

DEFINITION

The Data Page Pointer registers of the 166/167 CPU. There are four DPP registers available: DPP0-DPP3. The DPP registers hold the most significant digits for near addresses. The actual DPP register used for a near address is specified by bit 14 and bit 15 of the address. The physical address is calculated using the following formula:

$$\text{Physical Address} = (\text{DPPn} * 0x4000L) + (\text{bit0-bit13 of the near address})$$

CUSTOM MEMORY MODELS

By changing the allocation of DPPs, you can create customized memory models. The standard allocation of DPP1 to NCONST and DPP2 to NDATA can be overridden by the DPPUSE control in the L166 options. Applications for this might be to create an NCONST area of more than 16kb for large look-up tables, destined for EPROM. This can be done by reallocating DPP0. (In the C167/5, DPP0 is not used for far/huge/xhuge data accesses as the EXT_x instructions are preferred.) DPP0 could be combined with DPP1 to give a 32k linearly addressable region, here from 0x38000 to 0x3FFFF:

```
DPP0 = 0x0E      => address 0x38000 - 0x3BFFF (NCONST)
DPP1 = 0x0F      => address 0x3C000 - 0x3FFFF (NCONST)

DPP2 = 0x04      => NDATA at 0x10000-0x13FFF
DPP3 = 0x03      => SDATA at 0xC000-0xFFFF
```

L166 Input File for 32kb NCONST:

```
main.obj, &
start167.obj &
to exec &
DPPUSE(0=NCONST(0x38000-0x3FFFF), 2=NDATA(0x10000))
```

Taken to extremes, in the C167 with its 4k on-chip RAM, the NDATA and SDATA areas could be combined, starting at 0xF000, leaving DPP0-2 available to create a 48k linear NCONST area:

```
DPP0 = 0x0E      => address 0x34000 - 0x37FFF (NCONST)
DPP1 = 0x0F      => address 0x38000 - 0x3BFFF (NCONST)
DPP3 = 0x04      => address 0x3C000 - 0x3FFFF (NCONST)

DPP3 = 0x03      => SDATA at 0xC000 - 0xFFFF
```

L166 Input File for 48kb NCONST:

```
main.obj, &
start167.obj &
to exec &
DPPUSE(0=NCONST(0x34000-0x3FFFF),3=NDATA(0x10000))
```

DPPUSE() Syntax:

```
DPPUSE(<dppnr>=<groupname>(range),<dppnr>=<groupname>(range))
```

<dppnr> is the number of a DPP register (0 for DPP0, 1 for DPP1, 2 for DPP2, 3 for DPP3).

<groupname> is the name NDATA for the near data group or NCONST for the near constant group.

<range> is the address range where the group should be placed.

Examples:

```
DPPUSE(0=NDATA(0x18000-0x23FFF),3=NCONST(0xC000-0xEFFF))
```

In this example DPP0, DPP1, and DPP2 are used for accessing the NDATA group. DPP0 is loaded with the value 6, point to address 18000H. DPP1 is loaded with the value 7, pointing to the address 1C000H. DPP2 is loaded with the value 8, pointing to address 20000H. With these DPP values, the address range 18000H - 23FFFH may be access with short (16-bit) addresses rather than using far or huge addressing. For the NCONST group, the DPP3 register is used. For efficient access to 166/167 SFR registers, this register must be loaded with 3. This accesses the range 0C000H - 0FFFFH.

```
DPPUSE(1=NDATA(0x18000-0x1BFFF),2=NCONST(0x8000-0xEFFF))
```

In this example, the register DPP1 is used to access the NDATA addresses. The register DPP1 is therefore loaded with the value 6 for the address range 18000H - 1BFFFH. The DPP2 and DPP3 registers are used for accessing NCONST addresses. DPP2 is loaded with the value 2, pointing to address 08000H. DPP3 is loaded with the value 3, pointing to address 0C000H. This allows the address range 8000H - EFFFH to be used for NCONST objects.

Notes:

- L166 generates a proper initialization for all DPP registers. The DPP registers are assigned in ascending order to the named groups. L166 always assigns several DPP registers if the address range does not fit withing on 16kb page.
- The DPP3 register must always contain the value 3. Whenever the DPP3 register is used for the NDATA or NCONST group, the address range must fit into page 3 of the 166 address space (address range 0C000H - 0FFFFH).
- An address range for NDATA and NCONST must always be stated. It is not possible to re-assign just one group.

- The DPPUSE control also ensure that correct CLASS definitions for NDATA and NCONST are generated and eliminates the need for the CLASSES statement to include NDATA and NCONST.

SPECIAL MEMORY MAPS

The size of the near and near constant areas permitted by the default C166 memory models can be modified by the use of the DPPUSE() control. The C167/5 has a greater degree of flexibility in this respect as DPP0 is not used for far/huge/xhuge accesses. Perhaps the most common use for this feature is to increase the size of the fast-access near (NDATA class) area. In many applications, 16kb is not large enough and so DPP1 can be reallocated to NDATA, alongside the default DPP2 to create a 32k NDATA area. DPP0 can then be assigned to NCONST to give a default 16k region for constants.

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