

A. Appendix for as6809 Frankenstein Assembler

A.1 Pseudo Operations

A.1.1 *Standard_Pseudo_Operation_Mnemonics*

End	END
File Inclusion	INCL INCLUDE
If	IF
Else	ELSE
End If	ENDI
Equate	EQU
Set	SET
Org	ORG
Reserve Memory	RESERVE RMB
Define Byte Data	BYTE DB FCB
Define Word Data	DW FDB WORD
Define String Data	FCC STRING
Define Character Set Translation	CHARSET
Define Character Value	CHARDEF CHD
Use Character Translation	CHARUSE

A.2 Instructions

A.2.1 *Instruction_List*

Opcode	Syntax	Selection Criteria
ABX		
ADCA	'#' expr	
ADCA	expr	DIRECT
ADCA	expr	EXTENDED
ADCA	indexed	
ADCB	'#' expr	
ADCB	expr	DIRECT
ADCB	expr	EXTENDED
ADCB	indexed	
ADDA	'#' expr	
ADDA	expr	DIRECT
ADDA	expr	EXTENDED
ADDA	indexed	
ADDB	'#' expr	
ADDB	expr	DIRECT
ADDB	expr	EXTENDED
ADDB	indexed	

Opcode	Syntax	Selection Criteria
ADDD	'#' expr	
ADDD	expr	DIRECT
ADDD	expr	EXTENDED
ADDD	indexed	
ANDA	'#' expr	
ANDA	expr	DIRECT
ANDA	expr	EXTENDED
ANDA	indexed	
ANDB	'#' expr	
ANDB	expr	DIRECT
ANDB	expr	EXTENDED
ANDB	indexed	
ANDCC	'#' expr	
ASL	expr	DIRECT
ASL	expr	EXTENDED
ASL	indexed	
ASLA		
ASLB		
ASR	expr	DIRECT
ASR	expr	EXTENDED
ASR	indexed	
ASRA		
ASRB		
BCC	expr	
BCS	expr	
BEQ	expr	
BGE	expr	
BGT	expr	
BHI	expr	
BHS	expr	
BITA	'#' expr	
BITA	expr	DIRECT

Opcode	Syntax	Selection Criteria
BITA	expr	EXTENDED
BITA	indexed	
BITB	'#' expr	DIRECT EXTENDED
BITB	expr	
BITB	expr	
BITB	indexed	
BLE	expr	
BLO	expr	
BLS	expr	
BLT	expr	
BMI	expr	
BNE	expr	
BPL	expr	
BRA	expr	
BRN	expr	
BSR	expr	
BVC	expr	
BVS	expr	
CLR	expr	DIRECT EXTENDED
CLR	expr	
CLR	indexed	
CLRA		
CLRB		
CMPA	'#' expr	DIRECT EXTENDED
CMPA	expr	
CMPA	expr	
CMPA	indexed	
CMPB	'#' expr	DIRECT EXTENDED
CMPB	expr	
CMPB	expr	
CMPB	indexed	

Opcode	Syntax	Selection Criteria
CMPD	'#' expr	
CMPD	expr	DIRECT
CMPD	expr	EXTENDED
CMPD	indexed	
CMPS	'#' expr	
CMPS	expr	DIRECT
CMPS	expr	EXTENDED
CMPS	indexed	
CMPU	'#' expr	
CMPU	expr	DIRECT
CMPU	expr	EXTENDED
CMPU	indexed	
CMPX	'#' expr	
CMPX	expr	DIRECT
CMPX	expr	EXTENDED
CMPX	indexed	
CMPLY	'#' expr	
CMPLY	expr	DIRECT
CMPLY	expr	EXTENDED
CMPLY	indexed	
COM	expr	DIRECT
COM	expr	EXTENDED
COM	indexed	
COMA		
COMB		
CWAI	'#' expr	
DAA		
DEC	expr	DIRECT
DEC	expr	EXTENDED
DEC	indexed	
DECA		
DECB		
EORA	'#' expr	
EORA	expr	DIRECT
EORA	expr	EXTENDED

Opcode	Syntax	Selection Criteria
EORA	indexed	
EORB	'#' expr	
EORB	expr	DIRECT
EORB	expr	EXTENDED
EORB	indexed	
EXG	register ',' register	
INC	expr	DIRECT
INC	expr	EXTENDED
INC	indexed	
INCA		
INCB		
JMP	expr	DIRECT
JMP	expr	EXTENDED
JMP	indexed	
JSR	expr	DIRECT
JSR	expr	EXTENDED
JSR	indexed	
LBCC	expr	
LBCS	expr	
LBEQ	expr	
LBGE	expr	
LBGT	expr	
LBHI	expr	
LBHS	expr	
LBLE	expr	
LBLO	expr	
LBLS	expr	
LBLT	expr	
LBMI	expr	

Opcode	Syntax	Selection Criteria
LBNE	expr	
LBPL	expr	
LBRA	expr	
LBRN	expr	
LBSR	expr	
LBVC	expr	
LBVS	expr	
LDA	'#' expr	
LDA	expr	DIRECT
LDA	expr	EXTENDED
LDA	indexed	
LDB	'#' expr	
LDB	expr	DIRECT
LDB	expr	EXTENDED
LDB	indexed	
LDD	'#' expr	
LDD	expr	DIRECT
LDD	expr	EXTENDED
LDD	indexed	
LDS	'#' expr	
LDS	expr	DIRECT
LDS	expr	EXTENDED
LDS	indexed	
LDU	'#' expr	
LDU	expr	DIRECT
LDU	expr	EXTENDED
LDU	indexed	
LDX	'#' expr	
LDX	expr	DIRECT
LDX	expr	EXTENDED
LDX	indexed	
LDY	'#' expr	
LDY	expr	DIRECT
LDY	expr	EXTENDED
LDY	indexed	

Opcode	Syntax	Selection Criteria
LEAS	indexed	
LEAU	indexed	
LEAX	indexed	
LEAY	indexed	
LSL	expr	DIRECT
LSL	expr	EXTENDED
LSL	indexed	
LSLA		
LSLB		
LSR	expr	DIRECT
LSR	expr	EXTENDED
LSR	indexed	
LSRA		
LSRB		
MUL		
NEG	expr	DIRECT
NEG	expr	EXTENDED
NEG	indexed	
NEGA		
NEGB		
NOP		
ORA	'#' expr	
ORA	expr	DIRECT
ORA	expr	EXTENDED
ORA	indexed	
ORB	'#' expr	
ORB	expr	DIRECT
ORB	expr	EXTENDED
ORB	indexed	
ORCC	'#' expr	
PSHS	register list	

Opcode	Syntax	Selection Criteria
PSHU	register list	
PULS	register list	
PULU	register list	
ROL	expr	DIRECT
ROL	expr	EXTENDED
ROL	indexed	
ROLA		
ROLB		
ROR	expr	DIRECT
ROR	expr	EXTENDED
ROR	indexed	
RORA		
RORB		
RTI		
RTS		
SBCA	'#' expr	
SBCA	expr	DIRECT
SBCA	expr	EXTENDED
SBCA	indexed	
SBCB	'#' expr	
SBCB	expr	DIRECT
SBCB	expr	EXTENDED
SBCB	indexed	
SEX		
STA	expr	DIRECT
STA	expr	EXTENDED
STA	indexed	
STB	expr	DIRECT
STB	expr	EXTENDED
STB	indexed	
STD	expr	DIRECT
STD	expr	EXTENDED

Opcode	Syntax	Selection Criteria
STD	indexed	
STS	expr	DIRECT
STS	expr	EXTENDED
STS	indexed	
STU	expr	DIRECT
STU	expr	EXTENDED
STU	indexed	
STX	expr	DIRECT
STX	expr	EXTENDED
STX	indexed	
STY	expr	DIRECT
STY	expr	EXTENDED
STY	indexed	
SUBA	'#' expr	
SUBA	expr	DIRECT
SUBA	expr	EXTENDED
SUBA	indexed	
SUBB	'#' expr	
SUBB	expr	DIRECT
SUBB	expr	EXTENDED
SUBB	indexed	
SUBD	'#' expr	
SUBD	expr	DIRECT
SUBD	expr	EXTENDED
SUBD	indexed	
SWI2		
SWI3		
SWI		
SYNC		
TFR	register ',' register	
TST	expr	DIRECT
TST	expr	EXTENDED
TST	indexed	
TSTA		

Opcode	Syntax	Selection Criteria
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TSTB

A.2.2 **Operand_Types**

A.2.2.1 **register_list** The operands for the push and pull operations consist of a list of one or more registers seperated by commas. The stack pointer associated with an operator will give an error if it occurs in the list. The registers can be D, X, Y, U, S, PC, A, B, CC, DP and their lower case equivalents. For the push and pull operations, the D register is an alias for the A and B registers, and will result in two selection bits set in the postbyte.

A.2.2.2 **indexed** The indexed mode operands are in the forms.

```
, index
expr , index
accumulator , index
, index +
, index ++
, - index
, -- index
expr , PCR
[ , index ]
[ expr , index ]
[ accumulator , index ]
[ , index ++ ]
[ , -- index ]
[ expr , PCR ]
[ expr ]
```

Index can be any of X, Y, S, U (or their lower case equivalents). Accumulator can be any of A, B, D (or their lower case equivalents).

The short offset forms will only be used if the expression in the operand has a value defined at the first pass, and the value is small enough to fit. Expressions that have an as yet undefined value will use the 16 bit offset form.

A.2.3 **Selection_Criteria_Keywords**

DIRECT	The instruction can use the direct addressing mode. The expression must have a value between 0 and 255 that is defined when the instruction is processed in the input pass.
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EXTENDED

The instruction can use the extended addressing mode.

A.2.4 **Apostrophes** The apostrophes in the syntax field are a notation used for the parser generator and are not put in the assembler source statement.

A.3 Notes

A.3.1 **Reserved_Symbols**

A.3.1.1 **Machine_Dependent_Reserved_Symbols** A B CC D DP PC
PCR S U X Y a b cc d dp pc pcr s u x y

A.3.1.2 **Standard_Reserved_Symbols** AND DEFINED EQ GE GT
HIGH LE LOW LT MOD NE NOT OR SHL SHR XOR and defined eq ge
gt high le low lt mod ne not or shl shr xor

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