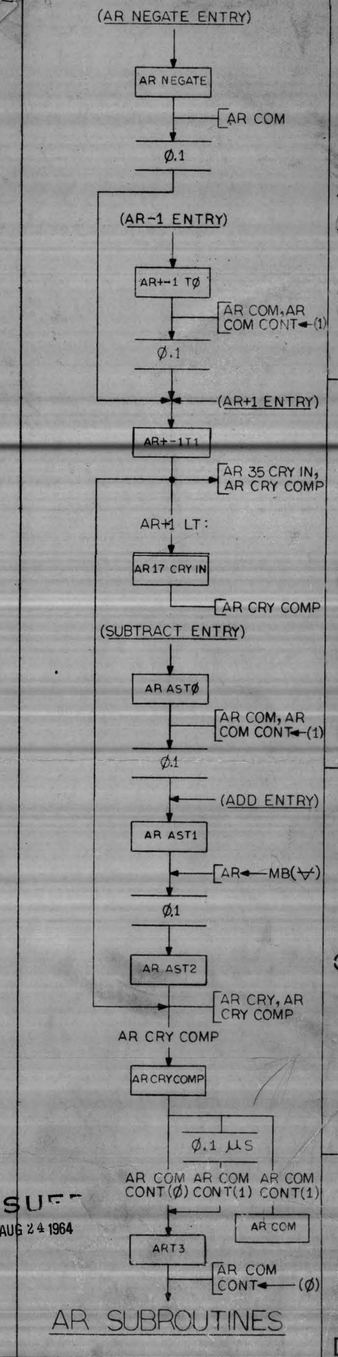
D-166-0-AL | REV LTR

	BOOLEAN (BOOLE)	ADD-SUBTRACT (AS)	HALF WORD TRANSMIT (HWT)	FULL WORD TRANSMIT (FWT)	EXCHANGE -EXCH	MEMORY/AC MODIFY (MEMAC)	AC MEMORY COMPARE (ACCP)	LOGICAL COMPARE (AC BIT MODIFY, ACBM)	AOBJP, AOBJN	
INST LAYOUT	|1ØØ|XXX|XYY| XXXX=CONNECTIVE CODE (ƒ) YY=MODE ØØ=DIRECT Ø1=IMMEDIATE 1Ø MEMORY 11=BOTH	|Ø1Ø|111|XYY| X-ADD, SUBTRACT YY=MODE (SEE BOOLEAN)	|1Ø1|WZZ|XYY| W=LT,RT ZZ=H,HZ,HO,HE X=-LT RT SWAP YY=MODE ØØ=DIRECT, Ø1=IMM 1Ø=MEM, 11=MEM-MEM	|Ø1Ø|ØØX|XYY| XX=MOVE,MOVS, MOVN,MOVM YY=MODE ØØ=DIRECT, Ø1=IMM 1Ø=MEM 11=MEM-MEM	|Ø1Ø|1Ø1|ØØØ|	|Ø11|VVW|XYZ| VV=ØØ-∿MEMAC; Ø1-TEST; 1Ø-+1; 11=-1 W AC/MEMORY X COND/∿COND Y COND=Ø Z COND=- >N	|Ø11|ØØW|XYZ| W=IMMEDIATE/DIRECT X=COND/∿COND Y=COND=Ø Z=COND=- >N	|11Ø|VVW|XYZ| VV=TNC,TCL,TSE,TCM W=IMMEDIATE/DIRECT X=COND/∿COND Y=COND=Ø Z=-/LT RT SWAP	|Ø1Ø|1Ø1|Ø1X| Y Y=Ø1Ø=AOBJP Y=Ø11=AOBJN	INST LAYOUT
INST ACTION	IR 7,8: ØØ-C(AC) ƒ C(E) → C(AC) Ø1-C(AC) ƒ Ø,E → C(AC) 1Ø-C(AC) ƒ C(E) → C(E) 11-C(AC) ƒ C(E) → C(E), C(AC)	(SEE BOOLEAN)	IR 7,8: ØØ: C(AC) ƒ C(E) → C(AC) Ø1= C(AC) ƒ Ø,E → C(AC) 1Ø= C(AC) ƒ C(E) → C(E) 11= C(E) ƒ C(E) → C(E)	IR 7,8 ØØ C(E) ƒ → C(AC) Ø1 Ø,E ƒ → C(AC) 1Ø C(AC) ƒ → C(E) 11 C(E) ƒ → C(E) ƒ = MOVE, SWAP, NEGATE, MAGNITUDE	C(AC) ←→ C(E)	C(AC) ƒ → C(AC) IF COND: E → PC C(E) ƒ → C(E) IF COND: PC+1	C(E); ; C(AC) IF COND: PC+1 Ø,E: ; C(AC) IF COND: PC+1	C(AC) ƒ Ø,E → C(AC) C(AC) ƒ C(E) → C(AC) C(AC) ƒ E,Ø → C(AC) C(AC) ƒ C(E SWAP) → C(AC) IF COND: PC+1	C(AC) + 1ØØØØØ1 → C(AC) IF AOBJP ∧ C(AC) = + ∨ AOBJN ∧ C(AC) = - THEN E → PC	INST ACTION
INITIAL REGS	ØØ = MB = C(E) Ø1 = MB = Ø,E 1Ø = MB = C(E) 11 = MB = C(E) AR = AC MQ = ? MA = E	(SEE BOOLEAN)	IR 7,8: ØØ AR=C(AC); MB=C(E) Ø1 AR=C(AC); MB=Ø,E 1Ø AR=C(AC); MB=C(E) 11 AR=Ø,E ; MB=C(E) MA=E; MQ=?	IR 7,8: ØØ AR=Ø,E ; MB=C(E) Ø1 AR=Ø E ; MB=Ø,E 1Ø AR=C(AC); MB=Ø/E 11 AR=Ø,E ; MB=C(E) MA=E MQ=?	AR=C(AC) MB=C(E) MA=E MQ=?	IR5(Ø): AR=C(AC); MB=Ø,E; MA=E MQ=? IR5(1): AR=Ø,E; MB=C(E); MA=E MQ=?	IR5(Ø): MB=Ø,E IR5(1): MB=C(E) AR=C(AC) MA=E MQ=?	IR5(Ø): MB=Ø,E IR5(1): MB=C(E) AR=C(E) C(AC)? MA=E MQ=?	AR=C(AC) MB=Ø,E MA=E MQ=?	INITIAL REGS
INITIAL SWITCHES	IR 7,8: ØØ: F C(E) Ø1: 1Ø: F C(E) PSE 11: F C(E) PSE	(SEE BOOLEAN)	IR 7,8: ØØ: F C(E) Ø1: 1Ø: F C(E) PSE 11: F C(E) PSE, F AC INH	IR 7,8: ØØ: F C(E), F AC INH Ø1: , F AC INH 1Ø: 11: F C(E) PSE, FAC INH	F C(E) PSE	IR5(1): F C(E) PSE, F AC INH ET LONG	IR5(1): F C(E) ET LONG	IR5(1): F C(E) ET LONG		INITIAL SWITCHES
ETØ	BOOLE Ø,3,14,17: AR ← (Ø) BOOLE 2,4,12,13,15: AR ← MB		IR 7,8 1Ø: MB (J) ←→ AR (J) 11: AR ← MB (J)	IR 7,8 ØØ,11: AR ← MB (J) Ø1,1Ø: MB ← AR (J)	MB(J) ←→ AR(J)	IR5(1): AR ← MB (J)		IR8(1): MB LT (J) ←→ MB RT (J)		ETØ
ET1	BOOLE 6,11,14: AR ← MB (∀) BOOLE 1,2,15,16: AR ← MB (Ø) BOOLE 3,4,7,1Ø,13: AR ← MB (1)		IR6(1) MB LT (J) ←→ MB RT (J) IR 4,5 = ∿ Ø,Ø: AR ← (Ø)	IR5,6 = Ø,1: MB LT (J) ←→ MB RT (J)				MB ← AR (Ø) IR 3,4: 1Ø: AR ← MB (∀) 11: AR ← MB (1)		ET1
ET3		IR6(Ø): AR ADD IR6(1): AR SUB		IR5(1) ∧ IR6(Ø) ∨ ARØ (1): AR NEGATE		IR 3,4 1Ø AR+1 11 AR-1	AR SUB		AR + 1ØØØØØ1 → AR	ET3
ET4	BOOLE 4,1Ø,11,14, 15,16,17 AR COM		IR4(1) ∧ IR3(1) ∧ (IR5(Ø) ∨ MB1(1)): AR LT COM IR4(1) ∧ IR3(Ø) ∧ IR5(Ø) ∨ MBØ(1): AR RT COM IR3(Ø): AR ← MB LT (J) IR3(1): AR ← MB RT (J)	IR 5,6 = Ø,1 MB(J) ←→ AR (J)				MB(J) ←→ AR(J)		ET4
ET5								AR COM		ET5
ET6								IR 3,4 = Ø,1 MB ← AR(Ø)		ET6
ET7						IR5(Ø) ∧ K: PC ← (Ø)		AR COM	ARØ(Ø) ∧ AOBJP ∨ ARØ(1) ∧ AOBJN: PC ← Ø	ET7
ET8						IR5(Ø) ∧ K: PC ← MA (1)			ARØ(Ø) ∧ AOBJP ∨ ARØ(1) ∧ AOBJN: PC ← MA (1)	ET8
ET9						IR5(1) ∧ K: PC+1	K: PC+1	MB (J) ←→ AR (J) IR6(Ø) ∧ M ∨ IR6(1) ∧ ∿M: PC+1		ET9
ET1Ø		AROV FLAG ← AROV(1) AR CRY Ø FLAG ← AR CRY Ø (1) AR CRY 1 FLAG ← AR CRY 1 (1)		AROV FLAG ← AR CRY Ø (Ø) ∧ AR CRY 1 (1)	MB ← AR (J) INH	AROV FLAG ← AROV(1) AR CRY Ø FLAG ← AR CRY Ø (1) AR CRY 1 FLAG ← AR CRY 1 (1)				ET1Ø
FINAL SWITCHES	IR 7,8: 1Ø S AC INH	(SAME AS BOOLE)	IR 7,8: 1Ø: S AC INH 11: S AC INH	IR 7,8: 1Ø: S AC INH, SC(E) 11: S AC INH		IR 5(1) S AC INH	S AC INH	IR 3,4 = ØØ: S AC INH		FINAL SWITCHES

L = IR7(1) ∧ AR=Ø ∨ IR8(1) ∧ (ARØ(1) ∀ AROV(1))
K = IR6(Ø) ∧ L ∨ IR6(1) ∧ ∿ L
M = IR7(1) ∧ AR=Ø
N = Ø - NEVER -

1	<Ø	L
2	=Ø	E
3	≤Ø	LE
4	ALWAYS	A
5	≥Ø	GE
6	≠Ø	N
7	>Ø	G



AR SUBROUTINES

ISSUED AUG 24 1964

CHANGE	DATE	ENG

REVISIONS

DRAWN	L.L. Bouchard	DATE	2-4-64
CHECKED		DATE	
ENG		DATE	
PROJ. ENG		DATE	
PROD.		DATE	

digital EQUIPMENT CORPORATION MAYNARD, MASSACHUSETTS

ASSY NO		CODE	FD
SHEET		OF	

TITLE: ARITHMETIC & LOGICAL INSTRUCTIONS
FOR: ARITH PROC 166; PDP-6
DRWG NO: D-166-0-AL
REV LTR:

BKE 2