

Organização do Ramses

(O método *ad-hoc* começa a falhar :-)

Fase de Busca da Instrução

Fase de Busca, todas as instruções:

$REM \leftarrow PC$

Read; $PC \leftarrow PC + 1$

$RI \leftarrow RDM$

Simplificação: registradores A, B e X substituídos por r

Execução - LDR

Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM Read r, N, Z \leftarrow RDM	REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM Read REM \leftarrow RDM Read r, N, Z \leftarrow RDM	REM \leftarrow PC Read; PC \leftarrow PC +1 r, N, Z \leftarrow RDM	REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM + X Read r, N, Z \leftarrow RDM

Execução - ADD

Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM Read r,N,Z,C \leftarrow r + RDM	REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM Read REM \leftarrow RDM Read r,N,Z,C \leftarrow r + RDM	REM \leftarrow PC Read; PC \leftarrow PC +1 r,N,Z,C \leftarrow r + RDM	REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM + X Read r,N,Z,C \leftarrow r + RDM

Semelhante para AND, OR, SUB

Execução - STR

Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
REM \leftarrow PC Read; PC \leftarrow PC +1	REM \leftarrow PC Read; PC \leftarrow PC +1	REM \leftarrow PC RDM \leftarrow r; PC \leftarrow PC +1	REM \leftarrow PC Read; PC \leftarrow PC +1
REM \leftarrow RDM RDM \leftarrow r Write	REM \leftarrow RDM Read REM \leftarrow RDM RDM \leftarrow r Write	Write	REM \leftarrow RDM + X RDM \leftarrow r Write

Execução - JMP

Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
REM \leftarrow PC Read PC \leftarrow RDM	REM \leftarrow PC Read REM \leftarrow RDM Read PC \leftarrow RDM	PC \leftarrow PC +1	REM \leftarrow PC Read PC \leftarrow RDM + X

Execução - Jx, x=1

Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
REM \leftarrow PC Read PC \leftarrow RDM	REM \leftarrow PC Read REM \leftarrow RDM Read PC \leftarrow RDM	PC \leftarrow PC +1	REM \leftarrow PC Read PC \leftarrow RDM + X

Jx, x=0

Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
PC \leftarrow PC +1	PC \leftarrow PC +1	PC \leftarrow PC +1	PC \leftarrow PC +1

Execução - Instr. com regs

Execução da instrução NEG

$r, N, Z, C \leftarrow - (r)$

Execução da instrução NOT

$r, N, Z \leftarrow \text{not}(r)$

Execução da instrução SHR

$r, N, Z, C \leftarrow \text{shr}(r)$

Execução - JSR

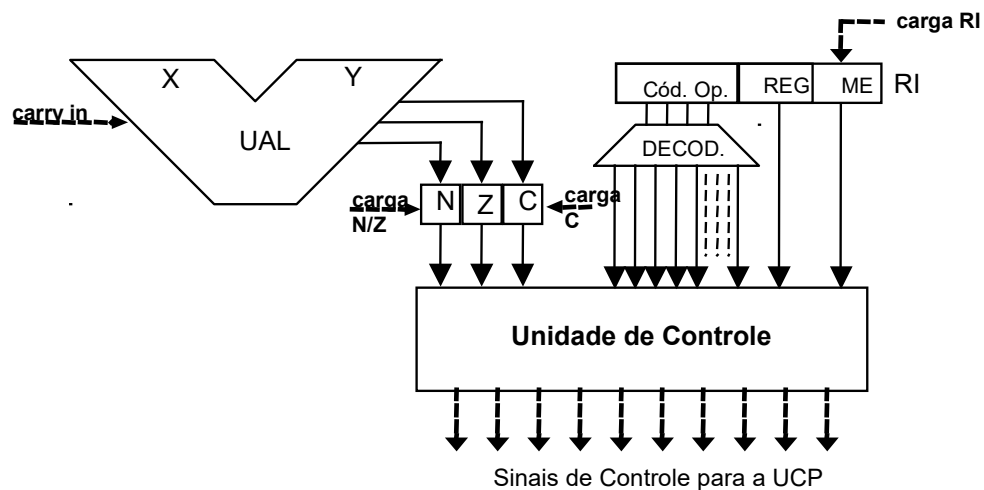
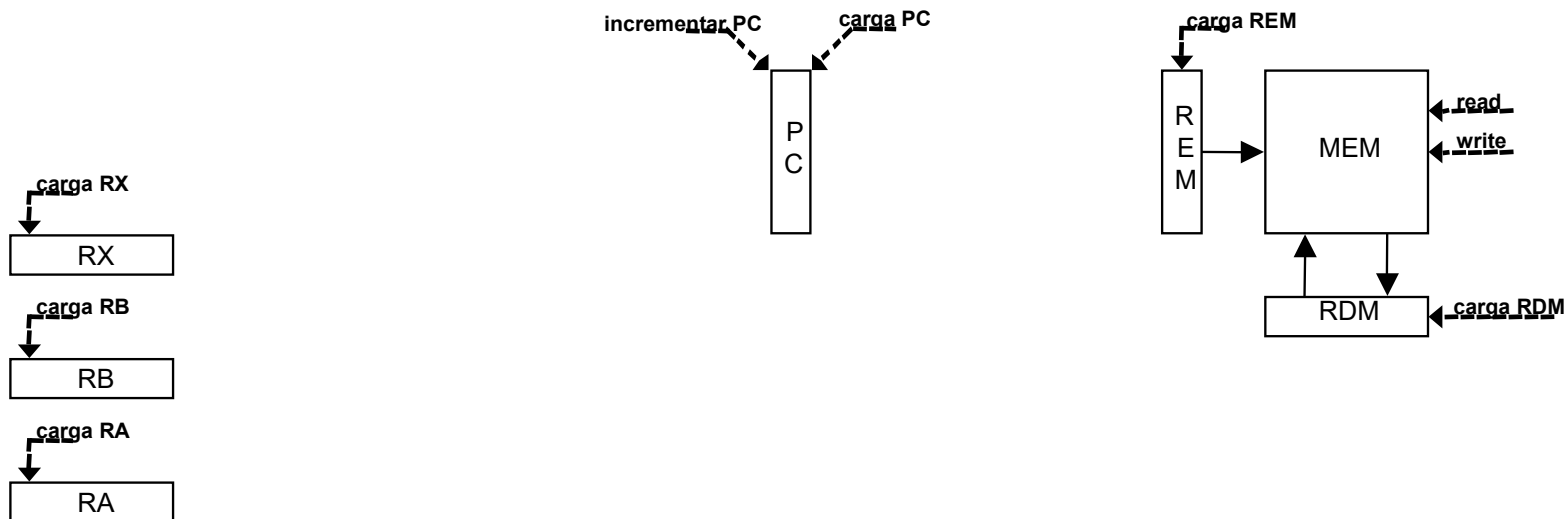
Modo Direto	Modo Indireto	Modo Imediato	Modo Indexado
REM \leftarrow PC Read; PC \leftarrow PC +1 temp \leftarrow RDM REM \leftarrow temp RDM \leftarrow PC Write; PC \leftarrow temp + 1	REM \leftarrow PC Read; PC \leftarrow PC +1 REM \leftarrow RDM Read temp \leftarrow RDM REM \leftarrow temp RDM \leftarrow PC Write; PC \leftarrow temp + 1	PC \leftarrow PC +1	REM \leftarrow PC Read; PC \leftarrow PC +1 temp \leftarrow RDM + X REM \leftarrow temp RDM \leftarrow PC Write; PC \leftarrow temp + 1

Operações

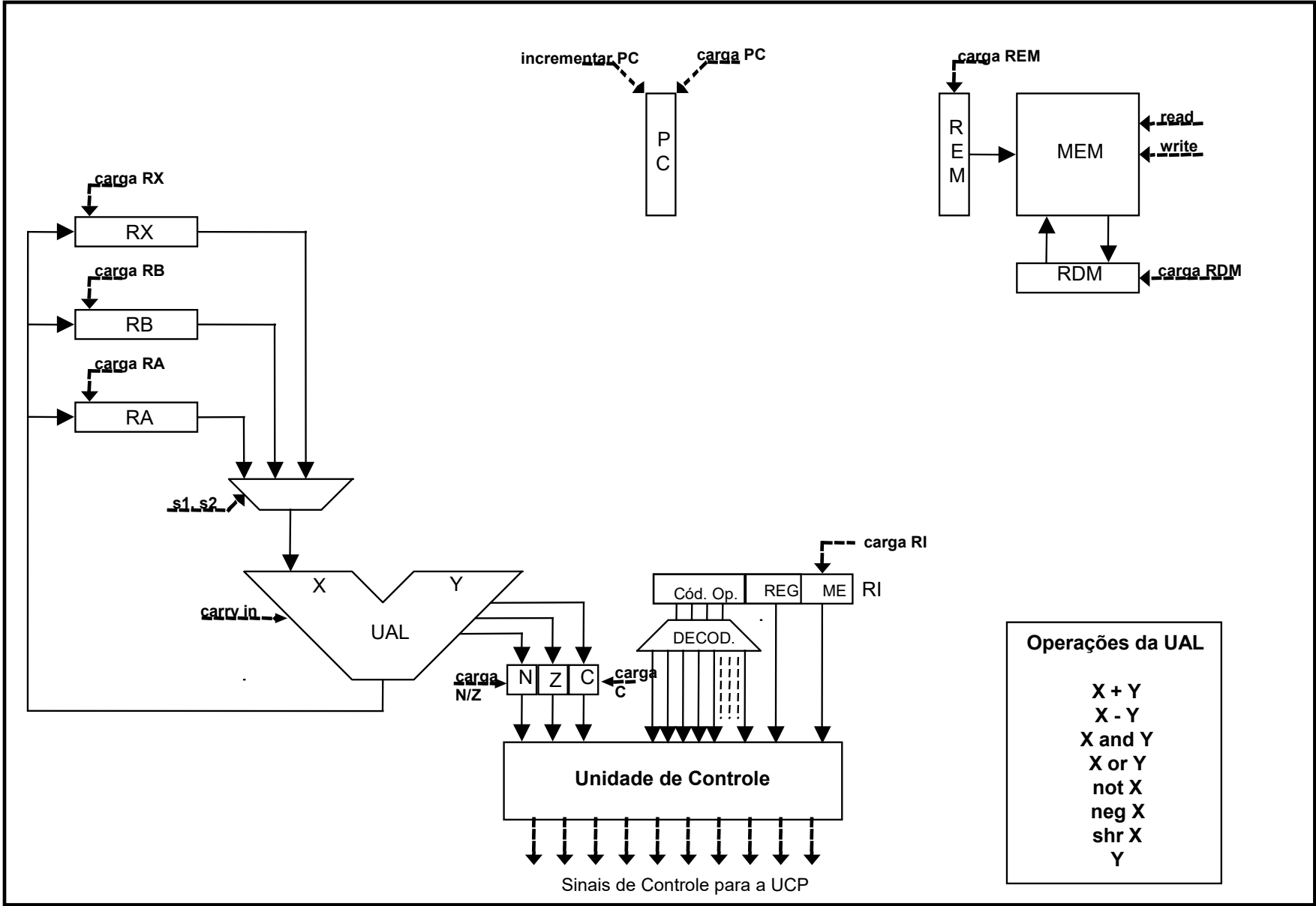
$PC \leftarrow PC + 1$
 $PC \leftarrow RDM$
 $PC \leftarrow RDM + X$
 $PC \leftarrow temp + 1$
 $RDM \leftarrow PC$
 $RDM \leftarrow r$
 $REM \leftarrow temp$
 $REM \leftarrow PC$
 $REM \leftarrow RDM$
 $REM \leftarrow RDM + X$
 $RI \leftarrow RDM$
 $temp \leftarrow RDM$
 $temp \leftarrow RDM + X$
Read
Write

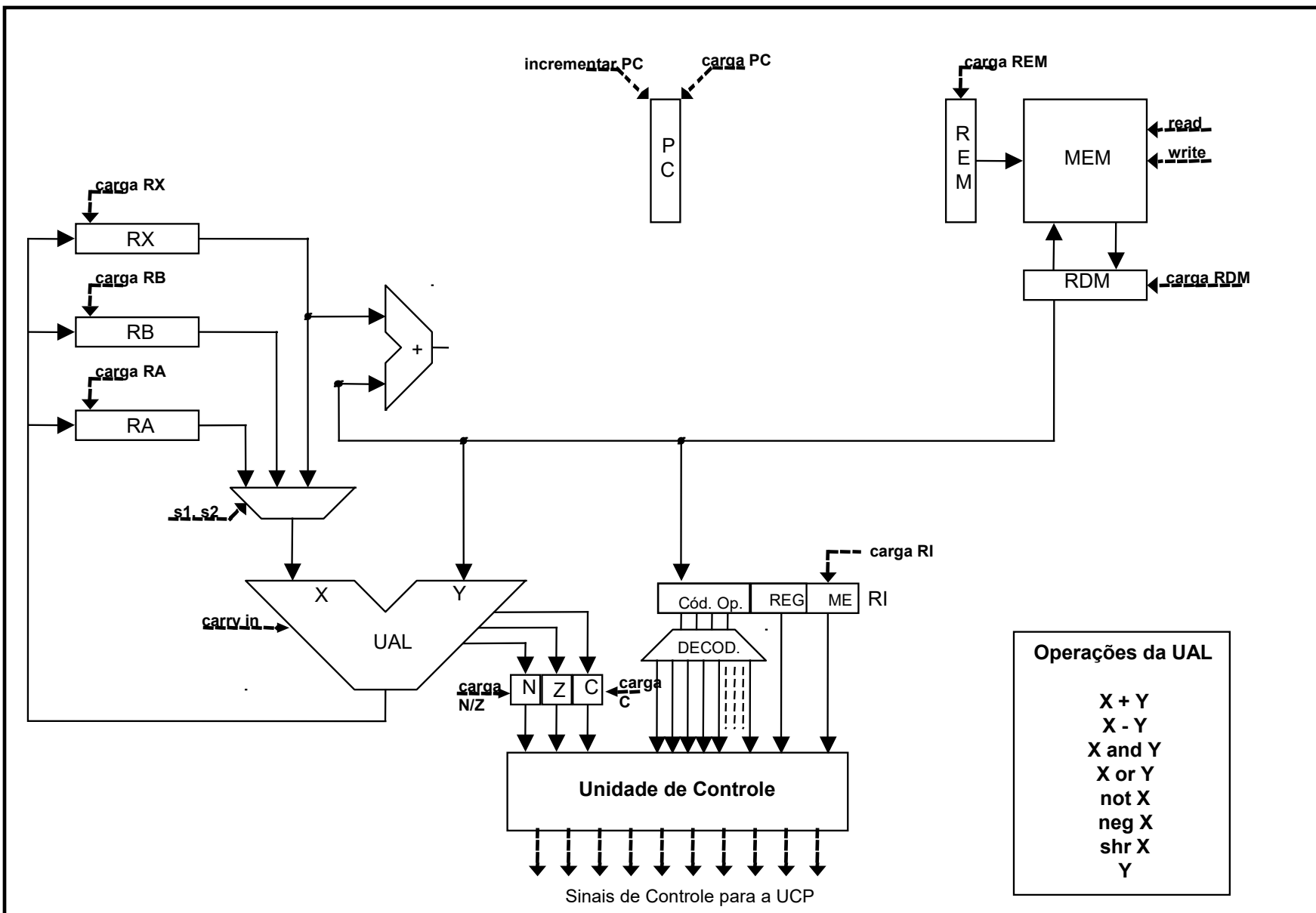
ULA

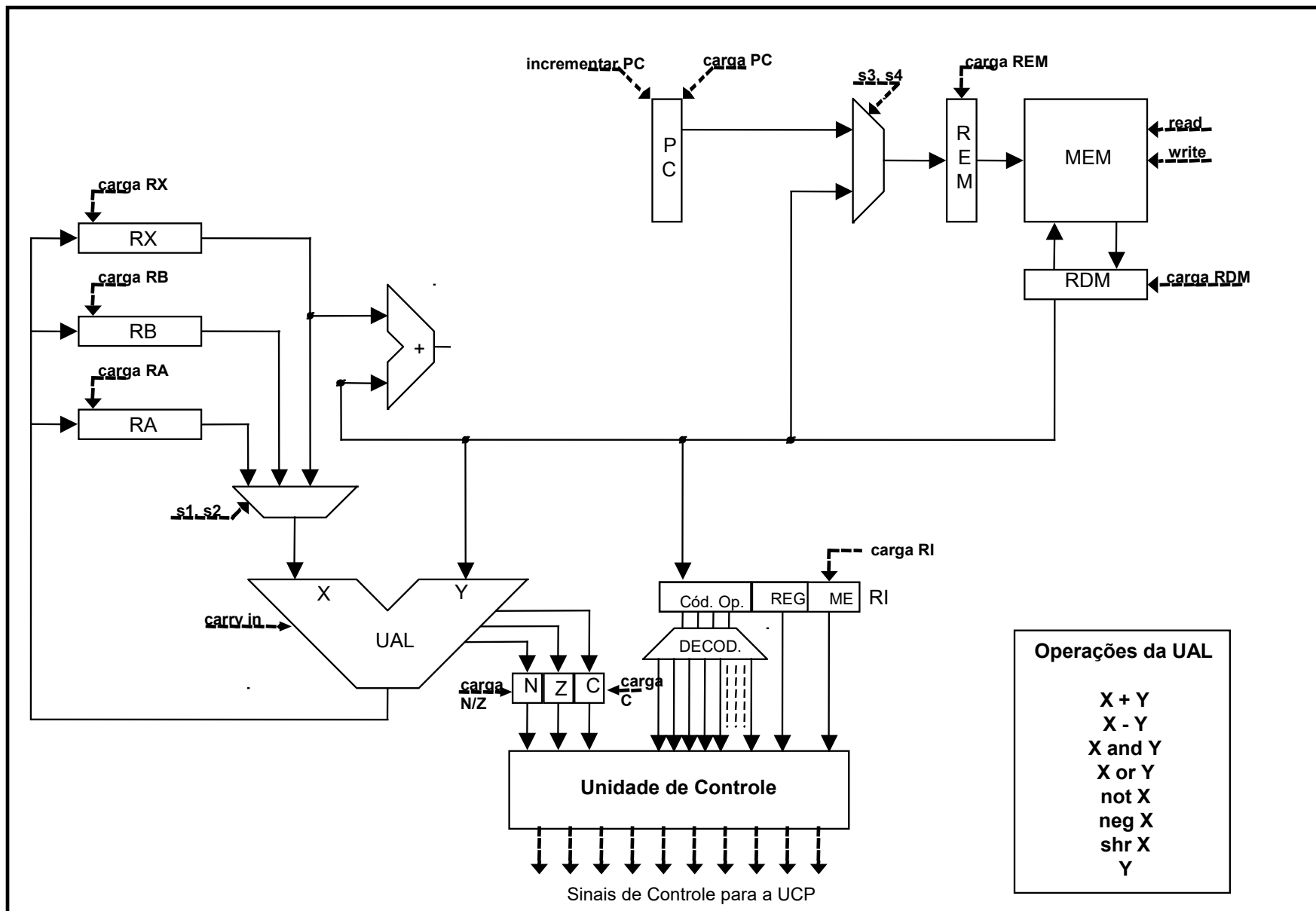
$r, N, Z \leftarrow RDM$
 $r, N, Z, C \leftarrow r + RDM$
 $r, N, Z, C \leftarrow r - RDM$
 $r, N, Z \leftarrow r \text{ or } RDM$
 $r, N, Z \leftarrow r \text{ and } RDM$
 $r, N, Z, C \leftarrow -r$
 $r, N, Z \leftarrow \text{not}(r)$
 $r, N, Z, C \leftarrow \text{shr}(r)$

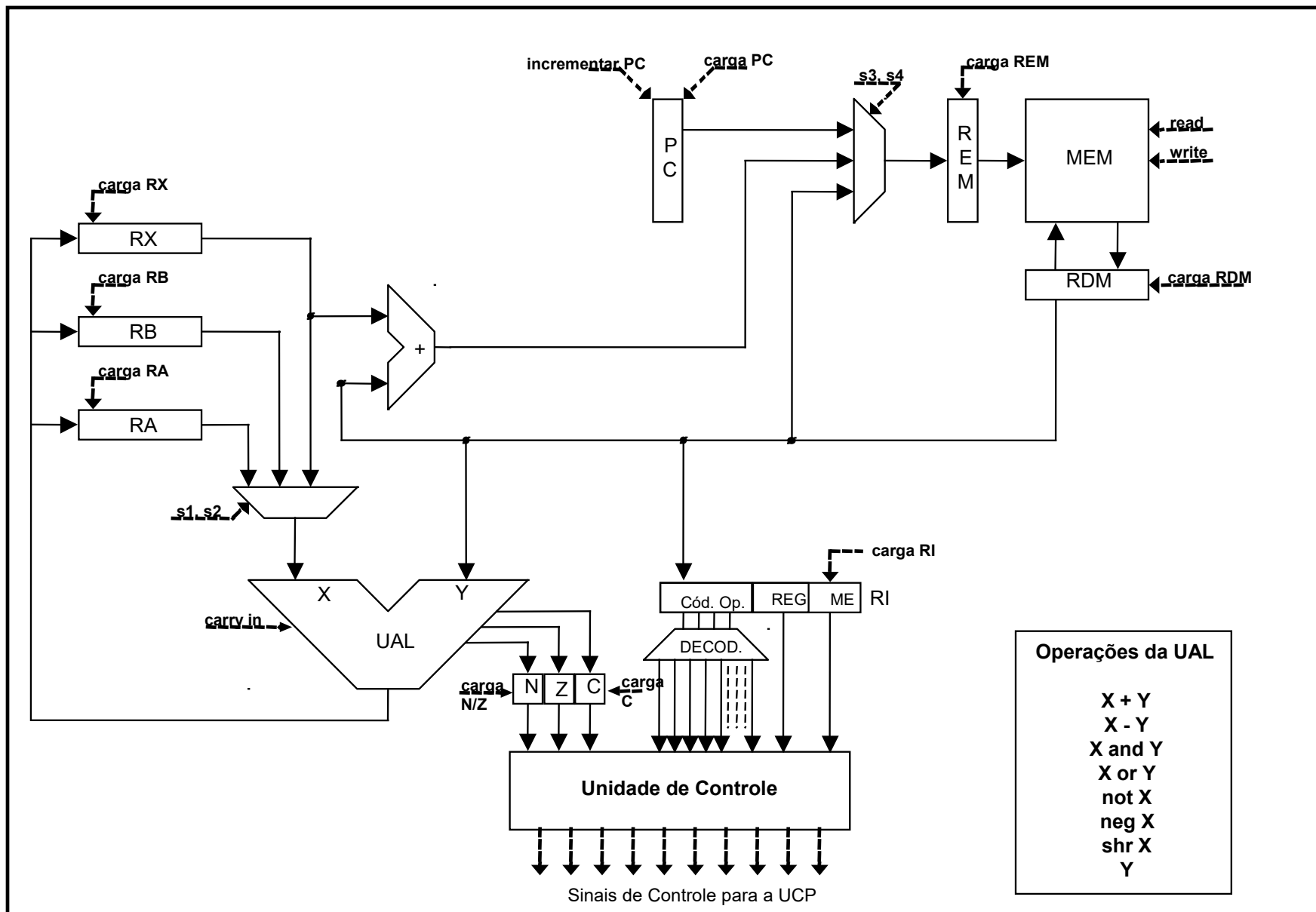


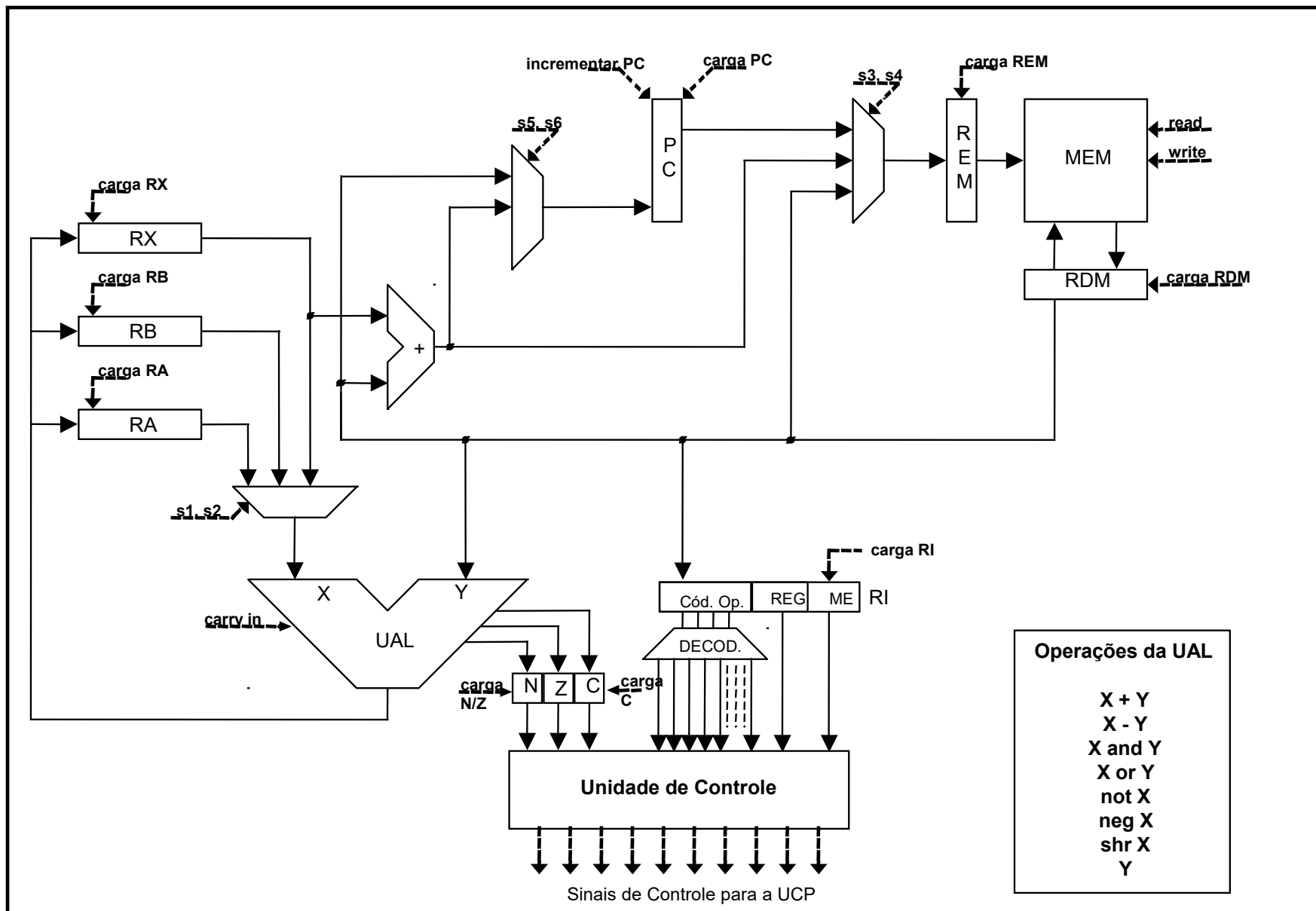
- Operações da UAL**
- $X + Y$
 - $X - Y$
 - $X \text{ and } Y$
 - $X \text{ or } Y$
 - not X
 - neg X
 - shr X
 - Y

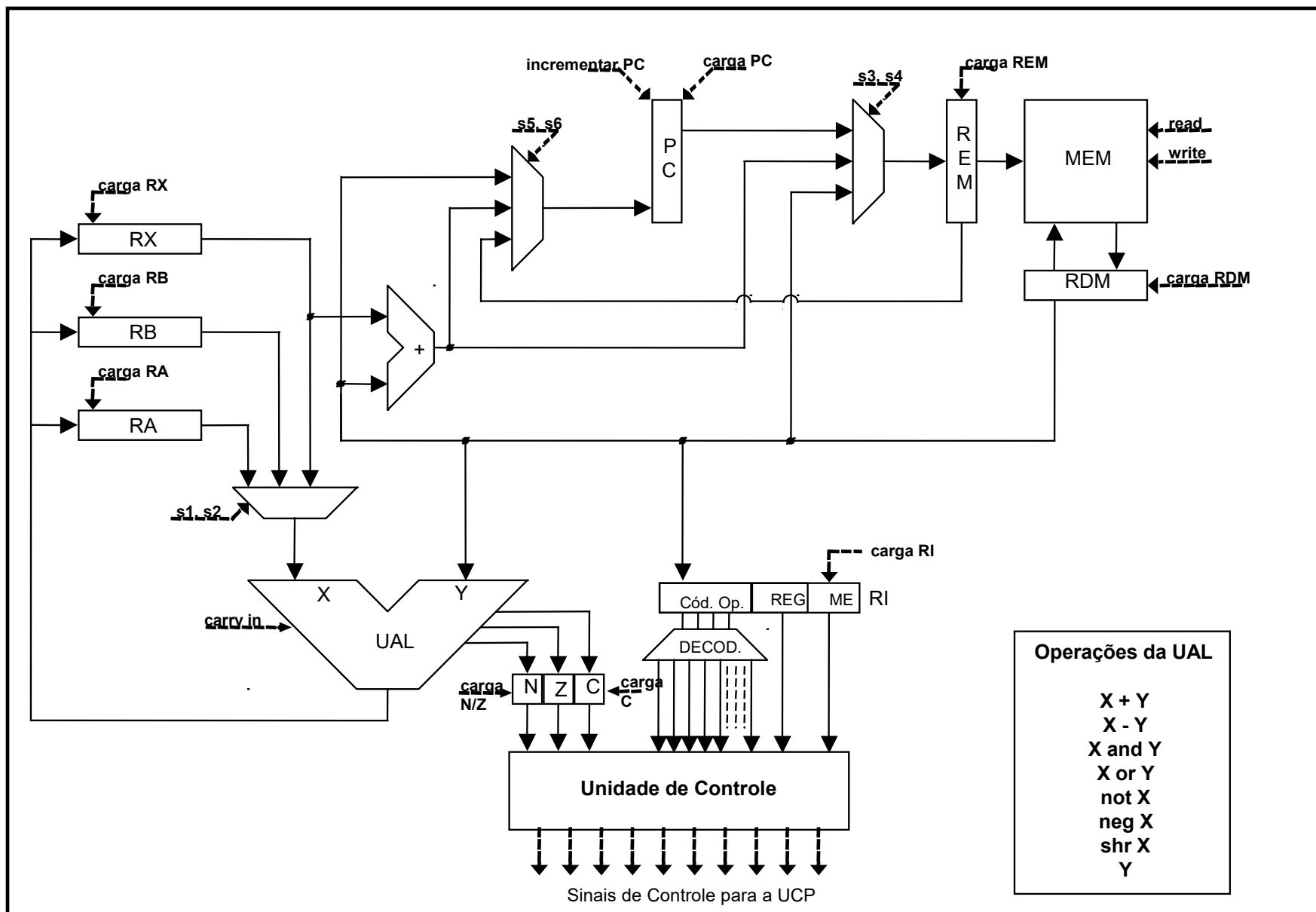


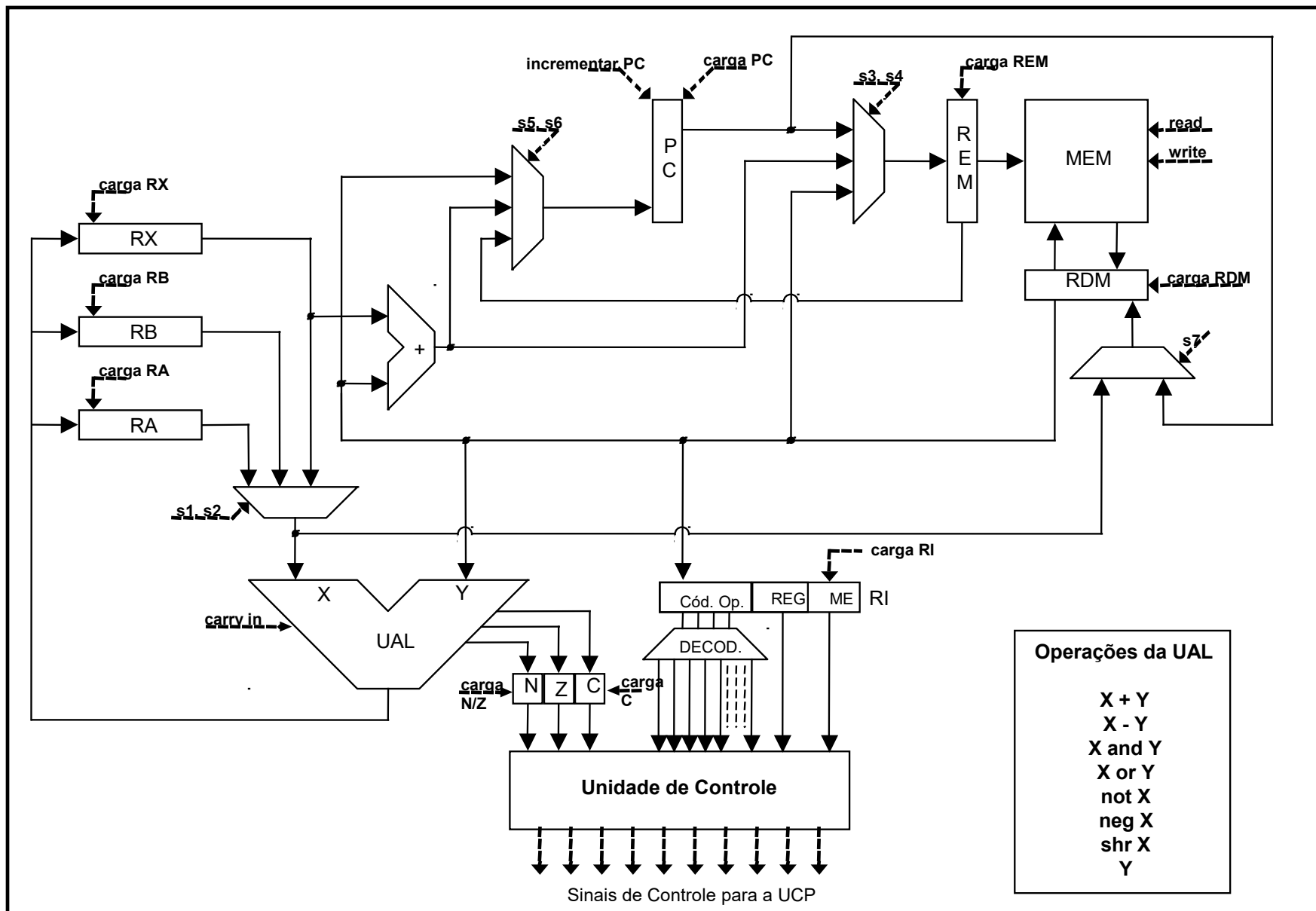










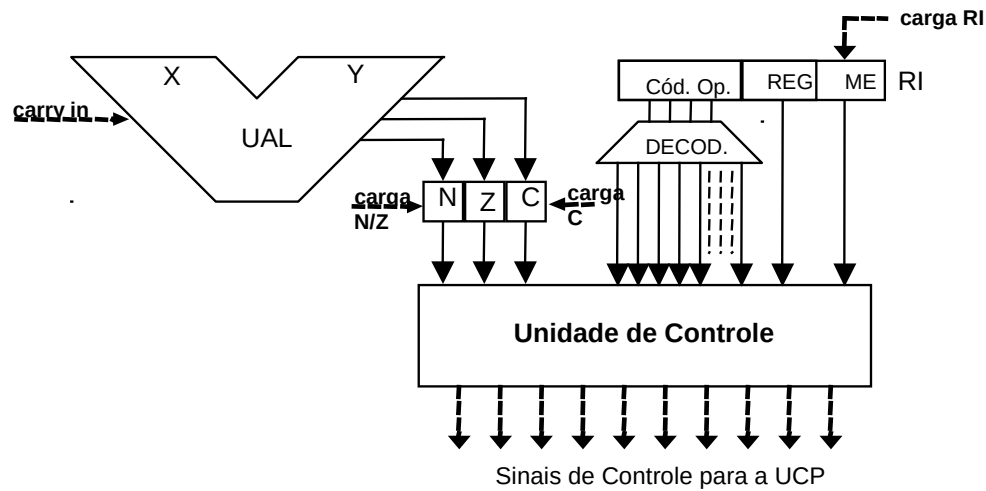
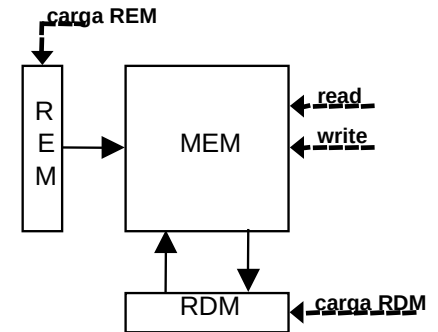
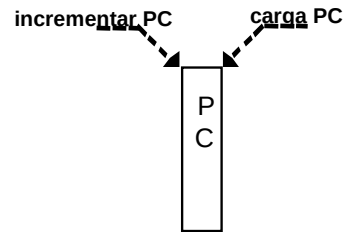
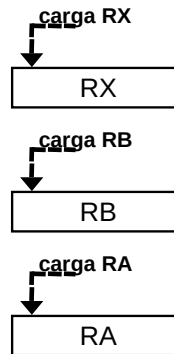


Operações

$PC \leftarrow PC + 1$
 $PC \leftarrow RDM$
 $PC \leftarrow RDM + X$
 $PC \leftarrow temp + 1$
 $RDM \leftarrow PC$
 $RDM \leftarrow r$
 $REM \leftarrow temp$
 $REM \leftarrow PC$
 $REM \leftarrow RDM$
 $REM \leftarrow RDM + X$
 $RI \leftarrow RDM$
 $temp \leftarrow RDM$
 $temp \leftarrow RDM + X$
Read
Write

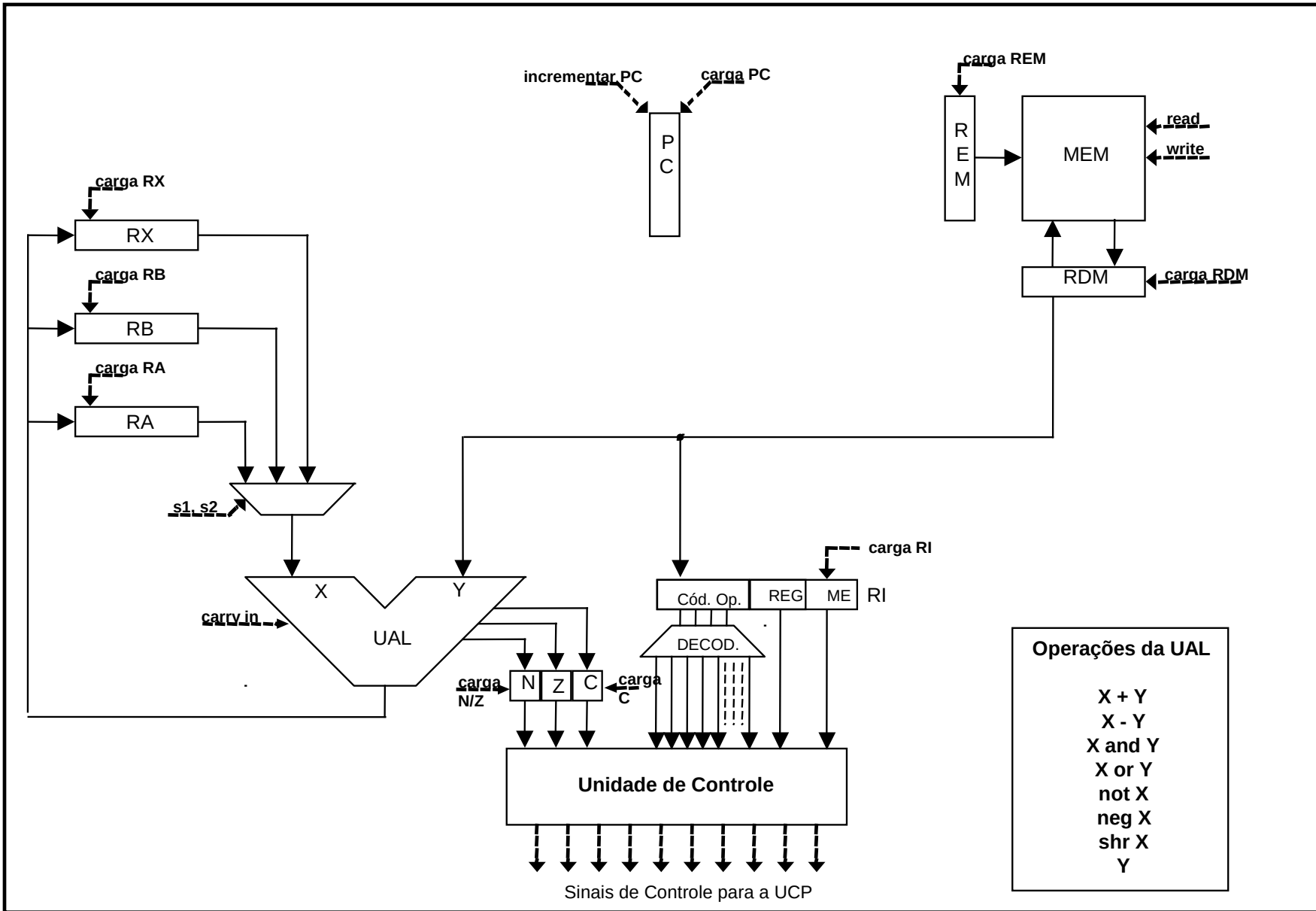
ULA

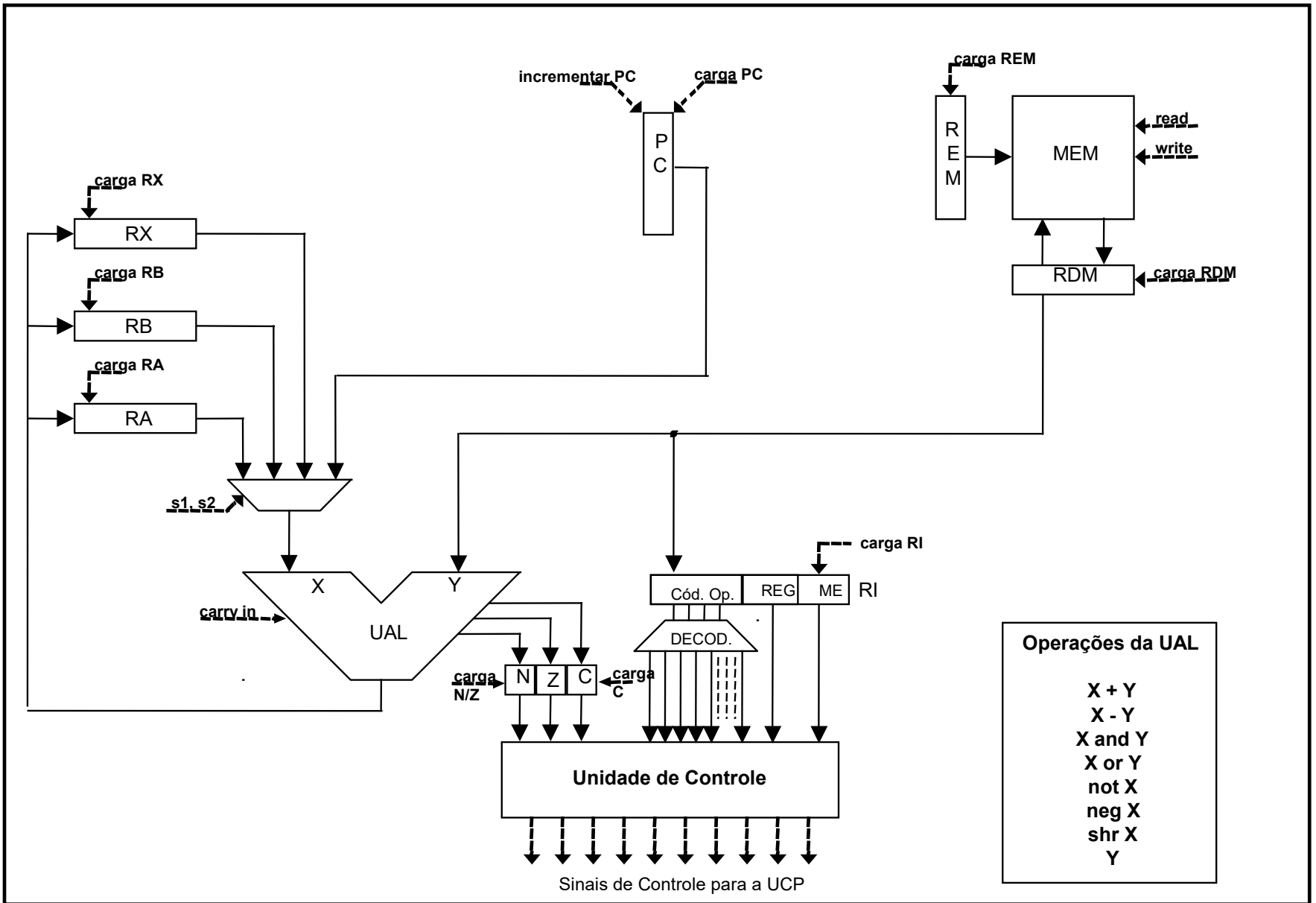
$r, N, Z \leftarrow RDM$
 $r, N, Z, C \leftarrow r + RDM$
 $r, N, Z, C \leftarrow r - RDM$
 $r, N, Z \leftarrow r \text{ or } RDM$
 $r, N, Z \leftarrow r \text{ and } RDM$
 $r, N, Z, C \leftarrow -r$
 $r, N, Z \leftarrow \text{not}(r)$
 $r, N, Z, C \leftarrow \text{shr}(r)$

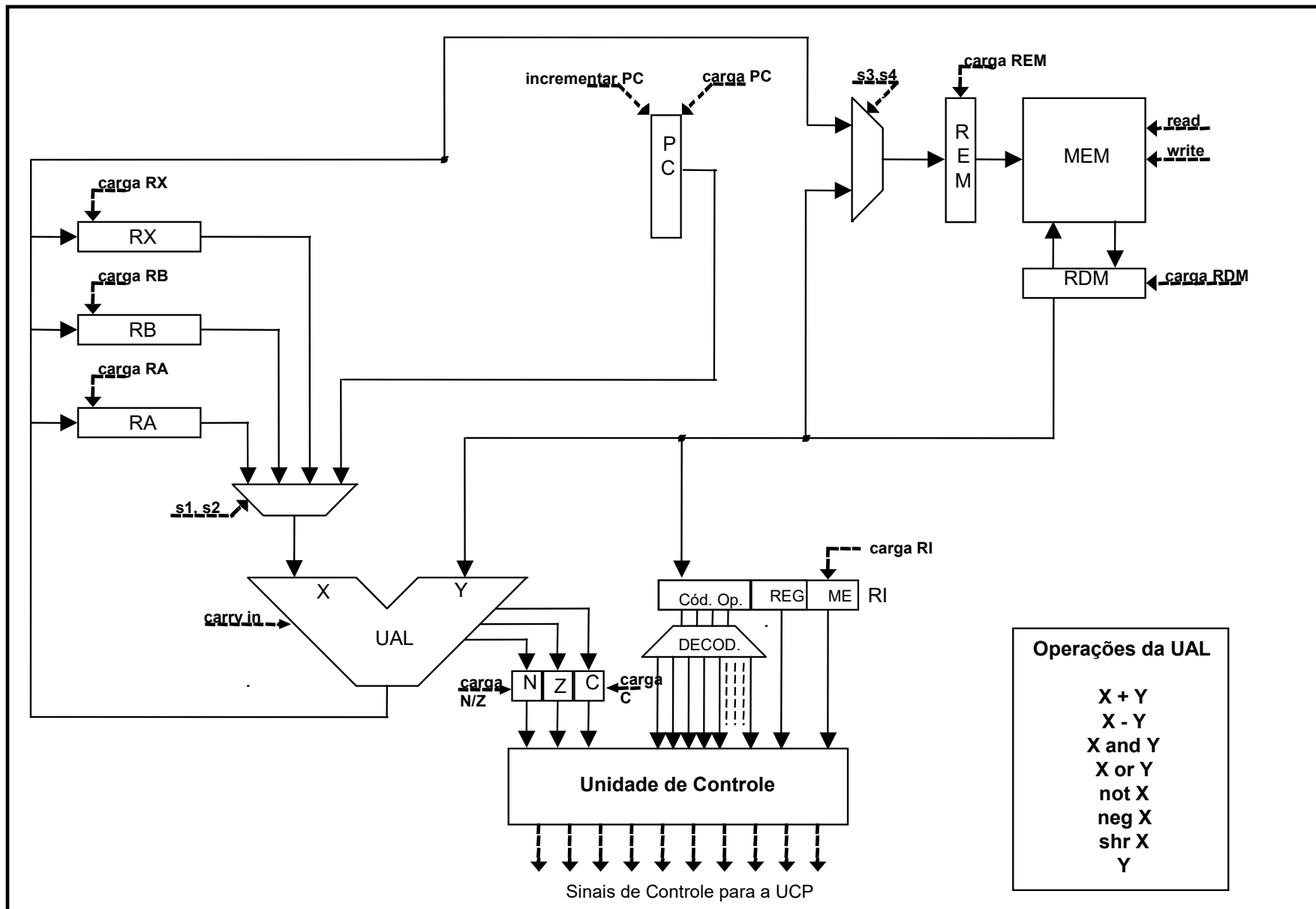


Operações da UAL

$X + Y$
 $X - Y$
 $X \text{ and } Y$
 $X \text{ or } Y$
 $\text{not } X$
 $\text{neg } X$
 $\text{shr } X$
 Y







- Operações da UAL**
- X + Y
 - X - Y
 - X and Y
 - X or Y
 - not X
 - neg X
 - shr X
 - Y

