gear-dependent hysteresis for the cut-off speed
KL_SA_N40_HYS	Distance between WE and SA speed
KL_SA_N40_TMOT	Tmot-dependent speed threshold for SA and WE

The gear-dependent constants are stored as a characteristic curve. The position within the characteristic curve corresponds to the current gear information. This means:

gear = 0: 1: no traction or no valid gear detected
1st gear
6: 6th gear
7: reverse gear

variable	Meaning
sa_we_st	Status SA/WE Bit 0 : SA triggering 1 : SA readiness 2 : sequential SA activation (currently still open) 3 : SA activation 4 : sequential WE (currently still open) 5 : Reinsertion (usually not visible, as only briefly set)
sa_dwdk	Threshold speed gradient for direct triggering of the SA = KL_SA_N40_DWDK
sa_n40_we	restart speed
sa_n40_tmot	base value of the restart speed
sa_n40_hyst_gang	Speed offset from KL_SA_N40_HYST_GANG
sa_n40_gang	Speed offset from KL_SA_N40_GANG
sa_n40	overrun cut-off speed
sa_trigger_delay	Delay time SA from KF_SA_TIME_TMOT_N40

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