

MEMORANDUM

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SUBJ: BEATRICE MICROCODE DOCUMENTATION

PLEASE FIND ATTACHED A SET OF FLOW DIAGRAMS AND EXPLANATORY NOTES DESCRIBING THE OPERATION OF THE BEATRICE APPLICATION MICROCODE.

I HOPE YOU WILL FIND THIS USEFUL,

REGARDS, SIMON

BEATRICE APPLICATION MICROCODE DOCUMENTATION: NOTES

THE ATTACHED FLOW DIAGRAMS ARE INTENDED TO ILLUSTRATE THE OVERALL STRUCTURE OF THE BEATRICE MICROCODE WHILE STILL BEING LOGICALLY COMPLETE AND CORRECT (NO LOGICAL SIMPLIFICATIONS HAVE BEEN MADE).

PLEASE NOTE THAT IT IS NOT POSSIBLE TO OPTIMISE THE MICROCODE FROM THE FLOW CHARTS ALONE. THERE ARE PLACES WHERE THE PROGRAM STRUCTURE AS ILLUSTRATED IN THE FLOW CHARTS MAY NOT LOOK OPTIMUM, BUT IN GENERAL THERE ARE GOOD REASONS FOR THIS AT THE MICROCODE LEVEL.

THE DRAWINGS ARE ARRANGED HIERARCHICALLY, THE HIGHEST LEVEL BEING THE OVERALL BLOCK DIAGRAM (DRAWING NO BM 1). THE TITLES OF THE OTHER DRAWINGS REFER TO THE START ADDRESSES OF THE MAJOR ROUTINES INCLUDED IN THE DRAWING. THE DRAWING INDEX CAN BE USED TO FIND THE CORRECT FLOW CHART FOR A PARTICULAR SECTION OF MICROCODE.

THE LABELS ON THE DRAWINGS ARE MICROCODE ADDRESSES.

THE TERMS INDEX IS AN ALPHABETICAL LIST OF THE TERMS USED TO DESCRIBE THE ALU OPERATIONS IN THE FLOW CHARTS. FOR EXAMPLE TO CLARIFY AN OPERATION SUCH AS

D=[MSG]ADDE-3]

THE ENTRIES IN THE TERMS INDEX ARE:-

D D-REGISTER, THE CONTENTS WILL BE TRANSFERRED TO THE SCREEN RAM LOCATION POINTED TO BY THE P-REGISTER.
MSG THE CONTENTS OF THE CURRENTLY ADDRESSED MESSAGE ROM LOCATION

DRAWING INDEX

DRAWING NO	ROUTINES	DESCRIPTION
BM 1		OVERALL BLOCK DIAG
BM 1.1	STO POLLO	START TELETXT RECEPTION ACT ON STBY OR AV ACTIVE
BM 1.2	HD3	PROCESS HEADER OF SELECTED MAG
BM 1.3	RDO HD100	WAIT FOR DISPLAY CHARS IN HEADER SET UP TO DISPLAY PART OF HEADER IN RW3

BM 1.4	RW3	ROUTINE
	GHO	DISPLAY ROW
	R27P0	WHICH GHOST ROW?
BM 1.5	R30P0	STORE PKT27 LINKS IN RAM
BM 1.6	EX0	PROCESS PKT8/30
	UPD100	PROCESS HEADER OF SELECTED PAGE
	HD83	ACT IF UPDATE MODE SELECTED
BM 1.7	RST0	ACT ON SUBTITLE AND UPDATE BITS IN HEADER
	PNO	HARDWARE RESET ENTRY POINT
	SCHO	DISPLAY TEXT PAGE NUMBER
BM 1.8	RC3	SEARCH FOR NEW PAGE
BM 1.8.1	TEXT0	DECODE TEXT MODE COMMANDS
	EXPO	SET TEXT MODE
	TIME0	GO TO NEXT EXPAND MODE
	HOLDO	GO TO SUB-PAGE MODE
BM 1.8.2	DIGIT0	HOLD DISPLAY
	PPAGE0	TEXT PAGE DIGIT ENTRY
BM 1.8.3	LINK0	CAPTURE PREVIOUS PAGE
BM 1.9	RC36	SET UP TO CAPTURE PAGE IN FLOF LINK
BM 1.9.1	TVO	DECODE TV MODE COMMANDS
	NRMO	SET TV MODE
	CLOCK0	NORMALISE COMMAND
BM 1.9.2	DGO	DISPLAY CLOCK IN TV MODE
	PGTO	PROGRAM/ CHANNEL DIGIT ENTRY
	MODE0	SET PROGRAM MODE
BM 1.9.3	STORE0	SET CHANNEL MODE
	QVO	ACT ON STORE KEY
	ICPO	ACT ON QUICK VIEW KEY
BM 1.9.4	TVIO	ACT ON PROGRAM/ CHANNEL INCREMENT KEY
BM 1.10	GLO	DISPLAY MENU
BM 1.11	GL100	TV MODE TOP ROW DISPLAYS
	WAIT0	MANAGE EXIT FROM GLO CODE
	WTRTNO	VARIABLE DELAY
	BLANK0	RETURN FROM DELAY
BM 1.12	SNZO	SWITCH OF DISPLAYS FOR .5S
	OKO	SET UP FOR NEW SNOOZE/MUTE MESSAGE
		EXIT AFTER INVALID RC RECEIVED

TERMS INDEX

FOR REGISTER AND FLAG LOCATIONS SEE LISTING COMMENTS

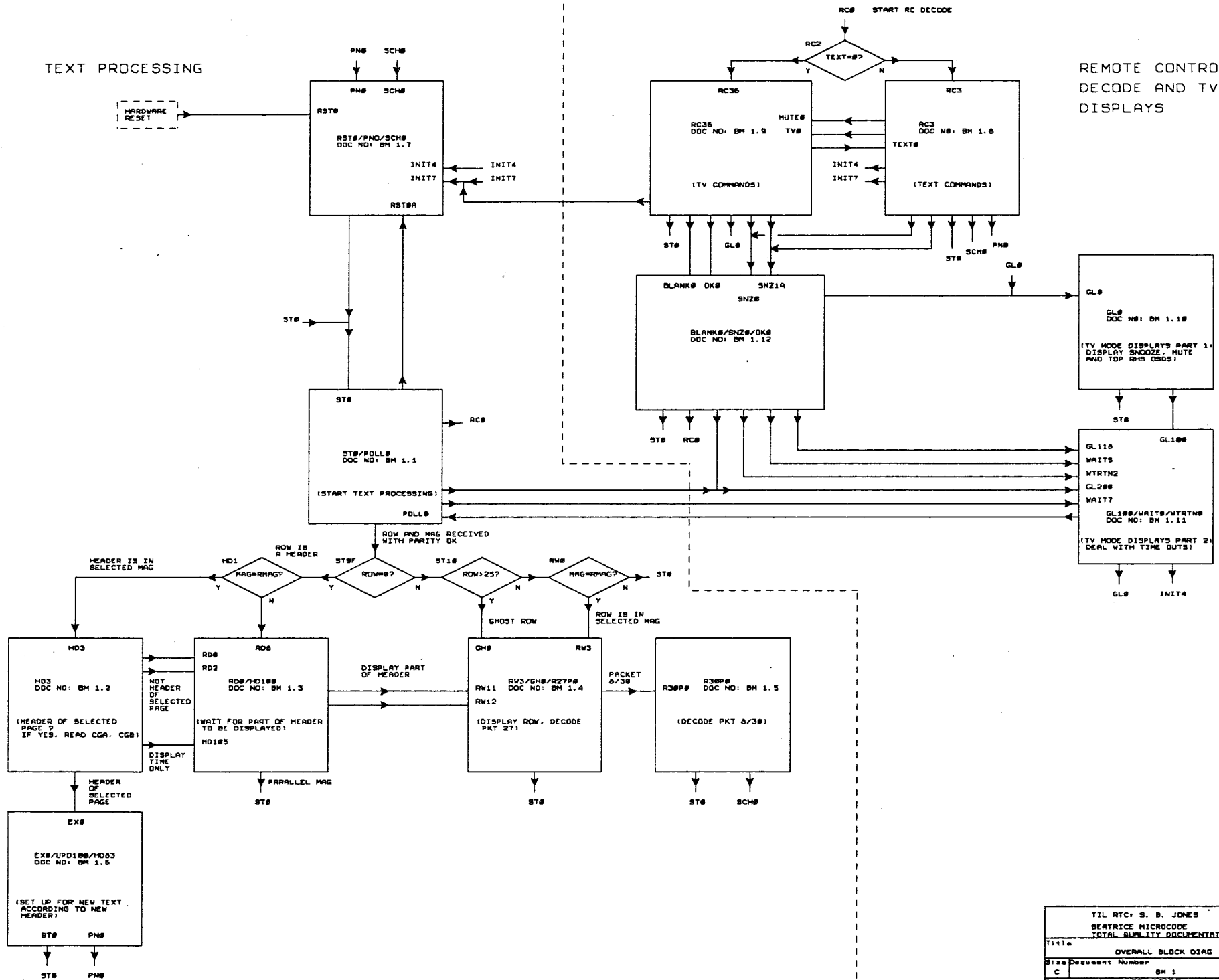
A	A-REGISTER
AV	AUX VIDEO H/W INPUT, 1= ACTIVE
AVFLG	AV FLAG, 1= 'AV' HAS ALREADY BEEN DISPLAYED
B	B-REGISTER
BYTE	PARITY BYTE SELECTED FROM FRONT END
CGA	CONTROL GROUP A (SEE WORLD SYSTEM SPEC)
CGB	CONTROL GROUP B (SEE WORLD SYSTEM SPEC)
CHUNIT	CHANNEL UNITS STORE IN RAM
CHTENS	CHANNEL TENS STORE IN RAM
CLOCK	CLOCK FLAG, 1=TIME BEING DISPLAYED IN TV MODE
CLR	CLEAR FLAG, COPY OF THE HEADER ERASE BIT, C4
C15	CONSTANT= -1
CNT1	LOCAL COUNT VARIABLE
CNT2	LOCAL COUNT VARIABLE
CNT3	LOCAL COUNT VARIABLE
D	D-REGISTER, THE CONTENTS WILL BE TRANSFERRED TO THE SCREEN
	RAM LOCATION POINTED TO BY THE P-REGISTER.
DIGIT	TEMPORARY RAM STORE FOR DIGIT FROM REMOTE CONTROL
DPTR	DIGIT ENTRY STATE REGISTER FOR TEXT PAGE ENTRY (DPTR IS

		INCREMETED IMMEDIATELY BEFORE DPTR CASE STATEMENT)
	#1	DIGIT IS NEW MAG
	#2	DIGIT IS NEW TENS
	#3	DIGIT IS NEW UNITS
	#4	DIGIT IS NEW SUB-PAGE THOUSANDS
	#5	DIGIT IS NEW SUB-PAGE HUNDREDS
	#6	DIGIT IS NEW SUB-PAGE TENS
	#7	DIGIT IS NEW SUB-PAGE UNITS
EXPT		EXPAND TOP FLAG VDP REG 2, SEE VDP SPEC (CF30147)
EXPB		EXPAND BOTTOM FLAG VDP REG 2, SEE VDP SPEC (CF30147)
F830		ENABLE PKT8/30 RECEPTION, 1= RECEPTION DISABLED
FC		FIRST CAPTURE FLAG, SET WHEN SEARCH FOR NEW TEXT PAGE BEGINS (IN SCHO) AND RESET AFTER THE FIRST HEADER OF THE NEW PAGE HAS BEEN DECODED
HAM		HAMMING BYTE SELECTED FROM FRONT END
HOLD		HOLD FLAG, 1=INHIBIT OVERWRITE OF STORED PAGE
IF		INHIBIT FLOF KEYS
IM		INDEX LINK MAGAZINE STORE IN RAM
L1M		CONSTANT, RAM ADDRESS OF RED FLOF LINK
L2M		CONSTANT, RAM ADDRESS OF GREEN FLOF LINK
L3M		CONSTANT, RAM ADDRESS OF YELLOW FLOF LINK
L4M		CONSTANT, RAM ADDRESS OF CYAN FLOF LINK
LIM		CONSTANT, RAM ADDRESS OF INDEX FLOF LINK
MAG		MAGAZINE ENTERED BY USER
MA(P)		THE CONTENTS OF THE RAM LOCATION POINTED TO BY THE P REGISTER
MSG		THE CONTENTS OF THE CURRENTLY ADDRESSED MESSAGE ROM LOCATION
MSGFLG		MENU REGISTER, IF MSGFLG<0 THEN A MENU IS BEING DISPLAYED
MUTE		MUTE FLAG, 1='MUTE' DISPLAYED
MPTR		MENU POINTER REGISTER, DEFINES WHICH MENU WILL BE DISPLAYED (VDPO IS SET TO MPTR IN TVIO ROUTINE TO ADDRESS MSG ROM)
NEWSF		NEWSFLASH FLAG VDP REG 3, SEE VDP SPEC (CF30147)
NEWTEN		TEMPORARY PROGRAM OR CHANNEL TENS STORE IN RAM DURING PARTIAL ENTRY
OFLG1		FIRST REGISTER FOR TOP RHS OSDS
	#0	JUMP OUT TO GL100 TO EXIT DISPLAY CODE
	#1	DISPLAY 'PROGRAM MODE'
	#2	DISPLAY 'CHANNEL MODE'
	#3	DISPLAY 'AV'
	#4	DISPLAY 'CH' AND JUMP TO OFLG2 CASE
	#5	DISPLAY 'P' AND JUMP TO OFLG2 CASE
	#6	JUMP STRAIGHT TO OFLG2 CASE
	#7	DISPLAY TIME ONLY FOR CLOCK FUNCTION
OFLG2		SECOND REGISTER FOR TOP RHS OSDS, DEFINES DISPLAY IN TENS POSITION
	#0	DISPLAY A SPACE
	#1	DISPLAY '-'
	#2	DISPLAY CHTEN (CHANNEL TENS)
	#3	DISPLAY PGTEN (PROGRAM TENS)
	#4	DISPLAY '+'
	#5	DISPLAY '-'
	#6	DISPLAY NEWTEN (TENS DURING PARTIAL PROG OR CHANNEL NO ENTRY)
OFLG3		THIRD REGISTER FOR TOP RHS OSDS, DEFINES DISPLAY IN UNITS POSITION
	#0	DISPLAY CHUNIT (CHANNEL UNITS)
	#1	DISPLAY PGUNIT (PROGRAM UNITS)
	#3	DISPLAY '-'
P		P-REGISTER, POINTS TO A LOCATION IN SCREEN RAM
PBR		PAGE BEING RECEIVED FLAG, 1=DISPLAY ROWS IN SELECTED MAGAZINE
PGM		MODE FLAG, 1= PROGRAM MODE, 0= CHANNEL MODE
PGUNIT		PROGRAM UNITS STORE IN RAM
PGTEN		PROGRAM TENS STORE IN RAM
PPMAG		PREVIOUS PAGE MAGAZINE RAM STORE

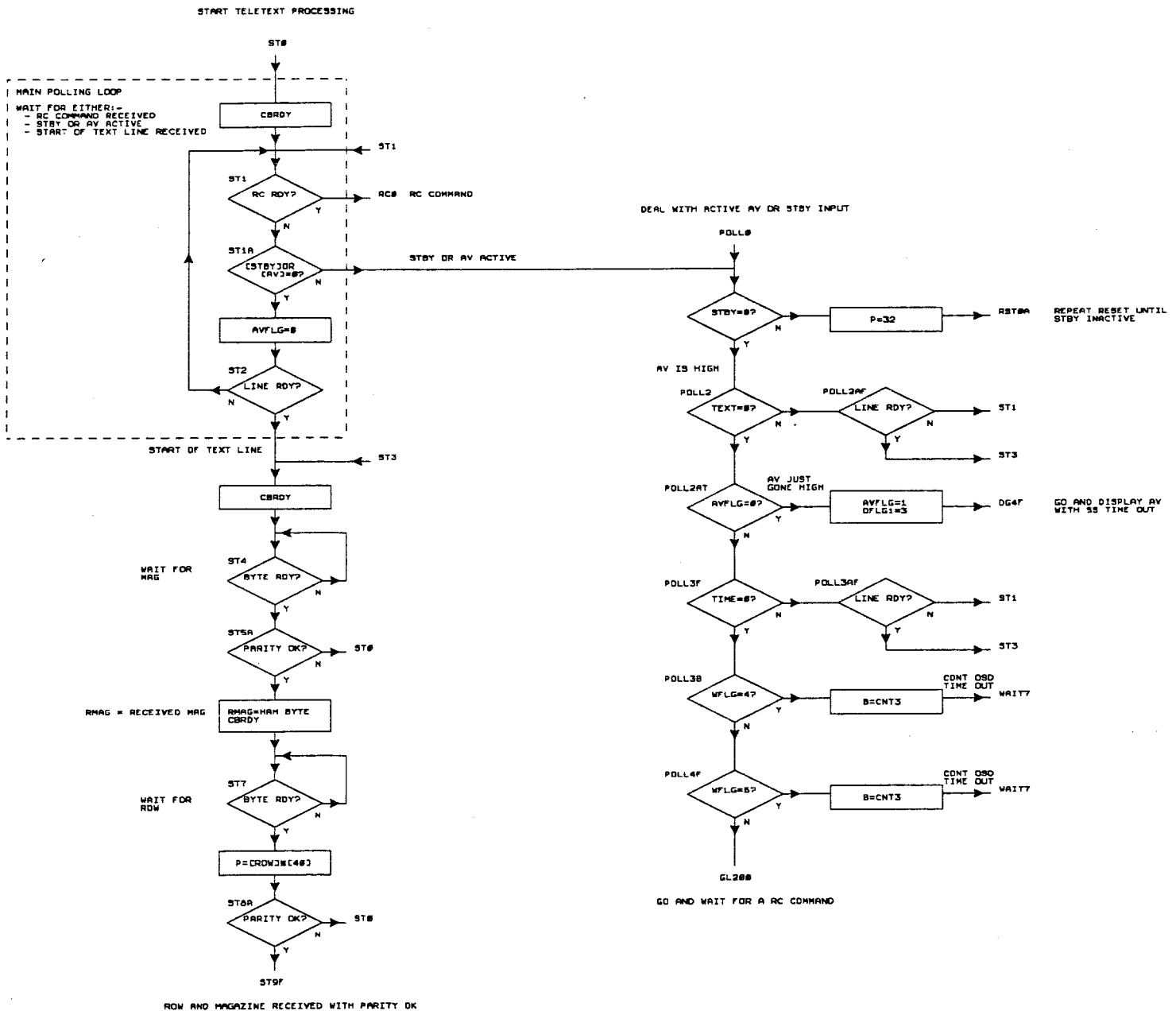
PPTENS	PREVIOUS PAGE TENS RAM STORE
PPUNITS	PREVIOUS PAGE UNITS RAM STORE
QVUNIT	QUICK VIEW UNITS RAM STORE
QVTEN	QUICK VIEW TENS RAM STORE
R24D	ROW 24 DISPLAY VDP REG 7, SEE VDP SPEC (CF30147)
R24P	ROW 24 POSITION VDP REG 2, SEE VDP SPEC (CF30147)
RC RDY	REMOTE CONTROL READY
RCL	REMOTE CONTROL WORD LOW THREE BIT WORD
RCM	REMOTE CONTROL WORD MIDDLE THREE BIT WORD
RCS	REMOTE CONTROL WORD HIGH THREE BIT WORD
RMAG	RECEIVED MAGAZINE
RH	ROLLING HEADER FLAG, 1= DISPLAY HEADERS OF NON SELECTED PAGES
ROD	DISPLAY ROWO FLAG VDP REG 7, SEE VDP SPEC (CF30147)
ROW	ROW BYTE SELECTED FROM FRONT END
RPD	DISPLAY ROWS 1-23 FLAG VDP REG 7, SEE VDP SPEC (CF30147)
RVL	REVEAL FLAG VDP REG 2, SEE VDP SPEC (CF30147)
SFLG	STORE REGISTER, DEFINES ACTION OF STORE KEY
	START A STORE SEQUENCE
= 0	ALREADY IN A STORE SEQUENCE
= 1	END STORE SEQUENCE WITH DEFINITIVE DISPLAY
= 2	END STORE SEQUENCE WITHOUT DEFINITIVE DISPLAY (IE AFTER QUICK
= 3	VIEW OR PROG/ CHANNEL INCREMENT)
SNZ	SNOOZE FLAG, 1='SNOOZE' DISPLAYED
SPA	SUB-PAGE FLAG, 1=SUB-PAGE ACTIVE
SPU	SUB-PAGE UNITS ENTERED BY USER
SPT	SUB-PAGE TENS ENTERED BY USER
SPH	SUB-PAGE HUNDREDS ENTERED BY USER
SPTH	SUB-PAGE THOUSANDS ENTERED BY USER
STBY	STANDBY H/W INPUT, 1= TV IN STBY
SUBT	SUBTITLE FLAG VDP REG 3, SEE VDP SPEC (CF30147)
SYNCH	SYNCH LATCH (LSB OF PSUEDO VDP REG 8), SELECTS SYNCH MODE, 1=
	INTERNAL SYNCH ENABLED IF 'BAD' VIDEO
TENS	TEXT PAGE TENS ENTERED BY USER
TEXT	TEXT FLAG, 1=TEXT MODE, 0=TV MODE
TIME	TIME FLAG, IF TIME<>0 THEN ONLY DISPLAY TIME PART OF HEADER
UNITS	TEXT PAGE UNITS ENTERED BY USER
UPD	UPDATE FLAG, IF UPD<>0 THEN USER HAS ENTERED UPDATE MODE
UPDTB	COPY OF CGA IN RAM INCLUDING THE UPDATE CONTROL BIT, C8
VDPO	THE CONTENTS OF THIS PSUEDO VDP REGISTER POINT TO THE MESSAGE
	ROM ROW
VDP1-7	VDP REGISTERS AS DESCRIBED IN THE VDP SPEC (CF30147)
VR2	COPY OF VDP2 IN RAM
VR3	COPY OF VDP3 IN RAM
VR4	COPY OF VDP4 IN RAM
WFLG	REGISTER WHICH DEFINES EXIT FROM DISPLAYING THE TOP RHS OSDS
	NO SNOOZE, MUTE OR TOP RHS OSDS
= 0	SNOOZE OR MUTE IS DISPLAYED
= 1	GO TO 5S DELAY
= 4	GO TO 10S FLASHING DELAY
= 5	RETURN TO FINISH INCOMPLETE DELAY
= 6	WAIT FOR RC RDY, AV OR STBY (IE DO NOT RECEIVE TEXT AS THERE
= 7	IS A PERMANENT DISPLAY)

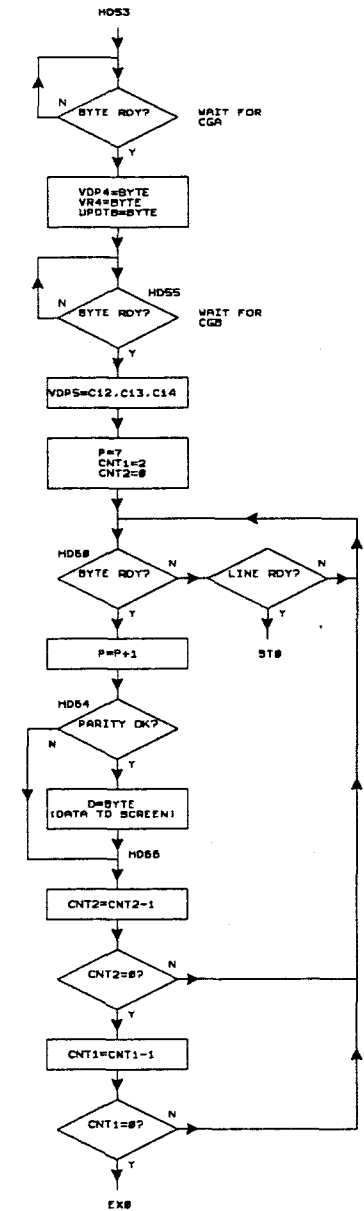
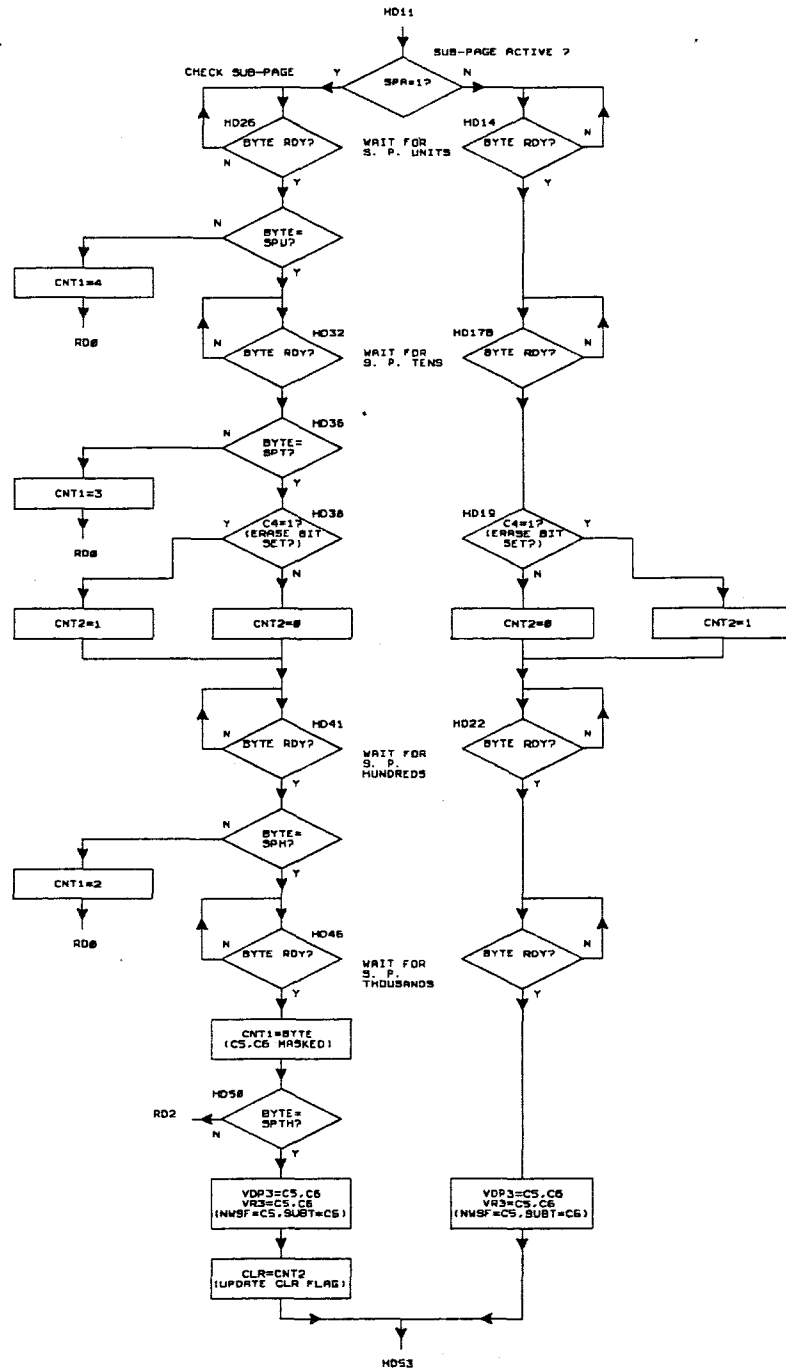
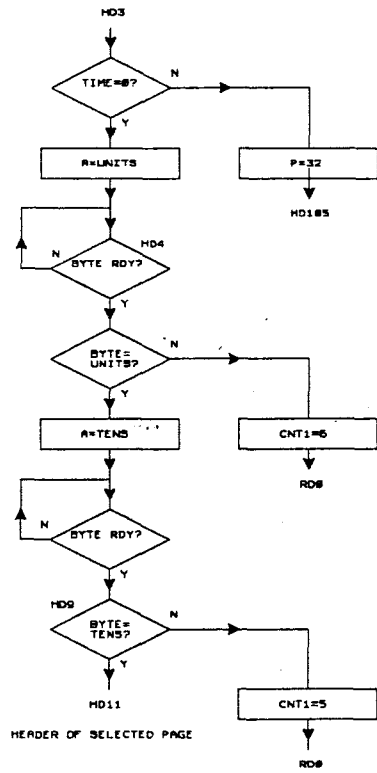
TEXT PROCESSING

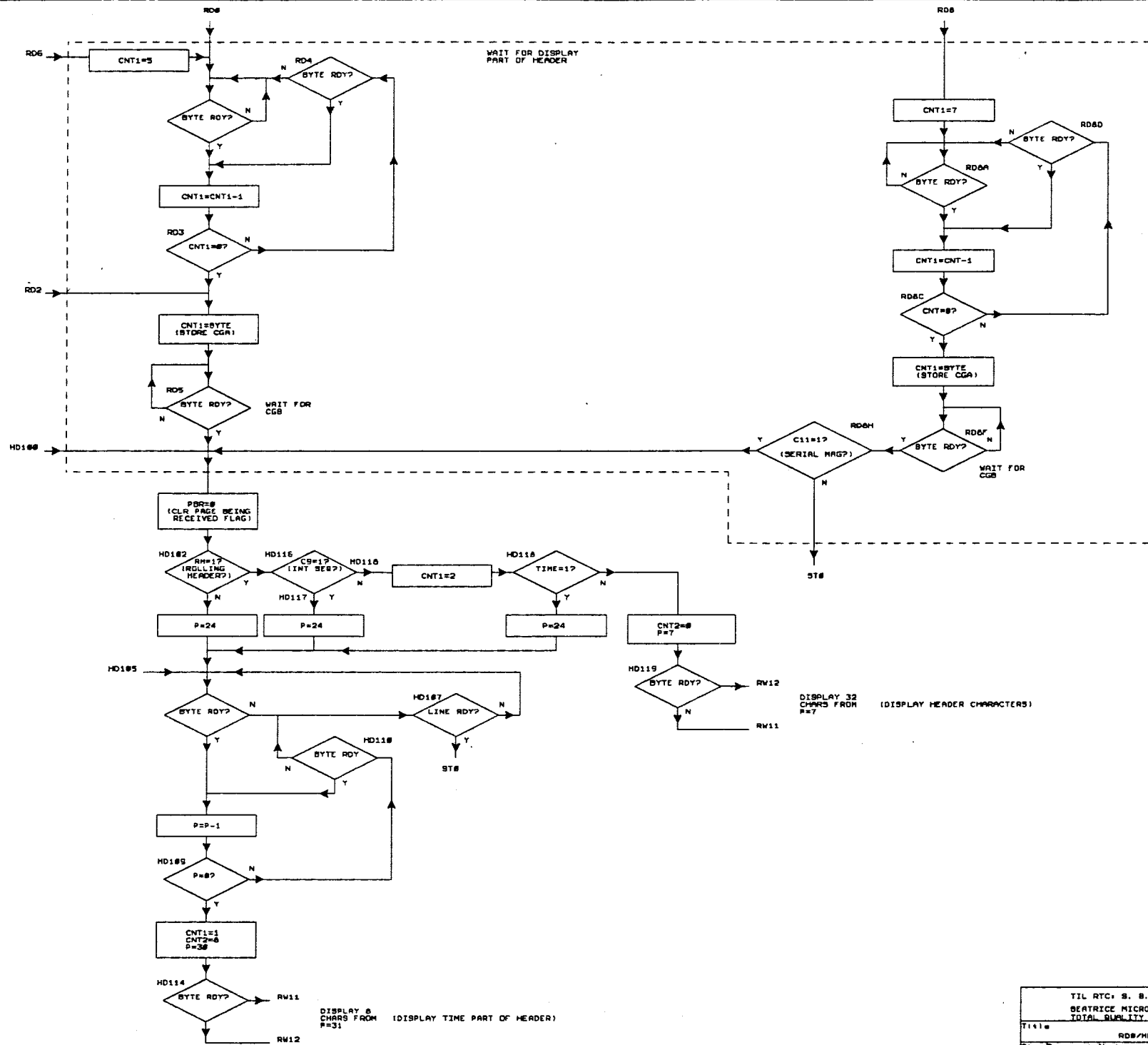
REMOTE CONTROL
DECODE AND TV
DISPLAYS



TIL RTC: S. B. JONES			
BEATRICE MICROCODE			
TOTAL SUPPLY DOCUMENTATION			
Title		OVERALL BLOCK DIAG	
Size	Document Number	REV	
C	BM 1	1	
Date:	March 29, 1969	Sheet:	1 of 28







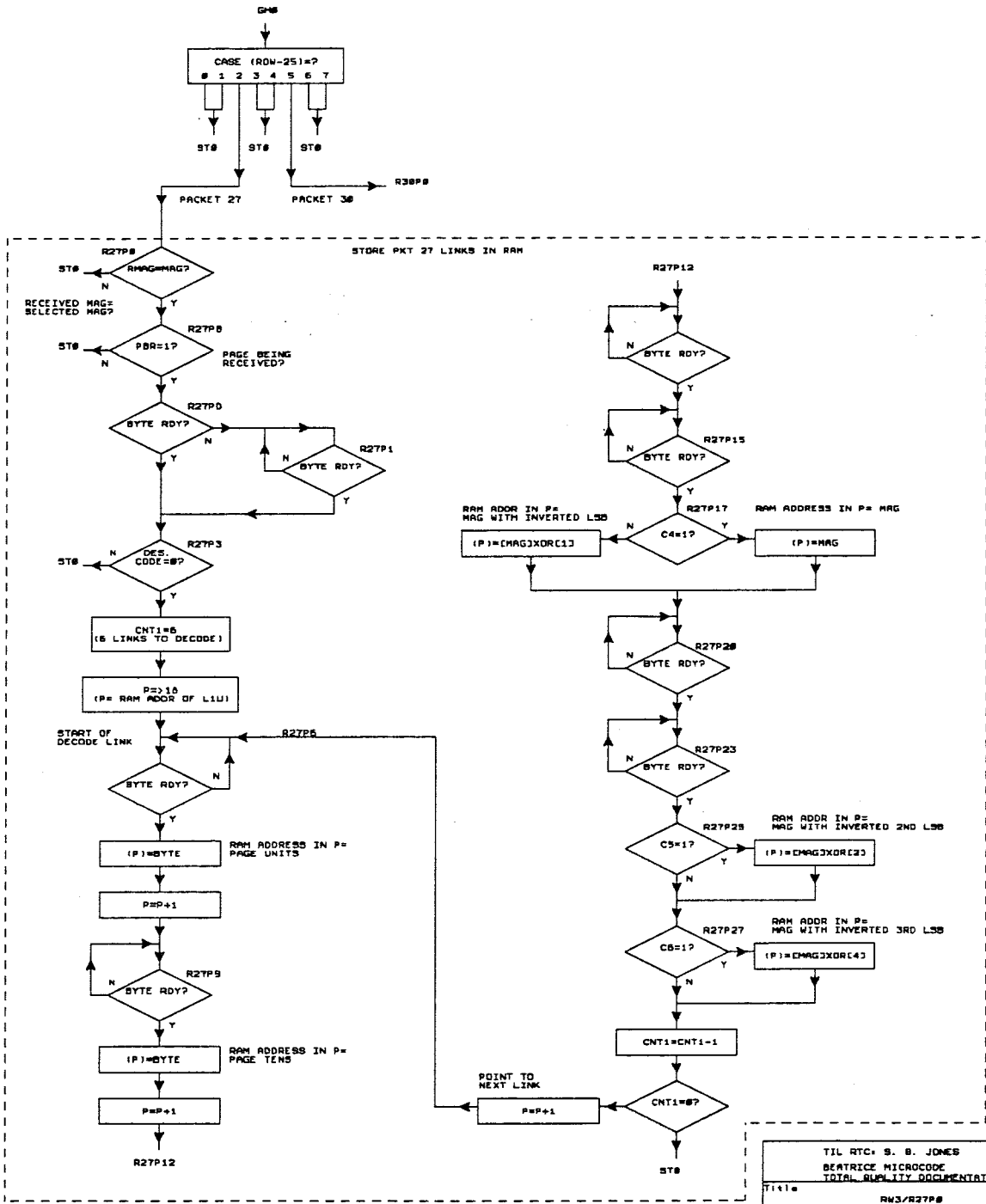
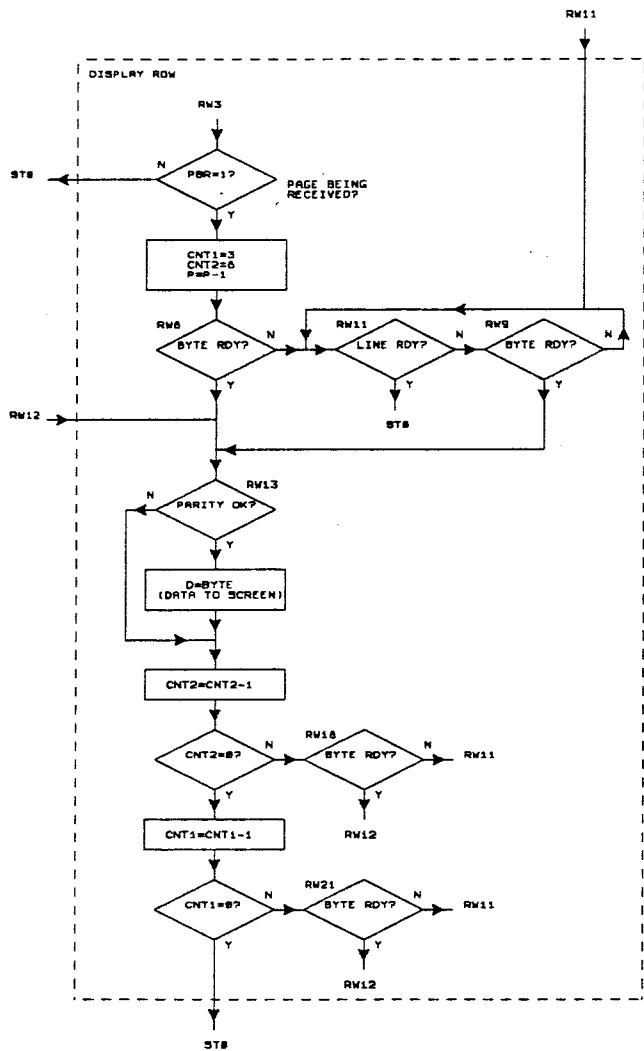
WAIT FOR DISPLAY PART OF HEADER

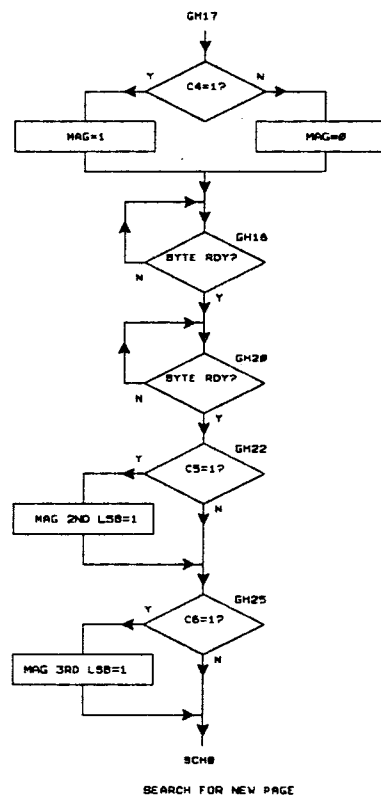
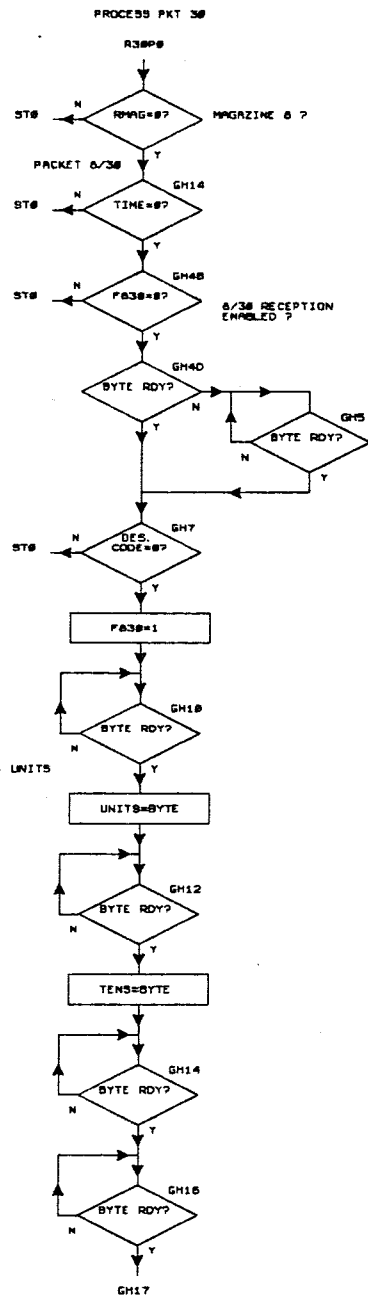
DISPLAY 32 CHARS FROM #7 (DISPLAY HEADER CHARACTERS)

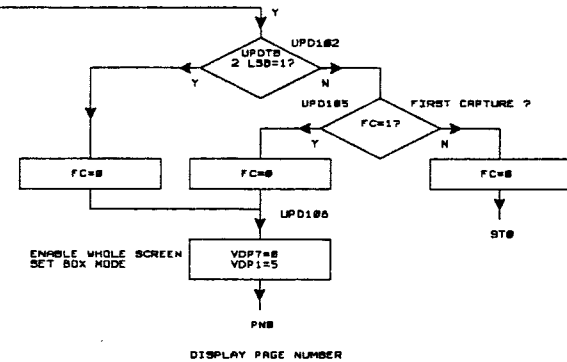
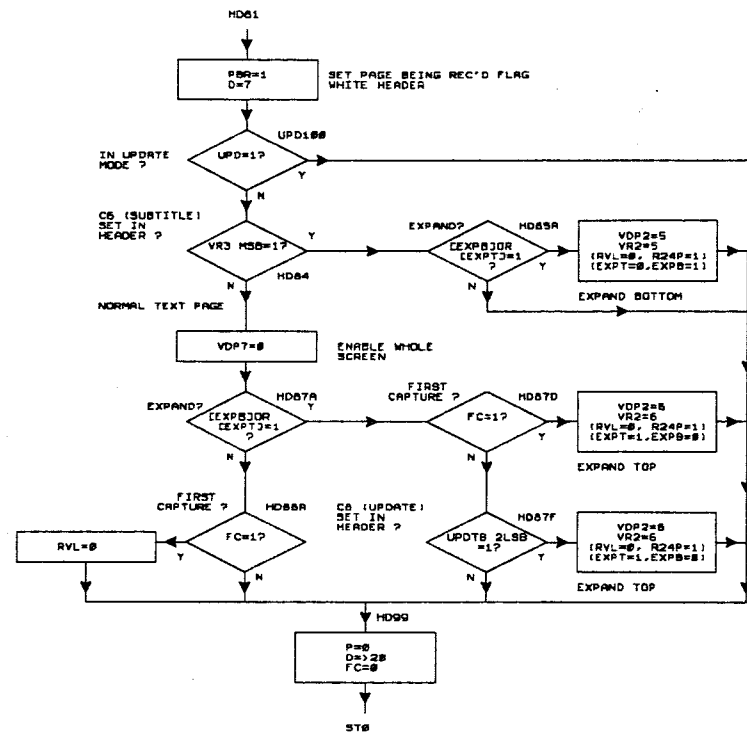
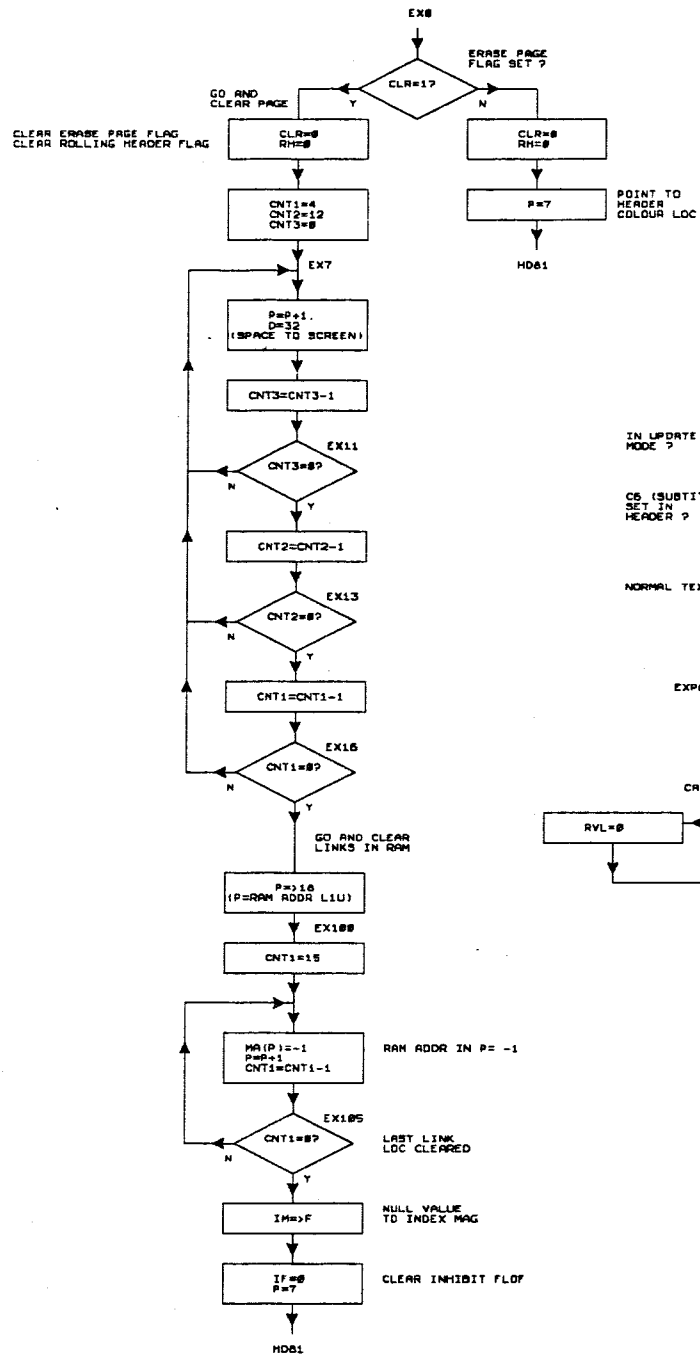
DISPLAY 8 CHARS FROM #31 (DISPLAY TIME PART OF HEADER)

TIL RTC: S. B. JONES		
BEATRICE MICROCODE		
TOTAL QUALITY DOCUMENTATION		
Title	RDS/HD100	
Site/Document Number	BM 1.3	
C	1	1
Date:	March 29, 1999	Sheet 4 of 28

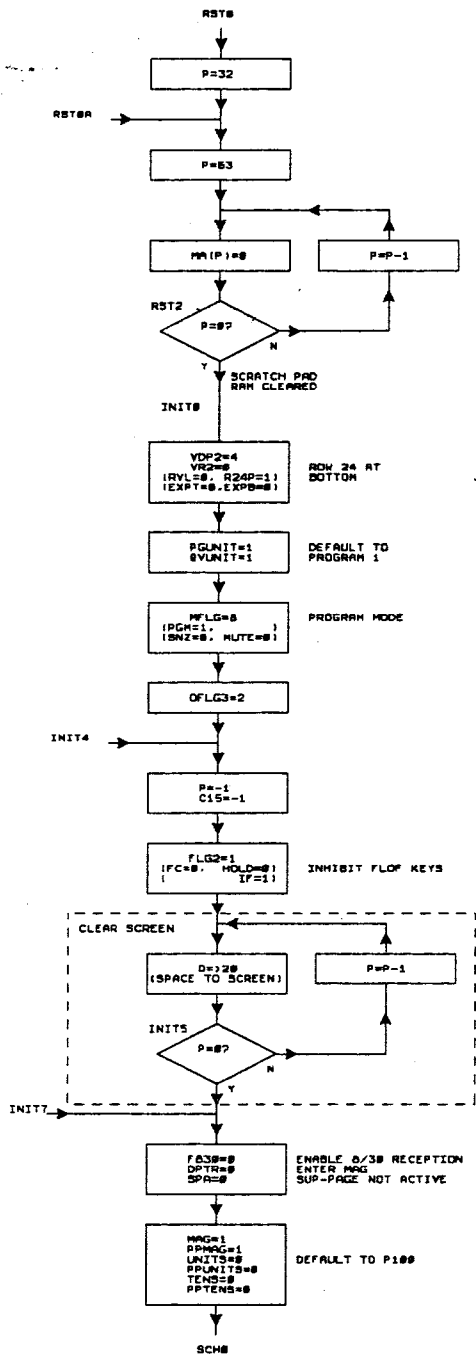
START OF GHOST ROW PROCESSING



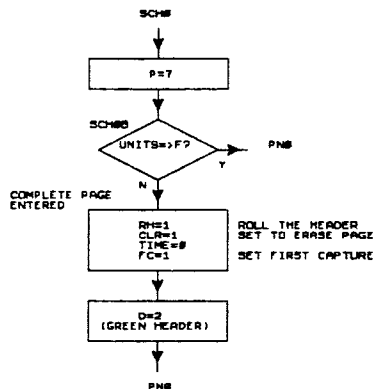




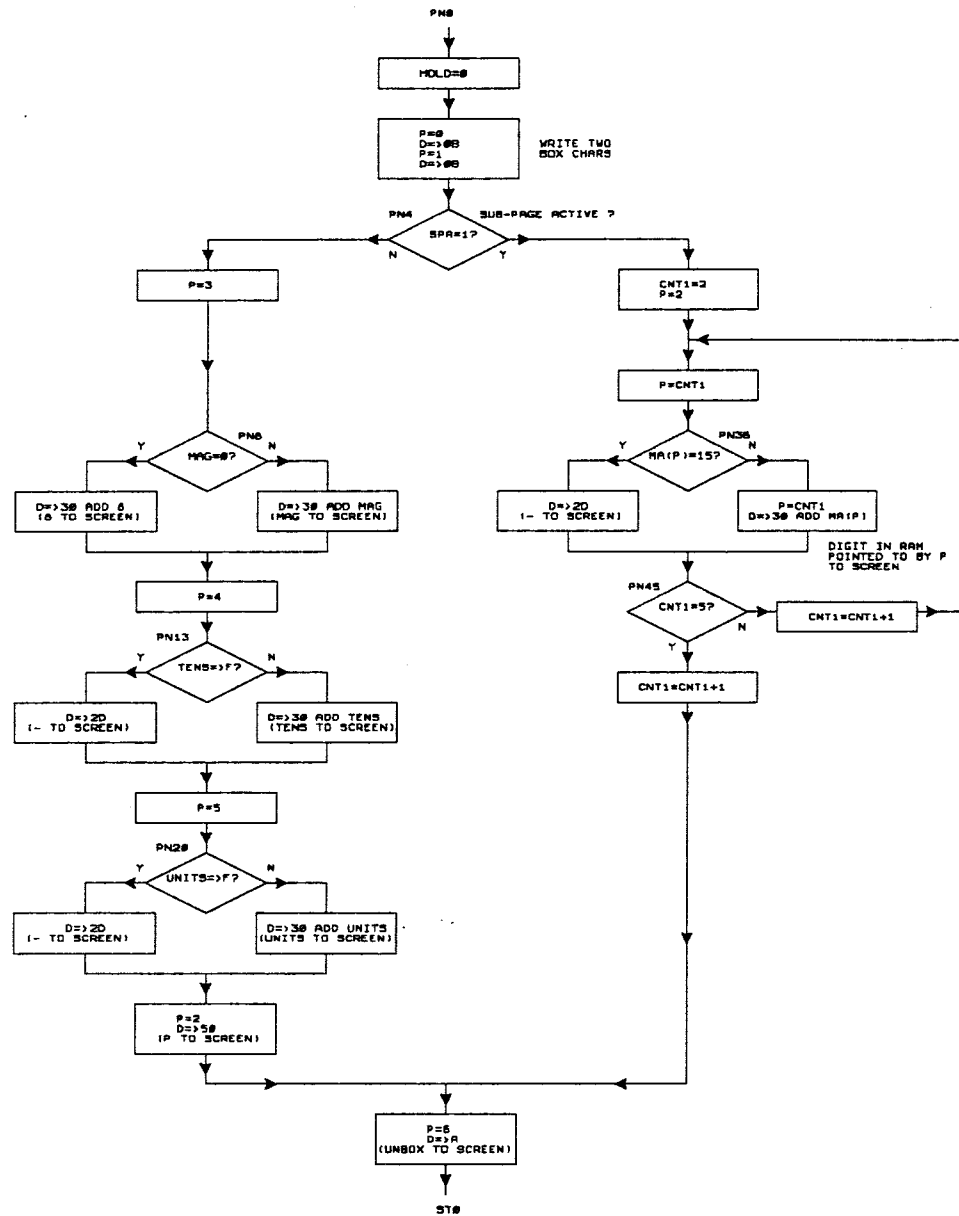
ENTRY POINT FROM POWER UP

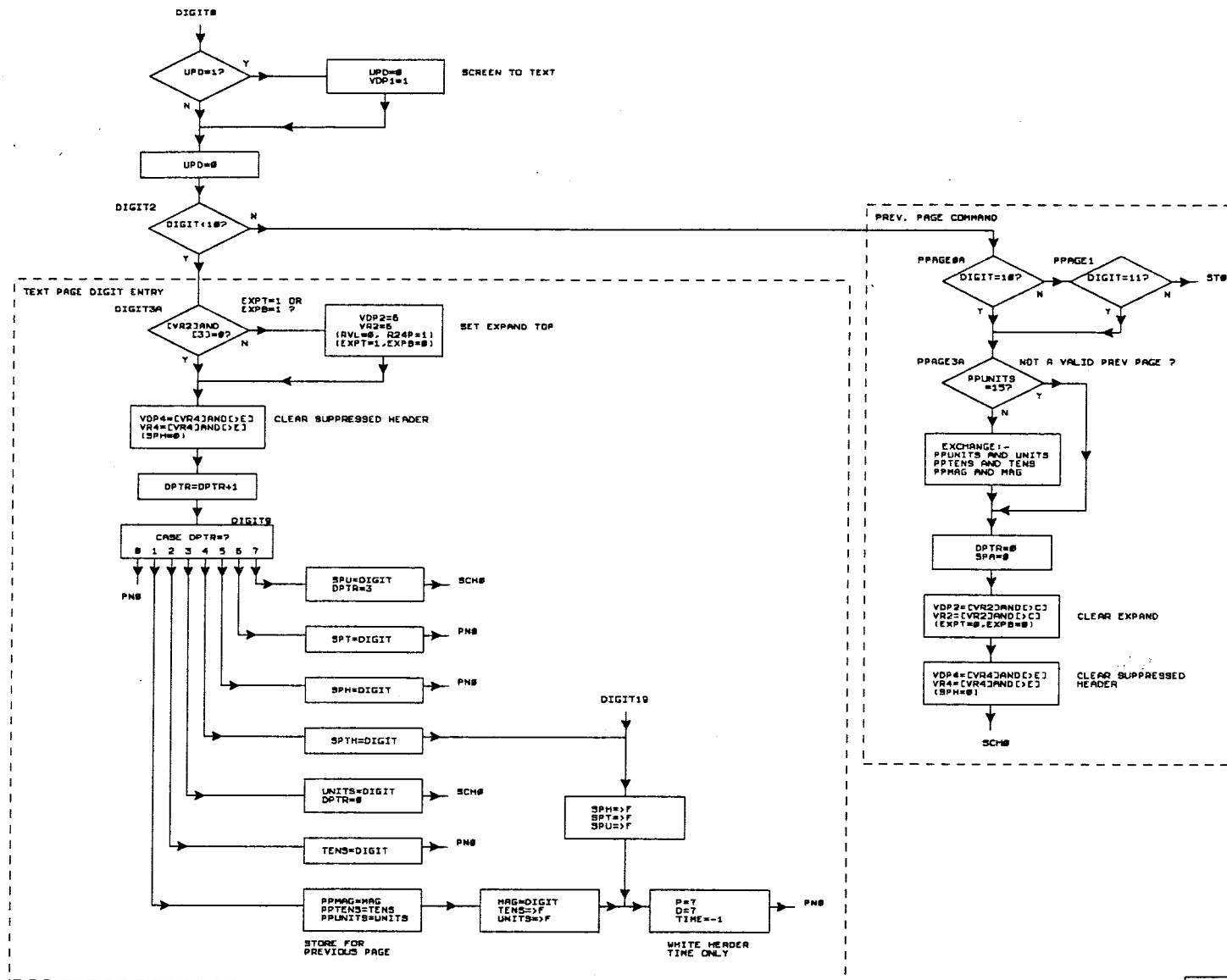


SEARCH FOR NEW PAGE IF COMPLETE PAGE NUMBER ENTERED

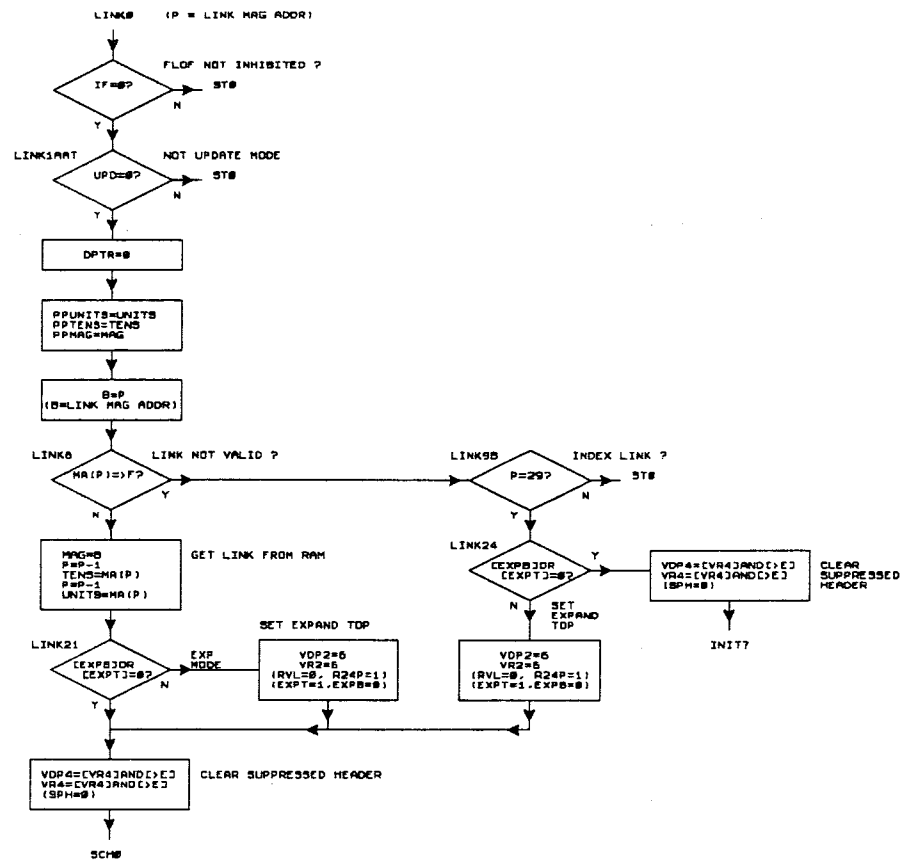


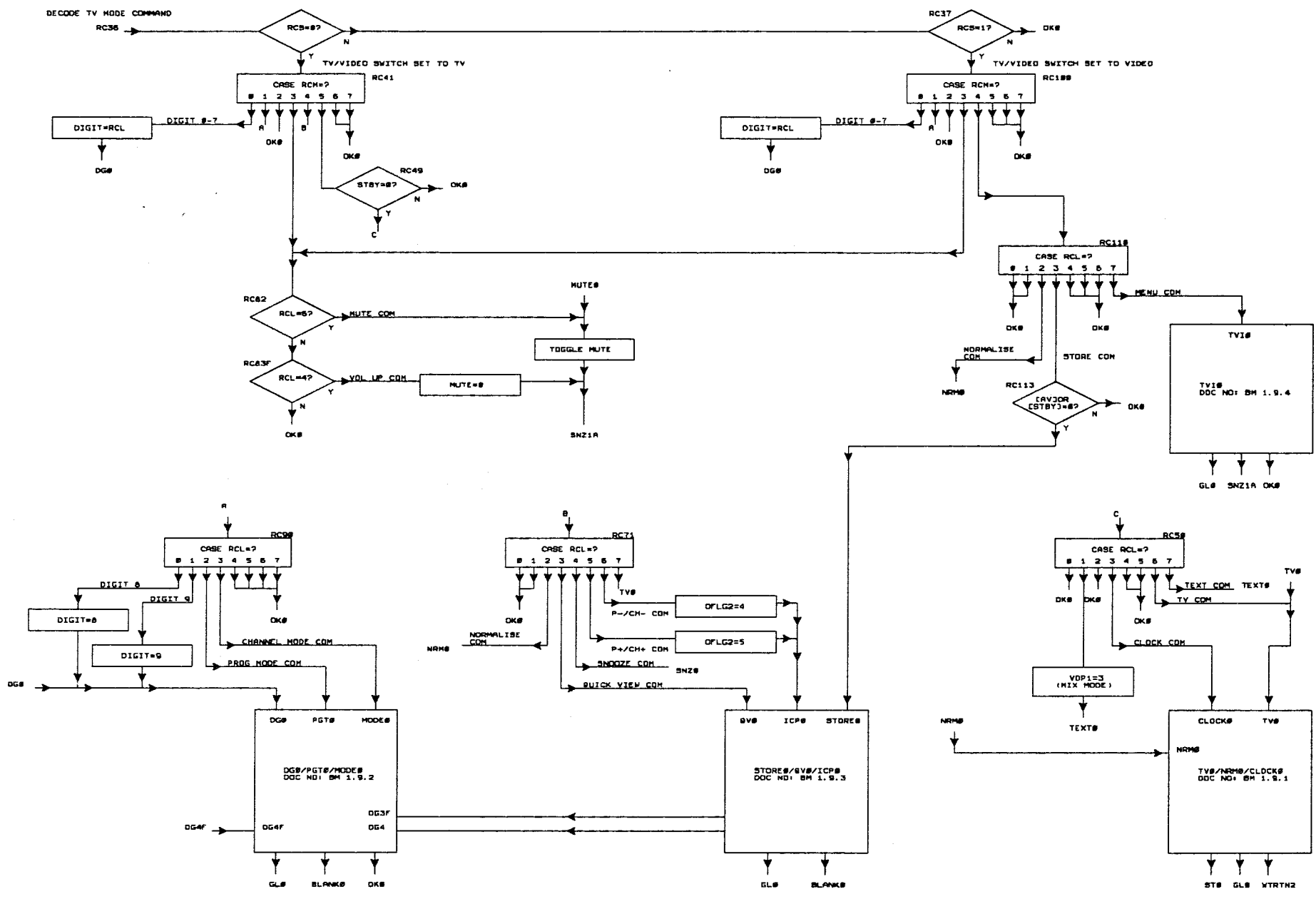
WRITE PAGE NUMBER TO SCREEN

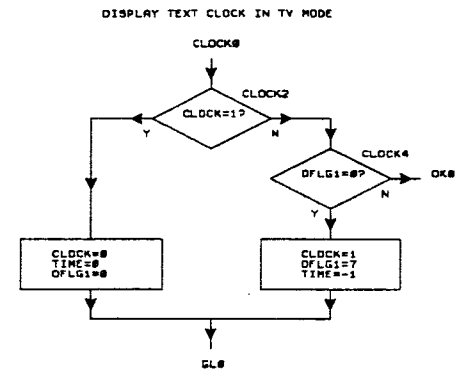
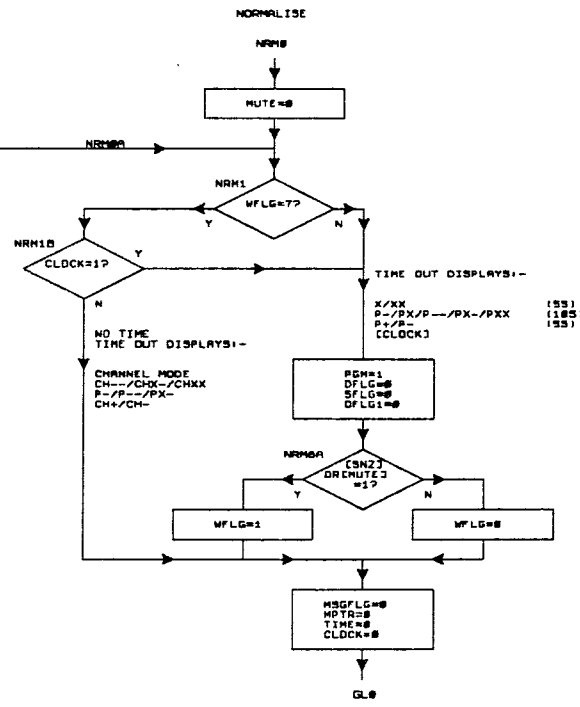
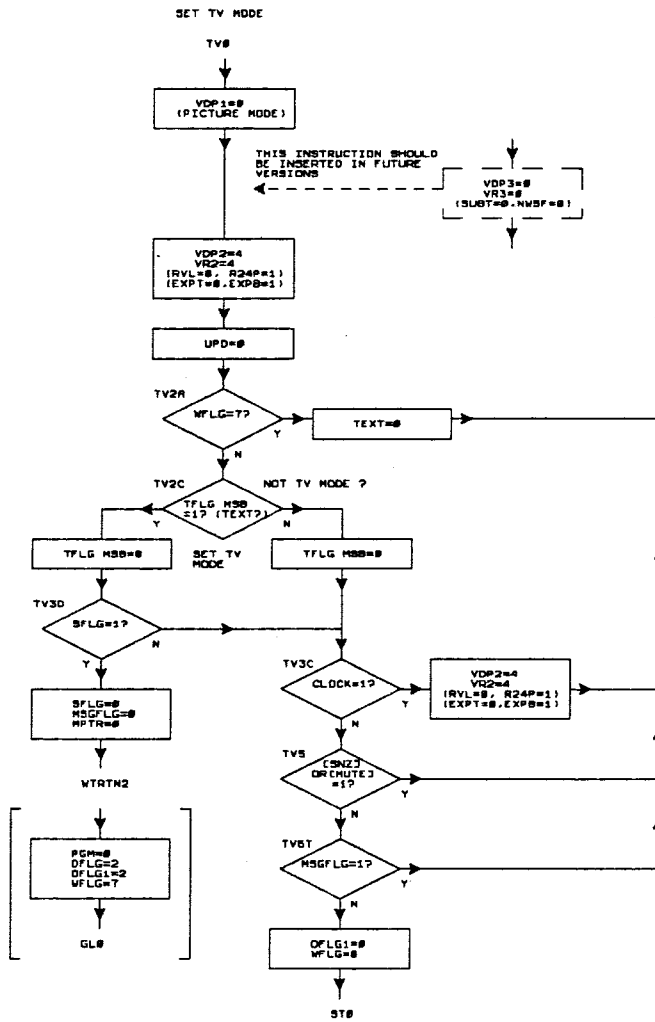




MOVE LINK TO MAG. TENS. UNITS

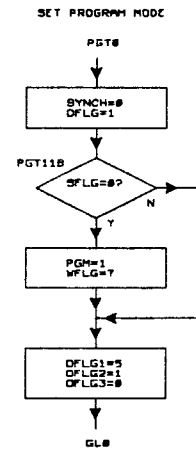
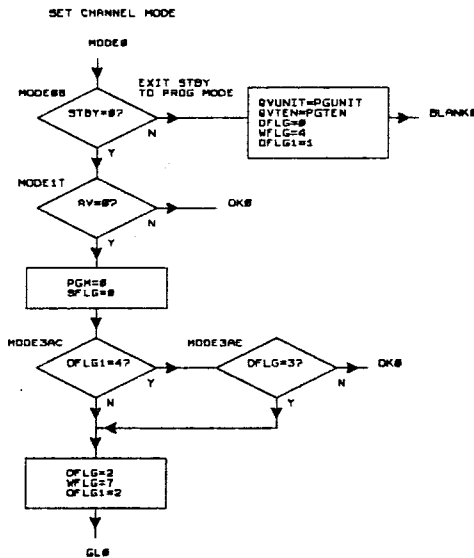
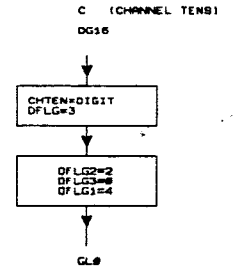
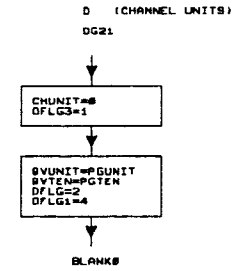
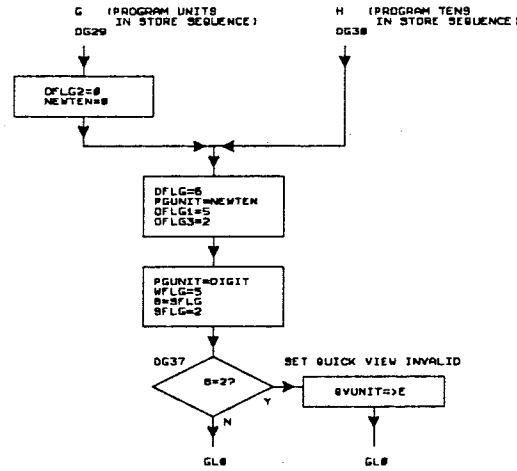
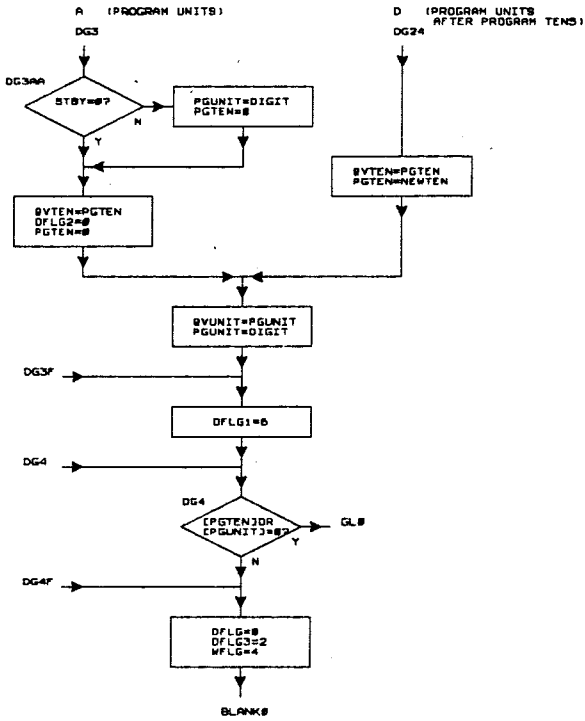
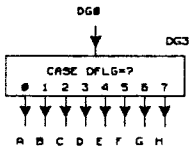




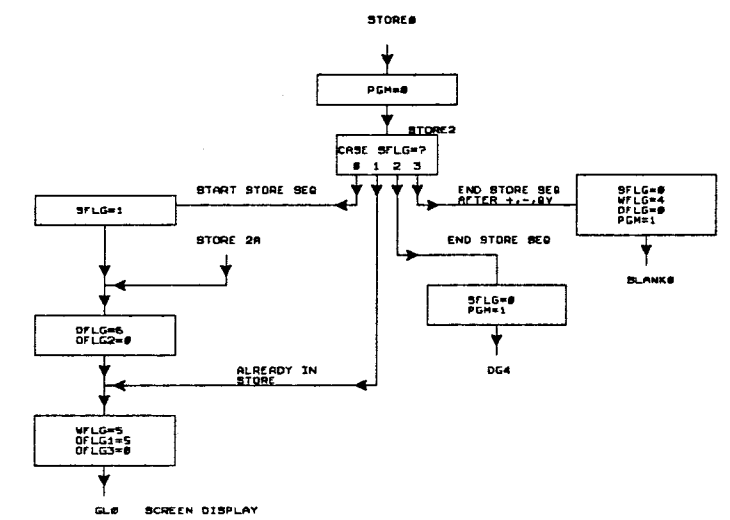
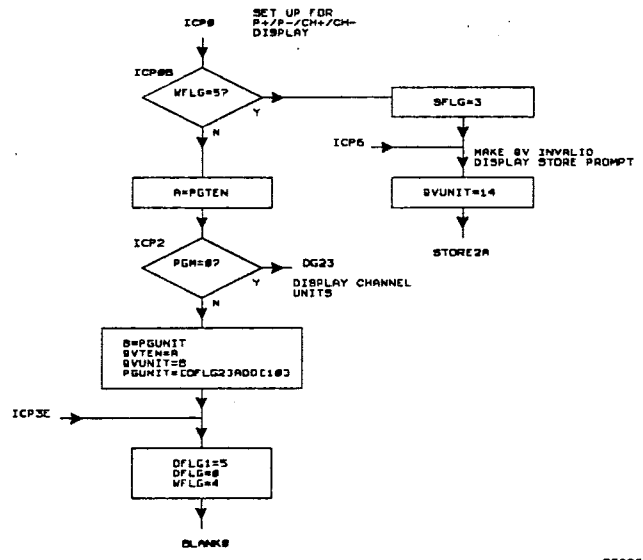
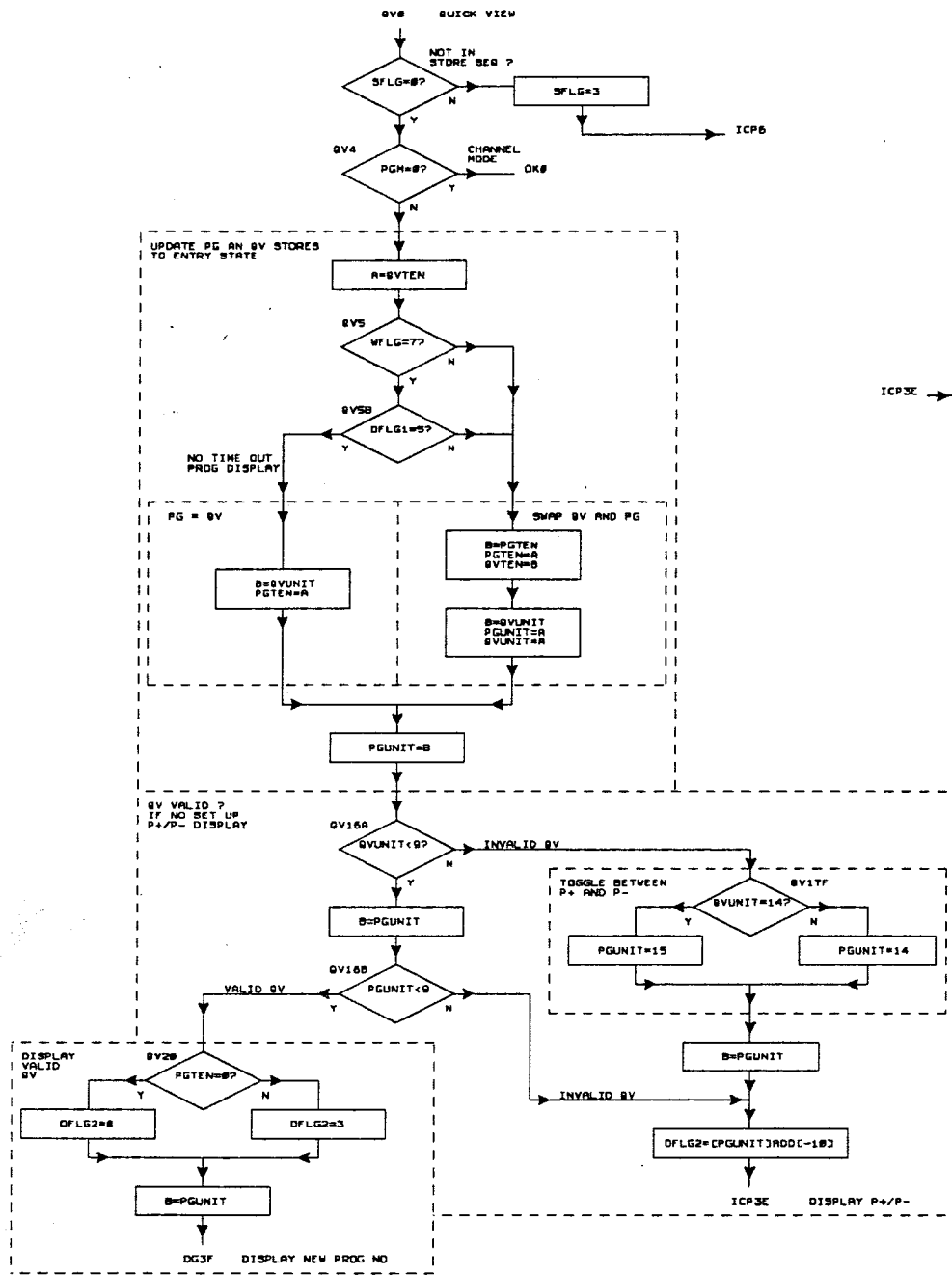


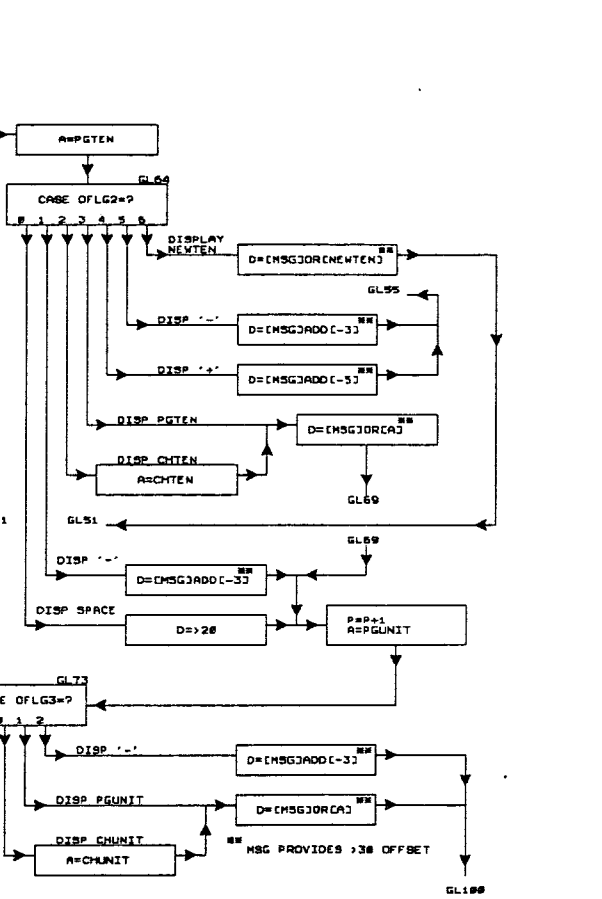
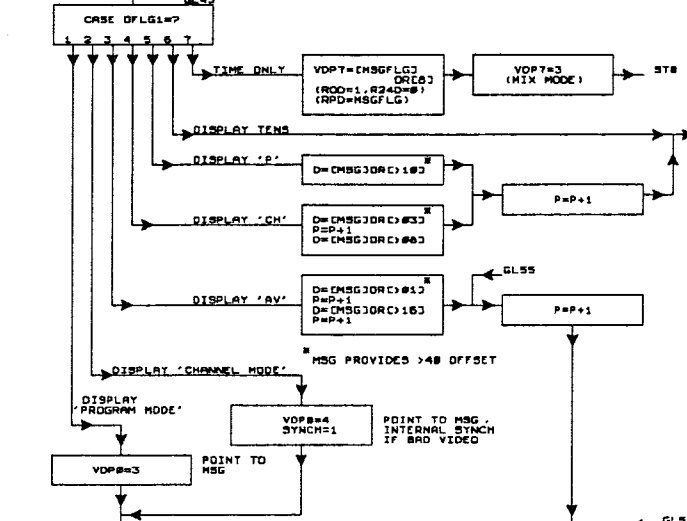
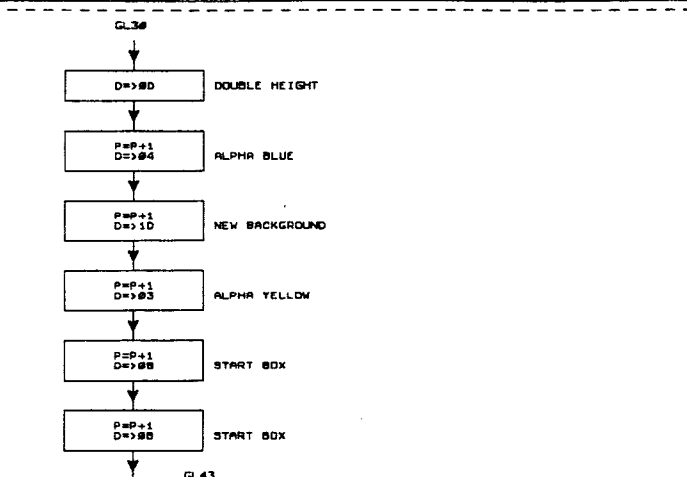
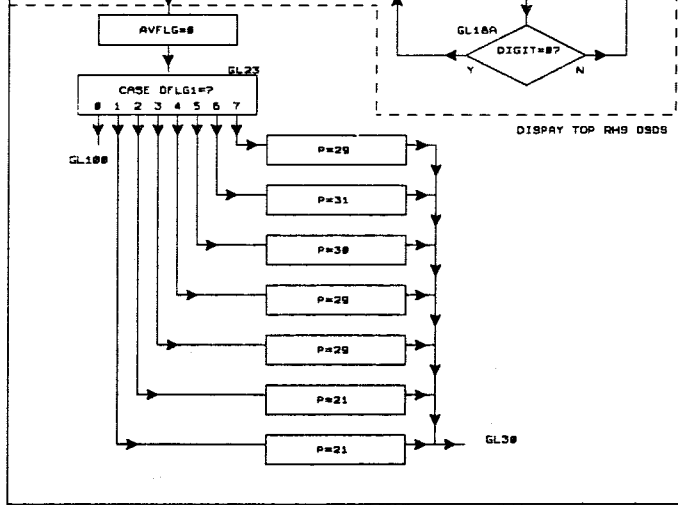
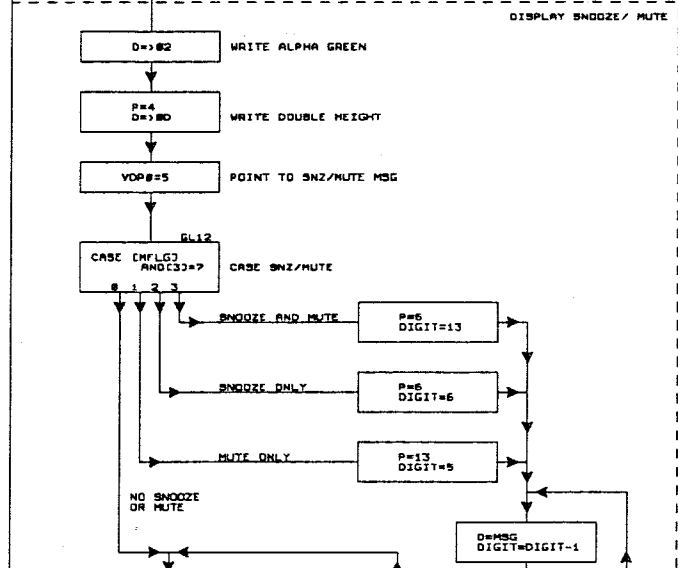
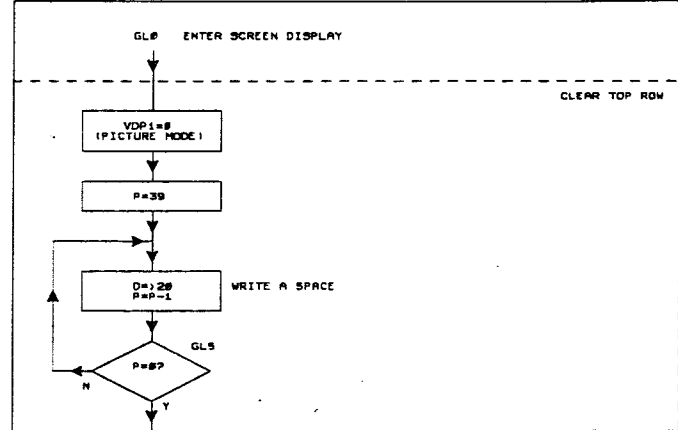
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BEATRICE MICROCODE			
TOTAL QUALITY DOCUMENTATION			
Title		TVS/NRMI/CLOCK0	
Size	Documnt Number	REV	
C	BM 1.0.1	3	
Date:	March 29, 1988	Sheet	14 of 28

PROGRAM/ CHANNEL DIGIT ENTRY

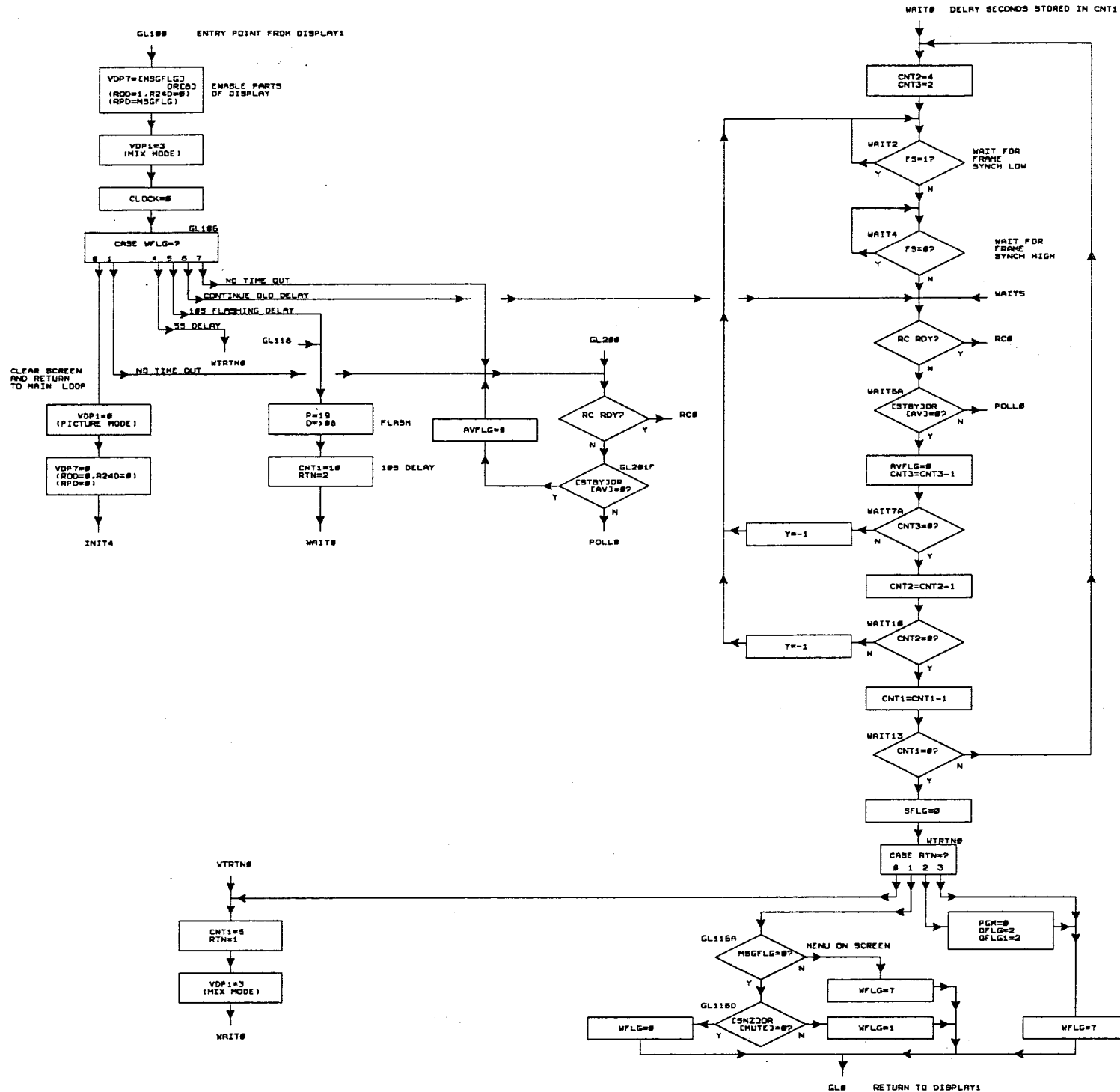


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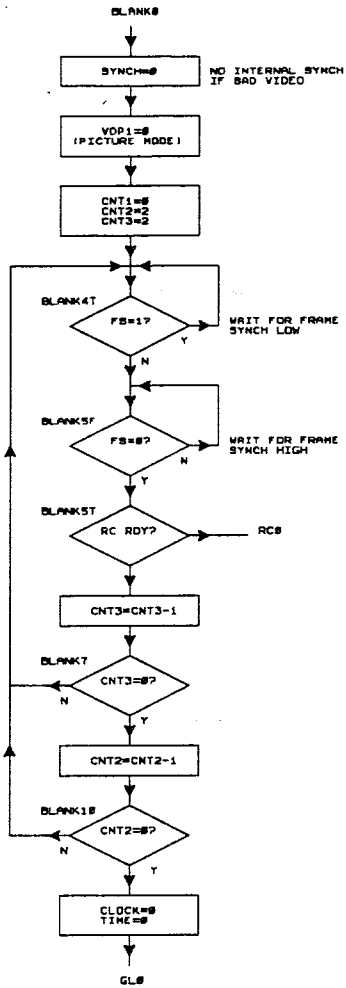




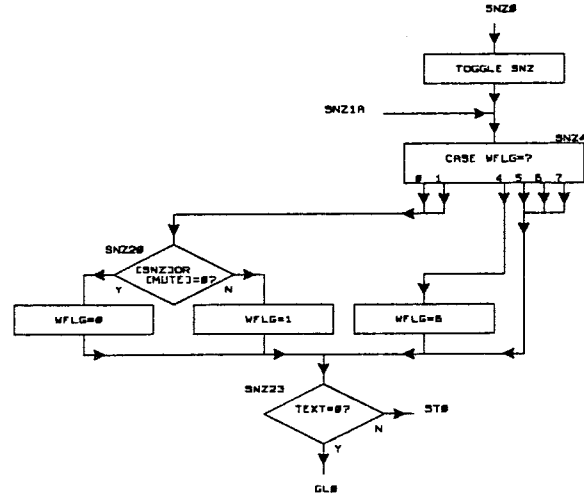
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BEATRICE MICROCODE		
TOTAL SUPPLY DOCUMENTATION		
Title	GL0	
Size Document Number	BM 1.10	REV 1
C		
Date	March 29, 1988	Sheet 10 of 20



SWITCH OFF DISPLAYS
FOR .SS AFTER PRGM/CHANNEL
CHANGE



UPDATE WFLG FOR NEW
SNDDZE/ MUTE STATUS



RETURN AFTER
INVALID RC

