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# Anchor Alarm (simplified), version 1.0
# See: http://www.yachtd.com/news/anchor_alarm.html
#
# To configure the Alarm Button, send the following sequence of commands:
# YD:RESET
# YD:MODE DS
# YD:LINK 7 SOUND 0
# YD:CHANNEL 7

FW_CAN1_TO_CAN2=OFF
FW_CAN2_TO_CAN1=OFF

SLOT1 = 000EF20D FF 08 00FDFFFFFFFFFFFF # Turn ON the the anchor alarm (Channel 1)
SLOT2 = 000EF20D FF 08 00FCFFFFFFFFFFFF # Turn OFF the the anchor alarm
SLOT3 = 000EF20D FF 08 0003C0FFFFFFFFFFFF # Turn off all channels, except Channel 1

# We'll run/stop the alarm once in 3 seconds to avoid fast switches
heartbeat(3000)
{
  if (D > 0) { # Alarm is set (D is the safe distance in meters)
    if (R > D) { # R is distance to D from current GPS position
      load(SLOT1) # Anchor alarm on
      M = 1      # Mark, that alarm was ON by the Bridge
    }
    else {
      load(SLOT2) # Anchor alarm off
      M = 0      # Alarm was OFF by the Bridge
    }
    send(CAN1)
  }
}

# Position, Rapid Update - calculate the distance from current position
match(CAN1,0x1F80100,0x1FFFF00)
{
  if (get(DATA,INT32) < 0x7FFFFFFF) {
    if (get(DATA+4,INT32) < 0x7FFFFFFF) {
      X = get(DATA,INT32) # Latitude, 0.0000001 deg
      Y = get(DATA+4,INT32) # Longitude, 0.0000001 deg
      T = timer() # Position is valid, save the time of position fix
      R = 0 # Reset the distance from current position
      if (D > 0) { # Is the alarm already set?
        # Calculate the distance by Haversine Formula
        W = (cast(X - A,FLOAT)/10000000) * M_PI / 180 # delta Lat
        Z = (cast(Y - B,FLOAT)/10000000) * M_PI / 180 # delta Lon
        W = sin(W/2)
        Z = sin(Z/2)
        E = cos((cast(A,FLOAT)/10000000) * M_PI / 180)*Z*Z
        U = W*W + cos((cast(X,FLOAT)/10000000) * M_PI / 180)*E
        if (U != 0) {
          U = atan2(sqrt(U),sqrt(1-U))
          R = 12742000*U # The distance to (A,B) in meters
        }
      }
    }
  }
}

# Binary Status Report
match(CAN1,0x1F20D00,0x1FFFF00)
{
  if (get(DATA,UINT8) == 0) { # Is it Bank 0 message?
    S = get(DATA+1,UINT16) # Status of Channels 1-8 (2 bit each: 1-ON, 0-OFF)
    if ((S & 3) != 1) { # Is anchor alarm NOT running?
      if ((S >> 12) & 3 == 1) { # Is hardware button was pressed (Channel 7 is set)?
        if (timediff(T) < 2000) { # Is GPS position valid?

          if (D == 0) { # Set new alarm
            A = X
            B = Y
            D = 20 # Safe distance in meters
          }
          else { # The alarm is already set, canceled by user
            if (M == 1) {
              load(SLOT3) # Cancel the alarm
              send(CAN1)
              M = 0
              D = 0
            }
          }
        }
      }
      else { # We have no actual position (GPS lost?)
        if (D > 0) { # Was the alarm set?
          if (M == 1) { # Was it canceled by user?
            load(SLOT3)
            send(CAN1) # Cancel the alarm
            M = 0
            D = 0
          }
          else { # It was not canceled by user
            R = 1000 # Run the Anchor Alarm!
            M = 0 # GPS position is lost!
          }
        }
      }
      else { # User tries to set new alarm
        load(SLOT3) # Switch off all buttons, do not allow
        send(CAN1) # to set the alarm without valid position
      }
    }
  }
}

# End of program
```