Exercise 7CAN_1 - Transmitting a Standard CAN Message with the CAN Module

- **Objective:**
  - Generate one Standard CAN (11-bit-Identifier) Message with the on-chip CAN Module*
  - Evaluate every identifier bit of incoming messages*
  - Use maximum bus speed of 1 Mbaud
  - Use Message Object 1
  - Use Identifier 0x123
  - Use 8 Data Bytes containing the data 0x00, 0x11, …, 0x77.

- *** Hints:**
  - As long as no receiving node is connected to the kitCON-167, the C167CR will not receive an acknowledge for its transmission and therefore will keep on trying to transmit the CAN message “forever”.
  - Connect another Starter Kit with CAN Capability or a CAN Analyzer to the CAN bus to generate real CAN data transfers.

Exercise 7CAN_1 - DAvE Configurations

- **Start DAvE 2.0** 

- **Select “Create a new project” from the Startup Dialog or click** 
- **Select the microcontroller C167CR/CS* and click “Create” (if this microcontroller is not on the list, you need to re-install it from the DAvE 2.0 CD ROM*)**
- **DAvE will create the project**
- **Save your project by selecting “File | Save” or press** 
  - Browse to directory “c:\hot167_2\7can_1\”
  - Enter project name: “7CAN_1”
  - Click “Save”
- **You will see the C167CR/CS block diagram and the Project Settings Window (configuration see next slide)**
- **To get back to the Project Settings window in case you close it: Select “File | Project Settings”**

* C167CS not yet supported by DAvE 2.0 CD ROM. See “Hints regarding DAvE.”

Exercise 7CAN_1 - DAvE Configurations (cont.)

- **Project Settings:**
  - General:
    - Select Tasking Compiler, SMALL model
  - System Clock:
    - External Oscillator Frequency: Set to 5 MHz
  - Startup Configuration:
    - Bus Type after Reset: Set to 16 bit DEMUX
    - Write Configuration: Pin #WR and #BHE operates as #WRL and #WRH

Exercise 7CAN_1 - DAvE Configurations (cont.)

- **Configure CAN Module:**
  - Control:
    - Global Mask Register: 0x7FF
      (evaluate every bit of incoming identifiers)
  - Baudrate:
    - Baudrate: Enter desired Baudrate: 1000 Kbaud
  - Objects:
    - Configure Object 1:
      - Enable Control: Enable Message Object
      - Identifier Selection: Standard 11 bit
      - Message Direction: Transmit Data Frames
      - Data Length Code: Select 8 Data Bytes
      - Data fields: Enter Data Bytes (0x00, 0x11, …, 0x77)
      - Arbitration Register: Enter Identifier 11-bit: 0x123
      - Close
  - Functions: Include functions CAN_vInit and CAN_vTransmit

- **Generate Code ()**

- **DAvE will show you all the files that he has generated (File Viewer is opened automatically)**

Exercise 7CAN_1 - EDE Configurations

- **Start Tasking EDE for C166**

- **Create new Project (Project | New):**
  - browse to directory c:\hot167_2\7can_1\
  - enter file name: 7can_1
  - click “save”, then verify the path and click “OK”

- **Edit Project (Project | Edit; opens up automatically):**
  - Add all C-files (from c:\hot167_2\7can_1)
  - Click “OK”

- **Load Files (Project | Load Files):**
  - Click “Invert” | “OK”

- **Select CPU (EDE | CPU Options):**
  - Select CPU type C167CR or C167CS, click “OK”

Exercise 7CAN_1 - EDE Configurations (cont.)

- **Select Debug Options (EDE | CrossView Pro Options | Debugger):**
  - Execution Environment:
    - Select RAM/ROM Monitor
  - Hardware Target
    - Select Phytec kitCON-167 as the monitor board

- **Define C167 Symbol (EDE | Macro Preprocessor | Project Options):**
  - Macros: Enter `C167`

- **Edit MAIN.C (main()-function):**
  - Transmit Message Object 5
  - Include endless loop:

```
// USER CODE BEGIN (Main,2)
   CAN_vTransmit(1);
   while(1) {};
// USER CODE END
```

- **Build Project (Project | Build)** 

Exercise 7CAN_1 - EDE Configurations (cont.)

- **Edit CAN.C (ONLY if you have an older EDE Demo Version and have trouble compiling the project):**
  - DELETE the DAvE Configurations for the unused Message Objects 2 - 15 in function CAN_vInit (otherwise the limits of the Task... EDE Demo version are exceeded):

```
//  ----------------------------------------
/// ----- Configure Message Object 2 --------
//  ----------------------------------------
/// message object 2 is not valid
CAN_OBJ[1].MCR  = 0x5555;
...
//  ----------------------------------------
/// ----- Configure Message Object 15 -------
//  ----------------------------------------
/// message object 15 is not valid
CAN_OBJ[14].MCR  = 0x5555;
```

DELETE from CAN.C!

Exercise 7CAN_1 - Running the Program

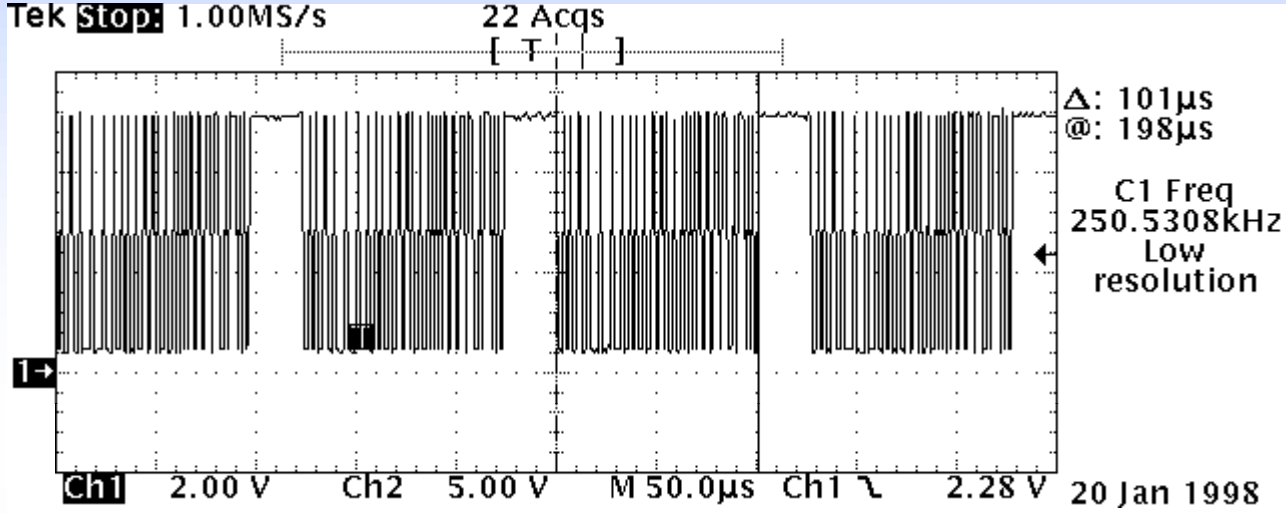
- **Reset Target Hardware (Press Reset Button on Starter Kit)**
- **Start CrossView Pro Debugger from EDE (Project | Debug)** 
- **CrossView Pro loads file c:\hot167_2\7can_1\7can_1.abs**
  - Hit GO button
- **Program Verification: Connect Scope to**
  - P4.6 / CAN_TxD (connector X3 pin 40, called A22/TXDC)

Exercise 7CAN_1 - Screenshot: CAN Message

50.0 us / Div

no acknowledge received

P4.6 / CAN_TxD



10.0 us / Div

1 us per bit = 1 Mbit/s

P4.6 / CAN_TxD