RTX 2000/2001 Instruction Set

Subroutine Call

```
0aaa aaaa aaaa aaaa   call aaaaaaaaaaaaaaa0
```

Subroutine Return

```
xxxx xxxx xx1x xxxx   return from subroutine
```

ALU

```
1010 000i 00;0 ssss                  {NOT}  shift
1010 111i 00;0 ssss   DROP DUP       {NOT}  shift
1010 cccc 00;0 ssss   OVER SWAP      alu    shift
1010 000i 01;0 ssss   SWAP DROP      {NOT}  shift
1010 111i 01;0 ssss   DROP           {NOT}  shift
1010 cccc 01;0 ssss                  alu    shift
1010 000i 10;0 ssss   SWAP DROP DUP  {NOT}  shift
1010 111i 10;0 ssss   SWAP           {NOT}  shift
1010 cccc 10;0 ssss   SWAP OVER      alu    shift
1010 000i 11;0 ssss   DUP            {NOT}  shift
1010 111i 11;0 ssss   OVER           {NOT}  shift
1010 cccc 11;0 ssss   OVER OVER      alu    shift
```

Step Math Functions

```
1010 xxxx xxx1 xxxx   See Programmer's Ref. Manual
```

Branch

```
1000 0bba aaaa aaaa   ?DUP OBRANCH
1000 1bba aaaa aaaa   OBRANCH
1001 0bba aaaa aaaa   BRANCH
1001 1bba aaaa aaaa   NEXT
```

Register and I/O Access

```
1011 000i 00;g gggg   g G@ DROP  {NOT}
1011 111i 00;g gggg   g G@       {NOT}
1011 cccc 00;g gggg   g G@ OVER  alu
1011 000i 10;g gggg   DUP g G!   {NOT}
1011 111i 10;g gggg   g G!       {NOT}
1011 cccc 10;g gggg   g G@ SWAP  alu
```

Short Literal

```
1011 000i x1;d dddd   d DROP      {NOT}
1011 111i 01;d dddd   d           {NOT}
1011 cccc 01;d dddd   d OVER      alu
1011 111i 11;d dddd   d SWAP DROP {NOT}
1011 cccc 11;d dddd   d SWAP      alu
```

User Space

	1st cycle	2nd cycle
1100 000i 00;u uuuu	u @ SWAP	{NOT}
1100 111i 00;u uuuu	u @ SWAP	SWAP {NOT}
1100 cccc 00;u uuuu	u @ SWAP	SWAP OVER alu
1100 000i 10;u uuuu	DUP u !	{NOT}
1100 111i 10;u uuuu	DUP u !	DROP {NOT}
1100 cccc 10;u uuuu	u @ SWAP	alu

Long Literal

	1st cycle	2nd cycle
1101 000i x0;x xxxx	D SWAP	{NOT}
1101 111i 00;x xxxx	SWAP	SWAP {NOT}
1101 cccc 00;x xxxx	D SWAP	SWAP OVER alu
1101 111i 10;x xxxx	D SWAP	DROP {NOT}
1101 cccc 10;x xxxx	D SWAP	alu

Memory Access

	1st cycle	2nd cycle
111s 000i 00;x xxxx	@ SWAP	{NOT}
111s 111i 00;x xxxx	@ SWAP	SWAP {NOT}
111s cccc 00;x xxxx	@ SWAP	SWAP OVER alu
111s 000p 01;x xxxx	{SWAP DROP} DUP @ SWAP	NOP
111s 111p 01;d dddd	{SWAP DROP} @ d	NOP
111s aaap 01;d dddd	{SWAP DROP} DUP @ SWAP d SWAP alu	NOP
111s 000i 10;x xxxx	OVER SWAP !	{NOT}
111s 111i 10;x xxxx	OVER SWAP !	DROP {NOT}
111s cccc 10;x xxxx	@ SWAP	alu
111s 000p 11;x xxxx	{OVER SWAP} SWAP OVER !	NOP
111s 111p 11;d dddd	{OVER SWAP} ! d	NOP
111s aaap 11;d dddd	{OVER SWAP} SWAP OVER ! d SWAP alu	NOP

s = 0 for word access(@/!), 1 for byte access (C@/C!)
{SWAP DROP} and {OVER SWAP} are performed if p = 0

cccc	aaa	function
0010	001	AND
0011		NOR
0100	010	SWAP-
0101		SWAP-c
0110	011	OR
0111		NAND
1000	100	+
1001		+c
1010	101	XOR
1011		XNOR
1100	110	-
1101		-c

ssss	function	ssss	function
0000	no shift	1000	N2*
0001	0<	1001	N2*c
0010	2*	1010	D2*
0011	2*c	1011	D2*c
0100	cU2/	1100	cUD2/
0101	c2/	1101	cD2/
0110	U2/	1110	UD2/
0111	2/	1111	D2/

CR	IL	RID										SID	BOT	BYT	CCY	CY
IMR			SWI	EI5	EI4	EI3	T2	T1	T0	EI2	RSV	PSV	RSU	PSU	EI1	
IBC	IB5	IB4	IB3	IB2	IB1	IB0	TC1	TC0	CYC	RND	DPS					

ggggg	register
00000	I read/wrt
00001	I push/pop
00010	I stream
00011	CR
00100	MD
00101	SQ
00110	SR
00111	PC
01000	IMR
01001	SPR
01010	reserved
01011	IVR/SLR
01100	IPR
01101	DPR
01110	UPR
01111	CPR
10000	IBC
10001	UBR
10010	reserved
10011	Timer 0
10100	Timer 1
10101	Timer 2
10110	MLR
10111	MHR

int		vector
0	NMI	vvvvvv0111100000
1	EI1	vvvvvv0111000000
2	PSU	vvvvvv0110100000
3	RSU	vvvvvv0110000000
4	PSV	vvvvvv0101100000
5	RSV	vvvvvv0101000000
6	EI2	vvvvvv0100100000
7	TC0	vvvvvv0100000000
8	TC1	vvvvvv0011100000
9	TC2	vvvvvv0011000000
10	EI3	vvvvvv0010100000
11	EI4	vvvvvv0010000000
12	EI5	vvvvvv0001100000
13	SWI	vvvvvv0001000000
-1	none	vvvvvv1000000000

Revised: April 29, 1989