

Microcontrollers

ApNote

AP2923

: Additional file
AP292302.EXE available

SAE 81C90/91 - CAN Bit Timing Calculation: CP_81C90.EXE

This document describes how to install and to use the "CP_81C90.EXE" tool. "CP_81C90.EXE" facilitates the CAN Bit Timing Calculation for the SAE 81C90\91 by automatically proposing register configurations to reach a given bus baudrate.

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AP2923 ApNote - Revision History		
Actual Revision : 03.99		Previous Revision : 08.97 (Original Version)
Page of actual Rev.	Page of prev.Rel.	Subjects (changes since last release)
4	3	New system requirements
4-5	-	CAN Bit Timing parameters

1 How to install „CP_81C90“

1.1 Requirements

The software MS-Windows™ 95/NT (32 bit system) are required.

1.2 Installing Procedure

- 1) Download the file "AP292302.EXE" in a directory of your choice, e.g. „c:\xyz“:
- 2) Run "AP292302.EXE". This will start the self-extraction of the files which are required to install "CP_81C90.EXE".
- 3) Once the self-extraction process is finished, run "c:\xyz\setup.exe". This setup will ask in which directory to install "CP_81C90.EXE". If this directory does not exist it will be created.
- 4) Once the installation is finished, a new program appears in the program group of your start menu.

2 How to use "CP_81C90"

- 1) Run "CP_81C90.EXE"
- 2) Fill in the "Cpu Freq." field with the SAE 81C90/91 input clock frequency (Xtal2). Press the [Return] key.
- 3) Fill in the "Baudrate" field with the CAN bus desired baudrate. Press the [Return] key.
- 4) The "Calculate" button is now selected. Simply press the [Return] key. The possible configurations of the bit timing registers, as well as the real baudrate and the bit segment composition, will appear in the list window.

3 CAN Bit Timing

The following relations were considered to calculate the bit timing:

$$T_{osc} = \frac{1}{f}$$

$$tq = 2(BRP + 1)T_{osc}$$

$$tb = \frac{1}{bd}$$

$$Nb = \frac{tb}{tq} = NT_{seg1} + NT_{seg2} + 1 = \frac{f}{2(BRP + 1)bd}$$

Where:

Tosc	Clock period
BRP	BaudRate Prescaler of the SAE 81C90/91
tq	Nominal time quantum length
bd	Bus baudrate

Nb	Number of time quanta per bit period
NTseg1	Number of time quanta for time segment 1
NTseg2	Number of time quanta for time segment 2

Moreover, the CAN specification 2.0 implies the following ranges for the bit timing parameters:

$$8 \leq Nb \leq 25$$

$$2 \leq NTseg1 \leq 16$$

$$2 \leq NTseg2 \leq 8$$

$$1 \leq Nsjw \leq 4$$

The Nsjw parameter was not taken into account since it depends from the clock tolerance and from the goals to be achieved (Maximum bus length or oscillator tolerance).