

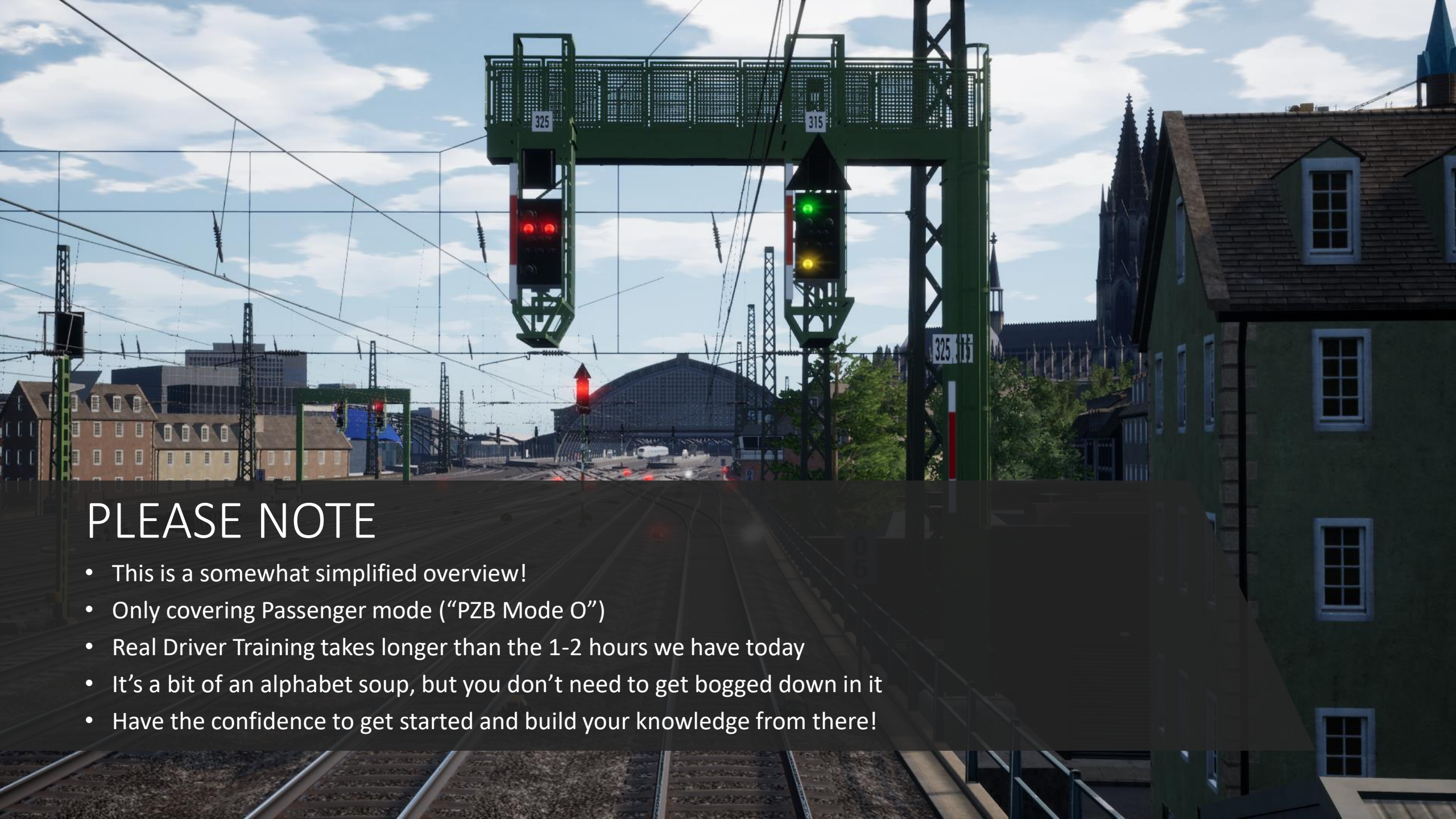


# German Signalling and Safety Systems

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## PLEASE NOTE

- This is a somewhat simplified overview!
- Only covering Passenger mode (“PZB Mode O”)
- Real Driver Training takes longer than the 1-2 hours we have today
- It’s a bit of an alphabet soup, but you don’t need to get bogged down in it
- Have the confidence to get started and build your knowledge from there!

# What are we covering?

- Signals
- PZB
- SIFA
- AFB
- LZB
- Specifically as it relates to Köln Aachen, and to some extent HRR.





# Learn the Signals FIRST

- Speed Based
- Lots of information
- Once you understand the signals, PZB makes a lot more sense
- There is more than one signalling system in Germany
- ... but they're basically all telling you the same thing.
- We'll be focusing on HP and KS systems
- ... but they're basically just telling you the same thing, don't worry!



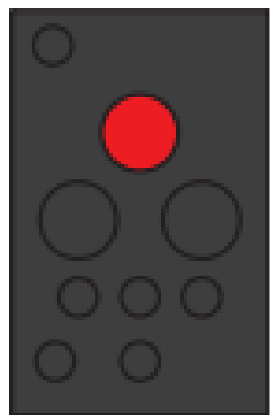


A photograph of two railroad signals on a track. The signals are mounted on green metal posts. Each signal has a black rectangular head with a yellow light illuminated. The background shows a blue sky with scattered white clouds and green trees. In the foreground, the railroad tracks and gravel bed are visible. A dark semi-transparent overlay covers the bottom half of the image, containing text.

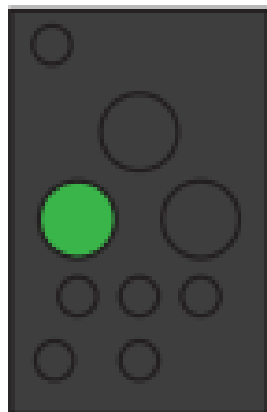
# Signals Overview

- Primarily two pieces of information relayed by a signal
  - What to do NOW
  - What you should expect NEXT
- KS signals combine these into a single head. HP signals they are two different heads on the same post.

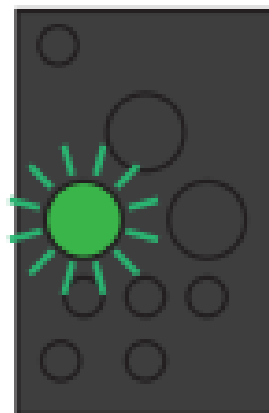
# KS Signal Heads (Köln)



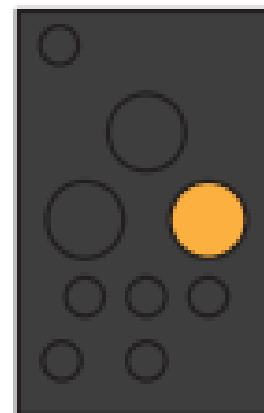
Now: STOP  
Next: BadThings



Now: GO  
Next: GO

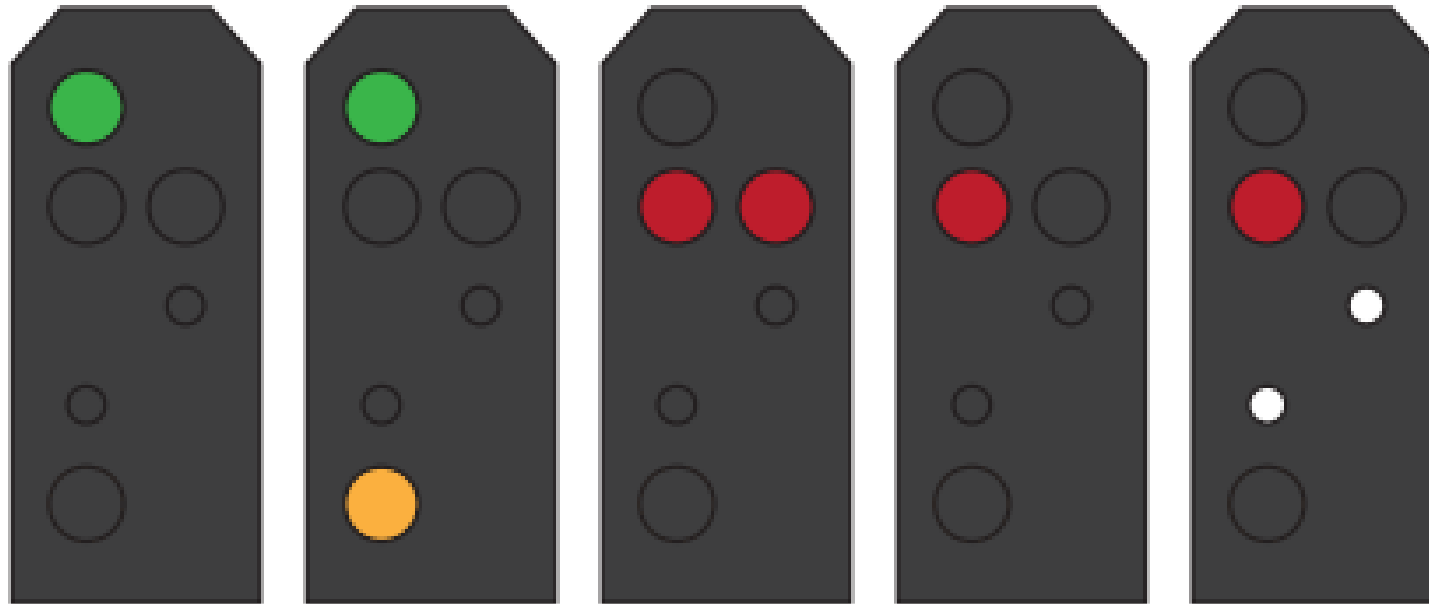


Now: GO  
Next: SLOW



Now: GO  
Next: STOP

# HP Signal Heads (Köln, HRR)



Now: GO

Now: GO SLOW

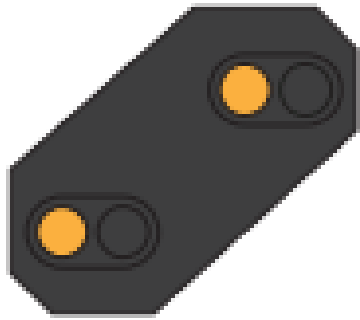
Now: STOP

Now: STOP

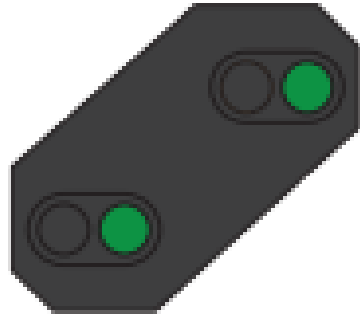
Now: GO SLOW

Notice - No "NEXT" information on the main signal head for a HP signal

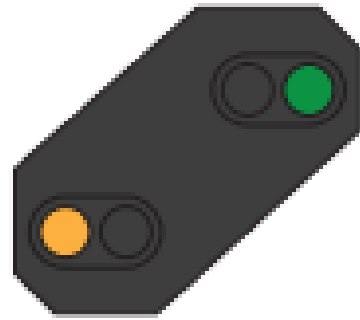
# HP Signal Heads 2



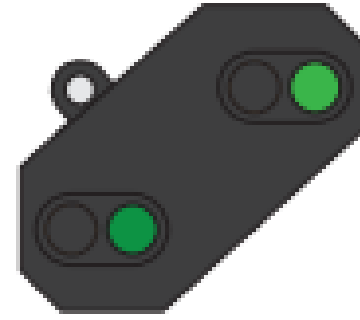
Next: STOP



Next: GO



Next: SLOW



Next: STOP

Reduced Distance to Next Signal





## Speed Limits

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- White digit on the top means a speed limit that applies NOW
- Yellow digit on the bottom means a speed limit that applies NEXT
- Multiply it by 10 to get the speed limit.
- This signal says “Proceed at 70km/h from this signal, reduce speed to 40km/h by the next signal” and the green light is flashing, hence “GO, SLOW”.





# Practice without PZB

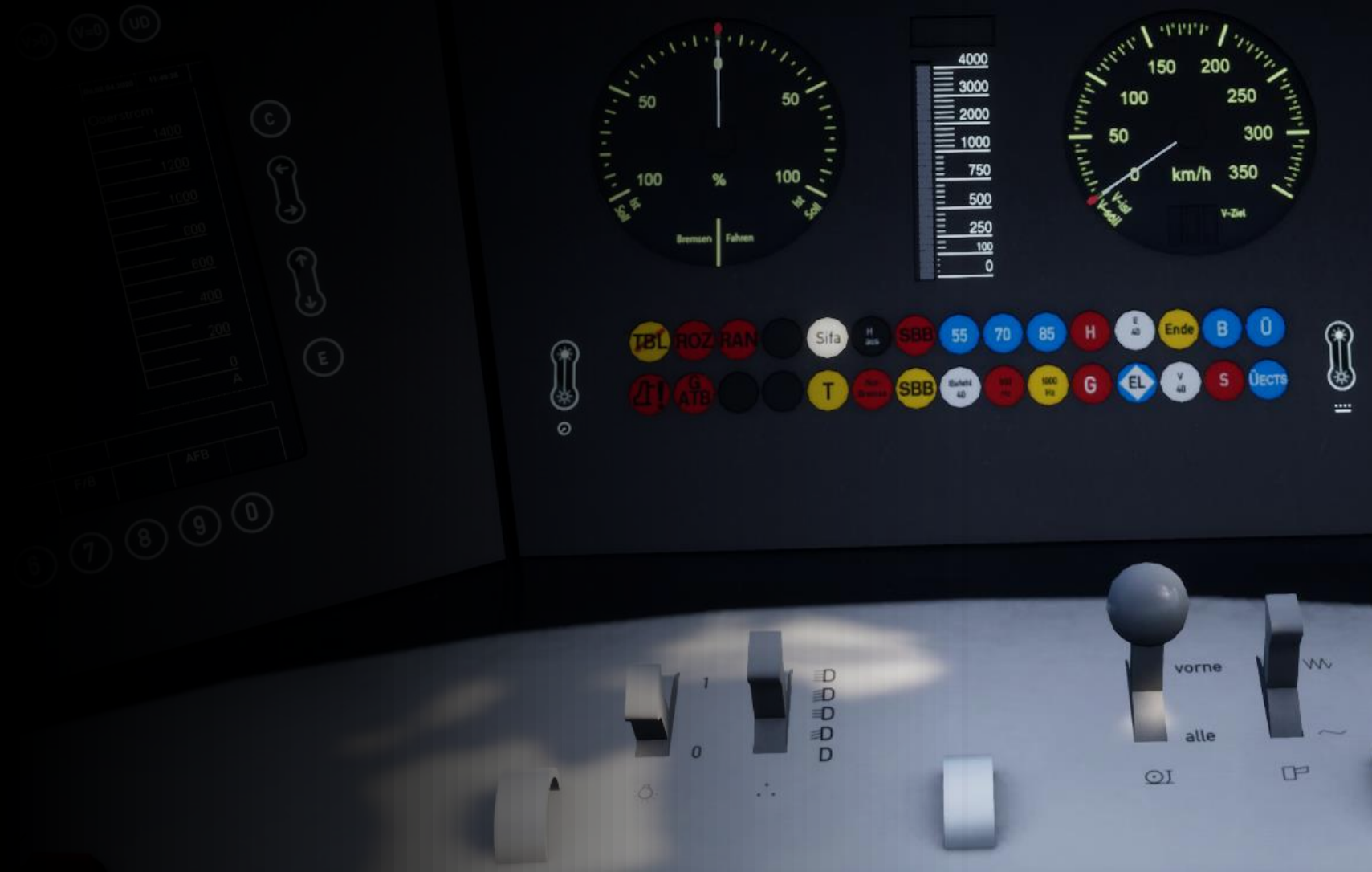
- As you approach a signal, interpret it, say it out loud.
- What is it telling you to do NOW
- What is it telling you to do NEXT
- Signal information more important than HUD
- Signal limits are NOT displayed on the HUD





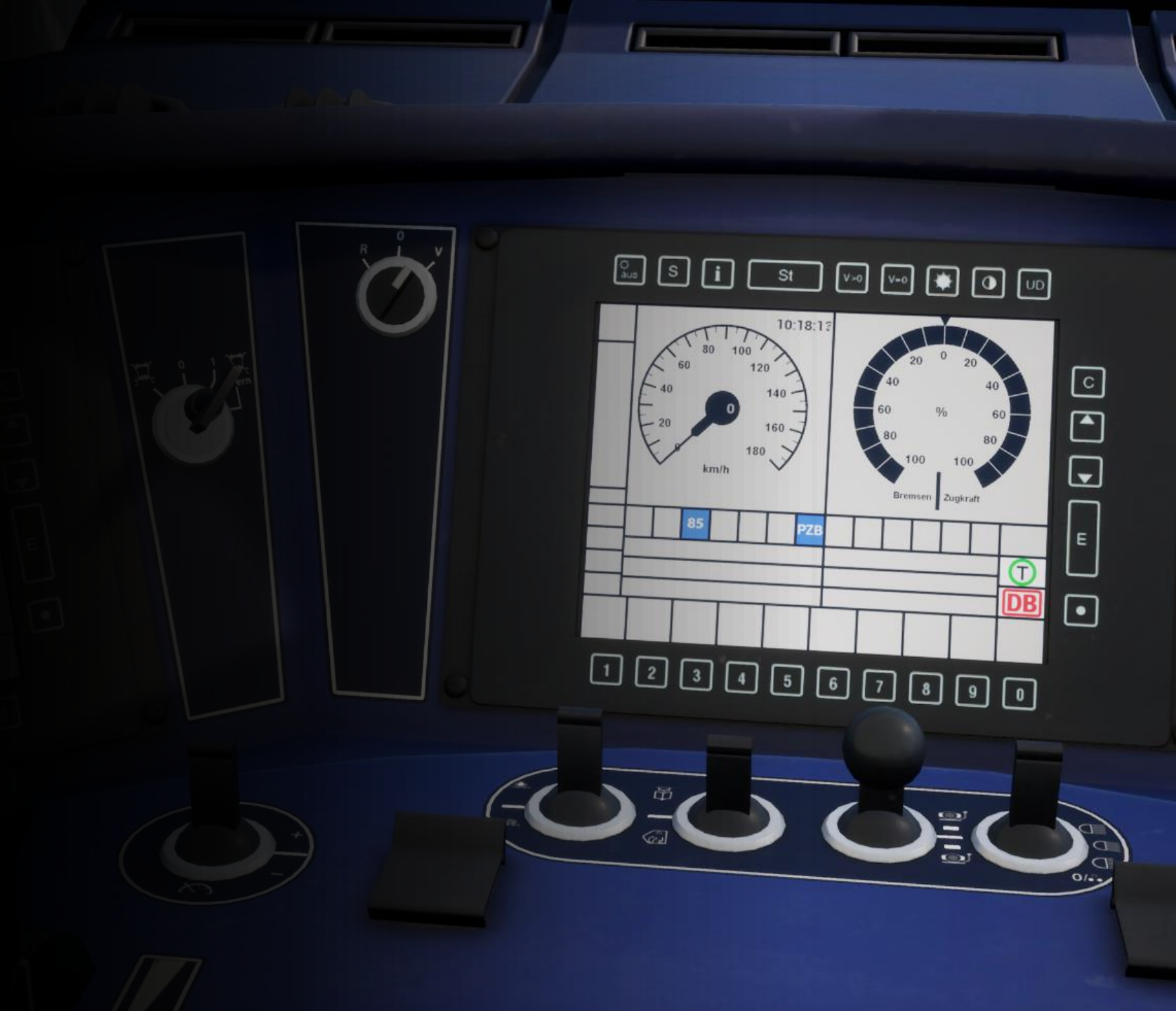
# Safety Systems - SIFA

- Simplest system
- Driver Vigilance
- Lights, Audio, Brakes.
- Does not require full stop if tripped
- Don't turn it on if learning other things!



## Safety Systems - PZB

- Broadly aims to make sure the driver is following a simplified set of speed restrictions
- There are no in-cab alarms until you've done it wrong
- Entirely based on signals and signs so keep your eyes open
- Lights on the desk and HUD tell you what it is doing
- Seems complex when you first start, but once it clicks it gets much easier
- Talent 2 and ICE 3M have different displays for PZB but they mean the same thing





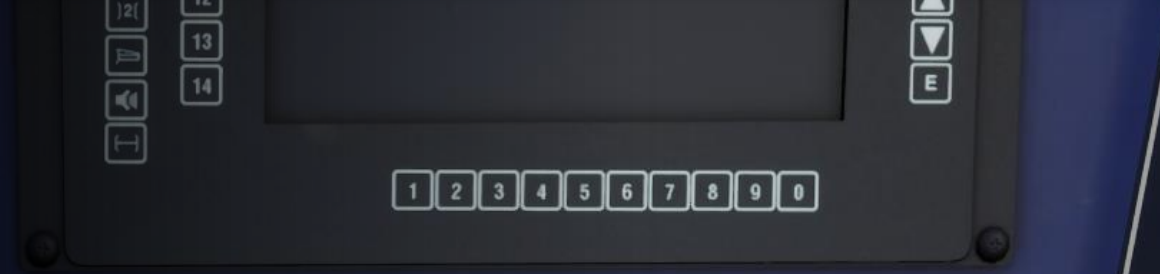
# Safety Systems – PZB – Track Magnets

- PZB interacts with the train through a series of magnets attached to the track and signals
- They are emitting a pulse of either 2000hz, 1000hz or 500hz.
- Each of these is intended to tell the train what is coming and ensure the driver is driving accordingly.
- **2000hz – will completely stop the train. These only occur on red signals.**
- **1000hz – a warning for upcoming speed reduction requirement.**
- **500hz – final warning before a red light, ensures the train is operating slower and can still stop in time.**



# Safety Systems – PZB - Overview

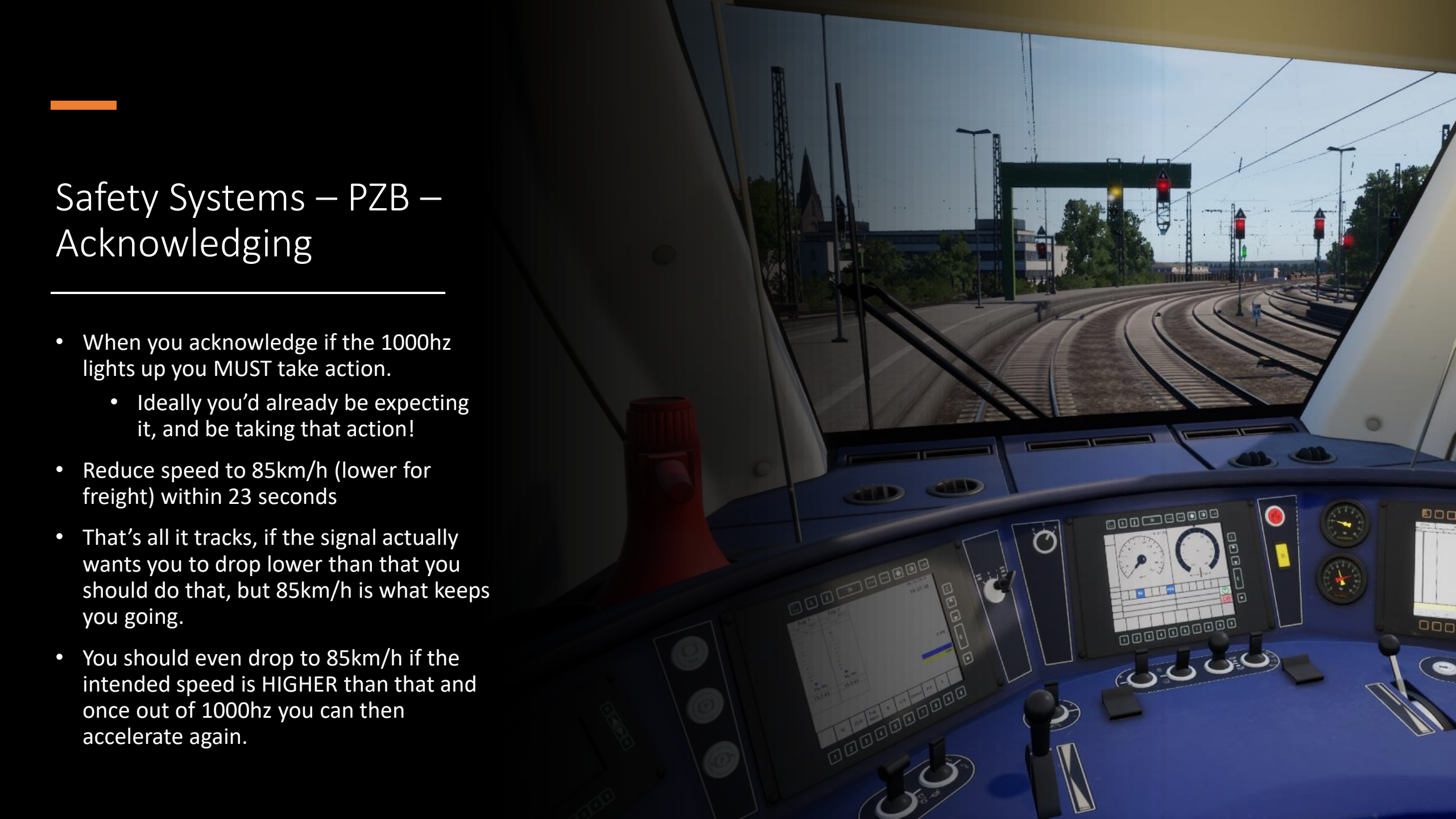
- Start Programme
  - Flashing indicator, hold to 45km/h.
  - PZB End if clear, otherwise it will release on its own.
- When to Acknowledge PZB
  - When you pass a signal or a post, you may need to acknowledge depending on what it is telling you and what you are doing
  - If anything on the signal is YELLOW it probably needs acknowledging
  - If it's telling you to slow down, it probably needs acknowledging
  - There are no penalties for acknowledging unnecessarily, so ack-away!
  - 'B', 'Circle', 'Page Down' to acknowledge.



Beachten Sie W-R-048/2012:  
Vzul 50 km/h bei gestörter PZB-  
Fahrzeugeinrichtung







## Safety Systems – PZB – Acknowledging

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- When you acknowledge if the 1000hz lights up you **MUST** take action.
  - Ideally you'd already be expecting it, and be taking that action!
- Reduce speed to 85km/h (lower for freight) within 23 seconds
- That's all it tracks, if the signal actually wants you to drop lower than that you should do that, but 85km/h is what keeps you going.
- You should even drop to 85km/h if the intended speed is **HIGHER** than that and once out of 1000hz you can then accelerate again.



## Approaching a Red Signal

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- You may first get a “GO/SLOW” - Ack! Slow to 85km/h!
- You will likely then get a “GO/STOP” – Ack! Slow to 65km/h!
- Expecting a stop means you should expect a “hot” 500hz magnet
- Stop before the red
- Remain below 45km/h until the 500hz goes out, even if the light changes!







## Safety Systems - LZB

- Used for high speed rail as it can see much further ahead than the driver
- Used in combination with AFB to allow the train to operate the speed directly





## Safety Systems – LZB – Activation

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- Enable it in the switch compartment
- Observe the “B” indicator is now lit telling you it is READY.
- When you pass an LZB sign it will sound an alarm and switch on automatically
- Observe the “” indicator is now lit telling you it is ACTIVE.
- If not using AFB, simply keep your speed below the red target mark on the speedometer.





# Safety Systems – LZB - Operation

- While LZB is running if there are any reductions in speed up ahead
  - The bar graph in the middle will count down the distance in meters
  - The speedometer will tell you what it is
  - The red speed target will guide you to that speed gently.
  - The “G” light will light up if you need to slow down
  - If the “G” light starts flashing, you are at risk of an emergency brake!
- This shot tells me my speed limit is 250km/h, but somewhere beyond 9.9km away there is a drop to 160km/h.



## Safety Systems – LZB - Ending

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- When the LZB ENDE light starts flashing, LZB is about to end.
- You must press PZB FREE (END key on keyboards) to acknowledge this or the train will come to a stop. The LZB ENDE will then go steady to remind you. LZB remains active however.
- Once LZB ENDE light then goes out, LZB is fully disabled and back in the “READY” state.





# ICE3M LZB INDICATORS



LZB Ending

LZB Enabled

LZB Active

Steady : Slow  
Flashing : Slow more!



# AFB – Cruise Control

- Easiest to enable AFB while stationary!
- To enable, on the left hand MFD go to button 9 to get to the AFB screen and then button 6 to enable it.
- Set the AFB lever to the desired target speed, note that it shows up on the HUD.
- When exiting LZB you must fully disable AFB and re-enable it before it can be used again outside of LZB control.







Let's Drive!

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