APPLICATION NOTE

MANAGING RECEPTION ERRORS WITH THE ST7 SCI PERIPHERAL

by 8-Bit Micro Application Team

1 INTRODUCTION

The purpose of this application note is to give some guidelines on managing communication errors with the ST7 SCI peripheral in reception mode.

2 HOW THE ST7 SCI CELL WORKS WHEN ERRORS OCCUR

Refer to the datasheet for a description of the SCI registers and bit definitions.
The first important thing to know is that the ST7 SCI peripheral do not need to be reset in case of error during data reception.

The SCI cell behaviour is :

If noise is detected on reception or worse, if an error frame is detected (for example: STOP bit not received where expected) the RDRF bit (Receive data flag) will be set anyway, and an interrupt will be generated if the RIE bit is set (SCCR2 register). In this interrupt routine you will read the SCSR register, to determine the interrupt source.

In case of reception (successful, with noise, or with error frame) the RDRF flag will be set. Then you can test the NF (noise) or the FE (Frame error) bits, in order to know if the reception happened with or without problems.

If NF is set, it can be that the received byte is corrupted. Noise was detected but it can be that the stored byte is OK. It's up to you to consider whether this byte is OK. See section 3 "Data Sampling".

If the FE bit is set, it's certain that the received byte is corrupted. You may then discard the received byte.

In any case (successful reception, or with noise or unsuccessful reception) a received data will be stored. To reset the NF and FE flags you just need to do the same as for resetting the RDRF flag: testing (reading) the SCSR register and then read the data register.

3 DATA SAMPLING

The received bit is sampled 3 times. Its value is determined according to the two to one majority voting. The NF bit is set or reset as shown in the following table.

Data sampled values	Received data bit value	Noise Error bit
000	0	0
001	0	1
010	0	1
011	1	1
100	0	1
101	1	1
110	1	1
111	1	0

The 3 data sampling times are $(8Tsci)/16, (9Tsci)/16, (10Tsci)/16$
Where *Tsci* is the SCI clock period.

4 SCI INTERRUPT ROUTINE STRUCTURE

To sum up find below an suggested way to organise your SCI interrupt routine :

```
if (ValBit(SCSR,RDRF))  /* If a message has been received - Read
{                                                    SCSR = first step for re-
setting RDRF, NF
                     and FE flags */
  if (ValBit(SCSR,NF)) /* if noise has been detected */
  {
  dummy=SCDR;           /* read data register - reset RDRF, NF and
  }                     FE flags. */
  else if(ValBit(SCSR,FE)) /* If a framing error occurred */
  {
  dummy=SCDR;           /* read data register - reset RDRF, NF and
                        FE flags. */
  }
  else                  /* Successful reception */ {
  received_data=SCDR;    /* read data register - reset RDRF, NF and
  ...                   FE flags. */
}
```

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