NBSIR 73-235

FIELD SERVICE TEST MODEL: COMPUTER-CONTROLLED U SYSTEM. OPERATIONS MANUAL AND SOFTWARE OPERATING SYSTEM APPENDICES FOR THE AUTOMATED SYSTEM. VOLUME II.

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July 11, 1973

Instruction Manual

Prepared for
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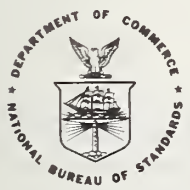

U. S. DEPARTMENT OF COMMERCE, Frederick B. Dent, Secretary
NATIONAL BUREAU OF STANDARDS, Richard W. Roberts, Director

FIELD SERVICE TEST MODEL: COMPUTER-CONTROLLED U SYSTEM

OPERATIONS MANUAL AND SOFTWARE OPERATING SYSTEM APPENDICES FOR THE AUTOMATED SYSTEM

VOLUME II

INTRODUCTION

Volume II of the "Automated U System" describes the software listings and the operator's manual. This volume is intended to instruct the station technician in the procedure to load programs and operate, under computer control, the automated U system. Other manuals describe the system and the technical design and are contained in the following manuals:

Volume I. Field Service Test Model: Computer-Controlled U System. Operations Manual and Software Operating System Appendices for the Automated System.

Field Service Test Model: Computer-Controlled U System. Manual for Receiver and ADACS Interface Chassis.

Field Service Test Model: Computer-Controlled U System. Manual for Test Unit.

Field Service Test Model: Computer-Controlled U System. Manual for Computer Subsystem.

Field Service Test Model: Computer-Controlled U System. Manual for System.

Certain commercial equipment and materials are identified in this paper in order to adequately specify the components used. In no case does such identification imply recommendation or endorsement by the National Bureau of Standards, nor does it imply that the material or equipment identified is necessarily the vest available for the purpose.

APPENDIX I

INT/EXT CROSS REFERENCE TABLE

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
B:IOR			I																									X	X
B:ORT		X				I																							
B.RET		I	X																										
B.RS1		I	X																										
B.RS2		I	X																										
B.STT	X	I				X	X			X																		X	X
E.28F	X					X	X	I								X	X			X	X	X							
E.28O	X							I																					
E.35I							X		I									X										X	X
E.35O	X					X			I																				
E:35S	X								I																				
E.3IC							X		I																				
E:ABR	X					I																							
E:ANF	I	X				X																							
E:ANL	X				I																								
E:BAD																X				X	X	X	I			X			
E:BDC																X							I						
E.BDF																X				X	X	X	I			X			
E:BSG																X					X		I			X			
E:BSK		I																											
E:COT													X	X		X									I				
E:DIF											X		X	X		X									I				
E:FAM																X					I								

NOTE: I denotes internal reference, X denotes external reference.

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	F$FMT	F$DMP
E:FCT						X					X					X								I					
E:FMF											X					X					X				I				
E:FRT	X					X	X							X		X	X			X	X	X		I					
E:I28	X							I																					
E:I35	X								I																				
E.IOF	X		X			X	X		I	X	X			X				X											
E:LOG		X		X							X					X	X	X				I							
E:MAG		X								I									X										
E:MGS			X							I																			
E:MIN	X			I																									
E:MIT	X				I						X							X											
E:MTI	X									I																			
E:028	X					X	X	I								X	X												
E:035	X	X	X			X	X		I	X	X			X				X											
E:OMI		X					I																						
E:PAR	X					I																							
E:PWD	X					I																							
E:SEC	X			I																									
E.SF1	X				I																								
E:SKD	X	I	X			X	X	X	X	X						X	X	X	X	X	X							X	X	
E:SRT											X																I		
E.TØ1		I			X																								
E.TØ2		I		X																									

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMP	E$SRT	F$FMT	F$DMP
E.TØ3		I			X																								
E.TØ4		I		X			X																						
E.TØ5		I						X																					
E.TØ6		I							X																				
E.TØ7		I						X																					
E.TØ8	X	I		X			X																						
E.TØ9		I																											
E.T1Ø		I				X																							
E.T11		I								X																			
E.T12		I																											
E.T13		I					X																						
E.T14		I		X																									
E.T15		I	X				X			X																			
E:T28		X						I																					
E:T35		X							I																				
E.TM1						X					X					X								I					
E.TM2						X					X					X								I					
E.TM3				I																X									
E.TSF	X	I	X																										
E:TSI	X		I																										
E.TSK		I																											
E.UBF					I																								
E.UBU	X				I																								

AI.4

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	E$FMT	E$DMP
E:UIN		X			I																								
F:ANL	I	X																											
F:BBT																													X
F:CHK																												I	X
F:CVT																												I	X
F.DBF																												I	X
F:DDD																												X	I
F:DMP		X																											I
F:FMT		X																										I	
F:FST																													I
F.MTP	X									X																		I	X
F:TIM																													I
F:TRD																												I	
F:USE																												I	X
M:ESC		X																I											
M.GNT				I															X										
M:INT	X																	I		I									
M:LEV		X																		I									
M.STA											X					X	X	I			X								
M:STD		X																			I								
M.TM1				X														I											
M.TRT				I															X										
M.UPT				I															X										

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	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIE	E$FMF	E$SRT	F$FMT	E$DMP
U.AMP											X		X	X	I	X					X								
U.AST	X										X		X	X	I	X	X												
U.BGF														X	I														
U.BLL	X				X						X				I	X		X			X								
U.CCL														I		X													
U.CCN	X										X				I				X										
U.CDM													X	I															
U.CDT													X	I															
U.CLS	X												X	X	I	X			X										
U.CMP	X										X				I														
U:CNI	I										I							X											
U.CPC	X										X		X		I														
U.CPP	X										X		X		I														
U.CST	X										X	X	X	X	I	X	X		X		X								
U.CTM	X										X			X	I	X													
U.CYC					X						X				I														
U.DIU	X										X		X	X	I	X	X				X								
U.DTM													X	X	I	X													
U.END													X	X	I	X			X										
U.FAC	X										X		X	X	I														
U.FRQ														X		X	X				X	I							
U.GAN	X			X	X						X				I	X		X			X	X							
U:GET													I	X															

	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FME	E$SRT	F$FMT	F$DMP
U.IHB	X				X						X				I		X				X								
U.LFZ													X	I		X													
U.LSP											X	X			I														
U:LSQ											X	I																	
U.LST											X	X			I														
U.LTF											X		X	X	I														
U.LTM													X	I		X													
U.OAM													X		I	X													
U.OCI													X	X	I	X													
U.OCR														X	I	X													
U.OFZ													X	X	I	X													
U.OSG													X		I	X													
U.OTB													X		I	X													
U.OTM													X	X	I	X			X										
U:PST		X																I											
U:RED		X															I												
U:RP1														X		I													
U:RP2													X	X		I													
U:RP3		X														I													
U:RTA		X									I																		
U.RTY	X										X				I				X										
U.SIG											I		X								X								
U.SLP	X											X		X	I														

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	E$INT	E$SKD	E$TSI	E$CLK	E$UIN	E$SUB	E$OMI	E$T28	E$T35	E$MAG	U$RTA	U$LSQ	U$TGR	U$WFA	U$DAT	U$REP	U$RED	U$PST	M$ESC	M$LEV	M$STD	E$LOG	E$BDC	E$FRT	E$DIF	E$FMF	E$SRT	E$FMT	E$DMP
U:TGR												X	I																
U.TM1	X			I																									
U.TM3	X										I																		
U.TM4	X				I						I																		
U.TRF	X										X		I		X				X										
U.TRK	X			X	X						X				I	X	X	X			X	X							
U.TRL													I						X										
U.UDR																I													
U:WFA													X																
U.WRK					X						X				I														
W.LAM															I	X													
W.LPK															I	X													
W.LTM															I	X													
W.ONR															I	X													
W.OST															I	X													
W.PAM															I	X													
W.PFZ															I	X													
W.PTM															I	X													
W.RAM															I	X													
W.RFZ															I	X													
W.RTM															I	X													
W.VAM															I	X													
W.VPK															I	X													

	W.VTM
E$INT	
E$SKD	
E$TSI	
E$CLK	
E$UIN	
E$SUB	
E$OMI	
E$T28	
E$T35	
E$MAG	
U$RTA	
U$LSQ	
U$TGR	
U$WFA	X
U$DAT	1
U$REF	X
U$RED	
U$PST	
M$ESC	
M$LEV	
M$STD	
E$LOG	
E$BDC	
E$FRT	
E$DIF	
E$FMF	
E$SRT	
F$FMT	
F$DMP	

APPENDIX II

NUSTAD MEMORY MAP

```
XXAP
P E$INT    0000
  F:ANL    0169
  E:ANF    0100
P E$SKD    01A3
  E.T15    01BF
  E.T14    01C0
  E.T13    01C1
  E.T12    01C2
  E.T11    01C3
  E.T10    01C4
  E.T09    01C5
  E.T08    01C6
  E.T07    01C7
  E.T06    01C8
  E.T05    01C9
  E.T04    01CA
  E.T03    01CB
  E.T02    01CC
  E.T01    01CD
  B.STT    01EA
  B.RS2    01F3
  B.RS1    01EC
  E.TSK    01BE
  E.TSF    01EB
  E:BSK    01CF
  E:SKD    01A3
  B.RET    01F9
P E$SUB    01FA
  E:PWD    01FA
  B:ORT    025D
  E:ABK    025A
  E:PAR    0224
P E$CLK    02A4
  M.TRT    032F
  M.UPT    042B
  U.TM1    0448
  M.GNT    03BB
  E.TM3    0449
  E:MIN    02D2
  E:SEC    02A4
P E$TSI    0468
  E:TSI    0468
  B:IOK    047C
P U$RED    049F
  U:RED    049F
P U$RTA    0569
  U:RTA    0569
```

```
    U.TM4   093A
    U.TM3   0939
    U:CNI   07F5
    U.SIG   08D2
P   U$LSQ   094B
    U:LSQ   094B
P   'STGR   09BE
    U.TRL   0CD3
    U.TRF   0B05
    U:TGR   09BE
    U:GET   0AA9
P   U$WFA   0D00
    U.LTM   1037
    U.LFZ   1029
    U:WFA   0D00
    U.CDT   1053
    U.CDM   1061
    U.CCL   10B8
P   E$DMI   10DE
    E:DMI   10DE
P   U$REP   1246
    U:RP3   1397
    U:RP2   133F
    U:RP1   1246
    U.UDR   1365
P   E$LDG   1AC1
    U.FRQ   1B91
    E:LDG   1AC1
P   E$UIN   1BAD
    E:ANL   1C2D
    E:UIN   1BAD
    E:MIT   1C30
    E.SF1   1E2C
    E.UBU   1C48
    E.UBF   1C72
P   M$ESC   1E2D
    M.STA   1EDB
    M:ESC   1E36
    M.TM1   1EDA
    M:INT   1E2D
P   M$STD   1EF7
    M:STD   1EF7
    E:FAM   1FF4
P   M$LEV   209A
    M:LEV   209A
P   U$PST   21D0
    U:PST   21D0
P   E$FRT   22E1
    E:FRT   22E5
    E.TM2   2329
    E.TM1   2323
    E:FCT   22E1
P   E$BDC   232A
```

```
   E.BSG    2358
   E.BDF    2359
   E:BDC    232A
   E:BAD    232D
P  E$FMF    235E
   E:FMF    235E
P  E$DIF    23A1
   E:CDT    23A1
   E:DIF    23A7
P  E$SRT    23FB
   E:SRT    23FB
P  E$MAG    243A
   E:MTI    243A
   E:MGS    246F
   E:MAG    243D
P  E$T35    24FC
   E.350    261E
   E.35I    262F
   E:35S    260B
   E:T35    24FF
   E:D35    25C4
   E:I35    24FC
   E.IDF    2792
   E.3IC    267F
P  E$T28    2793
   E.280    3073
   E.28F    3077
   E:T28    2796
   E:D28    27C3
   E:I28    2793
P  USDAT    3080
   U.CYC    3507
   W.VTM    3691
   W.RTM    36C9
   W.PTM    3605
   W.LTM    3659
   W.DST    362F
   U.RTY    3531
   U.DTM    3577
   U.LTF    30B8
   U.DTM    3593
   U.CTM    3345
   U.DTB    3595
   W.VPK    3683
   W.LPK    364B
   U.LST    30C8
   U.LSP    3154
   U.CST    353F
   U.DSG    35E9
   U.AST    354D
   U.WRK    3163
   U.TRK    3080
   W.DNR    363D
   U.CPP    34EB
```

```
   U.CPC   34F9
   U.END   3569
   U.CMP   3347
   U.AMP   36F3
   U.SLP   3155
   U.CLS   355B
   U.BLL   309C
   W.RFZ   36BB
   W.PFZ   35F7
   U.DIU   30AA
   U.IHB   3523
   U.BGF   30B9
   U.JFZ   35BF
   W.VAM   36AD
   W.RAM   36E5
   W.PAM   3621
   W.LAM   3675
   U.JDR   35CD
   U.JDI   35DB
   U.CCN   3515
   U.JAM   35B1
   U.GAN   308E
   U.FAC   30BA
P  F$FMT   3701
   F:CVT   378E
   F.MTP   381A
   F:USE   381B
   F:TRD   3811
   F:FMT   3701
   F:CHK   371D
   F.DBF   3842
P  F$DMP   3865
   F:FST   3942
   F:DMP   3865
   F:TIM   3A1D
   F:DDD   3869
   F:BBT   3AD3
   *HIGH 3AFC
   *XFER 0100
   *BIAS 0000
```

APPENDIX III

PROGRAM USER'S MANUAL

SECTION I. OPERATING PROCEDURES.

I. 1 SYSTEM START-UP.

a. Turn on rack power in all three processor racks, Teletype machines, ADACS, receiver, etc.

b. Put the ASR 35 and the ASR 28 in the on line mode of operation.

c. Put the ADACS in the auto/normal mode.

d. Mount the SAL (MODCOMP Stand Alone Linking Loader, MODCOMP No. 600000-012) program paper tape in the PTR.

e. Turn on the power to the PTR, depress the sync button for approximately 2 seconds. Ensure that no part of the data has passed over the read head.

f. Set the data entry switch to a HEX A (Swt 12 and 14 set to a one).

g. Depress Master Clear.

h. Depress Fill.

i. HALT/RUN to RUN.

j. The SAL tape will now load. The ASR 35 will type out the following message:

SAL @ 787D, CSW = BIAS, Type "I" for commands

k. Set all data entry switches to zero.

l. Turn power off to the PTR, remove and rewind the SAL tape.

m. Mount "NUSTAD" part I tape, turn power on to the PTR and sync the tape as in e above.

n. Type the characters PR and carriage return on the ASR 35. This will cause the NUSTAD tape to begin loading into the processor. When the tape halts at the end, turn power off to the PTR, mount the NUSTAD part 2 tape, restore power and sync the PTR. Depress the carriage return key on the ASR 35 and the tape will continue to load. If the load was successful, the ASR 35 will type out "SATISFIED." If during the loading procedure any other message is typed out or if no message is typed at the end of NUSTAD part 2, attempt to reload the system. If it fails to load again begin maintenance on the processor.

o. Type "GO" and a carriage return on the ASR 35 and the system will begin operation. This will cause a "System Restart" (See Figure I. 1) to be typed on the ASR 28. This will be followed by a status display message on the ASR 28.

p. The system is now in automatic operation, refer to Section II for operator options.

q. If any of the receiver channels do not respond to the initial parameter values established by the program, the operator may use the "OPC" option as described in paragraph II. 4 to adjust the gain

and/or blanking levels for proper operation. The operator should ensure that there is sufficient signal strength to the receiver before adjusting gain to maximum.

I. 2 NORMAL OPERATION.

a. No operator intervention is required for normal operation. He may exercise the options described in Section II.

b. MANUAL UNATTENDED OPERATION: Prior to departing the station at the end of a duty day the operator will:

1. Set all receiver controls to the average settings as determined from the previous days Parameter History for the upcoming 16 hour period. See Section III. 1 for correlation between NUSTAD and EECO values.

2. If the processor should fail, the system will automatically return the receivers to the manual mode of operation.

I. 3 MAINTENANCE.

Prior to taking a channel down for maintenance the operator will place the Normal/Maintenance switch on the ADACS to the maintenance position. When maintenance is complete return the switch to the normal position.

```
.....SYSTEM RESTART AT 023 215549.....

023 215549  CURRENT RECEIVER STATUS, DET 215

 CHAN FREQ C I M AM GAIN TR BLL DIURNAL SIGMA AMPLITUDE
   A  17.8 1 1 0  A
   B  21.0 0 1 0  A
   C  21.0 0 1 0  A
   D  16.0 1 1 0  A
   E  22.3 0 1 0  A
   F  18.6 1 1 0  A
   G  24.0 4 1 0  A
   H ZERO INPUT...
   I  17.8 7 1 0  A
   J ZERO INPUT...
   K ZERO INPUT...
   L ZERO INPUT...
   M  24.0 7 1 0  A
   N  17.8 7 1 0  A



023 215554  A IR
023 215554  A CC05
023 215554  B IR
023 215554  B CC05
023 215554  C IR
023 215554  C CC01
023 215554  D IR
023 215554  D CC05
023 215554  E IR
023 215554  E CC01
023 215554  F IR
023 215554  F CC05
023 215554  G IR
023 215554  G CC05
023 215554  I IR
023 215554  M IR
023 215554  N IR
023 215620  D GC20
023 215642  H GC20
023 215708  A BC05
023 215713  B BC05
023 215718  C BC05
023 215723  D BC05
023 215729  E BC05
```

Figure I.1
SYSTEM LOG OF NORMAL INITIAL STARTUP

SECTION II. OPERATOR/NUSTAD COMMUNICATIONS.

II. 1 GENERAL.

Normally, NUSTAD waits for the operator to initialize an action request via the ASR 35 Teletype. This is referred to as NUSTAD being in the REQUEST MODE. When an action request message has been received, NUSTAD may require additional information from the operator. An inquiry message will be typed on the ASR 35 and NUSTAD will enter the RESPONSE MODE awaiting the information from the operator.

The operator may return to the REQUEST MODE at any time by depressing the CONSOLE INTERRUPT switch on the processor front panel. The following message is typed, and NUSTAD returns to the REQUEST MODE:

BACKGROUND TASK ABORTED BY OPERATOR

The list of action request options is limited, but allows the operator to enter messages into the station log, review DRFUD data tapes, and determine the system status on command.

II. 2 CALLING NUSTAD.

The operator may request the attention of NUSTAD by typing the / character. If NUSTAD is in the REQUEST MODE and ready to

process an action request, it will respond by crossing the / to form the letter X and spacing over. NUSTAD is now ready to interpret a keyword action request.

Example: Operator calls: /

NUSTAD responds: X

II. 3 OPERATOR ACTION REQUESTS.

Once the operator has NUSTAD's attention, he may enter an action request by typing a keyword from the following list:

Keyword	Resulting Action
DFC:	Execute DRFUD format checking program (See Section II. 8. 1 for programs operation).
DDD:	Execute DRFUD data display program (See Section II. 8. 2 for program operation).
STD:	Generate the CURRENT RECEIVER STATUS message on the ASR 28.
CRC:	Perform a CHANNEL REDUNDANCY CHECK.
OPC:	Perform an operator initiated parameter change (See Section II. 4 for format).
LOG:	Enter an operator generated message into the station log (See Section II. 5 for format).

II. 4 THE OPC OPTION.

The operator can request NUSTAD to make changes in parameter settings for individual sensor channels. NUSTAD will make the change

unless there is a signal in progress on the requested channel, in which case NUSTAD will inform the operator of the fact. If a change is made, the new value will be logged.

The format for the request is: X OPC:C, F, VV

WHERE: C is the channel for which the change is requested (A thru N).

F is the function indicating which parameter is to be changed.

Use: B for Blanking Level

G for RF Gain

T for Tracking Rate

V is a two digit value to which the requested function is to be set. Permissible ranges are:

Blanking Level	(ØØ thru 63)
RF Gain	(ØØ thru 24)
Tracking Rate	(ØØ thru 09)

NOTE: See Section III. 1 for correlation between the NUSTAD and EECO setting values.

II. 5 THE LOG OPTION.

The operator may enter information into the station log by using the LOG option. The text of the message he generates on the ASR 35 will be logged on the ASR 28.

The format used is: X LOG: (Message text)

The text of the message is terminated by depressing the return key.

II. 6 COMMUNICATION ERROR MESSAGES.

When NUSTAD interprets operator messages, it informs the operator of any errors it encounters. These are generally self-explanatory, but a further explanation is given below.

INVALID SYSTEM CALL - If NUSTAD is in the REQUEST MODE and the first character encountered is not a /, the message is ignored and an invalid system call message is typed.

INVALID KEYWORD, MSG IGNORED - If the first four characters after NUSTAD responds to the operator's call are not given in the keyword list above, the message is ignored and NUSTAD returns to the REQUEST MODE.

The following messages apply specifically to the OPC option:

INVALID CHANNEL - Channel designation was not an alphabetic character between A and N. Parameter change was not permitted.

INVALID FUNCTION - Function designation was not B, G, or T. Parameter change was not permitted.

VALUE NOT WITHIN LIMITS - The requested new value was not within the limits specified above for the function.

INVALID FORMAT - The message was not entered in the proper format. This message usually reflects a misplaced or missing comma in the message.

See Section II. 8 for interpretation of error messages associated with the DFC: and DDD: options.

II. 7 MESSAGE EDITING.

While the operator is preparing a message he may correct typing errors by using the following editing features:

RUB OUT - depressing the rub out will cause NUSTAD to ignore the last character typed. The first RUB OUT will delete the most previous character. Immediately typing a second will delete the character just prior to that, etc. When a RUB OUT attempts to delete a nonexistent character, i. e., one prior to the first character of the keyword, the entire

message is ignored and NUSTAD returns to the REQUEST MODE.

CANCEL - Simultaneously depressing the CONTROL and X keys will cause NUSTAD to ignore the entire message.

II. 8 BACKGROUND PROCESSING OF DRFUD DATA.

NUSTAD provides for tape format error detection and a data display of DRFUD data in a "useable" format. The error checking routine may be used separately or in conjunction with the display routine.

The use of bit position Ø, 1, and 2 of the switch register provide more versatility in using these programs. Prior to starting each format check or data display, the operator should decide which switch options he desires and set these switches accordingly.

II. 8. 1 DRFUD FORMAT CHECK OPTION (DFC:).

The operator initiates a format check by mounting a DRFUD tape on the tape drive and calling NUSTAD as described in Section II. 2 (calling NUSTAD). After NUSTAD acknowledges, the operator types:

DFC:

followed by a return character. The processor will respond with:

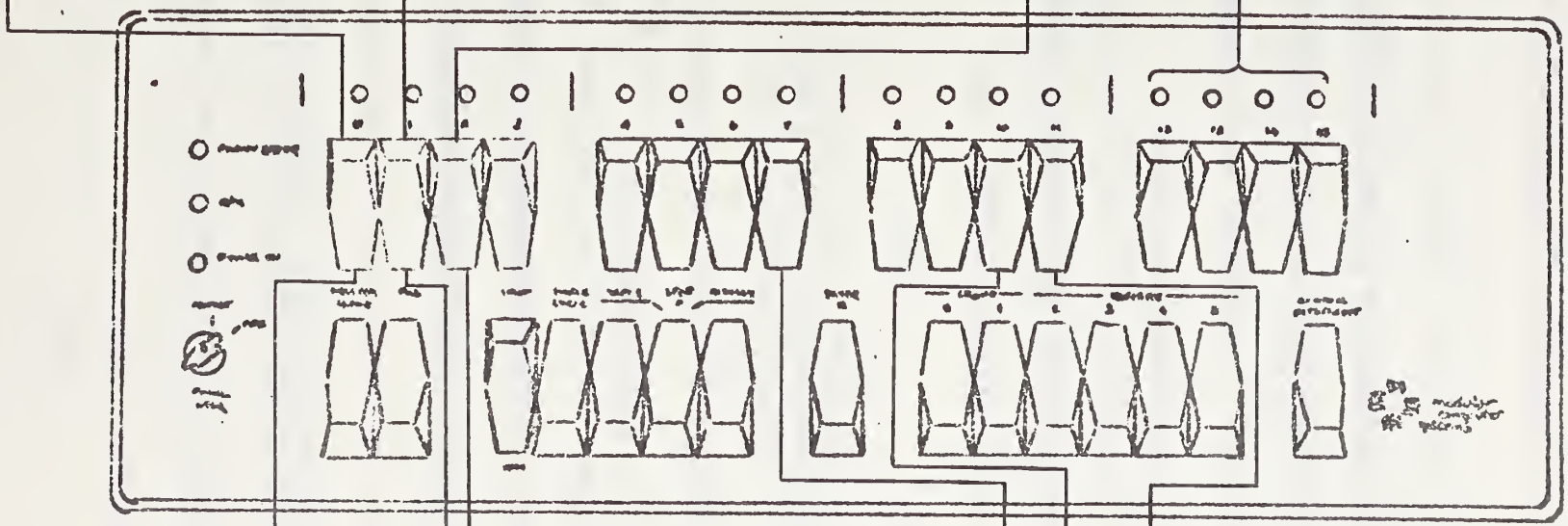
NO. OF BLOCKS TO BE CHECKED

This request is for the number of DRFUD scans the operator wishes to have checked; each scan should be equal to one second of DRFUD data. The maximum request for one check is limited by the computer word size to 32, 767 scans, which is just over 9 hours and 22 minutes of recorded DRFUD data. Checking more data than this will require that it be broken down into smaller segments.

NO. OF BLOCKS TO BE CHECKED	AMOUNT OF RECORDED DRFUD DATA CHECKED
1	1 Sec
6Ø	1 Min
3ØØ	5 Min
6ØØ	10 Min
36ØØ	1 Hour
32767	9 hrs 22 min 47 sec
(Max number of scans)	(Max data checked at one time)

TABLE II. 1

BLOCK COUNT TO TIME CONVERSION



Bit 1 Reset - Processor continues using data from the buffer now in memory.

Bit 2 Reset - Parity check performed (even parity expected).

Bits 12, 13, 14, & 15 - Channel designation for compressed data display (Ref Table 12.1).

Bit Ø Reset - Background task is aborted after detecting first format error.

Bit 2 Set - Parity errors ignored.

Bit 11 Set - Enables compressed data display.

Bit 1 Set - Each time DFC or DDD is called, the storage buffer (MTBUF) is refilled with new DRFUD data.

Bit 1Ø Set - Enables signal reject message display (Ref Table 15.1).

Bit 7 Set - Enables special operator options (Sect 8.1).

Bit Ø Set - Program does not terminate input options (Sect 8.1).

FIGURE II.1

After receiving the processor's request for the number of data blocks, the operator should type a positive integer no greater than 32767 followed by a return character. The processor then responds in one of three ways:

1. If the tape or tape unit is not ready, NUSTAD outputs a message indicating an improper tape drive condition. The operator should correct the improper condition and continue.

2. If the operator errs in his response, NUSTAD outputs: "INVALID CHARACTER, TASK ABORTED."

3. Reads and checks format on DRFUD tape.

Once the background task is aborted, the operator corrects the error by recalling NUSTAD and starting over.

Once the format checking process has begun, it will continue until a termination statement is output, which will be one of the following:

1. "TASK COMPLETED" indicates the requested amount of data has been checked and no errors were detected.

2. "FORMAT CHECK TERMINATED" indicates that an error was detected and Bit Ø of the switch register was reset.

The error message indicates which bit is in an improper state (See Figure II. 2) and displays the scan in which the error was detected. Once a termination message is output, NUSTAD returns to the REQUEST MODE.

II. 8. 2 DRFUD DATA DISPLAY OPTION (DDD:).

To call for a DRFUD DATA DISPLAY, the operator calls NUSTAD and enters

DDD:

followed by a return character. NUSTAD responds with:

SPECIFY ACTION DESIRED, 1, 2, OR 3

ACTION OPTION 1

OPTION 1 requires that the operator specify the data times at which the display is to begin and end. First NUSTAD requests:

SPECIFY START TIME DESIRED

The operator should respond with three digits of DOY, a space character, and six digits of TOD, followed by a return character.

NUSTAD will attempt to locate the requested start time on the DRFUD tape. Once the proper start time has been located, NUSTAD requests:

SPECIFY STOP TIME DESIRED

The operator should respond as above. NUSTAD begins displaying the DRFUD data at the data time requested and continues with one output record for each second of the requested time interval.

ACTION OPTION 2

OPTION 2 requires that the operator specify the data time at which the display is to begin and a number of data blocks (scans) that he wishes to have displayed.

The start time is requested and entered as above. NUSTAD then requests:

NO. OF BLOCKS TO BE DUMPED

The operator should respond with a positive integer less than 32767 followed by a return character. NUSTAD begins displaying the DRFUD data at the data time requested and continues until the requested number of scans has been displayed.

ACTION OPTION 3

OPTION 3 requires that the operator specify only the number of data blocks (scans) to be displayed. A start time is not required since

the display is started wherever the DRFUD tape is positioned. NUSTAD requests:

NO. OF BLOCKS TO BE DUMPED

Operator response should be as above. NUSTAD begins displaying DRFUD data and continues until the requested number of scans has been displayed.

If the DRFUD tape is positioned past a start time requested in OPTION 1 or 2, a message will be output stating this. The operator should rewind the tape and try again, ensuring that Bit 1 of the switch register is set. If the same message is output on the second try, the desired time is not contained on the DRFUD tape.

The display routine works in conjunction with the format check and if during the display process an error is detected, the Bit in error is noted and the scan containing the error is displayed. NUSTAD checks Bit Ø of the switch register to determine whether to abort the task or continue after each detected error.

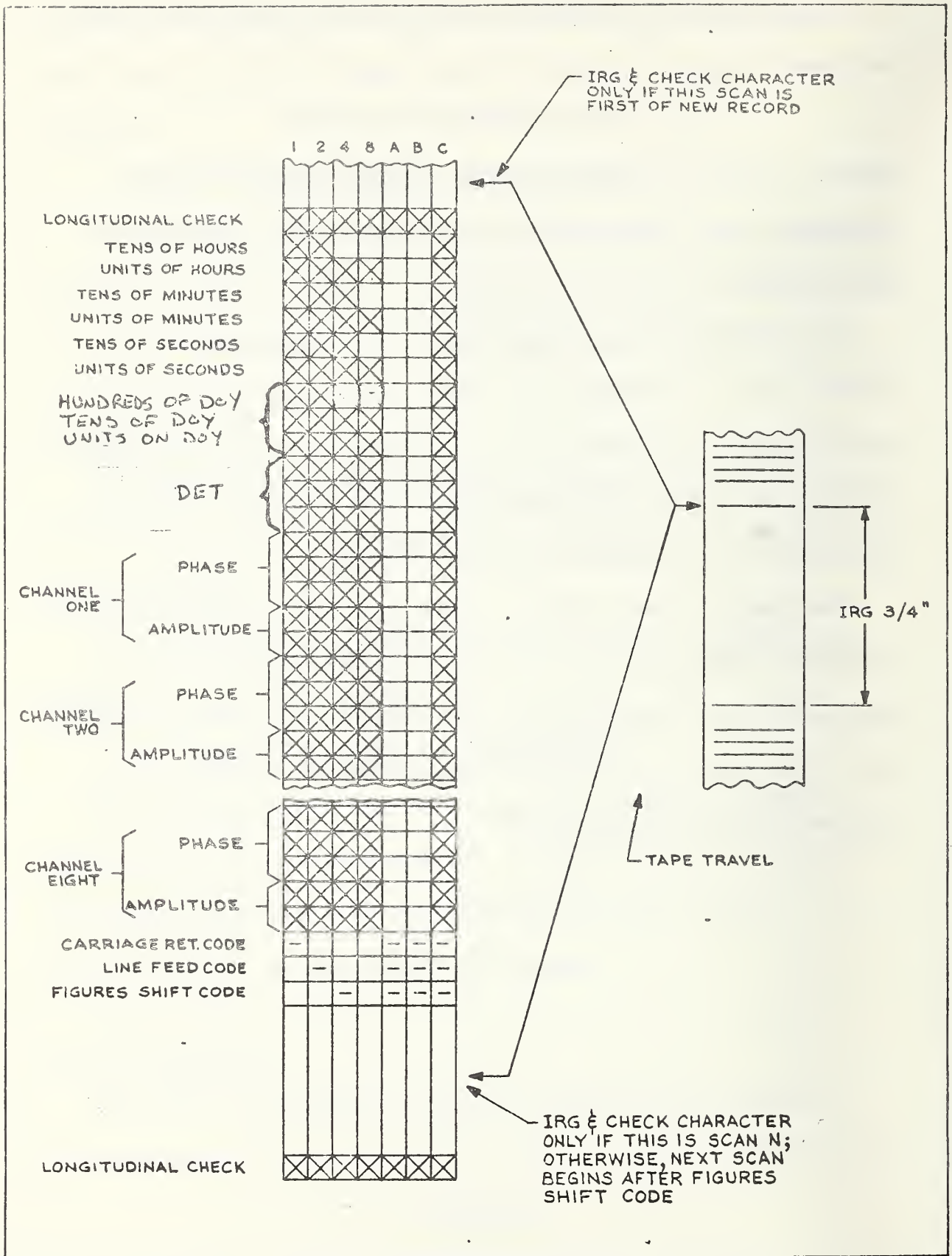


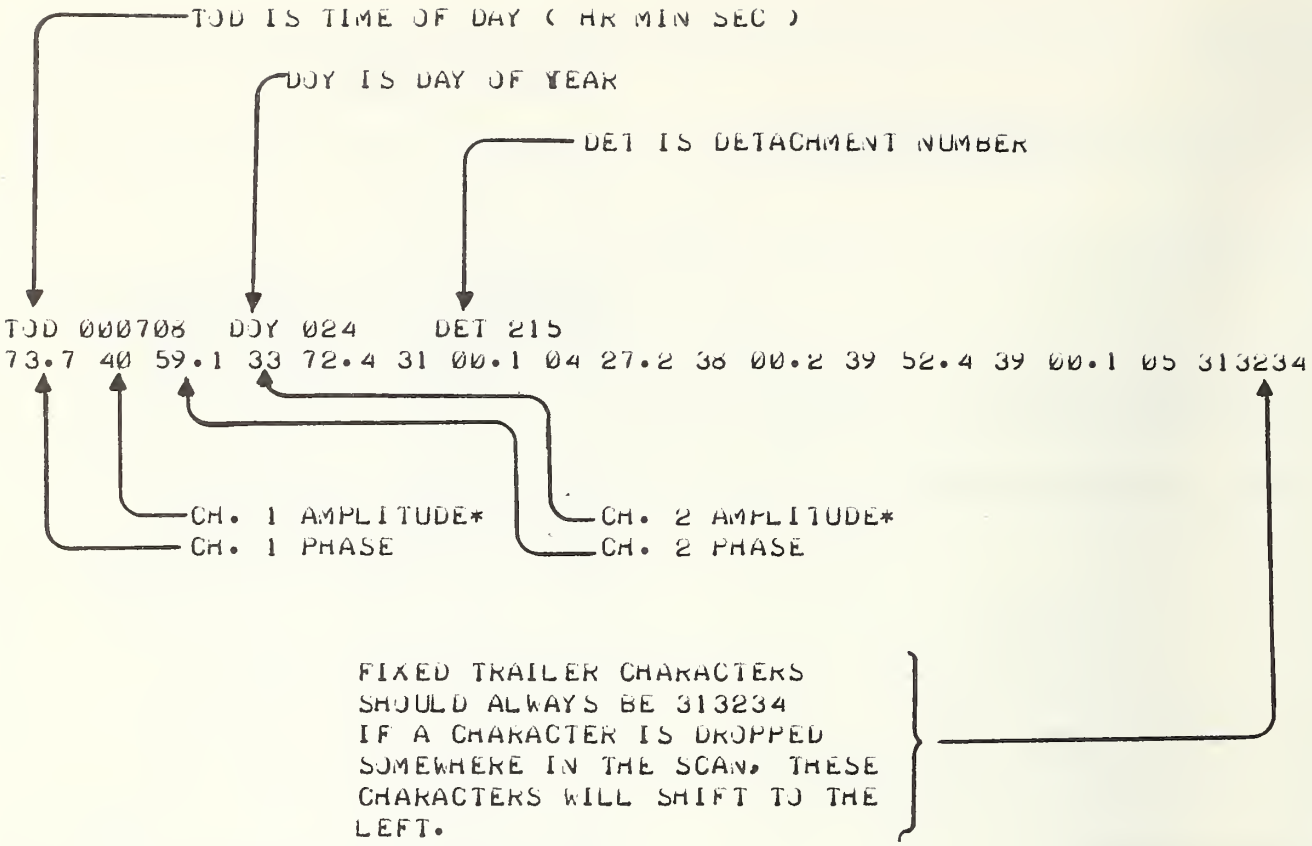
FIGURE II. 2

DRFUD TAPE FORMAT (NEW U SYSTEM)

```
X  DFC:                                    {OPERATOR CALLS FOR A DRFUD
                                           {FORMAT CHECK.

NO. OF BLOCKS TO BE CHECKED?4096           {OPERATOR WANTS 4096 SCANS TO
                                           {BE CHECKED.

FORMAT ERROR BIT 8                         {SOMEWHERE IN THE CHECKING
                                           {PROCESS. THE ROUTINE DETECTED
                                           {AN EOF CODE AS IS SHOWNIN
                                           {THE DUMP AS A ??.

TOD ??0925  DOY 024    DET 215
73.5 42 58.8 33 73.4 31 00.1 04 28.1 39 00.2 39 53.2 40 00.1 05 313234

FORMAT CHECK TERMINATED                    {TERMINATION STATEMENT
                                           {INDICATING THAT BIT 0
                                           {OF THE SWITCH REG WAS SET.


X  DFC:

NO. OF BLOCKS TO BE CHECKED?700

TASK COMPLETED                             {TERMINATION STATEMENT INDICATES
                                           {CHECK OF ALL 700 SCANS DETEC-
                                           {NO ERRORS.  THERE IS NO DUMP
                                           {INITIATED IF NO ERRORS ARE
                                           {DETECTED.
```

FIGURE II.3

EXAMPLE: DRFUD FORMAT CHECK.



* ALL EIGHT CHANNELS OF AMPLITUDE AND PHASE ARE DUMPED.

FIGURE II. 4

EXAMPLE: DRFUD DATA DUMP FORMAT.

```
X  DDD:                                  DRFUD DATA DUMP CALL

SPECIFY ACTION DESIRED, 1, 2, OR 3. 1   {MACHINE RESPONSE & OPERATOR
                                        {DESIRE.

SPECIFY START TIME DESIRED. 024 000608  {INITIAL MACHINE RESPONSE ON
                                        {OPTION 1. TIME REQUESTED BY
                                        {OPERATOR.

SPECIFY STOP TIME DESIRED.024 000620    {SECONDARY MACHINE RESPONSE
                                        {ON OPTION 1. TIME REQUESTED BY
                                        {OPERATOR.


TOD 000608  DOY 024    DET 215
73.9 41 59.0 33 73.5 32 00.1 04 27.3 38 00.2 38 53.1 38 00.1 05 313234

TOD 000609  DOY 024    DET 215
73.8 40 59.1 33 73.0 32 00.1 04 27.1 38 00.2 38 53.1 38 00.1 05 313234

TOD 000610  DOY 024    DET 215
74.1 41 59.0 33 73.2 32 00.1 04 27.1 38 00.2 38 52.9 38 00.2 04 313234

TOD 000611  DOY 024    DET 215
74.0 41 59.1 33 73.3 32 00.1 04 27.2 38 00.2 38 52.6 38 00.1 04 313234

TOD 000612  DOY 024    DET 215
74.7 40 59.1 33 73.2 32 00.1 04 27.1 38 00.2 38 52.4 38 00.1 05 313234

TOD 000613  DOY 024    DET 215
74.6 41 59.1 33 73.2 32 00.1 04 27.3 38 00.1 38 52.4 38 00.1 05 313234

TOD 000614  DOY 024    DET 215
74.3 41 58.9 33 72.9 32 00.1 04 27.4 38 00.2 38 52.4 38 00.1 05 313234

TOD 000615  DOY 024    DET 215
74.0 41 59.1 33 73.4 32 00.1 04 27.2 38 00.2 38 52.4 38 00.1 04 313234

TOD 000616  DOY 024    DET 215
73.7 40 59.1 33 73.0 32 00.1 04 27.3 38 00.2 39 52.4 38 00.1 04 313234

TOD 000617  DOY 024    DET 215
73.7 40 58.8 33 72.4 32 00.1 04 27.3 38 00.2 39 52.4 38 00.1 05 313234

TOD 000618  DOY 024    DET 215
74.2 41 58.8 33 73.2 32 00.1 04 27.2 38 00.2 39 52.3 38 00.2 04 313234
```

EXAMPLE: DRFUD DATA DUMP OPTION 1.

FIGURE II. 5

```
X  DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 2

SPECIFY START TIME DESIRED. 024 000700

FDD TAPE POSITIONED PAST TIME DESIRED.      {MESSAGE INFORMING OPERATOR
                                            {THAT HE MUST REWIND TAPE
                                            {AND TRY AGAIN.

        OPERATOR REWINDS TAPE, AND CALLS FOR DDD: AGAIN.........

X  DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 2       {OPERATOR SELECTS OPTION 2.

SPECIFY START TIME DESIRED. 024 000700      {START TIME FURNISHED BY OPER.

NO. OF BLOCKS TO BE DUMPED. 15              {OPERATOR ASKS FOR 15 SCANS
                                            {TO BE DUMPED.

TOD 000700  DOY 024     DET 215
73.6 40 60.3 33 74.2 31 00.1 04 27.3 38 00.2 39 52.7 39 00.1 05 313234

TOD 000701  DOY 024     DET 215
73.6 40 60.4 33 74.4 31 00.1 04 27.3 38 00.2 39 52.5 39 00.1 05 313234

TOD 000702  DOY 024     DET 215
74.0 41 60.4 33 74.4 31 00.2 04 27.4 39 00.2 39 52.3 39 00.1 05 313234

TOD 000702  DOY 024     DET 215
74.0 41 60.3 33 74.4 31 00.1 04 27.4 39 00.2 39 52.4 39 00.1 05 313234

TOD 000703  DOY 024     DET 215
74.0 41 60.3 33 74.5 31 00.1 04 27.4 39 00.2 39 52.6 39 00.1 05 313234

TOD 000704  DOY 024     DET 215
74.0 41 60.1 33 74.6 31 00.1 04 27.4 39 00.2 39 52.6 39 00.1 05 313234

TOD 000705  DOY 024     DET 215
73.7 40 60.0 33 74.1 31 00.1 04 27.3 38 00.2 39 52.4 39 00.1 05 313234
```

FIGURE II. 6

EXAMPLE: DRFDD DATA DUMP OPTION 2.

```
X  DDD:

SPECIFY ACTION DESIRED, 1, 2, OR 3. 3          {OPERATOR SELECTS OPTION 3.

NO. OF BLOCKS TO BE DUMPED. 10                 {OPERATOR WANTS TO START
                                               {WHEREVER THE DATA POINTER
                                               {IS POSITIONED AND DUMP
                                               {TEN SCANS.

TOD 000925  DOY 024    DET 215
73.5 42 58.8 33 73.4 31 00.1 04 28.1 39 00.2 39 53.2 40 00.1 05 313234

TOD 000926  DOY 024    DET 215
74.0 42 58.8 33 73.4 31 00.1 04 28.0 39 00.2 39 53.2 40 00.1 05 313234

TOD 000927  DOY 024    DET 215
74.0 43 58.7 33 73.4 31 00.2 04 28.1 39 00.2 39 53.4 40 00.1 05 313234

TOD 000928  DOY 024    DET 215
74.0 43 58.8 33 74.2 31 00.1 04 28.1 39 00.2 39 53.2 40 00.1 05 313234

TOD 000929  DOY 024    DET 215
74.0 43 59.2 33 74.9 31 00.1 04 28.0 39 00.1 39 53.0 40 00.1 05 313234

TOD 000930  DOY 024    DET 215
74.0 43 60.0 33 76.2 31 00.1 04 28.0 39 00.1 39 53.4 40 00.1 05 313234

TOD 000930  DOY 024    DET 215
73.8 42 60.5 33 76.3 31 00.1 04 28.1 39 00.1 39 53.0 40 00.1 05 313234

TOD 000931  DOY 024    DET 215
73.8 42 60.4 33 75.4 31 00.1 04 28.1 39 00.2 39 53.7 40 00.1 05 313234

TOD 000932  DOY 024    DET 215
74.1 42 60.1 33 74.8 31 00.1 04 28.1 39 00.1 39 53.4 40 00.1 05 313234

TOD 000933  DOY 024    DET 215
73.9 42 59.8 33 74.3 31 00.1 04 28.1 39 00.2 39 53.4 40 00.1 05 313234
```

FIGURE II. 7

EXAMPLE: DRFUD DATA DUMP OPTION 3.

```
X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 1
SPECIFY START TIME DESIRED. 300 000000
MAG TAPE PARITY ERROR,  CALLING TASK ABORTED.
```

{ THIS CHECK CAN BE BYPASSED BY SETTING BIT 3 ON THE SWITCH REGISTER.

```
X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 1
SPECIFY START TIME DESIRED. 025 000000
MAG TAPE NOT READY, CALLING TASK ABORTED.
```

{ OPERATOR SHOULD PUT MAG TAPE UNIT "ON LINE

```
X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 1
SPECIFY START TIME DESIRED. 025 000000
TAPE UNIT INOPERATIVE,  CALLING TASK ABORTED.
```

{ OPERATOR SHOULD TURN O ON POWER TO TAPE UNIT.

FIGURE II. 8

MAG TAPE CONDITION MESSAGES....

```
X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 2
SPECIFY START TIME DESIRED. 022 000700
FUD TAPE POSITIONED PAST DAY DESIRED.


X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 2
SPECIFY START TIME DESIRED. 024 000700
FUD TAPE POSITIONED PAST TIME DESIRED.
```

IN EACH OF THE CASES ABOVE, THE OPERATOR SHOULD REWIND THE DRFUD TAPE AND PERFORM THE SEARCH ONCE MORE. IF IT FAILS AGAIN, THE TIME DESIRED IS NOT CONTAINED ON THE DRFUD TAPE.*

```
X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 1
SPECIFY START TIME DESIRED. 024000700      { OPERATOR FAILED TO LEAVE
INVALID FORMAT ON TIME REQUEST             { A SPACE BETWEEN DOY AND
                                           { TIME.

X  DDD:
SPECIFY ACTION DESIRED, 1, 2, OR 3. 1
SPECIFY START TIME DESIRED. 024 00070X     { ILLEGAL CHARACTER USED
INVALID FORMAT ON TIME REQUEST             { IN TIME REQUEST (X)
/
```

FIGURE II.9

* SET SWITCH REGISTER BIT POSITION 1 BEFORE SEARCHING THE SECOND TIME.

The station log will be maintained on the ASR 28 Teletype. Messages entered into the log may be divided into four major categories:

(1) Routine; change of status, etc.

(2) Tables; current or historical data on system operating status.

(3) Reportable Signal Descriptors.

(4) Operator generated messages.

III. 1 ROUTINE MESSAGES.

Routine messages are generated by NUSTAD to log all changes in equipment status.

(1) Format: the general format is:

DDD TTTTTT C MM OOOOOOO

where: D represents a three digit DOY

T represents a six digit TOD for event

C indicates either a channel (A thru N) or T for the total system

M represents a two digit coded message

O represents additional information when necessary

(2) Coded messages: The following are the coded messages which may occur, and their meanings.

Two Char Code	Meaning of Code	Additional Information
AF	AIS Failure	NONE
AU	Auto/Manual Switch Set to Auto	NONE
BC	Blanking Level Changed	New Value
CC	Cardioid Configuration Changed	New Configuration Code
CF	Channel Put Coasting for Signal Failure	NONE
CN	Channel Put Coasting for Noise	NONE
CS	Channel Put Coasting for Saturation	NONE
D	Channel Put Down	NONE
FC	Frequency Changed	New Value
GC	RF Gain Changed	New Value
IR	INE Condition Reset	NONE
IS	INE Condition Set	NONE
MN	Auto/Manual Switch Set to Manual	NONE
MP	Memory Parity Error Discovered	Location of Error
MR	Maintenance Switch Reset	NONE
MS	Maintenance Swtich Set	NONE
PF	Processor Power Failure	NONE

Two Char Code	Meaning of Code	Additional Information
PR	Processor Power Restored	NONE
RS	Redundancy Check Successful	NONE
SD	System Dead in Scheduler	NONE
TC	Tracking Rate Changed	New Value
U	Channel Brought to Up State	Freq, Track Rate, Gain, Blank Level

(3) The various parameter values relate to the values on the EECO 881M as follows:

TRACKING RATE: Both the receiver and the processor work with ten discrete positions. The following table relates numeric values:

EECO	PROCESSOR
0.1	0
0.15	1
0.3	2
0.5	3
0.7	4
1.0	5
1.5	6
3.0	7
5.0	8
7.0	9

TABLE III. 1
TRACKING RATE EQUIVALENTS

RF GAIN: While the processor/ADACS uses 25 discrete values, the EECO control is by means of a continuously adjustable potentiometer. Conversion from one set of values to the other may be approximated with the following scale:

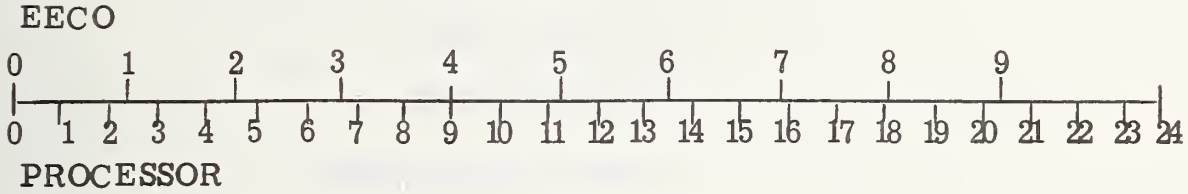


FIGURE III. 1
RF GAIN EQUIVALENTS

BLANKING LEVEL: The processor/ADACS uses 64 discrete values, the EECO control is by means of a continuously adjustable potentiometer. Conversion from one set of values to the other may be approximated with the following scale:

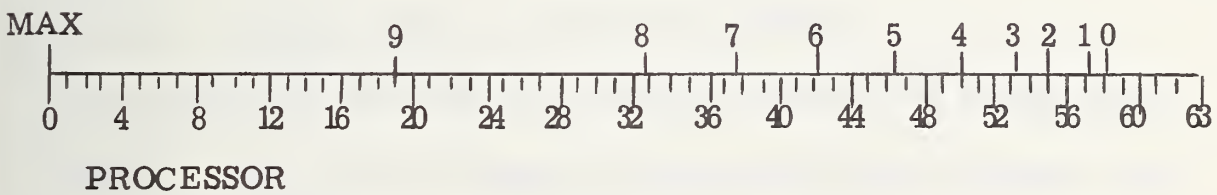


FIGURE III. 2
BLANKING LEVEL EQUIVALENTS

CARDIOID CONFIGURATION: The cardioid configuration is maintained as a one digit number which is interpreted as follows:

VALUE	CONFIGURATION
7	NO CARDIOID USED
6	WHIP REVERSE
5	LOOP REVERSE
4	LOOP/WHIP REVERSE
2	WHIP NORMAL
1	LOOP NORMAL
Ø	LOOP/WHIP NORMAL

TABLE III. 2
CARDIOID CONFIGURATION CODE INTERPRTATION

(4) SYSTEM RESTART: Whenever the system is reinitialized and restarted, the following message is logged:

.....SYSTEM RESTART AT DDD TTTTTT...

If the restart is processor initiated, the reason will be found as the last message prior to the restart message (PF, MP, etc.). If there is not a message indicating a processor discovered reason for restarting the system, the restart will be assumed to be operator initiated. The operator may induce a system restart by depressing the MASTER CLEAR switch on the processor control panel.

```
.....SYSTEM RESTART AT 023 215549.....

023 215549  CURRENT RECEIVER STATUS, DET 215

 CHAN FREQ C I M AM GAIN TR BLL DIURNAL SIGMA AMPLITUDE
   A  17.8 1 1 0  A
   B  21.0 0 1 0  A
   C  21.0 0 1 0  A
   D  16.0 1 1 0  A
   E  22.3 0 1 0  A
   F  18.6 1 1 0  A
   G  24.0 4 1 0  A
   H ZERO INPUT...
   I  17.8 7 1 0  A
   J ZERO INPUT...
   K ZERO INPUT...
   L ZERO INPUT...
   M  24.0 7 1 0  A
   N  17.8 7 1 0  A


023 215554  A IR
023 215554  A CC05
023 215554  B IR
023 215554  B CC05
023 215554  C IR
023 215554  C CC01
023 215554  D IR
023 215554  D CC05
023 215554  E IR
023 215554  E CC01
023 215554  F IR
023 215554  F CC05
023 215554  G IR
023 215554  G CC05
023 215554  I IR
023 215554  M IR
023 215554  N IR
023 215620  D GC20
023 215642  H GC20
023 215708  A BC05
023 215713  B BC05
023 215718  C BC05
023 215723  D BC05
023 215729  E BC05
023 215740  F BC05
```

FIGURE III. 3
Example of System Restart in Station Log

(5) REDUNDANCY FAILURE: If the periodic check between channels monitoring the same path should fail, the following message is generated:

DDD TTTTTT RED FAILURE, CHANS C AND C ON LEVEL N

where: C and C are the redundant channels and N is the reason for failure. N is interpreted as follows:

(LEVEL) N	REASON
1	The channel status, determined by the amplitude characteristics, is not the same for both channels.
2	The analysis status, indicating the progress into waveform processing, is not the same for both channels.
3	The short term noise characteristics are not the same on both channels.
4	The diurnal slope estimates are not approximately equal.

NOTE: If no two channels are monitoring the same path, no message is generated by the redundancy check program. All failures are logged. If no failures are found, a RS message is generated.

III. 2 TABLES.

The system generates several tables to provide data summarizing system performance and establishing current performance.

(1) CURRENT RECEIVER STATUS.

At present times, NUSTAD generates a table to record current parameter settings, processing values, and necessary status information. This status table may also be generated upon operator request by using the STD option.

Abbreviations used in the status table, in the order in which they appear:

CHAN	CHANNEL (A thru N)
FREQ	RECEIVER FREQUENCY (KHz)
C	CARDIOID CONFIGURATION (see above for interpretation)
I	INE STATUS Ø ⇒ Reset, 1 ⇒ Set
M	MAINTENANCE STATUS Ø ⇒ Reset, 1 ⇒ Set
AM	AUTO/MANUAL STATUS A ⇒ Auto, M ⇒ Manual
GAIN	RF GAIN (see above for interpretation)
TR	TRACKING RATE (see above for interpretation)
BLL	BLANKING LEVEL (see above for interpretation)
DIURNAL	DIURNAL SLOPE (see definition)
SIGMA	STANDARD DEVIATION (see definition)
AMPLITUDE	SIGNAL STRENGTH (-20 thru +20 dB)
NO INPUT	NO DIGITAL INPUT TO IOIS FOR THIS CHANNEL

LINE 1:

DDD TTTTTT CURRENT RECEIVER STATUS, DET NNN

where: D represents a three digit DOY

T represents a six digit TOD

N represents a three digit Det number

LINE 2: Column headings

LINE 3 thru 16: Channel status for each channel in tabular form. If INE or MAINTENANCE is set, no output is listed past the AM column; the channel is always down in these cases.

(2) PARAMETER HISTORY.

Thrice daily a table is generated to establish historical data useful in determining path reliability. The following information is logged for each channel:

1. The percentage of time that the system was operating during which the channel was in the UP state.

2. The percentage of up time that the channel was at each tracking rate.

3. The percentage of up taime that the channel was in each gain setting group.

```
024 060040  CURRENT RECEIVER STATUS, DET 215

 CHAN FREQ C I M AM GAIN TR BLL DIURNAL SIGMA AMPLITUDE
   A  17.8 5 0 0  A  09   8  00  -000.8 00.62 -09.80   UP
   B  21.0 5 0 0  A  12   9  02  -000.1 00.62 -06.76   UP
   C  21.0 1 0 0  A  12   9  04  -000.1 00.62 -03.16   UP
   D  16.0 5 0 0  A  20   2  00  -000.1 00.25 -05.04   UP
   E  22.3 1 0 0  A  09   2  01  &001.7 06.68 &00.68   UP
   F  18.6 5 0 0  A  11   9  00  -000.1 00.00 -00.08   UP
   G  24.0 5 0 0  A  20   3  00  -000.7 01.37 -01.24   UP
   H ZERO INPUT...
   I  17.8 7 0 0  A  11   8  00  -008.9 00.00 -19.96   DOWN
   J ZERO INPUT...
   K ZERO INPUT...
   L ZERO INPUT...
   M  24.0 7 0 0  A  19   9  00  &023.3 10.81 -06.48   C,R
   N  17.8 7 0 0  A  24   6  00  -000.4 11.00 -18.80   C,R


024 090153  CURRENT RECEIVER STATUS, DET 215

 CHAN FREQ C I M AM GAIN TR BLL DIURNAL SIGMA AMPLITUDE
   A  17.8 5 0 0  A  12   9  00  -000.1 00.18 -03.04   UP
   B  21.0 5 0 0  A  16   1  16  &000.6 03.00 -05.36   UP
   C  21.0 1 0 0  A  14   1  17  &000.7 03.00 -06.96   UP
   D  16.0 5 0 0  A  22   2  00  &000.0 00.81 -01.76   UP
   E  22.3 1 0 0  A  11   1  01  &001.5 00.25 -00.68   UP
   F  18.6 5 0 0  A  11   9  00  -000.2 00.06 &00.76   UP
   G  24.0 5 0 0  A  13   9  00  -000.1 00.25 &04.52   UP
   H ZERO INPUT...
   I  17.8 7 1 1  M
   J ZERO INPUT...
   K ZERO INPUT...
   L ZERO INPUT...
   M  24.0 7 0 0  A  20   9  00  -000.1 00.06 &03.48   UP
   N  17.8 7 0 0  A  24   9  00  -000.1 11.93 -19.44   DOWN
```

FIGURE III. 4

Examples of Receiver Status Table

Gain settings are divided into eight groups. The values in each group are:

GROUP	SETTINGS INCLUDED
0	0, 1, 2
1	3, 4, 5
2	6, 7, 8
3	9, 10, 11
4	12, 13, 14
5	15, 16, 17
6	18, 19, 20
7	21, 22, 23, 24

TABLE III. 3

GAIN SETTING GROUPS

024 080040 PARAMETER HISTORY, DET 215

CHAN	A	B	C	D	E	F	G	H	I	J	K	L	M	N
UP	99	100	100	99	100	100	100	0	0	0	0	0	99	73
TRACK RATE														
0	0	0	0	12	7	0	1	0	0	0	0	0	0	0
1	0	0	0	9	8	0	1	0	0	0	0	0	0	0
2	0	0	0	19	41	0	1	0	0	0	0	0	0	0
3	0	0	0	16	25	0	1	0	0	0	0	0	0	0
4	0	0	0	6	18	0	0	0	0	0	0	0	0	0
5	0	0	0	8	1	0	1	0	0	0	0	0	0	0
6	0	0	0	6	0	0	0	0	0	0	0	0	1	0
7	0	0	0	14	0	2	1	0	0	0	0	0	1	1
8	4	0	0	11	0	5	3	0	0	0	0	0	0	4
9	95	100	100	0	0	93	91	0	0	0	0	0	98	95
GAIN														
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	56	0	0	0	58	98	0	0	0	0	0	0	0	0
4	44	100	100	0	30	2	49	0	0	0	0	0	0	0
5	0	0	0	0	12	0	24	0	0	0	0	0	73	0
6	0	0	0	88	0	0	27	0	0	0	0	0	27	0
7	0	0	0	12	0	0	0	0	0	0	0	0	0	100

FIGURE III. 5

Example of Parameter History Table

III. 3 REPORTABLE SIGNAL DESCRIPTORS.

When the waveform analysis programs have determined that a signal meets reporting criteria NUSTAD generates its report in three parts.

(1) PART I:

The first part of the report is generated as soon as NUSTAD considers a signal reportable. This message supplies the operator with a relatively detailed description of the waveform thru the current time and is primarily for the operator's information.

Abbreviations used in the Part I of the REPORTABLE SIGNAL DESCRIPTION, in the order in which they appear:

CHAN	CHANNEL (A thru N)
FREQ	RECEIVER FREQUENCY (KHz)
TR	TRACKING RATE
GN	RF GAIN
BL	BLANKING LEVEL
CARD	CARDIOID CONFIGURATION
SIGMA	STANDARD DEVIATION
AMP	AMPLITUDE
DIUR	DIURNAL SLOPE
ON	@ ONSET

PK	@ PEAK
1P	@ FIRST PEAK OF COCO SIGNAL
2P	@ VALLEY POINT OF COCO SIGNAL
HR	@ HALF RECOVERY (Minimum of 1Ø minutes past onset)
FR	@ SIGNAL TERMINATION

The following format is used:

LINE 1:

DDD TTTTTT REPORTABLE SIGNAL DESCRIPTION, DET NNN

where: D reflects a three digit DOY

T reflects a six digit TOD

N reflects a three digit Det number

LINE 2: A three digit serial signal identification number, used to associate the three parts of the message with the signal.

LINE 3:

CHAN C; FREQ FF.F LLL; TRN; GNNN;BLNN; CARD N

where: C represents the channel reporting the signal

F represents a three digit frequency of the channel

L represents a three character set of call letters associated with that frequency. UNK is used if they are unknown.

N represents the current values associated with the TRACKING RATE, RF GAIN, BLANKING LEVEL, and CARDIOID CONFIGURATION.

LINE 4:

SIGNAL TYPE: YYYYYY SIGMA: SS.SS

where: Y represents the signal type being reported (ALPHA, BRAVO, COCO, or DELTA)

S represents the standard deviation of the phase at onset.

LINE 5: Column headings

LINE 6: (data concerning onset)

ON DDD TTTTTT PPPPP.PP AAA.AA RRRR.R

where: D represents DOY of onset

T represents TOD of onset

P is the relative phase value at onset*

A is the signal amplitude at onset

R is the DIURNAL SLOPE at onset

(* NOTE: The Relative PHASE assumes a range from -4Ø96.ØØ microseconds through +4Ø95.93 microseconds).

LINE 6-a: (Data concerning first peak of COCO signal; not used with other types)

1P DDD TTTTTT PPPPP.PP AAA.AA

where: D represents DOY at first peak

T represents TOD at first peak

P is the relative phase value at first peak

A is the signal amplitude at first peak

LINE 6-b: (Data concerning "valley point" of COCO signal; not used with other types)

2P DDD TTTTTT PPPPP.PP AAA.AA

where: D represents DOY at valley point

T represents TOD at valley point

P is the relative phase value at valley point

A is the signal amplitude at valley point

LINE 7: (data concerning signal peak)

PK DDD TTTTTT PPPPP.PP AAA.AA

where: D represents DOY at signal peak

T represents TOD at signal peak

P is the relative phase value at signal peak

A is the signal amplitude at signal peak

LINE 8: (data at the point where a signal is considered valid, generally this is the point of Half Recovery).

HR DDD TTTTTT PPPPP.PP AAA.AA RRRR.R

where: D represents DOY at valid recovery

T represents TOD at valid recovery

P is the relative phase value at valid recovery

A is the signal amplitude at valid recovery

R is the current DIURNAL SLOPE and approximates the rate of recovery

LINE 9:

OFFSET: NNNN.NN

where: N is the phase offset, including compensation for the diurnal

LINE 10:

ONSET RATE: NNN.N

where: N is the average rate of change of the phase between onset and peak

```
024 213300  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA    SIGMA 02.25
    DOY  TIME    PHASE     AMP      DIUR
ON  024 212231 &0033.37 -05.88    &000.0
PK  024 212254 &0018.37 -05.16
HR  024 213259 &0028.75 -05.60    &000.6
OFFSET: 0015.00
ONSET RATE:  039.1
```

```
025 104102  REPORTABLE SIGNAL DESCRIPTION, DET 215
013
CHAN C;FREQ 21.0 UNK;TR4;GN15:BL04;CARD1
SIGNAL TYPE: BRAVO    SIGMA 00.56
    DOY  TIME    PHASE     AMP      DIUR
ON  025 103052 &0070.31 -04.88    -000.2
PK  025 103120 &0091.43 -04.60
HR  025 104055 &0105.93 -04.88    &000.8
OFFSET: 0021.18
ONSET RATE:  045.4
```

```
024 223921  REPORTABLE SIGNAL DESCRIPTION, DET 215
005
CHAN B;FREQ 21.0 UNK;TR5;GN16:BL02;CARD5
SIGNAL TYPE: DELTA    SIGMA 00.50
    DOY  TIME    PHASE     AMP      DIUR
ON  024 222916 &0058.43 -05.08    -000.2
PK  024 223015 &0049.81 -05.32
HR  024 223921 &0058.56 -05.40    &000.3
OFFSET: 0008.50
ONSET RATE:  003.6
```

FIGURE III. 6

Examples of Part I of Reportable Signal Descriptions

(2) PART II:

The second part of the report is generated when NUSTAD has determined that the signal has terminated. Part II supplements the data generated in Part I to supply the operator with the remaining necessary information pertaining to the wave.

Abbreviations used are the same as described for Part I, above.

The following format is used:

LINES 1 thru 5 are the same as in Part I.

LINE 6: (data at signal termination)

FR DDD TTTTTT PPPPP.PP AAA.AA RRRR.R

where: D represents DOY of final recovery

T represents TOD of final recovery

P is the relative phase value at final recovery

A is the signal amplitude at final recovery

R is the DIURNAL SLOPE at final recovery

LINE 7:

SIGNAL TERMINATED: MMMMM

where: M takes on one of the following values:

VALUE	WHEN
NORMALLY	Recovery becomes full in phase and DIURNAL SLOPE
TIME LAPSE	Time since onset reaches 1 hour
SIGNAL LOST	Signal Amplitude drops out during recovery *
NEW ONSET	A new onset has been detected and the current signal analysis has been terminated to allow analysis of the new waveform

(*NOTE: A signal is also reported if the amplitude drops out after recovery has begun, but before half recovery.)

```
024 214421  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA     SIGMA 02.25
    DOY  TIME     PHASE     AMP      DIUR
FR  024 214359 &0033.87 -05.24    &000.2
SIGNAL TERMINATED: NORMALLY
```

```
025 110343  REPORTABLE SIGNAL DESCRIPTION, DET 215
013
CHAN C;FREQ 21.0 UNK;TR4;GN15:BL04;CARD1
SIGNAL TYPE: BRAVO     SIGMA 00.56
    DOY  TIME     PHASE     AMP      DIUR
FR  025 110339 &0116.00 -04.36    &000.0
SIGNAL TERMINATED: NORMALLY
```

```
024 224531  REPORTABLE SIGNAL DESCRIPTION, DET 215
005
CHAN B;FREQ 21.0 UNK;TR5;GN16:BL02;CARD5
SIGNAL TYPE: DELTA     SIGMA 00.50
    DOY  TIME     PHASE     AMP      DIUR
FR  024 224518 &0058.12 -04.43    &000.0
SIGNAL TERMINATED: NORMALLY
```

FIGURE III. 7

Examples of Part II of Reportable Signal Descriptions

(3) PART III:

The third part of the RSD message is generated as soon after Part II has been output as NUSTAD can find sufficient storage to ensure room for the verbage of this part. Part III is intended as part of the text of any message to be transmitted to HQ. Its format is such as to minimize possible data loss when transmitted over standard communication lines (i. e., numeric values are spelled out alphabetically; 2 being transmitted as TWO, etc.).

The following format is used:

LINE 1:

RSD (serial number)

where: the serial number is a three digit value used to identify the signal on this channel. It is initialized each time NUSTAD is reloaded and incremented for each new RSD message generated.

LINE 2:

(Class), (Type), (Frequency & Call Letters), (Path), (DOY)

where: class is either A or B to indicate whether class A or class B criteria have been met.

The type is either Alpha, Bravo, Coco, or Delta. The frequency is given digitally with the call letters for that transmitter. The path will be either FRONT or BACK.

LINES 3 & 4:

(Onset time), (Offset), (Direction)
(Onset Rate), (Onset Amplitude)

where: the onset time is given as six digits of hours, minutes, and seconds. The maximum phase offset is given in three digits to microseconds. The direction will be either ADVANCE or RETARD. The onset rate is the average rate-of-change in microseconds/minute. The amplitude is in dB from -20 to +20.

LINE 5: (paragraph B)

(Time from onset to peak), (Peak Amplitude)

The time from onset to peak is given as three digits representing tenths of minutes.

LINE 6: (paragraph C)

HALF (Time from onset to half recovery), (Half recovery amplitude)

Time is again in tenths of minutes, and the amplitude in dB.

LINE 7: (paragraph D)

FULL (Time from onset), (Amplitude at full recovery)
or
LOST (Phase offset remaining) MICROSECONDS, (Amplitude)
or
HOUR (Phase offset remaining) MICROSECONDS, (Amplitude)
or
(Phase offset remaining) MICROSECONDS, (Amplitude), SECOND ONSET

When the signal continues to full recovery, the first case above is used. The time from onset to full recovery is given in tenths of minutes and the amplitude in dB.

If the signal drops out before full recovery is reached, the remaining offset to recovery is given with the amplitude (Case 2 above).

If signal processing is terminated after one hour without full recovery, the third case is used to give the remaining offset and the signal amplitude.

If a possible new onset occurs prior to full recovery, the current signal is terminated using the fourth case to indicate the remaining offset to full recovery and the signal amplitude.

LINE 8: (paragraph E)

(Tracking Rate), (Sigma at Onset) MICROSECONDS, (Type)

where: the tracking rate is interpreted by the table in Section III. 1 above. The four digit onset Standard Deviation is given in hundreths of microseconds and the type is repeated from LINE 2.

LEADERS: To enable the operator to identify the Part III text on the punched paper tape, sections of unpunched tape (LEADERS) are run through the punch on the ASR 28. The format is:

```
024 213300  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA    SIGMA 02.25
    DOY  TIME    PHASE     AMP      DIUR
ON  024 212231 &0033.37 -05.88   &000.0
PK  024 212254 &0018.37 -05.16
HR  024 213259 &0028.75 -05.60   &000.6
OFFSET: 0015.00
ONSET RATE:  039.1
```

```
024 214421  REPORTABLE SIGNAL DESCRIPTION, DET 215
002
CHAN B;FREQ 21.0 UNK;TR4;GN16:BL02;CARD5
SIGNAL TYPE: ALPHA    SIGMA 02.25
    DOY  TIME    PHASE     AMP      DIUR
FR  024 214359 &0033.87 -05.24   &000.2
SIGNAL TERMINATED: NORMALLY
```

```
 RSD ZERO ZERO TWO
A, ALPHA,21.0 UNK, BACK, ZERO TWO FOUR
  A. TWO ONE TWO TWO THREE ONE, ZERO ONE FIVE, ADVANCE
     ZERO THREE NINE, MINUS ZERO SIX DB
  B. PEAK ZERO ZERO THREE, MINUS ZERO SIX DB
  C. HALF ONE ZERO FOUR, MINUS ZERO SIX DB
  D. FULL TWO ONE FOUR, MINUS ZERO SIX DB
  E. FOUR, ZERO TWO TWO FIVE MICROSECONDS, ALPHA
```

FIGURE III. 9

Parts I, II, and III of A Reportable Signal Description

(4) Understanding Real-Time RSD Messages.

1. When NUSTAD generates an RSD message, the parameters and values reported in the three parts supply information useful in determining the cause of the signal.

2. LONG TERM NOISE: If the diurnal estimate at onset (RSD, Part I, Last element in line beginning ON) is greater than about 2 to 3 microseconds/minute, the signal is probably the result of long term noise.

3. SHORT TERM NOISE: If the value of SIGMA at onset (RSD, Parts I, II, and III) is large, especially at the lower tracking rates, the signal is probably nothing more than short term noise with characteristics meeting criteria.

4. KEYING: If any of the reported amplitude points are abnormally low, or if the channel goes coasting during the signal, or if the onset is near the transmitter's normal keying period, the signal is probably the result of phase variations due to the transmitter's keying cycle. The channel's integrater balance should be checked for this type of signal report. (NOTE: Anytime an "U" message is generated, the channel is coming out of a coasting or down state.

If the coasting is less than 30 seconds, a "C" message will not have been printed.)

5. OVER RECOVERY: If the phase recovery value is significantly greater than the onset value for ALPHA or DELTA signals, or significantly greater than one cycle above the onset value for BRAVO signals, the signal is probably the result of natural causes (long term noise, etc.).

IV. OPERATOR GENERATED MESSAGES.

NUSTAD permits the operator to enter messages in the station log via the LOG option described in Section II. 5. The message appears in the log with the following format:

DDD TTTTTT L: (Message text)

```
023 220149  G TC08
023 220149  I TC08
023 220149  M TC08
023 220149  N TC08
023 220302 L: NUSTAD GOING UNATTENDED.....UKE.....
023 220319  A TC09
023 220319  B TC08
023 220319  E TC09
023 220319  F TC09
023 220319  G TC09
```

FIGURE III. 10

Example of Operator Message Among Routine Messages

APPENDIX IV

SYSTEM TERMS AND ABBREVIATIONS

SYSTEM TERMS AND ABBREVIATIONS.

ADACS — Automatic Data Analysis and Control System. The interface "box" between the sensor and the processor.

AIS — Analog Input Subsystem. The hardware subsystem of the MODCOMP III processor which controls input of the analog data from the sensor.

ASCII — American Standard Code for Information Interchange. A 7 bit character code for data transmission on the ASR 35 Teletype.

BAUDOT — A 5 bit character code used for data transmission on the ASR 28 Teletype.

BCD — Binary Coded Decimal. A data coding scheme which retains the integrity of the decimal numbering system by coding each decimal digit individually in binary.

CPU — The processor's Central Processing Unit, the program control and execution section of the computer.

CR — The RETURN character on the ASR 35 Teletype.

DFC — A MODCOMP assembler defined pseudo-op used to Define Constants.

DI — Data Interrupt. One of two types of interrupts generated by peripheral devices in data transmissions. Refer to MODCOMP III Reference Manual No. 310-103000-000; Chapter V.

DMP — Direct Memory Processor. A hardware Input/Output subsystem of the MODCOMP III processor which permits data transmission in blocks rather than by CPU control for each character.

DOY — The Julian designation for the Day of Year.

DRFUD — The Digital Recorder For U Data. The subsystem which collects raw sensor data.

INE — Invalid data, Equipment sensed. A condition detected by hardware circuitry in the sensor and ADACS which alerts NUSTAD not to process data on that sensor channel.

IOIS — The Input/Output Interface Subsystem. The hardware subsystem of the MODCOMP III processor which controls digital Input/Output between the sensor/ADACS and the processor, and includes a set of eight user defined external interrupts.

NULL — A nonprinting character.

NUSTAD — New U System of Totally Automated Design. The complete software package of the automated U technique.

ROS — The Real-Time Operating System section of NUSTAD.

RSD — The Reportable Signal Description message generated by NUSTAD in three parts when a signal meeting reporting criteria is encountered.

SAL — The Stand Alone Linking Loader (MODCOMP No. 600000-012). The program used to load NUSTAD into memory.

SI — Service Interrupt. One of two types of interrupts generated by peripheral devices in data transmissions. Refer to MODCOMP III Reference Manual No. 310-103000-000; Chapter V.

TOD The Time of Day.

WTC The World Time Clock. The timing subsystem which supplies NUSTAD with the BCD time and timing interrupts.

APPENDIX V

MODCOMP III INSTRUCTION SET

MNEMONIC		OP.CODE	DESCRIPTION
LOAD, STORE, AND TRANSFER INSTRUCTIONS			
LDM*,r,x	A	E5	Load Register from Memory
LDI,r	V	ED	Load Register from Memory Immediate
LDS,r,d		F5	Load Reg. from Memory Short Displaced
LDX,r,x		FD	Load Reg. from Memory Short Indexed
STM*,r,x	A	E6	Store Register in Memory
STI,r	V	EE	Store Register in Memory Immediate
STS,r,d		F6	Store Reg. in Memory Short Displaced
STX,r,x		FE	Store Reg. in Memory Short Indexed
LBX,r,x		AE	Load Byte from Memory
SBX,r,x		AF	Store Syte in Memory
LFM*,r,x	A	A4	Load File from Memory
LFS,r,d		B4	Load File from Memory Short Displaced
LFX,r,x		BC	Load File from Memory Short Indexed
SFM*,r,x	A	A5	Store File in Memory
SFS,r,d		B5	Store File in Memory Short Displaced
SFX,r,x		BD	Store File in Memory Short Indexed
TRR,r,s		6D	Transfer Register to Register
TRRB,r,s	B	7D	Transfer Reg. to Reg. and Branch if Nonzero
GMR,r,b		67	Generate Mask in Register
GMRB,r,b	B	77	Generate Mask in Reg. and Branch Unconditionally

MNEMONIC	OP.CODE		DESCRIPTION
ARITHMETIC INSTRUCTIONS			
ADM*,r,x	A	E0	Add Memory to Register
ADI,r	V	E8	Add Memory to Register Immediate
ADS,r,d		F0	Add Memory to Register Short Displaced
ADX,r,x		F8	Add Memory to Register Short Indexed
ADMM*,r,x	A	C0	Add Register to Memory
ADMB*,r,x	A,B	C4	Add Reg. to Memory and Branch if Nonzero
ADSM,r,d		D0	Add Register to Memory Short Displaced
ADSB,r,d	B	D4	Add Reg. to Mem. Short Disp. and Branch if Nonzero
ADXM,r,x		D8	Add Register to Memory Short Indexed
ADXB,r,x	B	DC	Add Reg. to Mem. Short Indx. and Branch if Nonzero
ADR,r,s		68	Add Register to Register
ADRB,r,s	B	78	Add Reg. to Reg. and Branch if Nonzero
DAR,r,s		22	Double Precision Add Register to Register
SUM*,r,x	A	E1	Subtract Memory from Register
SUI,r	V	E9	Subtract Memory from Register Immediate
SUS,r,d		F1	Subtract Memory from Register Short Displaced
SUX,r,x		F9	Subtract Memory from Register Short Indexed
SUR,r,s		69	Subtract Register from Register
SURB,r,s	B	79	Subtract Reg. from Reg. and Branch if Nonzero
MPM*,r,x	A	A0	Multiply Memory by Register
MPS,r,d		B0	Multiply Memory by Register Short Displaced
MPX,r,x		B8	Multiply Memory by Register Short Indexed
MPR,r,s		20	Multiply Register by Register
DVM*,r,x	A	A1	Divide Register by Memory
DVS,r,d		B1	Divide Register by Memory Short Displaced
DVX,r,x		B9	Divide Register by Memory Short Indexed
DVR,r,s		21	Divide Register by Register
CRMB*,r,x	A,B,B	C7	Compare Memory and Register
CRSB,r,d	B,B	D7	Compare Memory and Register Short Displaced
CRXB,r,x	B,B	DF	Compare Memory and Register Short Indexed
TRO,r		0E	Transfer and Reset Overflow Status
TTR,r,s		6F	Transfer 2's Complement Register to Register
TTRB,r,s	B	7F	Trans. 2's Complement Reg. to Reg. and Branch if Nonzero

MNEMONIC		OP.CODE	DESCRIPTION
LOGICAL INSTRUCTIONS			
ETM*,r,x	A	E2	Extract Memory from Register
ETI,r	V	EA	Extract Memory from Register Immediate
ETS,r,d		F2	Extract Memory from Register Short Displaced
ETX,r,x		FA	Extract Memory from Register Short Indexed
ETMM*,r,x	A	C1	Extract Register from Memory
ETMB*,r,x	A,B	C5	Extract Reg. from Mem. and Branch if Nonzero
ETSM,r,d		D1	Extract Register from Memory Short Displaced
ETSB,r,d	B	D5	Ext. Reg. from Mem. Sht. Dis. & Br. if Nonzero
ETXM,r,x		D9	Extract Reg. from Memory Short Indexed
ETXB,r,x	B	DD	Ext. Reg. from Mem. Sht. Indx. & Br. if Nonzero
ETR,r,s		6A	Extract Register from Register
ETRB,r,s	B	7A	Ext. Reg. from Reg. and Branch if Nonzero
ORM*,r,x	A	E3	OR Memory and Register
ORI,r	V	EB	OR Memory and Register Immediate
ORS,r,d		F3	OR Memory and Register Short Displaced
ORX,r,x		FB	OR Memory and Register Short Indexed
ORMM*,r,x	A	C2	OR Register and Memory
ORSM,r,d		D2	OR Register and Memory Short Displaced
ORXM,r,x		DA	OR Register and Memory Short Indexed
ORR,r,s		6B	OR Register and Register
ORRB,r,s	B	7B	OR Register and Register and Branch if Nonzero
XOM*,r,x	A	E4	Exclusive OR Memory and Register
XOI,r	V	EC	Exclusive OR Memory and Register Immediate
XOS,r,d		F4	Exclusive OR Mem. and Reg. Short Displaced
XOX,r,x		FC	Exclusive OR Mem. and Reg. Short Indexed
XOR,r,s		6C	Exclusive OR Register and Register
ZRR,r		6C	Zero Register
XORB,r,s	B	7C	Exclusive OR Reg. and Reg. and Branch if Nonzero
TOR,r,s		OD	Trans. 1's Complement Register to Register
TRMB*,r,x	A,B	C6	Test Reg. and Mem. and Branch if any 1's Compare
TRSB,r,d	B	D6	Test Reg. and Mem. Sht. Disp. & Br. if any 1's Compare
TRXB,r,x	B	DE	Test Reg. and Mem. Sht. Indx. & Br. if any 1's Compare
TERB,r,s	B	7E	Test Reg. and Reg. and Br. if any 1's Compare

MNEMONIC		OP.CODE	DESCRIPTION
SHIFT INSTRUCTIONS			
LAD,r,c		2E	Shift Left Arithmetic Double
RAD,r,c		2A	Shift Right Arithmetic Double
LAS,r,c		2F	Shift Left Arithmetic Single
RAS,r,c		2B	Shift Right Arithmetic Single
LLD,r,c		2C	Shift Left Logical Double
RLD,r,c		28	Shift Right Logical Double
LLS,r,c		2D	Shift Left Logical Single
RLS,r,c		29	Shift Right Logical Single
LRS,r,c		0F	Left Rotate Single
BIT MANIPULATION INSTRUCTIONS			
LBR,r,b		65	Load Bit in Register
LBRB,r,b	B	75	Load Bit in Register and Branch Unconditionally
ABMM*,b,x	A	80	Add Bit in Memory
ABMB*,b,x	A,B	84	Add Bit in Memory and Branch in Nonzero
ABSM,b,d		90	Add Bit in Memory Short Displaced
ABSB,b,d	B	94	Add Bit in Mem. Short Disp. and Branch if Nonzero
ABXM,b,x		98	Add Bit in Memory Short Indexed
ABXB,b,x	B	9C	Add Bit in Mem. Short Indx. and Branch if Nonzero
ABR,r,b		60	Add Bit in Register
ABRB,r,b	B	70	Add Bit in Register and Branch if Nonzero
SBR,r,b		61	Subtract Bit in Register
SBRB,r,b	B	71	Subtract Bit in Register and Branch if Nonzero
ZBMM*,b,x	A	81	Zero Bit in Memory
ZBMB*,b,x	A,B	85	Zero Bit in Memory and Branch if Nonzero
ZBSM,b,d		91	Zero Bit in Memory Short Displaced
ZBSB,b,d	B	95	Zero Bit in Mem. Shrt Disp. and Branch if Nonzero
ZBXM,b,x		99	Zero Bit in Memory Short Indexed
ZBXB,b,x	B	9D	Zero Bit in Mem. Shrt Indx. and Branch if Nonzero
ZBR,r,b		62	Zero Bit in Register
ZBRB,r,b	B	72	Zero Bit in Register and Branch if Nonzero
OBMM*,b,x	A	82	OR Bit in Memory
OBSM,b,d		92	OR Bit in Memory Short Displaced
OBXM,b,x		9A	OR Bit in Memory Short Indexed
OBR,r,b		63	OR Bit in Register
OBRB,r,b	B	73	OR Bit in Register and Branch Unconditionally
XBR,r,b		64	Exclusive OR Bit in Register
XBRB,r,b	B	74	Excl. OR Bit in Register and Branch if Nonzero
TBMB*,b,x	A,B	86	Test Bit in Memory and Branch if One
TBSB,b,d	B	96	Test Bit in Mem. Shrt Disp. and Branch if One
TBXB,b,x	B	9E	Test Bit in Mem. Shrt Indx. and Branch if One
TBRB,r,b	B	76	Test Bit in Register and Branch if One
CBMB*,b,x	A,B,B	87	Compare Bit and Memory
CBSB, b,d	B	97	Compare Bit and Memory Short Displaced
CBXB,b,x	B	9F	Compare Bit and Memory Short Indexed

MNEMONIC		OP.CODE	DESCRIPTION
BYTE MANIPULATION INSTRUCTIONS			
MUR,r,s		0B	Move Upper Byte Register to Register
MLR,r,s		0C	Move Lower Byte Register to Register
MBR,r,s		08	Move Byte Right Register to Register
MBL,r,s		09	Move Byte Left Register to Register
IBR,r,s		0A	Interchange Bytes Register to Register
UNCONDITIONAL BRANCH INSTRUCTIONS			
BLM*,r,x	A	E7	Branch and Link
BLI,r		EF	Branch and Link Immediate
BRU*,x	A	E7	Branch Unconditionally
HOP,d		F7	Branch Short Displaced
BRX,x		FF	Branch Short Indexed
CONTROL INSTRUCTIONS			
HLT		00	Halt
NOP		66	No Operation
INTERRUPT AND CALL INSTRUCTIONS			
SIE,1		26-1	Set Interrupt Enable
RIE,1		27-1	Reset Interrupt Enable
SIR,1		26-2	Set Interrupt Request
RIR,1		27-2	Reset Interrupt Request
SIA,1		26-0	Set Interrupt Active
RIA,1		27-0	Reset Interrupt Active
REX,n		23	Request Executive Service
RMI		01	Request Multiprocessor Interrupt
CAR		24	Clear Active Interrupt and Return
CIR		25	Clear Interrupt and Return
INPUT/OUTPUT INSTRUCTIONS			
ISA,r,u		48	Input Status from I/O Group A
ISB,r,u		49	Input Status from I/O Group B
ISC,r,u		4A	Input Status from I/O Group C
ISD,r,u		4B	Input Status from I/O Group D
IDA,r,u		4C	Input Data From I/O Group A
IDB,r,u		4D	Input Data From I/O Group B
IDC,r,u		4E	Input Data From I/O Group C
IDD,r,u		4F	Input Data From I/O Group D
OCA,r,u		40	Output Command to I/O Group A
OCB,r,u		41	Output Command to I/O Group B

MNEMONIC	OP.CODE	DESCRIPTION
INPUT/OUTPUT INSTRUCTIONS - CONTINUED		
OCC,r,u	42	Output Command to I/O Group C
OCD,r,u	43	Output Command to I/O Group D
ODA,r,u	44	Output Data to I/O Group A
ODB,r,u	45	Output Data to I/O Group B
ODC,r,u	46	Output Data to I/O Group C
ODD,r,u	47	Output Data to I/O Group D

MNEMONIC		OP.CODE	DESCRIPTION
A			
ABMB*,b,x	A,B	84	Add Bit in Memory and Branch if Nonzero
ABMM*,b,x	A	80	Add Bit in Memory
ABR,r,b		60	Add Bit in Register
ABRB,r,b	B	70	Add Bit in Register and Branch if Nonzero
ABSB,b,d	B	94	Add Bit in Mem. Short Disp. and Branch if Nonzero
ABSM,b,d		90	Add Bit in Memory Short Displaced
ABXB,b,x	B	9C	Add Bit in Mem. Short Indx. and Branch if Nonzero
ABXM,b,x		98	Add Bit in Memory Short Indexed
ADI,r	V	E8	Add Memory to Register Immediate
ADM*,r,x	A	EO	Add Memory to Register
ADMB*,r,x	A,B	C4	Add Reg. to Memory and Branch if Nonzero
ADMM*,r,x	A	CO	Add Register to Memory
ADR,r,s		68	Add Register to Register
ADRB,r,s	B	78	Add Reg. to Reg. and Branch if Nonzero
ADS,r,d		FO	Add Memory to Register Short Displaced
ADSB,r,d	B	D4	Add Reg. to Mem. Short Disp. and Branch if Nonzero
ADSM,r,d		DO	Add Register to Memory Short Displaced
ADX,r,x		F8	Add Memory to Register Short Indexed
ADXB,r,x	B	DC	Add Reg. to Mem. Short Indx. and Branch if Nonzero
ADXM,r,x		D8	Add Register to Memory Short Indexed
B			
BLI,r		EF	Branch and Link Immediate
BLM*,r,x	A	E7	Branch and Link
BRU*,x	A	E7	Branch Unconditionally
BRX,x		FF	Branch Short Indexed
C			
CAR		24	Clear Active Interrupt and Return
CBMB*,b,x	A,B,B	87	Compare Bit and Memory
CBSB,b,d	B	97	Compare Bit and Memory Short Displaced
CBXB,b,x	B	9F	Compare Bit and Memory Short Indexed
CIR		25	Clear Interrupt and Return
CRMB*,r,x	A,B,B	C7	Compare Memory and Register
CRSB,r,d	B,B	D7	Compare Memory and Register Short Displaced
CRXB,r,x	B,B	DF	Compare Memory and Register Short Indexed

MNEMONIC		OP.CODE	DESCRIPTION
D			
DAR,r,s		22	Double Precision Add Register to Register
DVM*,r,x	A	A1	Divide Register by Memory
DVR,r,s		21	Divide Register by Register
DVS,r,d		B1	Divide Register by Memory Short Displaced
DVX,r,x		B9	Divide Register by Memory Short Indexed
E			
ETI,r	V	EA	Extract Memory from Register Immediate
ETM*,r,x	A	E2	Extract Memory from Register
ETMB*,r,x	A,B	C5	Extract Reg. from Mem. and Branch if Nonzero
ETMM*,r,x	A	C1	Extract Register from Memory
ETR,r,s		6A	Extract Register from Register
ETRB,r,s	B	7A	Ext. Reg. from Reg. and Branch if Nonzero
ETS,r,d		F2	Extract Memory from Register Short Displaced
ETSB,r,d	B	D5	Ext. Reg. from Mem. Sht. Dis. & Br. if Nonzero
ETSM,r,d		D1	Extract Register from Memory Short Displaced
ETX,r,x		FA	Extract Memory from Register Short Indexed
ETXB,r,x	B	DD	Ext. Reg. from Mem. Sht, Indx. & Br. if Nonzero
ETXM,r,x		D9	Extract Reg. from Memory Short Indexed
G			
GMR,r,b		67	Generate Mask in Register
GMRB,r,b	B	77	Generate Mask in Register and Branch Unconditionally
H			
HLT		00	Halt
HOP,d		F7	Branch Short Displaced
I			
IBR,r,s		0A	Interchange Bytes Register to Register
IDA,r,u		4C	Input Data From I/O Group A
IDB,r,u		4D	Input Data From I/O Group B
IDC,r,u		4E	Input Data From I/O Group C
IDD,r,u		4F	Input Data From I/O Group D
ISA,r,u		48	Input Status from I/O Group A
ISB,r,u		49	Input Status from I/O Group B
ISC,r,u		4A	Input Status from I/O Group C
ISD,r,u		4B	Input Status from I/O Group D

MNEMONIC		OP.CODE	DESCRIPTION
L			
LAD,r,c		2E	Shift Left Arithmetic Double
LAS,r,c		2F	Shift Left Arithmetic Single
LBR,r,b		65	Load Bit in Register
LBRB,r,b	B	75	Load Bit in Register and Branch Unconditionally
LBX,r,x		AE	Load Byte from Memory
LDI,r	V	ED	Load Register from Memory Immediate
LDM*,r,x	A	E5	Load Register from Memory
LDS,r,d		F5	Load Register from Memory Short Displaced
LDX,r,x		FD	Load Register from Memory Short Indexed
LFM*,r,x	A	A4	Load File from Memory
LFS,r,d		B4	Load File from Memory Short Displaced
LFX,r,x		BC	Load File from Memory Short Indexed
LLD,r,c		2C	Shift Left Logical Double
LLS,r,c		2D	Shift Left Logical Single
LRS,r,c		OF	Left Rotate Single
M			
MBL,r,s		09	Move Byte Left Register to Register
MBR,r,s		08	Move Byte Right Register to Register
MLR,r,s		OC	Move Lower Byte Register to Register
MPM*,r,x	A	AO	Multiply Memory by Register
MPR,r,s		20	Multiply Register by Register
MPS,r,d		BO	Multiply Memory by Register Short Displaced
MPX,r,x		B8	Multiply Memory by Register Short Indexed
MUR,r,s		OB	Move Upper Byte Register to Register
N			
NOP		66	No Operation

MNEMONIC		OP.CODE	DESCRIPTION
O			
OBMM*,b,x	A	82	OR Bit in Memory
OBR,r,b		63	OR Bit in Register
OBRB,r,b	B	73	OR Bit in Register and Branch Unconditionally
OBSM,b,d		92	OR Bit in Memory Short Displaced
OBXM,b,x		9A	OR Bit in Memory Short Indexed
OCA,r,u		40	Output Command to I/O Group A
OCB,r,u		41	Output Command to I/O Group B
OCC,r,u		42	Output Command to I/O Group C
OCD,r,u		43	Output Command to I/O Group D
ODA,r,u		44	Output Data to I/O Group A
ODB,r,u		45	Output Data to I/O Group B
ODC,r,u		46	Output Data to I/O Group C
ODD,r,u		47	Output Data to I/O Group D
ORI,r	V	EB	OR Memory and Register Immediate
ORM*,r,x	A	E3	OR Memory and Register
ORMM*,r,x	A	C2	OR Register and Memory
ORR,r,s		6B	OR Register and Register
ORRB,r,s	B	7B	OR Register and Register and Branch if Nonzero
ORS,r,d		F3	OR Memory and Register Short Displaced
ORSM,r,d		D2	OR Register and Memory Short Displaced
ORX,r,x		FB	OR Memory and Register Short Indexed
ORXM,r,x		DA	OR Register and Memory Short Indexed
R			
RAD,r,c		2A	Shift Right Arithmetic Double
RAS,r,c		2B	Shift Right Arithmetic Single
REX,n		23	Request Executive Service
RIA,1		27-0	Reset Interrupt Active
RIE,1		27-1	Reset Interrupt Enable
RIR,1		27-2	Reset Interrupt Request
RLD,r,c		28	Shift Right Logical Double
RLS,r,c		29	Shift Right Logical Single
RMI		01	Request Multiprocessor Interrupt

MNEMONIC		OP.CODE	DESCRIPTION
S			
SBR,r,b		61	Subtract Bit in Register
SBRB,r,b	B	71	Subtract Bit in Register and Branch if Nonzero
SBX,r,x		AF	Store Byte in Memory
SFM*,r,x	A	A5	Store File in Memory
SFS,r,d		B5	Store File in Memory Short Displaced
SFX,r,x		BD	Store File in Memory Short Indexed
SIA,1		26-0	Set Interrupt Active
SIE,1		26-1	Set Interrupt Enable
SIR,1		26-2	Set Interrupt Request
STI,r	V	EE	Store Register in Memory Immediate
STM*,r,x	A	E6	Store Register in Memory
STS,r,d		F6	Store Reg. in Memory Short Displaced
STX,r,x		FE	Store Reg. in Memory Short Indexed
SUI,r	V	E9	Subtract Memory from Register Immediate
SUM*,r,x	A	E1	Subtract Memory from Register
SUR,r,s		69	Subtract Register from Register
SURB,r,s	B	79	Subtract Reg. from Reg. and Branch if Nonzero
SUS,r,d		F1	Subtract Memory from Register Short Displaced
SUX,r,x		F9	Subtract Memory from Register Short Indexed
T			
TBMB*,b,x	A,B	86	Test Bit in Memory and Branch if One
TBRB,r,b	B	76	Test Bit in Register and Branch if One
TBSB,b,d	B	96	Test Bit in Mem. Shrt Disp. and Branch if One
TBXB,b,x	B	9E	Test Bit in Mem. Shrt Indx. and Branch if One
TERB,r,s	B	7E	Test Reg. and Reg. and Br. if any 1's Compare
TOR,r,s		OD.	Trans. 1's Complement Register to Register
TRMB*,r,x	A,B	C6	Test Reg. and Mem. and Branch if any 1's Compare
TRO,r		OE	Transfer and Reset Overflow Status
TRR,r,s		6D	Transfer Register to Register
TRRB,r,s	B	7D	Transfer Reg. to Reg. and Branch if Nonzero
TRSB,r,d	B	D6	Test Reg. and Mem. Sht. Disp. & Br. if any 1's Compare
TRXB,r,x	B	DE	Test Reg. and Mem. Sht. Indx. & Br. if any 1's Compare
TTR,r,s		6F	Transfer 2's Complement Register to Register
TTRB,r,s	B	7F	Trans. 2's Comp. Reg. to Reg. and Br. if Nonzero

MNEMONIC		OP.CODE	DESCRIPTION
X			
XBR,r,b		64	Exclusive OR Bit in Register
XBRB,r,b	B	74	Excl. OR Bit in Register and Branch if Nonzero
XOI,r	V	EC	Exclusive OR Memory and Register Immediate
XOM*,r,x	A	E4	Exclusive OR Memory and Register
XOR,r,s		6C	Exclusive OR Register and Register
XORB,r,s	B	7C	Exclusive OR Reg. and Reg. and Branch if Nonzero
XOS,r,d		F4	Exclusive OR Mem. and Reg. Short Displaced
XOX,r,x		FC	Exclusive OR Mem. and Reg. Short Indexed
Z			
ZBMB*,b,x	A,B	85	Zero Bit in Memory and Branch if Nonzero
ZBMM*,b,x	A	81	Zero Bit in Memory
ZBR,r,b		62	Zero Bit in Register
ZBRB,r,b	B	72	Zero Bit in Register and Branch if Nonzero
ZBSB,b,d	B	95	Zero Bit in Mem. Shrt. Disp. and Branch if Nonzero
ZBSM,b,d		91	Zero Bit in Memory Short Displaced
ZBXB,b,x	B	9D	Zero Bit in Mem. Shrt Indx. and Branch if Nonzero
ZBXM,b,x		99	Zero Bit in Memory Short Indexed
ZRR,r		6C	Zero Register

OP. CODE	MNEMONIC	DESCRIPTION
00	HLT	Halt
01	RMI	Request Multiprocessor Interrupt
02-07	Unused	
08	MBR,r,s	Move Byte Right Register to Register
09	MBL,r,s	Move Byte Left Register to Register
0A	IBR,r,s	Interchange Bytes Register to Register
0B	MUR,r,s	Move Upper Byte Register to Register
0C	MLR,r,s	Move Lower Byte Register to Register
0D	TOR,r,s	Trans. 1's Complement Register to Register
0E	TRO,r	Transfer and Reset Overflow Status
0F	LRS,r,c	Left Rotate Single
10-1F	Unused	
20	MPR,r,s	Multiply Register by Register
21	DVR,r,s	Divide Register by Register
22	DAR,r,s	Double Precision Add Register to Register
23	REX,n	Request Executive Service
24	CAR	Clear Active Interrupt and Return
25	CIR	Clear Interrupt and Return
26-0	SIA,1	Set Interrupt Active
26-1	SIE,1	Set Interrupt Enable
26-2	SIR,1	Set Interrupt Request
27-0	RIA,1	Reset Interrupt Active
27-1	RIE,1	Reset Interrupt Enable
27-2	RIR,1	Reset Interrupt Request
28	RLD,r,c	Shift Right Logical Double
29	RLS,r,c	Shift Right Logical Single
2A	RAD,r,c	Shift Right Arithmetic Double
2B	RAS,r,c	Shift Right Arithmetic Single
2C	LLD,r,c	Shift Left Logical Double
2D	LLS,r,c	Shift Left Logical Single
2E	LAD,r,c	Shift Left Arithmetic Double
2F	LAS,r,c	Shift Left Arithmetic Single
30-3F	Unused	
40	OCA,r,u	Output Command to I/O Group A
41	OCB,r,u	Output Command to I/O Group B
42	OCC,r,u	Output Command to I/O Group C
43	OCD,r,u	Output Command to I/O Group D
44	ODA,r,u	Output Data to I/O Group A
45	ODB,r,u	Output Data to I/O Group B
46	ODC,r,u	Output Data to I/O Group C
47	ODD,r,u	Output Data to I/O Group D
48	ISA,r,u	Input Status from I/O Group A
49	ISB,r,u	Input Status from I/O Group B
4A	ISC,r,u	Input Status from I/O Group C
4B	ISD,r,u	Input Status from I/O Group D
4C	IDA,r,u	Input Data from I/O Group A

OP. CODE	MNEMONIC		DESCRIPTION
4D	IDB,r,u		Input Data from I/O Group B
4E	IDC,r,u		Input Data from I/O Group C
4F	IDD,r,u		Input Data from I/O Group D
50-5F	Unused		
60	ABR,r,b		Add Bit in Register
61	SBR,r,b		Subtract Bit in Register
62	ZBR,r,b		Zero Bit in Register
63	OBR,r,b		OR Bit in Register
64	XBR,r,b		Exclusive OR Bit in Register
65	LBR,r,b		Load Bit in Register
66	NOP		No Operation
67	GMR,r,b		Generate Mask in Register
68	ADR,r,s		Add Register to Register
69	SUR,r,s		Subtract Register from Register
6A	ETR,r,s		Extract Register from Register
6B	ORR,r,s		OR Register and Register
6C	XOR,r,s		Exclusive OR Register and Register
	ZRR,r		Zero Register
6D	TRR,r,s		Transfer Register to Register
6E	Unused		
6F	TTR,r,s		Transfer 2's Complement Register to Register
70	ABRB,r,b	B	Add Bit in Register and Branch if Nonzero
71	SBRB,r,b	B	Subtract Bit in Register and Branch if Nonzero
72	ZBRB,r,b	B	Zero Bit in Register and Branch if Nonzero
73	OBRB,r,b	B	OR Bit in Register and Branch Unconditionally
74	XBRB,r,b	B	Excl. OR Bit in Register and Branch if Nonzero
75	LBRB,r,b	B	Load Bit in Register and Branch Unconditionally
76	TBRB,r,b	B	Test Bit in Register and Branch if One
77	GMRB,r,b	B	Generate Mask in Register and Branch Unconditionally
78	ADRB,r,s	B	Add Reg. to Reg. and Branch if Nonzero
79	SURB,r,s	B	Subtract Reg. from Reg. and Branch if Nonzero
7A	ETRB,r,s	B	Ext. Reg. from Reg. and Branch if Nonzero
7B	ORRB,r,s	B	OR Register and Register and Branch if Nonzero
7C	XORB,r,s	B	Exclusive OR Reg. and Reg. and Branch if Nonzero
7D	TRRB,r,s	B	Transfer Reg. to Reg. and Branch if Nonzero
7E	TERB,r,s	B	Test Reg. and Reg. and Br. if any 1's Compare
7F	TTRB,r,s	B	Trans. 2's Comp. Reg. to Reg. and Br. if Nonzero
80	ABMM*,b,x	A	Add Bit in Memory
81	ZBMM*,b,x	A	Zero Bit in Memory
82	OBMM*,b,x	A	OR Bit in Memory
83	Unused		
84	ABMB*,b,x	A,B	Add Bit in Memory and Branch if Nonzero
85	ZBMB*,b,x	A,B	Zero Bit in Memory and Branch if Nonzero
86	TBMB*,b,x	A,B	Test Bit in Memory and Branch if One
87	CBMB*,b,x	A,B,B	Compare Bit and Memory
88-8F	Unused		
90	ABSM,b,d		Add Bit in Memory Short Displaced

OP. CODE	MNEMONIC		DESCRIPTION
91	ZBSM,b,d		Zero Bit in Memory Short Displaced
92	OBSM,b,d		OR Bit in Memory Short Displaced
93	Unused		
94	ABSB,b,d	B	Add Bit in Mem. Short Disp. and Branch if Nonzero
95	ZBSB,b,d	B	Zero Bit in Mem. Shrt Disp. and Branch if Nonzero
96	TBSB,b,d	B	Test Bit in Mem. Shrt Disp. and Branch if One
97	CBSB,b,d	B	Compare Bit and Memory Short Displaced
98	ABXM,b,x		Add Bit in Memory Short Indexed
99	ZBXM,b,x		Zero Bit in Memory Short Indexed
9A	OBXM,b,x		OR Bit in Memory Short Indexed
9B	Unused		
9C	ABXB,b,x	B	Add Bit in Mem. Short Indx. and Branch if Nonzero
9D	ZBXB,b,x	B	Zero Bit in Mem. Shrt Indx. and Branch if Nonzero
9E	TBXB,b,x	B	Test Bit in Mem. Shrt Indx. and Branch if One
9F	CBXB,b,x	B	Compare Bit and Memory Short Indexed
AO	MPM*,r,x	A	Multiply Memory by Register
A1	DVM*,r,x	A	Divide Register by Memory
A2-A3	Unused		
A4	LFM*,r,x	A	Load File from Memory
A5	SFM*,r,x	A	Store File in Memory
A6-AD	Unused		
AE	LBX,r,x		Load Byte from Memory
AF	SBX,r,x		Store Byte in Memory
BO	MPS,r,d		Multiply Memory by Register Short Displaced
B1	DVS,r,d		Divide Register by Memory Short Displaced
B2-B3	Unused		
B4	LFS,r,d		Load File from Memory Short Displaced
B5	SFS,r,d		Store File in Memory Short Displaced
B6-B7	Unused		
B8	MPX,r,x		Multiply Memory by Register Short Indexed
B9	DVX,r,x		Divide Register by Memory Short Indexed
BA-BB	Unused		
BC	LFX,r,x		Load File from Memory Short Indexed
BD	SFX,r,x		Store File in Memory Short Indexed
BE-BF	Unused		
CO	ADMM*,r,x	A	Add Register to Memory
C1	ETMM*,r,x	A	Extract Register from Memory
C2	ORMM*,r,x	A	OR Register and Memory
C3	Unused		
C4	ADMB*,r,x	A,B	Add Reg. to Memory and Branch if Nonzero
C5	ETMB*,r,x	A,B	Extract Reg. from Mem. and Branch if Nonzero
C6	TRMB*,r,x	A,B	Test Reg. and Mem. and Branch if any 1's Compare
C7	CRMB*,r,x	A,B,B	Compare Memory and Register
C8-CF	Unused		
DO	ADSM,r,d		Add Register to Memory Short Displaced
D1	ETSM,r,d		Extract Register from Memory Short Displaced
D2	ORSM,r,d		OR Register and Memory Short Displaced

OP. CODE	MNEMONIC		DESCRIPTION
D3	Unused		
D4	ADSB,r,d	B	Add Reg. to Mem. Short Disp. and Branch if Nonzero
D5	ETSB,r,d	B	Ext. Reg. from Mem. Shrt Disp. & Br. if Nonzero
D6	TRSB,r,d	B	Test Reg. and Mem. Shrt Disp. & Br. if any 1's Compare
D7	CRSB,r,d	B,B	Compare Memory and Register Short Displaced
D8	ADXM,r,x		Add Register to Memory Short Indexed
D9	ETXM,r,x		Extract Reg. from Memory Short Indexed
DA	ORXM,r,x		OR Register and Memory Short Indexed
DB	Unused		
DC	ADXB,r,x	B	Add Reg. to Mem. Short Indx. and Branch if Nonzero
DD	ETXB,r,x	B	Ext. Reg. from Mem. Shrt. Indx. & Br. if Nonzero
DE	TRXB,r,x	B	Test Reg. and Mem. Shrt Indx & Br. if any 1's Compare
DF	CRXB,r,x	B,B	Compare Memory and Register Short Indexed
EO	ADM*,r,x	A	Add Memory to Register
E1	SUM*,r,x	A	Subtract Memory from Register
E2	ETM*,r,x	A	Extract Memory from Register
E3	ORM*,r,x	A	OR Memory and Register
E4	XOM*,r,x	A	Exclusive OR Memory and Register
E5	LDM*,r,x	A	Load Register from Memory
E6	STM*,r,x	A	Store Register in Memory
E7	BLM*,r,x	A	Branch and Link
	BRU*,x	A	Branch Unconditionally
E8	ADI,r	V	Add Memory to Register Immediate
E9	SUI,r	V	Subtract Memory from Register Immediate
EA	ETI,r	V	Extract Memory from Register Immediate
EB	ORI,r	V	OR Memory and Register Immediate
EC	XOI,r	V	Exclusive OR Memory and Register Immediate
ED	LDI,r	V	Load Register from Memory Immediate
EE	STI,r	V	Store Register in Memory Immediate
EF	BLI,r		Branch and Link Immediate
FO	ADS,r,d		Add Memory to Register Short Displaced
F1	SUS,r,d		Subtract Memory from Register Short Displaced
F2	ETS,r,d		Extract Memory from Register Short Displaced
F3	ORS,r,d		OR Memory and Register Short Displaced
F4	XOS,r,d		Exclusive OR Mem. and Reg. Short Displaced
F5	LDS,r,d		Load Register from Memory Short Displaced
F6	STS,r,d		Store Reg. in Memory Short Displaced
F7	HOP,d		Branch Short Displaced
F8	ADX,r,x		Add Memory to Register Short Indexed
F9	SUX,r,x		Subtract Memory from Register Short Indexed
FA	ETX,r,x		Extract Memory from Register Short Indexed
FB	ORX,r,x		OR Memory and Register Short Indexed
FC	XOX,r,x		Exclusive OR Mem. and Reg. Short Indexed
FD	LDX,r,x		Load Register from Memory Short Indexed
FE	STX,r,x		Store Reg. in Memory Short Indexed
FF	BRX,x		Branch Short Indexed

r - General Purpose Destination Register (0-15)
s - General Purpose Source Register (0-15)
l - Interrupt Level (0-31)
n - Executive Service Number (0-255)
c - Shift Count (0-15)
u - I/O Unit Number (0-15)
b - Bit Position (0-15)
* - Indirect Addressing
A - Address Operand
x - Index Register
d - Short Displaced Offset (0-15)
V - Value on Immediate Instruction
B - Branch Address
G - I/O Group

```
                              PGM        E$INT
                               INT        F:ANL,E:ANF
                               EXT        E:I35,E:35S,E:SKD,E:035
                               EXT        E.IOF,E:I28,U.TRK,U.GAN,U.BLL
                               EXT        E:SEC,E:MIN,E.UBU,E:ANL,E.SF1
                               EXT        E:MIT,E.350,E.280,E.T08,M:INT
                               EXT        U.CPC,U.CCN,U.CST,U.RTY,U.TM1
                               EXT        U.TM3,U.TM4,E:FRT,E.28F
                               EXT        E:028,U.TRF,U.AST,U.DIU,U.IHB
                               EXT        U.SLP,U.FAC,U.OTM,E:TSI,E:MTI
                               EXT        E:PWD,E:PAR,E:ABR,F.MTP,B.STT
                               EXT        E.TSF
                           ***************************************************************
                           *     CAT NO. 400000-000
                           ***************************************************************
                           * LOW MEMORY CONSTANTS
          R  0000              REL
   0000      F700              BRU        ANFNG          PESTART ON CLEAR
   0001   R  0100
          A  0021              ORG        #21
   0021   X  0027              DFC        E:PWD          PWR DOWN/UP ENTRY
          A  0023              ORG        #23
   0023   X  0028              DFC        E:PAR          MEM PARITY ENTRY
          A  003D              ORG        #3D
   003D   X  0029              DFC        E:ABR          CONSOLE INTERRUPT ENTRY
          A  003F              ORG        #3F
   003F   X  0025              DFC        E:TSI          TIME-SLICE INT. ENTRY
          A  0063              ORG        #63
   0063   A  FFD6              DFC        -42            AIS DMP TC
          A  0073              ORG        #73
   0073   X  000C              DFC        E.UBU          AIS DMP TA
          A  008A              ORG        #8A
   008A   X  0001              DFC        E:I35          ASR 35 DI ENTRY
          A  0098              ORG        #98
   0098   X  0006              DFC        F:I28          ASR 28 DI ENTRY
   0099   X  0006              DFC        E:I28          ASR 28 DI ENTRY
          A  00A0              ORG        #A0
   00A0   X  000A              DFC        E:SEC          1 SEC INT ENTRY
   00A1   X  000B              DFC        E:MIN          1 MIN INT ENTRY
   00A2   X  0013              DFC        M:INT          INE INT ENTRY
          A  00A7              ORG        #A7
   00A7   X  0013              DFC        M:INT          INE INT ENTRY
          A  00C4              ORG        #C4
   00C4   X  0026              DFC        E:MTI          MAG TAPE SI ENTRY
          A  00CA              ORG        #CA
   00CA   X  0002              DFC        E:35S          ASR 35 SI ENTRY
          A  00D1              ORG        #D1
   00D1   X  000D              DFC        E:ANL          AIS SI ENTRY
                           ****************************************************************
                           * SET PROGRAM ORIGIN
```

```
              A  0100        ORG           #100
                         *************************************************************
                         * START-UP ROUTINE
              R  0100    E:ANF EQU         $
        0100     8200    ANFNG OBMM,0      E.SF1                   RESET START FLAG
        0101  X  000E
                         *************************************************************
                         * THIS SECTION TRANSMITS INITIAL GAIN, TRACKING
                         *   RATE, AND BLANKING LEVEL SETTINGS TO THE
                         *   RECEIVER.
        0102     6C33          ZRR,3
        0103     E750    XMIT1 BLM,5       E:MIT
        0104  X  000F
        0105     603F          ABR,3,15
        0106     ED40          LDI,4       14
        0107  A  000E
        0108     7943          SURB,4,3    XMIT1
        0109  R  0103
                         *************************************************************
                         * INTERRUPT START-UP
        010A     2780          RIP,#0
        010B     2700          RIA,#0
        010C     2640          SIE,#0
        010D     2781          RIR,#1
        010E     2701          RIA,#1
        010F     2641          SIE,#1
        0110     278C          RIR,#C
        0111     270C          RIA,#C
        0112     264C          SIE,#C
        0113     278D          RIR,#D
        0114     270D          RIA,#D
        0115     264D          SIE,#D
        0116     278E          RIR,#E
        0117     270E          RIA,#F
        0118     264E          SIE,#F
        0119     278F          RIR,#F
        011A     270F          RIA,#F
        011B     264F          SIE,#F
        011C     ED10          LDI,1       #60E1
        011D  A  60E1
        011E     4210          OCC,1,0                             ENABLE IOIS INTERRUPTS
        011F     6017          ABR,1,7
        0120     4210          OCC,1,0                             CLEAR INT. REQUESTS
                         *************************************************************
                         * CHANNEL PARAMETER INITIALIZATION:
        0121     6C33          ZRR,3
        0122     6C44          ZRR,4
        0123     655D          LBR,5,13                            =4
        0124     ED60          LDI,6       -18
        0125  A  FFEE
```

```
 94     0126      E643  PINIT STM,4,3      U.CCN              U.CCN=0
        0127  X   0015
 95     0128      E643        STM,4,3      U.CPC              U.CPC=0
        0129  X   0014
 96     012A      E653        STM,5,3      U.CST              U.CST=4
        012B  X   0016
 97     012C      E663        STM,6,3      U.RTY              U.RTY=-18
        012D  X   0017
 98     012E      E643        STM,4,3      U.IHB              U.IHB=0
        012F  X   0021
 99     0130      603F        ABR,3,15
100     0131      EDF0        LDI,15       14
        0132  A   000E
101     0133      79F3        SURB,15,3    PINIT
        0134  R   0126
102     0135      ED10        LDI,1        -30
        0136  A   FFE2
103     0137      E610        STM,1        U.TM1              U.TM1=-30
        0138  X   0018
104     0139      ED10        LDI,1        -12
        013A  A   FFF4
105     013B      E610        STM,1        U.TM3              GCLOK=-12
        013C  X   0019
106     013D      ED10        LDI,1        -9
        013E  A   FFF7
107     013F      E610        STM,1        U.TM4              TCLOK=-9
        0140  X   001A
108                     ********************************************************************
109                     * START-UP ASR 35 FOR OPERATOR INPUT
110                     * CLEAR ASR 28 FOR OUTPUT
111     0141      6C11        ZRR,1
112     0142      E610        STM,1        E.350              CLEAR FLAG
        0143  X   0010
113     0144      E610        STM,1        E.280
        0145  X   0011
114     0146      ED10        LDI,1        #4400
        0147  A   4400
115     0148      401A        OCA,1,#A                        TERMINATE
116     0149      4118        OCB,1,8                         TERMINATE
117     014A      4119        OCB,1,9                         ASR 28
118     014B      ED10        LDI,1        #AC00
        014C  A   AC00
119     014D      401A        OCA,1,#A                        READ
120     014E      8200        OBNM,0       E.T08               SCHEDULE STATUS DISPLAY
        014F  X   0012
121                     ********************************************************************
122                     * LOG RESTART ON ASR 28..
123     0150      6C11        ZRR,1
124     0151      E610        STM,1        E.IOF
        0152  X   0005
```

```
125     0153       E610        STM,1         E.28F
        0154   X   001C
126     0155       E7E0        BLM,14        E:FRT
        0156   X   001B
127     0157   R   0189        DFC           STIME
128     0158       E7E0        BLM,14        E:035
        0159   X   0004
129     015A   R   0198        DFC           MSG1
130     015B       E7E0        BLM,14        E:028
        015C   X   001D
131     015D   R   0173        DFC           MSG0
132                            ************************************************************
133                            * F:FMT SET-UP
134     015E       ED10        LDI,1         14080
        015F   A   3700
135     0160       E610        STM,1         F.MTP
        0161   X   002A
136     0162       6C11        ZRR,1
137     0163       E610        STM,1         B.STT
        0164   X   002B
138     0165       8100        ZBMM,0        E.TSF
        0166   X   002C
139     0167       E700        BRU           E:SKD
        0168   X   0003
140                            ************************************************************=
141                            * DUMMY TASKS
142     0169       6C22    F:ANL ZRR,2
143     016A       E620        STM,2         B.STT
        016B   X   002B
144     016C       E620        STM,2         E.IOF
        016D   X   0005
145     016E       E7E0        BLM,14        E:035
        016F   X   0004
146     0170   R   019A        DFC           MSG8
147     0171       E700        BRU           E:SKD
        0172   X   0003
```

```
149     0173  A  0D0A  MSG0  DFC         #0D0A,#0A0A,#0A0A
        0174  A  0A0A
        0175  A  0A0A
150     0176  A  2E2E        DFC         |.....SYSTEM RESTART|
        0177  A  2E2E
        0178  A  2E2E
        0179  A  2E2E
        017A  A  2E2E
        017B  A  2E2E
        017C  A  2E2E
        017D  A  2E2E
        017E  A  2E2E
        017F  A  2E2E
        0180  A  5359
        0181  A  5354
        0182  A  454D
        0183  A  2052
        0184  A  4553
        0185  A  5441
        0186  A  5254
151     0187  A  2041        DFC         | AT |
        0188  A  5420
152     0189  A  3132  STIME DFC         |123 123456.....|
        018A  A  3320
        018B  A  3132
        018C  A  3334
        018D  A  3536
        018E  A  2E2E
        018F  A  2E2E
        0190  A  2E2E
        0191  A  2E2E
        0192  A  2E2E
        0193  A  2E2E
        0194  A  2E2E
        0195  A  2E2E
        0196  A  2E2E
        0197  A  2E2E
153     0198  A  0D0A  MSG1  DFC         #0D0A,0
        0199  A  0000
154     019A  A  0D0A  MSG8  DFC         #0D0A,|F:ANL CALLED|,#0D0A,#0000
        0198  A  463A
        019C  A  414E
        019D  A  4C20
        019E  A  4341
        019F  A  4C4C
        01A0  A  4544
        01A1  A  0D0A
        01A2  A  0000
155     01A3  R  0100        END         ANFNG

TOTAL ASSEMBLY ERRORS =   0     SIZE =   419
```

```
 1                              PGM         E$SKD
 2                              INT         E:SKD,E.TSK,E:BSK,B.STT,E.TSF
 3                              INT         B.RS1,B.RS2,B.RET
 4                              INT         E.T01,E.T02,E.T03,E.T04,E.T05
 5                              INT         E.T09,E.T10,E.T11,E.T12,E.T13
 6                              INT         E.T06,E.T07,E.T08,E.T14,E.T15
 7                              EXT         F:LOG,U:RTA,E:OMI,M:LEV,M:STD
 8                              EXT         F:FMT,F:DMP,F:ANL,U:PST,E:T28
 9                              EXT         U:RED,E:UIN,E:T35,M:ESC,U:RP3
10                              EXT         E:ANF,E:MAG,B:ORT
11                         *    CAT NO.  400000-001
12                         * THIS IS THE NEW AUTOMATED U SYSTEM SCHEDULER.  TASKS ARE SCHEDULED
13                         *   BY SETTING THE 0 BIT FOR THAT TASK IN THE TASK TABLE.  WHEN THE
14                         *   SCHEDULER FINDS A TASK REQUIRING SERVICE, IT RESETS THE SCHEDULE
15                         *   BIT AND TRANSFERS CONTROL TO THAT ROUTINE.
16   0000      E530    E:SKD LDM,3       MXLIM       R3 FOR COUNTER
     0001  R   002B
17   0002      ED10          LDI,1       E.TSK       USE R1 AS TABLE BASE
     0003  R   001B
18   0004      ED20    SKD1  LDI,2       15
     0005  A   000F
19   0006      8602    SKD2  TBMB,0,2    E.TSK,FOUND BRANCH IF SCHEDULE BIT IS SET
     0007  R   001B
     0008  R   0016
20   0009      712F          SBRB,2,15   SKD2        DECREMENT INDEX, NEXT TASK
     000A  R   0006
21   000B      713F          SBRB,3,15   SKD1        CONTROL COUNT UNSUCCESFUL PASSES
     000C  R   0004
22   000D      9E01          TBXB,0,1    E:SKD       IS SYSTEM ALREADY DEAD
     000E  R   0000
23   000F      9A01          OBXM,0,1                SET SYSTEM DEAD FLAG
24   0010      ED50          LDI,5       #1307
     0011  A   1307
25   0012      E740          BLM,4       E:LOG
     0013  X   0001
26   0014      E700          BRU         E:ANF
     0015  X   0010
27   0016      9901    FOUND ZBXM,0,1                CLEAR DEAD FLAG
28   0017      8102          ZBMM,0,2    E.TSK
     0018  R   001B
29   0019      E70A          BRU*,2      E.TSK
     001A  R   001B
30                         * SYSTEM TASK TABLE, TASKS LISTED IN INVERTED ORDER OF PRIORITY.
31                         * FIRST ENTRY IS THE SYSTEM DEAD FLAG.
32   001B  A   0000    E.TSK DFC         0           SYSTEM DEAD FLAG
33   001C  R   002C    E.T15 DFC         E:BSK       15. BACKGROUND SCHEDULER
34   001D  X   0004    E.T14 DFC         M:LEV       14. GAIN/T.R. HISTORY LOG
35   001E  X   0009    E.T13 DFC         U:PST       13. OPER PARAM. CONTROL
36   001F  X   000D    E.T12 DFC         E:T35       12. ASR 35 TELETYPE ROUTINE
37   0020  X   0011    E.T11 DFC         E:MAG       11. MAG TAPE HANDLER
```

```
 38      0021  X  0012  E.T10 DFC           B:ORT          10. BACKGROUND ABORT
 39      0022  A  0000  E.T09 DFC           0              9.
 40      0023  X  0005  E.T08 DFC           M:STD          8. EQUIPMENT STATUS DISPLAY
 41      0024  X  000F  E.T07 DFC           U:RP3          7. REPORT MSG. GENERATOR
 42      0025  X  0003  E.T06 DFC           E:OMI          6. OPERATOR MESSAGE INTERPRETOR
 43      0026  X  000A  E.T05 DFC           E:T28          5. ASR 28 TELETYPE ROUTINE
 44      0027  X  000B  E.T04 DFC           U:RED          4. CHAN REDUNDANCY TEST
 45      0028  X  000C  E.T03 DFC           E:UIN          3. U DATA INPUT COMPLETE
 46      0029  X  000E  E.T02 DFC           M:ESC          2. EQUIP STATUS CHANGE MONITOR
 47      002A  X  0002  E.T01 DFC           U:RTA          1. REAL TIME DATA ANALYSIS
 48      002B  A  0000  MXLIM DFC           0
 49                     * THIS ROUTINE CONTROLS THE BACKGROUND (NON-REAL TIME) TASKS.
 50      002C     E520  E:BSK LDM,2          B.STT          GET BACKGROUND STATE
         002D  R  0047
 51      002E     ED30        LDI,3         4
         002F  A  0004
 52      0030     E630        STM,3         B.STT          SET BACKGROUND STATE = 5
         0031  R  0047
 53      0032     ED40        LDI,4         E.TSF
         0033  R  0048
 54      0034     9A04        OBXM,0,4                     SET E.TSF TO ENABLE TIME-SLICING
 55      0035     E70A        BRU*,2        BTABL
         0036  R  0037
 56                     * BACKGROUND TASK TABLE.
 57      0037  R  0042  BTABL DFC           BRSET          B.STT = 0
 58      0038  X  0006        DFC           F:FMT          B.STT = 1
 59      0039  X  0007        DFC           F:DMP          B.STT = 2
 60      003A  X  0008        DFC           F:ANL          B.STT = 3
 61      003B  R  003C        DFC           $+1            B.STT = 4
 62                     * IF B.STT = 4, A BACKGROUND TASK IS ALREADY IN EXECUTION.  RESET
 63                     *   REGISTERS AND RESUME PROCESSING.
 64      003C     A410        LFM,1         B.RS1
         003D  R  0049
 65      003E     A4A0        LFM,10        B.RS2
         003F  R  0050
 66      0040     E708        BRU*          B.RET
         0041  R  0056
 67      0042     9904  BRSET ZBXM,0,4                     RESET E.TSF TO INHIGIT TIME-SLICING
 68      0043     E620        STM,2         B.STT          RESET BACKGROUND STATE TO 0
         0044  R  0047
 69      0045     E700        BRU           E:SKD
         0046  R  0000
 70      0047  A  0000  B.STT DFC           0              BACKGROUND STATE
 71      0048  A  0000  E.TSF DFC           0              TIME SLICING FLAG
 72      0049  A  0000  B.RS1 RES           7,0
 73      0050  A  0000  B.RS2 RES           6,0
 74      0056  A  0000  B.RET DFC           0
 75      0057           END

TOTAL ASSEMBLY ERRORS =   0     SIZE =     87
```

```
 1                              PGM          E$TSI
 2                              INT           E:TSI,B:IOR
 3                              EXT           E.TSF,B.RS1,B.RS2,B.RET,E.T15,
 4                              EXT           F:SKD,E.IOF,E:035,E:MGS
 5                          * THE TIME SLICING INTERRUPT COMES 10 TIMES PER SECOND.  IT IS USED
 6                          *   TO PREVENT BACKGROUND ROUTINES FROM HOLDING ON TO THE PROCESSOR
 7                          *   TOO LONG AND THEREBY HAMPERING THE REAL TIME TASKS.
 8                          * IF THE SYSTEM IS IN A BACKGROUND TASK WHEN THE INTERRUPT OCCURS,
 9                          *   THE SYSTEM SAVES ALL STATUS INFORMATION NECESSARY TO RESUME
10                          *   PROCESSING AND RESCHEDULES THE BACKGROUND TASK IN THE SCHEDULER.
11                          *   IF NO BACKGROUND TASK IS IN EXECUTION, THE INTERRUPT IS IGNORED.
12   0000      8600     E:TSI TBMB,0        E.TSF,TSF1      IS TIME-SLICING ENABLED?
     0001  X   0001
     0002  R   0004
13   0003      2500           CIR                          CLEAR INTERRUPTS AND RETURN
14   0004      A510     TSF1  SFM,1         B.RS1           SAVE REGISTERS
     0005  X   0002
15   0006      A5A0           SFM,10        B.RS2
     0007  X   0003
16   0008      E520           LDM,2         #3E             (FILL IN LOCATION WITH RET. ADDR))
     0009  A   003E
17   000A      E620           STM,2         B.RET           SAVE REENTRY LOCATION
     000B  X   0004
18   000C      8200           OBMM,0        E.T15           RESCHEDULE BACKGROUND SYSTEM
     000D  X   0005
19   000E      8100           ZBMM,0        E.TSF           RESET TIME SLICING FLAG.
     000F  X   0001
20   0010      270F           RIA,#F
21   0011      278F           RIR,#F
22   0012      E700           BRU           E:SKD           RETURN TO SCHEDULER.
     0013  X   0007
23                          * B$IOR IS THE SYSTEM I/O HANDLER FOR BACKGROUND LEVEL TASKS.  THIS
24                          *   ROUTINE WILL TAKE CARE OF NECESSARY HOUSEKEEPING TO RETURN CONTROL
25                          *   TO THE SYSTEM ONCE THE I/O OPERATION HAS BEGUN AND ENSURE
26                          *   CONTINUATION OF THE BACKGROUND TASK ONCE THE I/O HAS BEEN COMPLETED.
27                          * THE CALLING SEQUENCE DEPENDS ON THE DESIRED DEVICE....
28                          *   FOR I/O TO THE ASR 35..
29                          *     BLM,15        B:IOR
30                          *     DFC           (PARAMETER)
31                          *     DFC           (MSG START ADDR.)
32                          *   WHERE OUTPUT CONTINUES TO A NULL CHAR. (#0000)
33                          *   AND FOR I/O TO THE MAG TAPE UNIT..
34                          *     BLM,15        B:IOR
35                          *     DFC           (PARAMETER)
36                          *     DFC           (MSG START ADDR.)
37                          *     DFC           (COUNT OF WORDS)
38                          * PARAMETER WORD INTERPRETATION..
39                          *   BIT 0..0 DO NOT RESCHEDULE BACKGROUND SYSTEM AFTER I/O
40                          *            1 RESCHEDULE BACKGROUND SYSTEM AFTER I/O IS DONE
41                          *   BIT 1..0 NO RESPONSE IS EXPECTED
```

```
 42                     *          1 RESPONSE IS EXPECTED FROM OPERATOR ON ASR 35
 43                     *    BIT 2..0 I/O ON ASR 35
 44                     *          1 I/O ON MAG TAPE
 45                     *    BIT 3..0 INPUT  (REQUEST FOR MAG TAPE ONLY)
 46                     *          1 OUTPUT
 47    0014     A510  B:IOR SFM,1         B.RS1          SAVE REGISTERS
       0015  X  0002
 48    0016     A5A0        SFM,10        B.RS2
       0017  X  0003
 49    0018     FD2F        LDX,2,15                     GET PARAMETER
 50    0019     60FF        ABR,15,15
 51    001A     FD3F        LDX,3,15                     GET MSG START ADDR.
 52    001B     60FF        ABR,15,15
 53    001C     FD4F        LDX,4,15                     GET WORD COUNT FOR MAG TAPE.
 54    001D     8100        ZBMM,0        E.TSF          RESET E.TSF TO INHIBIT INTERRUPT
       001E  X  0001
 55    001F     E620        STM,2         E.IOF          SAVE PARAMETER FOR E:035 USE.
       0020  X  0008
 56    0021     7622        TBRB,2,2      BIOR1          BRU IF MAG TAPE CALL
       0022  R  002C
 57    0023     E630        STM,3         $+4
       0024  R  0027
 58    0025     E7E0        BLM,14        E:035
       0026  X  0009
 59    0027  A  0000        RES           1,0            MSG. START ADDR. PARAMETER
 60    0028     E6F0  BIOR2 STM,15        B.RET          SAVE REENTRY ADDRESS
       0029  X  0004
 61    002A     E700        BRU           E:SKD
       002B  X  0007
 62    002C     E630  BIOR1 STM,3         $+6
       002D  R  0032
 63    002E     E640        STM,4         $+5
       002F  R  0033
 64    0030     E7D0        BLM,13        E:MGS
       0031  X  000A
 65    0032  A  0000        RES           1,0            MSG. START ADDR PARAMETER
 66    0033  A  0000        RES           1,0            WORD COUNT PARAMETER
 67    0034     60FF        ABR,15,15                    MOVE RETURN ADDR. OVER LAST PARM.
 68    0035     E700        BRU           BIOR2
       0036  R  0028
 69    0037                 END

TOTAL ASSEMBLY ERRORS =   0     SIZE =     55
```

MODCOMP ASSEMBLY

```
1                       PGM             E$CLK
2                        INT             E:SEC,U.TM1,M.TRT,M.GNT
3                        INT             M.UPT,E.TM3,E:MIN
4                        EXT             M.TM1,E.T02,E:LOG,E.T04,E.T08,U.IHB,U.CST
5                        EXT             U.TRK,U.GAN,E.T14
6                   *     CAT NO.  400000-003
7                   * THIS IS THE SYSTEM SOFTWARE CLOCK.  IT'S TWO ROUTINES, E:SEC AND
8                   *   E:MIN, RESPOND TO THE 1/SECOND AND 1/MINUTE TIME INTERRUPTS.
```

```
10                          * E:SEC IS ENTERED VIA THE 1 SECOND TIME PULSE GENERATED BY THE WORLD
11                          *   TIME CLOCK.
12                          *       1. THE 5 SECOND DELAY FOR THE ENTRY TO M:ESC IS COUNTED DOWN.
13                          *       2. THE INPUT OF U DATA IS INITIATED.
14   0000     A510  E:SEC SFM,1         SAVRS          SAVE REGISTERS 1 - 7 FOR USE.
     0001 R   0195
15                          * PULSE TO KEEP ADACS IN AUTO
16   0002     6540        LBR,4,0
17   0003     464E        ODC,4,#E
18   0004     E510        LDM,1         M.TM1          GET DELAY TIMER
     0005 X   0001
19   0006     7D11        TRRB,1,1      $+3            IS TIMER ALREADY ZERO?
     0007 R   0009
20   0008     F706        HOP,SEC01
21   0009     84F0        ABMB,15       M.TM1,SEC01    INCREMENT AND CHECK FOR ZERO
     000A X   0001
     000B R   000E
22   000C     8200        OBMM,0        E.T02          SCHEDULE M:SEC IF ZERO
     000D X   0002
23                          * AIS DATA READ SEQUENCE
24   000E     ED10  SEC01 LDI,1         #4400          SET UP TO READ U DATA
     000F A   4400
25   0010     4110        OCB,1,0
26   0011     ED10        LDI,1         #4000
     0012 A   4000
27   0013     4110        OCB,1,0
28   0014     ED10        LDI,1         #C829
     0015 A   C829
29   0016     4110        OCB,1,0
30   0017     ED10        LDI,1         #D000
     0018 A   D000
31   0019     4111        OCB,1,1                      INIT. READ
32   001A     4921        ISB,2,#1                     CHECK TO SEE IF BUSY
33   001B     7627        TBRB,2,7      $+3
     001C R   001E
34   001D     F706        HOP,ANERR
35   001E     8100        ZBMM,0        SFLAG          CLEAR ANALOG SYSTEM FLAG
     001F R   01A3
36   0020     A410  RETN1 LFM,1         SAVRS
     0021 R   0195
37   0022     2500        CIR                          CLEAR INTERRUPT AND RETURN
38   0023     8600  ANERR TBMB,0        SFLAG,RETN1
     0024 R   01A3
     0025 R   0020
39   0026     8200        OBMM,0        SFLAG          SET ANALOG SYSTEM FLAG
     0027 R   01A3
40   0028     ED50        LDI,5         #1312          GENERATE |AF| MESSAGE
     0029 A   1312
41   002A     E740        BLM,4         E:LOG
     002B X   0003
```

```
 42    002C    E700        BRU         RETN1
       002D R  0020
```

```
                        * E:MIN IS ENTERED VIA THE 1 MINUTE TIME PULSE GENERATED BY THE WORLD
                        *   TIME CLOCK.
                        *       1. SCHEDULES REDUNDANCY CHECK EVERY 30 MINUTES.
                        *       2. SCHEDULES STATUS DUMP EVERY FOUR HOURS.
                        *       3. SAVES PARAMETER STATUS FOR LATER DUMP.
002E      A510  E:MIN SFM,1         SAVRR           SAVE REGISTERS
002F  R   019C
0030      84F0        ABMB,15       U.TM1,MIN02
0031  R   01A4
0032  R   0039
0033      ED20        LDI,2         -30             TIME TO SCHEDULE REDUN. CHECK
0034  A   FFE2
0035      E620        STM,2         U.TM1           RESET TIMER TO 30 MINUTES
0036  R   01A4
0037      8200        OBMM,0        E.T04           SCHEDULE REDUNDANCY TEST
0038  X   0004
0039      ED10  MIN02 LDI,1         M.TRT           BASE OF TRACK RATE TABLE IN R1
003A  R   008B
003B      ED20        LDI,2         M.GNT           BASE OF GAIN TABLE IN R2
003C  R   0117
003D      ED30        LDI,3         -1              R3 FOR CHANNEL POINTER
003E  A   FFFF
003F      80F0        ABMM,15       E.TM3           INCRIMENT SYSTEM UP TIMER
0040  R   01A5
0041      603F  MIN04 ABR,3,15                      NEXT CHANNEL
0042      8603        TBMB,0,3      U.IHB,MIN03     BYPASS OPERATION ON PROC. INHIBITED
0043  X   0006
0044  R   005B
0045      E543        LDM,4,3       U.CST           GET CHANNEL STATUS
0046  X   0007
0047      714F        SBRB,4,15     MIN03           BRANCH IF CHANNEL NOT UP
0048  R   0059
0049      80F3        ABMM,15,3     M.UPT           LOG CHANNEL AS UP
004A  R   0187
004B      E543        LDM,4,3       U.TRK           PUT TRACK RATE IN R4
004C  X   0008
004D      6841        ADR,4,1                       CELL POINTER IN R4
004E      98F4        ABXM,15,4                     INC. COUNTER FOR THIS T.R. ON CHAN.
004F      6C44        ZRR,4
0050      E553        LDM,5,3       U.GAN           PUT CHAN IN R5
0051  X   0009
0052      ED60        LDI,6         #3
0053  A   0003
0054      2146        DVR,4,6                       DIVIDE GAIN BY 4
0055      765C        TBRB,5,12     $+3             PUT |24| IN LAST GROUP
0056  R   0058
0057      F702        HOP,$+2                       (GAIN NOT 24)
0058      615F        SBR,5,15                      MOVE BACK TO LAST GOOP.
0059      6852        ADR,5,2                       CELL POINTER TO PRO;ER GROUP
005A      98F5        ABXM,15,5                     INC. COUNT IN CELL
```

```
 75  005B     ED40  MIN03 LDI,4         10
     005C  A  000A
 76  005D     6814        ADR,1,4                    MOVE TO BASE FOR NEXT CHAN. (+10)
 77  005E     614E        SBR,4,14
 78  005F     6824        ADR,2,4                    MOVE TO BASE FOR NEXT CHAN. (+8)
 79  0060     ED40        LDI,4         -13
     0061  A  FFF3
 80  0062     7843        ADRB,4,3      MIN04        LOOP IF LAST CHAN. NOT DONE
     0063  R  0041
 81  0064     ED10        LDI,1         #4000        SET UP TO READ DOY/TIME GROUP
     0065  A  4000
 82  0066     431F        OCD,1,#F
 83  0067     4F2F        IDD,2,#F
 84  0068     4F3F        IDD,3,#F                   TIME GROUP IN R2,R3
 85  0069     0D22        TOR,2,2
 86  006A     0D33        TOR,3,3
 87  006B     2C29        LLD,2,9
 88  006C     EA20        ETI,2         #8180        PUT HR/MIN IN R2
     006D  A  8180
 89                   *  HOURS AND MINS IN R2.  CHECK TIME TABLES TO SEE
 90                   *    IF ITS TIME TO SCHEDULE M$LEV OR M$STD.
 91  006E     ED10        LDI,1         -6
     006F  A  FFFA
 92  0070     6D32  MIN01 TRR,3,2                    COPY TIME
 93  0071     E131        SUM,3,1       LEVTB+6      CHECK AGAINST TABLE
     0072  R  01AC
 94  0073     7D33        TRRB,3,3      $+3
     0074  R  0076
 95  0075     F704        HOP,MIN06                  FOUND IN TABLE
 96  0076     701F        ABRB,1,15     MIN01
     0077  R  0070
 97  0078     F703        HOP,MIN05
 98  0079     8200  MIN06 OBMM,0        E.T14        SCHEDULE M$LEV
     007A  X  000A
 99  007B     ED10  MIN05 LDI,1         -24
     007C  A  FFE8
100  007D     6D32  MIN07 TRR,3,2                    COPY TIME
101  007E     F131        SUM,3,1       STDTB+24     CHECK VS. TABLE
     007F  R  01C4
102  0080     7D33        TRRB,3,3      $+3
     0081  R  0083
103  0082     F704        HOP,MIN08                  FOUND IN TABLE
104  0083     701F        ABRB,1,15     MIN07
     0084  R  007D
105  0085     F703        HOP,$+3
106  0086     8200  MIN08 OBMM,0        E.T08        SCHEDULE M$STD
     0087  X  0005
107  0088     A410        LEM,1         SAVRR        CLEAR INTERRUPT AND RETURN
     0089  R  019C
108  008A     2500        CIR
```

```
 110                    * M.TRT IS A TABLE OF TRACK RATE SETTINGS.
 111                    *      TR.....
 112                    * CHAN  0  1  2  3  4  5  6  7  8  9
 113                    *    0
 114                    *    1
 115                    *    .
 116                    *    .
 117                    *   13
 118     0088  A  0000  M.TRT RES           140,0
 119                    * M.GNT IS A TABLE OF GAIN SETTINGS
 120                    *      GAIN.......
 121                    * CHAN  0  1  2  3  4  5  6  7
 122                    *    0
 123                    *    1
 124                    *    .
 125                    *    .
 126                    *   13
 127     0117  A  0000  M.GNT RES           112,0
 128                    * M.UPT IS A TABLE OF UP TIME
 129     0187  A  0000  M.UPT RES           14,0
 130     0195           SAVRS RES           7
 131     019C           SAVRR RES           7
 132     01A3  A  0000  SFLAG DFC           0              ANALOG SUBSYSTEM ERROR FLAG
 133     01A4  A  FFE2  U.TM1 DFC           -30            REDUNDANCY CHECK TIMER
 134     01A5  A  0000  E.TM3 DFC           0              SYSTEM UP TIMER
 135                    * TABLE OF TIMES TO CALL M$LEV
 136     01A6  A  0000  LEVTB DFC           #0000          0000 HRS
 137     01A7  A  1000        DFC           #1000          0800 HRS
 138     01A8  A  2C00        DFC           #2C00          1600 HRS
 139     01A9  A  0000        RES           3,0            (EXPAND 3 TIMES)
 140                    * TABLE OF TIMES TO CALL M$STD
 141     01AC  A  0400  STDTB DFC           #0400          0200 HRS
 142     01AD  A  0C00        DFC           #0C00          0600 HRS
 143     01AE  A  2000        DFC           #2000          1000 HRS
 144     01AF  A  2800        DFC           #2800          1400 HRS
 145     01B0  A  3000        DFC           #3000          1800 HRS
 146     01B1  A  4400        DFC           #4400          2200 HRS
 147     01B2  A  0000        RES           18,0           (EXPAND 18 TIMES)
 148     01C4                 END

TOTAL ASSEMBLY ERRORS =   0     SIZE =    452
```

```
                           PGM          E$UIN
                            INT          E:UIN,E.UBF,E:MIT,E.SF1,E:ANL
                            INT          E.UBU
                            EXT          U.IHB,U.CYC,U.TRK,U.GAN,U.BLL,E:SKD,U.WRK
                            EXT          E.T01,E.T03
                      *     CAT NO.  400000-009
                      * E$UIN IS ENTERED AT THE COMPLETION OF EACH TRANSFER OF U-DATA VIA
                      *   THE ANALOG SUBSYSTEM.
0000      ED10  E:UIN LDI,1        E.UBF          POINTER TO NEXT ROW
0001  R   00C5
      R   0001  UIN1  EQU          $-1
0002      ED70        LDI,7        -42            42 SAMPLES
0003  A   FFD6
0004      6C33        ZRR,3                       INIT. CHANNEL
0005      E527  UINLP LDM,2,7      E.UBU+42       GET AMP VALUE
0006  R   00C5
0007      607F        ABR,7,15                    NEXT LOAD LOC.
0008      7620        TBRB,2,0     NEGAM          IS SIGN BIT SET?
0009  R   000D
000A      EA20        ETI,2        #F800          CLEAR GARBAGE
000B  A   F800
000C      F702        HOP,$+2
000D      6C22  NEGAM ZRR,2                       NO NEG AMP PERMITTED
000E      FE21        STX,2,1                     STORE AMP AWAY
000F      601F        ABR,1,15                    NEXT STORE LOC.
0010      E527        LDM,2,7      E.UBU+42       GET FAZ VALUE
0011  R   00C5
0012      607F        ABR,7,15                    NEXT LOAD LOC.
0013      8603        TBMB,0,3     U.IHB,STRFZ    NO FAZ ON INHIBITTED CHANNEL
0014  X   0001
0015  R   007C
0016      7620        TBRB,2,0     NEGFZ
0017  R   001B
0018      EA20        ETI,2        #F800          CLEAR GARBAGE
0019  A   F800
001A      F702        HOP,$+2
001B      6C22  NEGFZ ZRR,2
001C      6D42        TRR,4,2
001D      E940        SUI,4        240            SUB 15 MICROSEC
001E  A   00F0
001F      7640        TBRB,4,0     LOFAZ          AND BRANCH IF NEG.
0020  R   0078
0021      F940        SUI,4        1120           SUB ANOTHER 60 MICROSEC
0022  A   0460
0023      7640        TBRB,4,0     STFAZ          AND BRANCH IF NEG.
0024  R   0030
0025      ED40        LDI,4        800            SET CYCLE FLAG
0026  A   0320
0027      F643  UIN2  STM,4,3      U.CYC
0028  X   0002
```

```
35      0029      6320          OBR,2,0                       SET BIT IN DATA WORD
36      002A      82F0          OBMM,15       SHIFT           CYCLE SHIFT BIT
        002B  R   027D
37      002C      E750          BLM,5         E:MIT            SEND SHIFT
        002D  R   0083
38      002E      81F0          ZBMM,15       SHIFT           CLEAR SHIFT BIT
        002F  R   027D
39      0030      FE21  STFAZ   STX,2,1                       STORE FAZ AWAY
40      0031      601F          ABR,1,15                      NEXT STORE LOC.
41      0032      E527          LDM,2,7       E.UBU+42        GET BLANK LEVEL VALUE
        0033  R   00C5
42      0034      7620          TBRB,2,0      NEGBL           IS BLL NEG.?
        0035  R   0039
43      0036      EA20          ETI,2         #F800           CLEAR GARBAGE BITS
        0037  A   F800
44      0038      F702          HOP,$+2
45      0039      6C22  NEGBL   ZRR,2                        CLEAR BLL TO 0
46      003A      FE21          STX,2,1
47      003B      601F          ABR,1,15
48      003C      603F          ABR,3,15                      NEXT CHAN.
49      003D      707F          ABRB,7,15     UINLP           LOOP THRU 42 SAMPLES
        003E  R   0005
50      003F      ED40          LDI,4         #4000           READ TIME GROUP TO END OF ROW
        0040  A   4000
51      0041      434F          OCD,4,#F
52      0042      4F5F          IDD,5,#F
53      0043      0D55          TOR,5,5
54      0044      FE51          STX,5,1                       STORE UPPER HALF
55      0045      601F          ABR,1,15
56      0046      4F5F          IDD,5,#F
57      0047      0D55          TOR,5,5
58      0048      FE51          STX,5,1                       STORE LOWER HALF
59      0049      601F          ABR,1,15
60      004A      E610          STM,1         UIN1            TOP OF NEXT ROW
        004B  R   0001
61      004C      8600          TBMB,0        E.SF1,START     START UP IF FLAG SET
        004D  R   027F
        004E  R   006A
62      004F      84F0          ABMB,15       SCONT,E:SKD     TEN SAMPLES YET
        0050  R   027E
        0051  X   0006
63      0052      ED20  UPDAT   LDI,2         -440             YES, MOVE BUFFER TO WORKING STORE
        0053  A   FE48
64      0054      ED30          LDI,3         U.WRK
        0055  X   0007
65      0056      E830          ADI,3         44
        0057  A   002C
66      0058      E512  LOOP1   LDM,1,2       E.UBF+440        GET NEXT VALUE
        0059  R   027D
67      005A      FE13          STX,1,3                         STORE IT
```

```
68      005B      603F        ABR,3,15                    MOVE WORKING AREA POINTER
69      005C      702F        ABRB,2,15     LOOP1          LOOP THRU BUFFER THEN QUIT
        005D  R   0058
70      005E      8200        OBMM,0        E.TO1        . SCHEDULE ANALYSIS
        005F  X   0008
71      0060      ED10  UIN3   LDI,1         -10
        0061  A   FFF6
72      0062      E610        STM,1         SCONT          RESET SAMPLE COUNTER
        0063  R   027E
73      0064      ED10        LDI,1         E.UBF
        0065  R   00C5
74      0066      E610        STM,1         UIN1
        0067  R   0001
75      0068      E700        BRU           E:SKD          RETURN
        0069  X   0006
76      006A      8100  START ZBMM,0        E.SF1          RESET START FLAG
        006B  R   027F
77      006C      ED20        LDI,2         -44
        006D  A   FFD4
78      006E      ED30        LDI,3         U.WRK          SET ROW 1 OF WORKING STORAGE
        006F  X   0007
79      0070      E512  LOOP2 LDM,1,2       E.UBF+44       GET NEXT VALUE
        0071  R   00F1
80      0072      FE13        STX,1,3                        STORE
81      0073      603F        ABR,3,15                     MOVE POINTER AND
82      0074      702F        ABRB,2,15     LOOP             LOOP
        0075  R   0070
83      0076      E700        BRU           UIN3           RESET AND RETURN
        0077  R   0060
84      0078      ED40  LOFAZ LDI,4         -800           SET CYCLE FLAG FOR -50 MICROSEC.
        0079  A   FCE0
85      007A      E700        BRU           UIN2
        007B  R   0027
86      007C      EA20  STRFZ ETI,2         #F800          CLEAR GARBAGE BITS
        007D  A   F800
87      007E      E700        BRU           STFAZ        STORE AWAY
        007F  R   0030
```

```
 89                          * INTERRUPT RESPONSE ROUTINE, SCHEDULES E:UIN
 90     0080      8200       E:ANL OBMM,0        E.T03
        0081   X  0009
 91     0082      2500             CIR
```

```
 93                     * E$MIT IS THE ROUTINE WHICH TRANSMITS DIGITAL DATA TO THE RECEIVER
 94                     *   FROM THE APROCESSOR.
 95                     *   CALLING SEQUENCE......
 96                     *     BLM,5          E:MIT
 97                     *     WITH CHANNEL DESIGNATOR IN R3 (0 FOR A, ETC.)
 98     0083    A560    E:MIT SFM,6          SVR67          SAVE R6, R7 FOR INTERNAL USE
        0084 R  0099
 99     0085    E563          LDM,6,3        U.TRK          TRACK RATE IN BITS 0 - 3.
        0086 X  0003
100     0087    2D65          LLS,6,5                       MAKE ROOM FOR GAIN
101     0088    E363          ORM,6,3        U.GAN
        0089 X  0004
102     008A    2D66          LLS,6,6
103     008B    E363          ORM,6,3        U.BLL          ADD IN BLANKING LEVEL IN BITS 9 - 14
        008C X  0005
104     008D    2D61          LLS,6,1                       MAKE ROOM FOR SHIFT BIT
105     008E    E360          ORM,6          SHIFT          PUT SHIFT BIT IN BIT 15, OUTPT READY
        008F R  027D
106     0090    6D73          TRR,7,3
107     0091    E870          ADI,7          #4660
        0092 A  4660
108     0093    E670          STM,7          $+2
        0094 R  0095
109     0095 A  0000          DEC            0              EXECUTE OUTPUT
110     0096    A460          LFM,6          SVR67          RESTORE REGISTERS
        0097 R  0099
111     0098    FF05          BRX,5                         RETURN
112     0099            SVR67 RES            2
113                     * INPUT BUFFER.................
114                     *  TIME/VALUE
115                     *   0   AMPA FAZA BLNA AMP3 FAZB BLNB ..............AMPN FAZN BLNN TIME~
116                     *  +1   AMPA FAZA BLNA ............
117                     *  +2   AMPA FAZA BLNA ............
118                     *  +3   AMPA FAZA BLNA ............
119                     *  ....... THRU .......
120                     *  +9   AMPA FAZA BLNA ............
121                     *  OR (14 CHANS * 3 INPUTS + TIME)* 10 SECONDS = 440 WORDS
122     0098 A  0000    E.UBU RES            42,0
123     00C5 A  0000    E.UBF RES            440,0          INPUT BUFFER
124     027D A  0000    SHIFT DEC            0              CYCLE SHIFT BIT
125     027E A  FFF6    SCONT DEC            -10            SAMPLE COUNTER
126     027F A  0000    E.SF1 DEC            0              START FLAG
127     0280                  END

TOTAL ASSEMBLY ERRORS =   0     SIZE =   640
```

```
                        PGM         E$SUB
                         INT         E:PWD,E:PAR,E:ABR,B:ORT
                         EXT         E:FRT,E.TM1,E.TM2,E:FCT,E.28F
                         EXT         E:028,E:ANF,B.STT,E.350,E.T10
                         EXT         E.IOF,E:035,E:SKD
                *        CAT NO. 400000-019
                * E:PWD POWER DOWN SYSTEM INTERRUPT
                * E:PWU POWER UP SYSTEM INTERRUPT
                * E:PAR MEMORY PARITY ERROR SYSTEM INTERRUPT
                * E:ABR CONSOLE INTERRUPT
```

```
12                      ********************************************************
13                      * E:PWD IS ENTERED JUST BEFORE THE PROCESSOR POWER
14                      *   DROPS OUT.
15      0000    E010    E:PWD LDI,1       E:PWU
        0001 R  0010
16      0002    E610          STM,1       #21
        0003 A  0021
17      0004    E010          LDI,1       #4000          READ PWR DOWN TIME
        0005 A  4000
18      0006    431F          OCD,1,#F
19      0007    4F2F          IDD,2,#F
20      0008    0D22          TOR,2,2
21      0009    E620          STM,2       PWDT1
        000A R  006F                                     .
22      000B    4F2F          IDD,2,#F
23      000C    0D22          TOR,2,2
24      000D    E620          STM,2       PWDT1+1
        000E R  0070
25      000F    F700          HDP,$                      WAIT FOR PWR LOSS
```

```
 27                     ************************************************************
 28                     * E:PWU IS ENTERED WHEN POWER IS RESTORED.
 29     0010     ED10   E:PWU LDI,1        E:PWD          RESET DOWN ENTRY
        0011  R  0000
 30     0012     E610         STM,1        #21
        0013  A  0021
 31     0014     E7E0         BLM,14       E:FRT          POWER UP TIME
        0015  X  0001
 32     0016  R  007C         DFC          PMS1
 33     0017     E510         LDM,1        PWDT1
        0018  R  006F
 34     0019     E610         STM,1        E.TM1
        001A  X  0002
 35     0018     E510         LDM,1        PWDT1+1
        001C  R  0070
 36     001D     E610         STM,1        E.TM2
        001E  X  0003
 37     001F     E7E0         BLM,14       E:FCT
        0020  X  0004
 38     0021  R  0073         DFC          PWRMS+2
 39     0022     6C11         ZRR,1
 40     0023     E610         STM,1        E.28F
        0024  X  0005
 41     0025     E7E0         BLM,14       E:028          LOG DOWN/UP
        0026  X  0006
 42     0027  R  0071         DFC          PWRMS
 43     0028     E700         BRU          E:ANF
        0029  X  0007
```

```
45                      ************************************************************
46                      * E:PAR IS ENTERED WHEN A MEMORY PARITY ERROR IS
47                      *   DETECTED.
48      002A    E7E0    E:PAR BLM,14        E:ERT
        002B  X 0001
49      002C  R 0087          DEC           PARMS+2
50      002D    E570          LDM,7         #22
        002E  A 0022
51      002F    ED30          LDI,3         -2
        0030  A FFFE
52      0031    6C66    PAR1  ZRP,6
53      0032    2C64          LLD,6,4
54      0033    0926          MBL,2,6                     FIRST DIGIT
55      0034    E960          SUI,6         #A
        0035  A 000A
56      0036    7660          TBRB,6,0      $+5
        0037  R 003B
57      0038    E820          ADI,2         #3700         DIGIT 0-9
        0039  A 3700
58      003A    F703          HOP,$+3
59      003B    E820          ADI,2         #3000
        003C  A 3000
60      003D    6C66          ZRP,6
61      003E    2C64          LLD,6,4
62      003F    6826          ADR,2,6
63      0040    E960          SUI,6         #A
        0041  A 000A
64      0042    7660          TBRB,6,0      $+5
        0043  R 0047
65      0044    E820          ADI,2         #37
        0045  A 0037
66      0046    F703          HOP,$+3
67      0047    E820          ADI,2         #30
        0048  A 0030
68      0049    E623          STM,2,3       PARS1+4
        004A  R 0093
69      0048    703F          ABRB,3,15     PAR1
        004C  R 0031
70      004D    6C66          ZRP,6
71      004E    E660          STM,6         E.28F
        004F  X 0005
72      0050    E7E0          BLM,14        E:028
        0051  X 0006
73      0052  R 0085          DEC           PARMS         LOG MP FOUND
74      0053    80E0          ABMM,15        PARCT
        0054  R 0094
75      0055    E510          LDM,1         PARCT
        0056  R 0094
76      0057    7610          TBRB,1,0      E:ANF         TRY TWO RESTARTS
        0058  X 0007
```

```
 77      0059    2740        RIE,#0
 78      005A    2741        RIE,#1
 79      005B    274C        RIE,#C
 80      005C    274D        RIE,#D
 81      005D    274E        RIE,#E
 82      005E    274F        RIE,#F
 83      005F    F700        HOP,$                    KILL SYSTEM
```

```
 85                     ************************************************************
 86                     * CONSOLE INTERRUPT USED TO ABORT BACKGROUND PROGRAM
 87     0060     8200   E:ABR OBMM,0       E.T10
        0061  X  000A
 88     0062     2500         CIR                            RETURN
 89                     ************************************************************
 90                     * B:CRT LOGS THE OPERATOR INDUCED ABORTION.
 91     0063     6C11   B:CRT ZRP,1
 92     0064     E610         STM,1         B.STT            ABORT TASK
        0065  X  0008
 93     0066     E610         STM,1         E.350            CLEAR ASR 35
        0067  X  0009
 94     0068     E610         STM,1         E.IOF
        0069  X  000B
 95     006A     E7E0         BLM,14        E:035
        006B  X  000C
 96     006C  R  0095         DFC           PMSG
 97     006D     E700         BRU           E:SKD
        006E  X  000D
```

```
 99                       ****************************************************************
100   006F  A  0000  PWDT1 RES      2,0           POWER TIME
101   0071  A  0A0A  PWRMS DFC      #0A0A,#0D0A,|123 123456  T PF|,#0D0A
      0072  A  0D0A
      0073  A  3132
      0074  A  3320
      0075  A  3132
      0076  A  3334
      0077  A  3536
      0078  A  2020
      0079  A  5420
      007A  A  5046
      007B  A  0D0A
102   007C  A  3132  PMS1  DFC      |123 123456  T PR|,0
      007D  A  3320
      007E  A  3132
      007F  A  3334
      0080  A  3536
      0081  A  2020
      0082  A  5420
      0083  A  5052
      0084  A  0000
103   0085  A  0D0A  PARMS DFC      #0D0A,#0D0A,|123 123456  T MP|
      0086  A  0D0A
      0087  A  3132
      0088  A  3320
      0089  A  3132
      008A  A  3334
      008B  A  3536
      008C  A  2020
      008D  A  5420
      008E  A  4D50
104   008F  A  2041  PARS1 DFC      | AT 0000|,0
      0090  A  5420
      0091  A  3030
      0092  A  3030
      0093  A  0000
105   0094  A  FFFE  PARCT DFC      -2
106   0095  A  0D0A  BMSG  DFC      #0D0A,|BACKGROUND TASK ABORTED |
      0096  A  4241
      0097  A  434B
      0098  A  4752
      0099  A  4F55
      009A  A  4E44
      009B  A  2054
      009C  A  4153
      009D  A  4B20
      009E  A  4142
      009F  A  4F52
      00A0  A  5445
```

```
          00A1  A  4420
 107      00A2  A  4259          DFC          |BY OPERATOR.|,#0D0A,0
          00A3  A  204F
          00A4  A  5045
          00A5  A  5241
          00A6  A  544F
          00A7  A  522E
          00A8  A  0D0A
          00A9  A  0000
 108      00AA                   END

TOTAL ASSEMBLY ERRORS =    0     SIZE =    170
```

```
  1                        PGM         E$OMI
  2                         INT         E:OMI
  3                         EXT         E.35I,E:035,E.IOF,E:028,E.3IC
  4                         EXT         E:SKD,B.STT,E.T15,E.T08,E.T04
  5                         EXT         E:FRT,E.T13,E.28F
  6                   *     CAT NO.  400000-002
  7                   * THIS IS THE OPERATOR'S MESSAGE INTERPRETOR ROUTINE.  IT IS SCHEDULED
  8                   *   IN RESPONSE TO AN OPERATOR MESSAGE VIA THE ASR 35.  E$OMI EXAMINES
  9                   *   THE MESSAGE FOR FORMAT VALIDITY AND SCHEDULES APPROPRIATE TASKS IN ~
 10                   *   RESPONSE.
 11   0000    A440  E:OMI LDM,4         E.35I           GET FIRST 4 INPUT CHARS.
      0001 X  0001
 12   0002    0966        MBL,6,6                       PACK CHARS. IN R6 AND R7
 13   0003    6B76        ORR,7,6
 14   0004    0964        MBL,6,4
 15   0005    6B65        ORR,6,5
 16   0006    ED50        LDI,5         -28             SET TABLE POINTER FOR FIRST ENTRY
      0007 A  FFE4
 17   0008    6D26  OMI1  TRR,2,6                       COPY KEYWORD IN R2,R3
 18   0009    6D37        TRR,3,7
 19   000A    E425        XOM,2,5       MSGTB+28        DO THESE MATCH?
      000B R  0112
 20   000C    7D22        TRRB,2,2      OMI2              NO...
      000D R  0014
 21   000E    E435        XOM,3,5       MSGTB+29          MAYBE...
      000F R  0113
 22   0010    7D33        TRRB,3,3      OMI2              NO...
      0011 R  0014
 23   0012    E700        BRU           FOUND             YES..
      0013 R  0020
 24   0014    705D  OMI2  ABRB,5,13     OMI1            NEXT ENTRY IF ANY UNCHECKED.
      0015 R  0008
 25   0016    7607        TBRB,0,7      OMI6
      0017 R  005E
 26   0018    6C44  OMI7  ZRR,4
 27   0019    E640        STM,4         E.ICF           SEND MSG. TO OPERATOR ON ASR 35
      001A X  0003
 28   001B    E7E0        BLM,14        E:035            |INVALID KEYWORD, MSG. IGNORED|
      001C X  0002
 29   001D R  0112        DFC           MSG1
 30   001E    E700        BRU           E:SKD
      001F X  0006
 31                   * MATCH FOUND.........
 32                   *  SET UP DESIRED OPERATION
 33   0020    8605  FOUND TBMB,0,5      MSGTB+30,TLOG   BIT 0 SET FOR LOG INPUT
      0021 R  0114
      0022 R  002F
 34   0023    8615        TBMB,1,5      MSGTB+30,TSET   BIT 1 SET FOR MAJOR TASK REQUEST
      0024 R  0114
      0025 R  0058
```

```
35      0026      F525        LDM,2,5     MSGTB+30    BACKGROUND TASK REQUEST, GET B.STT
        0027  R   0114
36      0028      0C22        MLR,2,2                 CLEAR UPPER BYTE
37      0029      E620        STM,2       B.STT
        002A  X   0007
38      0028      8200        OBMM,0      E.T15       SCHEDULE BACKGROUND TASK.
        002C  X   0008
39      002D      E700        BRU         E:SKD       RETURN
        002E  X   0006
40      002F      E7E0  TLOG  BLM,14      E:FRT       GET REAL TIME AND FORMAT FOR OUTPUT
        0030  X   0008
41      0031  R   0125        DFC         MSG2+1
42      0032      ED20        LDI,2       E.35I
        0033  X   0001
43      0034      602D        ABR,2,13                ADDR OF FIFTH INPUT CHARACTER
44      0035      6C33        ZRR,3                   OUTPUT BUFFER POINTER
45      0036      FD42  OMI3  LDX,4,2                 GET NEXT CHARACTER
46      0037      7D54        TRBB,5,4    $+4         BRANCH ON END OF MESSAGE
        0038  R   003B
47      0039      E700        BRU         OMI4
        003A  R   004E
48      003B      0955        MBL,5,5
49      003C      602F        ABR,2,15
50      003D      FD42        LDX,4,2                 GET NEXT CHARACTER
51      003E      7D44        TRBB,4,4    $+4         BRANCH ON END OF MESSAGE
        003F  R   0042
52      0040      E700        BRU         OMI5
        0041  R   0049
53      0042      6854        ORR,5,4
54      0043      E653        STM,5,3     MSG2A
        0044  R   012C
55      0045      603F        ABR,3,15
56      0046      602F        ABR,2,15
57      0047      E700        BRU         OMI3
        0048  R   0036
58      0049      E350  OMI5  ORM,5       SPACE       FILL WORD WITH SPACE CHARACTER
        004A  R   0123
59      004B      E653        STM,5,3     MSG2A
        004C  R   012C
60      004D      603F        ABR,3,15
61      004E      6C55  OMI4  ZRR,5
62      004F      E653        STM,5,3     MSG2A       MESSAGE TERMINATOR
        0050  R   012C
63      0051      E650        STM,5       E.28F
        0052  X   000D
64      0053      E7E0        BLM,14      E:028
        0054  X   0004
65      0055  R   0124        DFC         MSG2
66      0056      E700        BRU         E:SKD       RETURN
        0057  X   0006
```

```
 67     0058      E545  TSET  LDM,4,5      MSGTB+31     GET E$SKD ENTRY
        0059   R  0115
 68     005A      8204        OBMM,0,4     0            SET SCHEDULE BIT FOR THAT ENTRY
        005B   A  0000
 69     005C      E700        BRU          E:SKD        AND RETURN.
        005D   X  0006
```

```
                        ****************************************************************
                        * IF BIT 7 IS SET IN THE SWITCH REGISTER, WE ENABLE
                        *   TWO ADDITIONAL OPERATOR REQUESTS:
                        *    DIS:HHHH   DISPLAY CONTENTS OF #HHHH ON ASR 35
                        *    SET:HHHH=CCCC   STORE #CCCC IN #HHHH
005E      6D26  OMI6   TRR,2,6
005F      6D37         TRR,3,7
0060      EC20         XOI,2          #4449          |DI|
0061  A   4449
0062      7D22         TRRB,2,2       OMI8           NOT DIS REQUEST
0063  R   006A
0064      EC30         XOI,3          #533A          |S:|
0065  A   533A
0066      7D33         TRRB,3,3       OMI8           NOT DIS REQUEST
0067  R   006A
0068      E700         BRU            DISPL
0069  R   0086
006A      6D26  OMI8   TRR,2,6
006B      6D37         TRR,3,7
006C      EC20         XOI,2          #5345          |SE|
006D  A   5345
006E      7D22         TRRB,2,2       OMI7           NOT SET REQUEST
006F  R   0018
0070      EC30         XOI,3          #543A          |T:|
0071  A   543A
0072      7D33         TRRB,3,3       OMI7           NOT SET REQUEST
0073  R   0018
                       * SET: REQUEST FOUND
0074      ED10         LDI,1          E.35I
0075  X   0001
0076      6010         ABR,1,13                      POINT TO FIRST DIGIT
0077      E7E0         BLM,14         GETHX          GET ADDR IN R4
0078  R   00A9
0079      6DF4         TRR,15,4                      HOLD ADDR.
007A      FD51         LDX,5,1                       CHECK FOR = SIGN
007B      601F         ABR,1,15
007C      F950         SUI,5          #003D
007D  A   003D
007E      7D55         TRRB,5,5       EMTER          NOT PROPER FORMAT
007F  R   00EE
0080      E7E0         BLM,14         GETHX
0081  R   00A9
                       * SET LOCATION TO VALUE
0082      FE4F         STX,4,15                      STORE VAL
0083      6D4F         TRR,4,15
0084      E700         BRU            DISP1          LOG CHANGE
0085  R   008B
                       * DIS: REQUEST FOUND
0086      ED10  DISPL  LDI,1          E.35I
0087  X   0001
```

```
105     0088      601D        ABR,1,13
106     0089      E7E0        BLM,14        GETHX          GET ADDR TO BE DISPLAYED
        008A  R   00A9
107     0088      FD54  DISP1 LDX,5,4                      GET VALUE
108                     * DISPLAY ADDRESS IN R4 AND VALUE IN R5
109     008C      ED10        LDI,1         MSG2A
        008D  R   012C
110     008E      EDF0        LDI,15        #203C
        008F  A   203C
111     0090      FEF1        STX,15,1                     STORE | <| FOR OUTPUT
112     0091      601F        ABR,1,15
113     0092      6D74        TRR,7,4                      R7=ADDR
114     0093      E7E0        BLM,14        PUTHX
        0094  R   00CF
115     0095      EDF0        LDI,15        #3E3D
        0096  A   3E3D
116     0097      FEF1        STX,15,1                     STORE |>=| FOR OUTPUT
117     0098      601F        ABR,1,15
118     0099      6D75        TRR,7,5                      R7=VALUE
119     009A      E7E0        BLM,14        PUTHX
        009B  R   00CF
120     009C      EDF0        LDI,15        #0D0A
        009D  A   0D0A
121     009E      FEF1        STX,15,1
122     009F      601F        ABR,1,15
123     00A0      6CFF        ZRR,15
124     00A1      FEF1        STX,15,1                     TERMINATE MSG
125     00A2      E6F0        STM,15        E.IOF
        00A3  X   0003
126     00A4      E7E0        BLM,14        E:035          OUTPUT VALUE
        00A5  X   0002
127     00A6  R   012C        DEC           MSG2A
128     00A7      E700        BRU           E:SKD
        00A8  X   0006
129                     * GETHX RETRIVES HEX CHARS FROM INPUT BUFFER
130     00A9      EDD0  GETHX LDI,13        -4
        00AA  A   FFFC
131     00AB      FD51  GETH1 LDX,5,1                      GET NEXT CHAR
132     00AC      601F        ABR,1,15
133     00AD      E950        SUI,5         #30            CHECK DIGIT 0-9
        00AE  A   0030
134     00AF      7650        TBRB,5,0      HXERR          VAL<30
        00B0  R   00BD
135     00B1      E950        SUI,5         #A
        00B2  A   000A
136     00B3      7650        TBRB,5,0      GETH2
        00B4  R   00C5
137     00B5      E950        SUI,5         #7             CHECK DIGIT A-F
        00B6  A   0007
138     00B7      7650        TBRB,5,0      HXERR
```

```
                00B8  R  00BD
139             00B9     E950        SUI,5       #6
                00BA  A  0006
140             00BB     7650        TBRB,5,0    GETH3
                00BC  R  00C8
141             00BD     6C44  HXERR ZRR,4
142             00BE     E640        STM,4       E.IOF          INVALID HEX DIGIT
                00BF  X  0003
143             00C0     E7E0        BLM,14      E:035
                00C1  X  0002
144             00C2  R  0154        DFC         MSG3
145             00C3     E700        BRU         E:SKD
                00C4  X  0006
146             00C5     E850  GETH2 ADI,5       #A             DIGIT 0-9
                00C6  A  000A
147             00C7     F703        HOP,$+3
148             00C8     E850  GETH3 ADI,5       #10            DIGIT A-F
                00C9  A  0010
149             00CA     2D5C        LLS,5,12
150             00CB     2C44        LLD,4,4                    MOVE DIGIT TO R4
151             00CC     70DF        ABRB,13,15  GETH1
                00CD  R  00AB
152             00CE     FF0E        BRX,14                     RETURN, R4=VAL
153                               * PUTHX STORES HEX VALUES IN OUTPUT BUFFER
154             00CF     EDD0  PUTHX LDI,13      -2
                00D0  A  FFFE
155             00D1     6C66  PUTH1 ZRR,6
156             00D2     2C64        LLD,6,4
157             00D3     0926        MBL,2,6                    FIRST DIGIT
158             00D4     E960        SUI,6       #A
                00D5  A  000A
159             00D6     7660        TBRB,6,0    $+5
                00D7  R  00DB
160             00D8     E820        ADI,2       #3700          DIGIT A-F
                00D9  A  3700
161             00DA     F703        HOP,$+3
162             00DB     E820        ADI,2       #3000          DIGIT 0-9
                00DC  A  3000
163             00DD     6C66        ZRR,6
164             00DE     2C64        LLD,6,4
165             00DF     6826        ADR,2,6                    SECOND DIGIT
166             00E0     E960        SUI,6       #A
                00E1  A  000A
167             00E2     7660        TBRB,6,0    $+5
                00E3  R  00E7
168             00E4     E820        ADI,2       #37            DIGIT A-F
                00E5  A  0037
169             00E6     F703        HOP,$+3
170             00E7     E820        ADI,2       #30
                00E8  A  0030
```

```
171     00E9      FE21        STX,2,1
172     00EA      601F        ABR,1,15
173     00EB      70DF        ABRB,13,15    PUTH1
        00EC  R   00D1
174     00ED      FF0E        BRX,14                      RETURN
175                       * FORMAT ERROR MSG OUTPUT
176     00EE      6C44    FMTER ZRP,4
177     00EF      E640        STM,4         E.IOF
        00F0  X   0003
178     00F1      E7E0        BLM,14        E:035
        00F2  X   0002
179     00F3  R   015F        DFC           MSG4
180     00F4      E700        BRU           E:SKD
        00F5  X   0006
```

```
182                     * THE TABLE OF VALID MESSAGES GIVES NECESSARY INFORMATION TO RESPOND
183                     *   TO THE OPERATOR'S REQUEST.  THE FOLLOWING GIVES THE FORMAT OF THE
184                     *   ENTRIES.
185                     *  WORD 1..FIRST TWO CHARACTERS OF KEYWORD.
186                     *  WORD 2..LAST TWO CHARACTERS OF KEYWORD.
187                     *  WORD 3..BIT 0..SET FOR LOG MESSAGE
188                     *          BIT 1..SET FOR TASK SCHEDULED
189                     *          BIT 2..SET FOR BACKGROUND TASK
190                     *          BIT 3-15..B.STT VLLUE FOR BACKGROUND TASK
191                     *  WORD 4..ADDRESS OF TASK TO BE SCHEDULED IN E:SKD.
192  00F6  A  4C4F  MSGTB DFC           |LOG:|,#8000,#0000
     00F7  A  473A
     00F8  A  8000
     00F9  A  0000
193  00FA  A  4446        DFC           |DFC:|,#2001,E.T15
     00FB  A  433A
     00FC  A  2001
     00FD  X  0008
194  00FE  A  4444        DFC           |DDD:|,#2002,E.T15
     00FF  A  443A
     0100  A  2002
     0101  X  0008
195  0102  A  4444        DFC           |DDA:|,#2003,E.T15
     0103  A  413A
     0104  A  2003
     0105  X  0008
196  0106  A  4F50        DFC           |OPC:|,#4000,E.T13
     0107  A  433A
     0108  A  4000
     0109  X  000C
197  010A  A  5354        DFC           |STD:|,#4000,E.T08
     010B  A  443A
     010C  A  4000
     010D  X  0009
198  010E  A  4352        DFC           |CRC:|,#4000,E.T04
     010F  A  433A
     0110  A  4000
     0111  X  000A
199  0112  A  494E  MSG1  DFC           |INVALID KEYWORD, MSG. IGNORED|,#0D0A,0
     0113  A  5641
     0114  A  4C49
     0115  A  4420
     0116  A  4B45
     0117  A  5957
     0118  A  4F52
     0119  A  442C
     011A  A  204D
     011B  A  5347
     011C  A  2E20
     011D  A  4947
```

```
         011E  A  4E4F
         011F  A  5245
         0120  A  4420
         0121  A  0D0A
         0122  A  0000
200      0123  A  0020  SPACE DFC          #0020
201      0124  A  0D0A  MSG2  DFC          #0D0A,|123 123456 L: |
         0125  A  3132
         0126  A  3320
         0127  A  3132
         0128  A  3334
         0129  A  3536
         012A  A  204C
         012B  A  3A20
202      012C  A  0000  MSG2A RES          40,0          LOG MSG BUFFER
203      0154  A  494E  MSG3  DFC          |INVALID HEX DIGIT|,#0D0A,0
         0155  A  5641
         0156  A  4C49
         0157  A  4420
         0158  A  4845
         0159  A  5820
         015A  A  4449
         015B  A  4749
         015C  A  5420
         015D  A  0D0A
         015E  A  0000
204      015F  A  494E  MSG4  DFC          |INVALID FORMAT|,#0D0A,0
         0160  A  5641
         0161  A  4C49
         0162  A  4420
         0163  A  464F
         0164  A  524D
         0165  A  4154
         0166  A  0D0A
         0167  A  0000
205      0168             END

TOTAL ASSEMBLY ERRORS =    0     SIZE =    360
```

```
 1                      PGM          E$T28
 2                       INT          E:I28,E:T28,E:028,E.28F,E.280
 3                       EXT          F.T05,F.T07,E:SKD
 4                *      CAT NO.  400000-015
 5                * E$T28 IS THE ASR 28 HANDLER. THE PROGRAM CONSISTS
 6                *   OF THREE PARTS:
 7                *     E:I28 RESPONDS TO A DI FROM THE ASR 28
 8                *     E:T28 OUTPUTS BAUDOT CHARS TO THE ASR 28
 9                *     E:028 TRANSLATES ASCII TO BAUDOT AND BUFFERS
10                *           THE OUTPUT FOR E:T28.
```

```
                          ***********************************************************
 12                       * E:I28 RESPONDS TO THE DI (DATA INTERRUPT) GENERATED
 13                       *   BY THE COMPLETION OF EACH CHARACTER TRANSFER.
 14                       *   THIS ROUTINE SCHEDULES E:T28 IN E$SKD.
 15                       *
 16     0000        8200  E:I28 OBMM,0       E.T05
        0001   X    0001
 17     0002        2500        CIF
```

```
                        ************************************************************
                        * E:T28 IS ENTERED AFTER THE TRANSFER OF A CHARACTER
                        *   HAS BEEN COMPLETED AND THE ASR 28 IS READY TO
                        *   ACCEPT ANOTHER.
                        * THEREFORE, THIS ROUTINE CHECKS TO SEE IF THE BUFFER
                        *   IS EMPTY.
                        *   IF NOT, THE POINTER SHOWS WHERE THE
                        *   NEXT CHARACTER COMES FROM, SO IT SENDS IT.
0003     ED20   E:T28 LDI,2        CHRBF          BYTE ADDRESSING SET UP.
0004 R   00E0
0005     E530         LDM,3        PNTOT          BYTE POINTER
0006 R   00DF
0007     8620         TBMB,2       T28IO,T281
0008 R   08E0
0009 R   0018
000A     603F         ABR,3,15                    MOVE POINTER TO NEXT BYTE (CHAR)
000B     7633         TBRB,3,3     $+3
000C R   000E
000D     F702         HOP,$+2
000E     6C33         ZRR,3                       RECYCLE POINTER
000F     E630         STM,3        PNTOT          STORE UPDATED POINTER
0010 R   00DF
0011     6D43         TRR,4,3
0012     E140         SUM,4        PNTIN          CHECK FOR EMPTY BUFFER
0013 R   00DE
0014     7D44         TRRB,4,4     $+6                 ?
0015 R   001A
0016     E700         BRU          EMPTY
0017 R   0023
0018     8120   T281  ZBMM,2       T28IO
0019 R   08E0
001A     AE92         LBX,9,2                     GET CHAR FROM BUFFER
001B     A450         LFM,5        CONTR          GET CONTROL WORDS
001C R   08E1
001D     4158         OCB,5,8
001E     4169         OCB,6,9
001F     4599         ODB,9,9                     OUTPUT CHAR (R9)
0020     4178         OCB,7,8
0021     E700         BRU          E:SKD          RETURN
0022 X   0003
0023     8100   EMPTY ZBMM,0       T28IO          CLEAR OUTPUT FLAG
0024 R   08E0
0025     8610         TBMB,1       T28IO,RESCH    RESCH REPORT?
0026 R   08E0
0027 R   002A
0028     E700         BRU          E:SKD           NO, RETURN
0029 X   0003
002A     8200   RESCH OBMM,0       E.T07          RESCHEDULE REPORT GENERATOR
002B X   0002
002C     8110         ZBMM,1       T28IO          CLEAR RESCH BIT
```

```
          002D  R  08E0
52        002E     E700        BRU         E:SKD
          002F  X  0003
```

```
54                       ***********************************************************************
55                       * E:028 IS THE WAY THE SYSTEM SETS UP OUTPUT MESSAGES
56                       *   FOR THE ASR 28.  A PROGRAM CALLS THIS ROUTINE
57                       *   TO HAVE A MESSAGE TRANSLATED FROM ASCII TO
58                       *   BAUDOT AND THOSE CHARACTERS STUFFED AWAY IN
59                       *   THE CHRBF.
60                       * CALLING SEQUENCE:
61                       *     BLM,14        E:028
62                       *     (ADDRRSS OF FIRST CHAR. TO BE PRINTED)
63                       * THE FIRST WORD FOLLOWING THE MESSAGE MUST BE #0000
64                       * E.28F IS CHECKED AND SETS FLAGS IN T28IO ACCORDINGLY.
65    0030     A510      E:028 SFM,1         SAVPS              RESERVE CONTENTS OF HONORABLE REGS.
      0031  R  08E5
66    0032     FD2E            LDX,2,14                         GET START ADDRESS
67    0033     60EF            ABR,14,15                        MOVE RETURN ADDR.
68    0034     6C33            ZRR,3                            R3 INPUT BYTE POINTER
69    0035     ED40            LDI,4         CHRBF              BASE OF CHARACTER BUFFER
      0036  R  00E0
70    0037     EDA0            LDI,10        BAUDT
      0038  R  009E
71    0039     E550            LDM,5         PNTIN              ENTRY POINTER
      003A  R  00DE
72                       * SET UP FIRST CHAR TO BE |LTR MODE| SELECT
73    003B     ED10            LDI,1         #1F                |LTR| CHARACTER
      003C  A  001F
74    003D     E770            BLM,7         STORE              STORE CHARACTER
      003E  R  008C
75    003F     8180            ZBMM,8        FLAG               SET FOR LTR MODE
      0040  R  08EC
76    0041     AEB2      NXTWD LBX,11,2                         GET ASCII CHAR
77    0042     603F            ABR,3,15                         MOVE POINTER
78    0043     7DBB            TRRB,11,11    $+4                IS CHAR=0
      0044  R  0047
79    0045     E700            BRU           FINI                YES, DONE
      0046  R  006D
80    0047     AE1A            LBX,1,10                         TRANSLATE TO BAUDOT CHAR
81    0048     E560            LDM,6         FLAG
      0049  R  08EC
82    004A     6C61            XOR,6,1                          CHECK MODE VS. CUR. MODE
83    004B     7668            TBRB,6,8      MDCHN              BIT 8 SET = > CHANGE MODE.
      004C  R  0052
84    004D     6218      STRIT ZBR,1,8
85    004E     E770            BLM,7         STORE              STORE BAUDOT CHAR
      004F  R  008C
86    0050     E700            BRU           NXTWD
      0051  R  0041
87                       * MDCHN CHANGES MODE
88    0052     8680      MDCHN TBMB,8        FLAG,FTOL
      0053  R  08EC
      0054  R  0061
```

```
 89                          * CHANGE LTR TO FIG........
 90     0055      E610             STM,1       HOLD1
        0056   R  005E
 91     0057      ED10             LDI,1       #1B              |FIG| CHARACTER
        0058   A  001B
 92     0059      E770             BLM,7       STORE
        005A   R  008C
 93     005B      8280             OBMM,8      FLAG             SET BIT 8 FOR FIG.
        005C   R  08EC
 94     005D      ED10             LDI,1       0
        005E   A  0000
 95             R 005E       HOLD1 EQU         $-1
 96     005F      E700             BRU         STRIT
        0060   R  004D
 97                          * CHANGE FIG TO LTR
 98     0061      E610       FTOL  STM,1       HOLD2
        0062   R  006A
 99     0063      ED10             LDI,1       #1F              |LTR| CHARACTER
        0064   A  001F
100     0065      E770             BLM,7       STORE
        0066   R  008C
101     0067      8180             ZBMM,8      FLAG             RESET BIT 8 FOR LTR
        0068   R  08EC
102     0069      ED10             LDI,1       0
        006A   A  0000
103             R 006A       HOLD2 EQU         $-1
104     006B      E700             BRU         STRIT
        006C   R  004D
105                          ******************************************************************
106                          * FINI WHEN BUFFER FULL, OR NO MORE DATA.
107     006D      8600       FINI  TBMB,0      E.28F,$+4        DESIRE RESCHEDULE U.RP3?
        006E   R  08E4
        006F   R  0071
108     0070      F703             HOP,$+3                       NO
109     0071      8210             OBMM,1      T28IO             YES, FLAG T28IO
        0072   R  08E0
110     0073      8600             TBMB,0      T28IO,RETRN      IS OUTPUT UNDERWAY?
        0074   R  08E0
        0075   R  0089
111                          * NOTHING GOING ON WITH ASR 28, SO LET'S START SOMETHING
112     0076      ED50             LDI,5       #4002
        0077   A  4002
113     0078      4158             OCB,5,8
114     0079      4919             ISR,1,9
115     007A      7613             TBRB,1,3    $+4              NO POWER TO 28.
        007B   R  007E
116     007C      E700             BRU         PERR
        007D   R  009B
117     007E      8200             OBMM,0      T28IO            FLAG OUTPUT UNDERWAY
        007F   R  08E0
```

```
118     0080      8220        OBMM,2      T28IO
        0081  R   08E0
119     0082      A450        LFM,5       CONTR       GET CONTROL WORDS
        0083  R   08E1
120     0084      6C99        ZRR,9                   SEND NULL CHAR
121     0085      4158        OCB,5,8
122     0086      4169        OCB,6,9
123     0087      4599        ODB,9,9                 START OUTPUT
124     0088      4178        OCP,7,8
125     0089      A410  RETRN LFM,1       SAVRS       RESTORE REGISTERS
        008A  R   08E5
126     008B      FF0E        BRX,14                   AND RETURN
```

```
128                     ************************************************************************
129                     * STORE STORES BAUDOT CHAR IN CHRBF AND UPDATES
130                     *   PNTIN....
131     008C    AF14    STORE SBX,1,4                       STORE CHAR
132     008D    605F          ABR,5,15                      MOVE POINTER TO NEXT LOCATION
133     008E    7653          TBRB,5,3      $+3
        008F R  0091
134     0090    F702          HOP,$+2
135     0091    6C55          7RR,5
136     0092    E650          STM,5         PNTIN
        0093 R  00DE
137     0094    E560          LDM,6         PNTOT
        0095 R  00DF
138     0096    7965          SURB,6,5      $+4
        0097 R  009A
139     0098    E700          BRU           FINI            BUFFER FULL
        0099 R  006D
140     009A    FF07          BRX,7                         RETURN
141                     ************************************************************************
142                     * POWER OFF ON ASR 28, SET OFF SONALERT
143     009B    0100    PERR  RMI
144     009C    E700          BRU           RETRN
        009D R  0089
```

```
146                     ************************************************************************
147                     * TABLE IS PACKED WITH 1 CHAR PER BYTE.  THE MSB
148                     *   OF A BYTE IS SET IF THE CHAR IS IN THE |FIGS|
149                     *   MODE.  THE BITS ARE STORED IN THE 5 LEAST
150                     *   SIGNIFICANT BITS OF THE BYTE, IN REVERSE ORDER.
151                     *   FOR EXAMPLE, THE LETTER |A| IS NORMALLY #18.
152                     *   IT IS STORED IN THE TABLE AS #03.
153     009E  A 0000    BAUDT DFC           #0000,#0000,#0000,#0000,#0000
        009F  A 0000
        00A0  A 0000
        00A1  A 0000
        00A2  A 0000
154     00A3  A 0200          DFC           #0200,#0008,#0000,#0000,#0000
        00A4  A 0008
        00A5  A 0000
        00A6  A 0000
        00A7  A 0000
155     00A8  A 0000          DFC           #0000,#0000,#0000,#0000,#1B00
        00A9  A 0000
        00AA  A 0000
        00AB  A 0000
        00AC  A 1B00
156     00AD  A 001F          DFC           #001F,#048D,#9194,#899D,#9A8B
        00AE  A 048D
        00AF  A 9194
        00B0  A 899D
        00B1  A 9A8B
157     00B2  A 8F92          DFC           #8F92,#8B9A,#8C83,#9C9D,#9697
        00B3  A 8B9A
        00B4  A 8C83
        00B5  A 9C9D
        00B6  A 9697
158     00B7  A 9381          DFC           #9381,#8A90,#9587,#8698,#8E9E
        00B8  A 8A90
        00B9  A 9587
        00BA  A 8698
        00BB  A 8E9E
159     00BC  A 8F8D          DFC           #8F8D,#9299,#0003,#190E,#0901
        00BD  A 9299
        00BE  A 0003
        00BF  A 190E
        00C0  A 0901
160     00C1  A 0D1A          DFC           #0D1A,#1406,#0B0F,#121C,#0C18
        00C2  A 1406
        00C3  A 0B0F
        00C4  A 121C
        00C5  A 0C18
161     00C6  A 1617          DFC           #1617,#0A05,#1007,#1E13,#1D15
        00C7  A 0A05
        00C8  A 1007
```

```
                00C9  A  1E13
                00CA  A  1D15
162             00CB  A  118F        DFC        #118F,#8C92,#0083,#8C03,#190E
                00CC  A  8C92
                00CD  A  0083
                00CE  A  8C03
                00CF  A  190E
163             00D0  A  0901        DFC        #0901,#0D1A,#1406,#0B0F,#121C
                00D1  A  0D1A
                00D2  A  1406
                00D3  A  0B0F
                00D4  A  121C
164             00D5  A  0C18        DFC        #0C18,#1617,#0A05,#1007,#1E13
                00D6  A  1617
                00D7  A  0A05
                00D8  A  1007
                00D9  A  1E13
165             00DA  A  1D15        DFC        #1D15,#118F,#8C92,#0085
                00DB  A  118F
                00DC  A  8C92
                00DD  A  0085
```

```
                        ************************************************************************
                        * TWO POINTERS ARE USED TO ACCESS THE CHARACTER
                        *   BUFFER:
                        * PNTIN INDICATES THE NEXT LOCATION A CHAR MAY BE
                        *   ENTERED IN.
                        * PNTOT INDICATES THE NEXT LOCATION A CHAR WILL
                        *   BE TAKEN FROM FOR TRANSMISSION TO THE ASR 28.
                        * IF THEY POINT TO THE SAME LOCATION WHILE FILLING
                        *   THE BUFFER, IT IS FULL AND ADDITIONAL CHARACTERS
                        *   IN THAT MESSAGE WILL BE LOST.
                        * IF THEY POINT TO THE SAVE LOCATION WHILE DUMPING
                        *   THE BUFFER, IT IS EMPTY AND THE TRANSMISSION
                        *   IS TERMINATED.
                        * CHRBF IS A 4096 CHARACTER BUFFER.
                        *   FOR YOU WHO CAN'T DIVIDE BY 2, THAT'S A WHOPPING
                        *   2048 WORDS.  THIS THING HAS TO BE BIG ENOUGH FOR
                        *   SEVERAL OF THE MANY TABLES, ETC. THAT COULD BE
                        *   GENERATED AT ONE TIME.
00DE   A  0000          PNTIN DFC           0
00DF   A  0000          PNTOT DFC           0
00E0   A  0000          CHRBF RES           2048,0
                        ************************************************************************
                        * T28IO IS A STATUS FLAG FOR THE ASR 28
                        * BIT 0=0 IDLE
                        *      =1 OUTPUT UNDERWAY
                        * BIT 1=0 NO REPORT MESSAGES WAITING
                        *      =1 REPORT MESSAGES WAITING
                        * BIT 2=0 NORMAL
                        *      =1 FIRST CHAR COMING UP
     R  08E0    E.28O EQU           $
08E0   A  0000          T28IO DFC           0
                        ************************************************************************
                        * CONTR HAS THE CONTROL WORDS NECESSARY TO MAKE THE
                        *   ASR 28 OUTPUT
08E1   A  6002          CONTR DFC           #6002,#A020,#0200
08E2   A  A020
08E3   A  0200
                        ************************************************************************
                        * E.28F IS A REQUEST FLAG FOR E$T28 ACTIONS.......
                        * BIT 0=0 THIS IS A |NORMAL| MESSAGE
                        *      =1 THIS INITIATES A REPORT SEQUENCE.
08E4   A  0000          E.28F DFC           0
                        ************************************************************************
08E5                    SAVRS RES           7               SAVE REGISTERS
                        ************************************************************************
08EC   A  0000          FLAG DFC            0               SHOWS MODE
08ED                          END

TOTAL ASSEMBLY ERRORS =   0     SIZE =  2285
```

```
                            PGM       E$T35
                            INT       E:I35,E:T35,E:035,E.35I
                            INT       E.3IC,E.IOF,E:35S,E.350
                            EXT       E.T12,E.T06,E.T15,E:SKD
                       *$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$
                       *HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*HEP*
                       *$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$*$
                       *
                       * E$T35 IS THE ASR 35 TELETYPE SERVICE ROUTINE.  THIS INCLUDES SEVERAL
                       *   SUBROUTINES NECESSARY TO ALLOW OPERATOR I/O THROUGH THE SYSTEM...
                       *
                       *   E$I35 ENTERED VIA THE DATA INTERRUPT FROM THE ASR 35, SCHEDULFS
                       *   E$T35 IN THE SYSTEM SCHEDULER.
                       *
                       *   E$T35 ENTERED AFTER EACH CHARACTER IS INPUT OR OUTPUT.  ON INPUT,
                       *   SOME BASIC TEXT ANALYSIS IS PERFORMED.  THE INPUT TERMINATION
                       *   (SIGNALED BY A C/R) CAUSES THE SYSTEM TO SCHEDULE EITHER THE
                       *   OPERATOR MESSAGE INTERPRETOR OR THE BACKGROUND PROCESSOR.  ON
                       *   OUTPUT THE NEXT CHARACTER IS SET UP UNTIL ALL OUTPUT IS COMPLETED
                       *
                       *   F$035 IS CALLED BY ANY PROGRAM DESIRING TO OUTPUT INFORMATICN TO
                       *   THE ASR 35.  THE DATA IS MOVED TO THE OUTPUT BUFFER AND CONTROL
                       *   IS RETURNED TO THE CALLING PROGRAM.
                       *
                       *   THE ASR 35 WILL BE USED PRIMARILY FOR OPERATOR CUMMUNICATION WITH
                       *   THE SYSTEM AND THE ASR 28 USED FOR LOGGING INFORMATION OF AN
                       *   IMPORTANT NATURE.
                       *
  0000     8200        E:I35 OBMM,0         E.T12           SET FLAG BIT FOR E:T35 IN E$SKD
  0001  X  0001
  0002     2500              CIR                            CLEAR INTERRUPT AND RETURN
                       *
  0003     8600        E:T35 TBMB,0         T35IO,OUTPT     BRANCH IF OUTPUT UNDERWAY
  0004  R  0122
  0005  R  007C
  0006     4C3A              IDA,3,#A                       READ CHARACTER
  0007     6238              ZBR,3,8                        CLEAR PARITY BIT
  0008     8610              TBMB,1         T35IO,GONG1     BRANCH IF PAST FIRST CHAR. NOW
  0009  R  0122
  000A  R  002D
  000B     8620              TBMB,2         T35IO,RESPN
  000C  R  0122
  000D  R  0028
                       **
                       * CHECK FOR VALID FIRST CHARACTER OF OPERATOR INITIATED REQUEST
                       **
  000E     E930              SUI,3          #2F             FIRST CHAR SHOULD BE |/|
  000F  A  002F
  0010     7D33              TRRB,3,3       $+4               GOODY IT IS!!!!
  0011  R  0014
```

```
42      0012      E700        BRU         VALID
        0013  R   001C
43      0014      6C33        ZRR,3
44      0015      E630        STM,3       E.IOF       ZERO E.IOF.........
        0016  R   0296
45      0017      E7E0        BLM,14      E:035       LOG INVALID INITIAL CHAR
        0018  R   00C8
46      0019  R   0123        DFC         FOUL1
47      001A      E700        BRU         E:SKD
        001B  X   0004
48      001C      6C22  VALID ZRR,2
49      001D      E620        STM,2       E.3IC       SET INPUT COUNTER TO 0
        001E  R   0183
50      001F      E620        STM,2       E.IOF       RESET E.IOF......
        0020  R   0296
51      0021      E7E0        BLM,14      E:035       SEND VALID INITIATE RESPONSE
        0022  R   00C8
52      0023  R   0130        DFC         GOOD1
53      0024      8210        OBMM,1      T351O       SET FLAG FOR MSG. PAST FIRST CHAR
        0025  R   0122
54      0026      E700        BRU          E:SKD
        0027  X   0004
55      0028      8210  RESPN OBMM,1      T351O       2ST CHAR OF RESPONSE ANYTHING GOES
        0029  R   0122
56      002A      6C22        ZRR,2
57      002B      E620        STM,2       E.3IC       RESET OUTPUT COUNTER
        002C  R   0183
58      002D      E540  GONG1 LDM,4       E.3IC       INPUT CHARACTER COUNTER
        002E  R   0183
59      002F      E634        STM,3,4     E.35I       STORE INPUT CHAR AWAY
        0030  R   0133
60      0031      ED50        LDI,5       #7F         IS CHAR RUB OUT (#10) ?
        0032  A   007F
61      0033      7953        SURB,5,3    $+4         BRU IF CHAR IS INDEED A RUB OUT
        0034  R   0037
62      0035      E700        BRU         RUBCT
        0036  R   0073
63      0037      ED50        LDI,5       #18         IS CHAR CANCEL (#18)
        0038  A   0018
64      0039      7953        SURB,5,3    $+4         BRU IF CHAR IS INDEED A CANCEL
        003A  R   003D
65      003B      E700        BRU         CANCL
        003C  R   0069
66      003D      ED50        LDI,5       #0D         IS CHAR C/R (#0D) ?
        003E  A   000D
67      003F      7953        SURB,5,3    $+4         BRU IF CHAR IS INDEED A C/R
        0040  R   0043
68      0041      E700        BRU         DONE
        0042  R   004A
69      0043      604F        ABR,4,15                MOVE POINTER/COUNTER
```

```
70      0044        E640        STM,4       E.3IC
        0045  R     0183
71      0046        E940        SUI,4       80
        0047  A     0050
72      0048        7D44        TRRB,4,4    E:SKD       RETURN AND AWAIT NEXT CHARACTER
        0049  X     0004
73      004A        6C33  DONE  ZRR,3
74      004B        E630        STM,3       E.IOF       RESET E.IOF.....
        004C  R     0296
75      004D        E7E0        BLM,14      E:035       OUTPUT CR/LF TO ASR 35
        004E  R     00C8
76      004F  R     0184        DFC         CRLF
77      0050        E540        LDM,4       E.3IC
        0051  R     0183
78      0052        E634        STM,3,4     E.35I       STORE MSG TERMINATOR
        0053  R     0133
79      0054        8110        ZBMM,1      T35IO       CLEAR MSG. UNDERWAY FLAG BIT
        0055  R     0122
80      0056        8620        TBMB,2      T35IO,RSPNS IS MSG. REQUEST OR RESPONSE
        0057  R     0122
        0058  R     005C
81      0059        8200        OBMM,0      E.T06       .....REQUEST, SO SCHED. E:OMI
        005A  X     0002
82      005B        E705        HOP,$+5
83      005C        8120  RSPNS ZBMM,2      T35IO       RESET REQUEST/RESPONSE FLAG BIT
        005D  R     0122
84      005E        8200        OBMM,0      E.T15       AND SCHEDULE BACKGROUND SYSTEM
        005F  X     0003
85      0060        8630        TBMB,3      T35IO,$+5   IS OUTPUT WAITING? BRU IF IT IS.
        0061  R     0122
        0062  R     0065
86      0063        E700        BRU         E:SKD       NO, RETURN TO SYSTEM
        0064  X     0004
87      0065        E770        BLM,7       TOTST       BEGIN TTY OUTPUT
        0066  R     0102
88      0067        E700        BRU         E:SKD       AND THEN RETURN TO SYSTEM
        0068  X     0004
89      0069        8110  CANCL ZBMM,1      T35IO       CANCEL MSG, RESET MSG UNDERWAY FLAG
        006A  R     0122
90      006B        6C22        ZRR,2
91      006C        E620        STM,2       E.IOF       CLEAR E.IOF...
        006D  R     0296
92      006E        E7E0        BLM,14      E:035       SEND CR,LF TO ASR 35
        006F  R     00C8
93      0070  R     0184        DFC         CRLF
94      0071        E700        BRU         E:SKD
        0072  X     0004
95      0073        7D44  RUBCT TRRB,4,4    $+4
        0074  R     0077
96      0075        E700        BRU         CANCL       RUB OUT FIRST CHAR SAVE AS CANCEL
```

```
                0076  R 0069
 97             0077    614F          SBR,4,15                    BACKSPACE POINTER COUNTER ONE
 98             0078    E640          STM,4       E.31C
                0079  R 0183
 99             007A    E700          BRU         E:SKD
                007B  X 0004
100             007C    8660  OUTPT   TBMB,6      T351O,OUT01     NEED SECOND NULL?
                007D  R 0122
                007E  R 0084
101             007F    8670          TBMB,7      T351O,OUT02
                0080  R 0122
                0081  R 008D
102             0082    E700          BRU         NOUT
                0083  R 009A
103             0084    8160  OUT01   ZBMM,6      T351O           RESET TO NORMAL MODE
                0085  R 0122
104             0086    6C33          ZRR,3
105             0087    ED40          LDI,4       #A000
                0088  A A000
106             0089    404A          OCA,4,#A                    CONTROL TO 35
107             008A    443A          ODA,3,#A                    OUTPUT NULL CHARACTER
108             008B    E700          BRU         E:SKD
                008C  X 0004
109                             *
110             008D    ED20  OUT02   LDI,2       OUTBF           SET TO GET CHAR WITH BYTE ADDRESS.
                008E  R 0186
111             008F    E530          LDM,3       PNTOT           BYTE POINTER
                0090  R 0287
112             0091    AE82          LBX,8,2                     GET CHARACTER
113             0092    ED40          LDI,4       #A000
                0093  A A000
114             0094    404A          OCA,4,#A
115             0095    448A          ODA,8,#A                    OUTPUT CHARACTER
116             0096    8170          ZBMM,7      T351O           CLEAR FIRST CHARACTER FLAG
                0097  R 0122
117             0098    E700          BRU         E:SKD
                0099  X 0004
118                             *
119             009A    ED20  NOUT    LDI,2       OUTBF           SET UP FOR BYTE ADDRESSING
                009B  R 0186
120             009C    E530          LDM,3       PNTOT
                009D  R 0287
121             009E    603F          ABR,3,15                    MOVE POINTER TO NEXT BYTE
122             009F    7636          TBRB,3,6    $+3
                00A0  R 00A2
123             00A1    F702          HOP,$+2
124             00A2    6C33          ZRR,3                       RECYCLE BUFFER TO TOP
125             00A3    E630          STM,3       PNTOT           STORE UPDATED OUTPUT POINTER
                00A4  R 0287
126             00A5    6D43          TRR,4,3
```

```
127     00A6      F140        SUM,4       PNTIN       BUFFER EMPTY IF PNTOT = PNTIN
        00A7  R   0286
128     00A8      7D44        TRRB,4,4    $+4         BRU IF BUFFER IS EMPTY
        00A9  R   00AC
129     00AA      E700        BRU         EMPTY
        00AB  R   00B3
130     00AC      AE82        LBX,8,2                 GET CHAR FROM MEMORY INTO R8
131     00AD      ED40        LDI,4       #A000       INITIALIZE OUTPUT OF NEXT CHAR
        00AE  A   A000
132     00AF      404A        OCA,4,#A
133     00B0      448A        ODA,8,#A
134     00B1      E700        BRU         E:SKD       RETURN TO SENDER
        00B2  X   0004
135     00B3      ED20  EMPTY LDI,2       #9800
        00B4  A   9800
136     00B5      C120        ETMM,2      T35IO       RESET FLAG BITS 0, 3, 4
        00B6  R   0122
137     00B7      8650        TBMB,5      T35IO,$+5
        00B8  R   0122
        00B9  R   00BC
138     00BA      E700        BRU         EMTY1
        00BB  R   00C0
139     00BC      8200        OBMM,0      E.T15       SCHEDULE BACKGROUND SYSTEM
        00BD  X   0003
140     00BE      8150        ZBMM,5      T35IO       CLEAR RESCHEDULE FLAG BIT
        00BF  R   0122
141     00C0      ED40  EMTY1 LDI,4       #4400
        00C1  A   4400
142     00C2      404A        OCA,4,#A                RESET INTERRUPT FOR INPUT CHARS
143     00C3      ED40        LDI,4       #AC00
        00C4  A   AC00
144     00C5      404A        OCA,4,#A
145     00C6      E700        BRU         E:SKD       RETURN TO SENDER
        00C7  X   0004
```

```
147                     *
148                     * E:035 IS THE MEANS FOR SYSTEM AND APPLICATION PROGRAMS TO OUTPUT
149                     *   INFORMATION TO THE ASR 35 TELETYPEWRITER.
150                     *   CALLING SEQUENCE IS.......
151                     *
152                     *     BLM,14        E:035
153                     *     ( ADDR OF FIRST WORD OF STUFF TO BE PRINTED ON ASR 35 )
154                     *
155                     * WHERE THE FIRST WORD AFTER THE MESSAGE IS #0000 TO TERMINATE OUTPUT
156                     *
157     00C8    A510  E:035 SFM,1         SAVRS          SAVE REGISTERS
        00C9  R 0288
158     00CA    FD2E        LDX,2,14                     GET START ADDRESS
159     00CB    60EF        ABR,14,15                    MOVE RETURN ADDRESS AROUND PARAM.
160     00CC    E550        LDM,5         PNTIN          GET INPUT BUFFER POINTER
        00CD  R 0286
161     00CE    2951        RLS,5,1                      CONVERT COUNTER FROM BYTES TO WORDS
162     00CF    FD32  NXTWD LDX,3,2                      GET NEXT WOTPUT WORD (2 CHARS.)
163     00D0    7D33        TRRB,3,3      $+4            DONE IF WORD IS #0000
        00D1  R 00D4
164     00D2    E700        BRU           FINI
        00D3  R 00E7
165     00D4    E635        STM,3,5       OUTBF          STORE IN OUTPUT BUFFER
        00D5  R 0186
166     00D6    80E0        ABMM,14       PNTIN          MOVE POINTER TWO BYTES IN MEMORY
        00D7  R 0286
167     00D8    605F        ABR,5,15                     MOVE POINGER ONE WORD IN R5
168     00D9    8660        TBMB,6        PNTIN,$+5      IS POINTER OVER TOP OF BUFFER
        00DA  R 0286
        00DB  R 00DE
169     00DC    E700        BRU           $+5
        00DD  R 00E1
170     00DE    6C55        ZRR,5                        YES, RESET TO TOP
171     00DF    E650        STM,5         PNTIN          IN MEMORY, AND R5
        00E0  R 0286
172     00E1    602F        ABR,2,15                     MOVE NEXT WORD POINTER
173     00E2    E540        LDM,4         PNTOT          GET OUTPUT POINTER
        00E3  R 0287
174     00E4    2941        RLS,4,1
175     00E5    7945        SURB,4,5      NXTWD
        00E6  R 00CF
176     00E7    8610  FINI  TBMB,1        E.IOF,$+4      LAST OUTPUT WORD MOVED TO BUFFER
        00E8  R 0296
        00E9  R 00EB
177     00EA    F703        HOP,$+3
178     00EB    8220        OBMM,2        T35IO          NEXT INPUT WILL BE OPERATOR RESPONSE
        00EC  R 0122
179     00ED    8600        TBMB,0        E.IOF,$+4
        00EE  R 0296
        00EF  R 00F1
```

```
180  00F0     F703        HOP,$+3
181  00F1     8250        OBMM,5        T35IO          RESCHEDULE BACKGROUND AFTER OUTPUT
     00F2  R  0122
182  00F3     8610        TBMB,1        T35IO,UNDER    IS INPUT UNDERWAY INHIBITING OUTPUT
     00F4  R  0122
     00F5  R  00FE
183  00F6     8600        TBMB,0        T35IO,RETRN    IF OUTPUT IS UNDERWAY, NEW STUFF RDY
     00F7  R  0122
     00F8  R  00FB
184  00F9     E770        BLM,7         TOTST
     00FA  R  0102
185  00FB     A410  RETRN LFM,1         SAVRS          RESTORE REGISTERS
     00FC  R  0288
186  00FD     FF0E        BRX,14                       RETURN
187  00FE     8230  UNDER OBMM,3        T35IO          SET OUTPUT WAIT
     00FF  R  0122
188  0100     E700        BRU           RETRN          AND RETURN
     0101  R  00FB
189                       ************************************************************
190                       ***  TOTST TAKES CARE OF STARTING OUTPUT.....................***
191                       ************************************************************
192  0102     8200  TOTST OBMM,0        T35IO          SET FLAG TO SHOW OUTPUT
     0103  R  0122
193  0104     8240        OBMM,4        T35IO          SET FLAG TO SHOW OUTPUT UNDERWAY
     0105  R  0122
194  0106     8130        ZBMM,3        T35IO          CLEAR OUTPUT WAITING FLAG BIT
     0107  R  0122
195  0108     ED20        LDI,2         #5000          ENABLE SI
     0109  A  5000
196  010A     402A        OCA,2,#A
197  010B     ED20        LDI,2         #4400          TERMINATE
     010C  A  4400
198  010D     402A        OCA,2,#A
199  010E     FF07        BRX,7                        RETURN, WAIT FOR SI
200                       ************************************************************
201                       *
202                       * AFTER THE TERMINATE IS COMPLETED, AN SI IS
203                       *   GENERATED WHICH VECTORS ENTRY TO E:35S.
204                       *
205                       ************************************************************
206  010F     A510  E:35S SFM,1         E35SV          SAVE REGISTERS
     0110  R  028F
207  0111     483A        ISA,3,#A                     READ 35 STATUS
208  0112     7637        TBRB,3,7      PERR           NO POWER TO ASR 35
     0113  R  0120
209  0114     ED20        LDI,#2        #A000
     0115  A  A000
210  0116     6C33        ZRR,3
211  0117     402A        OCA,2,#A                     XFER INIT.
212  0118     443A        OCA,3,#A                     OUTPUT NULL CHARACTER
```

```
213     0119      8260        OBMM,6      T35IO       SET FOR ANOTHER NULL
        011A  R   0122
214     011B      8270        OBMM,7      T35IO       FLAG FIRST CHAR. OUTPUT
        011C  R   0122
215     011D      A410        LFM,1       E35SV       RESTORE REGISTERS
        011E  R   028F
216     011F      2500        CIP
217                   ********************************************************************
218                   *
219                   * A POWER LOSS HAS BEEN DETECTED TO THE ASR 35.
220                   *   FOR LACK OF ANYTHING BETTER TO DO, SET OFF
221                   *   A SONALERT.
222                   *
223     0120      0100  PERR  RMI
224     0121      2500        CIR
225                   *
```

```
227                     * T351O IS THE WORD USED TO FLAG VARIOUS ACTIVITIES AND CONDITIONS FOR
228                     *   OPERATIONS ON THE ASR 35.  THE BITS ARE INTERPRETED AS FOLLOWS.
229                     *
230                     * BIT 0=0 INPUT EXPECTED
231                     *      =1 OUTPUT UNDERWAY
232                     *
233                     *     1=0 FIRST CHAR. OF INPUT MESSAGE
234                     *      =1 INPUT PAST FIRST CHARACTER
235                     *
236                     *     2=0 INPUT IS OPERATOR INITIATED REQUEST TO SYSTEM
237                     *      =1 INPUT IS OPERATOR RESPONSE TO SYSTEM INQUIRY
238                     *
239                     *     3=0 NO OUTPUT SCHEDULED DURING INPUT
240                     *      =1 OUTPUT SCHEDULED DURING INPUT OPERATION
241                     *
242                     *     4=0 ASR 35 NOT BUSY WITH OUTPUT
243                     *      =1 ASR 35 OUTPUT UNDERWAY
244                     *
245                     *     5=0 NO BACKGROUND RESCHEDULED AFTER OUTPUT
246                     *      =1 RESCHEDULE BACKGROUND SYSTEM AFTER OUTPUT COMPLETED
247                     *
248                     *     6=0 NORMAL OUTPUT MODE
249                     *      =1 NEED ANOTHER NULL OUTPUT
250                     *
251                     *     7=0 NORMAL RUN
252                     *      =1 OUTPUT FIRST CHARACTER
253                     *
254           R  0122   E.350 EQU           $
255     0122  A  0000   T351C DFC           0
256     0123  A  0D0A   FOUL1 DFC           #0D0A,|INVALID SYSTEM CALL |,#0D0A,0
        0124  A  494E
        0125  A  5641
        0126  A  4C49
        0127  A  4420
        0128  A  5359
        0129  A  5354
        012A  A  454D
        012B  A  2043
        012C  A  414C
        012D  A  4C20
        012E  A  0D0A
        012F  A  0000
257     0130  A  0D5C   GOOD1 DFC           #0D5C,#2020,#0000
        0131  A  2020
        0132  A  0000
258     0133  A  0000   E.351 RES           80,0            INPUT BUFFER
259     0183  A  0000   E.31C DFC           0               INPUT CHAR. COUNTER
260     0184  A  0D0A   CRLF  DFC           #0D0A,0
        0185  A  0000
261                     *
```

262 *

```
264                     * OUTBF IS THE OUTPUT BUFFER, PACKED AT TWO CHARS PER WORD. BYTE
265                     *   ADDRESSING IS USED TO RETRIEVE THE OUTPUT CHARACTERS IN TURN.
266                     *   PNTIN IS THE BUFFER POINTER USED TO STORE DATA IN THE BUFFER.
267                     *   PNTOT IS THE BUFFER POINTER USED TO REMOVE DATA FROM THE BUFFER.
268                     *   BFLIM IS THE LIMIT FOR THE BUFFER POINTERS BEFORE RECYCLING.
269                     *
270     0186            OUTBF RES       256         512 CHARACTER OUTPUT BUFFER (#100)
271     0286  A 0000    PNTIN DFC       0
272     0287  A 0000    PNTOT DFC       0
273     0288            SAVRS RES       7
274     028F            E35SV RES       7
275                     *
276                     *
```

```
 278                    * E.IOF TRANSMITS DATA ABOUT CALL FROM B:IOR TO E:035.
 279                    *   BIT 0=0 DO NOT RESCHEDULE BACKGROUND AFTER I/O DONE
 280                    *         =1 RESCHEDULE BACKGROUND AFTER I/O DONE
 281                    *       1=0 NO RESPONSE EXPECTED
 282                    *         =1 OPERATOR RESPONSE IS EXPECTED
 283                    *
 284     0296  A  0000  E.IOF DFC           0
 285     0297                 END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   663
```

```
                        PGM             E$MAG
                         INT             E:MAG,E:MTI,E:MGS
                         EXT             E:SKD,E.T15,E.IOF,E:035,B.STT
                         EXT             E.T11,F.MTP
                *        CAT.NO.400000-018
                * E$MAG IS THE MAGNETIC TAPE UNIT CONTROL PROGRAM.
                *  IT CONSISTS OF THREE PARTS:
                *   1. E:MGS IS CALLED BY A BACKGROUND ROUTINE
                *      VIA THE B:IOR TO INIATE A DATA TRANSFER.
                *   2. E:MTI RESPONDS TO THE SI FOLLOWING THE
                *      COMPLETION OF THE DATA TRANSFER AND SCHEDULES
                *      E:MAG IN THE SYSTEM SCHEDULER.
                *   3. E:MAG CHECKS FOR ERRORS IN THE DATA TRANSFER
                *      AND INFORMS THE OPERATOR OF THEM.  IF ALL
                *      WENT WELL, THE BACKGROUND PROCESSOR IS
                *      RESCHEDULES.
```

```
18                      ************************************************************
19                      * A MAG TAPE SI CAUSES ENTRY TO E:MTI
20      0000     8200   E:MTI OBMM,0        E.T11          SCHEDULE E:MAG
        0001  X  0006
21      0002     2500         CIR
```

```
23                      ****************************************************************
24                      * AFTER EACH MAG TAPE SI, E:MAG IS ENTERED FROM THE
25                      *    SCHEDULER.
26                      * E:MAG CHECKS THE STATUS OF THE MAG TAPE UNIT AND
27                      *    LOGS ANY ERRORS FOR THE OPERATOR.
28    0003      4814    E:MAG ISA,1,4                         READ MT STATUS
29    0004      7610          TBRB,1,0      NOERR
      0005  R   0031
30                      * WE HAVE A MAG TAPE ERROR, PINPOINT THE CUASE*
31    0006      7612          TBRB,1,2      PARER             PARITY ERROR
      0007  R   0010
32    0008      7616    MAG01 TBRB,1,6      DEFER             TAPE DEFECT
      0009  R   0015
33    000A      7619          TBRB,1,9      EOTER             EOT FOUND
      000B  R   0018
34    000C      7613          TBRB,1,3      INOPE             INOPERATIVE
      000D  R   001B
35    000E      E700          BRU           NOERR
      000F  R   0031
36    0010      7602    PARER TBRB,0,2      MAG01
      0011  R   0008
37    0012      ED10          LDI,1         M02
      0013  R   0078
38    0014      F709          HOP,EROUT
39    0015      ED10    DEFER LDI,1         M03
      0016  R   0086
40    0017      F706          HOP,EROUT
41    0018      ED10    EOTER LDI,1         M04
      0019  R   0093
42    001A      F703          HOP,EROUT
43    001B      ED10    INOPE LDI,1         M05
      001C  R   00A0
44    001D      6C22    EROUT ZRR,2
45    001E      E620          STM,2         E.IOF
      001F  X   0003
46    0020      E610          STM,1         $+4
      0021  R   0024
47    0022      E7E0          BLM,14        E:035
      0023  X   0004
48    0024  A   0000          DFC           0
49    0025      E7E0          BLM,14        E:035
      0026  X   0004
50    0027  R   00AE          DFC           M06
51    0028      6C22          ZRR,2
52    0029      E620          STM,2         B.STT             ABORT BACKGROUND
      002A  X   0005
53    002B      ED10          LDI,1         14080
      002C  A   3700
54    002D      E610          STM,1         F.MTP
      002E  X   0007
```

```
 55     002F      E700        BRU          E:SKD
        0030  X   0001
 56                       * LAST MAG TAPE READ WAS GOOD, RESCHEDULE BACKGROUND.
 57     0031      8200   NOERR OBMM,0       E.T15
        0032  X   0002
 58     0033      E700        BRU          E:SKD
        0034  X   0001
```

```
60                      ********************************************************************
61                      * E:MGS IS CALLED BY THE BACKGROUND SYSTEM TO BEGIN
62                      *   A MAG TAPE I/O TRANSFER.
63                      * CALLING SEQUENCE:
64                      *     BLM,13        E:MGS
65                      *     (PARAMETER WORD)
66                      *     (MEMORY START ADDRESS)
67                      *     (WORD COUNT)
68   0035    A510  E:MGS SFM,1         TEMP
     0036  R 00BB
69   0037    FD2D        LDX,2,13
70   0038    E620        STM,2         #74             STORE TA
     0039  A 0074
71   003A    60DF        ABR,13,15
72   003B    FD2D        LDX,2,13
73   003C    6F22        TTR,2,2
74   003D    E620        STM,2         #64             STORE TC
     003E  A 0064
75   003F    60DF        ABR,13,15                     MOD RETURN ADDRESS
76   0040    4814        ISA,1,4
77   0041    7613        TBRB,1,3      ABRT            BRU IF MT NOT RDY
     0042  R 0051
78   0043    761C        TBRB,1,12     ABRT            BRU IF MT OFFLINE
     0044  R 0051
79   0045    EC10        XOI,1         #C4F0           POWER OFF STATUS
     0046  A C4F0
80   0047    7D11        TRRB,1,1      $+4
     0048  R 004B
81   0049    F700        BRU           ABRT            POWER IS OFF
     004A  R 0051
82   004B    ED10        LDI,1         #DCC0
     004C  A DCC0
83   004D    4014        OCA,1,4                       INIATE DMP READ.....
84   004E    A410  MGSRT LFM,1         TEMP
     004F  R 00BB
85   0050    FF0D        BRX,13
86   0051    6C11  ABRT  ZPR,1
87   0052    E610        STM,1         E.IOF
     0053  X 0003
88   0054    E7E0        BLM,14        E:035
     0055  X 0004
89   0056  R 0060        DFC           M01
90   0057    6C11        ZRR,1
91   0058    E610        STM,1         B.STT
     0059  X 0005
92   005A    ED10        LDI,1         14080
     005B  A 3700
93   005C    E610        STM,1         F.MTP
     005D  X 0007
94   005E    E700        BRU           MGSRT
```

005F R 004E

```
 96                           *********************************************************************
 97    0060  A  0D0A  M01    DFC             #0D0A,|MAG TAPE NOT READY, |
       0061  A  4D41
       0062  A  4720
       0063  A  5441
       0064  A  5045
       0065  A  204E
       0066  A  4F54
       0067  A  2052
       0068  A  4541
       0069  A  4459
       006A  A  2C20
 98    006B  A  4341         DFC             |CALLING TASK ABORTED. |,#0D0A
       006C  A  4C4C
       006D  A  494E
       006E  A  4720
       006F  A  5441
       0070  A  534B
       0071  A  2041
       0072  A  424F
       0073  A  5254
       0074  A  4544
       0075  A  2E20
       0076  A  0D0A
 99    0077  A  0000         DFC             0
100    0078  A  0D0A  M02    DFC             #0D0A,|MAG TAPE PARITY ERROR,  |
       0079  A  4D41
       007A  A  4720
       007B  A  5441
       007C  A  5045
       007D  A  2050
       007E  A  4152
       007F  A  4954
       0080  A  5920
       0081  A  4552
       0082  A  524F
       0083  A  522C
       0084  A  2020
101    0085  A  0000         DFC             0
102    0086  A  0D0A  M03    DFC             #0D0A,|TAPE DEFECT DETECTED, |
       0087  A  5441
       0088  A  5045
       0089  A  2044
       008A  A  4546
       008B  A  4543
       008C  A  5420
       008D  A  4445
       008E  A  5445
       008F  A  4354
       0090  A  4544
```

```
          0091  A  2C20
 103      0092  A  0000         DFC        0
 104      0093  A  0D0A  M04    DFC        #0D0A,|END OF TAPE DETECTED, |
          0094  A  454E
          0095  A  4420
          0096  A  4F46
          0097  A  2054
          0098  A  4150
          0099  A  4520
          009A  A  4445
          009B  A  5445
          009C  A  4354
          009D  A  4544
          009E  A  2C20
 105      009F  A  0000         DFC        0
 106      00A0  A  0D0A  M05    DFC        #0D0A,|TAPE UNIT INOPERATIVE,  |
          00A1  A  5441
          00A2  A  5045
          00A3  A  2055
          00A4  A  4E49
          00A5  A  5420
          00A6  A  494E
          00A7  A  4F50
          00A8  A  4552
          00A9  A  4154
          00AA  A  4956
          00AB  A  452C
          00AC  A  2020
 107      00AD  A  0000         DFC        0
 108      00AE  A  4341  M06    DFC        |CALLING TASK ABORTED. |,#0D0A,0
          00AF  A  4C4C
          00B0  A  494E
          00B1  A  4720
          00B2  A  5441
          00B3  A  534B
          00B4  A  2041
          00B5  A  424F
          00B6  A  5254
          00B7  A  4544
          00B8  A  2E20
          00B9  A  0D0A
          00BA  A  0000
 109      00BB  A  0000  TEMP   RES        7,0
 110      00C2                  END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   194
```

```
                    PGM         U$RTA
                     INT         U:RTA,U:CNI,U.SIG,U.TM3,U.TM4
                     EXT         U.CYC,U.WRK,U.RTY,U.IHB,U.AST
                     EXT         U.FAC,U.CCN,U.LST,U.LSP,E:DIF
                     EXT         E:SRT,U.LTF,U.DIU,E:MIT,U.BLL
                     EXT         U.TRK,U:LSQ,U.CPC,U.CMP,U.CTM
                     EXT         U.TRF,E:035,E.TM1,E.TM2,E:FCT
                     EXT         U.CST,E:LOG,U.GAN,U.AMP,E:FMF
                     EXT         U.CPP,E.IOF,M.STA
*     CAT NO.  400100-002
*U$RTA PERFORMS THE FOLLOWING FUNCTIONS
*   1. MONITORS CHANNEL AMPLITUDE TO DETERMINE NEED FOR GAIN CHANGES.
*   2. MONITORS CHANNEL PHASE TO DETERMINE NEED FOR TRACKING RATE CHANGE
*   3. MONITORS PERCENT BLANKED SIGNAL TO DETERMINE NEEDED LEVEL CHANGES
*   4. CONTROLS CHANNEL R.F. GAIN AND LOGS CHANGES
*   5. CONTROLS CHANNEL BLANKING LEVEL AND LOGS CHANGES
*   6. COMPUTES STANDARD DEVIATION OF INPUT PHASE SIGNAL
*   7. CONTROLS CHANNEL TRACK RATE BASED ON STD DEV AND LOGS CHANGES
*   8. PERFORMS DATA COMPRESSION
*   9. CONTROLS CHANNEL DOWN SEQUENCE.
* (BUSY LITTLE BASTARD ISN'T IT?????)
```

```
                                ********************************************************************
                                * AMPLITUDE MONITORING SECTION....
0000     6C66  U:RTA ZRR,6                          R6 CHANNEL POINTER (C)
0001     EDD0  RTA1  LDI,13      44                 R13 SAMPLE POINTER (S)
0002 A   002C
0003     6C55        ZRR,5
0004     E650        STM,5       MUBAV              RESET BAD AVERAGE FLAG
0005 R   0314
0006     E650        STM,5       SATTY              RESET SATURATION TALLY
0007 R   0312
0008     F650        STM,5       DRPTY              RESET DROP TALLY
0009 R   0313
000A     ED30  RTA2  LDI,3       #3
000B A   0003
000C     2036        MPR,3,6
000D     6D23        TRR,2,3
000E     682D        ADR,2,13                       INDEX = S + C. (R2)
000F     E532        LDM,3,2     U.WRK              GET AMPLITUDE VALUE INTO R3
0010 X   0002
0011     E130        SUM,3       AMPMN
0012 R   02F2
0013     7630        TBRB,3,0    LOVAL              GO TALLY VAL IF ITS LESS THAN AMPMN
0014 R   002C
0015     E130        SUM,3       AMPMX
0016 R   02F3
0017     7630        TBRB,3,0    NXTSM              CHECK NEXT SAMPLE IF POINT IS O.K.
0018 R   004A
0019     80F6        ABMM,15,6   HIVTY              TALLY HI AMP VALUE ON THIS CHAN
001A R   0304
001B     E130        SUM,3       SATUR
001C R   02F5
001D     7630        TBRB,3,0    NXTSM              GO ON IF POINT NOT SATURATED
001E R   004A
001F     80F0        ABMM,15     SATTY              TALLY SATURATED AMP VALUE
0020 R   0312
0021     E530        LDM,3       SATTY                ?
0022 R   0312
0023     E930        SUI,3       #6                 IS SATURATION TALLY FULL?
0024 A   0006
0025     7D33        TRRB,3,3    NXTSM
0026 R   004A
0027     653F        LBR,3,15
0028     E630        STM,3       MUBAV              SET MUBAV=+1 TO FLAG SATURATED CHAN
0029 R   0314
002A     E700        BRU         NXTSM              GO TO NEXT SAMPLE
002B R   004A
002C     80F6  LOVAL ABMM,15,6   LOVTY              TALLY LO AMP VALUE ON THIS CHAN
002D R   02F6
002E     E030        ADM,3       AMPDP
002F R   02F4
```

```
52    0030      7630      TBRB,3,0    $+4
      0031  R   0034
53    0032      E700      BRU         NXTSM       NOT DROP VALUE, CHECK NEXT SAMPLE
      0033  R   004A
54    0034      80F0      ABMM,15     DRPTY       TALLY SIGNAL DROP-OUT VALUE
      0035  R   0313
55    0036      E530      LDM,3       DRPTY
      0037  R   0313
56    0038      F930      SUI,3       #3          IS DROP TALLY FULL
      0039  A   0003
57    003A      7D33      TRRB,3,3    $+7
      003B  R   0041
58    003C      673F      GMR,3,15
59    003D      E630      STM,3       MUBAV       SET MUBAV=-1 TO FLAG SIGNAL LOST
      003E  R   0314
60    003F      E700      BRU         NXTSM
      0040  R   004A
61    0041      6D32      TRR,3,2                 SUBSTITUTE PREVIOUS PHASE VALUE FOR
62    0042      603F      ABR,3,15                 CURRENT
63    0043      6D43      TRR,4,3
64    0044      E940      SUI,4       44
      0045  A   002C
65    0046      E554      LDM,5,4     U.WRK       GET PREVIOUS PHASE VALUE
      0047  X   0002
66    0048      E653      STM,5,3     U.WRK       STORE FOR CURRENT ONE
      0049  X   0002
67    004A      F8D0  NXTSM ADI,13    44          MOVE POINTER TO NEXT ROW (NEXT SAMP)~
      004B  A   002C
68    004C      ED30      LDI,3       484
      004D  A   01E4
69    004E      793D      SURB,3,13   RTA2
      004F  R   000A
70    0050      E532      LDM,3,2     U.WPK       RETAIN CURRENT AMP VALUE
      0051  X   0002
71    0052      E636      STM,3,6     U.AMP
      0053  X   001D
```

```
                        ****************************************************************
                        * PHASE MONITOR SECTION......
0054      E530                LDM,3          MUBAV
0055  R   0314
0056      7D33                TRRB,3,3       DNSEQ           IF MUBAV IS NOT 0, BEGIN DOWN SEQ.
0057  R   020A
0058      E536                LDM,3,6        U.CST           IS CHANNEL STATUS UP?
0059  X   001A
005A      713F                SBRB,3,15      $+4             YES GO TO NORMAL PROCESSING
005B  R   005E
005C      E700                BRU            MFAZ1
005D  R   007D
005E      8606                TBMB,0,6       U.IHB,NXTCH     IS PROC INHIBITED ON THIS CHAN?
005F  X   0004
0060  R   00DF
0061      84F6                ABMB,15,6      U.RTY,MFAZ1     NO, BEGIN CHANNEL UP SEQUENCE
0062  X   0003
0063  R   007D
                        * WHEN U.RTY REACHES 0, LOG CHANNEL UP, SET PARMS. ACCORDINGLY
0064      0956                MBL,5,6                        GET CHAN FOR E$LOG CALL
0065      E740                BLM,4          E:LOG           LOG CHANNEL AS 'U'
0066  X   001B
0067      E556                LDM,5,6        U.CST           SET CHANNEL STATUS PRIOR TO COMMING U
0068  X   001A
0069      654F                LBR,4,15
006A      E646                STM,4,6        U.CST           SET CHANNEL STATUS TO 1 (UP)
006B  X   001A
006C      765D                TBRB,5,13      $+4             IF FORMER STATUS WAS DOWN, RESET VALS
006D  R   0070
006E      E700                BRU            MFAZ1           IF NOT, CONTINUE LIKE NUTTIN HAPPEN
006F  R   007D
0070      6C44                ZRR,4
0071      E646                STM,4,6        U.TRF                U.TRF=0
0072  X   0015
0073      E646                STM,4,6        UBADT                UBADT=0
0074  R   0315
0075      E646                STM,4,6        UBADS                UBADS=0
0076  R   0323
0077      E646                STM,4,6        U.CPC                U.CPC=0
0078  X   0012
0079      E550                LDM,5          U.LTF
007A  X   000C
007B      E656                STM,5,6        U.FAC                U.FAC=U.LTF
007C  X   0006
007D      EDF0          MFAZ1 LDI,15         U.WRK           R15 POINTS TO FIRST TIME ENTRY
007E  X   0002
007F      E8F0                ADI,15         41               (U.WRK+41)
0080  A   0029
0081      EDE0                LDI,14         45              R14 SAMPLE POINTER
0082  A   002D
```

```
100  0083      6CAA        ZRR,10                    R10,R11 SERVE AS UACC
101  0084      6CBB        ZRR,11
102  0085      6CCC        ZRR,12                    R12,R13 SERVE AS U2ACC
103  0086      6CDD        ZRR,13
104                    * BEGIN LOOP BY COMPUTING LOCATION OF FAZ POINT IN R2
105  0087      ED30  MFAZ3 LDI,3         #3          GET CHANNEL
     0088  A   0003
106  0089      2036        MPR,3,6
107  008A      6D23        TRR,2,3
108  008B      682E        ADR,2,14                  GET SAMPLE POINTER, SUM INTO R2
109  008C      E552        LDM,5,2       U.WRK       GET PHASE POINT
     008D  X   0002
110  008E      7650        TBRB,5,0      $+3
     008F  R   0091
111  0090      F703        HOP,$+3
112  0091      6250        ZBR,5,0                   CLEAR CYCLE SHIFT BIT
113  0092      6380        OBR,8,0                   SET FLAG BIT IN R8
114  0093      E056        ADM,5,6       U.CCN       ADD CYCLE SHIFT COMPENSATION
     0094  X   0007
115  0095      6D45        TRR,4,5
116  0096      E146        SUM,4,6       WINMN       IS POINT LOWER THAN WINMN?
     0097  R   03A1
117  0098      7640        TBRB,4,0      FINDN       BRU IF IT IS
     0099  R   009F
118  009A      6D45        TRR,4,5
119  009B      E146        SUM,4,6       WINMX       IS POINT GREATER THAN WINMX?
     009C  R   0393
120  009D      7640        TBRB,4,0      MFAZ2       BRU IF IT IS NOT
     009E  R   00A3
121  009F      E740  FINDN BLM,4          COMPR       STORE NEW COMPRESSED POINT
     00A0  R   0290
122  00A1      E740        BLM,4         NEWIN       COMPARE NEW WINDOW LIMITS
     00A2  R   02AF
123  00A3      7650  MFAZ2 TBRB,5,0      $+4
     00A4  R   00A7
124  00A5      6C44        ZRR,4                     POSITIVE VALUE
125  00A6      F702        HOP,$+2
126  00A7      674F        GMR,4,15                  NEGATIVE VALUE
127  00A8      22A4        DAR,10,4                  DOUBLE PRECISION:VACC+CUR.POINT
128  00A9      E156        SUM,5,6       XBAR        (PHASE - XBAR)
     00AA  R   0385
129  00AB      2045        MPR,4,5                     SQUARED
130  00AC      22C4        DAR,12,4                  DBL.PREC:U2ACC=U2ACC+(CURPOINT)**2
131  00AD      7680        TBRB,8,0      $+3
     00AE  R   00B0
132  00AF      F709        HOP,$+9
133  00B0      6280        ZBR,8,0                   CLEAR FLAG BIT
134  00B1      E546        LDM,4,6       U.CYC
     00B2  X   0001
135  00B3      C046        ADMM,4,6      U.CCN       U.CCN=U.CCN+U.CYC;UPDATE CYCLE COUNT~
```

```
        00B4  X  0007
136     00B5     6C44      ZRR,4
137     00B6     E646      STM,4,6      U.CYC       CLEAR CYCLE SHIFT FLAG FOR CHAN
        00B7  X  0001
138     00B8     E8E0      ADI,14       44
        00B9  A  002C
139     00BA     ED30      LDI,3        485
        00BB  A  01E5
140     00BC     793E      SURB,3,14    MFAZ3       LOOP THRU 10 SAMPLES
        00BD  R  0087
141     00BE     6D16      TRR,1,6                  GET DOUBLE PRECISION DATA POINTER
142     00BF     2F11      LAS,1,1
143     00C0     E541      LDM,4,1      UACC1       DBL.PREC.:UACC1=UACC1+UACC
        00C1  R  0331
144     00C2     E551      LDM,5,1      UACC1+1
        00C3  R  0332
145     00C4     224A      DAR,4,10
146     00C5     E641      STM,4,1      UACC1
        00C6  R  0331
147     00C7     E651      STM,5,1      UACC1+1
        00C8  R  0332
148     00C9     E541      LDM,4,1      U2ACC       DBL.PREC:U2ACC=U2ACC+CUR.U2ACC
        00CA  R  034D
149     00CB     E551      LDM,5,1      U2ACC+1
        00CC  R  034E
150     00CD     224C      DAR,4,12
151     00CE     E641      STM,4,1      U2ACC
        00CF  R  034D
152     00D0     E651      STM,5,1      U2ACC+1
        00D1  R  034E
153     00D2     ED40      LDI,4        10
        00D3  A  000A
154     00D4     21A4      DVR,10,4                 GET 10 SECOND AVERAGE PHASE
155     00D5     E510      LDM,1        U.LSP       FIND STORAGE POINTER
        00D6  X  0009
156     00D7     6816      ADR,1,6                  ADD ROW POINTER AND CHAN POINTER
157     00D8     E6B1      STM,11,1     U.LST       STORE AVER
        00D9  X  0008
```

```
159  00DA    602F        ABR,2,15                    MOVE DATA POINTER TO BLANKING VALUE
160  00DB    E542        LDM,4,2       U.WRK         GET DATA BLANK VALUE
     00DC  X 0002
161  00DD    C046        ADMM,4,6      UBACC         UBACC=UBACC+CUR.VALUE
     00DE  R 03BF
162  00DF    606F  NXTCH ABR,6,15                    MOVE POINTER TO NEXT CHANNEL
163  00E0    ED40        LDI,4         14
     00E1  A 000E
164  00E2    7946        SURB,4,6      RTA1          LOOP THROUGH 14 CHANNELS
     00E3  R 0001
165  00E4    ED10        LDI,1         14
     00E5  A 000E
166  00E6    C010        ADMM,1        U.LSP         MOVE POINTER TO NEXT ROW
     00E7  X 0009
167  00E8    ED10        LDI,1         140
     00E9  A 008C
168  00EA    E110        SUM,1         U.LSP         SEE IF TIME TO RESET POINTER
     00EB  X 0009
169  00EC    7D11        TRRB,1,1      $+4            NO, CONTINUE.
     00ED  R 00F0
170  00EE    E610        STM,1         U.LSP         RESET TO TOP OF BUFFER
     00EF  X 0009
171                      ************************************************************
172                      * GAIN AND BLANKING LEVEL CONTROL SECTIONS.....
173                      *   ENTRY TO THIS SECTION IS CONTROLLED BY THE GAIN CLOCK, WHICH PERMITS
174                      *   EXECUTION EVERY TWO MINUTES.
175                      * GAIN ADJUSTMENTS ARE MADE BASED ON THE NUMBER OF HIGH AND LOW VALUES
176                      *   TALLIED IN THE MONITOR SECTION.
177                      * BLANKING LEVEL ADJUSTMENTS ARE MADE BASED ON THE AVERAGE BLANKING
178                      *   LEVEL IN UBACC RELATIVE TO MAXIMUM AND MINIMUM PERMITTED VALUES.
179  00F0    84F0          ABMB,15       GCLCK,CTCLK
     00F1  R 03D0
     00F2  R 016C
180  00F3    6C66        ZRR,6                       RESET CHANNEL POINTER TO FIRST CHAN
181  00F4    E7F0  RTLOP BLM,15        CAN1          SEE IF PARM CHANGE O.K.
     00F5  R 0268
182  00F6    E700        BRU           RSTAL          NO, GO ON AROUND CHANGE.
     00F7  R 0152
183                      * O.K. WE'VE ESTABLISHED THAT IT'S ALL RIGHT TO ADJUST THE GAIN OR
184                      *   BLANKING LEVEL AS NEEDED
185  00F8    EDA0        LDI,10        90            LIMITER FOR LOW VALUE TALLY
     00F9  A 005A
186  00FA    E1A6        SUM,10,6      LOVTY
     00FB  R 02F6
187  00FC    76A0        TBRB,10,0     LOGAN         BRU IF GAIN IS TOO LOW
     00FD  R 0106
188  00FE    EDA0        LDI,10        90
     00FF  A 005A
189  0100    E1A6        SUM,10,6      HIVTY
     0101  R 0304
```

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0102      76A0          TBRB,10,0     HIGAN          BRU IF GAIN IS TOO HIGH
0103  R   0114
0104      E700          BRU           CKBLL          NO GAIN CHANGE NEEDED
0105  R   0127
0106      E5A6   LOGAN  LDM,10,6      U.GAN          CHECK TO SEE IF GAIN IS AT MAX SET.
0107  X   001C
0108      F9A0          SUI,10        24
0109  A   0018
010A      7DAA          TRRB,10,10    $+4
010B  R   010E
010C      E700          BRU           CKBLL          GAIN ALREADY AT MAX, NO CHANGE
010D  R   0127
010E      80F6          ABMM,15,6     U.GAN
010F  X   001C
0110      E5A6          LDM,10,6      U.GAN
0111  X   001C
0112      E700          BRU           GCHNG
0113  R   011D
0114      E5A6   HIGAN  LDM,10,6      U.GAN          CHECK TO SEE IF GAIN IS AT MIN SET.
0115  X   001C
0116      7DAA          TRRB,10,10    $+4
0117  R   011A
0118      E700          BRU           CKBLL
0119  R   0127
011A      61AF          SBR,10,15                    DECREMENT GAIN
011B      E6A6          STM,10,6      U.GAN
011C  X   001C
011D      E6A0   GCHNG  STM,10        GPARM          PASS NEW GAIN VALUE TO LOG ROUTINE
011E  R   0126
011F      8200          OBMM,0        CFLAG          SET CHANGE MADE FLAG
0120  R   03CD
0121      0956          MBL,5,6                      SET UP R5 FOR E$LOG CALL
0122      F850          ADI,5         #04            MSG NO. FOR |GC| MESSAGE
0123  A   0004
0124      F740          BLM,4         E:LOG
0125  X   001B
0126  A   0000   GPARM  DFC           0              NEW GAIN VALUE
```

```
211  0127     E5A6  CKBLL LDM,10,6      UBACC
     0128  R  03BF
212  0129     E1A0        SUM,10        BLKMN        CHECK AGAINST MIN. VALUE....
     012A  R  03CE
213  012B     76A0        TBRB,10,0     LOBLK        IF R10<0, THEN LEVEL IS TOO LOW
     012C  R  013F
214  012D     E1A0        SUM,10        BLKMX        CHECK AGAINST MAX. VALUE....
     012E  R  03CF
215  012F     76A0        TBRB,10,0     RSTAL        IF R10<0, THEN NO CHANGE NEEDED
     0130  R  0152
216  0131     E5A6        LDM,10,6      U.BLL        CHECK TO SEE IF AT MAX SETTING
     0132  X  000F
217  0133     E9A0        SUI,10        63
     0134  A  003F
218  0135     7DAA        TRRB,10,10    $+4
     0136  R  0139
219  0137     E700        BRU           RSTAL        BLANK LEVEL AT MAX SETTING
     0138  R  0152
220  0139     80F6        ABMM,15,6     U.BLL        INCREMENT SETTING
     013A  X  000F
221  013B     E5A6        LDM,10,6      U.BLL
     013C  X  000F
222  013D     E700        BRU           BCHNG
     013E  R  0148
223  013F     E5A6  LOBLK LDM,10,6      U.BLL        CHECK TO SEE IF AT MIN SETTING
     0140  X  000F
224  0141     7DAA        TRRB,10,10    $+4            ?
     0142  R  0145
225  0143     E700        BRU           RSTAL        BLANK LEVEL AT MIN SETTING
     0144  R  0152
226  0145     61AF        SBR,10,15
227  0146     E6A6        STM,10,6      U.BLL
     0147  X  000F
228  0148     E6A0  BCHNG STM,10        BPARM        PASS NEW BLANK LEVEL TO E$LOG
     0149  R  0151
229  014A     8200        OBMM,0        CFLAG        SET CHANGE MADE FLAG
     014B  R  03CD
230  014C     0956        MBL,5,6                    SET UP R5 FOR E$LOG CALL
231  014D     E850        ADI,5         #05          MSG NO. FOR |BC|MESSAGE
     014E  A  0005
232  014F     E740        BLM,4         E:LOG
     0150  X  001B
233  0151  A  0000  BPARM DFC           0            NEW BLANK LEVEL
234  0152     6C44  RSTAL ZRR,4                      RESET COUNTERS
235  0153     E646        STM,4,6       HIVTY         HI VALUE GAIN COUNTER
     0154  R  0304
236  0155     E646        STM,4,6       LOVTY         LO VALUE GAIN COUNTER
     0156  R  02F6
237  0157     E646        STM,4,6       UBACC         BLANK LEVEL AVERAGER
     0158  R  03BF
```

```
238     0159      8600      TBMB,0      CFLAG,$+5    DOES CHANNEL HAVE PARAMETER CHANGE
        015A R    03CD
        015B R    015E
239     015C      E700      BRU         NXTCN        GO ON TO NEXT CHANNEL, NO CHANGE
        015D R    0163
240     015E      8100      ZBMM,0      CFLAG        RESET FLAG
        015F R    03CD
241     0160      6D36      TRP,3,6                  SET CHANNEL IN R3
242     0161      E750      BLM,5       E:MIT        GO MAKE CHANGE
        0162 X    000E
243     0163      606F NXTCN ABR,6,15                MOVE TO NEXT CHANNEL
244     0164      ED50      LDI,5       14
        0165 A    000E
245     0166      7956      SURB,5,6    RTLOP        LOOP THRU 14 CHANNELS, THEN
        0167 R    00F4
246     0168      ED50      LDI,5       -12          RESET GAIN CLOCK TO -12 (120 SEC)
        0169 A    FFF4
247     016A      E650      STM,5       GCLCK
        016B R    03D0
```

```
                        ********************************************************************
                        * TRACK RATE CONTROL SECTION.............
                        *   ENTRY TO THIS SECTION IS CONTROLLED BY THE TRACK CLOCK,  WHICH
                        *   PERMITS EXECUTION EVERY 1 1/2 MINUTES.
                        * TRACK RATE ADJUSTMENTS ARE MADE BASED ON THE STANDARD DEVIATION OF
                        *   THE PHASE INPUT, SO NATURALLY WE HAVE TO COMPUTE IT FIRST.
016C      84F0  CTCLK ABMB,15       TCLOCK,=INI
016D   R  03D1
016E   R  01F8
016F      6C66        ZRR,6                           RESET CHANNEL POINTER TO FIRST CHAN
                        * DO STANDARD DEVIATION COMPUTATION....
0170      6D56  STDEV TRR,5,6                         R6 HAS CHANNEL POINTER
0171      2D51        LLS,5,1                         R5 HAS D.P. DATA CHANNEL POINTER
                        * SIGMA=SQRT(U2ACC/89)
0172      E525        LDM,2,5       U2ACC             R2,R3 HAS U2ACC
0173   R  034D
0174      E535        LDM,3,5       U2ACC+1
0175   R  034E
0176      EDA0        LDI,10        8900              R10=8900
0177   A  22C4
0178      212A        DVR,2,10
0179      6DD2        TRR,13,2                        R13 HAS REMAINDER
017A      ED40        LDI,4         100               R4=100
017B   A  0064
017C      ED70        LDI,7         89                R7=89
017D   A  0059
017E      6CCC        ZRR,12                          R12,R13=REMAINDER
017F      21C7        DVR,12,7
0180      6CCC        ZRR,12                          R13=REM*100/89
0181      2024        MPR,2,4                         R2,R3=U2ACC/8900*100
0182      22C2        DAR,12,2                        R12,R13=U2ACC(D.P.)/89
0183      E7F0        BLM,14        E:SRT             TAKE SQUARE ROOT
0184   X  0008
0185      E526        LDM,2,6       SIGMA             SAVE LAST SIGMA
0186   R  0369
0187      E626        STM,2,6       LSIGM
0188   R  0377
0189      E6D6        STM,13,6      SIGMA             STORE SIGMA AWAY
018A   R  0369
                        * NOW UPDATE XBAR:
                        *    XBAR=(UACC1/90)
018B      ED70        LDI,7         90
018C   A  005A
018D      E5C5        LDM,12,5      UACC1
018E   R  0331
018F      E5D5        LDM,13,5      UACC1+1
0190   R  0332
0191      21C7        DVR,12,7                        R12=UACC1/90
0192      E9C0        SUI,12        45
0193   A  002D
```

```
284     0194     76C0        TBRB,12,0     $+3
        0195  R  0197
285     0196     60DF        ABR,13,15
286     0197     E6D6        STM,13,6      XBAR
        0198  R  0385
287                       * CLEAR ACCUMULATORS,
288                       *   UACC1=0
289                       *   U2ACC=0
290     0199     6C44          ZRR,4
291     019A     E645        STM,4,5       UACC1
        019B  R  0331
292     019C     E645        STM,4,5       UACC1+1
        019D  R  0332
293     019E     E645        STM,4,5       U2ACC
        019F  R  034D
294     01A0     E645        STM,4,5       U2ACC+1
        01A1  R  034E
295                       * DO NOT CHANGE DELTA IF PROCESSING A TRIGGER
296     01A2     E536        LDM,3,6       U.AST
        01A3  X  0005
297     01A4     613E        SBR,3,14
298     01A5     7630        TBRB,3,0      $+4
        01A6  R  01A9
299     01A7     E700        BRU           ADJTR
        01A8  R  01BE
300                       * THE DATA COMPRESSION IS 2*DELTA WIDE, WHERE:
301                       *    DELTA=LSIGM*K
302     01A9     E5D6        LDM,13,6      LSIGM
        01AA  R  0377
303     01AB     E530        LDM,3         K+1
        01AC  R  03BE
304     01AD     202D        MPP,2,13                    R2=FRACTION PART
305     01AE     2E21        LAD,2,1
306     01AF     E530        LDM,3         K
        01B0  R  03BD
307     01B1     20C3        MPR,12,3                    R13=INTEGER PART
308     01B2     68D2        ADR,13,2
309     01B3     E6D6        STM,13,6      DELTA
        01B4  R  03AF
310                       * SET MINIMUM WINDOW WIDTH OF 2 MICROSECONDS,
311                       *    THAT IS, A MINIMUM DELTA = 1 MICROSECOND.
312     01B5     61DB        SBR,13,11
313     01B6     76D0        TBRB,13,0     $+3
        01B7  R  01B9
314     01B8     F704        HOP,$+4                     HOP IF VAL O.K..
315     01B9     65DB        LBR,13,11
316     01BA     F6D6        STM,13,6      DELTA         SET TO 1 MICROSECOND
        01BB  R  03AF
317     01BC     E740        BLM,4         NEWIN         SET NEW WINDOW
        01BD  R  02AF
```

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319                     *ADJUST TRACKING RATE BASED ON HOW SIGMA FARES RELATIVE TO FIXED
320                     *   LIMITS.......
321   01BE      E7F0    ADJTR BLM,15        CANI          CAN I ADJUST.RATE?
      01BF  R   0268
322   01C0      E700          BRU           NEXTC         NO, GO TO NEXT CHANNEL
      01C1  R   01F2
323   01C2      E546          LDM,4,6       SIGMA         CHECK FOR TOO LOW FIRST
      01C3  R   0369
324   01C4      E140          SUM,4         TRMIN
      01C5  R   03D3
325   01C6      7640          TBRB,4,0      LOTR          BRU IF T.R. IS LOW
      01C7  R   01D0
326   01C8      E540          LDM,4         TRMAX
      01C9  R   03D2
327   01CA      E146          SUM,4,6       SIGMA
      01CB  R   0369
328   01CC      7640          TBRB,4,0      HITR          BRU IF TR IS HIGH
      01CD  R   01DE
329   01CE      E700          BRU           NEXTC
      01CF  R   01F2
330   01D0      E5A6    LOTR  LDM,10,6      U.TRK         CHECK IF T.R. IS AT MAX
      01D1  X   0010
331   01D2      E9A0          SUI,10        9
      01D3  A   0009
332   01D4      7DAA          TRBB,10,10    $+4
      01D5  R   01D8
333   01D6      E700          BRU           NEXTC         T.R. ALREADY AT MAX
      01D7  R   01F2
334   01D8      80F6          ABMM,15,6     U.TRK         INCREMENT T.R.
      01D9  X   0010
335   01DA      E5A6          LDM,10,6      U.TRK
      01DB  X   0010
336   01DC      E700          BRU           TCHNG
      01DD  R   01E7
337   01DE      E5A6    HITR  LDM,10,6      U.TRK         CHECK IF T.R. IS AT MIN
      01DF  X   0010
338   01E0      7DAA          TRBB,10,10    $+4
      01E1  R   01E4
339   01E2      E700          BRU           NEXTC         T.R. ALREADY AT MIN
      01E3  R   01F2
340   01E4      61AF          SBR,10,15                   DECREMENT T.R.
341   01E5      E6A6          STM,10,6      U.TRK
      01E6  X   0010
342   01E7      E6A0    TCHNG STM,10        TPARM         PASS NEW TR TO E$LOG
      01E8  R   01EE
343   01E9      0956          MBL,5,6                     SET UP R5 FOR E$LOG CALL
344   01EA      E850          ADI,5         #03           MSG NO. FOR |TC| MESSAGE
      01EB  A   0003
345   01EC      E740          BLM,4         E:LOG
      01ED  X   001B
```

```
346     01EE  A  0000  TPARM DFC          0             NEW TR VALUE
347     01EF     6D36        TRR,3,6                    SET CHANNEL IN R3
348     01F0     E750        BLM,5        E:MIT         GO MAKE CHANGE
        01F1  X  000E
349     01F2     606F  NEXTC ABR,6,15                   MOVE TO NEXT CHANNEL
350     01F3     ED50        LDI,5        14
        01F4  A  000F
351     01F5     7956        SURB,5,6     STDEV         LOOP THRU 14 CHANNELS, THEN
        01F6  R  0170
352     01F7     ED50        LDI,5        -9             RESET TR CLOK TO -9.
        01F8  A  FFF7
353     01F9     E650        STM,5        TCLCK
        01FA  R  03D1
354                  * NOW MOVE LAST ROW OF U.WRK (MOST CURRENT DATA) TO THE FIRST
355                  *  TO SET UP FOR NEXT TEN SECONDS ENTRY TO U$RTA.
356     01FB     ED50  FINI  LDI,5        U.WRK
        01FC  X  0002
357     01FD     6D65        TRR,6,5
358     01FE     E860        ADI,6        440           R6=U.WRK+440
        01FF  A  01B8
359     0200     ED70        LDI,7        -44
        0201  A  FFD4
360     0202     FD46        LDX,4,6
361     0203     FE45        STX,4,5
362     0204     605F        ABR,5,15
363     0205     606F        ABR,6,15
364     0206     707F        ABRB,7,15    $-4           LOOP THRU 44 POINTS
        0207  R  0202
365     0208     E700        BRU          U:LSQ         GO ON TO LEAST SQUARES PGM
        0209  X  0011
```

```
                        * WHEN MUBAV IS SET OTHER THAN 0, INDICATING |BAD| DATA,
                        *   THE CHANNEL IS PUT INTO A DOWN SEQUENCE WHICH EVENTUALLY
                        *   PUTS THE CHANNEL INTO A DOWN STATE IF THE LOW QUALITY
                        *   DATA CONTINUES.
                        * ENTER WITH MUBAV IN R3, CHANNEL IN R6
020A      B606  DNSEQ TBMB,0,6      U.IHB,STREC     BRU IF PROC INHIBITED
020B  X   0004
020C  R   0215
020D      E556        LDM,5,6       U.CST
020E  X   001A
020F      E70D        BRU*,5        JMPTB-1
0210  R   0210
                        * THE NEXT STEP DEPENDS ON WHAT THE CURRENT STATUS IS...
0211  R   021B  JMPTB DFC           ISUP            U.CST=1, UP
0212  R   0224        DFC           ISCNR           U.CST=2, COAST,NO-REPORT
0213  R   0250        DFC           ISCR            U.CST=3, COAST,REPORT
0214  R   0215        DFC           STREC           U.CST=4, DOWN
0215      ED50  STREC LDI,5         -1B
0216  A   FFEE
0217      E656        STM,5,6       U.RTY           RESET RECOVERY TALLY
021B  X   0003
0219      E700        BRU           NXTCH           AND EXIT
021A  R   00DF
021B      80F6  ISUP  ABMM,15,6     U.CST           SET STATE = COAST NO REPORT
021C  X   001A
021D      655F        LBR,5,15
021E      E656        STM,5,6       UBADT           SET BAD TALLY = 1
021F  R   0315
0220      E636        STM,3,6       UBADS           ADD MUBAV TO BAD SUM
0221  R   0323
0222      E700        BRU           STREC
0223  R   0215
0224      80F6  ISCNR ABMM,15,6     UBADT           INCRM BAD TALLY
0225  R   0315
0226      C036        ADMM,3,6      UBADS           ADD MUBAV TO BAD SUM
0227  R   0323
0228      E556        LDM,5,6       UBADT
0229  R   0315
022A      E950        SUI,5         3
022B  A   0003
022C      7D55        TRRB,5,5      STREC           CHECK OF TALLY=3
022D  R   0215
022E      80F6        ABMM,15,6     U.CST           YES, UP STATE TO COAST REPORT
022F  X   001A
0230      E556        LDM,5,6       UBADS
0231  R   0323
0232      E950        SUI,5         3
0233  A   0003
0234      7D55        TRRB,5,5      $+4
0235  R   0238
```

```
397  0236     E700        BRU          CSMSG
     0237 R   0248
398  0238     E556        LDM,5,6      UBADS
     0239 R   0323
399  023A     E850        ADI,5        3
     023B A   0003
400  023C     7D55        TRRB,5,5     $+4
     023D R   0240
401  023E     E700        BRU          CFMSG
     023F R   024C
402  0240     ED70        LDI,7        15           MSG NO. FOR |CN|
     0241 A   000F
403  0242     0956  LOGCR MBL,5,6                    SET UP CHAN FOR LOG MSG.
404  0243     6857        ADR,5,7                    ADD IN MSG NO.
405  0244     E740        BLM,4        E:LOG        LOG COASTING AND REASON
     0245 X   001B
406  0246     E700        BRU          STREC
     0247 R   0215
407  0248     ED70  CSMSG LDI,7        16           MSG NO FOR |CS|
     0249 A   0010
408  024A     E700        BRU          LOGCR
     024B R   0242
409  024C     ED70  CFMSG LDI,7        14           MSG NO FOR CF
     024D A   000E
410  024E     E700        BRU          LOGCR
     024F R   0242
411  0250     80F6  ISCR  ABMM,15,6    UBADT        INCREM BAD TALLY
     0251 R   0315
412  0252     E556        LDM,5,6      UBADT
     0253 R   0315
413  0254     E950        SUI,5        30           IS BAD TALLY = 30?
     0255 A   001E
414  0256     7D55        TRRB,5,5     STREC
     0257 R   0215
415  0258     80F6        ABMM,15,6    U.CST        YES, GO DOWN
     0259 X   001A
416  025A     0956        MBL,5,6
417  025B     E850        ADI,5        17           MSG NO FOR |D| MESSAGE
     025C A   0011
418  025D     E740        BLM,4        E:LOG        LOG DOWN CHANNEL
     025E X   001B
419  025F     6C44        ZRR,4                     RESET
420  0260     E646        STM,4,6      UBADT         BAD TALLY
     0261 R   0315
421  0262     E646        STM,4,6      UBADS         BAD SUM
     0263 R   0323
422  0264     E646        STM,4,6      U.CCN         CYCLE COUNTER
     0265 X   0007
423  0266     E700        BRU          STREC
     0267 R   0215
```

```
424                 **************END MAINLINE OF U$RTA**********************************
```

```
                                ********************************************************************
                                * CANI IS A SUBROUTINE TO DETERMINE OF I CAN MAKE A PARAMETER
                                *  ADJUSTMENT.  ADJUSTMENTS ARE NOT PERMITTED IF VAVEFORM ANALYSIS
                                *  INDICATES A REPORTABLE SIGNAL IS PROBABLY IN PROGRESS.  THE
                                *  FOLLOWING CRITERIA ARE USED TO DETERMINE IF THERE MIGHT BE A
                                *  SIGNAL UNDERWAY:
                                *   1.  U.AST, THE ALARM STATUS, SHOWS A PEAK HAS BEEN FOUND (>4)
                                *   2.  THE ELAPSED TIME FROM ONSET IS LONGER THAN 50 SECONDS.
                                * CALLING SEQUENCE:
                                *     BLM,15        CANI   (R6=CHAN)
                                *     (RETURN IF NOT PERMITTED)
                                *     (RETURN IF CHANGES O.K.)
0268    A5C0  CANI  SFM,12        THOLD          SAVE R4
0269  R 0288
026A    EDC0        LDI,12        #3
026B  A 0003
026C    E1C6        SUM,12,6      U.CST
026D  X 001A
026E    76C0        TBRB,12,0     CANRT          BRU IF DOWN OR COAST REPORTED
026F  R 0285
0270    86F6        TBMB,15,6     M.STA,CANRT    NO CHANGE IN MANUAL
0271  X 0021
0272  R 0285
0273    EDC0  CANI1 LDI,12        #4
0274  A 0004
0275    E1C6        SUM,12,6      U.AST
0276  X 0005
0277    76C0        TBRB,12,0     CANRT          BRU IF SIGNAL PAST PEAK
0278  R 0285
0279    E7E0        BLM,14        E:DIF          GET TIME SINCE ONSET
027A  X 000A
027B  X 0014        DFC           U.CTM          LOC. OF CURRENT TIME
027C    F707        HOP,$+7
027D    6600        NOP
027E    EDE0        LDI,14        50
027F  A 0032
0280    69ED        SUR,14,13                    BRU IF > 50 SEC PAST PEAK
0281    76E0        TBRB,14,0     CANRT
0282  R 0285
                  * IF YOU MAKE IT THIS FAR, YOU MAY MAKE A PARM ADJUSTMENT.
0283    80E0        ABMM,14       THOLD+3        ADJ. RETURN ADDRESS
0284  R 028B
0285    A4C0  CANRT LFM,12        THOLD
0286  R 0288
0287    FF0F        BRX,15
0288          THOLD RES           4              RETURN
028C    A5C0  U:CNI SFM,12        THOLD
028D  R 0288
028E    F700        BRU           CANI1
028F  R 0273
```

```
461                     ********************************************************************
462                     * COMPR ESTABLISHES A NEW COMPRESSED POINT, IT:
463                     *    1. SETS A NEW WINDOW CENTER
464                     *    2. SAVES POINT VALUE AND TIME
465                     * NEWIN ESTABLISHES A NEW DATA WINDOW WHEN:
466                     *    1. A NEW CENTER HAS BEEN FOUND
467                     *    2. A NEW DELTA HAS BEEN COMPUTED
468                     * CALLING SEQUENCE......
469                     *      BLM,4          COMPR
470                     *     (CUR. VAL IN R5, TIME IN LOC. AT R14,R15)
471                     *      BLM,4          NEWIN
472   0290      A510  COMPR SFM,1          TREGS          SAVE REGISTERS
      0291  R   02C0
473   0292      E656        STM,5,6        CENTR          SET NEW COUNTER
      0293  R   03D4
474   0294      ED30        LDI,3          3
      0295  A   0003
475   0296      A026        MPM,2,6        U.CPC          ENTRY COUNTER
      0297  X   0012
476   0298      E036        ADM,3,6        U.CPP          BUFFER POINTER
      0299  X   001F
477   029A      FE53        STX,5,3                       STORE DATA IN BUFFER
478   029B      603F        ABR,3,15                      STORE LOC. FOR TIME
479   029C      6D7E        TRR,7,14
480   029D      687F        ADR,7,15                      TIME POINTER
481   029E      FD57        LDX,5,7                       GET TIME
482   029F      FE53        STX,5,3                       STORE IN BUFFER
483   02A0      E650        STM,5          E.TM1
      02A1  X   0017
484   02A2      607F        ABR,7,15
485   02A3      603F        ABR,3,15
486   02A4      FD57        LDX,5,7                        SECOND TIME WORD
487   02A5      FE53        STX,5,3                        AND STORE
488   02A6      E650        STM,5          E.TM2
      02A7  X   0018
489   02A8      80F6        ABMM,15,6      U.CPC           BUMP COMP. POINT COUNTER
      02A9  X   0012
490   02AA      760B        TBFB,0,11      CMPCT
      02AB  R   02C7
491   02AC      A410  COMRT LFM,1          TREGS          RESTORE REGISTERS
      02AD  R   02C0
492   02AE      FF04        BRX,4                         AND RETURN
493   02AF      A510  NEWIN SFM,1          TREGS          MAX=CENTER + DELTA
      02B0  R   02C0
494   02B1      E556        LDM,5,6        CENTR
      02B2  R   03D4
495   02B3      E056        ADM,5,6        DELTA
      02B4  R   03AF
496   02B5      E656        STM,5,6        WINMX
      02B6  R   0393
```

```
497     02B7      E556        LDM,5,6       CENTR          MIN=CENTER - DELTA
        02B8  R   03D4
498     02B9      E156        SUM,5,6       DELTA
        02BA  R   03AF
499     02BB      E656        STM,5,6       WINMN
        02BC  R   03A1
500     02BD      A410        LFM,1         TREGS
        02BE  R   02C0
501     02BF      FF04        BRX,4                        RETURN
502     02C0              TREGS RES         7
503                 ********************************************************
```

```
505                     ****************************************************************
506                     * IF BIT 11 OF THE SWITCH REGISTER IS SET, ALL COMPRESSED DATA
507                     *   POINTS ON THE CHANNEL GIVEN IN BITS 12-15 WILL BE LISTED
508                     *   ON THE ASR 35.
509   02C7      6D10  CMPCT TRR,1,0
510   02C8      EA10        ETI,1           #FFF0           GET CHANNEL FROM R0
      02C9  A   FFF0
511   02CA      7916        SURB,1,6        COMRT           BRU IF NOT THIS CHANNEL
      02CB  R   02AC
512   02CC      A5A0        SFM,10          COSVR
      02CD  R   02EC
513   02CE      E7E0        BLM,14          E:FCT           SET UP POINT'S TIME
      02CF  X   0019
514   02D0  R   02E0        DFC             LSTMS
515   02D1      E5C6        LDM,12,6        CENTR           GET PHASE VALUE
      02D2  R   03D4
516   02D3      E7F0        BLM,15          E:FMF           SET UP OUTPUT
      02D4  X   001F
517   02D5  R   02E5        DFC             LSTMG
518   02D6      6CEE        ZRR,14
519   02D7      E6E0        STM,14          E.IOF
      02D8  X   0020
520   02D9      E7F0        BLM,14          E:035           OUTPUT LINE
      02DA  X   0016
521   02DB  R   02E0        DFC             LSTMS
522   02DC      A4A0        LFM,10          COSVR           RESTORE REGISTERS
      02DD  R   02EC
523   02DE      E700        BRU             COMRT
      02DF  R   02AC
524   02E0  A   3132  LSTMS DFC             |123 123456|
      02E1  A   3320
      02E2  A   3132
      02E3  A   3334
      02E4  A   3536
525   02E5  A   202B  LSTMG DFC             | +0037.46 |,#0D0A,#0000 '
      02E6  A   3030
      02E7  A   3337
      02E8  A   2E34
      02E9  A   3620
      02EA  A   0D0A
      02EB  A   0000
526   02EC            COSVR RES             6
```

```
                                ********************************************************************
                                * GAIN CONTROL PARAMETERS....
                                * AMPMN...MINIMUM ACCEPTABLE AMPLITUDE VALUE.
                                * AMPMX...DIFF. BETWEEN MAX ACCEPTABLE AND MIN.
                                * AMPDP...VALUE BELOW WHICH PHASE CONSIDERED WORTHLESS.
                                * SATUR...SATURATION POINT, VALUE ABOVE WHICH PHASE CONSIDERED WORTHLESS
02F2  A  0266  AMPMN DFC        614             =30
02F3  A  029A  AMPMX DFC        666             =30+52.5=62.5
02F4  A  0233  AMPDP DFC        563             =30-27.5=2.5
02F5  A  02C3  SATUR DFC        707             =62.5+34.5=97
                                * LOVTY .. IS COUNTER OF POINTS BELOW AMPMN FOR EACH CHANNEL
                                * HIVTY .. IS COUNTER OF POINTS ABOVE AMPMN+AMPMX FOR EACH CHANNEL
02F6  A  0000  LOVTY RES        14,0
0304  A  0000  HIVTY RES        14,0
0312  A  0000  SATTY DFC        0               SATURATION TALLY DURING CUR. BLOCK
0313  A  0000  DRPTY DFC        0               DROP TALLY DURING CURRINT BLOCK
                                * MUBAV IS THE AMPLITUDE BAD SAMPLE FLAG.  IT'S SET TO +1 IF THE CHAN
                                *   IS SATURATED AND TO -1 IF THE SIGNAL DROPS OUT.
0314  A  0000  MUBAV DFC        0
                                * THE CHANNEL DOWN SEQUENCE USES TWO PARAMETERS:
                                *   UBADT IS THE TALLY OF BAD DATA BLOCKS AND DETERMINES WHEN CHANNEL
                                *    CHANGES STATE.
                                *   UBADS IS A SUM OF U.BAV AND IS USED TO DETERMINE WHY CHANNEL IS
                                *    CHANGING STATUS.
0315  A  0000  UBADT RES        14,0
0323  A  0000  UBADS RES        14,0
                                * THE STANDARD DEVIATION OF THE INPUT IS COMPUTED USING THE FOLLOWING:
                                * SIGMA=SQRT(SUM OF (FAZ-XBAR)**2
                                *   WHERE:
                                *     UACC1 = SUM OF CURRENT POINTS
                                *     U2ACC = SUM OF (CURRENT POINTS - XBAR)**2/89
                                *     XBAR  = ESTIMATE OF AVERAGE INPUT
0331  A  0000  UACC1 RES        28,0            (DOUBLE PRECISION)
034D  A  0000  U2ACC RES        28,0            (DOUBLE PRECISION)
      R  0369  U.SIG EQU        $
0369  A  0000  SIGMA RES        14,0
0377  A  0000  LSIGM RES        14,0
0385  A  0000  XBAR  RES        14,0
                                * COMPRESSED DATA POINTS ARE MAINTAINED IN THE U$DAT AREA, BUT THE
                                *   FOLLOWING ARE USED IN COMPRESSED DATA COMPUTATION.....
                                * WINMX AND WINMN ARE THE UPPER AND LOWER BOUNDS FOR THE CURRENT WINDOW
                                *  DELTA IS SIGMA*K
0393  A  7FFF  WINMX RES        14,#7FFF
03A1  A  8000  WINMN RES        14,#8000
03AF  A  0000  DELTA RES        14,0
03BD  A  0001  K     DFC        #0001,#4000     =1.5
03BE  A  4000
                                * UBACC IS USED TO DETERMINE THE APPROXIMATE PERCENTAGE BLANKED.
                                *   THE LAST BLANKED PERCENTAGE VALUE FROM EACH 10 SECOND PERIOD IS
                                *   AVERAGED OVER TWO MINUTES.
```

```
 577     03BF  A  0000  UBACC RES           14,0
 578     03CD  A  0000  CFLAG DFC           0              BIT 0 = 1 IF ANY CHANGES TO BE MADE
 579                    * BLANKING LEVEL CONTROL PARAMETERS: MIN AND MAX ALLOWED VALUES
 580     03CE  A  00B9  BLKMN DFC           #B9
 581     03CF  A  00A9  BLKMX DFC           #A9
 582                    * GCLOK IS THE GAIN CLOCK....
 583                    * TCLOK IS THE TRACK RATE CLOCK....
 584           R  03D0  U.TM3 EQU           $
 585     03D0  A  FFF4  GCLOK DFC           -12
 586           R  03D1  U.TM4 EQU           $
 587     03D1  A  FFF7  TCLOK DFC           -9
 588                    ********************************************************************
 589                    * TRACKING RATE CONTROL PARAMETERS......
 590                    * TRMAX MAXIMUM STANDARD DEVIATION PERMITTED
 591                    * TRMIN MINIMUM STANDARD DEVIATION PERMITTED
 592                    * WHEN SIGMA FALLS OUTSIDE THESE BOUNDS, TRY TO BRING IT BACK
 593     03D2  A  0014  TRMAX DFC           #14
 594     03D3  A  0008  TRMIN DFC           #08
 595                    ********************************************************************
 596                    * CENTR IS THE COMPRESSED DATA POINT AT THE WINDOW CENTER
 597     03D4  A  0000  CENTR RES           14,0
 598                    ********************************************************************
 599     03E2                 END

TOTAL ASSEMBLY ERRORS =   0     SIZE =   994
```

```
 1                              PGM           U$LSQ
 2                               INT           U:LSQ
 3                               EXT           U.LST,U.LSP,U:TGR,U.CST,U.SLP
 4                         *     CAT NO.  400100-003
 5                         * U$LSQ IS THE LEAST SQUARES SLOPE ESTIMATOR.
 6                         *   THE LAST 10 OF THE 10 SECOND PHASE AVERAGES ARE ANALYZED.
 7     0000      6C44    U:LSQ ZRR,4                          CLEAR SUMS
 8     0001      ED60          LDI,6         -28
       0002  A   FFE4
 9     0003      E646          STM,4,6       SUM+28
       0004  R   006F
10     0005      706F          ABRB,6,15     $-2
       0006  R   0003
11     0007      E550          LDM,5         U.LSP          R5=ROW POINTER
       0008  X   0002
12     0009      E540          LDM,4         TUMAX
       000A  R   0071
13     000B      6F44          TTR,4,4
14     000C      E640          STM,4         TUWAT          INIT. TUWAT=-TUMAX
       000D  R   006F
15     000E      6C66    NEXTA ZRR,6                          R6=CHANNEL POINTER(B)
16     000F      6D46    LOOP1 TRR,4,6
17     0010      2D41          LLS,4,1                      D.P.POINTER
18     0011      86D6          TBMB,13,6     U.CST,LASTB    BYPASS IF CHANNEL DOWN
       0012  X   0004
       0013  R   0024
19     0014      6D76          TRR,7,6
20     0015      6875          ADR,7,5                      POINT=A+B
21                         * SUM=SUM+2**4*TUWAT*U.LST
22     0016      E5D0          LDM,13        TUWAT
       0017  R   006F
23     0018      A0C7          MPM,12,7      U.LST          R12,13=U.LST*TUNAT
       0019  X   0001
24     001A      2ACC          RAD,12,12                     *2**4 (CLR MPY BY FRACTION)
25     001B      E5A4          LDM,10,4      SUM            +SUM
       001C  R   0053
26     001D      E5B4          LDM,11,4      SUM+1
       001E  R   0054
27     001F      22AC          DAR,10,12
28     0020      E6A4          STM,10,4      SUM            INTO SUM!
       0021  R   0053
29     0022      E6B4          STM,11,4      SUM+1
       0023  R   0054
30     0024      606F    LASTB ABR,6,15                       NEXT CHAN
31     0025      ED40          LDI,4         14
       0026  A   000E
32     0027      7946          SURB,4,6      LOOP1          LOOP THRU 14 CHANNELS
       0028  R   000F
33     0029      E850          ADI,5         14             NEXT ROW
       002A  A   000E
```

```
34      002B     ED40        LDI,4       140
        002C  A  008C
35      002D     7945        SURB,4,5    $+3
        002E  R  0030
36      002F     6D54        TRR,5,4                 RECYCLE ROW POINTER
37      0030     E540        LDM,4       U.LSP
        0031  X  0002
38      0032     7945        SURB,4,5    $+4         LOOP THRU 10 ROWS
        0033  R  0036
39      0034     E700        BRU         DONEA       THEN EXIT
        0035  R  003C
40      0036     E560        LDM,6       TUWDF
        0037  R  0070
41      0038     C060        ADMM,6      TUWAT       TUWAT=TUWAT+TUNDF
        0039  R  006F
42      003A     E700        BRU         NEXTA             AND DO NEXT ROW
        003B  R  000E
43                        * SLOPE=TUFAC*SUM FOR EACH CHAN.
44      003C     6C66' DONEA ZRR,6                   REINIT CHANNEL POINTER
45      003D     6D46  LOOP2 TRR,4,6
46      003E     2D41        LLS,4,1                 D.P. POINTER FOR CHANNEL
47      003F     E536        LDM,3,6     U.CST
        0040  X  0004
48      0041     E930        SUI,3       1           CHECK IF CHANNEL IS UP
        0042  A  0001
49      0043     7D33        TRRB,3,3    NEXTB       ...NO, DO NEXT CHANNEL
        0044  R  004C
50      0045     E5D4        LDM,13,4    SUM+1
        0046  R  0054
51      0047     A0C0        MPM,12      TUFAC       SUM*TUFAC
        0048  R  0072
52      0049     2EC1        LAD,12,1
53      004A     E6C6        STM,12,6    U.SLP        INTO U.SLP
        004B  X  0005
54      004C     606F  NEXTB ABR,6,15                NEXT CHANNEL
55      004D     ED50        LDI,5       14
        004E  A  000E
56      004F     7956        SURB,5,6    LOOP2        LOOP THRU 14 CHANNELS
        0050  R  003D
57      0051     E700        BRU         U:TGR       DO TRIGGER DETECTION
        0052  X  0003
```

```
  59                        ****************************************************************
  60                        * SUM IS A DOUBLE PRECISION ACCUMULATOR FOR THE COMPUTATION
  61     0053  A  0000  SUM   RES            28,0
  62     006F  A  3999  TUWAT DFC            #3999          .45
  63     0070  A  0CCC  TUWDF DFC            #0CCC          .10
  64     0071  A  3999  TUMAX DFC            #3999          .45
  65     0072  A  5D17  TUFAC DFC            #5D17          .727272
  66     0073             END

TOTAL ASSEMBLY ERRORS =   0     SIZE =    115
```

```
                              PGM         U$TGR
                              INT         U:TGR,U:GET,U.TRF,U.TRL
                              EXT         U.CPC,U.CPP,U.AST,E:COT,E:DIF
                              EXT         U:WFA,U.CDT,U.COM,U.AMP,U.OAM
                              EXT         U.DIU,U.ODI,U.OFZ,U.OTM,U.OTB
                              EXT         U.CST,U.OSG,U.SIG,U.DTM,U.END
                              EXT         U:RP2,U.CLS,U.LTF,U.FAC,U.LFZ
                              EXT         U.LTM
                        *     CAT NO.  400100-005
                        * U$TGR IS THE U-WAVEFORM TRIGGER DETECTION ROUTINE.
0000        6C66        U:TGR ZRR,6                           INIT CHANNEL COUNTER
0001        E546        NEXTP LDM,4,6     U.CST
0002   X    0010
0003        714F              SBRB,4,15   NEXTC
0004   R    00C7
0005        ED20              LDI,2       1                   IS ALARM STATUS = TO 1?
0006   A    0001
0007        E126              SUM,2,6     U.AST
0008   X    0003
0009        7D22              TRRB,2,2    $+3                 ..NO, GO TO NEXT CHAN
000A   R    000C
000B        F705              HOP,LOOK
000C        E820              ADI,2       #6                  NEW ONSET?
000D   A    0006
000E        7D22              TRRB,2,2    NEXTC
000F   R    00C7
0010        E7E0        LOOK  BLM,14      U:GET
0011   R    00EB
0012        E700              BRU         NEXTC               NO POINTS, NEXT CHANNEL
0013   R    00C7
0014        6D56              TPR,5,6
0015        2051              LLS,5,1                         D.P. CHAN POINTER
0016        E526              LDM,2,6     U.TRF
0017   R    0147
0018        E70A              BRU*,2      JMPTB
0019   R    001A
001A   R    001F        JMPTB DFC         TRF0                U.TRF=0
001B   R    0024              DFC         TRF1                     =1
001C   R    00CE              DFC         TRF2                     =2
001D   R    00E5              DFC         TRF3                     =3
001E   R    00C7              DFC         NEXTC                    =4
                        * U.TRF=0, SO WE'RE LOOKING FOR THE FIRST POINT, AND SINCE
                        *   U.CPC ISN'T ZERO, WE HAVE IT IN R11, TIME IN R12,13.
                        * NOW, SOME HOUSEKEEPING, THEN ON TO THE INTERESTING STUFF.
001F        6C22        TRF0  ZRR,2
0020        F626              STM,2,6     TRCNT               RESET TRCNT=0
0021   R    0155
0022        E700              BRU         INCTR
0023   R    002D
                        * U.TRF=1, SO WE HAVE THE FIRST POINT IN TRBUF AND THE SECOND IN
```

```
38                      *   R12.  WE'LL COMPARE THESE TO DETERMINE THE DIRECTION OF THE
39                      *   POSSIBLE ONSET.
40                      * IF THE SECOND POINT > FIRST, SET U.TRF=3 (RETARD)
41                      *  OTHERWISE, SET U.TRF=2 (ADVANCE).
42  0024     E740  TRF1  BLM,4          STPON           STORE POSSIBLE ONSET
    0025  R  0129
43  0026     6D1B        TRR,1,11                       GET CURRENT VALUE
44  0027     E11E        SUM*,1,6       TRBFP           SUBTRACT ONSET VALUE
    0028  R  0307
45  0029     7610        TBRB,1,0       INCTR
    002A  R  002D
46  002B     80F6        ABMM,15,6      U.TRF           SET TRFLAG=3
    002C  R  0147
47  002D     80F6  INCTR ABMM,15,6      U.TRF           SET TRFLAG=2
    002E  R  0147
48                      * STORE CURRENT POINT AND TIME IN TRBUF....
49  002F     ED30  STRTR LDI,3          3
    0030  A  0003
50  0031     A026        MPM,2,6        TRCNT
    0032  R  0155
51  0033     E036        ADM,3,6        TRBFP           R3=NEXT LOC IN TRBUF FOR THIS CHAN
    0034  R  0307
52  0035     FEB3        STX,11,3                       STORE VALUE
53  0036     603F        ABR,3,15
54  0037     FEC3        STX,12,3                       STORE HI-TIME WORD
55  0038     603F        ABR,3,15
56  0039     FED3        STX,13,3
57  003A     80F6        ABMM,15,6      TRCNT           INCRM TRCNT
    003B  R  0155
58                      * ANOTHER POINT IN OUR POSSIBLE TRIGGER HAS BEEN SAFELY TUCKED IN.
59                      *   NOW, LET'S SEE IF WE HAVE TRLIM OF THEM YET.....
60  003C     E526        LDM,2,6        TRCNT
    003D  R  0155
61  003E     E126        SUM,2,6        U.TRL
    003F  R  0315
62  0040     7D22        TRRB,2,2       NEXTP           NOT ENOUGH YET, GET ANOTHER
    0041  R  0001
63                      * ONSET IS GETTING MORE LIKELY.  WE HAVE TRLIM POINTS IN THE SAME
64                      *   DIRECTION.  NOW, IF THEY FALL WITHIN TRTIM SECONDS, WE HAVE
65                      *   A REAL HONEST-TO-GOODNESS TRIGGER.
66                      * FIRST, GET THE POSSIBLE ONSET TIME INTO U.DTM
67  0042     ED30        LDI,3          U.DTM
    0043  X  0013
68  0044     E525        LDM,2,5        PONST
    0045  R  0323
69  0046     FE23        STX,2,3
70  0047     603F        ABR,3,15
71  0048     E525        LDM,2,5        PONST+1
    0049  R  0324
72  004A     FE23        STX,2,3                        SET U.DTM WITH POSS. ONSET TIME
```

```
 73      004B      E6C0        STM,12        TEMP
         004C  R   033F
 74      004D      E6D0        STM,13        TEMP1
         004E  R   0340
 75      004F      6D46        TRR,4,6                     HOLD CHANNEL REGISTER
 76      0050      ED60        LDI,6         14            POINT TO U.DTM
         0051  A   000E
 77      0052      E7E0        BLM,14        E:DIF         RETURN WITH
         0053  X   0005
 78      0054  R   033F        DEC           TEMP           R12,13=TIME DIFFERENCE
 79      0055      6600        NOP
 80      0056      6600        NOP
 81      0057      6D64        TRR,6,4                     RESTORE CHANNEL REGISTER
 82      0058      E1D0        SUM,13        TRTIM
         0059  R   0341
 83      005A      76D0        TBRB,13,0     GUDTR         BRU IF TIME<TRTIM
         005B  R   007C
 84      005C      E536        LDM,3,6       TRCNT
         005D  R   0155
 85      005E      613F        SBR,3,15                    DECRIMENT COUNT
 86      005F      E636        STM,3,6       TRCNT
         0060  R   0155
 87      0061      ED40        LDI,4         3
         0062  A   0003
 88      0063      2024        MPR,2,4                     WORDS TO BE TRANSFERED
 89      0064      6F43        TTR,4,3                     R4=-WORD COUNT
 90      0065      E526        LDM,2,6       TRBFP         R2=STORE LOCATION
         0066  R   0307
 91      0067      6D32        TRR,3,2
 92      0068      E830        ADI,3         3             R3=LOAD LOCATION
         0069  A   0003
 93      006A      FD13  LOOP1 LDX,1,3                     MOVE FIRST VALUE OUT
 94      006B      FE12        STX,1,2                      AND REST UP ONE
 95      006C      602F        ABR,2,15
 96      006D      603F        ABR,3,15
 97      006E      704F        ABRB,4,15     LOOP1
         006F  R   006A
 98      0070      E536        LDM,3,6       TRBFP         SET UP FOR NEW PONST
         0071  R   0307
 99      0072      E830        ADI,3         3
         0073  A   0003
100      0074      603F        ABR,3,15
101      0075      FDC3        LDX,12,3
102      0076      603F        ABR,3,15
103      0077      FD03        LDX,13,3
104      0078      E740        BLM,4         STPCN         GET NEW PONST
         0079  R   0129
105      007A      E700        BRU           NEXTP
         007B  R   0001
106                       * HOLY COW (SAINTLY BOVINE?), WE HAVE AN ONSET ON THE CHAN IN R6
```

```
107     007C     E546  GUDTR LDM,4,6       U.AST
        007D  X  0003
108     007E     714F        SBRB,4,15      $+4
        007F  R  0082
109     0080     E700        BRU            GOODY          INITIAL ONSET
        0081  R  0092
110                       * THE ONSET WE HAVE JUST FOUND TERMINATES A SIGNAL
111                       *   ALREADY IN PROGRESS, BUT PAST ITS HALF RECOVERY
112                       *   POINT.
113                       * WE'LL HAVE TO TERMINATE PROCESSING ON THAT SIGNAL
114                       *   BEFORE WE CAN TAKE UP THIS NEW POSSSIBILITY.
115     0082     6542        LBR,4,2
116     0083     E646        STM,4,6        U.END          FLAG END TYPE
        0084  X  0014
117     0085     E7F0        BLM,15         U:RP2          CUT OLD SIG OFF
        0086  X  0015
118     0087     6C44        ZRR,4                         CLEAR PARMS FOR NEW SIGNAL
119     0088     E646        STM,4,6        U.END
        0089  X  0014
120     008A     E646        STM,4,6        U.CLS
        008B  X  0016
121     008C     E546        LDM,4,6        U.LTF
        008D  X  0017
122     008E     E646        STM,4,6        U.FAC
        008F  X  0018
123     0090     E700        BRU            GOOD1
        0091  R  009A
124     0092     E546  GOODY LDM,4,6        U.DIU
        0093  X  0008
125     0094     E646        STM,4,6        U.ODI          ONSET DIURNAL=U.DIU
        0095  X  000C
126     0096     E546        LDM,4,6        U.SIG
        0097  X  0012
127     0098     E646        STM,4,6        U.OSG
        0099  X  0011
128     009A     E546  GOOD1 LDM,4,6        U.TRF
        009B  R  0147
129     009C     E646        STM,4,6        U.AST          SET U.AST=U.TRF
        009D  X  0003
130     009E     654D        LBR,4,13
131     009F     E646        STM,4,6        U.TPF          RESET U.TRF=4
        00A0  R  0147
132     00A1     E546        LDM,4,6        U.AMP
        00A2  X  0009
133     00A3     E646        STM,4,6        U.OAM          ONSET AMP=U.AMP
        00A4  X  000A
134     00A5     E546        LDM,4,6        TRBFP
        00A6  R  0307
135     00A7     FD34        LDX,3,4
136     00A8     E636        STM,3,6        U.OFZ          ONSET PHASE
```

```
                00A9  X  000D
137             00AA     E536        LDM,3,6       U.LFZ
                00AB  X  0019
138             00AC     E636        STM,3,6       U.CDT          CANDIDATE PEAK
                00AD  X  0007
139             00AE     604D        ABR,4,13
140             00AF     FD34        LDX,3,4
141             00B0     E635        STM,3,5       U.OTB          ONSET TIME, BCD
                00B1  X  000F
142             00B2     E535        LDM,3,5       U.LTM
                00B3  X  001A
143             00B4     E635        STM,3,5       U.CDM
                00B5  X  0008
144             00B6     E535        LDM,3,5       PONST
                00B7  R  0323
145             00B8     E635        STM,3,5       U.OTM          ONSET TIME, BINARY
                00B9  X  000E
146             00BA     604F        ABR,4,15
147             00BB     605F        ABR,5,15
148             00BC     FD34        LDX,3,4
149             00BD     E635        STM,3,5       U.OTB
                00BE  X  000F
150             00BF     E535        LDM,3,5       U.LTM
                00C0  X  001A
151             00C1     E635        STM,3,5       U.CDM
                00C2  X  0008
152             00C3     E535        LDM,3,5       PONST
                00C4  R  0323
153             00C5     E635        STM,3,5       U.OTM
                00C6  X  000E
154                              * GO ON TO NEXT CHANNEL
155             00C7     606F    NEXTC ABR,6,15
156             00C8     ED50        LDI,5         14
                00C9  A  000E
157             00CA     7956        SURB,5,6      NEXTP          LOOP THROUGH 14 CHANNELS
                00CB  R  0001
158             00CC     E700        BRU           U:WFA          THEN DO WAVE FORM ANALYSIS
                00CD  X  0006
159                              * IF U.TRF=2 WE ARE WORKING ON AN ADVANCE ONSET.  IF THE CURRENT
160                              *   POINT CONTINUES THE TREND, C'EST GRAND.  OTHERWISE, SAVE THE
161                              *   LAST POINT AS THE POSSIBLE START OF A NEW ONSET AND TAKE
162                              *   IT FROM THERE.
163             00CE     E7E0    TRF2  BLM,14        FZDIF
                00CF  R  0139
164             00D0     F700        BRU           $+4            CUR>LAST VAL, CONTINUE
                00D1  R  00D4
165             00D2     F700        BRU           STRTR          CUR<LAST VAL
                00D3  R  002F
166             00D4     E546    TRRST LDM,4,6       TRBFP            RESET TRIGGER
                00D5  R  0307
```

```
167     00D6      ED70        LDI,7       -3              MOVE LAST VALUE....
        00D7  A   FFFD
168     00D8      FD23  LOOP2 LDX,2,3                     TO FIRST!
169     00D9      FE24        STX,2,4
170     00DA      603F        ABR,3,15
171     00DB      604F        ABR,4,15
172     00DC      707F        ABRB,7,15   LOOP2
        00DD  R   00D8
173     00DE      652F        LBR,2,15                  RESET
174     00DF      E626        STM,2,6     U.TRF          U.TRF=1
        00E0  R   0147
175     00E1      E626        STM,2,6     TRCNT          TRCNT=1
        00E2  R   0155
176     00E3      E700        BRU         TRF1
        00E4  R   0024
177                       * IF U.TRF=3 WE ARE WORKING ON A RETARD ONSET.  IF THE CURRENT
178                       *   POINT CONTINUES IN THAT DIRECTION, C'EST MAGNIFIQUE.
179                       *   OTHERWISE, SAVE THE LAST POINT AS THE POSSIBLE ONSET AND
180                       *   TAKE IT FROM THERE.
181     00E5      E7E0  TRF3 BLM,14       FZDIF
        00E6  R   0139
182     00E7      E700        BRU         STRTR          GOOD POINT!
        00E8  R   002F
183     00E9      E700        BRU         TRRST          BAD POINT!
        00EA  R   00D4
```

```
185                     ********************************************************************
186                     * U:GET IS A DUAL-RETURN SUBROUTINE WHICH:
187                     *  1.  CHECKS TO SEE OF ANY COMPRESSED POINTS ARE HELD
188                     *  2.  IF ANY ARE, IT RETURNS THE NEXT ONE.
189                     * CALLING SEQUENCE:
190                     *      BLM,14          U:GET  (CHAN IN R6)
191                     *     (RETURN IF NO COMPRESSED POINTS)
192                     *     (RETURN IF THERE ARE COMPRESSED POINTS)
193                     * RETURN WITH POINTS IN R11, ITS TIME IN R12,13
194     00EB    A510    U:GET SFM,1           GETSV           SAVE REGISTERS
        00EC  R 0114
195     00ED    E526          LDM,2,6         U.CPC           GET COMP. POINT COUNTER
        00EE  X 0001
196     00EF    7D22          TRRB,2,2        $+4             EXIT IF COUNT=0
        00F0  R 00F3
197     00F1    E700          BRU             GET01
        00F2  R 0110
198     00F3    ED30          LDI,3           3               TAKE OUT COUNTER
        00F4  A 0003
199     00F5    A026          MPM,2,6         GETCN            *3
        00F6  R 011B
200     00F7    E036          ADM,3,6         U.CPP            +OFFSET
        00F8  X 0002
201     00F9    FDB3          LDX,11,3                        GET POINT
202     00FA    603F          ABR,3,15
203     00FB    FDC3          LDX,12,3                        GET HI-TIME WORD
204     00FC    603F          ABR,3,15
205     00FD    FDD3          LDX,13,3                        GET LOW-TIME WORD
206     00FE    60EE          ABR,14,14                       MOVE RETURN ADDRESS
207     00FF    80F6          ABMM,15,6       GETCN           MOVE OUT COUNTER
        0100  R 011B
208     0101    ED30          LDI,3           -1
        0102  A FFFF
209     0103    C036          ADMM,3,6        U.CPC           DECREM. COMP.POINT COUNTER
        0104  X 0001
210     0105    E6B6          STM,11,6        U.LPZ           SAVE LAST POINT
        0106  X 0019
211     0107    2D61          LLS,6,1
212     0108    E6C6          STM,12,6        U.LTM
        0109  X 001A
213     010A    606F          ABR,6,15
214     010B    E6D6          STM,13,6        U.LTM
        010C  X 001A
215     010D    A410  GETRT LFM,1             GETSV           RESTORE REGISTERS
        010E  R 0114
216     010F    FF0E          BRX,14                          AND RETURN
217     0110    F626  GET01 STM,2,6           GETCN           RESET OUT-COUNTER
        0111  R 011B
218     0112    E700          BRU             GETRT
        0113  R 010D
```

```
219     0114           GETSV RES          7
220     011B   A 0000  GETCN RES          14,0
```

```
222                     ****************************************************************
223                     * STPON TAKES THE INPUT FORMATTED TIME IN R12,13 AND STORES
224                     *   THE BINARY EQUIVALENT IN PONST FOR THE CURRENT CHANNEL
225     0129    E6C0    STPON STM,12          TEMP          STORE POSSIBLE ONSET
        012A  R 033F
226     012B    E6D0          STM,13          TEMP1           TIME IN TEMP STORAGE
        012C  R 0340
227     012D    E7E0          BLM,14          E:COT
        012E  X 0004
228     012F  R 033F          DFC             TEMP
229     0130    E6C5          STM,12,5        PONST         BINARY POSSIBLE ONSET TIME
        0131  R 0323
230     0132    E6D5          STM,13,5        PONST+1
        0133  R 0324
231     0134    E5C0          LDM,12          TEMP          RESTORE R12,13
        0135  R 033F
232     0136    E5D0          LDM,13          TEMP1
        0137  R 0340
233     0138    FF04          BRX,4
```

```
235                     ************************************************************
236                     * FZDIF COMPUTES THE DIFFERENCE IN PHASE BETWEEN THE CURRENT
237                     *   VALUE IN (R11) AND THE LAST VALUE STORED IN TRBUF.
238                     * IF CUR.VAL.>LAST VAL., USE 1ST RETURN
239                     *   OTHERWISE USE THE 2ND RETURN
240                     * CALLING SEQUENCE.....
241                     *     BLM,14          FZDIF (R6=CHAN,R11=CURRENT VALUE)
242                     *    (RETURN LOCATION IF CUR.VAL.>LAST VAL.)
243                     *    (RETURN OTHERWISE)
244     0139     E536   FZDIF LDM,3,6         TRCNT
        013A  R  0155
245     013B     613F         SBR,3,15
246     013C     ED40         LDI,4           3
        013D  A  0003
247     013E     2024         MPR,2,4
248     013F     E036         ADM,3,6         TRBFP          R3=ADDR OF LAST PHASE VALUE
        0140  R  0307
249     0141     FD23         LDX,2,3                        R2=LAST PHASE VALUE
250     0142     692B         SUR,2,11                       R2=LAST VAL.-CUR.VAL.
251     0143     7620         TBRB,2,0        $+3            BRU IF CUR>LAST VALUE
        0144  R  0146
252     0145     60EE         ABR,14,14                      INC. RETURN IF LAST>CUR VAL
253     0146     FF0E         BRX,14                         RETURN
```

```
                    ******************************************************************
                    * U.TPF IS THE TRIGGER STATUS FLAG. IT IS INTERPRETED:
                    *   0 LOOKING FOR ONSET (FIRST POINT)
                    *   1 LOOKING FOR SECOND POINT IN EITHER DIRECTION
                    *   2 LOCKING FOR ADDITIONAL POINTS (ADVANCED DIRECTION)
                    *   3 LOOKING FOR ADDITIONAL POINTS (RETARD DIRECTION)
                    *   4 VALID ONSET
0147  A  0000       U.TRF RES         14,0
                    *******************************************************************
                    * TRCNT IS A COUNTER OF POINTS IN THE TRIGGER BUFFER
0155  A  0000       TRCNT RES         14,0
                    *******************************************************************
                    * TRBUF IS A 14 CHANNEL * 3 WORD/ENTRY * 10 ENTRY BUFFER OF POSSIBLE
                    *   POINTS LEADING TO A VALID TRIGGER.
                    * TRBFP IS A CHAN BY CHAN TABLE OF STARTING POINTS.
0163  A  0000       TRBUF RES         420,0
0307  R  0163       TRBFP DFC         TRBUF          CHAN 0
0308  R  0181             DFC         TRBUF+30       CHAN 1
0309  R  019F             DFC         TRBUF+60       CHAN 2
030A  R  01BD             DFC         TRBUF+90       CHAN 3
030B  R  01DB             DFC         TRBUF+120      CHAN 4
030C  R  01F9             DFC         TRBUF+150      CHAN 5
030D  R  0217             DFC         TRBUF+180      CHAN 6
030E  R  0235             DFC         TRBUF+210      CHAN 7
030F  R  0253             DFC         TRBUF+240      CHAN 8
0310  R  0271             DFC         TRBUF+270      CHAN 9
0311  R  028F             DFC         TRBUF+300      CHAN 10
0312  R  02AD             DFC         TRBUF+330      CHAN 11
0313  R  02CB             DFC         TRBUF+360      CHAN 12
0314  R  02E9             DFC         TRBUF+390      CHAN 13
                    *******************************************************************
                    * TPLIM IS THE MUMBER OF POINTS REQUIRED FOR A VALID TRIGGER
0315  A  0005       U.TRL RES         14,5
                    ********************************************************************
                    * PCNST IS THE BINARY TIME FOR THE FIRST POINT IN TRBUF (EACH CHAN)
0323  A  0000       PONST RES         28,0
                    ********************************************************************~
033F  A  0000       TEMP  DFC         0              TEMPORARY STORAGE
0340  A  0000       TEMP1 DFC         0
                    *********************************************************************
                    * TRTIM IS THE MAXIMUM PERMISSIBLE TIME BETWEEN FIRST AND LAST POINT
                    *  IN THE TRIGGER SEQUENCE.  (TIME IN SECONDS).
0341  A  001E       TRTIM DFC         30
                    ********************************************************************
0342                      END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   834
```

```
*****WARNING*** **0**  015F   CURRENT DIURNAL TO ONSET VALUE.
*****WARNING*** **0**  0184         PASS, SET CLASS = 2
*****WARNING*** **0**  0188         PASS, SET CLASS = 2          CK. CLASS 2 OFFSET CRITERIA).*******
*****WARNING*** **0**  018A          REASN
```

```
 1                          PGM       U$WFA
 2                           INT       U:WFA,U.LFZ,U.LTM,U.CDT,U.CDM
 3                           INT       U.CCL
 4                           EXT       U.CST,U.AST,U.SLP,U.DIU,U.FAC
 5                           EXT       U:RP1,U:RP2,U:GET,E:DIF,U.CTM
 6                           EXT       U.CLS,W.PFZ,W.PTM,W.PAM,W.OST
 7                           EXT       W.ONR,W.LPK,W.LTM,W.VPK,W.VTM
 8                           EXT       W.RFZ,W.RTM,W.RAM,E:SKD,U.END
 9                           EXT       U.OFZ,U.ODI,U.BGF,U.TRK,U.ODR
10                           EXT       E:COT,U.OTM,E.IOF,U.LTF,E:035
11                           EXT       E:FRT,U.AMP,U.DTM,W.LAM,W.VAM
12                           EXT       U.FRQ,U.TRF,U.TRL
13                    *      CAT NO.  400100-006
14                    * U$WFA PERFORMS WAVEFORM ANALYSIS ON A POSSIBLE SIGNAL WHICH
15                    *   WAS DETECTED BY U$TGR.
16     0000    6C66   U:WFA ZRR,6                          R6=CHANNEL
17     0001    86D6   LOOP1 TBMB,13,6     U.CST,DIED       IS CHAN DOWN?
       0002  X 0001
       0003  R 0026
18     0004    E526          LDM,2,6      U.AST            NO, CHECK U.AST
       0005  X 0002
19     0006    612F          SBR,2,15
20     0007    7620          TRRB,2,0     WFA1             U.AST=0
       0008  R 000D
21     0009    7D22          TRRB,2,2     WFA2             U.AST>1
       000A  R 0053
22     000B    E700          BRU          UPDIU            U,AST=1
       000C  R 0014
23     000D    652F   WFA1   LBR,2,15                      JUST UP, INITIATE THINGS AND STUFF
24     000E    E626          STM,2,6      U.AST            SET U.AST=1
       000F  X 0002
25     0010    E526          LDM,2,6      U.SLP
       0011  X 0003
26     0012    E626          STM,2,6      U.DIU            U.DIU=U.SLP
       0013  X 0004
27                    * THE DIURNAL SLOPE ESTIMATE IS UPDATED THUS:
28                    * U.DIU=U.DIU+U.FAC*(U.SLP-U.DIU)
29     0014    E536   UPDIU LDM,3,6       U.SLP
       0015  X 0003
30     0016    E136          SUM,3,6      U.DIU
       0017  X 0004
31     0018    A026          MPM,2,6      U.FAC
       0019  X 0005
32     001A    2E21          LAD,2,1
33     001B    C026          ADMM,2,6     U.DIU
       001C  X 0004
34     001D    E7F0   NEXTC  BLM,15        SCMPD            CLEAR C.P. BUFFER
       001E  R 032F
35     001F    606F          ABR,6,15                      NEXT CHANNEL
36     0020    ED50          LDI,5        14
```

```
          0021   A  000E
   37     0022      7956          SURB,5,6        LOOP1
          0023   R  0001
   38                         * ALL U-ANALYSIS IS DONE FOR THIS TEN SECOND PERIOD,
   39                         * RETURN TO THE SCHEDULER AND WAIT, WE'LL BE BACK.
   40                         *      SEE Y'ALL LATER
   41     0024      E700          BRU             E:SKD
          0025   X  0018
```

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                                * THE CHANNEL IS DOWN.  IF WE HAVE A WAVEFORM IN THE ADVANCED
                                *   STAGES, I.E. U.AST IS 7 OR 8, REPORT THE WAVE, QUALIFYING
                                *   THE REPORT WITH A CHANNEL DOWN STATEMENT.  IN ANY CASE,
                                *   ENSURE THAT U.AST=0 AND GO TO THE NEXT CHANNEL.
0026      E526  DIED  LDM,2,6       U.AST
0027  X   0002
0028      E920        SUI,2         6
0029  A   0006
002A      7620        TBRB,2,0      RSTAS          U.AST<6
002B  R   0047
002C      7D22        TRRB,2,2      DAST7          U.AST=7
002D  R   0043
002E      E536        LDM,3,6       U.LFZ          SET UP CURRENT VALUES
002F  R   0337
0030      E636        STM,3,6       W.RFZ           AS HALF RECOVERY
0031  X   0015
0032      E536        LDM,3,6       U.AMP           VALUES.
0033  X   0025
0034      E636        STM,3,6       W.RAM
0035  X   0017
0036      6D56        TRR,5,6
0037      2D51        LLS,5,1
0038      E535        LDM,3,5       U.LTM
0039  R   0345
003A      E635        STM,3,5       W.RTM
003B  X   0016
003C      605F        ABR,5,15
003D      E535        LDM,3,5       U.LTM
003E  R   0345
003F      E635        STM,3,5       W.RTM
0040  X   0016
0041      E7F0        BLM,15        U:RP1          U.AST=6,END SIGNAL THERE
0042  X   0006
0043      8206  DAST7 OBMM,0,6      U.END          SET ABNORMAL END BIT
0044  X   0019
0045      E7F0        BLM,15        U:RP2          END SIGNAL COMPLETELY
0046  X   0007
0047      6C22  RSTAS ZRR,2
0048      E626        STM,2,6       U.AST          RESET U.AST=0
0049  X   0002
004A      6D56        TRR,5,6
004B      2D51        LLS,5,1                      D.P. CHAN POINTER
004C      E625        STM,2,5       U.OTM          RESET ONSET TIME
004D  X   0020
004E      605F        ABR,5,15
004F      E625        STM,2,5       U.OTM          IN TWO PARTS
0050  X   0020
0051      E700        BRU           NEXTC
0052  R   001D
```

```
 74                     **********************************************************************
 75                     * U.AST INDICATES THE STATE OF THE WAVEFORM.
 76                     *   GO TO THE ROUTINE CORRESPONDING TO THAT STATE.......
 77     0053     E526   WFA2  LDM,2,6       U.AST
        0054   X 0002
 78     0055     E70A         BRU*,2        JMPTB-2
        0056   R 0055
 79     0057   R 005D   JMPTB DFC           UAST2
 80     0058   R 0099         DFC           UAST3
 81     0059   A 0000         DFC           0              (ILLEGAL VALUE)
 82     005A   R 01A5         DFC           UAST5
 83     005B   R 01F0         DFC           UAST6
 84     005C   R 02A2         DFC           UAST7
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 86                     ********************************************************************~
 87                     * WHEN U.AST=2, WE HAVE FOUND AN ONSET IN THE ADVANCE DIRECTION.
 88                     *   AS LONG AS PHASE VALUES DECREASE, WE KEEP TRACKING. WHEN
 89                     *   TWO SUCCESSIVE COMPRESSED POINTS SHOW A CHANGE, THE MINIMAL
 90                     *   POINT IS CONSIDERED PEAK.
 91                     * IF NO PEAK IS FOUND WITHIN T1 SECONDS, THE ONSET AND SIGNAL
 92                     *   ARE REJECTED.
 93     005D     6D56  UAST2 TRR,5,6
 94     005E     2D51        LLS,5,1
 95     005F     E7E0        BLM,14          U:GET
        0060  X  0008
 96     0061     F700        BRU             AST21           NO COMP. POINTS
        0062  R  008E
 97     0063     E526        LDM,2,6         U.CDT           IS CUR.POINT<CDATE
        0064  R  0361
 98     0065     692B        SUR,2,11
 99     0066     612F        SBR,2,15                        (DON'T UPDATE ON =)
100     0067     7620        TBRB,2,0        AST22           NO,CHECK DELAY COUNT
        0068  R  0084
101     0069     E6B6        STM,11,6        U.CDT           YES,NEW CANDIDATE FOR PEAK
        006A  R  0361
102     006B     E6C5        STM,12,5        U.CDM             AND ITS TIME
        006C  R  036F
103     006D     E6D5        STM,13,5        U.CDM+1
        006E  R  0370
104     006F     6C22        ZRR,2
105     0070     E626        STM,2,6         CFIRM           RESET DELAY COUNTER
        0071  R  0399
106     0072     E6C0  AST23 STM,12          TEMP            CURRENT POINT TIME
        0073  R  03A7
107     0074     E6D0        STM,13          TEMP+1
        0075  R  03A8
108     0076     E7E0        BLM,14          E:DIF
        0077  X  0009
109     0078  R  03A7        DFC             TEMP
110     0079     6600        NOP                              ONSET TIME SHOULD
111     007A     6600        NOP                               NEVER = 0
112     007B     E1D0        SUM,13          T1
        007C  R  03AA
113     007D     76D0        TBRB,13,0       UAST2+2         NEXT POINT IF TIME<T1
        007E  R  005F
114     007F     652F  SREA1 LBR,2,15                       SET REASN=1
115     0080     E626        STM,2,6         REASN
        0081  R  03D4
116     0082     E700        BRU             FAIL
        0083  R  02EF
117     0084     80F6  AST22 ABMM,15,6       CFIRM           INC. CONFIRMATION
        0085  R  0399
118     0086     ED20        LDI,2           4
        0087  A  0004
```

```
119     0088       E126        SUM,2,6       CFIRM
        0089   R   0399
120     008A       7D22        TRRB,2,2      AST23       IF CONFIRMATION IS MADE
        008B   R   0072
121     008C       E700        BRU           PVALC       GO CHECK PEAK VALIDITY
        008D   R   00DF
122     008E       E7E0  AST21 BLM,14         E:DIF       NO POINTS AVAILABLE
        008F   X   0009
123     0090   X   000A        DFC           U.CTM       HOW LONG SINCE ONSET?
124     0091       6600        NOP                       ONSET NEVER=0 HERE
125     0092       6600        NOP                             ?
126     0093       E1D0        SUM,13        T1
        0094   R   03AA
127     0095       76D0        TBRB,13,0     UPDIU       NOT > T1 YET.
        0096   R   0014
128     0097       E700        BRU           SREA1
        0098   R   007F
```

```
130                     ***************************************************************
131                     * WHEN U.AST=3, WE HAVE FOUND AN ONSET IN THE RETARD DIRECTION.
132                     *   PEAK IS OBTAINED THE SLOPE BETWEEN ONSET AND A CANDIDATE
133                     *   PEAK VALUE EXCEEDS THREE SUCCESSIVE COMPUTED SLOPES FROM
134                     *   ONSET TO THE THEN CURRENT POINT.
135                     * IF NO PEAK IS FOUND WITHIN T1 SECONDS, THE ONSET AND SIGNAL
136                     *   ARE REJECTED.
137     0099    6D56    UAST3 TRR,5,6
138     009A    2D51          LLS,5,1                   D.P.CHAN POINTER
139     009B    E7E0          BLM,14        U:GET
        009C  X 0008
140     009D    E700          BRU           AST21       NO COMP. POINTS
        009E  R 008E
141     009F    E6C0          STM,12        TEMP        COMPUTE SLOPE IF CFIRM=0
        00A0  R 03A7
142     00A1    E6D0          STM,13        TEMP+1      SAVE CURRENT TIME....
        00A2  R 03A8
143                     * CUR. SLOPE=(CUR. FAZ-U.OFZ)/(CUR. TIME-U.OTM)
144     00A3    E7E0          BLM,14        E:DIF
        00A4  X 0009
145     00A5  R 03A7          DFC           TEMP
146     00A6    6600          NOP                       ONSET TIME
147     00A7    6600          NOP                        NOT 0.
148     00A8    6D3B          TRR,3,11                   CURRENT PHASE
149     00A9    E136          SUM,3,6       U.OFZ        CUR. PHASE-U.OFZ
        00AA  X 001A
150     00AB    6C22          ZRR,2
151     00AC    212D          DVR,2,13
152                     * FIND THE MAXIMUM SLOPE AS |SLOPE|
153                     *   COMPARE CURRENT SLOPE FROM ONSET TO CURRENT MAX.
154     00AD    6D23          TRR,2,3
155     00AE    E126          SUM,2,6       SLOPE
        00AF  R 038B
156     00B0    7620          TBRB,2,0      AST35        NOT NEW MAX
        00B1  R 00B6
157                     * WE HAVE A NEW MAXIMUM SLOPE
158     00B2    E636          STM,3,6       SLOPE
        00B3  R 038B
159     00B4    E700          BRU           AST32
        00B5  R 00BF
160                     * WE'LL CALL IT A PEAK WHEN THE CURRENT SLOPE RELAXES
161                     *   BY 25 PERCENT FROM THE MAX.
162     00B6    E5F6    AST35 LDM,15,6      SLOPE
        00B7  R 038B
163     00B8    ED20          LDI,2         #6000        =.75
        00B9  A 6000
164     00BA    20E2          MPR,14,2
165     00BB    2EE1          LAD,14,1
166     00BC    693E          SUR,3,14
167     00BD    7630          TBRB,3,0      AST33        BRU IF CONFIRMING PEAK
```

```
        00BE  R  00D7
168                      * NOT YET CONFIRMING PEAK SAVE NEW CANDIDATE
169     00BF     E6B6    AST32 STM,11,6      U.CDT          NEW PEAK CANDIDATE
        00C0  R  0361
170     00C1     E5D0          LDM,13        TEMP
        00C2  R  03A7
171     00C3     E6D5          STM,13,5      U.CDM          ITS TIME
        00C4  R  036F
172     00C5     E5D0          LDM,13        TEMP+1
        00C6  R  03A8
173     00C7     E6D5          STM,13,5      U.CDM+1
        00C8  R  0370
174     00C9     6CDD          ZRR,13
175     00CA     E6D6          STM,13,6      CFIRM          RESET CFIRM=0
        00CB  R  0399
176     00CC     E7E0    AST34 BLM,14        E:DIF
        00CD  X  0009
177     00CE  R  03A7          DFC           TEMP
178     00CF     6600          NOP
179     00D0     6600          NOP
180     00D1     E1D0          SUM,13        T1
        00D2  R  03AA
181     00D3     76D0          TBRB,13,0     UAST3+2        NEXT POINT IF TIME<T1
        00D4  R  009B
182     00D5     E700          BRU           SREA1
        00D6  R  007F
183     00D7     80F6    AST33 ABMM,15,6     CFIRM          INC CFIRM COUNTER
        00D8  R  0399
184     00D9     E536          LDM,3,6       CFIRM
        00DA  R  0399
185     00DB     E930          SUI,3         4
        00DC  A  0004
186     00DD     7D33          TRRB,3,3      AST34          IF CFIRM NOT=3, CONTINUE
        00DE  R  00CC
```

```
188                     ***************************************************************
189                     * NOW WE HAVE BOTH AN ONSET AND A PEAK.  LET'S FIND OUT IF THE
190                     *   PEAK IS VALID.  IF IT IS, WE'LL START LOOKING FOR RECOVERY
191                     *   TO BEGIN, OTHERWISE WE'LL DROP THE WHOLE THING AND START
192                     *   LOOKING FOR ANOTHER ONSET.
193  00DF      6C22     PVALC ZRR,2
194  00E0      E626           STM,2,6      CFIRM          RESET CFIRM
     00E1  R   0399
195  00E2      E530           LDM,3        U.BGF          SET:
     00E3  X   001C
196  00E4      E636           STM,3,6      U.FAC           U.FAC=U.BGF
     00E5  X   0005
197  00E6      E536           LDM,3,6      U.CLS
     00E7  X   000B
198  00E8      E930           SUI,3        3
     00E9  A   0003
199  00EA      7D33           TRRB,3,3     PVAL1          CLASS NOT 3, BRU
     00EB  R   0103
200  00EC      ED30           LDI,3        5              CLASS=3
     00ED  A   0005
201  00EE      E636           STM,3,6      U.AST          SET U.AST=5
     00EF  X   0002
202  00F0      E536           LDM,3,6      U.ODI
     00F1  X   0018
203  00F2      E636           STM,3,6      U.DIU          U.DIU=U.ODI
     00F3  X   0004
204  00F4      E536           LDM,3,6      U.CDT          REAL PEAK VALUES
     00F5  R   0361
205  00F6      E636           STM,3,6      W.PFZ           W.PFZ=U.CDT
     00F7  X   000C
206  00F8      E535           LDM,3,5      U.CDM
     00F9  R   036F
207  00FA      E635           STM,3,5      W.PTM           W.PTM=U.CDM
     00FB  X   000D
208  00FC      605F           ABR,5,15
209  00FD      E535           LDM,3,5      U.CDM
     00FE  R   036F
210  00FF      E635           STM,3,5      W.PTM
     0100  X   000D
211  0101      E700           BRU          WFA2           MOVE ALONG
     0102  R   0053
212                     * CLASS NOT 3, WHICH IMPLIES NORMAL ADVANCE OR RETARD
213                     *   SIGNAL.  WE WILL NOW COMPUTE THE OFFSET AND ONSET
214                     *   RATE.
215                     * WHEN COMPUTING THE OFFSET, TAKE INTO ACCOUNT THE DIURNAL
216                     *   AT ONSET.  TO DO THIS, USE THE FOLLOWING:
217                     * W.OST=U.CDT-(U.CDM-U.OTM)*U.ODI-U.OFZ
218                     * W.ONR=W.OST/(U.CDM-U.OTM)
219  0103      E535     PVAL1 LDM,3,5      U.CDM
     0104  R   036F
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220  0105     E630      STM,3        TEMP
     0106  R  03A7
221  0107     E535      LDM,3,5      U.CDM+1
     0108  R  0370
222  0109     E630      STM,3        TEMP+1
     010A  R  03A8
223  010B     E7E0      BLM,14       E:DIF
     010C  X  0009
224  010D  R  03A7      DFC          TEMP
225  010E     6600      NOP
226  010F     6600      NOP
227  0110     E6D0      STM,13       TEMP2          TEMP=(PEAK TIME-ONSET TIME)
     0111  R  03A9
228  0112     E536      LDM,3,6      U.CDI
     0113  X  001B
229  0114     20C3      MPR,12,3                    O.DIU*(U.CDM-U.OTM)
230  0115     ED30      LDI,3        480            SCALE
     0116  A  01E0
231  0117     21C3      DVR,12,3
232  0118     E536      LDM,3,6      U.CDT
     0119  R  0361
233  011A     693D      SUR,3,13
234  011B     E136      SUM,3,6      U.OFZ
     011C  X  001A
235  011D     7630      TBRB,3,0     $+3
     011E  R  0120
236  011F     F702      HOP,$+2
237  0120     6F33      TTR,3,3
238  0121     E636      STM,3,6      W.OST
     0122  X  000F
239  0123     EDC0      LDI,12       60             SCALE
     0124  A  003C
240  0125     202C      MPR,2,12
241  0126     A120      DVM,2        TEMP2
     0127  R  03A9
242  0128     E636      STM,3,6      W.ONR
     0129  X  0010
243                 * NOW THAT WE HAVE THE OFFSET AND ONSET RATE, WE'LL DETERMINE
244                 *   WHETHER THEY MEET REPORTING CRITERIA:
245                 * CLASS 1 SIGNAL:
246                 *   W.OST>POFF
247                 *   W.ONR>PONHI IF TRACK RATE>4
248                 *        >PONMD IF TRACK RATE=2, 3, OR 4
249                 *        >PONLO IF TRACK RATE=0 OR 1
250                 * CLASS 2 SIGNAL (ADVANCE ONLY):
251                 *   W.OST>SOFF
252                 *   W.ONR>SONRT
253  012A     E546        LDM,4,6      U.TRK
     012B  X  001D
254  012C     614E        SBR,4,14
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255      012D     7640        TBRB,4,0      LOTRK
         012E  R  0199
256      012F     E940        SUI,4         3
         0130  A  0003
257      0131     7640        TBRB,4,0      MDTRK
         0132  R  019F
258      0133     E130        SUM,3         PCNHI          CHECK HI TRACK RATE (CLASS1)
         0134  R  03AF
259      0135     7630        TBRB,3,0      CKSEC
         0136  R  016C
260      0137     E526  CKPOF LDM,2,6       W.OST          CHECK OFFSET RATE (CLASS1)
         0138  X  000F
261      0139     E120        SUM,2         PCFF
         013A  R  03AE
262      013B     7620        TBRB,2,0      CKSEC
         013C  R  016C
263      013D     652F        LBR,2,15
264      013E     E626        STM,2,6       U.CLS          PASS, SET CLASS=1
         013F  X  000B
265                          * SIGNAL PASSES CLASS 1 CRITERIA.......
266      0140     E526  PASS  LDM,2,6       U.CDT
         0141  R  0361
267      0142     E626        STM,2,6       W.PFZ
         0143  X  000C
268      0144     E626        STM,2,6       W.VPK
         0145  X  0013
269      0146     E525        LDM,2,5       U.CDM
         0147  R  036F
270      0148     E625        STM,2,5       W.PTM
         0149  X  000D
271      014A     E625        STM,2,5       W.VTM
         014B  X  0014
272      014C     605F        ABR,5,15
273      014D     E525        LDM,2,5       U.CDM
         014E  R  036F
274      014F     E625        STM,2,5       W.PTM
         0150  X  000D
275      0151     E625        STM,2,5       W.VTM
         0152  X  0014
276      0153     E526        LDM,2,6       U.AMP
         0154  X  0025
277      0155     E626        STM,2,6       W.PAM
         0156  X  000E
278                          **************************************************
279      0157     E626        STM,2,6       W.PAM ONLY):OR 1ERIA:(U.CDM-U.OTM)ET TIME)******* +
         0158  X  000E
280      0159     E626        STM,2,6       W.PAM ONLY):OR 1ERIA:(U.CDM-U.OTM)ET TIME)******* +
         015A  X  000E
281 0    015B     0000   CURRENT DIURNAL TO ONSET VALUE.
         015C  A  0000
```

```
282      015D     E526        LDM,2,6      U.ODI
         015E  X  001B
283      015F     E626        STM,2,6      U.DIU
         0160  X  0004
284      0161     E526        LDM,2,6      U.AST
         0162  X  0002
285      0163     612F        SBR,2,15
286      0164     E626        STM,2,6      U.ODR
         0165  X  001E
287      0166     ED20        LDI,2        5
         0167  A  0005
288      0168     E626        STM,2,6      U.AST        SET U.AST=5
         0169  X  0002
289      016A     E700        BRU          WFA2         CONTINUE
         016B  R  0053
290      016C     E546  CKSEC LDM,4,6      U.AST
         016D  X  0002
291      016E     714E        SBRB,4,14    SREA2        NO CLASS 2 ON RETARD SIGNAL
    U    016F  A  0000
292      0170     E526        LDM,2,6      W.OST
         0171  X  000F
293      0172     E120        SUM,2        SOFF         CK. CLASS 2 OFFSET CRITERIA
         0173  R  03B2
294      0174     7620        TBRB,2,0     SREA3
         0175  R  018E
295      0176     E526        LDM,2,6      W.ONR
         0177  X  0010
296      0178     E120        SUM,2
    A    0179  A  0000
297      017A     E526        LDM,2,6      W.ONR        CK. CLASS 2 OFFSET CRITERIA).*******
         017B  X  0010
298      017C     E526        LDM,2,6      W.ONR
         017D  X  0010
299      017E     E120        SUM,2        SONRT        CK. CLASS 2 ONSET RATE CRITERIA
         017F  R  03B3
300      0180     7620        TBRB,2,0     SREA4
         0181  R  0194
301      0182     E120        SUM,2        SONRT        CK. CLASS 2 ONSET RATE CRITERIA*** +
         0183  R  03B3
302 D    0184     0000        PASS, SET CLASS = 2
         0185  A  0000
303      0186     E700        BRU
    A    0187  A  0000
304 D    0188     0000        PASS, SET CLASS = 2      CK. CLASS 2 OFFSET CRITERIA).*******
         0189  A  0000
305 D    018A     0000         REASN
         018B  A  0000
306      018C     E700        BRU            FAIL
         018D  R  02EF
307      018E     ED20  SREA3 LDI,2          3
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```
        018F  A  0003
 308    0190     E626         STM,2,6        REASN
        0191  R  03D4
 309    0192     E700         BRU            FAIL
        0193  R  02EF
 310    0194     652D   SREA4 LBR,2,13
 311    0195     E626         STM,2,6        REASN
        0196  R  03D4
 312    0197     E700         BRU            FAIL
        0198  R  02EF
 313    0199     E130   LOTRK SUM,3          PCNLO
        019A  R  03B1
 314    019B     7630         TBRB,3,0       CKSEC
        019C  R  016C
 315    019D     E700         BRU            CKPOF         PASS CLASS 1 ONSET  RATE
        019E  R  0137
 316    019F     E130   MDTRK SUM,3          PONMD
        01A0  R  03B0
 317    01A1     7630         TBRB,3,0       CKSEC
        01A2  R  016C
 318    01A3     E700         BRU            CKPOF         PASS CLASS 1 ONSET RATE
        01A4  R  0137
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320                     ************************************************************************
321                     * WHEN U.AST=5, WE HAVE A VALID PEAK TO OUR LITTLE SIGNAL.
322                     *   THE NEXT STEP IS TO LOOK FOR IT TO BEGIN RECOVERING.
323                     * AT PEAK WE RESET THE CURRENT DIURNAL ESTIMATE TO THE
324                     *   ONSET ESTIMATE. AT THE SAME TIME WE SET U.FAC TO THE
325                     *   BIG VALUE.  THIS REDUCES THE TIME CONSTANT IN THE
326                     *   DIGITAL FILTER FOR DIURNAL UPDATES.  NOW, WHEN THE
327                     *   CURRENT DIURANL SLIPS AROUND PAST THE ONSET VALUE
328                     *   BY ALPHA, RECOVERY HAS BEGUN.
329                     * ONLY ONE CATCH, THIS MUST OCCUR WITHIN T2 SECONDS OF
330                     *   ONSET.
331  01A5       E7F0  UAST5 BLM,15        UAST4          GET RID OF COMPRESSED DATA.
     01A6  R    02D8
332  01A7       E526        LDM,2,6       U.DIU          IS.......
     01A8  X    0004
333  01A9       E126        SUM,2,6       U.ODI           (U.DIU-U.ODI)
     01AA  X    001B
334  01AB       E120        SUM,2         ALPHA             -ALPHA>0?
     01AC  R    03B6
335  01AD       7620        TBRB,2,0      AST51          BRU IF NOT
     01AE  R    01E1
336                     * RECOVERY HAS BEGUN
337  01AF       ED20        LDI,2         6
     01B0  A    0006
338  01B1       E626        STM,2,6       U.AST          SET U.AST=6
     01B2  X    0002
339  01B3       E526        LDM,2,6       U.ODR
     01B4  X    001E
340  01B5       712F        SBRB,2,15     AST52
     01B6  R    01BC
341                     * IF DIRECTION=1 (ADVANCE SIGNAL),
342                     *   SET MINIMUM RECOVERY (RCMIN)= 1/2 OFFSET
343                     * IF DIRECTION=2 (RETARD SIGNAL)
344                     *   SET RCMIN=1/2 (CYCLE-OFFSET)
345                     *   WHERE CYCLE = 1/FREQUENCY
346                     * OTHERWISE,
347                     *   SET RCMIN = 7 MICROSECONDS
348  01B7       E536        LDM,3,6       W.OST
     01B8  X    000F
349  01B9       2B31        RAS,3,1
350  01BA       E700        BRU           AST53+2
     01BB  R    01DD
351  01BC       712F  AST52 SBRB,2,15      AST53
     01BD  R    01DB
352                     * CONVERT FREQUENCY TO BINARY
353  01BE       6D76        TRR,7,6
354  01BF       2D71        LLS,7,1
355  01C0       E557        LDM,5,7       U.FRQ
     01C1  X    0029
356  01C2       E950        SUI,5         #3030
```

```
                01C3  A  3030
357             01C4     08D5          MBR,13,5                        R13=FREQ*10
358             01C5     ED40          LDI,4           #A
                01C6  A  000A
359             01C7     20C4          MPR,12,4                        TIMES 10
360             01C8     0C55          MLR,5,5
361             01C9     68D5          ADR,13,5                        +FREQ*1
362             01CA     20C4          MPR,12,4                        TIMES 10
363             01CB     607F          ABR,7,15
364             01CC     E557          LDM,5,7         U.FRQ
                01CD  X  0029
365             01CE     E950          SUI,5           #2E30
                01CF  A  2E30
366             01D0     68D5          ADR,13,5                        +FREQ*.1
367                                 * CYCLE = 160000 / FREQ     (MICROSEC * 16)
368                                 *  WHERE 160000 = #27100
369             01D1     652E          LBR,2,14
370             01D2     ED30          LDI,3           #7100
                01D3  A  7100
371             01D4     212D          DVR,2,13
372             01D5     E636          STM,3,6         CYCLE           SAVE CYCLE FOR FULL RECOVERY
                01D6  R  03C6
373                                 * NOW COMPUTE RECOVERY MINIMUM
374             01D7     E136          SUM,3,6         W.OST           (CYCLE - OFFSET)
                01D8  X  000F
375             01D9     2B31          RAS,3,1                              /2
376             01DA     F703          HOP,AST53+2
377             01DB     ED30  AST53 LDI,3             #70
                01DC  A  0070
378             01DD     E636          STM,3,6         RCMIN
                01DE  R  03B8
379             01DF     E700          BRU             UPDIU
                01E0  R  0014
380             01E1     E7E0  AST51 BLM,14            E:DIF
                01E2  X  0009
381             01E3  X  000A          DFC             U.CTM           HOW LONG SINCE ONSET
382             01E4     6600          NOP
383             01E5     6600          NOP
384             01E6     E1D0          SUM,13          T2
                01E7  R  03AB
385             01E8     76D0          TBR8,13,0       UPDIU           TIME O.K.
                01E9  R  0014
386             01EA     ED20          LDI,2           5               TOO LONG, DROP SIGNAL
                01EB  A  0005
387             01EC     E626          STM,2,6         REASN           SET REASON=5
                01ED  R  03D4
388             01EE     E700          BRU             FAIL
                01EF  R  02EF
```

```
                        ********************************************************************
                        * WHEN U.AST=6, RECOVERY HAS BGUN.  THE MOST IMPORTANT
                        *   STEP FOLLOWS: DETERMINING A VALID RECOVERY.
                        * IF RECOVERY IS CONSIDERED COMPLETE (U.DIU RETURNS TO
                        *   WITHIN BETA OF U.ODI) IN LESS THAN T3, THE SIGNAL
                        *   IS REJECTED.  IF WE LAST T3 SECONDS INTO THE SIGNAL
                        *   WITHOUT COMPLETION, WE CHECK THE PROGRESS OF THE
                        *   RECOVERY.  IF WE RECOVER BY PCMIN FROM PEAK AND THE
                        *   RECOVERY RATE IS LESS THAN THE ONSET RATE, RECOVERY
                        *   IS VALID AND THE PEAK IS REPORTABLE.
01F0      6D56  UAST6 TBR,5,6
01F1      2D51        LLS,5,1
01F2      E526        LDM,2,6       U.DIU         IS....
01F3  X   0004
01F4      E126        SUM,2,6       U.ODI         (U.DIU-U.ODI)
01F5  X   001B
01F6      E120        SUM,2         BETA             -BETA>0?
01F7  R   03B7
01F8      7620        TBRR,2,0      $+4           BRU IF NOT
01F9  R   01FC
01FA      E700        BRU           AST61
01FB  R   0243
                        * IF AN ADVANCE SIGNAL WITH THE ONSET RATE PASSING
                        *   PRIMARY CRITERIA FAILS HERE, IT MAY WELL BE
                        *   A CCCC (CLASS=3) TYPE SIGNAL.
01FC      E526        LDM,2,6       U.ODR
01FD  X   001E
01FE      712F        SBRB,2,15     SREA6         NOT ADVANCE
01FF  R   0230
0200      E526        LDM,2,6       W.CNR
0201  X   0010
0202      E546        LDM,4,6       U.TRK
0203  X   001D
0204      614F        SBR,4,14
0205      7640        TBRR,4,0      TLC6
0206  R   0210
0207      E940        SUI,4         3
0208  A   0003
0209      7640        TBRR,4,0      TMD6
020A  R   0215
020B      E120        SUM,2         PCNHI
020C  R   03AF
020D      7620        TBRR,2,0      SREA6
020E  R   0230
020F      E70A        HDR,MAYBE
0210      E120  TLC6  SUM,2         PCNLO
0211  R   03B1
0212      7620        TBRR,2,0      SREA6
0213  R   0230
0214      E705        HDR,MAYBE
```

```
424     0215      E120  TMD6  SUM,2          PCNMD
        0216  R   03B0
425     0217      7620        TBFB,2,0       SREA6
        0218  R   023D
426                       * MAYBE WE HAVE A CLASS 3 SIGNAL HERE.....
427     0219      652E  MAYBE LBR,2,14
428     021A      E626        STM,2,6        U.AST          RESET U.AST=2
        021B  X   0002
429                       * RESET |PEAK| VALUES TO |LOW PEAK| AND ESTABLISH
430                       *   A NEW PEAK CANDIDATE;
431     021C      E526        LDM,2,6        U.LFZ
        021D  R   0337
432     021E      E626        STM,2,6        U.CDT
        021F  R   0361
433     0220      E526        LDM,2,6        W.PFZ
        0221  X   000C
434     0222      E626        STM,2,6        W.LPK
        0223  X   0011
435     0224      E526        LDM,2,6        W.PAM
        0225  X   000E
436     0226      E626        STM,2,6        W.LAM
        0227  X   0027
437     0228      ED10        LDI,1          -2
        0229  A   FFFE
438     022A      E525  LPKST LDM,2,5        U.LTM
        022B  R   0345
439     022C      E625        STM,2,5        U.CTM
        022D  X   000A
440     022E      E525        LDM,2,5        W.PTM
        022F  X   000D
441     0230      E625        STM,2,5        W.LTM
        0231  X   0012
442     0232      605E        ABR,5,15
443     0233      701E        ABRB,1,15      LPKST
        0234  R   022A
444     0235      ED20        LDI,2          3
        0236  A   0003
445     0237      E626        STM,2,6        U.CLS
        0238  X   000B
446     0239      E626        STM,2,6        U.CDR
        023A  X   001E
447     023B      E700        BRU            WFA2
        023C  R   0053
448     023D      ED20  SREA6 LDI,2          6              YES...
        023E  A   0006
449     023F      E626        STM,2,6        REASN          SET REASON=6
        0240  R   03D4
450     0241      E700        BRU            FAIL
        0242  R   02EF
451     0243      E7E0  AST61 BLN,14         E:DIF          CHECK TIME SINCE ONSET
```

```
        0244  X  0009
452     0245  X  000A        DFC             U.CTM
453     0246     6600        NOP
454     0247     6600        NOP
455     0248     E1D0        SUM,13          T3
        0249  R  03AC
456     024A     76D0        TBRB,13,0       AST62           NOT LONG ENOUGH
        024B  R  029E
457                       * WE'VE SURVIVED T3 SECONDS AND THINGS LOOK PROMISING.
458     024C     E7E0   AST63 BLM,14          U:GET
        024D  X  0008
459     024E     E700        BRU             UPDIU           NO POINTS
        024F  R  0014
460     0250     6D2B        TRR,2,11                         IS...
461     0251     E126        SUM,2,6         W.PFZ             (CUR.PHASE-PEAK PHASE)
        0252  X  000C
462     0253     E126        SUM,2,6         RCMIN                  > RCMIN?
        0254  R  03B8
463     0255     7620        TBRB,2,0        AST63           NO, TRY HARDER
        0256  R  024C
464                       * WE HAVE SUFFICIENT RECOVERY FOR A VALID SIGNAL.
465                       *   ALL THAT REMAINS IS TO CHECK THE RECOVERY RATE
466                       *   AGAINST THE ONSET RATE.
467     0257     ED20        LDI,2           7
        0258  A  0007
468     0259     E626        STM,2,6         U.AST           SET U.AST=7
        025A  X  0002
469     025B     ED20        LDI,2           8
        025C  A  0008
470     025D     E626        STM,2,6         U.TRL
        025E  X  002B
471     025F     6C22        ZRR,2
472     0260     E626        STM,2,6         U.TRF
        0261  X  002A
473     0262     E6B6        STM,11,6        W.RFZ           SAVE VALID RECOVERY PARAMETERS:
        0263  X  0015
474     0264     E6C5        STM,12,5        W.RTM            PHASE
        0265  X  0016
475     0266     605F        ABR,5,15
476     0267     E6D5        STM,13,5        W.RTM            TIME
        0268  X  0016
477     0269     615F        SBR,5,15
478     026A     E526        LDM,2,6         U.AMP            AMPLITUDE
        026B  X  0025
479     026C     E626        STM,2,6         W.RAM
        026D  X  0017
480     026E     E526        LDM,2,6         U.CLS
        026F  X  000B
481     0270     E920        SUI,2           3
        0271  A  0003
```

```
482  0272      7D22        TRRB,2,2    $+4
     0273  R   0276
483  0274      E700        BRU         AST64
     0275  R   029C
484  0276      E1B6        SUM,11,6    W.PFZ       R11=CUR. PEAK PHASE
     0277  X   000C
485  0278      ED20        LDI,2       W.PTM
     0279  X   000D
486  027A      6825        ADR,2,5
487  027B      E620        STM,2       $+4
     027C  R   027F
488  027D      E7E0        BLM,14      E:COT
     027E  X   001F
489  027F  A   0000        DFC         0
490  0280      E6C0        STM,12      U.DTM
     0281  X   0026
491  0282      657F        LBR,7,15
492  0283      E6D7        STM,13,7    U.DTM
     0284  X   0026
493  0285      6D76        TRR,7,6                 SAVE R6
494  0286      ED60        LDI,6       14
     0287  A   000E
495  0288      E7E0        BLM,14      E:DIF
     0289  X   0009
496  028A  X   000A        DFC         U.CTM       R13=TIME FROM PEAK
497  028B      6600        NOP
498  028C      6600        NOP
499  028D      6D67        TRR,6,7                 RESTORE R7
500  028E      EDE0        LDI,14      480         SCALE
     028F  A   01E0
501  0290      20AE        MPR,10,14
502  0291      21AD        DVR,10,13               R10=RECOVERY RATE
503  0292      E1B6        SUM,11,6    W.CNR       IS RECRT<W.ONR?
     0293  X   0010
504  0294      76B0        TBRB,11,0   AST64
     0295  R   029C
505  0296      ED20        LDI,2       7            NO, FAILED AGAIN
     0297  A   0007
506  0298      E626        STM,2,6     REASN       SET REASON=7
     0299  R   03D4
507  029A      E700        BRU         FAIL
     029B  R   02EF
508  029C      E7F0  AST64 BLM,15      U:RP1       GENERATE MSG. ON SIGNAL
     029D  X   0006
509  029E      E7F0  AST62 BLM,15      UAST4
     029F  R   02D8
510  02A0      E700        BRU         UPDIU
     02A1  R   0014
```

```
512                     ****************************************************************
513                     * WHEN U.AST=7 WE HAVE A VALID SIGNAL AND ARE WAITING OUT
514                     *   THE END OF THE SIGNAL.
515                     * FOR ALL SIGNALS, THE CURRENT DIURNAL (U.DIU) MUST RETURN
516                     *   TO WITHIN BETA OF THE ONSET DIURNAL (U.ODI).  ADVANCE
517                     *   SIGNALS (U.ODR=1) MUST HAVE THE PHASE RETURN TO WITHIN
518                     *   TREC OF THE ONSET PHASE.
519                     * IF THE SIGNAL DOESN'T END OF IT'S OWN VOLITION WITHIN
520                     *   T4 SECONDS, THE PROCESSING IS AUTOMATICALLY TERMINATED.
521  02A2     E526  UAST7 LDM,2,6       U.DIU           IS.....
     02A3   X 0004
522  02A4     E126        SUM,2,6      U.ODI           (U.DIU-U.ODI)
     02A5   X 001B
523  02A6     E120        SUM,2        BETA             -BETA>0?
     02A7   R 03B7
524  02A8     7620        TBRB,2,0     AST71           NO, GOOD END MAYBE
     02A9   R 02BB
525  02AA     E7F0        BLM,15       SCMPD           YES , KEEP LOOKING
     02AB   R 032F
526  02AC     E7E0  AST72 BLM,14       E:DIF           HAVE WE WAITED
     02AD   X 0009
527  02AE   X 000A        DFC          U.CTM            LONG ENOUGH?
528  02AF     6600        NOP
529  02B0     6600        NOP
530  02B1     E1D0        SUM,13       T4
     02B2   R 03AD
531  02B3     76D0        TBRB,13,0    UPDIU           NO, STILL WAITING
     02B4   R 0014
532  02B5     8216        OBMM,1,6     U.END           FLAG TIME-OUT ENDING
     02B6   X 0019
533  02B7     E7F0        BLM,15       U:RP2           END OF MESSAGE SIGNAL
     02B8   X 0007
534  02B9     E700        BRU          FAIL
     02BA   R 02EF
535  02BB     E526  AST71 LDM,2,6      U.ODR
     02BC   X 001E
536  02BD     712F        SBRB,2,15    $+3
     02BE   R 02C0
537  02BF     F703        HOP,AST74
538  02C0     712F        SBRB,2,15    AST73
     02C1   R 02D1
539  02C2     E5A6  AST74 LDM,10,6     U.OFZ
     02C3   X 001A
540  02C4     86F6        TBMB,15,6    U.ODR,$+5
     02C5   X 001E
     02C6   R 02C9
541  02C7     E0A6        ADM,10,6     CYCLE
     02C8   R 03C6
542  02C9     E1A6        SUM,10,6     U.LFZ           IS....
     02CA   R 0337
```

```
543     02CB     E1A0       SUM,10        TREC          (U.OFZ-CUR.PHASE)
        02CC  R  03B5
544     02CD     76A0       TBRB,10,0     AST73          -TREC<0? BRU IF YES
        02CE  R  02D1
545     02CF     E700       BRU           AST72         NO, CHECK NEXT POINT
        02D0  R  02AC
546     02D1     6C22  AST73 ZRR,2
547     02D2     E620       STM,2         U.END
        02D3  X  0019
548     02D4     E7F0       BLM,15        U:RP2         END MESSAGE GENERATOR
        02D5  X  0007
```

```
550     02D6     E700         BRU          FAIL
        02D7  R  02EF
551                     ***************************************************************
552                     * UAST4 IS A SUBROUTINE TO LOOK FOR A POSSIBLE
553                     *   |VALLEY| IN A CLASS 3 WAVE.
554                     * THE MAXIMUM VALUE (LCW POINT IN THE VAVE) IS
555                     *   SAVED.  IF WE LATER DECIDE WE HAVE A CLASS 3
556                     *   SIGNAL, WE'RE SET.
557                     * CALLING SEQUENCE:
558                     *     BLM,15        UAST4
559                     *     (CHAN IN R6)
560     02D8     6D56   UAST4 TRR,5,6
561     02D9     2D51         LLS,5,1
562     02DA     E7E0   AST41 BLM,14       U:GET
        02DB  X  0008
563     02DC     FF0F         BRX,15
564     02DD     6600         NOP
565     02DE     E526         LDM,2,6      W.VPK
        02DF  X  0013
566     02E0     692B         SUR,2,11
567     02E1     7620         TBRB,2,0     $+4
        02E2  R  02E5
568     02E3     E700         BRU          UAST41
        02E4  R  02D8
569     02E5     E6B6         STM,11,6     W.VPK
        02E6  X  0013
570     02E7     E6C5         STM,12,5     W.VTM
        02E8  X  0014
571     02E9     605F         ABR,5,15
572     02EA     E6D5         STM,13,5     W.VTM
        02EB  X  0014
573     02EC     615F         SBR,5,15
574     02ED     E700         BRU          UAST41
        02EE  R  02D8
```

```
576                     ************************************************************
577                     * FAIL IS CALLED IF THE CURRENT SIGNAL FAILS TO MEET ALL CRITERIA.
578                     *   THE REASON FOR THE FAILURE IS KEPT IN REASN.
579                     * FAIL ALSO TERMINATES NORMAL PROCESSING ON A REPORTABLE SIGNAL.
580     02EF    6C22    FAIL  ZRR,2                         RESET:
581     02F0    E626          STM,2,6       U.END           U.END=0
        02F1  X 0019
582     02F2    E626          STM,2,6       CFIRM           CFIRM=0
        02F3  R 0399
583     02F4    E626          STM,2,6       U.CLS           U.CLS=0
        02F5  X 000B
584     02F6    E626          STM,2,6       U.TRF           U.TRF=0
        02F7  X 002A
585     02F8    E626          STM,2,6       SLOPE           SLOPE=0
        02F9  R 038B
586     02FA    ED30          LDI,3         5
        02FB  A 0005
587     02FC    E636          STM,3,6       U.TRL
        02FD  X 002B
588     02FE    6D56          TRR,5,6
589     02FF    2D51          LLS,5,1
590     0300    E625          STM,2,5       U.OTM           BIN. ONSET TIME
        0301  X 0020
591     0302    605F          ABR,5,15
592     0303    E625          STM,2,5       U.OTM
        0304  X 0020
593     0305    602F          ABR,2,15
594     0306    E626          STM,2,6       U.AST           U.AST=1
        0307  X 0002
595     0308    E520          LDM,2         U.LTF
        0309  X 0022
596     030A    E626          STM,2,6       U.FAC           U.FAC=U.LTF
        030B  X 0005
597     030C    760A          TBRB,0,10     WRITE
        030D  R 0315
598     030E    E7F0  FAIL1   BLM,15        SCMPD           DUMP COMPRESSED POINTS
        030F  R 032F
599     0310    6C22          ZRR,2
600     0311    F626          STM,2,6       REASN           RESET REASN FLAG
        0312  R 03D4
601     0313    E700          BRU           UPDIU           AND GO ON.
        0314  R 0014
```

```
603                     ****************************************************************
604                     * WRITE.. IF BIT 10 OF THE SWITCH REGISTER IS SET,
605                     *   THE REASON FOR ALL SIGNAL REJECTIONS ARE DISPLAYED
606                     *   ON THE ASR 35.
607     0315    E526    WRITE LDM,2,6       REASN
        0316 R  03D4
608     0317    7D22          TRRB,2,2      $+4             NORMAL END
        0318 R  0318
609     0319    E700          BRU           FAIL1
        031A R  030E
610     0318    E820          ADI,2         #5230            |RN|
        031C A  5230
611     031D    E620          STM,2         FLMSG+7
        031E R  03E9
612     031F    0956          MBL,5,6
613     0320    E850          ADI,5         #4120            |C |
        0321 A  4120
614     0322    E650          STM,5         FLMSG+6
        0323 R  03E8
615     0324    E7E0          BLM,14        E:FRT           GET CURRENT TIME
        0325 X  0024
616     0326 R  03E2          DFC           FLMSG
617     0327    6CEE          ZRR,14
618     0328    E6E0          STM,14        E.IOF
        0329 X  0021
619     032A    E7E0          BLM,14        E:035           SEND TO ASR 35.
        032B X  0023
620     032C R  03E2          DFC           FLMSG
621     032D    E700          BRU           FAIL1           RETURN
        032E R  030E
```

```
623                     ************************************************************
624                     * SCMPD IS A ROUTINE WHICH PASSES OVER COMPRESSED DATA
625                     *   POINTS DURING THOSE PARTS OF WAVEFORM ANALYSIS THAT
626                     *   DON'T USE THEM.  THE LAST ONE AND ITS TIME ARE HELD
627                     *   IN U.LFZ AND U.LTM
628     032F    6D56    SCMPD TRR,5,6
629     0330    2D51          LLS,5,1                     D.P. CHANNEL POINTER
630     0331    E7E0          BLM,14        U:GET
        0332  X 0008
631     0333    FF0F          BRX,15                      RETURN WHEN NONE LEFT
632     0334    6600          NOP
633     0335    E700          BRU           $-4           LOOP THRU ALL POINTS
        0336  R 0331
```

```
                        ********************************************************************
                        * SINCE WE DON'T KEEP EVERY POINT, WE'LL SAVE THE LAST
                        *   VALUE AND ITS TIME HERE.
0337  A  0000  U.LFZ RES           14,0
0345  A  0000  U.LTM RES           28,0
                        ********************************************************************
                        * WHILE SEARCHING FOR THE PEAK, A LIKELY CANDIDATE MUST BE KEPT
                        *   WITH ITS TIME.  ALSO, FOR RETARD SIGNALS, THE SLOPE TO THE
                        *   POSSIBLE PEAK MUST BE RETAINED
0361  A  0000  U.CDT RES           14,0            PEAK CANDIDATE
036F  A  0000  U.CDM RES           28,0            ITS TIME
038B  A  0000  SLOPE RES           14,0            SLOPE
0399  A  0000  CFIRM RES           14,0            PEAK CONFIRMATION COUNTER
                        ********************************************************************
03A7  A  0000  TEMP  RES           2,0             WORKING STORAGE
03A9  A  0000  TEMP2 RES           1,0
                        ********************************************************************
                        * WAVEFORM TIMING PARAMETERS
                        *   T1 MAX ALLOWED TIME FROM ONSET TO PEAK
                        *   T2 MAX ALLOWED TIME TO BEGIN RECOVERY
                        *   T3 MIN ALLOWED TIME FROM ONSET TO FULL RECOVERY
                        *   T4 MAX DURATION OF SIGNAL, ONSET TO FULL RECOVERY
03AA  A  0258  T1    DFC           600             (10 MINUTES)
03AB  A  04B0  T2    DFC           1200            (20 MINUTES)
03AC  A  0258  T3    DFC           600             (10 MINUTES)
03AD  A  0E10  T4    DFC           3600            (60 MINUTES)
                        ********************************************************************
                        * WAVEFORM EVALUATION CRITERIA
                        *   POFF  PRIMARY OFFSET CRITERIA
                        *   PONHI PRIMARY ONSET RATE, HI TRACK RATES
                        *   PONMD PRIMARY ONSET RATE, MED TRACK RATES
                        *   PONLO PRIMARY ONSET RATE, LO TRACK RATES
                        *   SOFF  SECONDARY OFFSET CRITERIA
                        *   SONRT SECONDARY ONSET RATE CRITERIA, ALL TRACK RATES
                        *   LOPEK PERMISSIBLE OFFSET FOR FIRST OF MULTIPLE PEAKS
                        *             ( ADVANCE DIRECTION ONLY )
                        *   RCMIN MIN RECOVERY FROM PEAK FOR VALID RECOVERY
                        *   TREC  POINT TO WHICH PHASE MUST APPROACH ONSET TO END RECOVERY
                        *   ALPHA DIFFERENCE TWIXT U.DIU AND U.ODI TO BEGIN RECOVERY
                        *   BETA  DIFFERENCE TWIXT U.DIU AND U.ODI TO END RECOVERY
                        *   CYCLE IS THE MICROSECOND LENGTH OF ONE CYCLE (RET SIGS ONLY)
03AE  A  00A0  POFF  DFC           160             10 MICROSEC
03AF  A  0140  PONHI DFC           #140            20 MICROSEC/MIN
03B0  A  00A0  PONMD DFC           #0A0            10 MICROSEC/MIN
03B1  A  0060  PONLO DFC           #060             6 MICROSEC/MIN
03B2  A  0020  SOFF  DFC           32               2 MICROSEC
03B3  A  0030  SONRT DFC           #030             3 MICROSEC/MIN
03B4  A  0050  LOPEK DFC           80               5 MICROSEC
03B5  A  0030  TREC  DFC           48               3 MICROSEC
03B6  A  0026  ALPHA DFC           38              .3 MICROSEC/MIN
```

```
 685     03B7  A  001A  BETA  DFC          26              .2 MICROSEC/MIN
 686     03B8  A  0030  RCMIN RES          14,48
 687           R  03C6  U.CCL EQU          $
 688     03C6  A  0000  CYCLE RES          14,0
 689                    ************************************************************************
 690                    * FAILURE MESSAGE:
 691                    * FORMAT: |123 123456  C RN|
 692                    *  WHERE:
 693                    *    C IS THE CHANNEL (A,B,C,,,,,,N)
 694                    *    R INDICATES SIGNAL REJECTION
 695                    *    N IS A CODED VALUE (1,2,.....7)
 696                    *      1 FOR EXCESSIVE TIME TO PEAK
 697                    *      2 RETARD SIGNAL FAILS OFFSET CRITERIA
 698                    *      3 ADV SIGNAL FAILS SECONDARY OFFSET CRITERIA
 699                    *      4 ADV SIGNAL FAILS SECONDARY ONSET RATE CRITERIA
 700                    *      5 EXCESSIVE TIME TO BEGIN RECOVERY
 701                    *      6 SLOPE RECOVERY TOO SOON AFTER ONSET
 702                    *      7 RECOVERY RATE GREATER THAN ONSET RATE
 703     03D4  A  0000  REASN RES          14,0
 704     03E2  A  3132  FLMSG DFC          |123 123456  C RN|,#0D0A,#0000
         03E3  A  3320
         03E4  A  3132
         03E5  A  3334
         03E6  A  3536
         03E7  A  2020
         03E8  A  4320
         03E9  A  524E
         03EA  A  0D0A
         03EB  A  0000
 705     03EC                END

TOTAL ASSEMBLY ERRORS =   7    SIZE =  1004
 *****WARNING*** **0**  0000  GM          U$DAT
```

```
  0    0000      0000   GM            U$DAT
       0001   A  0000
                               INT            U.WRK,U.TRK,U.GAN,U.BLL,U.IHB
                               INT            U.CST,U.DIU,U.LTF,U.BGF,U.FAC
                               INT            U.CMP,U.CPC,U.CTM,U.OTM,U.DTM
                               INT            U.CPP,U.SLP,U.RTY,U.AST,U.CCN
                               INT            U.LST,U.AMP,U.OTB,U.OFZ,U.ODR
                               INT            U.ODI,U.OAM,U.END,U.CLS,W.PFZ
                               INT            W.PTM,W.PAM,W.OST,W.ONR,W.LPK
                               INT            W.LTM,W.VPK,W.VTM,W.RFZ,W.RTM
                               INT            W.RAM,U.CYC,U.LSP,U.OSG,W.LAM
                               INT            W.VAM
                        *************************************************************
                        ***   CAT NO.  400100-001  ***********************************
                        *************************************************************
                        * U$DAT IS THE COMMCN DATA STORAGE AREA FOR THE
                        *   U-DATA ANALYSIS PROGRAMS.
```

```
18                      ************************************************************
19                      * U.TRK IS THE CHANNEL TRACKING RATE
20                      *       (BETWEEN 0 AND 9)
21                      * U.GAN IS THE CHANNEL GAIN SETTING
22                      *       (BETWEEN 0 AND 24)
23                      * U.BLL IS THE CHANNEL BLANKING LEVEL
24                      *       (BETWEEN 0 AND 63)
25      0002  A  0005   U.TRK RES             14,5
26      0010  A  000C   U.GAN RES             14,12
27      001E  A  0028   U.BLL RES             14,40
```

```
 29                     ***************************************************************
 30                     * U.DIU IS THE PROGRAM'S ESTIMATE OF THE SLOPE IN
 31                     *   THE LONG-TERM TREND OF THE DATA.  ACTUALLY,
 32                     *   IT IS THE RESULT OF A DIGITAL FILTER APPLIED
 33                     *   TO THE LEAST SQUARES SLOPES.....
 34                     *  WHERE:
 35                     *      U.FAC=U.LTF NORMALLY
 36                     *           =U.BGF WHILE LOOKING FOR RECOVERY
 37      002C   A 0000  U.DIU RES            14,0
 38      003A   A 0666  U.LTF DFC            #0666           =.05
 39      003B   A 0CCC  U.BGF DFC            #0CCC           =.10
 40      003C   A 0666  U.FAC RES            14,#0666
 41                     ***************************************************************
 42                     * U.LST IS A TABLE OF 10 SECOND AVERAGE POINTS
 43                     *   USED FOR THE LEAST SQUARES SLOPE ESTIMATES.
 44                     * U.LSP IS A ROW POINTER FOR U.LST
 45      004A   A 0000  U.LST RES            140,0
 46      00D6   A 0000  U.LSP DFC            0
 47                     ***************************************************************
 48                     * U.SLP IS THE LEAST SQUARES SLOPE ESTIMATE.
 49      00D7   A 0000  U.SLP RES            14,0
```

```
                                ***************************************************************
                                * U.WRK IS THE WORK AREA FOR THE VARIOUS U ANALYSIS
                                *   PROGRAMS.  AFTER 10 SECONDS OF DATA IS COLLECTED
                                *   IN E.UBF BY E$SEC (E$CLK) AND E$UIN, THAT BUFFER
                                *   IS FLUSHED INTO ROWS 2-11 OF U.WRK AND THE
                                *   ANALYSIS PROGRAMS ARE SCHEDULED.  ROW 1 OF U.WRK
                                *   HOLDS THE LAST SECOND'S DATA FROM THE PREVIOUS
                                *   10 SECOND BLOCK.
                                * FORMAT:  (A:AMP;A:PHASE;B:BLANK RATE)
                                *CHAN    A       B       C    ......   N   (TIME)
                                *T T-1 A P B  A P B  A P B ...... A P B  X Y
                                *I T0  A P B  A P B  A P B ...... A P B  X Y
                                *M T1  A P B  A P B  A P B ...... A P B  X Y
                                *E T2  .....
                                *.      .....
                                *.       .....
                                *  T9  A P B  A P B  A P B ...... A P B  X Y
                                * U.CTM IS A POINTER TO THE (CURRENT TIME)
00E5  A  0000  U.WRK RES        484,0
      R  02C7  U.CTM EQU        $-2
                                ***************************************************************
                                * U.CMP IS THE COMPRESSED DATA BUFFER...
                                *   EACH CHANNEL GETS 10 ENTRIES OF 3 WORDS
                                *      (ONE OF PHASE, TWO OF TIME)
                                * U.CPP ID A POINTER TO THE START OF EACH
                                *   CHANNEL'S AREA.
                                * U.CPC IS THE COMPRESSED DATA COUNTER, TELLING THE
                                *   NUMBER OF COMPRESSED POINTS FOUND FOR EACH CHAN
                                *   DURING THE CURRENT PERIOD.
02C9  A  0000  U.CMP RES        420,0
046D  R  02C9  U.CPP DFC        U.CMP          CHAN 0
046E  R  02E7        DFC        U.CMP+30       CHAN 1
046F  R  0305        DFC        U.CMP+60       CHAN 2
0470  R  0323        DFC        U.CMP+90       CHAN 3
0471  R  0341        DFC        U.CMP+120      CHAN 4
0472  R  035F        DFC        U.CMP+150      CHAN 5
0473  R  037D        DFC        U.CMP+180      CHAN 6
0474  R  039B        DFC        U.CMP+210      CHAN 7
0475  R  03B9        DFC        U.CMP+240      CHAN 8
0476  R  03D7        DFC        U.CMP+270      CHAN 9
0477  R  03F5        DFC        U.CMP+300      CHAN 10
0478  R  0413        DFC        U.CMP+330      CHAN 11
0479  R  0431        DFC        U.CMP+360      CHAN 12
047A  R  044F        DFC        U.CMP+390      CHAN 13
047B  A  0000  U.CPC RES        14,0
                                ***************************************************************
                                * U.CYC IS SET TO EITHER 150 OR -50 MICROSECONDS
                                *   TO SHOW THE DIRECTION OF A 50 MICROSECOND
                                *   CYCLE SHIFT SENT BY THE E$UIN DURING THE PREVIOUS
                                *   TEN SECOND DATA BLOCK.  BIT 0 OF THE PHASE INPUT
```

```
101                         *   ON THE APPROPRIATE CHANNEL IS SET FOR THE LAST
102                         *   VALUE RECEIVED BEFORE THE SHIFT WAS SENT.
103                         * U.CCN IS THE ACCUMULATION OF CYCLE SHIFTS (U.CYC)
104                         *   ON EACH CHANNEL.  THIS VALUE IS ADDED TO THE PHASE
105                         *   TO GIVE A TRUE REPRESENTATION OF THE PHASE.
106     0489  A  0000  U.CYC RES            14,0
107     0497  A  0000  U.CCN RES            14,0
```

```
                        ********************************************************************
                        * U.IHB; IF AN INE OR MAINTENANCE CONDITION EXISTS,
                        *   U.IHB IS SET TO INHIBIT PROCESSING ON THAT CHAN.
                        *   BIT 0=0 PERMITS NORMAL PROCESSING
                        *         =1 INHIBITS PROCESSING ON THE CHANNEL
04A5  A  0000  U.IHB RES            14,0
                        ********************************************************************
                        * U.RTY IS THE CHANNEL RECOVERY TALLY.....
                        *   WHENEVER U$RTA SENSES BAD DATA ON A CHANNEL,
                        *   THAT CHAN'S RECOVERY TALLY IS SET TO -18.
                        *   WHEN THE DATA IS AGAIN CONSIDERED |GOOD|, THE
                        *   TALLY GETS INCREMENTED ONCE EACH TEN SECONDS.
                        *   IF U.RTY REACHES ZERO, THE CHANNEL IS PUT UP.
04B3  A  FFEE  U.RTY RES            14,-18
                        ********************************************************************
                        * U.CST IS THE CHANNEL'S PROCESSING STATUS:
                        *    =1 FOR UP
                        *    =2 FOR COASTING, NO REPORT
                        *    =3 FOR COASTING, REPORTED (LOGGED ON TTY)
                        *    =4 FOR DOWN
04C1  A  0004  U.CST RES            14,4
                        ********************************************************************
                        * U.AST IS THE CHANNEL'S ALARM STATUS:
                        *    =1 WHEN LOOKING FOR ONSET
                        *    =2 WHEN LOOKING FOR PEAK, ADV SIGNAL
                        *    =3 WHEN LOOKING FOR PEAK, RET SIGNAL
                        *    =4 WHEN LOOKING FOR BACKSWING PEAK, MULTIPLE PEAK SIGNAL
                        *    =5 WHEN LOOKING FOR RECOVERY TO BEGIN
                        *    =6 WHEN LOOKING FOR VALID RECOVERY
                        *    =7 WHEN LOOKING FOR THE SIGNAL'S END.
04CF  A  0000  U.AST RES            14,0
                        ********************************************************************
                        * U.CLS IS THE WAVEFORM CLASS:
                        *    =1 FOR MEETING PRIMARY CRITERIA
                        *    =2 FOR MEETING SECONDARY CRITERIA
                        *    =3 FOR MULTIPLE PEAK SIGNAL
04DD  A  0000  U.CLS RES            14,0
                        ********************************************************************
                        * U.END INDICATES THE TYPE OF SIGNAL ENDING:
                        *    BIT 0=0 FOR NORMAL END TO WAVEFORM
                        *          =1 FOR END DUE TO CHAN GOING DOWN
                        *    BIT 1=0 NORMAL
                        *          =1 TIME LIMITED TERMINATION
                        *    BIT 2=0 NORMAL
                        *          =1 NEW ONSET TERMINATES SIGNAL
04EB  A  0000  U.END RES            14,0
```

```
                        ************************************************************************
                        * U.OTM IS THE ONSET TIME IN SECONDS (BINARY).
                        *   SUBROUTINE E$DIF CHECKS THE TIME DIFFERENCE
                        *   BETWEEN A FIXED VALUE AND THE CHANNEL'S ONSET
                        *   TIME (U.OTM).
                        * U.DTM IS USED BY E$DIF WHEN A COMPARISON IS DESIRED
                        *   TO SOME TIME OTHER THAN AN ONSET TIME.
                        * U.OTB IS THE ONSET TIME IN BCD
                        * U.OAM IS THE ONSET AMPLITUDE
                        * U.OFZ IS THE ONSET PHASE
                        * U.ODI IS THE ONSET DIURNAL
                        * U.ODR IS THE DIRECTION OF ONSET
                        *    =1 FOR ADVANCE
                        *    =2 FOR RETARD
                        * U.OSG IS THE STD. DEVIATION AT ONSET
04F9  A  0000  U.OTM RES           28,0
0515  A  0000  U.DTM RES           2,0
0517  A  0000  U.OTB RES           28,0
0533  A  0000  U.OAM RES           14,0
0541  A  0000  U.OFZ RES           14,0
054F  A  0000  U.ODR RES           14,0
055D  A  0000  U.ODI RES           14,0
056B  A  0000  U.OSG RES           14,0
```

```
180                     ********************************************************************
181                     * W.PFZ IS THE PEAK PHASE
182                     * W.PTM IS THE PEAK AMPLITUDE
183                     * W.OST IS THE PHASE OFFSET TO PEAK
184                     * W.ONR IS THE RATE OF ONSET TO PEAK
185                     * W.LPK IS THE PHASE FOR A CLASS 3 LOW PEAK
186                     * W.LTM IS THE TIME (BCD) OF THE W.LPK
187                     * W.LAM IS THE AMP AT W.LTM
188                     * W.VPK IS THE CLASS 3 VALLEY PEAK PHASE
189                     * W.VTM IS THE TIME (BCD) OF THE W.VPK
190                     * W.VAM IS THE AMP AT W.VTM
191     0579  A  0000   W.PFZ RES           14,0
192     0587  A  0000   W.PTM RES           28,0
193     05A3  A  0000   W.PAM RES           14,0
194     05B1  A  0000   W.OST RES           14,0
195     05BF  A  0000   W.ONR RES           14,0
196     05CD  A  0000   W.LPK RES           14,0
197     05DB  A  0000   W.LTM RES           28,0
198     05F7  A  0000   W.LAM RES           14,0
199     0605  A  0000   W.VPK RES           14,0
200     0613  A  0000   W.VTM RES           28,0
201     062F  A  0000   W.VAM RES           14,0
```

```
203                     ************************************************************
204                     * W.RFZ IS THE PHASE AT VALID RECOVERY
205                     * W.RTM IS THE BCD TIME OF VALID RECOVERY
206                     * W.RAM IS THE AMPLITUDE AT VALID RECOVERY
207     063D  A  0000   W.RFZ RES           14,0
208     064B  A  0000   W.RTM RES           28,0
209     0667  A  0000   W.RAM RES           14,0
```

```
 211                    ************************************************************
 212                    *U.AMP IS THE CURRENT AMPLITUDE ESTIMATE.
 213                    *  ACTUALLY, IT'S THE LAST AMPLITUDE VALUE OF
 214                    *  THE 10 SECOND PERIOD JUST ENDED.
 215      0675  A 0000  U.AMP RES           14,0
 216      0683                 END

TOTAL ASSEMBLY ERRORS =   1    SIZE =  1667
```

```
                        PGM         U$REP
                         INT         U:RP1,U:RP2,U:RP3,U.UDR
                         EXT         E:FRT,E:BAD,E.BDF,U.FRQ,U.TRK
                         EXT         U.GAN,U.BLL,M.STA,U.CLS,U.ODR
                         EXT         U.OSG,E:FMF,E:FAM,E:FCT,E.TM1
                         EXT         E.TM2,E.28F,E:028,U.AMP,U.OTB
                         EXT         U.OFZ,U.OAM,U.ODI,W.PFZ,W.PAM
                         EXT         W.RTM,W.RFZ,W.RAM,U.DIU,W.LTM
                         EXT         W.LPK,W.LAM,W.VTM,W.VPK,W.VAM
                         EXT         W.OST,W.ONR,U.LFZ,U.LTM,U.END
                         EXT         W.PTM,W.BDC,E:COT,U.DTM,U.OTM
                         EXT         E:SKD,E:BDC,U.CTM,E:DIF,E.BSG
                         EXT         U.CCL
                *        CAT NO.  400100-008
                * U$REP IS THE REPORTABLE SIGNAL MESSAGE GENERATOR.
                *   THE GENERATOR CONSISTS OF THREE SECTIONS:
                *  U:RP1 PRODUCES A MESSAGE FOR THE OPERATOR LISTING
                *   ALL AVAILABLE INFORMATION ABOUT THE SIGNAL. THIS
                *   ROUTINE IS CALLED AT HALF (OR VALID) RECOVERY.
                *  U:RP2 PRODUCES A MESSAGE FOR THE OPERATOR LISTING
                *   THE DATA ON THE SIGNAL SINCE HALF RECOVERY.  THIS
                *   ROUTINE SETS UP THE CALL TO U:RP3.
                *  U:RP3 PRODUCES THE UDR FOR HQ.
```

```
25                      ************************************************************
26                      * U:RP1  CALLED BY U:WFA WHEN A SIGNAL HAS PASSED
27                      *   ALL REPORT CRITERIA AND HAS A HALF (VALID) RECOVERY.
28                      * CALLING SEQUENCE:
29                      *     BLM,15       U:RP1
30                      * USING:-----
31                      *   ONSET----
32                      *    TIME FROM U.OTB
33                      *    PHASE FROM U.OFZ
34                      *    AMP FROM U.OAM
35                      *    DIURNAL FROM U.ODI
36                      *   PEAK----
37                      *    TIME FROM W.PTM
38                      *    PHASE FROM W.PFZ
39                      *    AMP FROM W.PAM
40                      *   HALF RECOVERY----
41                      *    TIME FROM W.RTM
42                      *    PHASE FROM W.RFZ
43                      *    AMP FROM W.RAM
44                      *    DIURNAL FROM U.DIU
45                      *  AND IF THE SIGNAL IS A CLASS 3:
46                      *   1ST PEAK----
47                      *    TIME FROM W.LTM
48                      *    PHASE FROM W.LPK
49                      *    AMP FROM W.LAM
50                      *   2ND PEAK----
51                      *    TIME FROM W.VTM
52                      *    PHASE  FROM W.VPK
53                      *    AMP FROM W.VAM
54   0000      A510     U:RP1 SFM,1          RPSV1          SAVE REGISTERS
     0001  R   0635
55   0002      A5A0           SFM,10         RPSV2
     0003  R   063C
56                      * ASSIGN NEXT UDR NUMVER TO THIS SIGNAL
57                      *   AND UPDATE COUNT.
58   0004      E510           LDM,1          U.UDR
     0005  R   061F
59   0006      E616           STM,1,6        UDRNO
     0007  R   0611
60   0008      80F0           ABMM,15        U.UDR
     0009  R   061F
61   000A      E516           LDM,1,6        U.ODR
     000B  X   000A
62   000C      E616           STM,1,6        ZODR
     000D  R   077F
63   000E      E516           LDM,1,6        U.CLS
     000F  X   0009
64   0010      E616           STM,1,6        ZCLS
     0011  R   06C9
65   0012      6D56           TRR,5,6
```

```
 66     0013      2D51        LLS,5,1
 67     0014      E515        LDM,1,5       U.OTM
        0015  X   002D
 68     0016      F615        STM,1,5       ZOTM
        0017  R   072B
 69     0018      605F        ABR,5,15
 70     0019      E515        LDM,1,5       U.OTM
        001A  X   002D
 71     001B      E615        STM,1,5       ZOTM
        001C  R   072B
 72                          * DO 5 LINE HEADER.....
 73     001D      E7F0        BLM,15        HEADR
        001E  R   0332
 74                          * DO LONG ONSET LINE
 75     001F      6C11        ZRR,1
 76     0020      E610        STM,1         LINEN
        0021  R   0620
 77     0022      E516        LDM,1,6       U.OFZ
        0023  X   0015
 78     0024      E610        STM,1         TPHAS
        0025  R   0632
 79     0026      E616        STM,1,6       ZOFZ
        0027  R   0819
 80     0028      E516        LDM,1,6       U.OAM
        0029  X   0016
 81     002A      E616        STM,1,6       ZOAM
        002B  R   0763
 82     002C      E610        STM,1         TAMP
        002D  R   0633
 83     002E      E516        LDM,1,6       U.ODI
        002F  X   0017
 84     0030      E610        STM,1         TDIUR
        0031  R   0634
 85     0032      6D56        TRR,5,6
 86     0033      2D51        LLS,5,1
 87     0034      E515        LDM,1,5       U.OTB
        0035  X   0014
 88     0036      E615        STM,1,5       ZOTB
        0037  R   0747
 89     0038      E610        STM,1         E.TM1
        0039  X   000F
 90     003A      605F        ABR,5,15
 91     003B      E515        LDM,1,5       U.OTB
        003C  X   0014
 92     003D      E615        STM,1,5       ZOTB
        003E  R   0747
 93     003F      E610        STM,1         E.TM2
        0040  X   0010
 94     0041      E7F0        BLM,15        LONGL
        0042  R   03FC
```

```
 95                             *  IF CLASS NOT 3, GO TO PEAK OUTPUT
 96                             *   ELSE, DO SHORT 1ST PEAK
 97     0043      E516          LDM,1,6      U.CLS
        0044  X   0009
 98     0045      E616          STM,1,6      ZCLS
        0046  R   06C9
 99     0047      E910          SUI,1        #3
        0048  A   0003
100     0049      7D11          TRRB,1,1     PKOUT
        004A  R   007B
101     004B      651F          LBR,1,15
102     004C      E610          STM,1        LINEN
        004D  R   0620
103     004E      E516          LDM,1,6      W.LPK
        004F  X   001F
104     0050      E610          STM,1        TPHAS
        0051  R   0632
105     0052      E516          LDM,1,6      W.LAM
        0053  X   0020
106     0054      E610          STM,1        TAMP
        0055  R   0633
107     0056      6D56          TRR,5,6
108     0057      2D51          LLS,5,1
109     0058      E515          LDM,1,5      W.LTM
        0059  X   001E
110     005A      E610          STM,1        E.TM1
        005B  X   000F
111     005C      605F          ABR,5,15
112     005D      E515          LDM,1,5      W.LTM
        005E  X   001E
113     005F      E610          STM,1        E.TM2
        0060  X   0010
114     0061      E7F0          BLM,15       SHRTL
        0062  R   042E
115                            * AND DO SHORT 2ND PEAK LINE
116     0063      651E          LBR,1,14
117     0064      E610          STM,1        LINEN
        0065  R   0620
118     0066      E516          LDM,1,6      W.VPK
        0067  X   0022
119     0068      E610          STM,1        TPHAS
        0069  R   0632
120     006A      E516          LDM,1,6      W.VAM
        006B  X   0023
121     006C      E610          STM,1        TAMP
        006D  R   0633
122     006E      6D56          TRR,5,6
123     006F      2D51          LLS,5,1
124     0070      E515          LDM,1,5      W.VTM
        0071  X   0021
```

```
125     0072       E610        STM,1         E.TM1
        0073   X   000F
126     0074       605F        ABR,5,15
127     0075       E515        LDM,1,5       W.VTM
        0076   X   0021
128     0077       E610        STM,1         E.TM2
        0078   X   0010
129     0079       E7F0        BLM,15        SHRTL
        007A   R   042E
130                        * DC SHORT PEAK LINE
131     007B       ED10    PKOUT LDI,1         3
        007C   A   0003
132     007D       E610        STM,1         LINEN
        007E   R   0620
133     007F       E516        LDM,1,6       W.PFZ
        0080   X   0018
134     0081       E610        STM,1         TPHAS
        0082   R   0632
135     0083       E516        LDM,1,6       W.PAM
        0084   X   0019
136     0085       E616        STM,1,6       ZPAM
        0086   R   07B7
137     0087       E610        STM,1         TAMP
        0088   R   0633
138     0089       6D56        TRR,5,6
139     008A       2D51        LLS,5,1
140     008B       E515        LDM,1,5       W.PTM
        008C   X   0029
141     008D       E615        STM,1,5       ZPTM
        008E   R   0798
142     008F       E610        STM,1         E.TM1
        0090   X   000F
143     0091       605F        ABR,5,15
144     0092       E515        LDM,1,5       W.PTM
        0093   X   0029
145     0094       E615        STM,1,5       ZPTM
        0095   R   0798
146     0096       E610        STM,1         E.TM2
        0097   X   0010
147     0098       E7F0        BLM,15        SHRTL
        0099   R   042E
148                        * DC LONG HALF RECOVERY LINE
149     009A       651D        LBR,1,13
150     009B       E610        STM,1         LINEN
        009C   R   0620
151     009D       E516        LDM,1,6       W.RFZ
        009E   X   0018
152     009F       E616        STM,1,6       ZRFZ
        00A0   R   07EF
153     00A1       E610        STM,1         TPHAS
```

```
        00A2  R  0632
154     00A3     E516        LDM,1,6      W.RAM
        00A4  X  001C
155     00A5     E616        STM,1,6      ZRAM
        00A6  R  07E1
156     00A7     E610        STM,1        TAMP
        00A8  R  0633
157     00A9     E516        LDM,1,6      U.DIU
        00AA  X  001D
158     00AB     E610        STM,1        TDIUR
        00AC  R  0634
159     00AD     6D56        TRR,5,6
160     00AE     2D51        LLS,5,1
161     00AF     E515        LDM,1,5      W.RTM
        00B0  X  001A
162     00B1     E615        STM,1,5      ZRTM
        00B2  R  07C5
163     00B3     E610        STM,1        E.TM1
        00B4  X  000F
164     00B5     605F        ABR,5,15
165     00B6     E515        LDM,1,5      W.RTM
        00B7  X  001A
166     00B8     E615        STM,1,5      ZRTM
        00B9  R  07C5
167     00BA     E610        STM,1        E.TM2
        00BB  X  0010
168     00BC     E7F0        BLM,15       LONGL
        00BD  R  03FC
169                       * SET UP OFFSET AND ONSET RATE
170     00BE     E5C6        LDM,12,6     W.OST
        00BF  X  0024
171     00C0     E6C6        STM,12,6     ZOST
        00C1  R  0771
172     00C2     E7F0        BLM,15       E:FMF
        00C3  X  000C
173     00C4  R  062D        DFC          TEMP
174     00C5     ED10        LDI,1        -4
        00C6  A  FFFC
175     00C7     E521        LDM,2,1      TEMP+5
        00C8  R  0632
176     00C9     E621        STM,2,1      M03S1+4
        00CA  R  052F
177     00CB     701F        ABRB,1,15    $-4
        00CC  R  00C7
178     00CD     E536        LDM,3,6      W.ONR
        00CE  X  0025
179     00CF     E636        STM,3,6      ZONR
        00D0  R  078D
180     00D1     ED10        LDI,1        #A
        00D2  A  000A
```

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181  00D3      2021        MPR,2,1
182  00D4      2A23        RAD,2,3
183  00D5      603F        ABR,3,15
184  00D6      2B31        RAS,3,1
185  00D7      6DC3        TRR,12,3
186  00D8      E7E0        BLM,14        E:BAD
     00D9  X   0002
187  00DA      ED10        LDI,1         E.BDF
     00DB  X   0003
188  00DC      FD21        LDX,2,1
189  00DD      E820        ADI,2         #2E00
     00DE  A   2E00
190  00DF      E620        STM,2         M03S2+2
     00E0  R   0538
191  00E1      601E        ABR,1,14
192  00E2      FD21        LDX,2,1
193  00E3      0922        MBL,2,2
194  00E4      611F        SBR,1,15
195  00E5      F821        ADX,2,1
196  00E6      E620        STM,2         M03S2+1
     00E7  R   0537
197  00E8      601E        ABR,1,14
198  00E9      FD21        LDX,2,1
199  00EA      E820        ADI,2         #2000
     00EB  A   2000
200  00EC      E620        STM,2         M03S2
     00ED  R   0536
201  00EE      6C22        ZRR,2
202  00EF      E620        STM,2         E.28F
     00F0  X   0011
203  00F1      E7E0        BLM,14        E:028
     00F2  X   0012
204  00F3  R   0526        DFC           MSG03
205                    * RESTORE REGISTERS AND RETURN
206  00F4      A410        LFM,1         RPSV1
     00F5  R   0635
207  00F6      A4A0        LFM,10        RPSV2
     00F7  R   063C
208  00F8      FF0F        BRX,15
209                    ****************************************************************
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 211                      ***************************************************************
 212                      * U:RP2 IS CALLED WHEN THE SIGNAL ON THE CHANNEL IN
 213                      *   R6 IS TERMINATED,  THIS ROUTINE PRINTS PERTINENT
 214                      *   INFORMATION ABOUT THE FINAL PART OF THE SIGNAL,
 215                      *   SAVES INFORMATICN FOR THE UDR, AND SETS UP THE
 216                      *   CALL TO U:RP3 TC PREPARE THE UDR.
 217    00F9     A510     U:RP2 SFM,1         RPSV1
        00FA  R  0635
 218    00FB     A5A0           SFM,10        RPSV2
        00FC  R  063C
 219                      * SET UP 5 LINE HEADER
 220    00FD     E7F0           BLM,15        HEADR
        00FE  R  0332
 221                      * SET UP LONG FULL RECOVERY LINE
 222    00FF     ED10           LDI,1         5
        0100  A  0005
 223    0101     E610           STM,1         LINEN
        0102  R  0620
 224    0103     E516           LDM,1,6       U.LFZ
        0104  X  0026
 225    0105     E616           STM,1,6       ZFFZ
        0106  R  0835
 226    0107     E610           STM,1         TPHAS
        0108  R  0632
 227    0109     E516           LDM,1,6       U.AMP
        010A  X  0013
 228    010B     E616           STM,1,6       ZFAM
        010C  R  0827
 229    010D     E610           STM,1         TAMP
        010E  R  0633
 230    010F     E516           LDM,1,6       U.DIU
        0110  X  001D
 231    0111     E610           STM,1         TDIUR
        0112  R  0634
 232    0113     6D56           TRR,5,6
 233    0114     2D51           LLS,5,1
 234    0115     E515           LDM,1,5       U.LTM
        0116  X  0027
 235    0117     E615           STM,1,5       ZFTM
        0118  R  0843
 236    0119     E610           STM,1         E.TM1
        011A  X  000F
 237    011B     605F           ABR,5,15
 238    011C     E515           LDM,1,5       U.LTM
        011D  X  0027
 239    011E     E615           STM,1,5       ZFTM
        011F  R  0843
 240    0120     E610           STM,1         E.TM2
        0121  X  0010
 241    0122     E7F0           BLM,15        LONGL
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```
        0123  R  03FC
242                      * DETERMINE HOW SIGNAL ENDED AND LOG
243     0124     8606          TBMB,0,6     U.END,SGLST
        0125  X  0028
        0126  R  0130
244     0127     8616          TBMB,1,6     U.END,TMLAP
        0128  X  0028
        0129  R  0133
245     012A     8626          TBMB,2,6     U.END,NUONS
        012B  X  0028
        012C  R  0136
246     012D     ED10          LDI,1        END1
        012E  R  0642
247     012F     F709          HOP,STRND
248     0130     ED10  SGLST   LDI,1        END3
        0131  R  064E
249     0132     F706          HOP,STRND
250     0133     ED10  TMLAP   LDI,1        END2
        0134  R  0648
251     0135     F703          HOP,STRND
252     0136     ED10  NUONS   LDI,1        END4
        0137  R  0654
253     0138     ED20  STRND   LDI,2        -6
        0139  A  FFFA
254     013A     FD31          LDX,3,1
255     013B     E632          STM,3,2      MO4S1+6
        013C  R  054A
256     013D     601F          ABR,1,15
257     013E     702F          ABRB,2,15    STRND+2
        013F  R  013A
258                      * OUTPUT LAST LINE SETTING FLAG TO HAVE U:RP3
259                      *   SCHEDULED WHEN ASR 28 BECOMES AVAILABLE.
260     0140     6520          LBR,2,0
261     0141     E620          STM,2        E.28F
        0142  X  0011
262     0143     E7E0          BLM,14       E:028
        0144  X  0012
263     0145  R  053A          DFC          MSG04
264                      * SAVE ALL DATA NEEDED FOR U:RP3...
265     0146     E516          LDM,1,6      U.END
        0147  X  0028
266     0148     E616          STM,1,6      ZEND
        0149  R  086D
267     014A     8206          OBMM,0,6     INPRG          FLAG REPORTABLE ON THIS CHAN
        014B  R  085F
268                      * NOW GET THE HELL OUT OF THIS PROGRAM
269     014C     A410          LFM,1        RPSV1
        014D  R  0635
270     014E     A4A0          LFM,10       RPSV2
        014F  R  063C
```

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271     0150    FF0F        BRX,15
272     ********************************************************************
```

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274                     ****************************************************************
275                     * U:RP3 SETS UP ONE RSD MESSAGE AND RESCHEDULES ITSELF
276     0151    6C66    U:RP3 ZRR,6                         INIT CHAN
277     0152    8606          TBMB,0,6      INPRG,RP301
        0153  R 085F
        0154  R 0162
278     0155    606F          ABR,6,15
279     0156    ED50          LDI,5         14
        0157  A 000E
280     0158    7956          SURB,5,6      U:RP3+1
        0159  R 0152
281                     * NO MORE TO OUTPUT
282     015A    6C66          ZRR,6
283     015B    E660          STM,6         E.28F
        015C  X 0011
284     015D    E7E0          BLM,14        E:028
        015E  X 0012
285     015F  R 0569          DFC           LEADR+25
286     0160    E700          BRU           E:SKD
        0161  X 002E
287                     * FIRST LINE OUTPUT: LEADER/RSD ONE ONE ONE/LEADER
288     0162    6510    RP301 LBR,1,0
289     0163    E610          STM,1         E.28F
        0164  X 0011
290     0165    E7E0          BLM,14        E:028
        0166  X 0012
291     0167  R 0550          DFC           LEADR
292     0168    8106          ZBMM,0,6      INPRG
        0169  R 085F
293     016A    E5C6          LDM,12,6      UDRNO
        016B  R 0611
294     016C    E7E0          BLM,14        E:BDC
        016D  X 002F
295     016E    ED70          LDI,7         3
        016F  A 0003
296     0170    EDA0          LDI,10        MOSS1
        0171  R 056F
297     0172    6CBB          ZRR,11
298     0173    E7E0          BLM,14        CUTNO
        0174  R 0490
299     0175    6C55          ZRR,5
300     0176    AF5A          SBX,5,10
301     0177    60BF          ABR,11,15
302     0178    AF5A          SBX,5,10
303     0179    6550          LBR,5,0
304     017A    E650          STM,5         E.28F
        017B  X 0011
305     017C    E7E0          BLM,14        E:028
        017D  X 0012
306     017E  R 056B          DFC           MSG05
```

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307                         * LINE 2: CLASS, TYPE, FRQ CALL LTRS, PATH, DOY
308     017F     ED50       LDI,5     #41
        0180  A  0041
309     0181     E546       LDM,4,6   ZCLS
        0182  R  06C9
310     0183     714E       SBRB,4,14 $+3
        0184  R  0186
311     0185     605F       ABR,5,15
312     0186     EDA0       LDI,10    M06S1
        0187  R  0583
313     0188     6CBB       ZRR,11
314     0189     AF5A       SBX,5,10
315     018A     60BF       ABR,11,15
316     018B     ED50       LDI,5     #2C
        018C  A  002C
317     018D     AF5A       SBX,5,10
318     018E     60BF       ABR,11,15
319                         * STORE TYPE:
320     018F     E546       LDM,4,6   ZTYPE
        0190  R  06D7
321     0191     6C55       ZRR,5
322     0192     ED30       LDI,3     -6
        0193  A  FFFA
323     0194     E7F0       BLM,15    STRCH       TYPE
        0195  R  0462
324     0196     ED50       LDI,5     #2C
        0197  A  002C
325     0198     AF5A       SBX,5,10                ,
326     0199     60BF       ABR,11,15
327                         * DO FREQUENCY AND CALL LETTERS
328     019A     6D16       TRR,1,6
329     019B     2D11       LLS,1,1
330     019C     6D41       TRR,4,1
331     019D     E840       ADI,4     ZFRQ
        019E  R  06E5
332     019F     6C55       ZRR,5
333     01A0     ED30       LDI,3     -4
        01A1  A  FFFC
334     01A2     E7F0       BLM,15    STRCH       FREQ
        01A3  R  0462
335                         * DO CALL LETTERS
336     01A4     6D41       TRR,4,1
337     01A5     E840       ADI,4     CALLT
        01A6  R  0701
338     01A7     E7F0       BLM,15    STRCH       CALL LETTERS
        01A8  R  0462
339     01A9     ED50       LDI,5     #2C
        01AA  A  002C
340     01AB     AF5A       SBX,5,10
341     01AC     60BF       ABR,11,15               ,
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342                         * INDICATE FRONT OR BACK PATH
343     01AD      ED50          LDI,5         11
        01AE  A   000B
344     01AF      86A6          TBMB,10,6     ZSTA,$+4
        01B0  R   071D
        01B1  R   01B3
345     01B2      615F          SBR,5,15
346     01B3      E7F0          BLM,15        ABCNO           FRONT/BACK
        01B4  R   0451
347     01B5      ED50          LDI,5         #2C
        01B6  A   002C
348     01B7      AF5A          SBX,5,10
349     01B8      60BF          ABR,11,15                     ,
350                         * DO DAY OF YEAR
351     01B9      6C22          ZRR,2
352     01BA      E530          LDM,3         U.CTM
        01BB  X   0030
353     01BC      2C22          LLD,2,2
354     01BD      6D52          TRR,5,2
355     01BE      E7F0          BLM,15        ABCNO           1ST DIGIT
        01BF  R   0451
356     01C0      6C22          ZRR,2
357     01C1      2C24          LLD,2,4
358     01C2      6D52          TRR,5,2
359     01C3      E7F0          BLM,15        ABCNO           2ND DIGIT
        01C4  R   0451
360     01C5      6C22          ZRR,2
361     01C6      2C24          LLD,2,4
362     01C7      6D52          TRR,5,2
363     01C8      E7F0          BLM,15        ABCNO           3RD DIGIT
        01C9  R   0451
364                         * END LINE AND OUTPUT
365     01CA      E7F0          BLM,15        TERLN
        01CB  R   049A
366                         * SET UP PARAGRAPH A.
367     01CC      ED50          LDI,5         |  |
        01CD  A   2020
368     01CE      E650          STM,5         M06S1
        01CF  R   0583
369     01D0      ED50          LDI,5         |A.|
        01D1  A   412E
370     01D2      E650          STM,5         M06S1+1
        01D3  R   0584
371     01D4      EDA0          LDI,10        M06S1+2         SET UP FOR OUTPUT
        01D5  R   0585
372     01D6      6CBB          ZRR,11
373     01D7      6D76          TRR,7,6
374     01D8      2D71          LLS,7,1
375     01D9      E537          LDM,3,7       ZOTB
        01DA  R   0747
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376                     * DO SIX DIGIT ONSET TIME
377     01DB    6C22    ZRR,2
378     01DC    2D3A    LLS,3,10
379     01DD    2C22    LLD,2,2
380     01DE    6D52    TRR,5,2
381     01DF    E7F0    BLM,15          ABCNO           1ST DIGIT (HRS X 10)
        01E0 R  0451
382     01E1    6C22    ZRR,2
383     01E2    2C24    LLD,2,4
384     01E3    6D52    TRR,5,2
385     01E4    E7F0    BLM,15          ABCNO           2ND DIGIT (HR X 1)
        01E5 R  0451
386     01E6    607F    ABR,7,15
387     01E7    E537    LDM,3,7         U.OTB
        01E8 X  0014
388     01E9    6C22    ZRR,2
389     01EA    2C25    LLD,2,5
390     01EB    6D52    TRR,5,2
391     01EC    E7F0    BLM,15          ABCNO           3RD DIGIT (MIN X 10)
        01ED R  0451
392     01EE    6C22    ZRR,2
393     01EF    2C24    LLD,2,4
394     01F0    6D52    TRR,5,2
395     01F1    E7F0    BLM,15          ABCNO           4TH DIGIT (MIN X 1)
        01F2 R  0451
396     01F3    6C22    ZRR,2
397     01F4    2C23    LLD,2,3
398     01F5    6D52    TRR,5,2
399     01F6    E7F0    BLM,15          ABCNO           5TH DIGIT (SEC X 10)
        01F7 R  0451
400     01F8    6C22    ZRR,2
401     01F9    2C24    LLD,2,4
402     01FA    6D52    TRR,5,2
403     01FB    E7F0    BLM,15          ABCNO           6TH DIGIT (SEC X 1)
        01FC R  0451
404     01FD    ED50    LDI,5           #2C
        01FE A  002C
405     01FF    AF5A    SBX,5,10                        ,
406     0200    60BF    ABR,11,15
407     0201    E5C6    LDM,12,6        ZOST            OFFSET
        0202 R  0771
408     0203    60CC    ABR,12,12                       ROUND OFF
409     0204    29C4    RLS,12,4
410     0205    E7E0    BLM,14          E:BCC
        0206 X  002F
411     0207    ED70    LDI,7           3
        0208 A  0003
412     0209    E7E0    BLM,14          OUTNO           3 DIGIT OFFSET
        020A R  0490
413     020B    ED50    LDI,5           #2C
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          020C  A  002C
414       020D     AF5A        SBX,5,10                    ,
415       020E     60BF        ABR,11,15
416       020F     E546        LDM,4,6       ZODR
          0210  R  077F
417       0211     ED50        LDI,5         19
          0212  A  0013
418       0213     714E        SBRB,4,14     $+3
          0214  R  0216
419       0215     F702        HOP,$+2
420       0216     615F        SBR,5,15
421       0217     E7F0        BLM,15        ABCNO         DIRECTION
          0218  R  0451
422       0219     E7E0        BLM,14        NXTLN
          021A  R  04A5
423       021B     E5C6        LDM,12,6      ZONR
          021C  R  078D
424       021D     60CC        ABR,12,12                   ROUND OFF
425       021E     29C4        RLS,12,4
426       021F     E7E0        BLM,14        E:BDC
          0220  X  002E
427       0221     ED70        LDI,7         3
          0222  A  0003
428       0223     E7E0        BLM,14        OUTNO         THREE DIGIT ONSET RATE
          0224  R  0490
429       0225     ED50        LDI,5         #2C
          0226  A  002C
430       0227     AF5A        SBX,5,10
431       0228     60BF        ABR,11,15
432       0229     E556        LDM,5,6       ZOAM
          022A  R  0763
433       022B     E7C0        BLM,12        STAMP
          022C  R  046D
434       022D     E7F0        BLM,15        TERLN
          022E  R  049A
435                       * PEAK DATA, PARAGRAPH B.
436       022F     ED50        LDI,5         |B.|           |B.|
          0230  A  422E
437       0231     E650        STM,5         M06S1+1
          0232  R  0584
438       0233     EDA0        LDI,10        M06S1+2
          0234  R  0585
439       0235     6CBB        ZRR,11
440       0236     ED50        LDI,5         12
          0237  A  000C
441       0238     E7F0        BLM,15        ABCNO         |PEAK|
          0239  R  0451
442                       * GET TIME FROM ONSET TO PEAK
443       023A     6D76        TRR,7,6
444       023B     2D71        LLS,7,1
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445     023C      E557        LDM,5,7     ZOTM
        023D  R   072B
446     023E      E650        STM,5       U.DTM
        023F  X   002C
447     0240      654F        LBR,4,15
448     0241      607F        ABR,7,15
449     0242      E557        LDM,5,7     ZOTM
        0243  R   072B
450     0244      E654        STM,5,4     U.DTM
        0245  X   002C
451     0246      617F        SBR,7,15
452     0247      E870        ADI,7       ZPTM
        0248  R   079B
453     0249      E670        STM,7       $+7
        024A  R   0250
454     024B      6D76        TRR,7,6
455     024C      ED60        LDI,6       14
        024D  A   000E
456     024E      E7E0        BLM,14      E:DIF
        024F  X   0031
457     0250  A   0000        DFC         0
458     0251      6600        NOP
459     0252      6600        NOP
460     0253      6D67        TRR,6,7
461     0254      ED70        LDI,7       #6
        0255  A   0006
462     0256      21C7        DVR,12,7
463     0257      6DCD        TRR,12,13
464     0258      E7E0        BLM,14      E:BDC
        0259  X   002F
465     025A      ED70        LDI,7       3
        025B  A   0003
466     025C      E7E0        BLM,14      OUTNO       THREE DIGIT TIME FROM ONSET
        025D  R   0490
467     025E      ED50        LDI,5       #2C
        025F  A   002C
468     0260      AF5A        SBX,5,10
469     0261      60BF        ABR,11,15
470     0262      E556        LDM,5,6     ZPAM
        0263  R   07B7
471     0264      E7C0        BLM,12      STAMP
        0265  R   046D
472     0266      E7F0        BLM,15      TERLN
        0267  R   049A
473                       * HALF RECOVERY DATA, PARAGRAPH C.
474     0268      ED50        LDI,5       |C.|        |C.|
        0269  A   432E
475     026A      E650        STM,5       M06S1+1
        026B  R   0584
476     026C      EDA0        LDI,10      M06S1+2
```

```
        026D  R  0585
477     026E     6CBB        ZRR,11
478     026F     ED50        LDI,5          13
        0270  A  000D
479     0271     E7F0        BLM,15         ABCNO           |HALF|
        0272  R  0451
480                       * GET TIME FROM ONSET TO HALF RECOVERY
481     0273     6D76        TRR,7,6
482     0274     2D71        LLS,7,1
483     0275     E870        ADI,7          ZRTM
        0276  R  07C5
484     0277     E670        STM,7          $+7
        0278  R  027E
485     0279     6D76        TRR,7,6
486     027A     ED60        LDI,6          14
        027B  A  000E
487     027C     E7E0        BLM,14         E:DIF
        027D  X  0031
488     027E  A  0000        DFC            0
489     027F     6600        NOP
490     0280     6600        NOP
491     0281     6D67        TRR,6,7
492     0282     ED70        LDI,7          #6
        0283  A  0006
493     0284     21C7        DVR,12,7
494     0285     6DCD        TRR,12,13
495     0286     E7E0        BLM,14         E:BDC
        0287  X  002F
496     0288     ED70        LDI,7          3
        0289  A  0003
497     028A     E7E0        BLM,14         OUTNO           THREE DIGIT TIME FROM ONSET
        028B  R  0490
498     028C     ED50        LDI,5          #2C
        028D  A  002C
499     028E     AF5A        SBX,5,10
500     028F     60BF        ABR,11,15
501     0290     E556        LDM,5,6        ZRAM
        0291  R  07E1
502     0292     E7C0        BLM,12         STAMP
        0293  R  046D
503     0294     E7F0        BLM,15         TERLN
        0295  R  049A
504                       * DAT ABOUT SIGNAL ENDING, PARAGRAPH D.
505     0296     ED50        LDI,5          |D.|            |D.|
        0297  A  442E
506     0298     E650        STM,5          M06S1+1
        0299  R  0584
507     029A     EDA0        LDI,10         M06S1+2
        029B  R  0585
508     029C     6CBB        ZRR,11
```

```
509                         * DETERMINE HOW SIGNAL ENDED (HAPPY I HOPE)
510   029D      8606        TBMB,0,6      ZEND,LTEND
      029E  R   086D
      029F  R   02DC
511   02A0      8616        TBMB,1,6      ZEND,HREND
      02A1  R   086D
      02A2  R   02DF
512   02A3      8626        TBMB,2,6      ZEND,NOND
      02A4  R   086D
      02A5  R   02E3
513                         * FULL RECOVERY HERE.........
514   02A6      ED50        LDI,5         14
      02A7  A   000E
515   02A8      E7F0        BLM,15        ABCNO           |FULL|
      02A9  R   0451
516   02AA      6D76        TRR,7,6
517   02AB      2D71        LLS,7,1
518   02AC      E870        ADI,7         ZFTM
      02AD  R   0843
519   02AE      E670        STM,7         $+7
      02AF  R   02B5
520   02B0      6D76        TRR,7,6
521   02B1      ED60        LDI,6         14
      02B2  A   000E
522   02B3      E7E0        BLM,14        E:DIF
      02B4  X   0031
523   02B5  A   0000        DFC           0
524   02B6      6600        NOP
525   02B7      6600        NOP
526   02B8      6D67        TRR,6,7
527   02B9      ED70        LDI,7         #6
      02BA  A   0006
528   02BB      21C7        DVR,12,7
529   02BC      6DCD        TRR,12,13
530   02BD      E7E0        BLM,14        E:BDC
      02BE  X   002F
531   02BF      ED70        LDI,7         3
      02C0  A   0003
532   02C1      E7E0        BLM,14        OUTNO           THREE DIGIT TIME FROM ONSET
      02C2  R   0490
533   02C3      ED50  FRAMP LDI,5         #2C
      02C4  A   002C
534   02C5      AF5A        SBX,5,10
535   02C6      60BF        ABR,11,15
536   02C7      E556        LDM,5,6       ZFAM
      02C8  R   0827
537   02C9      E7C0        BLM,12        STAMP
      02CA  R   046D
538   02CB      8626        TBMB,2,6      ZEND,$+5
      02CC  R   086D
```

```
         02CD  R  02D0
539      02CE     E700        BRU           SFEND
         02CF  R  02D8
540      02D0     ED50        LDI,5         #2C
         02D1  A  002C
541      02D2     AF5A        SBX,5,10
542      02D3     60BF        ABR,11,15
543      02D4     ED50        LDI,5         23
         02D5  A  0017
544      02D6     E7F0        BLM,15        ABCNO          |SECOND ONSET|
         02D7  R  0451
545      02D8     E7F0  SFEND BLM,15        TERLN
         02D9  R  049A
546      02DA     E700        BRU           PARAE
         02DB  R  02FD
547      02DC     ED50  LTEND LDI,5         16             |LOST|
         02DD  A  0010
548      02DE     F703        HOP,$+3
549      02DF     ED50  HREND LDI,5         15             |HOUR|
         02E0  A  000F
550      02E1     E7F0        BLM,15        ABCNO
         02E2  R  0451
551      02E3     E556  NONC  LDM,5,6       ZOFZ           ONSET VALUE
         02E4  R  0819
552      02E5     86F6        TBMB,15,6     ZCDR,$+5
         02E6  R  077F
         02E7  R  02EA
553      02E8     E056        ADM,5,6       U.CCL
         02E9  X  0033
554      02EA     E156        SUM,5,6       ZFFZ           - CUR. VALUE
         02EB  R  0835
555      02EC     ED70        LDI,7         10
         02ED  A  000A
556      02EE     2047        MPR,4,7
557      02EF     2A44        RAD,4,4
558      02F0     6DC5        TRR,12,5
559      02F1     E7E0        BLM,14        E:BDC
         02F2  X  002F
560      02F3     ED70        LDI,7         3
         02F4  A  0003
561      02F5     E7E0        BLM,14        OUTNO          3 DIGIT DIFFERENCE
         02F6  R  0490
562      02F7     ED50        LDI,5         17
         02F8  A  0011
563      02F9     E7F0        BLM,15        ABCNO          |MICROSECONDS|
         02FA  R  0451
564      02FB     E700        BRU           FRAMP
         02FC  R  02C3
565                          * PARAGRAPH E: TRACK RATE, ONSET SIGMA, TYPE
566      02FD     ED50  PARAE LDI,5         |E.|
```

```
        02FE  A  452E
567     02FF     E650        STM,5          M06S1+1        |E.|
        0300  R  0584
568     0301     EDA0        LDI,10         M06S1+2
        0302  R  0585
569     0303     6CBB        ZRR,11
570     0304     E556        LDM,5,6        ZTR
        0305  R  07FD
571     0306     E7F0        BLM,15         ABCNO          TRACK RATE
        0307  R  0451
572     0308     ED50        LDI,5          #2C
        0309  A  002C
573     030A     AF5A        SBX,5,10
574     030B     60BF        ABR,11,15
575     030C     E556        LDM,5,6        ZOSG           ONSET SIGMA
        030D  R  080B
576     030E     ED70        LDI,7          100
        030F  A  0064
577     0310     2047        MPR,4,7
578     0311     2A44        RAD,4,4
579     0312     6DC5        TRR,12,5
580     0313     E7E0        BLM,14         E:BDC
        0314  X  002F
581     0315     ED70        LDI,7          4
        0316  A  0004
582     0317     E7E0        BLM,14         OUTNO
        0318  R  0490
583     0319     ED50        LDI,5          17
        031A  A  0011
584     031B     E7F0        BLM,15         ABCNO          |MICROSECONDS|
        031C  R  0451
585     031D     ED50        LDI,5          #2C
        031E  A  002C
586     031F     AF5A        SBX,5,10
587     0320     60BF        ABR,11,15
588     0321     E546        LDM,4,6        ZTYPE
        0322  R  06D7
589     0323     6C55        ZRR,5
590     0324     ED30        LDI,3          -6
        0325  A  FFFA
591     0326     E7F0        BLM,15         STPCH
        0327  R  0462
592     0328     E7F0        BLM,15         TERLN
        0329  R  049A
593     032A     65F0        LBR,15,0
594     032B     E6F0        STM,15         E.28F
        032C  X  0011
595     032D     E7E0        BLM,14         E:028
        032E  X  0012
596     032F  R  054D        DFC            LEADS
```

```
597     0330      E700        BRU         E:SKD
        0331  X   002E
```

```
599                     ****************************************************************
600                     * HEADR SETS UP THE FIRST  FIVE LINES TO THE ASR 28.
601                     *  THIS INCLUDES ALL DATA ABOUT THE CHANNEL:
602                     *   1. CHAN DESIGNATOR (SHOWS PRIORITY)
603                     *   2. FREQ AND TRANSMITTER CALL SIGN
604                     *   3. TRACK RATE, GAIN, AND BLANK LEVEL
605                     *   4. CARDIOID CONFIGURATION
606                     *   5. SIGNAL TYPE
607                     *   6. BACKGROUND LEVEL AT ONSET
608  0332     E7E0  HEADR BLM,14          E:FRT           GET MESSAGE TIME
     0333  X  0001
609  0334  R  04B8       DFC             MSG01+2
610                     * READ DET NUMBER AND SET IT UP FOR OUTPUT
611  0335     ED20       LDI,2           #400E
     0336  A  400E
612  0337     432E       OCD,2,#E
613  0338     4F4E       IDD,4,#E
614  0339     0824       MBR,2,4
615  033A     E820       ADI,2           #2030
     033B  A  2030
616  033C     E620       STM,2           M01S1+2         | 5--|
     033D  R  04CF
617  033E     0C44       MLR,4,4
618  033F     2844       RLD,4,4
619  0340     2D44       LLS,4,4
620  0341     2C44       LLD,4,4
621  0342     E840       ADI,4           #3030
     0343  A  3030
622  0344     E640       STM,4           M01S1+3         | 515|
     0345  R  04D0
623                     * SET UP RSD (REPORATABLE SIGNAL DESCRIPTOR) NUMBER.
624  0346     E5C6       LDM,12,6        UDRNO
     0347  R  0611
625  0348     E7E0       BLM,14          E:BAD           CONVERT TO DECIMAL
     0349  X  0002
626  034A     ED50       LDI,5           E.BDF
     034B  X  0003
627  034C     FD45       LDX,4,5
628  034D     0944       MBL,4,4
629  034E     E840       ADI,4           #0020
     034F  A  0020
630  0350     E640       STM,4           M01S2+1         |--0 |
     0351  R  04D3
631  0352     605E       ABR,5,14
632  0353     FD45       LDX,4,5
633  0354     0944       MBL,4,4
634  0355     615F       SBR,5,15
635  0356     F845       ADX,4,5
636  0357     E640       STM,4           M01S2           |000 |
     0358  R  04D2
```

```
                    * DC CHANNEL DESIGNATOR......
0359     6D56             TRR,5,6
035A     E850             ADI,5          #2041          | A|
035B  A  2041
035C     E650             STM,5          M01S2+5
035D  R  04D7
                    * DO FREQ AND CALL LETTERS....
035E     ED10             LDI,1          -56
035F  A  FFC8
0360     6D76             TRR,7,6
0361     2D71             LLS,7,1
0362     E547             LDM,4,7        U.FRQ          R4,5=FREQUENCY
0363  X  0004
0364     E647             STM,4,7        ZFRQ
0365  R  06E5
0366     607F             ABR,7,15
0367     E557             LDM,5,7        U.FRQ
0368  X  0004
0369     E657             STM,5,7        ZFRQ
036A  R  06E5
036B     E640             STM,4          M01S3          STORE FREQ
036C  R  04DB
036D     E650             STM,5          M01S3+1
036E  R  040C
036F     E521       HED02 LDM,2,1        CALTR+56
0370  R  060B
0371     E531             LDM,3,1        CALTR+57
0372  R  060C
0373     7C24             XORB,2,4       NXT01
0374  R  0387
0375     7C35             XORB,3,5       NXT01
0376  R  0387
0377     E521             LDM,2,1        CALTR+58
0378  R  060D
0379     E620             STM,2          M01S3+2        GET CALL LTRS.
037A  R  04DD
037B     617F             SBR,7,15
037C     E627             STM,2,7        CALLT
037D  R  0701
037E     E521             LDM,2,1        CALTR+59
037F  R  060E
0380     607F             ABR,7,15
0381     E627             STM,2,7        CALLT
0382  R  0701
0383     E620             STM,2          M01S3+3
0384  R  04DE
0385     E700             BRU            HED01
0386  R  0397
0387     701D       NXT01 ABRB,1,13      HED02
0388  R  036F
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```
666  0389     ED20      LDI,2      | U|          IF NO MATCH FOUND,
     038A  A  2055
667  038B     617F      SBR,7,15
668  038C     F627      STM,2,7    CALLT           USE | UNK|
     038D  R  0701
669  038E     E620      STM,2      M01S3+2
     038F  R  04DD
670  0390     ED20      LDI,2      |NK|              FOR UNKNOWN
     0391  A  4E4B
671  0392     607F      ABR,7,15
672  0393     E627      STM,2,7    CALLT
     0394  R  0701
673  0395     E620      STM,2      M01S3+3
     0396  R  04DE
674                     * NOW, SET UP TRACK RATE, GAIN, AND BLANK LEVEL....
675  0397     E556   HED01 LDM,5,6 U.TRK
     0398  X  0005
676  0399     E656      STM,5,6    ZTR
     039A  R  07FD
677  039B     E850      ADI,5      #5230
     039C  A  5230
678  039D     E650      STM,5      M01S3+5         TRAKC RATE
     039E  R  04E0
679  039F     E556      LDM,5,6    U.GAN
     03A0  X  0006
680  03A1     6C44      ZRR,4
681  03A2     ED10      LDI,1      10
     03A3  A  000A
682  03A4     2141      DVR,4,1
683  03A5     E850      ADI,5      |NO|
     03A6  A  4E30
684  03A7     E650      STM,5      M01S3+7         GAIN
     03A8  R  04E2
685  03A9     0944      MBL,4,4
686  03AA     E840      ADI,4      |0:|
     03AB  A  303A
687  03AC     E640      STM,4      M01S3+8
     03AD  R  04E3
688  03AE     E556      LDM,5,6    U.BLL
     03AF  X  0007
689  03B0     6C44      ZRR,4
690  03B1     2141      DVR,4,1
691  03B2     0955      MBL,5,5
692  03B3     6854      ADR,5,4
693  03B4     E850      ADI,5      #3030
     03B5  A  3030
694  03B6     E650      STM,5      M01S3+10
     03B7  R  04E5
695                     * GET CARDICID PATTERN
696  03B8     E556      LDM,5,6    M.STA
```

```
        03B9  X  0008
697     03BA     E656        STM,5,6       ZSTA
        03BB  R  071D
698     03BC     6C44        ZRR,4
699     03BD     2D5A        LLS,5,10
700     03BE     2C43        LLD,4,3
701     03BF     E840        ADI,4         !CO!
        03C0  A  4430
702     03C1     E640        STM,4         MO1S3+13
        03C2  R  04E8
703                       * DETERMINE SIGNAL TYPE
704     03C3     E546        LDM,4,6       ZCLS
        03C4  R  06C9
705     03C5     714F        SBRB,4,15     CKCL2
        03C6  R  03D1
706     03C7     E546        LDM,4,6       ZODR
        03C8  R  077F
707     03C9     714F        SBRB,4,15     SETBR
        03CA  R  03CE
708     03CB     ED40        LDI,4         TYPEA           TYPE ALPHA
        03CC  R  0621
709     03CD     F708        HOP,STYPE                      (CLASS=1,DIR=ADV)
710     03CE     ED40  SETBR LDI,4         TYPEB           TYPE BRAVO
        03CF  R  0624
711     03D0     F708        HOP,STYPE                      (CLASS=1,DIR=RET)
712     03D1     714F  CKCL2 SBRB,4,15     SETCO
        03D2  R  03D6
713     03D3     ED40        LDI,4         TYPED           TYPE DELTA
        03D4  R  062A
714     03D5     F703        HOP,STYPE                      (CLASS=2)
715     03D6     ED40  SETCO LDI,4         TYPEC           TYPE COCO, CLS=3
        03D7  R  0627
716     03D8     E646  STYPE STM,4,6       ZTYPE
        03D9  R  06D7
717     03DA     ED10        LDI,1         -3
        03DB  A  FFFD
718     03DC     FD24        LDX,2,4
719     03DD     E621        STM,2,1       MO1S4+3
        03DE  R  04F3
720     03DF     604F        ABR,4,15
721     03E0     701F        ABRB,1,15     STYPE+4         OUTPUT 3 CHAR TYPE ID
        03F1  R  03DC
722                       * SET UP ONSET STANDARD DEVIATION
723     03E2     E5C6        LDM,12,6      U.OSG
        03E3  X  000B
724     03E4     E6C6        STM,12,6      ZOSG
        03E5  R  080B
725     03E6     E6F0        STM,15        HR15
        03E7  R  03EC
726     03E8     E7F0        BLM,15        E:FMF
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```
        03E9  X  000C
727     03EA  R  062D        DFC             TEMP
728     03EB     EDF0        LDI,15          0
        03EC  A  0000
729           R  03EC  HR15  EQU             $-1
730     03ED     ED30        LDI,3           -3
        03EE  A  FFFD
731     03EF     E543        LDM,4,3         TEMP+5
        03F0  R  0632
732     03F1     E643        STM,4,3         M01S5+3
        03F2  R  04FB
733     03F3     703F        ABRB,3,15       $-4
        03F4  R  03EF
734                  * NOW, OUTPUT THOSE 5 LINES........
735     03F5     6CEE        ZRR,14
736     03F6     E6E0        STM,14          E.28F
        03F7  X  0011
737     03F8     E7E0        BLM,14          E:028
        03F9  X  0012
738     03FA  R  04B6        DFC             MSG01
739     03FB     FF0F        BRX,15                          RETURN.
740                  ********************************************************
741                  * LONGL SETS UP AND OUTPUTS A LONG LINE
742     03FC     E750  LONGL BLM,5           SHSET
        03FD  R  0435
743     03FE     ED10        LDI,1           | |
        03FF  A  2020
744     0400     E610        STM,1           M02S2           CLEAR TERMINATIOR
        0401  R  0520
745     0402     E530        LDM,3           TDIUR            DO DIURNAL.
        0403  R  0634
746     0404     ED10        LDI,1           #A
        0405  A  000A
747     0406     2021        MPR,2,1
748     0407     2A26        RAD,2,6
749     0408     603F        ABR,3,15
750     0409     2B31        RAS,3,1
751     040A     6DC3        TRR,12,3
752     040B     E7E0        BLM,14          E:BAD
        040C  X  0002
753     040D     E520        LDM,2           E.BSG
        040E  X  0032
754     040F     E620        STM,2           M02S2+1         | +------|
        0410  R  0521
755     0411     ED10        LDI,1           E.BDF
        0412  X  0003
756     0413     FD21        LDX,2,1
757     0414     0922        MBL,2,2
758     0415     E820        ADI,2           #20
        0416  A  0020
```

```
0417     E620         STM,2        M02S2+4         | +----0 |
0418  R  0524
0419     601F         ABR,1,15
041A     FD21         LDX,2,1
041B     0922         MBL,2,2
041C     E820         ADI,2        #2E
041D  A  002E
041E     E620         STM,2        M02S2+3         | +--0.0 |
041F  R  0523
0420     601E         ABR,1,14
0421     FD21         LDX,2,1
0422     0922         MBL,2,2
0423     611F         SBR,1,15
0424     F821         ADX,2,1
0425     E620         STM,2        M02S2+2         | +000.0 |
0426  R  0522
0427     6C22   LOUT  ZRR,2
0428     E620         STM,2        E.28F
0429  X  0011
042A     E7E0         BLM,14       E:028
042B  X  0012
042C  R  0510         DFC          MSG02
042D     FF0F         BRX,15                       RETURN.
                ****************************************************************
                * SHRTL SETS UP AND OUTPUTS A SHORT LINE
042E     E750   SHRTL BLM,5        SHSET
042F  R  0435
0430     6C22         ZRR,2
0431     E620         STM,2        M02S2           TERMINATE LINE
0432  R  0520
0433     E700         BRU          LOUT
0434  R  0427
                ***********************************************************
                * SHSET SETS UP THE COMMON PART OF BOTH
                *   LONG AND SHORT LINES.
0435     E510   SHSET LDM,1        LINEN
0436  R  0620
0437     E521         LDM,2,1      LLABE
0438  R  060B
0439     E620         STM,2        MSG02+1
043A  R  0511
                *  CONVERT TIME ELEMENT
043B     E7E0         BLM,14       E:FCT
043C  X  000E
043D  R  0513         DFC          MSG02+3
043E     E5C0         LDM,12       TPHAS
043F  R  0632
0440     6DEF         TRR,14,15                        SAVE R15
0441     E7F0         BLM,15       E:FMF           FORMAT PHASE
0442  X  000C
```

```
794  0443 R 0518        DFC          MSG02+8
795  0444   6DFE        TRR,15,14
796  0445   E516        LDM,1,6      U.AMP          HOLD REAL AMP
     0446 X 0013
797  0447   E520        LDM,2        TAMP
     0448 R 0633
798  0449   E626        STM,2,6      U.AMP           SUPPLY AMP FOR OUTPUT
     044A X 0013
799  044B   E7E0        BLM,14       E:FAM
     044C X 000D
800  044D R 051D        DFC          M02S1+4
801  044E   E616        STM,1,6      U.AMP          RESTORE REAL AMP
     044F X 0013
802  0450   FF05        BRX,5                       RETURN
803                    ***************************************************************
804                    * ABCNO IS A SUBROUTINE TO CONVERT A NUMERIC DIGIT
805                    *   TO THE APPHABETIC REPRESENTATION.
806                    *   IT HAS BEEN EXTENDED TO OUTPUT OTHER |WORDS|
807                    *   AS WELL.
808                    * CALLING SEQUENCE:
809                    *     BLM,15       ABCNO
810                    *   WITH R5= NUMBER TO BE CONVERTED
811                    *            OR CODE FOR DESIRED WORD.
812                    *        R10,R11 = BYTE ADDRESS TO BEGIN STORAGE
813                    *  EXIT WITH R10,R11 UPDATED FOR NEXT USAGE.
814  0451   A540  ABCNO SFM,4        RPSV1
     0452 R 0635
815  0453   E545        LDM,4,5      NCTBL
     0454 R 065A
816  0455   6C55        ZRR,5
817  0456   AE74  ABCN1 LBX,7,4
818  0457   7D77        TRRB,7,7     $+3
     0458 R 045A
819  0459   F706        HOP,ABCRT
820  045A   AF7A        SBX,7,10
821  045B   605F        ABR,5,15
822  045C   60BF        ABR,11,15
823  045D   E700        BRU          ABCN1
     045E R 0456
824  045F   A440  ABCRT LFM,4        RPSV1
     0460 R 0635
825  0461   FF0F        BRX,15
826                    ***************************************************************
827                    * STRCH STORES A FIXED NUMBER OF CHARACTERS IN THE OUTPUT
828                    *    LINE.
829                    *
830                    *     BLM,15       STRCH
831                    *   WITH R4=LOCATION OF FIRST CHAR
832                    *        R5= ZERO
833                    *        R3=-COUNT OF CHARS
```

```
834                         *     RESGISTERS ARE RESTORED FOR RETUNR.
835                         *       R10,R11 BYTE ADDR FOR STORAGE,
836                         *          ARE UPDATED ON RETURN.
837     0462     A530   STRCH SFM,3          RPSV1
        0463  R  0635
838     0464     AE74         LBX,7,4
839     0465     AF7A         SBX,7,10
840     0466     605F         ABR,5,15
841     0467     60BF         ABR,11,15
842     0468     703F         ABRB,3,15      STRCH+2
        0469  R  0464
843     046A     A430         LFM,3          RPSV1
        046B  R  0635
844     046C     FF0F         BRX,15
845                         ********************************************************************
846                         * STAMP TAKES THE NUMERIC AMPLITUDE, CONVERS IT TO
847                         *   DB AND PUTS IT IN THE OUTPUT BUFFER
848                         *     BLM,12         STAMP
849                         *   WITH R5= VALUE
850                         *        R10,R11 FOR STORAGE LOCATION
851                         *           UPDATED ON RETURN.
852     046D     A540   STAMP SFM,4          RPSV2
        046E  R  063C
853     046F     ED70         LDI,7          10
        0470  A  000A
854     0471     2047         MPR,4,7                        AMP*100
855     0472     2A49         RAD,4,9                          /2048
856     0473     E950         SUI,5          20                -5 VOLTS
        0474  A  0014
857     0475     6D6C         TRR,6,12
858     0476     6DC5         TRR,12,5
859     0477     E7E0         BLM,14         E:BDC
        0478  X  002E
860                         * OUTPUT SIGN....
861     0479     6DC6         TRR,12,6
862     047A     ED50         LDI,5          20
        047B  A  0014
863     047C     E560         LDM,6          E.BSG
        047D  X  0032
864     047E     E960         SUI,6          #202D
        047F  A  202D
865     0480     7D66         TRRB,6,6       $+3
        0481  R  0483
866     0482     605F         ABR,5,15
867     0483     E7F0         BLM,15         ABCNO          PLUS/MINUS
        0484  R  0451
868                         * 3 DIGIT OUTPUT,....
869     0485     ED70         LDI,7          2
        0486  A  0002
870     0487     E7E0         BLM,14         OUTNO
```

```
        0488  R  0490
871     0489     ED50        LDI,5          22
        048A  A  0016
872     048B     E7F0        BLM,15         ABCNO          |DB|
        048C  R  0451
873     048D     A440        LFM,4          RPSV2
        048E  R  063C
874     048F     FF0C        BRX,12
875                          ***************************************************************
876                          *  CUTNO OUTPUTS THE NUMBER OF DIGITS SPECIFIED IN
877                          *    R7 FROM E.BDF+(R7) THRU E.BDF.
878                          *     BLM,14         OUTNO
879     0490     ED40   OUTNO LDI,4          E.BDF
        0491  X  0003
880     0492     6847        ADR,4,7
881     0493     614F        SBR,4,15                      FIRST CHAR.
882     0494     FD54        LDX,5,4
883     0495     E7F0        BLM,15         ABCNO
        0496  R  0451
884     0497     717F        SBRB,7,15      $-4
        0498  R  0493
885     0499     FF0E        BRX,14
886                          ***************************************************************
887                          * TERLN TERMINATES LINE AND OUTPUTS TO ASR 28
888     049A     6C55   TERLN ZRR,5
889     049B     AF5A        SBX,5,10
890     049C     60BF        ABR,11,15
891     049D     AF5A        SBX,5,10
892     049E     6550        LBR,5,0
893     049F     E650        STM,5          E.28F
        04A0  X  0011
894     04A1     E7E0        BLM,14         E:028
        04A2  X  0012
895     04A3  R  0582        DFC            MSG06
896     04A4     FF0F        BRX,15
897                          ***************************************************************
898                          * NXTLN IS A SUBROUTINE TO SET UP ANOTHER LINE IN
899                          *    THE CURRENT PARAGRAPH.
900                          *     BLM,14         NXTLN
901     04A5     ED50   NXTLN LDI,5          #0D                C/R
        04A6  A  000D
902     04A7     AF5A        SBX,5,10
903     04A8     60BF        ABR,11,15
904     04A9     ED50        LDI,5          #0A                L/F
        04AA  A  000A
905     04AB     AF5A        SBX,5,10
906     04AC     60BF        ABR,11,15
907     04AD     ED40        LDI,4          -4
        04AE  A  FFFC
908     04AF     ED50        LDI,5          #20                4 SPACES
```

```
        04B0  A  0020
909     04B1     AF5A        SBX,5,10
910     04B2     60BF        ABR,11,15
911     04B3     704F        ABRB,4,15     $-2
        04B4  R  04B1
912     04B5     FF0E        BRX,14
```

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914                     ************************************************************
915     04B6  A  0D0A   MSG01 DFC           #0D0A,#0A0A,|123 123456  |
        04B7  A  0A0A
        04B8  A  3132
        04B9  A  3320
        04BA  A  3132
        04BB  A  3334
        04BC  A  3536
        04BD  A  2020
916     04BE  A  5245         DFC           |REPORTABLE SIGNAL DESCRIPTION,|
        04BF  A  504F
        04C0  A  5254
        04C1  A  4142
        04C2  A  4C45
        04C3  A  2053
        04C4  A  4947
        04C5  A  4E41
        04C6  A  4C20
        04C7  A  4445
        04C8  A  5343
        04C9  A  5249
        04CA  A  5054
        04CB  A  494F
        04CC  A  4E2C
917     04CD  A  2044   M01S1 DFC           | DET 515|,#0D0A
        04CE  A  4554
        04CF  A  2035
        04D0  A  3135
        04D1  A  0D0A
918     04D2  A  3030   M01S2 DFC           |001 |,#0D0A,|CHAN A;FREQ |
        04D3  A  3120
        04D4  A  0D0A
        04D5  A  4348
        04D6  A  414E
        04D7  A  2041
        04D8  A  3B46
        04D9  A  5245
        04DA  A  5120
919     04DB  A  3137   M01S3 DFC           |17.8 NAA;TR7;GN23;BL47;CARD7|
        04DC  A  2E38
        04DD  A  204E
        04DE  A  4141
        04DF  A  3B54
        04E0  A  5237
        04E1  A  3B47
        04E2  A  4E32
        04E3  A  333B
        04E4  A  424C
        04E5  A  3437
        04E6  A  3B43
```

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        04E7  A  4152
        04E8  A  4437
920     04E9  A  0D0A        DFC          #0D0A,|SIGNAL TYPE:|
        04EA  A  5349
        04EB  A  474E
        04EC  A  414C
        04ED  A  2054
        04EE  A  5950
        04EF  A  453A
921     04F0  A  2041  M01S4 DFC          | ALPHA    SIGMA |
        04F1  A  4C50
        04F2  A  4841
        04F3  A  2020
        04F4  A  2020
        04F5  A  5349
        04F6  A  474D
        04F7  A  4120
922     04F8  A  3030  M01S5 DFC          |00.75 |,#0D0A,|    DOY |
        04F9  A  2E37
        04FA  A  3520
        04FB  A  0D0A
        04FC  A  2020
        04FD  A  2020
        04FE  A  444F
        04FF  A  5920
923     0500  A  2054        DFC          | TIME    PHASE    AMP     DIUR|,0
        0501  A  494D
        0502  A  4520
        0503  A  2020
        0504  A  2050
        0505  A  4841
        0506  A  5345
        0507  A  2020
        0508  A  2020
        0509  A  414D
        050A  A  5020
        050B  A  2020
        050C  A  2020
        050D  A  4449
        050E  A  5552
        050F  A  0000
924     0510  A  0D0A  MSG02 DFC          #0D0A,|ON  123 123456 +|
        0511  A  4F4E
        0512  A  2020
        0513  A  3132
        0514  A  3320
        0515  A  3132
        0516  A  3334
        0517  A  3536
        0518  A  202B
```

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925     0519  A  3030  M02S1 DFC          |0003.62  00.00|
        051A  A  3033
        051B  A  2E36
        051C  A  3220
        051D  A  2030
        051E  A  302E
        051F  A  3030
926     0520  A  2020  M02S2 DFC          |   +000.0 |,0
        0521  A  202B
        0522  A  3030
        0523  A  302E
        0524  A  3020
        0525  A  0000
927     0526  A  0D0A  MSG03 DFC          #0D0A,|OFFSET: |
        0527  A  4F46
        0528  A  4653
        0529  A  4554
        052A  A  3A20
928     052B  A  3031  M03S1 DFC          |0137.62 |,#0D0A,|ONSET RATE: |
        052C  A  3337
        052D  A  2E36
        052E  A  3220
        052F  A  0D0A
        0530  A  4F4E
        0531  A  5345
        0532  A  5420
        0533  A  5241
        0534  A  5445
        0535  A  3A20
929     0536  A  2030  M03S2 DFC          | 000.0|,0
        0537  A  3030
        0538  A  2E30
        0539  A  0000
930     053A  A  0D0A  MSG04 DFC          #0D0A,|SIGNAL TERMINATED:|
        053B  A  5349
        053C  A  474E
        053D  A  414C
        053E  A  2054
        053F  A  4552
        0540  A  4D49
        0541  A  4E41
        0542  A  5445
        0543  A  443A
931     0544  A  2053  M04S1 DFC          | SIGNAL LOST|,#0D0A,#0A0A,0
        0545  A  4947
        0546  A  4E41
        0547  A  4C20
        0548  A  4C4F
        0549  A  5354
        054A  A  0D0A
```

```
        054B  A  0A0A
        054C  A  0000
932     054D  A  0D0A  LEADS DFC          #0D0A,#0A0A,#0A0A
        054E  A  0A0A
        054F  A  0A0A
933     0550  A  0101  LEADR RES          25,#0101
934     0569  A  1F1F        DFC          #1F1F,0
        056A  A  0000
935     056B  A  0D0A  MSG05 DFC          #0D0A,#0A0A,| RSD|
        056C  A  0A0A
        056D  A  2052
        056E  A  5344
936     056F  A  0000  M05S1 RES          19,0
937     0582  A  0D0A  MSG06 DFC          #0D0A
938     0583  A  0000  M06S1 RES          80,0
```

```
940                     * TABLE TO ASSOCIATE TRANSMITTER CALL LETTERS WITH
941                     *  FREQUENCY.
942     05D3  A  3132   CALTR DFC          |12.0 MG4|
        05D4  A  2E30
        05D5  A  204D
        05D6  A  4734
943     05D7  A  3132          DFC          |12.2 MG1|
        05D8  A  2E32
        05D9  A  204D
        05DA  A  4731
944     05DB  A  3133          DFC          |13.1 MG3|
        05DC  A  2E31
        05DD  A  204D
        05DE  A  4733
945     05DF  A  3136          DFC          |16.0 GBR|
        05E0  A  2E30
        05E1  A  2047
        05E2  A  4252
946     05E3  A  3136          DFC          |16.4 JXZ|
        05E4  A  2E34
        05E5  A  204A
        05E6  A  585A
947     05E7  A  3137          DFC          |17.4 NDT|
        05E8  A  2E34
        05E9  A  204E
        05EA  A  4454
948     05EB  A  3137          DFC          |17.8 NAA|
        05EC  A  2E38
        05ED  A  204E
        05EE  A  4141
949     05EF  A  3138          DFC          |18.6 NPG|
        05F0  A  2E36
        05F1  A  204E
        05F2  A  5047
950     05F3  A  3139          DFC          |19.6 GBZ|
        05F4  A  2E36
        05F5  A  2047
        05F6  A  425A
951     05F7  A  3230          DFC          |20.0 WWV|
        05F8  A  2E30
        05F9  A  2057
        05FA  A  5756
952     05FB  A  3231          DFC          |21.4 NSS|
        05FC  A  2E34
        05FD  A  204E
        05FE  A  5353
953     05FF  A  3232          DFC          |22.3 NWC|
        0600  A  2E33
        0601  A  204E
        0602  A  5743
```

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954     0603  A  3233        DFC           |23.4 NPM|
        0604  A  2E34
        0605  A  204E
        0606  A  504D
955     0607  A  3234        DFC           |24.0 NBA|
        0608  A  2E30
        0609  A  204E
        060A  A  4241
956                         * LINE LABELS....
957     060B  A  4F4E  LLABE DFC           |ONP1P2PKHRFR|
        060C  A  5031
        060D  A  5032
        060E  A  504B
        060F  A  4852
        0610  A  4652
958                         * RSD NUMBERS FOR SIGNALS IN PROGRESS...
959     0611  A  0000  UDRNO RES           14,0
960     061F  A  0001  U.UDR DFC           001             MASTER NUMBER
961     0620  A  0000  LINEN DFC           0               OUTPUT LINE ID
962     0621  A  2041  TYPEA DFC           | ALPHA|
        0622  A  4C50
        0623  A  4841
963     0624  A  2042  TYPEB DFC           | BRAVO|
        0625  A  5241
        0626  A  564F
964     0627  A  2043  TYPEC DFC           | COCO |
        0628  A  4F43
        0629  A  4F20
965     062A  A  2044  TYPED DFC           | DELTA|
        062B  A  454C
        062C  A  5441
966     062D  A  0000  TEMP  RES           5,0
967     0632  A  0000  TPHAS RES           1,0
968     0633  A  0000  TAMP  RES           1,0
969     0634  A  0000  TDIUR RES           1,0
970     0635  A  0000  RPSV1 RES           7,0
971     063C  A  0000  RPSV2 RES           6,0
972     0642  A  204E  END1  DFC           | NORMALLY    |
        0643  A  4F52
        0644  A  4D41
        0645  A  4C4C
        0646  A  5920
        0647  A  2020
973     0648  A  2054  END2  DFC           | TIME LAPSE  |
        0649  A  494D
        064A  A  4520
        064B  A  4C41
        064C  A  5053
        064D  A  4520
974     064E  A  2053  END3  DFC           | SIGNAL LOST|
```

```
                064F  A  4947
                0650  A  4E41
                0651  A  4C20
                0652  A  4C4F
                0653  A  5354
 975            0654  A  204E  END4  DFC          | NEW ONSET  |
                0655  A  4557
                0656  A  204F
                0657  A  4E53
                0658  A  4554
                0659  A  2020
 976            065A  R  0672  NOTBL DFC          NO0            ZERO
 977            065B  R  0675        DFC          NO1            ONE
 978            065C  R  0678        DFC          NO2            TWO
 979            065D  R  067B        DFC          NO3            THREE
 980            065E  R  067F        DFC          NO4            FOUR
 981            065F  R  0682        DFC          NO5            FIVE
 982            0660  R  0685        DFC          NO6            SIX
 983            0661  R  0688        DFC          NO7            SEVEN
 984            0662  R  068C        DFC          NO8            EIGHT
 985            0663  R  0690        DFC          NO9            NINE
 986            0664  R  0693        DFC          NO10           FRONT
 987            0665  R  0697        DFC          NO11           BACK
 988            0666  R  069A        DFC          NO12           PEAK
 989            0667  R  069D        DFC          NO13           HALF
 990            0668  R  06A0        DFC          NO14           FULL
 991            0669  R  06A3        DFC          NO15           HOUR
 992            066A  R  06A6        DFC          NO16           LOST
 993            066B  R  06A9        DFC          NO17           MICROSECOND
 994            066C  R  06B0        DFC          NO18           ADVANCE
 995            066D  R  06B5        DFC          NO19           RETARD
 996            066E  R  06B9        DFC          NO20           PLUS
 997            066F  R  06BC        DFC          NO21           MINUS
 998            0670  R  06C0        DFC          NO22           DB
 999            0671  R  06C2        DFC          NO23           SECOND ONSET
1000                                 ************************************************************
1001            0672  A  205A  NO0   DFC          | ZER|,#4F00
                0673  A  4552
                0674  A  4F00
1002            0675  A  204F  NO1   DFC          | ONE|,0
                0676  A  4E45
                0677  A  0000
1003            0678  A  2054  NO2   DFC          | TWO|,0
                0679  A  574F
                067A  A  0000
1004            067B  A  2054  NO3   DFC          | THREE|,0
                067C  A  4852
                067D  A  4545
                067E  A  0000
1005            067F  A  2046  NO4   DFC          | FOU|,#5200
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         0680  A  4F55
         0681  A  5200
1006     0682  A  2046  NO5   DFC          | FIV|,#4500
         0683  A  4956
         0684  A  4500
1007     0685  A  2053  NO6   DFC          | SIX|,0
         0686  A  4958
         0687  A  0000
1008     0688  A  2053  NO7   DFC          | SEVEN|,0
         0689  A  4556
         068A  A  454E
         068B  A  0000
1009     068C  A  2045  NO8   DFC          | EIGHT|,0
         068D  A  4947
         068E  A  4854
         068F  A  0000
1010     0690  A  204E  NO9   DFC          | NIN|,#4500
         0691  A  494E
         0692  A  4500
1011     0693  A  2046  NO10  DFC          | FRONT|,0
         0694  A  524F
         0695  A  4E54
         0696  A  0000
1012     0697  A  2042  NO11  DFC          | BAC|,#4B00
         0698  A  4143
         0699  A  4B00
1013     069A  A  2050  NO12  DFC          | PEA|,#4B00
         069B  A  4541
         069C  A  4B00
1014     069D  A  2048  NO13  DFC          | HAL|,#4600
         069E  A  414C
         069F  A  4600
1015     06A0  A  2046  NO14  DFC          | FUL|,#4C00
         06A1  A  554C
         06A2  A  4C00
1016     06A3  A  2048  NO15  DFC          | HOU|,#5200
         06A4  A  4F55
         06A5  A  5200
1017     06A6  A  204C  NO16  DFC          | LOS|,#5400
         06A7  A  4F53
         06A8  A  5400
1018     06A9  A  204D  NO17  DFC          | MICROSECOND|,#5300
         06AA  A  4943
         06AB  A  524F
         06AC  A  5345
         06AD  A  434F
         06AE  A  4E44
         06AF  A  5300
1019     06B0  A  2041  NO18  DFC          | ADVANCE|,0
         06B1  A  4456
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```
         06B2  A  414E
         06B3  A  4345
         06B4  A  0000
1020     06B5  A  2052  NO19  DFC          | RETAR|,#4400
         06B6  A  4554
         06B7  A  4152
         06B8  A  4400
1021     06B9  A  2050  NO20  DFC          | PLU|,#5300
         06BA  A  4C55
         06BB  A  5300
1022     06BC  A  204D  NO21  DFC          | MINUS|,0
         06BD  A  494E
         06BE  A  5553
         06BF  A  0000
1023     06C0  A  2044  NO22  DFC          | D|,#4200
         06C1  A  4200
1024     06C2  A  2053  NO23  DFC          | SECOND ONSE|,#5400
         06C3  A  4543
         06C4  A  4F4E
         06C5  A  4420
         06C6  A  4F4E
         06C7  A  5345
         06C8  A  5400
```

```
1026    06C9  A  0000  ZCLS   RES          14,0          U.CLS
1027    06D7  A  0000  ZTYPE  RES          14,0          POINTS TO TYPE
1028    06E5  A  0000  ZFRQ   RES          28,0          U.FRQ
1029    0701  A  0000  CALLT  RES          28,0          COMPUTES
1030    071D  A  0000  ZSTA   RES          14,0          M.STA
1031    072B  A  0000  ZOTM   RES          28,0          U.OTM
1032    0747  A  0000  ZOTB   RES          28,0          U.OTB
1033    0763  A  0000  ZOAM   RES          14,0          U.OAM
1034    0771  A  0000  ZOST   RES          14,0          W.OST
1035    077F  A  0000  ZODR   RES          14,0          U.ODR
1036    078D  A  0000  ZONR   RES          14,0          W.ONR
1037    079B  A  0000  ZPTM   RES          28,0          W.PTM
1038    07B7  A  0000  ZPAM   RES          14,0          W.PAM
1039    07C5  A  0000  ZRTM   RES          28,0          W.RAM
1040    07E1  A  0000  ZRAM   RES          14,0          W.RAM
1041    07EF  A  0000  ZRFZ   RES          14,0          W.RFZ
1042    07FD  A  0000  ZTR    RES          14,0          U.TRK
1043    080B  A  0000  ZOSG   RES          14,0          U.OSG
1044    0819  A  0000  ZOFZ   RES          14,0          U.OFZ
1045    0827  A  0000  ZFAM   RES          14,0          U.AMP
1046    0835  A  0000  ZFFZ   RES          14,0          U.LFZ
1047    0843  A  0000  ZFTM   RES          28,0          U.LTM
1048    085F  A  0000  INPRG  RES          14,0
1049    086D  A  0000  ZEND   RES          14,0
1050    087B                 END

TOTAL ASSEMBLY ERRORS =    0     SIZE =   2171
```

```
 1                                PGM          U$RED
 2                                 INT          U:RED
 3                                 EXT          U.CST,U.AST,U.TRK,U.DIU,E:SKD
 4                                 EXT          E:028,E.28F,E:LOG,U.FRQ,U.IHB
 5                                 EXT          E:FRT,M.STA
 6                              *     CAT NO.  400100-007
 7                              * U$RED CHECKS FOR CHANNELS ON THE SAME FREQUENCY.
 8                              *   THOSE WHICH ARE, ARE COMPARED FOR CRITICAL
 9                              *   PROCESSING PARAMETER IDENTITY.  THE LEVELS OF
10                              *   CHECKING ARE:
11                              *     1.  CHANNEL STATUS (U.CST)
12                              *     2.  ANALYSIS STATUS (U.AST)
13                              *     3.  TRACKING RATES (U.TRK)
14                              *     4.  DIURNAL SLOPE (U.DIU)
15     0000      6C66  U:RED ZRR,6                              1ST CHAN POINTER
16     0001      E660        STM,6         FLAG                 RESET FLAG WORD
       0002  R   00C9
17     0003      8606  RED02 TBMB,0,6      U.IHB,RED01          SKIP CHAN IF INHIBITED
       0004  X   000A
       0005  R   0071
18     0006      6D76        TRR,7,6
19     0007      607F        ABR,7,15                           START 2ND CHAR AT 1ST + 1
20     0008      8607  RED04 TBMB,0,7      U.IHB,RED03          SKIP CHAN IF INHIBITED
       0009  X   000A
       000A  R   006C
21                             * WE HAVE 2 UNHIBITED CHANS, LET'S SEE IF THEY'RE
22                             *   ON THE SAME FREQUENCY.
23     0008      6D16          TRR,1,6
24     000C      2D11          LLS,1,1
25     000D      6D27          TRR,2,7
26     000E      2D21          LLS,2,1
27     000F      E531          LDM,3,1       U.FRQ
       0010  X   0009
28     0011      E132          SUM,3,2       U.FRQ
       0012  X   0009
29     0013      7D33          TRPB,3,3      RED03                BRU IF NOT SAME
       0014  R   006C
30     0015      601F          ABR,1,15
31     0016      602F          ABR,2,15
32     0017      E531          LDM,3,1       U.FRQ
       0018  X   0009
33     0019      E132          SUM,3,2       U.FRQ
       001A  X   0009
34     001B      7D33          TRRB,3,3      RED03                TENTHS NOT SAME
       001C  R   006C
35                             * IF EITHER CHANNEL HAS NO CARDIOIC, IT WILL MATCH
36                             *   THE OTHER; IF BOTH DO, THEY MUST BE ON THE SAME
37                             *   PATH.
38     001D      E536          LDM,3,6       M.STA
       001E  X   000C
```

```
39      001F      EA30        ETI,3       #FFC7
        0020  A   FFC7
40      0021      EC30        XOI,3       #0038
        0022  A   0038
41      0023      7D33        TRRB,3,3    $+4
        0024  R   0027
42      0025      E700        BRU         REDO5          CHAN IN 6 NONE
        0026  R   0036
43      0027      E537        LDM,3,7     M.STA
        0028  X   000C
44      0029      EA30        ETI,3       #FFC7
        002A  A   FFC7
45      002B      EC30        XOI,3       #0038
        002C  A   0038
46      002D      7D33        TRRB,3,3    $+3
        002E  R   0030
47      002F      F707        HOP,REDO5                  CHAN IN 7 NONE
48                          * NOW, MAKE SURE BOTH OF THESE CHANNELS ARE MONITORING
49                          *   THE SAME PATH.
50      0030      E536        LDM,3,6     M.STA
        0031  X   000C
51      0032      E437        XOM,3,7     M.STA
        0033  X   000C
52      0034      763A        TBRB,3,10   REDO3
        0035  R   006C
53                          * WE HAVE NOW ASCERTAINED THAT THE CHANS IN R6 AND
54                          *   R7 ARE ON THE SAME FREQUENCY.  LET'S CHECK AND
55                          *   SEE IF THEY ARE AT THE SAME LEVEL OF PROCESSING.
56                          * THE CHAN STATUS SHOULD BE THE SAME (U.CST)
57      0036      8210    REDO5 OBMM,1      FLAG
        0037  R   00C9
58      0038      E536        LDM,3,6     U.CST
        0039  X   0001
59      003A      E137        SUM,3,7     U.CST
        003B  X   0001
60      003C      7D33        TRRB,3,3    FLEV1          BRU ON FAILURE
        003D  R   0084
61                          * THE ANALYSIS STATUS SHOULD BE THE SAME (U.AST)
62      003E      E536        LDM,3,6     U.AST
        003F  X   0002
63      0040      E137        SUM,3,7     U.AST
        0041  X   0002
64      0042      7D33        TRRB,3,3    FLEV2          BRU ON FAILURE
        0043  R   0088
65                          * THE DIFFERENCE IN TRACKING RATES SHOULD BE
66                          *   SMALL.
67      0044      E536        LDM,3,6     U.TRK
        0045  X   0003
68      0046      E137        SUM,3,7     U.TRK
        0047  X   0003
```

```
69      0048      7630        TBRB,3,0    $+3
        0049  R   004B
70      004A      F702        HOP,$+2
71      004B      6F33        TTR,3,3
72      004C      E930        SUI,3       #3
        0040  A   0003
73      004E      7630        TBRB,3,0    $+4
        004F  R   0052
74      0050      E700        BRU         FLEV3
        0051  R   008C
75                          * THE DIFFERENCE IN DIURNAL ESTIMATES SHOULD
76                          *   LIKEWISE BE SMALL.
77                          * IF THE NOISE LEVEL IS SUFFICIENT TO REQUIRE LOW
78                          *   TRACK RATES. THE VALUE OF COMPARING DIURNALS IS
79                          *   QUESTIONABLE, SO WE WON'T.
80      0052      E536        LDM,3,6     U.TRK
        0053  X   0003
81      0054      E930        SUI,3       5           (MUST BE > 4)
        0055  A   0005
82      0056      7630        TBRB,3,0    REDO3       TOO LOW
        0057  R   006C
83      0058      E537        LOM,3,7     U.TRK
        0059  X   0003
84      005A      E930        SUI,3       5
        005B  A   0005
85      005C      7630        TBRB,3,0    REDO3       TOO LOW
        005D  R   006C
86      005E      E536        LOM,3,6     U.DIU
        005F  X   0004
87      0060      E137        SUM,3,7     U.DIU
        0061  X   0004
88      0062      7630        TBRB,3,0    $+3
        0063  R   0065
89      0064      F702        HOP,$+2
90      0065      6F33        TTR,3,3
91      0066      E930        SUI,3       #0
        0067  A   0000
92      0068      7630        TBRB,3,0    REDO3       ALL LEVELS PASS
        0069  R   006C
93      006A      E700        BRU         FLEV4
        006B  R   0090
94      006C      607F  REDO3 ABR,7,15                NEXT 2ND CHANNEL
95      006D      ED10        LDI,1       14
        006E  A   000E
96      006F      7917        SURB,1,7    REDO4
        0070  R   0008
97      0071      606F  REDO1 ABR,6,15                NEXT 1ST CHANNEL
98      0072      ED10        LDI,1       13
        0073  A   000D
99      0074      7916        SURB,1,6    REDO2
```

```
                0075  R  0003
100             0076     8610        TBMB,1          FLAG,$+5
                0077  R  00C9
                0078  R  007B
101             0079     E700        BRU             E:SKD           NO MATCHES
                007A  X  0005
102             007B     8600        TBMB,0          FLAG,E:SKD      FAILURES FOUND
                007C  R  00C9
                007D  X  0005
103                              * SUCCESSFUL MATCHES FOUND, GENERATE LOG MSG.
104             007E     ED50        LDI,5           #1306
                007F  A  1306
105             0080     E740        BLM,4           E:LOG
                0081  X  0008
106             0082     E700        BRU             E:SKD
                0083  X  0005
107             0084     ED10   FLEV1 LDI,1           #C001
                0085  A  C001
108             0086     E700        BRU             MSGUP
                0087  R  0092
109             0088     ED10   FLEV2 LDI,1           #C002
                0089  A  C002
110             008A     E700        BRU             MSGUP
                008B  R  0092
111             008C     ED10   FLEV3 LDI,1           #C003
                008D  A  C003
112             008E     E700        BRU             MSGUP
                008F  R  0092
113             0090     ED10   FLEV4 LDI,1           #C004
                0091  A  C004
114             0092     E610   MSGUP STM,1           FLAG
                0093  R  00C9
115             0094     E7E0        BLM,14          E:FRT
                0095  X  000B
116             0096  R  00AF        DFC             FMSG+1
117             0097     0911        MBL,1,1
118             0098     E810        ADI,1           #3020
                0099  A  3020
119             009A     E610        STM,1           FMSG+25
                009B  R  00C7
120             009C     6D16        TRR,1,6
121             009D     E810        ADI,1           #2041
                009E  A  2041
122             009F     E610        STM,1           FMSG+16
                00A0  R  00BE
123             00A1     6D17        TRR,1,7
124             00A2     E810        ADI,1           #2041
                00A3  A  2041
125             00A4     E610        STM,1           FMSG+19
                00A5  R  00C1
```

```
 126      00A6      6C11          ZRR,1
 127      00A7      E610          STM,1          E.28F
          00A8  X   0007
 128      00A9      E7E0          BLM,14         E:028
          00AA  X   0006
 129      00AB  R   00AE          DFC            FMSG
 130      00AC      E700          BRU            RED03
          00AD  R   006C
 131      00AE  A   0D0A  FMSG    DFC            #0D0A,|123 123456  RED FAILURE,|
          00AF  A   3132
          00B0  A   3320
          00B1  A   3132
          00B2  A   3334
          00B3  A   3536
          00B4  A   2020
          00B5  A   5245
          00B6  A   4420
          00B7  A   4641
          00B8  A   494C
          00B9  A   5552
          00BA  A   452C
 132      00BB  A   2043          DFC            | CHANS A AND B ON LEVEL 1 |,0
          00BC  A   4841
          00BD  A   4E53
          00BE  A   2041
          00BF  A   2041
          00C0  A   4E44
          00C1  A   2042
          00C2  A   204F
          00C3  A   4E20
          00C4  A   4C45
          00C5  A   5645
          00C6  A   4C20
          00C7  A   3120
          00C8  A   0000
 133      00C9  A   0000  FLAG    DFC            0
 134      00CA              END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   202
```

```
 1                          PGM           U$PST
 2                           INT           U:PST
 3                           EXT           U.GAN,U.TRK,U.BLL,E.35I,E.IOF
 4                           EXT           E:035,U:CNI,E:SKD,E:MIT,E:LOG
 5                     *     CAT NO.  400100-004
 6                     * THIS PROGRAM ALLOWS THE OPERATOR TO MAKE NEEDED AJUSTMENTS TO
 7                     *   THE TRACK RATE, GAIN, AND BLANKING LEVEL BY TYPING IN THE
 8                     *   DESIRED VALUE FOR EACH ON THE ASR 35 TELETYPEWRITER.  THE
 9                     *   MACHINE RESPONDS BY EITHER CARRYING OUT THE DESIRED FUNCTION
10                     *   OR EXPLANING WHY IT COULDN'T.
11                     * THE OPERATOR CALLING SEQUENCE IS..... OPC: (HE THEN TYPES)
12                     *   A THRU N FOLLOWED BY A COMMA FOR CHANNEL DESIGNATION,
13                     *   A SINGLE LETTER FOR FUNCTION;  B = BLANKING CHANGE
14                     *                                  G = GAIN CHANGE
15                     *                                  T = TRACKING RATE CHANGE
16                     *   THIS FUNCTION SHOULD BE FOLLOWED BY A COMMA, AND A
17                     *   TWO DIGIT VALUE. (SHOULD BE POSITIVE AND WITHIN THE
18                     *   FOLLOWING LIMITS)  B = 00 THRU 63
19                     *                      G = 00 THRU 24
20                     *                      T = 00 THRU 09
21                     *           THE TWO DIGIT VALUE SHOULD BE FOLLOWED BY A CR.
22                     ****************************************************************
23                     ****************************************************************
24                     *********                                             ***********
25                     *********     EXAMPLE:    OPC:B,G,08                  ***********
26                     *********                                             ***********
27                     ****************************************************************
28                     ****************************************************************
29     0000     ED10   U:PST LDI,1         E.35I          GET CHANNEL
       0001  X  0004
30     0002     601D         ABR,1,13
31     0003     FD61         LDX,6,1
32     0004     E960         SUI,6         #41            CONVERT LETTER TO NUMBER
       0005  A  0041
33     0006     7660         TBRB,6,0      GOOF1
       0007  R  000D
34     0008     6D56         TRR,5,6                          AND HOLD IN R6
35     0009     E950         SUI,5         14             IS CHANNEL NUMBER OK?
       000A  A  000E
36     0008     7650         TBRB,5,0      MAYI           IF YES CHECK FOR SIGNAL IN PROGRESS
       000C  R  0015
37     000D     6C22   GOOF1 ZRR,2
38     000E     E620         STM,2         E.IOF
       000F  X  0005
39     0010     E7E0         BLM,14        E:035          IF NO   SAY SO...
       0011  X  0006
40     0012  R  00BD         DFC           ILLCH
41     0013     E700         BRU           E:SKD
       0014  X  0008
42                     ****************************************************************
```

```
43                          *** SO MUCH FOR THE CHANNEL NUMBER CHECKER MESS.....   ****
44                          ************************************************************
45      0015      E7F0  MAYI  BLM,15          U:CNI           SIGNAL IN PROGRESS?
        0016  X   0007
46      0017      E700        BRU             NOGO              YES???...NO CHANGES PLEASE
        0018  R   0047
47      0019      601F        ABR,1,15                          NO????...GET FUNCTION
48      001A      E7E0        BLM,14          COMCK
        001B  R   0057
49      001C      FDA1        LDX,10,1
50      001D      E9A0        SUI,10          #42             DOES HE WANT BLANKING CHANGE?
        001E  A   0042
51      001F      7DAA        TRRB,10,10      $+4             ...NEGATIVE....
        0020  R   0023
52      0021      E700        BRU             BVAL            ...ROGER.....
        0022  R   0091
53      0023      E9A0        SUI,10          #5              DOES HE WANT A GAIN CHANGE?
        0024  A   0005
54      0025      7DAA        TRRB,10,10      $+4             ...NEGATIVE AGAIN....
        0026  R   0029
55      0027      E700        BRU             GVAL            THAT'S WHAT THE MAN WANTS
        0028  R   00AB
56      0029      E9A0        SUI,10          #D              EITHER HE WANTS A TRACK RATE CHANGE
        002A  A   000D
57      002B      7DAA        TRRB,10,10      NOFUN           ......OR HE HIT THE WRONG KEY.
        002C  R   004F
58      002D      E7A0        BLM,10          VALPK           GO GET THE VALUE
        002E  R   006F
59      002F      E630        STM,3           PARAM
        0030  R   00A5
60      0031      E930        SUI,3           10              IS TR VALUE OK?
        0032  A   000A
61      0033      7630        TBRB,3,0        $+4             ....YES..CONTINUE
        0034  R   0037
62      0035      E700        BRU             OOPS            ....NO...THEN SAY SO
        0036  R   003F
63      0037      E520        LDM,2           PARAM
        0038  R   00A5
64      0039      E626        STM,2,6         U.TRK
        003A  X   0002
65      003B      ED70        LDI,7           03
        003C  A   0003
66      003D      E700        BRU             OUTGO           YOUR ON YOUR WAY
        003E  R   00A1
67      003F      6C22  OOPS  ZRR,2
68      0040      E620        STM,2           E.IOF
        0041  X   0005
69      0042      E7E0        BLM,14          E:035           ILLEGAL VALUE MESSAGE
        0043  X   0006
70      0044  R   00F8        DFC             ILLVL
```

```
71      0045      E700        BRU         E:SKD
        0046  X   0008
72      0047      6C22  NOGO  ZRR,2
73      0048      E620        STM,2       E.IOF
        0049  X   0005
74      004A      E7E0        BLM,14      E:035       OUTPUT MESSAGE TO OPER.
        004B  X   0006
75      004C  R   00C8        DFC         NOPAR       .....SIG IN PROGRESS.....
76      004D      E700        BRU         E:SKD       TOO BAD, MAYBE NEXT TIME
        004E  X   0008
77      004F      6C22  NOFUN ZRR,2
78      0050      E620        STM,2       E.IOF
        0051  X   0005
79      0052      E7E0        BLM,14      E:035       ILLEGAL FUNCTION MESSAGE
        0053  X   0006
80      0054  R   00DF        DFC         ILFUN
81      0055      E700        BRU         E:SKD       TRY AGAIN SOME OTHER TIME
        0056  X   0008
82      0057      FDB1  COMCK LDX,11,1                GET NEXT CHAR
83      0058      E9B0        SUI,11      #2C         IS IT A COMMA
        0059  A   002C
84      005A      7DBB        TRRB,11,11  $+4
        005B  R   005E
85      005C      601F        ABR,1,15                YES....
86      005D      FF0E        BRX,14
87      005E      6C22        ZRR,2                   NO, LOG INVALID FORMAT
88      005F      E620        STM,2       E.IOF
        0060  X   0005
89      0061      E7E0        BLM,14      E:035
        0062  X   0006
90      0063  R   0107        DFC         INFMT
91      0064      E700        BRU         E:SKD       RETURN
        0065  X   0008
92      0066      7640  NUMCK TBRB,4,0    OOPS        NUMBER TOO LOW, SAY SO
        0067  R   003F
93      0068      E940        SUI,4       10
        0069  A   000A
94      006A      7640        TBRB,4,0    $+4         NUMBER TOO HIGH, SAY SO
        006B  R   006E
95      006C      E700        BRU         OOPS
        006D  R   003F
96      006E      FF0E        BRX,14
```

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 98                     * VALPK CHECKS THE VALUE REQUESTED FOR A NEG VALUE, AND IF IT
 99                     *   IS NEGATIVE, OUTPUTS A MESSAGE SAYING SO.  IF THE VALUE IS
100                     *   ZERO OR GREATER IT CONVERTS THE VALUE TO BINARY.
101  006F     601F  VALPK ABR,1,15                    GET FIRST CHAR.
102  0070     E7E0        BLM,14        COMCK
     0071  R  0057
103  0072     FD31        LDX,3,1
104  0073     6D43        TRR,4,3                     SAVE R2
105  0074     E940        SUI,4         #2D
     0075  A  002D
106  0076     7D44        TRRB,4,4      NOTNG         IS CHAR |-|?
     0077  R  007F
107  0078     E640        STM,4         E.ICF
     0079  X  0005
108  007A     E7E0        BLM,14        E:035         ....YES...
     007B  X  0006
109                     *          TELL SOMEONE ABOUT IT
110  007C  R  00EA        DFC           ILVAL
111  007D     E700        BRU           E:SKD
     007E  X  0008
112  007F     E930  NOTNG SUI,3         #30           **********************************
     0080  A  0030
113  0081     6D43        TRR,4,3                     *                                *
114  0082     E7E0        BLM,14        NUMCK         *                                *
     0083  R  0066
115  0084     ED80        LDI,11        10            * CONVERSION TO BINARY ROUTINE *
     0085  A  000A
116  0086     203B        MPR,3,11                    *                                *
117  0087     601F        ABR,1,15                    * VALUE=(1ST DIGIT-#30)*10       *
118  0088     FD41        LDX,4,1                     *                                *
119  0089     E940        SUI,4         #30           *                                *
     008A  A  0030
120  008B     E7E0        BLM,14        NUMCK         *                                *
     008C  R  0066
121  008D     F831        ADX,3,1                     *              +(2ND DIGIT-#30)  *
122  008E     E930        SUI,3         #30           **********************************
     008F  A  0030
123  0090     FF0A        BRX,10
124  0091     E7A0  BVAL  BLM,10        VALPK         CONVERT VALUE TO BIN. HOLD IN R2
     0092  R  006F
125  0093     E630        STM,3         PARAM         SAVE VALUE
     0094  R  00A5
126  0095     E930        SUI,3         64            IS BLANKING LEVEL OK?
     0096  A  0040
127  0097     7630        TBRB,3,0      $+4           ...YES....CONTINUE
     0098  R  0098
128  0099     E700        BRU           OOPS          ...NO.....THEN SAY SO
     009A  R  003F
129  009B     E520        LDM,2         PARAM
     009C  R  00A5
```

```
130     009D     E626          STM,2,6     U.BLL       SET BLANKING LEVEL TO NEW VALUE
        009E  X  0003
131     009F     ED70          LDI,7       05
        00A0  A  0005
132     00A1     0956   OUTGO  MBL,5,6                 SET LEFT BYTE OF R5 TO CHANNEL
133     00A2     6857          ADR,5,7                 SET RIGHT BYTE OF R5 TO MESSAGE NO.
134     00A3     E740          BLM,4       E:LOG
        00A4  X  000A
135     00A5  A  0000   PARAM  DFC         0           OUTPUT LOG MESSAGE
136     00A6     6D36   SEND   TRR,3,6
137     00A7     E750          BLM,5       E:MIT
        00A8  X  0009
138     00A9     E700          BRU         E:SKD
        00AA  X  0008
139     00AB     E7A0   GVAL   BLM,10      VALPK       CONVERT VALUE TO BINARY
        00AC  R  006F
140     00AD     E630          STM,3       PARAM       SAVE VALUE
        00AE  R  00A5
141     00AF     E930          SUI,3       25          IS GAIN CHANGE VALUE OK?
        00B0  A  0019
142     00B1     7630          TBRB,3,0    $+4         ...YES....CONTINUE
        00B2  R  00B5
143     00B3     E700          BRU         OOPS        ...NO.....THEN SAY SO
        00B4  R  003F
144     00B5     E520          LDM,2       PARAM
        00B6  R  00A5
145     00B7     E626          STM,2,6     U.GAN       SET GAIN TO NEW VALUE
        00B8  X  0001
146     00B9     ED70          LDI,7       04
        00BA  A  0004
147     00BB     E700          BRU         OUTGO
        00BC  R  00A1
```

```
149                          * CLEVER LITTLE MESSAGES TO LET THE OPERATOR IN ON WHAT'S HAPPENING
150   00BD  A  0D0A  ILLCH DFC          #0D0A,|INVALID CHANNEL |,#0D0A,#0000
      00BE  A  494E
      00BF  A  5641
      00C0  A  4C49
      00C1  A  4420
      00C2  A  4348
      00C3  A  414E
      00C4  A  4E45
      00C5  A  4C20
      00C6  A  0D0A
      00C7  A  0000
151   00C8  A  0D0A  NOPAR DFC           #0D0A,|NO PARM. CHANGE PERMITTED, SIG. IN PROG.|
      00C9  A  4E4F
      00CA  A  2050
      00CB  A  4152
      00CC  A  4D2E
      00CD  A  2043
      00CE  A  4841
      00CF  A  4E47
      00D0  A  4520
      00D1  A  5045
      00D2  A  524D
      00D3  A  4954
      00D4  A  5445
      00D5  A  442C
      00D6  A  2053
      00D7  A  4947
      00D8  A  2E20
      00D9  A  494E
      00DA  A  2050
      00DB  A  524F
      00DC  A  472E
152   00DD  A  0D0A        DFC           #0D0A,#0000
      00DE  A  0000
153   00DF  A  0D0A  ILFUN DFC           #0D0A,|INVALID FUNCTION|,#0D0A,#0000
      00E0  A  494E
      00E1  A  5641
      00E2  A  4C49
      00E3  A  4420
      00E4  A  4655
      00E5  A  4E43
      00E6  A  5449
      00E7  A  4F4E
      00E8  A  0D0A
      00E9  A  0000
154   00EA  A  0D0A  ILVAL DFC           #0D0A,|CANNOT USE NEG. VALUES|,#0D0A,#0000
      00EB  A  4341
      00EC  A  4E4E
      00ED  A  4F54
```

```
          00EE  A  2055
          00EF  A  5345
          00F0  A  204E
          00F1  A  4547
          00F2  A  2E20
          00F3  A  5641
          00F4  A  4C55
          00F5  A  4553
          00F6  A  0D0A
          00F7  A  0000
 155      00F8  A  0D0A  ILLVL DFC          #0D0A,|VALUE NOT WITHIN LIMITS |,#0D0A,#0000
          00F9  A  5641
          00FA  A  4C55
          00FB  A  4520
          00FC  A  4E4F
          00FD  A  5420
          00FE  A  5749
          00FF  A  5448
          0100  A  494E
          0101  A  204C
          0102  A  494D
          0103  A  4954
          0104  A  5320
          0105  A  0D0A
          0106  A  0000
 156      0107  A  0D0A  INFMT DFC          #0D0A,|INVALID FORMAT|,#0D0A,#0000
          0108  A  494E
          0109  A  5641
          010A  A  4C49
          010B  A  4420
          010C  A  464F
          010D  A  524D
          010E  A  4154
          010F  A  0D0A
          0110  A  0000
 157      0111               END

TOTAL ASSEMBLY ERRORS =   0     SIZE =    273
```

```
                   PGM         M$ESC
                    INT        M:INT,M.TM1,M:ESC,M.STA
                    EXT        *E:SKD,E:LOG,U.IHB,U.CST,U.RTY
                    EXT        U.END,U.CLS,U.TRF,U.OTM
                    EXT        U.CCN,U.TRL
                * M:INT IS THE INTERRUPT ROUTINE ENTERED WHEN THE OPERATOR CHANGES
                *   A RECEIVER FREQUENCY OR CARDIOID CONFIGURATION, OR CHANGES EITHER
                *   THE MAINTENANCE OR AUTO/MANUAL SWITCHES, OR THE SENSORS DISCOVER
                *   AN INE CONDITION.  THE ROUTINE SETS A FIVE SECOND TIMER IN THE
                *   SYSTEM CLOCK ROUTINE.  WHEN THE TIMER RUNS OUT, M:ESC IS SCHEDULED.~
0000     E620   M:INT STM,2    $+7          SAVE R2
0001  R  0007
0002     ED20         LDI,2    -5
0003  A  FFFB
0004     E620         STM,2    M.TM1        SET M.TM1=5
0005  R  00AD
0006     ED20         LDI,2    0            RESTORE R2
0007  A  0000
0008     2500         CIR                   CLEAR INTERRUPT AND RETURN
                * M:ESC IS THE EQUIPMENT STATUS CHANGE MONITOR ROUTINE.  THIS ROUTINE
                *   CHECKS THE STATUS OF FREQUENCY, CARDIOID, INE, MAINTENANCE, AND
                *   AUTO/MANUAL FOR EACH CHANNEL AND LOGS THE NEW VALUE ON THE ASR 28.
                *   ANY PROCESSING STATUS CHANGES WHICH MAY RESULT FROM THE EQUIPMENT
                *   STATUS ARE ASLO MADE.
0009     ED20   M:ESC LDI,2    -14          SET UP TO READ DATA
000A  A  FFF2
000B     ED50         LDI,5    #4350        INIT COMMANDS
000C  A  4350
000D     E650         STM,5    READ1         OCD COMMANDS
000E  R  0015
000F     ED50         LDI,5    #4F30
0010  A  4F30
0011     E650         STM,5    READ2         IDD COMMAND
0012  R  0016
0013     ED50         LDI,5    #4000        CONTROL WORD
0014  A  4000
0015     4350   READ1 OCD,5,0
0016     4F30   READ2 IDD,3,0
0017     EC30         XOI,3    #FFFC
0018  A  FFFC
0019     E632         STM,3,2  INWRD+14     STORE DATA IN BUFFER
001A  R  00CA
001B     80F0         ABMM,15  READ1        UPDATE OCD
001C  R  0015
001D     80F0         ABMM,15  READ2        UPDATE IDD
001E  R  0016
001F     605F         ABR,5,15              UPDATE CONTROL WORD
0020     702F         ABRB,2,15 READ1       LOOP THRU 14 CHANNELS
0021  R  0015
0022     ED20         LDI,2    -14          CHANNEL POINTER
```

```
      0023  A  FFF2
36    0024     E532  ESC2  LDM,3,2       INWRD+14        R3=NEW VALUE FOR THIS CHANNEL
      0025  R  00CA
37    0026     E562        LDM,6,2       SVWRD+14        R6=PREVIOUS VALUE FOR THIS CHAN.
      0027  R  00BC
38    0028     7C63        XORB,6,3      ESC1            BR. IF ANYTHING'S BEEN CHANGED
      0029  R  002E
39    002A     702F  ESC3  ABRB,2,15     ESC2             NEXT CHANNEL
      002B  R  0024
40    002C     E700        BRU           E:SKD           RETURN TO SYSTEM
      002D  X  0001
41                       * CHANGE IN STATUS FOUND ON THIS CHANNEL.  NOW TRY TO FIND WHAT'S BEEN
42                       *   CHANGED TO LOG IT.
43                       * LAYOUT OF STATUS WORD IS....
44                       *   BIT 0-9..FREQUENCY SETTING (9'S COMPLEMENT)
45                       *   BIT 10-12..CARDIOID CONFIGURATION
46                       *   BIT 13.....INE
47                       *   BIT 14.....MAINTENANCE
48                       *   BIT 15.....AUTO/MANUAL
49    002E     E632  ESC1  STM,3,2        SVWRD+14        REPLACE OLD VLAUE WITH NEW
      002F  R  008C
50    0030     766F        TBRB,6,15     CHAUM           BRANCH IF AUTO MANUAL CHANGED
      0031  R  003E
51    0032     766E  ESC4  TBRB,6,14     CHMAI           BRANCH IF MAINTENANCE MODE CHANGED
      0033  R  0049
52    0034     766D  ESC5  TBRB,6,13     CHINE           BRANCH IF INE STATUS CHANGED
      0035  R  005C
53    0036     6C77  ESC6  ZRR,7
54    0037     2866        RLD,6,6                       SHIFT CARDIOID DETECTOR TO R7
55    0038     7D77        TRRB,7,7      CHCAR           BRANCH IF CARDIOID CHANGED
      0039  R  006F
56    003A     7D66  ESC7  TRRB,6,6      CHFRQ           BRANCH IF FREQUENCY CHANGED
      003B  R  007D
57    003C     E700        BRU           ESC3             GO ON TO NEXT CHANNEL CHECK
      003D  R  002A
58                       * CHANGE DETECT IN AUTO/MANUAL SWITCH,  CHECK TO SEE WHICH WAY CHANGED.~
59    003E     0952  CHAUM MBL,5,2                       SET UP CHAN. DESIGNATOR FOR E:LOG
60    003F     E850        ADI,5         #0E08
      0040  A  0E08
61    0041     763F        TBRB,3,15     $+3
      0042  R  0044
62    0043     605F        ABR,5,15                      MAKE MSG. NO. 9 IF NOW AUTO
63    0044     E740        BLM,4         E:LOG
      0045  X  0002
64    0046     626F        ZBR,6,15
65    0047     E700        BRU           ESC4
      0048  R  0032
66                       * CHANGE DETECTED IN MAINTENANCE MODE
67    0049     0952  CHMAI MBL,5,2                       CHANNEL INDICATOR
68    004A     E850        ADI,5         #0E0A           SET UP CHANNEL MSG. FOR E:LOG
```

```
                004B  A  0E0A
 69             004C     0845          MBR,4,5                        GET CHANNEL POINTER
 70             004D     763E          TBRB,3,14     ESC10-2          GOING IN OR COMING OUT OF MAINT.
                004E  R  0055
 71             004F     605F          ABR,5,15                       MAKE MSG. NO. 11 IF NOW OUT OF MAINT.
 72             0050     763D          TBRB,3,13     ESC10            DO NOT RESET IF INE STILL ON
                0051  R  0057
 73             0052     E770          BLM,7         RESET            RESET PARAMETERS TO ALLOW CHAN UP
                0053  R  00A2
 74             0054     F703          HOP,$+3
 75             0055     E770          BLM,7         REST2            SET INHIBIT FLAG FOR NEW MAINT COND
                0056  R  008B
 76             0057     E740  ESC10   BLM,4         E:LOG            LOG MAINT. CHANGE
                0058  X  0002
 77             0059     626E          ZBR,6,14                       RESET MAINT. DETECTION BIT
 78             005A     E700          BRU           ESC5             RETURN
                005B  R  0034
 79                                  * CHANGE IN INE STATUS FOUND
 80             005C     0952  CHINE   MBL,5,2
 81             005D     E850          ADI,5         #0E0C            SET UP CHAN/MSG NO. FOR E:LOG
                005E  A  0E0C
 82             005F     0845          MBR,4,5                        SET CHANNEL POINTER
 83             0060     763D          TBRB,3,13     ESC11-2          GOING IN OR COMING OUT OF INE
                0061  R  0068
 84             0062     605F          ABR,5,15                       MAKE MSG. NO. 13 IF NOW OUT OF INE
 85             0063     763E          TBRB,3,14     ESC11            DO NOT RESET IF STILL IN MAINT.
                0064  R  006A
 86             0065     E770          BLM,7         RESET            RESET PARMS AND ALLOW CHAN TO COME UP
                0066  R  00A2
 87             0067     F703          HOP,$+3
 88             0068     E770          BLM,7         REST2            SET INHIBIT FLAG FOR NEW INE
                0069  R  008B
 89             006A     E740  ESC11   BLM,4         E:LOG            LOG INE CHANGE
                006B  X  0002
 90             006C     626D          ZBR,6,13                       RESET THE DETECTION BIT
 91             006D     E700          BRU           ESC6             RETURN
                006E  R  0036
 92                                  * CHANGE IN CARDIOID CONFIGURATION FOUND
 93             006F     6D53  CHCAR   TRR,5,3                        GET NEW VALUE
 94             0070     2953          RLS,5,3
 95             0071     EA50          ETI,5         #FFF8
                0072  A  FFF8
 96             0073     E650          STM,5         ESC9
                0074  R  007A
 97             0075     0952          MBL,5,2
 98             0076     E850          ADI,5         #0E02
                0077  A  0E02
 99             0078     E740          BLM,4         E:LOG
                0079  X  0002
100             007A  A  0000  ESC9    DFC           0
```

```
0078     E700        BRU         ESC7
007C  R  003A
                * FREQUENCY SETTING CHANGE FOUND
007D     6D53   CHFRQ TRR,5,3
007E     E650        STM,5       ESC8
007F  R  0088
0080     0952        MBL,5,2
0081     E850        ADI,5       #0E01
0082  A  0E01
0083     0845        MBR,4,5
0084     E770        BLM,7       REST1         RESET PARMS TO ALLOW NEW CHAN UP
0085  R  00A4
0086     E740        BLM,4       E:LOG         LOG NEW FREQ SETTING
0087  X  0002
0088  A  0000   ESC8  DFC         0
0089     E700        BRU         ESC3          GO TO NEXT CHAN
008A  R  002A
008B     8204   REST2 OBMM,0,4    U.IHB         SET INHIBIT BIT
008C  X  0003
008D     6CAA        ZRR,10
008E     E6A4        STM,10,4    U.END         RESET PROCESSING PARAMETERS
008F  X  0006
0090     E6A4        STM,10,4    U.CLS
0091  X  0007
0092     E6A4        STM,10,4    U.TRF
0093  X  0008
0094     E6A4        STM,10,4    U.CCN
0095  X  000A
0096     6D1A        TRR,1,10
0097     2D11        LLS,1,1
0098     E6A1        STM,10,1    U.OTM
0099  X  0009
009A     601F        ABR,1,15
009B     E6A1        STM,10,1    U.OTM
009C  X  0009
009D     F707        HOP,REST1
009E     EDA0        LDI,10      5
009F  A  0005
00A0     E6A4        STM,10,4    U.TRL
00A1  X  000B
00A2     8104   RESET ZBMM,0,4    U.IHB         RESET CHAN PROCESSING INHIBIT FLAG
00A3  X  0003
00A4     ED10   REST1 LDI,1       4
00A5  A  0004
00A6     E614        STM,1,4     U.CST         SET CHANNEL STATUS DOWN (4)
00A7  X  0004
00A8     ED10        LDI,1       -18
00A9  A  FFEE
00AA     E614        STM,1,4     U.RTY         RESET RECOVERY TALLY TO -10
00AB  X  0005
```

```
 131      00AC       FF07          BRX,7                          RETURN
 132      00AD   A   0000   M.TM1  DFC            0               DELAY TIMER
 133             R   00AE   M.STA  EQU            $
 134      00AE   A   0000   SVWRD  RES            14,0            CURRENT STATUS VALUES
 135      00BC   A   0000   INWRD  RES            14,0            INPUT STATUS VALUES
 136      00CA                     END

TOTAL ASSEMBLY ERRORS =    0     SIZE =    202
```

```
 1                          PGM          M$LEV
 2                           INT          M:LEV
 3                           EXT          E:FRT,E:028,E:BAD,E:SKD,E.TM3
 4                           EXT          M.UPT,M.TRT,M.GNT,E.BDF,E.28F
 5                    *      CAT NO.  400000-010
 6                    * M$LEV EXAMINES THE DATA COLLECTED BY E$MIN AND COMPUTES STATISTICAL
 7                    *   INFORMATION FOR EACH CHANNEL WHICH THE OPERATOR WILL USE TO
 8                    *   DETERMINE PATH RELIABILITY.
 9                    * OUTPUT INCLUDES A CHANNEL BY CHANNEL LISTING OF:
10                    *      1. PERCENT OF TIME CHANNEL WAS UP
11                    *      2. PERCENT OF UP TIME CHANNEL WAS AT EACH TRACK RATE
12                    *      3. PERCENT OF UP TIME CHANNEL WAS AT EACH GAIN SETTING
13      0000          E7E0  M:LEV BLM,14        E:FRT          GET CURRENT DOY/TIME GROUP
        0001  X       0001
14      0002  R       00C2        DFC           LINE1+1
15      0003          ED20        LDI,2         #400E
        0004  A       400E
16      0005          432E        OCD,2,#E
17      0006          4F4E        IDD,4,#E                     READ DET NO.
18      0007          0824        MBR,2,4
19      0008          E820        ADI,2         #2030
        0009  A       2030
20      000A          E620        STM,2         LINE1+18       UPPER HALF
        000B  R       00D3
21      000C          0C44        MLR,4,4
22      000D          2844        RLD,4,4
23      000E          2D44        LLS,4,4
24      000F          2C44        LLD,4,4
25      0010          E840        ADI,4         #3030
        0011  A       3030
26      0012          E640        STM,4         LINE1+19
        0013  R       00D4
27      0014          6C22        ZRR,2
28      0015          E620        STM,2         E.28F
        0016  X       000A
29      0017          E7E0        BLM,14        E:028          OUTPUT FIRST LINE
        0018  X       0002
30      0019  R       00BF        DFC           LINE0
31      001A          ED20        LDI,2         #5550          LABEL UP TIME LINE
        001B  A       5550
32      001C          E620        STM,2         BUFFR+1
        001D  R       0108
33      001E          6C22        ZRR,2                        R2 FOR CHAN POINTER (0 - 13)
34      001F          6C33        ZRR,3                        R3 FOR OUTPUT BUFFER POINTER
35      0020          E540        LDM,4         E.TM3          DIVISOR TO DETERMINE PRCNT UP TIME
        0021  X       0005
36      0022          E630        STM,3         E.TM3          RESET SYSTEM TIMER
        0023  X       0005
37      0024          ED50        LDI,5         100            R5 SCALE TO PERCENT (MPY*100)
        0025  A       0064
```

```
38      0026      E5D2  LEV01 LDM,13,2      M.UPT          GET UP TIME VALUE FOR CHANNEL
        0027  X   0006
39      0028      20C5        MPR,12,5                     PERCENT=(M.UPT*100/E.TM1)
40      0029      21C4        DVR,12,4
41      002A      2FC1        LAS,12,1
42      002B      69C4        SUR,12,4
43      002C      76C0        TBRB,12,0      $+3
        002D  R   002F
44      002E      60DF        ABR,13,15
45      002F      6DCD        TRR,12,13
46      0030      E6C2        STM,12,2       UPFLG          STORE VALUE FOR LATER USE
        0031  R   0126
47      0032      E7E0        BLM,14         E:BAD          CONVERT VALUE TO BCD
        0033  X   0003
48      0034      E7E0        BLM,14         LPACK          STORE CHARS FOR OUTPUT
        0035  R   0098
49      0036      602F        ABR,2,15                      MOVE POINTER TO NEXT CHANNEL
50      0037      EDB0        LDI,11         14
        0038  A   000E
51      0039      79B2        SURB,11,2      LEV01          LOOP UNTIL LAST CHANNEL IS DONE
        003A  R   0026
52      003B      E7E0        BLM,14         E:028          LOG LINE OF PERCENT UP TIMES
        003C  X   0002
53      003D  R   0107        DFC            BUFFR
54                        * NOW ATTACK TRACK RATES AND GAINS
55      003E      E7E0        BLM,14         E:028          OUTPUT TRACK RATE TO TTY
        003F  X   0002
56      0040  R   00F6        DFC            LINE2
57      0041      ED70        LDI,7          100            R7 = 100
        0042  A   0064
58      0043      ED10        LDI,1          10             R1 = INCREMENTAL VALUE BETWEEN CHANS~
        0044  A   000A
59      0045      6C44        ZRR,4                         R4 VALUE POINTER
60      0046      8100        ZBMM,0         LFLAG          SET FLAG = 0 FOR TRACK RATE
        0047  R   0134
61      0048      ED50        LDI,5          #A
        0049  A   000A
62      004A      E650        STM,5          ENDVL          SET END VALUE FOR TR SETTING = 10
        004B  R   0135
63      004C      ED50        LDI,5          M.TRT          BASE OF TRACK RATE TABLE
        004D  X   0007
64      004E      6C22  LEV02 ZRR,2                         R2 IS CHANNEL POINTER
65      004F      6C33        ZRR,3                         R3 IS OUTPUT BUFFER POINTER
66      0050      6DB5        TRR,11,5                      TABLE POINTER FOR THIS SETTING
67      0051      6DC4        TRR,12,4                      OUTPUT NEW LEVEL
68      0052      E8C0        ADI,12         #2030
        0053  A   2030
69      0054      E6C0        STM,12         BUFFR+1        STORE IN OUTPUT BUFFER
        0055  R   0108
70      0056      E5C2  LEV03 LDM,12,2       UPFLG
```

```
                0057  R  0126
 71             0058       7DCC        TRR8,12,12      $+3             WAS CHANNEL UP AT ALL
                0059  R  005B
 72             005A       F70C        HOP,LEV04                        NO, OUTPUT '0'
 73             005B       FDDB        LDX,13,11                       GET VALUE OF M.GNT FOR CHANNEL
 74             005C       20C7        MPR,12,7                              *100
 75             005D       A1C2        DVM,12,2        M.UPT                 /M.UPT
                005E  X    0006
 76             005F       2FC1        LAS,12,1
 77             0060       E1C0        SUM,12          M.UPT
                0061  X    0006
 78             0062       76C0        T8R8,12,0       $+3
                0063  R    0065
 79             0064       60DF        ABR,13,15
 80             0065       6DCD        TRR,12,13
 81             0066       E7E0  LEV04 BLM,14          E:8AD           CONVERT TO ASCII DECIMAL
                0067  X    0003
 82             0068       E7E0        8LM,14          LPACK           PACK AND STORE FOR OUTPUT
                0069  R    0098
 83             006A       6881        ADR,11,1                        MOVE TABLE POINTER TO NEXT CHANNEL
 84             006B       602F        ABR,2,15                        MOVE POINTER TO NEXT CHANNEL
 85             006C       EDA0        LDI,10          14
                006D  A    000E
 86             006E       79A2        SUR8,10,2       LEV03           DO NEXT CHANNEL AT THIS LEVEL
                006F  R    0056
 87             0070       E7E0        BLM,14          E:028
                0071  X    0002
 88             0072  R    0107        DFC             BUFFR
 89             0073       605F        ABR,5,15                        MOVE BASE POINTER FOR NEXT SETTING
 90             0074       604F        ABR,4,15                        INCREMENT SETTING
 91             0075       6DA4        TRR,10,4
 92             0076       E1A0        SUM,10          ENDVL           LOOP TILL LAST SETTING DONE
                0077  R    0135
 93             0078       7DAA        TRR8,10,10      LEV02
                0079  R    004E
 94             007A       8600        T8MB,0          LFLAG,LEV05
                0078  R    0134
                007C  R    008D
 95             007D       8200        08MM,0          LFLAG           SET FLAG BIT FOR GAIN
                007E  R    0134
 96             007F       E7E0        BLM,14          E:028           OUTPUT 'GAIN' TO TTY
                0080  X    0002
 97             0081  R    00FE        DFC             LINE3
 98             0082       ED10        LDI,1           8               INCREMENTAL VALUE BETWEEN CHANNELS
                0083  A    0008
 99             0084       6C44        ZRR,4                           RESET VALUE
100             0085       ED50        LDI,5           #8
                0086  A    0008
101             0087       E650        STM,5           ENDVL           SET END VALUE FOR GAIN = 8
                0088  R    0135
```

```
102     0089     ED50        LDI,5          M.GNT
        008A  X  0008
103     008B     E700        BRU            LEV02
        008C  R  004E
104     008D     ED20  LEV05 LDI,2          265
        008E  A  0109
105     008F     6C33        ZRP,3
106     0090     E632  LEV06 STM,3,2        M.TRT
        0091  X  0007
107     0092     712F        SBRB,2,15      LEV06
        0093  R  0090
108     0094     E630        STM,3          M.TRT
        0095  X  0007
109     0096     E7E0        BLM,14         E:028
        0097  X  0002
110     0098  R  0103        DFC            TERMN
111     0099     E700        BRU            E:SKD
        009A  X  0004
112                          * LPACK TAKES OUTPUT FROM E$BAD AND PACKS IT IN ASCII CHARS FOR M$LEV
113                          *   IN THE OUTPUT BUFFER.
114     009B     ED60  LPACK LDI,6          4              R6 IS CHAR POINTER
        009C  A  0004
115     009D     716F  LPCK  SBRB,6,15      $+3
        009E  R  00A0
116     009F     F70B        HOP,LPCK1
117     00A0     EDC0        LDI,12         -#30
        00A1  A  FFD0
118     00A2     E5D6        LDM,13,6       E.BDF
        00A3  X  0009
119     00A4     78CD        ADRB,12,13     LPCK1
        00A5  R  00AA
120     00A6     81B6        ZBMM,11,6      E.BDF          CHANGE LEADING 0 TO A SPACE CHAR
        00A7  X  0009
121     00A8     E700        BRU            LPCK
        00A9  R  009D
122     00AA     ED60  LPCK1 LDI,6          3              R6 IS CHAR POINTER AGAIN
        00AB  A  0003
123     00AC     E5C6        LDM,12,6       E.BDF          GET FIRST CHAR
        00AD  X  0009
124     00AE     09CC        MBL,12,12                           TO LEFT BYTE
125     00AF     616F        SBR,6,15
126     00B0     E0C6        ADM,12,6       E.BDF          GET SECOND CHAR TO RIGHT BYTE
        00B1  X  0009
127     00B2     E6C3        STM,12,3       BUFFR+2        STORE FOR OUTPUT
        00B3  R  0109
128     00B4     616F        SBR,6,15
129     00B5     E5C6        LDM,12,6       E.BDF          GET 3RD CHAR.
        00B6  X  0009
130     00B7     09CC        MBL,12,12                           TO LEFT BYTE
131     00B8     616F        SBR,6,15
```

```
132     00B9       E0C6        ADM,12,6      E.BDF          GET LAST CHAR IN RIGHT BYTE
        00BA   X   0009
133     00BB       E6C3        STM,12,3      BUFFR+3        STORE FOR OUTPUT
        00BC   R   010A
134     00BD       603E        ABR,3,14                     SET UP FOR NEXT OUTPUT
135     00BE       FF0E        BRX,14                       RETURN
136     00BF   A   0D0A  LINE0 DFC           #0D0A,#0A0A
        00C0   A   0A0A
137     00C1   A   0A0A  LINE1 DFC           #0A0A,|123 123456  PARA|
        00C2   A   3132
        00C3   A   3320
        00C4   A   3132
        00C5   A   3334
        00C6   A   3536
        00C7   A   2020
        00C8   A   5041
        00C9   A   5241
138     00CA   A   4D45        DFC           |METER HISTORY, DET 515|
        00CB   A   5445
        00CC   A   5220
        00CD   A   4849
        00CE   A   5354
        00CF   A   4F52
        00D0   A   592C
        00D1   A   2044
        00D2   A   4554
        00D3   A   2035
        00D4   A   3135
139     00D5   A   0D0A        DFC           #0D0A,#0A43,|HAN A   B   C   D   E   F   G |
        00D6   A   0A43
        00D7   A   4841
        00D8   A   4E20
        00D9   A   4120
        00DA   A   2020
        00DB   A   4220
        00DC   A   2020
        00DD   A   4320
        00DE   A   2020
        00DF   A   4420
        00E0   A   2020
        00E1   A   4520
        00E2   A   2020
        00E3   A   4620
        00E4   A   2020
        00E5   A   4720
140     00E6   A   2020        DFC           | H   I   J   K   L   M   N |,#0D0A,#0000
        00E7   A   4820
        00E8   A   2020
        00E9   A   4920
        00EA   A   2020
```

```
          00EB  A  4A20
          00EC  A  2020
          00ED  A  4B20
          00EE  A  2020
          00EF  A  4C20
          00F0  A  2020
          00F1  A  4D20
          00F2  A  2020
          00F3  A  4E20
          00F4  A  0D0A
          00F5  A  0000
 141      00F6  A  0D0A  LINE2 DFC          #0D0A,#0D0A,|TRACK RATE|,#0000
          00F7  A  0D0A
          00F8  A  5452
          00F9  A  4143
          00FA  A  4B20
          00FB  A  5241
          00FC  A  5445
          00FD  A  0000
 142      00FE  A  0D0A  LINE3 DFC          #0D0A,#0D0A,|GAIN|,#0000
          00FF  A  0D0A
          0100  A  4741
          0101  A  494E
          0102  A  0000
 143      0103  A  0D0A  TERMN DFC          #0D0A,#0A0A,#0A0A,0
          0104  A  0A0A
          0105  A  0A0A
          0106  A  0000
 144      0107  A  0D0A  BUFFR DFC          #0D0A
 145      0108           RES               29
 146      0125  A  0000  DFC               #0000
 147      0126  A  0000  UPFLG RES          14,0
 148      0134  A  0000  LFLAG DFC          0              BIT 0=0 FOR TR, =1 FOR GAIN
 149      0135  A  0000  ENDVL DFC          0
 150      0136           END

TOTAL ASSEMBLY ERRORS =    0     SIZE =    310
```

```
 1                              PGM          M$STD
 2                               INT          M:STD,E:FAM
 3                               EXT          E:FRT,E:028,E.28F,E:BAD,E.BSG
 4                               EXT          E.BDF,E:FMF,U.GAN,U.TRK,U.BLL
 5                               EXT          U.SIG,U.DIU,U.AMP,M.STA,U.FRQ
 6                               EXT          U.IHB,E:SKD,U.CST
 7                          *    CAT NO.  400000-017
 8                          *M$STD PROVIDES A CHANNEL BY CHANNEL LIST OF ALL
 9                          *   IMPORTANT RECEIVER AND PROCESSING PARAMETERS.
10                          *   THIS LIST IS LOGGED ON THE ASR 28.
11  0000      E7E0  M:STD BLM,14        E:FRT          SET DAY/TIME GROUP
    0001  X   0001
12  0002  R   0135        DFC          LINE1+1
13  0003      ED20        LDI,2        #400E
    0004  A   400E
14  0005      432E        OCD,2,#E
15  0006      4F4E        IDD,4,#E                    READ DET NO.
16  0007      0824        MBR,2,4
17  0008      E820        ADI,2        #2030
    0009  A   2030
18  000A      E620        STM,2        LINE1+21       UPPER HALF
    000B  R   0149
19  000C      0C44        MLR,4,4
20  000D      2844        RLD,4,4
21  000E      2D44        LLS,4,4
22  000F      2C44        LLD,4,4
23  0010      E840        ADI,4        #3030
    0011  A   3030
24  0012      E640        STM,4        LINE1+22       LOWER HALF
    0013  R   014A
25  0014      6C22        ZRP,2
26  0015      E620        STM,2        E.28F
    0016  X   0003
27  0017      E7E0        BLM,14       E:028          WRITE 2 LINES
    0018  X   0002
28  0019  R   0133        DFC          LINE0
29  001A      6C66        ZRR,6                       INIT. CHAR POINTER
30  001B      6D56  STD1  TRR,5,6
31  001C      F850        ADI,5        #2041          CHANGE TO ALPHABETIC CHAN. DESIG.
    001D  A   2041
32  001E      E650        STM,5        LINE2+2         AND STORE AWAY.
    001F  R   016B
33  0020      E650        STM,5        LINE3+2
    0021  R   018A
34                          * READ RECEIVER DATA....
35  0022      ED40        LDI,4        #4340
    0023  A   4340
36  0024      6846        ADR,4,6
37  0025      E640        STM,4        READ1
    0026  R   002F
```

```
38      0027        ED40        LDI,4       #4F50
        0028    A   4F50
39      0029        6846        ADR,4,6
40      002A        E640        STM,4       READ2
        002B    R   0030
41      002C        ED40        LDI,4       #4000
        002D    A   4000
42      002E        6846        ADR,4,6
43      002F        4340  READ1 OCD,4,0                   READ STATUS WORD
44      0030        4F50  READ2 IDD,5,0
45      0031        7D55        TRRB,5,5    $+4
        0032    R   0035
46      0033        E700        BRU         OPEN        OPEN INPUT LINE
        0034    R   00EF
47      0035        EC50        XOI,5       #FFFC
        0036    A   FFFC
48      0037        E656        STM,5,6     M.STA       SAVE IT FOR CUR. VALUE
        0038    X   000E
49      0039        6C44        ZRR,4
50      003A        2C42        LLD,4,2
51      003B        2D44        LLS,4,4
52      003C        2C44        LLD,4,4
53      003D        ED30        LDI,3       #3939
        003E    A   3939
54      003F        6934        SUR,3,4
55      0040        6234        ZBR,3,4
56      0041        6235        ZBR,3,5
57      0042        E630        STM,3       LINE2+4     FREQ, PART 1
        0043    R   016D
58      0044        6D16        TRR,1,6
59      0045        2D11        LLS,1,1
60      0046        E631        STM,3,1     U.FRQ
        0047    X   000F
61      0048        6C44        ZRR,4
62      0049        2C44        LLD,4,4
63      004A        ED30        LDI,3       #2E39
        004B    A   2E39
64      004C        6934        SUR,3,4
65      004D        E630        STM,3       LINE2+5     FREQ, PART 2
        004E    P   016E
66      004F        601F        ABR,1,15
67      0050        E631        STM,3,1     U.FRQ
        0051    X   000F
68      0052        6C44        ZRR,4
69      0053        2C43        LLD,4,3
70      0054        E840        ADI,4       #2030
        0055    A   2030
71      0056        E640        STM,4       LINE2+6     CARDIOID SETTING
        0057    R   016F
72      0058        6C44        ZRR,4
```

```
 73     0059      2C41        LLD,4,1
 74     005A      6D14        TRR,1,4                       COPY INE BIT
 75     005B      E840        ADI,4         #2030
        005C  A   2030
 76     005D      E640        STM,4         LINE2+7         INE BIT
        005E  R   0170
 77     005F      6C44        ZRR,4
 78     0060      2C41        LLD,4,1
 79     0061      6B14        ORR,1,4                       OR IN MAINT. BIT
 80     0062      E840        ADI,4         #2030
        0063  A   2030
 81     0064      E640        STM,4         LINE2+8         MAINT BIT
        0065  R   0171
 82     0066      ED40        LDI,4         #4D20           AUTO/MAN. = M
        0067  A   4D20
 83     0068      7650        TBRB,5,0      $+4
        0069  R   006C
 84     006A      ED40        LDI,4         #4120           AUTO/MAN. = A
        006B  A   4120
 85     006C      E640        STM,4         LINE2+10
        006D  R   0173
 86                       * SO MUCH FOR THE INFO FROM THE RECEIVER.
 87                       *   CHECK, IF EITHER MAINT OR INE IS SET,
 88                       *   TERMINATE LINE HERE.
 89                       * OTHERWISE, LINE UP PROCESSOR CONTROLLED PARAMETERS.
 90     006E      761F        TBRB,1,15     SHORT
        006F  R   00E5
 91     0070      6C44        ZRR,4
 92     0071      E556        LDM,5,6       U.GAN           DO GAIN
        0072  X   0008
 93     0073      ED10        LDI,1         10
        0074  A   000A
 94     0075      2141        DVR,4,1
 95     0076      E850        ADI,5         #2030
        0077  A   2030
 96     0078      E650        STM,5         LINE2+11
        0079  R   0174
 97     007A      0944        MBL,4,4
 98     007B      E840        ADI,4         #3020
        007C  A   3020
 99     007D      E640        STM,4         LINE2+12
        007E  R   0175
100     007F      E556        LDM,5,6       U.TRK           DO TRACK RATE
        0080  X   0009
101     0081      0955        MBL,5,5
102     0082      E850        ADI,5         #3020
        0083  A   3020
103     0084      E650        STM,5         LINE2+14
        0085  R   0177
104     0086      6C44        ZRR,4                         DO BLANKING LEVEL
```

```
105     0087     E556       LDM,5,6      U.BLL
        0088  X  000A
106     0089     2141       DVR,4,1
107     008A     E850       ADI,5        #2030
        008B  A  2030
108     008C     E650       STM,5        LINE2+15
        008D  R  0178
109     008E     0944       MBL,4,4
110     008F     E840       ADI,4        #3020
        0090  A  3020
111     0091     E640       STM,4        LINE2+16
        0092  R  0179
112                      * NOW SET UP CURRENT VALUE FOR THE DIURNAL,
113                      *   STANDART DEVIATION, AND AMPLITUDE.
114     0093     E556       LDM,5,6      U.DIU        DIURNAL
        0094  X  000C
115     0095     2041       MPR,4,1                    *10
116     0096     2A46       RAD,4,6
117     0097     605F       ABR,5,15
118     0098     2851       RAS,5,1
119     0099     6DC5       TRR,12,5
120     009A     E7E0       BLM,14       E:BAD        CONVERT TO ASCII DECIMAL
        009B  X  0004
121     009C     E540       LDM,4        E.BSG
        009D  X  0005
122     009E     E640       STM,4        LINE2+17     STORE SIGN
        009F  R  017A
123     00A0     ED20       LDI,2        E.BDF
        00A1  X  0006
124     00A2     FD42       LDX,4,2
125     00A3     0944       MBL,4,4
126     00A4     E840       ADI,4        #20
        00A5  A  0020
127     00A6     E640       STM,4        LINE2+20
        00A7  R  017D
128     00A8     602F       ABR,2,15
129     00A9     FD42       LDX,4,2
130     00AA     0944       MBL,4,4
131     00AB     E840       ADI,4        #2E
        00AC  A  002E
132     00AD     E640       STM,4        LINE2+19
        00AE  R  017C
133     00AF     602F       ABR,2,15
134     00B0     FD42       LDX,4,2
135     00B1     602F       ABR,2,15
136     00B2     FD52       LDX,5,2
137     00B3     0955       MBL,5,5
138     00B4     6B54       ORR,5,4
139     00B5     E650       STM,5        LINE2+18
        00B6  R  0178
```

```
140     00B7     E5C6        LDM,12,6    U.SIG          GET SIGMA
        00B8  X  000B
141     00B9     E7F0        BLM,15      E:FMF
        00BA  X  0007
142     00BB  R  0196        DFC         TEMP           CONVERT FOR OUTPUT
143     00BC     E530        LDM,3       TEMP+2
        00BD  R  0198
144     00BE     E630        STM,3       LINE2+21
        00BF  R  017E
145     00C0     E530        LDM,3       TEMP+3
        00C1  R  0199
146     00C2     E630        STM,3       LINE2+22
        00C3  R  017F
147     00C4     E530        LDM,3       TEMP+4
        00C5  R  019A
148     00C6     E630        STM,3       LINE2+23
        00C7  R  0180
149     00C8     E7E0        BLM,14      E:FAM
        00C9  R  00FD
150     00CA  R  0181        DFC         LINE2+24
151                       * ALSO, SHOW THE CHANNEL STATUS FROM U.CST
152     00CB     E546        LDM,4,6     U.CST
        00CC  X  0012
153     00CD     614F        SBR,4,15
154     00CE     2D41        LLS,4,1
155     00CF     E534        LDM,3,4     STAT
        00D0  R  019B
156     00D1     E630        STM,3       L2S1+1
        00D2  R  0185
157     00D3     604F        ABR,4,15
158     00D4     E534        LDM,3,4     STAT
        00D5  R  019B
159     00D6     E630        STM,3       L2S1+2
        00D7  R  0186
160     00D8     E7E0  STD2  BLM,14      E:028          OUTPUT LINE.
        00D9  X  0002
161     00DA  R  0169        DFC         LINE2
162     00DB     606F  STD3  ABR,6,15
163     00DC     ED50        LDI,5       14
        00DD  A  000E
164     00DE     7956        SURB,5,6    STD1           LOOP THRU 14 CHANNELS
        00DF  R  001B
165     00E0     E7E0        BLM,14      E:028
        00E1  X  0002
166     00E2  R  0193        DFC         TERMN          TERMINATION MSG.
167     00E3     E700        BRU         E:SKD          RETURN
        00E4  X  0011
168     00E5     6C22  SHORT ZRR,2
169     00E6     E620        STM,2       LINE2+11
        00E7  R  0174
```

```
170     00E8     8206       OBMM,0,6     U.IHB          SET INHIBIT BIT
        00E9  X  0010
171     00EA     652D       LBR,2,13
172     00EB     E626       STM,2,6      U.CST          SET CHAN DOWN
        00EC  X  0012
173     00ED     E700       BRU          STD2
        00EE  R  00D8
174     00EF     8206  OPEN OBMM,0,6     U.IHB          SET INHIBIT BIT
        00F0  X  0010
175     00F1     652D       LBR,2,13
176     00F2     E626       STM,2,6      U.CST          SET CHAN DOWN
        00F3  X  0012
177     00F4     EC50       XOI,5        #FFFC
        00F5  A  FFFC
178     00F6     E656       STM,5,6      M.STA
        00F7  X  000E
179     00F8     E7E0       BLM,14       E:028
        00F9  X  0002
180     00FA  R  0188       DFC          LINE3          LOG |ZERO INPUT|
181     00FB     E700       BRU          STD3
        00FC  R  00DB
```

```
183                     ************************************************************************
184                     * E:FAM WILL TAKE THE AMPLITUDE OF THE CHANNEL
185                     *   SPECIFIED IN R6, CONVERTS IT FOR OUTPUT AND
186                     *   STORES THE RESULT IN THREE WORDS STARTING AT
187                     *   THE LOC SPECIFIED BY THE PARAMETER IN THE CALLING
188                     *   SEQUENCE:
189                     *     BLM,14        E:FAM     CHAN IN R6
190                     *   (LOC OF FIRST WORD OF OUTPUT)
191                     * FORMAT:  |+00.00|  ( IN DB )
192     00FD    A510    E:FAM SFM,1         FAMSV
        00FE  R 012C
193     00FF    FD7E          LDX,7,14                    GET STORE ADDR.
194     0100    60EF          ABR,14,15                   MOVE RET ADDR.
195     0101    E6E0          STM,14        FSV14
        0102  R 012A
196     0103    607E          ABR,7,14
197     0104    E556          LDM,5,6       U.AMP
        0105  X 000D
198     0106    ED10          LDI,1         1000
        0107  A 03E8
199     0108    2041          MPR,4,1                     AMP*1000
200     0109    2A4B          RAD,4,11                     /2048
201     010A    E950          SUI,5         500
        010B  A 01F4
202     010C    2F52          LAS,5,2
203     010D    6DC5          TRR,12,5
204     010E    E7E0          BLM,14        E:BAD         CONVERT TO DECIMAL
        010F  X 0004
205     0110    ED20          LDI,2         E.BDF
        0111  X 0006
206     0112    FD42          LDX,4,2
207     0113    602F          ABR,2,15
208     0114    FD52          LDX,5,2
209     0115    0955          MBL,5,5
210     0116    6B54          ORR,5,4
211     0117    FE57          STX,5,7                      |....00|
212     0118    617F          SBR,7,15
213     0119    602F          ABR,2,15
214     011A    FD42          LDX,4,2
215     011B    0944          MBL,4,4
216     011C    E840          ADI,4         #002E         |..0.00|
        011D  A 002E
217     011E    FE47          STX,4,7
218     011F    617F          SBR,7,15
219     0120    602F          ABR,2,15
220     0121    FD52          LDX,5,2
221     0122    E540          LDM,4         E.BSG         GET SIGN
        0123  X 0005
222     0124    0944          MBL,4,4
223     0125    6854          ADR,5,4
```

```
224  0126      FE57        STX,5,7                  |+00.00|
225  0127      A410        LFM,1        FAMSV       RESTORE REGISTERS
     0128  R   012C
226  0129      EDE0        LDI,14       0
     012A  A   0000
227       R   012A  FSV14   EQU          $-1
228  0128      FF0E        BRX,14                   RETURN
229  012C  A   0000  FAMSV   RES          7,0
```

```
 231                       ***************************************************************
 232   0133  A  0D0A  LINE0 DFC        #0D0A
 233   0134  A  0A0A  LINE1 DFC        #0A0A,|123 123456  CURRENT |
       0135  A  3132
       0136  A  3320
       0137  A  3132
       0138  A  3334
       0139  A  3536
       013A  A  2020
       013B  A  4355
       013C  A  5252
       013D  A  454E
       013E  A  5420
 234   013F  A  5245        DFC        |RECEIVER STATUS, DET 515|
       0140  A  4345
       0141  A  4956
       0142  A  4552
       0143  A  2053
       0144  A  5441
       0145  A  5455
       0146  A  532C
       0147  A  2044
       0148  A  4554
       0149  A  2035
       014A  A  3135
 235   014B  A  0D0A        DFC        #0D0A,#0A20
       014C  A  0A20
 236   014D  A  4348        DFC        |CHAN FREQ C I M AM GAIN TR BLL|
       014E  A  414E
       014F  A  2046
       0150  A  5245
       0151  A  5120
       0152  A  4320
       0153  A  4920
       0154  A  4D20
       0155  A  414D
       0156  A  2047
       0157  A  4149
       0158  A  4E20
       0159  A  5452
       015A  A  2042
       015B  A  4C4C
 237   015C  A  2044        DFC        | DIURNAL SIGMA AMPLITUDE|,0
       015D  A  4955
       015E  A  524E
       015F  A  414C
       0160  A  2053
       0161  A  4947
       0162  A  4D41
       0163  A  2041
```

```
        0164  A  4D50
        0165  A  4C49
        0166  A  5455
        0167  A  4445
        0168  A  0000
238     0169  A  0D0A  LINE2 DFC          #0D0A,|   A  16.0 2 0 0  A  2|
        016A  A  2020
        016B  A  2041
        016C  A  2020
        016D  A  3136
        016E  A  2E30
        016F  A  2032
        0170  A  2030
        0171  A  2030
        0172  A  2020
        0173  A  4120
        0174  A  2032
239     0175  A  3320        DFC          |3   7  06  +000.0 000.6  00.00|
        0176  A  2020
        0177  A  3720
        0178  A  2030
        0179  A  3620
        017A  A  202B
        017B  A  3030
        017C  A  302E
        017D  A  3020
        017E  A  3030
        017F  A  302E
        0180  A  3620
        0181  A  2030
        0182  A  302E
        0183  A  3030
240     0184  A  2020  L2S1  DFC          |  DOWN|
        0185  A  444F
        0186  A  574E
241     0187  A  0000        DFC          #0000
242     0188  A  0D0A  LINE3 DFC          #0D0A,|   A ZERO INPUT...|,0
        0189  A  2020
        018A  A  2041
        018B  A  205A
        018C  A  4552
        018D  A  4F20
        018E  A  494E
        018F  A  5055
        0190  A  542E
        0191  A  2E2E
        0192  A  0000
243     0193  A  0D0A  TERMN DFC          #0D0A,#0A0A,#0000
        0194  A  0A0A
        0195  A  0000
```

```
 244      0196  A  0000  TEMP  RES          5,0
 245      019B  A  2055  STAT  DFC          | UP C,NRC,R DOWN|
          019C  A  5020
          019D  A  432C
          019E  A  4E52
          019F  A  432C
          01A0  A  5220
          01A1  A  444F
          01A2  A  574E
 246      01A3                END

TOTAL ASSEMBLY ERRORS =   0    SIZE =   419
```

```
 1                                PGM           E$LOG
 2                                 INT           E:LOG,U.FRQ
 3                                 EXT           E:028,E:FRT,E:BAD,U.TRK,U.GAN
 4                                 EXT           E.BDF,U.BLL,E.28F
 5                          * THIS IS THE LOG MESSAGE GENERATOR.  CHANGES IN SYSTEM STATUS OR
 6                          *   PARAMETER VALUES ARE LOGGED ON THE STATION LOGGING TELEPRINTER.
 7                          *   THE OUTPUT FORMAT IS.....
 8                          *   CHAR 1-3....DAY OF YEAR
 9                          *   CHAR 4......BLANK
10                          *   CHAR 5-10...ZULU TIME OF DAY
11                          *   CHAR 11-12..BLANK
12                          *   CHAR 13.....CHANNEL DESIGNATOR
13                          *   CHAR 14.....BLANK
14                          *   CHAR 15-16..TWO CHAR CODED MESSAGE (SEE MESSAGE TABLE)
15                          *   NEW VALUE, ETC. FOLLOWS FOR APPROPRIATE MESSAGES.
16                          * THE CALLING SEQUENCE DEPENDS ON THE TYPE OF MESSAGE.
17                          *   FOR ALL MESSAGES, ONE PARAMETER IS PASSED VIA R5, INTERPRETED AS..
18                          *      BITS 0-7....CHANNEL DESIGNATOR, 0 FOR CHAN A, 1 FOR B, ETC.
19                          *      BITS 8-15...MESSAGE NUMBER POINTS TO ENTRY IN MSG. TABLE
20                          *   FOR MESSAGES WITH NO NEW VALUE, ETC. NEEDED...
21                          *      BLM,4          E:LOG
22                          *   WHILE FOR MESSAGES WITH FURTHER INFORMATION...
23                          *      BLM,4          E:LOG
24                          *      DFC            (NEW VALUE OR OTHER ADDITIONAL INFORMATION)
25   0000      E7E0     E:LOG BLM,14         E:FRT           SET UP DAY/TIME GROUP FOR OUTPUT
     0001  X   0002
26   0002  R   00B9           DFC            OBUFF+1
27   0003      A510           SFM,1          SAVRS           SAVE REGISTERS
     0004  R   00C9
28   0005      0B75           MUR,7,5                        SEPARATE CHAN AND MSG NO.
29   0006      E870           ADI,7          #4120           CONVERT CHARS TO ASCII
     0007  A   4120
30   0008      E670           STM,7          OBUF1           STORE CHANNEL INDICATOR
     0009  R   00BF
31   000A      EA50           ETI,5          #FF00           RECOVER MSG NO.
     000B  A   FF00
32   000C      E525           LDM,2,5        MSGTB           GET TWO CHAR. CODED MSG.
     000D  R   00A2
33   000E      E620           STM,2          OBUF1+1         STORE MSG IN OUTPUT BUFFER
     000F  R   00C0
34   0010      7D55           TRRB,5,5       $+4             IS MSG =0?
     0011  R   0014
35   0012      E700           BRU            UPMSG            YES, DO UP MSG.
     0013  R   0063
36   0014      715F           SBRB,5,15      $+4             IS MSG =1?
     0015  R   0018
37   0016      E700           BRU            FRMSG            YES, DO FC MSF.
     0017  R   0028
38   0018      E950           SUI,5          5
     0019  A   0005
```

```
001A     7650         TBRB,5,0    PRMSG       MSG NO IS 2, 3, 4, 5.
001B  R  004B
001C     6C66         ZRR,6
001D     E660         STM,6       OBUF1+2     STORE MSG TERMINATOR (#00)
001E  R  00C1
001F     6C22   LOG1  ZRR,2
0020     E620         STM,2       E.28F
0021  X  0008
0022     E7E0         BLM,14      E:028       LOG MSG ON ASR 28
0023  X  0001
0024  R  00B8         DFC         OBUFF
0025     A410         LFM,1       SAVRS       RESTORE REGISTERS
0026  R  00C9
0027     FF04         BRX,4                   RETURN
                * FREQUENCY CHANGE MESSAGE...
0028     E740   FRMSG BLM,4       GETCH       GET CHANNEL IN R5
0029  R  009A
002A     2D51         LLS,5,1
002B     E578         LDM*,7      SAVRS+3     GET PARAMETERS
002C  R  00CC
002D     80F0         ABMM,15     SAVRS+3     MOVE RETURN AROUND PARM.
002E  R  00CC
002F     6C66         ZRR,6
0030     2C62         LLD,6,2                 FREQ*10 INTO R6
0031     2D64         LLS,6,4
0032     2C64         LLD,6,4                 FREQ*1 INTO R6
0033     ED40         LDI,4       #3939
0034  A  3939
0035     6946         SUR,4,6                 RECOVER FREQ FROM 9'S COMPLIMENT
0036     6245         ZBR,4,5
0037     6244         ZBR,4,4
0038     E645         STM,4,5     U.FRQ       SAVE FOR OTHER USES
0039  R  00D0
003A     605F         ABR,5,15
003B     E640         STM,4       OBUF1+2     STORE IN OUTPUT BUFFER
003C  R  00C1
003D     6C66         ZRR,6
003E     2C64         LLD,6,4                 FREQ*1 INTO R6
003F     ED40         LDI,4       #2E39
0040  A  2E39
0041     6946         SUR,4,6                 RECOVER VALUE FROM 9'S COMPLIMENT
0042     E645         STM,4,5     U.FRQ       SAVE REST OF FREQ.
0043  R  00D0
0044     E640         STM,4       OBUF1+3     STORE IN OUTPUT BUFFER
0045  R  00C2
0046     6C66         ZRR,6
0047     E660         STM,6       OBUF1+4     STORE MSG TERMINATOR
0048  R  00C3
0049     E700         BRU         LOG1        OUTPUT MSG.
004A  R  001F
```

```
 73                             * PARAMETER CHANGE MSG....
 74     004B      E6C0  PRMSG  STM,12          HLD12          SAVE R12
        004C  R   0054
 75     004D      E5C8         LDM*,12         SAVRS+3        GET PARAMETER VALUE
        004E  R   00CC
 76     004F      80F0         ABMM,15         SAVRS+3        MOVE RETURN AROUND PARM.
        0050  R   00CC
 77     0051      E7E0         BLM,14          E:BAD          CONVERT VALUE TO ASCII DECIMAL
        0052  X   0003
 78     0053      EDC0         LDI,12          0
        0054  A   0000
 79           R   0054  HLD12  EQU             $-1
 80   * 0055      ED20         LDI,2           E.BDF
        0056  X   0006
 81     0057      FD52         LDX,5,2                        GET LOW ORDER DIGIT
 82     0058      602F         ABR,2,15
 83     0059      FD42         LDX,4,2                        GET HIGH ORDER DIGIT
 84     005A      0944         MBL,4,4
 85     005B      6B45         ORR,4,5                        PACK TO ONE WORD
 86     005C      E640         STM,4           OBUF1+2        STORE IN OUTPUT BUFFER
        005D  R   00C1
 87     005E      6C44         ZRR,4
 88     005F      E640         STM,4           OBUF1+3        STORE MSG TERMINATOR
        0060  R   00C2
 89     0061      E700         BRU             LOG1           OUTPUT
        0062  R   001F
 90                             * UP MESSAGE TIME, GIVE FREQ, TRACK RATE, GAIN, BLANKING LEVEL...
 91     0063      E740  UPMSG  BLM,4           GETCH          CHANNEL POINTER IN R5
        0064  R   009A
 92     0065      6D45         TRR,4,5
 93     0066      2D41         LLS,4,1                        U.FRQ POINTER IN R4
 94     0067      E534         LDM,3,4         U.FRQ
        0068  R   00D0
 95     0069      E630         STM,3           OBUF1+2        STORE UPPER HALF OF FREQ IN BUFFER
        006A  R   00C1
 96     006B      604F         ABR,4,15
 97     006C      E534         LDM,3,4         U.FRQ
        006D  R   00D0
 98     006E      E630         STM,3           OBUF1+3        STORE LOWER HALF OF FREQ IN BUFFER
        006F  R   00C2
 99     0070      E535         LDM,3,5         U.TRK          GET TRACK RATE
        0071  X   0004
100     0072      E830         ADI,3           #2C30          CONV DIGIT TO ASCII AND ADD COMMA
        0073  A   2C30
101     0074      E630         STM,3           OBUF1+4
        0075  R   00C3
102     0076      E5C5         LDM,12,5        U.GAN
        0077  X   0005
103     0078      E7E0         BLM,14          E:BAD          CONVERT GAIN TO DECIMAL ASCII
        0079  X   0003
```

```
104     007A      ED60        LDI,6       E.BDF
        007B  X   0006
105     007C      FD36        LDX,3,6                 GET LOW ORDER DIGIT
106     007D      0933        MBL,3,3
107     007E      E830        ADI,3       #002C       ADD COMMA
        007F  A   002C
108     0080      E630        STM,3       OBUF1+6     STORE LOW PART OF GAIN
        0081  R   00C5
109     0082      606F        ABR,6,15
110     0083      FD36        LDX,3,6                 GET HIGH ORDER DIGIT
111     0084      E830        ADI,3       #2C00       ADD COMMA
        0085  A   2C00
112     0086      E630        STM,3       OBUF1+5     STORE HIGH PART OF GAIN
        0087  R   00C4
113     0088      E5C5        LDM,12,5    U.BLL       GO AFTER BLANKING LEVEL
        0089  X   0007
114     008A      E7E0        BLM,14      E:BAD       CONV BLANK LEVEL TO DECIMAL ASCII
        008B  X   0003
115     008C      ED60        LDI,6       E.BDF
        008D  X   0006
116     008E      FD36        LDX,3,6                 GET LOW ORDER DIGIT
117     008F      606F        ABR,6,15
118     0090      FD26        LDX,2,6                 GET HIGH ORDER DIGIT
119     0091      0922        MBL,2,2
120     0092      6B23        ORR,2,3                 PACK TO ONE WORD
121     0093      E620        STM,2       OBUF1+7     STORE IN OUTPUT BUFFER
        0094  R   00C6
122     0095      6C22        ZRR,2
123     0096      E620        STM,2       OBUF1+8     MESSAGE TERMINATOR
        0097  R   00C7
124     0098      E700        BRU         LOG1        OUTPUT
        0099  R   001F
125     009A      ED60  GETCH LDI,6       OBUF1
        009B  R   00BF
126     009C      ED70        LDI,7       0
        009D  A   0000
127     009E      AE56        LBX,5,6                 GET CHAN.
128     009F      E950        SUI,5       #41
        00A0  A   0041
129     00A1      FF04        BRX,4                   RETURN WITH CHAN. IN R5.
130     00A2  A   5520  MSGTB DFC         |U |        00-CHANNEL UP
131     00A3  A   4643        DFC         |FC|        01-FREQUENCY CHANGED
132     00A4  A   4343        DFC         |CC|        02-CARDIOID CHANGED
133     00A5  A   5443        DFC         |TC|        03-TRACKING RATE CHANGED
134     00A6  A   4743        DFC         |GC|        04-GAIN CHANGED
135     00A7  A   4243        DFC         |BC|        05-BLANKING LEVEL CHANGED
136     00A8  A   5253        DFC         |RS|        06-REDUNDANCY CHECK SUCCESSFUL
137     00A9  A   5344        DFC         |SD|        07-SYSTEM DEAD IN SCHEDULER
138     00AA  A   4D4E        DFC         |MN|        08-MANUAL/AUTO TO MANUAL
139     00AB  A   4155        DFC         |AU|        09-MANUAL/AUTO TO AUTO
```

```
 140     00AC  A  4D53          DFC            |MS|            10-MAINTENANCE SET
 141     00AD  A  4D52          DFC            |MR|            11-MAINTENANCE RESET
 142     00AE  A  4953          DFC            |IS|            12-INE SET
 143     00AF  A  4952          DFC            |IR|            13-INE RESET
 144     00B0  A  4346          DFC            |CF|            14-CHAN COASTING DUE TO LOST SIGNAL
 145     00B1  A  434E          DFC            |CN|            15-CHAN COASTING DUE TO NOISE
 146     00B2  A  4353          DFC            |CS|            16-CHAN COASTING, SATURATED SIGNAL
 147     00B3  A  4420          DFC            |D |            17-CHANNEL DOWN
 148     00B4  A  4146          DFC            |AF|            18-ANALOG SYSTEM FAILURE
 149     00B5  A  5046          DFC            |PF|            19-POWER FAILURE
 150     00B6  A  5052          DFC            |PR|            20-POWER REGAINED
 151     00B7  A  4D50          DFC            |MP|            21-MEMORY PARITY ERROR DISCOVERED
 152     00B8  A  0D0A  OBUFF   DFC            #0D0A,|123 123456  |
         00B9  A  3132
         00BA  A  3320
         00BB  A  3132
         00BC  A  3334
         00BD  A  3536
         00BE  A  2020
 153     00BF  A  0000  OBUF1   RES            10,0
 154     00C9           SAVRS   RES            7
 155     00D0  A  0000  U.FRQ   RES            28,0
 156     00EC           END

TOTAL ASSEMBLY ERRORS =    0     SIZE =    236
```

```
 1                              PGM          E$BDC
 2                               INT          E:BDC,E:BAD,E.BDF,E.BSG
 3                          * THIS UTILITY PROGRAM CONVERTS A BINARY VALUE IN R12 TO ITS ASCII
 4                          *   DECIMAL (E:BAD) OR BCD (E:BDC) EQUIVALENT, LEAVING THOSE CHARS,
 5                          *   LEAST SIGNIFICANT DIGIT FIRST, IN A FIVE WORD BUFFER (E.BDF).
 6                          *   THE ASCII REPRESENTATION OF THE NUMBER'S SIGN IS STORED IN E.BSG.
 7                          * CALLING SEQUENCES ARE.......
 8                          *     BLM,14          E:BDC          FOR BCD CHARS
 9                          *     BLM,14          E:BAD          FOR ASCII CHARS
10                          *      WITH BINARY NUMBER IN R12
11     0000      8200   E:BDC OBMM,0          CONVR          SET CONVERSION FLAG
       0001  R   0026
12     0002      F703         HOP,$+3
13     0003      8100   E:BAD ZBMM,0          CONVR          RESET CONVERSION FLAG
       0004  R   0026
14     0005      A510         SFM,1          SAVRS          SAVE WORKING REGISTERS
       0006  R   0027
15     0007      76C0         TBRB,12,0      NEGNO          IS NUMBER NEGATIVE?
       0008  R   000E
16     0009      ED10         LDI,1          #202B            NO..
       000A  A   202B
17     000B      E610         STM,1          E.BSG          SET E.BSG TO '+'.
       000C  R   002E
18     000D      F706         HOP,$+6
19     000E      ED10   NEGNO LDI,1          #202D            YES..
       000F  A   202D
20     0010      E610         STM,1          E.BSG          SET E.BSG TO '-'.
       0011  R   002E
21     0012      6FCC         TTR,12,12                     GET ABS (NUMBER) FOR NO.
22     0013      ED10         LDI,1          -5
       0014  A   FFFB
23     0015      ED20         LDI,2          10
       0016  A   000A
24     0017      6D5C         TRR,5,12
25     0018      6C44   DIVLP ZRR,4
26     0019      2142         DVR,4,2
27     001A      8600         TBMB,0         CONVR,$+5      CHECK FOR ASCII OR BCD OUTPUT
       001B  R   0026
       001C  R   001F
28     001D      E840         ADI,4          #30              CONV. TO ASCII.
       001E  A   0030
29     001F      E641         STM,4,1        E.BDF+5
       0020  R   0034
30     0021      701F         ABRB,1,15      DIVLP          LOOP BACK TILL FOUR CHARS.
       0022  R   0018
31     0023      A410         LFM,1          SAVRS          RESTORE REGISTERS
       0024  R   0027
32     0025      FF0E         BRX,14                        RETURN
33     0026  A   0000   CONVR DFC          0              CODE I.D. FLAG
34     0027              SAVRS RES          7
```

```
 35     002E  A  0000  E.BSG DFC          0          NUMBER SIGN
 36     002F             E.BDF RES          5          WORKING AND OUTPUT BUFFER
 37     0034                   END

TOTAL ASSEMBLY ERRORS =    0     SIZE =     52
```

```
 1                              PGM           E$FRT
 2                               INT           E:FRT,E:FCT,E.TM1,E.TM2
 3                          *    CAT NO.  400000-007
 4                          * THIS ROUTINE PREPARES THE DOY/TIME GROUP AND STORES THE ASCII
 5                          *   REPRESENTATION IN MEMORY STARTING AT THE LOCATION SPECIFIED
 6                          *   IN THE PARAMETER.  IF ENTRY IS MADE AT E:FRT, THE CURRENT TIME
 7                          *   IS READ FROM THE WORLD TIME CLOCK AND IS USED.  IF ENTRY IS MADE
 8                          *   AT E:FCT, THE DAY/TIME GROUP IN E.TM1,E.TM2 IS USED.  THE CALLING
 9                          *   SEQUENCE FOR EACH FOLLOWS.
10                          *     BLM,14        E:FRT
11                          *     DFC           (ADDR. TO STORE ASCII CHARS. IN)
12                          *     BLM,14        E:FCT          (TIME IS IN E.TM1,E.TM2)
13                          *     DFC           (ADDR. TO STORE ASCII CHARS. IN)
14     0000     A5A0  E:FCT SFM,10        SAVER          USE R10 - R15
       0001  R  0041
15     0002     E700        BRU           FMTIM
       0003  R  0011
16     0004     A5A0  E:FRT SFM,10        SAVER          USE R10 - R15
       0005  R  0041
17     0006     EDB0        LDI,11        #4000          SET UP TO READ DOY/TIME GROUP OFF WTC
       0007  A  4000
18     0008     43BF        OCD,11,#F
19     0009     4FDF        IDD,13,#F
20     000A     0DDD        TOR,13,13
21     000B     E6D0        STM,13        E.TM1
       000C  R  0047
22     000D     4FDF        IDD,13,#F
23     000E     0DDD        TOR,13,13
24     000F     E6D0        STM,13        E.TM2
       0010  R  0048
25     0011     FDAE  FMTIM LDX,10,14                    GET PARAMETER, I.E. STORAGE LOCATION-
26     0012     80F0        ABMM,15       SAVER+4        UPDATE RETURN ADDRESS
       0013  R  0045
27     0014     6CCC        ZRR,12
28     0015     E5D0        LDM,13        E.TM1          HI INPUT WORD
       0016  R  0047
29     0017     2CC2        LLD,12,2                     DAY X 100 INTO R12
30     0018     2DC4        LLS,12,4
31     0019     2CC4        LLD,12,4                     GET DAY TIMES 10
32     001A     E8C0        ADI,12        #3030          CONVERT DIGITS TO ASCII
       001B  A  3030
33     001C     FECA        STX,12,10                    STORE AWAY
34     001D     60AF        ABR,10,15                    MOVE OUTPUT WORD POINTER
35     001E     6CCC        ZRR,12
36     001F     2CC4        LLD,12,4                     GET DAY X 1
37     0020     09CC        MBL,12,12
38     0021     E8C0        ADI,12        #3020          CONV TO ASCII AND ADD SPACE CHAR
       0022  A  3020
39     0023     FECA        STX,12,10                    STORE AWAY
40     0024     60AF        ABR,10,15                    MOVE POINTER TO NEXT WORD
```

```
 41     0025       6CCC        ZRR,12
 42     0026       2CC2        LLD,12,2                    GET HR X 10
 43     0027       2DC4        LLS,12,4
 44     0028       2CC4        LLD,12,4                    GET HR X 1
 45     0029       E8C0        ADI,12          #3030       CONVERT TO ASCII
        002A   A   3030
 46     002B       FECA        STX,12,10                   STORE AWAY
 47     002C       60AF        ABR,10,15                   MOVE POINTER TO NEXT LOCATION
 48     002D       E5D0        LDM,13          E.TM2       GET LO INPUT WORD
        002E   R   0048
 49     002F       6CCC        ZRR,12
 50     0030       2CC5        LLD,12,5                    GET MIN X 10
 51     0031       2DC4        LLS,12,4
 52     0032       2CC4        LLD,12,4                    GET MIN X 1
 53     0033       E8C0        ADI,12          #3030       CONVERT TO ASCII
        0034   A   3030
 54     0035       FECA        STX,12,10                   STORE AWAY
 55     0036       60AF        ABR,10,15                   MOVE POINTER TO NEXT LOCATION
 56     0037       6CCC        ZRR,12
 57     0038       2CC3        LLD,12,3                    GET SEC X 10
 58     0039       2DC4        LLS,12,4
 59     003A       2CC4        LLD,12,4                    GET SEC X 1
 60     003B       E8C0        ADI,12          #3030       CONVERT TO ASCII
        003C   A   3030
 61     003D       FECA        STX,12,10                   STORE AWAY
 62     003E       A4A0        LFM,10          SAVER       RESTORE REGISTERS
        003F   R   0041
 63     0040       FF0E        BRX,14                      RETURN
 64     0041              SAVER RES             6           REGISTER SAVER
 65     0047   A   0000  E.TM1 DEC             0           DAY/TIME GROUP IN INPUT FORMAT
 66     0048   A   0000  E.TM2 DEC             0            CON'T
 67     0049              END

TOTAL ASSEMBLY ERRORS =    0     SIZE =     73
```

```
 1                          PGM           E$DIF
 2                           INT           E:DIF,E:COT
 3                           EXT           U.OTM
 4                    *      CAT NO.  400000-012
 5                    * E$DIF CONTAINS TWO EXECUTIVE UTILITY PROGRAMS CONCERNED WITH THE
 6                    *   CONVERSION OF BCD TIME, AS READ THRU THE IOIS, TO BINARY COUNT OF
 7                    *   SECONDS.
 8                    * E:COT SIMPLY CONVERTS THE BCD TIME CHARACTERS AT THE LOCATION
 9                    *   SPECIFIED IN THE PARAMETER WORD TO BINARY, RETURNS IN R12,R13
10                    * E:DIF DOES NOTHING IF THERE IS NO SIGNAL IN PROGRESS, I.E. THE CHAN'S~
11                    *   ONSET TIME IS ZERO.   IF A SIGNAL IS CURRENTLY IN PROGRESS, THE
12                    *   DIFFERENCE BETWEEN THE ONSET TIME AND THE TIME SPECIFIED BY THE
13                    *   CALLING PARAMETER IS RETURNED IN R12,R13. CHANNEL DESIGNATED IN R6.~
14                    * CALLING SEQUENCE.....
15                    *      BLM,14         E:COT
16                    *      (ADDRESS OF FIRST WORD OF TIME TO BE CONVERTED)
17                    * OR....
18                    *      BLM,14         E:DIF
19                    *      (ADDRESS OF FIRST WORD OF TIME TO BE CONVERTED)
20                    *      (RETURN LOCATION IF ONSET TIME IS ZERO)
21                    *      (RETURN LOCATION WITH TIME DIFFERENCE FROM ONSET)
22                    * COMPUTATION IS MADE THUSLY:
23                    *    IF D0=HR*10
24                    *       D1=HR*1
25                    *       D2=MIN*10
26                    *       D3=MIN*1
27                    *       D4=SEC*10
28                    *       D5=SEC*1
29                    *    THEN
30                    *     SECONDS COUNT = (((((D0*10+D1)*6+D2)*6+D4):10+D5)
31   0000     A510    E:COT SFM,1          SAVER          SAVE REGISTERS FOR RETURN
     0001  R  0052
32   0002     8200          OBMM,0         FLAG           SET ENTRY FLAG FOR E:COT
     0003  R  0059
33   0004     E700          BRU            COMCN
     0005  R  0016
34   0006     A510    E:DIF SFM,1          SAVER          WEIDER, SAVE THE REGISTERS
     0007  R  0052
35   0008     8100          ZBMM,0         FLAG           JA WOHL, UND RESET DAS ENTRY FLAG
     0009  R  0059
36   000A     2D61          LLS,6,1                       SET UP FOR CHAN D.P. POINTER
37   000B     E516          LDM,1,6        U.OTM
     000C  X  0001
38   000D     606F          ABR,6,15
39   000E     E016          ADM,1,6        U.OTM          BRU IF U.OTM ISN'T ZERO
     000F  X  0001
40   0010     7D11          TRRB,1,1       COMON
     0011  R  0016
41   0012     60EF          ABR,14,15                     RETURN IF NO SIGNAL IN PROGRESS
42   0013     A410    RETRN LFM,1          SAVER          RESTORE REGISTERS
```

```
0014 R 0052
0015   FF0E         BRX,14                         UND, RETURN
0016   FD7E   COMON LDX,7,14                       GET HI ORDER TIME WORD ADDRESS
0017   FD57         LDX,5,7                         NOW GET THE WORD
0018   60EF         ABR,14,15                      MOVE RETURN ADDRESS OVER PARAMFTER
0019   2D5A         LLS,5,10                       MOVE HRX10 TO LEFT END OF R5
001A   6C44         ZRR,4
001B   2C42         LLD,4,2                         AND OVER INTO R4.
001C   6DD4         TRR,13,4                       R13=HRX10
001D   ED10         LDI,1          #A              R1=10
001E A 000A
001F   20C1         MPR,12,1
0020   6C44         ZRR,4
0021   2C44         LLD,4,4                        MOVE HR X 1 DIGIT TO R4
0022   68D4         ADR,13,4                        AND ADD TO R13
0023   ED20         LDI,2          #6              R2=6
0024 A 0006
0025   20C2         MPR,12,2                        ?
0026   607F         ABR,7,15                       SET UP TO GET LOW ORDER TIME WORD
0027   FD57         LDX,5,7                         THEN GET IT
0028   6C44         ZRR,4
0029   2C45         LLD,4,5                        GET MIN*10
002A   68D4         ADR,13,4                        AND ADD TO R13
002B   20C1         MPR,12,1
002C   6C44         ZRR,4
002D   2C44         LLD,4,4                        GET MIN*1
002E   68D4         ADR,13,4                        AND ADD TO R13
002F   20C2         MPR,12,2
0030   6C44         ZRR,4
0031   2C43         LLD,4,3                        GET SEC*10
0032   68D4         ADR,13,4                        AND ADD TO R13
0033   20C1         MPR,12,1
0034   6C44         ZRR,4
0035   2C44         LLD,4,4                        GET SEC*1
0036   6D54         TRR,5,4
0037   6C44         ZRR,4
0038   22C4         DAR,12,4                       AND DOUBLE PRECISION ADD TO R12,R13
              * READY TO EXIT IF ONLY TASK WAS TO CONVERT TO BINARY.
0039   8600         TBMB,0         FLAG,RETRN
003A R 0059
003B R 0013
003C   60EE         ABR,14,14                      USE 2ND RETURN
003D   E556         LDM,5,6        U.OTM           GET ONSET TIME IN R4,R5
003E X 0001
003F   616F         SBP,6,15
0040   E546         LDM,4,6        U.OTM
0041 X 0001
0042   0D44         TOR,4,4                         AND NEGATE
0043   6F55         TTR,5,5                          (NEGATE????)
0044   7D55         TRRB,5,5       $+3
```

```
         0045  R  0047
  86     0046     604F          ABR,4,15
  87     0047     22C4          DAR,12,4                        THEN ADD TO PARAMETER TIME
  88                          * WE'VE GOT TO WATCH OUT FOR TIME SPREADS WHICH TRAVERSE MIDNIGHT ZULU
  89                          *   IF THE DIFFERENCE IS NEGATIVE, ADD 86,400 SECONDS TO CORRECT.
  90                          *   NOTE: 86,400=#15180
  91     0048     76C0          TBRB,12,0     $+4               CORRECT IF SIGN BIT IS SET
         0049  R  004C
  92     004A     E700          BRU           RETRN             OTHERWISE RETURN
         004B  R  0013
  93     004C     654F          LBR,4,15
  94     004D     ED50          LDI,5         #5180             R4,R5=#15180
         004E  A  5180
  95     004F     22C4          DAR,12,4                        ADD 86,400 TO DIFFERENCE
  96     0050     E700          BRU           RETRN              AND NOW RETURN
         0051  R  0013
  97                          * STORAGE AREA..............
  98     0052  A  0000       SAVER RES         7,0               REGISTER HOLD
  99     0059  A  0000       FLAG  DFC         0                 ENTRY POINT FLAG
 100     005A                    END

TOTAL ASSEMBLY ERRORS =   0     SIZE =     90
```

```
 1                          PGM           E$FMF
 2                           INT           E:FMF
 3                           EXT           E:BAD,E.BSG,E.BDF
 4                    *      CAT NO.  400000-013
 5                    * E$FMF ASSUMES THE VALUE IN R12 IS A PHASE VALUE.  THIS
 6                    *   ROUTINE CONVERTS THE NUMBER TO ASCII DECIMAL AND STORES
 7                    *   THE CHARACTERS AWAY IN THE LOCATION SPECIFIED FOR OUTPUT.
 8                    * CALLING SEQUENCE:
 9                    *      BLM,15        E:FMF    (VALUE IN R12)
10                    *     (ADDR OF FIRST LOC. OUTPUT TO  BE STORED IN)
11                    * OUTPUT FORMAT: | +0037.62 |  (I.E. 5 WORDS)
12      0000     A510 E:FMF SFM,1          SAVER
        0001   R 003C
13      0002     FD7F       LDX,7,15                        GET STORE ADDR (R7)
14      0003     60FF       ABR,15,15                       MOD RETURN ADDR
15      0004     6C33       ZRR,3
16      0005     6D2C       TRR,2,12                        COPY VAL IN R2
17      0006     2A24       RAD,2,4                         INTEGER PART IN R2
18      0007     0833       MBR,3,3
19      0008     2934       RLS,3,4                         FRACTION PART IN R3
20      0009     7620       TBRB,2,0      $+4
        000A   R 000D
21      000B     6D13       TRR,1,3
22      000C     F702       HOP,$+2
23      000D     6F13       TTR,1,3                         FRACTION MUST BE POS.
24      000E     6DC2       TRR,12,2
25      000F     E6E0       STM,14        HLD14
        0010   R 0038
26      0011     E7E0       BLM,14        E:BAD
        0012   X 0001
27      0013     ED30       LDI,3         E.BDF
        0014   X 0003
28      0015     E830       ADI,3         3
        0016   A 0003
29      0017     E540       LDM,4         E.BSG
        0018   X 0002
30      0019     FE47       STX,4,7                         STORE SIGN
31      001A     607F       ABR,7,15                        NEXT STORE LOC
32      001B     ED60       LDI,6         -2
        001C   A FFFE
33      001D     FD43 FMF1  LDX,4,3                         HIGH-ORDERED DIGIT
34      001E     0944       MBL,4,4
35      001F     613F       SBR,3,15
36      0020     F843       ADX,4,3                         NEXT DIGIT
37      0021     FE47       STX,4,7                         STORE FIRST TWO DIGITS
38      0022     607F       ABR,7,15                        NEXT STORE LOC
39      0023     613F       SBR,3,15
40      0024     706F       ABRB,6,15     FMF1
        0025   R 001D
41      0026     ED60       LDI,6         625
```

```
         0027   A  0271
  42     0028      2016          MPR,1,6                        DECIMAL*625
  43     0029      6DC1          TRR,12,1
  44     002A      E7E0          BLM,14          E:BAD
         002B   X  0001
  45     002C      603D          ABR,3,13
  46     002D      FD43          LDX,4,3
  47     002E      E840          ADI,4           #2E00
         002F   A  2E00
  48     0030      FE47          STX,4,7                        STORE |.D|
  49     0031      607F          ABR,7,15
  50     0032      613F          SBR,3,15
  51     0033      FD43          LDX,4,3
  52     0034      0944          MBL,4,4
  53     0035      604A          ABR,4,10
  54     0036      FE47          STX,4,7                        STORE LAST DIGIT, SPACE
  55     0037      EDE0          LDI,14          #0
         0038   A  0000
  56            R  0038   HLD14 EQU             $-1
  57     0039      A410          LFM,1           SAVER
         003A   R  003C
  58     003B      FF0F          BRX,15
  59                         ********************************************************************************
  60     003C   A  0000   SAVER RES             7,0
  61     0043              END

TOTAL ASSEMBLY ERRORS =    0     SIZE =     67
```

```
                         PGM          E$SRT
                          INT          E:SRT
                    *     CAT NO.  400000-016
                    * E$SRT IS A SQUARE ROOT COMPUTATION ROUTINE.
                    *   THE CALCULATION USES NEWTON'S METHOD OF
                    *   TANGENTS.
                    * ITERATION IS MADE AS FOLLOWS:
                    *   X(N+1) = ( A/X(N) + X(N) ) / 2
                    * WHERE X(0) IS BASED ON THE VALUE OF A, THE
                    *   ARGUMENT OF THE SQUARE ROOT FUNCTION.
                    * THE ROUTINE IS ENTERED WITH DOUBLE PRECISION
                    *   A IN R12,R13.
                    * THE CALLING SEQUENCE IS:
                    *     BLM,14       E:SRT
                    * AND THE FUNCTION ROOT IS RETURNED IN R13.
0000     A510   E:SRT SFM,1        SAVER
0001   R 0038
0002     6D6C         TRR,6,12                    COPY ARG.
0003     6D7D         TRR,7,13
0004     76C0         TBRB,12,0    NEGAR          IS A<0? BRU IF YES
0005   R 000A
0006     7DCC         TRRB,12,12   SRT1           CHECK A=0
0007   R 000E
0008     7DDD         TRRB,13,13   SRT2
0009   R 0016
000A     6CDD   NEGAR ZRR,13                      RETURN VAL=0
000B     A410   RETRN LFM,1        SAVER          RESTORE REGS.
000C   R 0038
000D     FF0E         BRX,14                      RETURN
000E     ED10   SRT1  LDI,1        31             BIT COUNTER
000F   A 001F
0010     2C61   SRT3  LLD,6,1
0011     7660   SRT4  TBRB,6,0     EXIT
0012   R 001B
0013     611F         SBR,1,15
0014     E700         BRU          SRT3
0015   R 0010
0016     ED10   SRT2  LDI,1        16
0017   A 0010
0018     6D67         TRR,6,7
0019     E700         BRU          SRT4
001A   R 0011
001B     2B11   EXIT  RAS,1,1                     DIVIDE COUNT BY 2
001C     E810         ADI,1        #2A60          MAKE 'RAD,6,N' INSTR
001D   A 2A60
001E     E610         STM,1        SRT6
001F   R 0022
0020     6D6C         TRR,6,12
0021     6D7D         TRR,7,13
0022     2A60   SRT6  RAD,6,0                     COMPUTE X(0)
```

```
 39     0023      6D17        TRR,1,7
 40     0024      6D6C  SRT5  TRR,6,12
 41     0025      6D7D        TRR,7,13
 42     0026      2161        DVR,6,1                    R7=A/X(N)
 43     0027      6871        ADR,7,1                      =A/X(N)+X(N)
 44     0028      2971        RLS,7,1                      =(A/X(N)+X(N))/2
 45                       * NEW ESTIMATE IN R7, CHECK AGAINST OLD ESTIMATE
 46     0029      6917        SUR,1,7
 47     002A      7610        TBRB,1,0     $+3           ABS(X(N+1)-X(N))
        002B  R   002D
 48     002C      F702        HOP,$+2
 49     002D      6F11        TTR,1,1
 50     002E      E910        SUI,1        3             ACCURACY DETERMINATION
        002F  A   0003
 51     0030      7610        TBRB,1,0     $+5
        0031  R   0035
 52     0032      6D17        TRR,1,7                    SET NEW ESTIMATE
 53     0033      E700        BRU          SRT5          AND TRY AGAIN
        0034  R   0024
 54     0035      6DD7        TRR,13,7                   DONE
 55     0036      E700        BRU          RETRN
        0037  R   000B
 56                       ********************************************************************************
 57     0038  A   0000  SAVER RES          7,0           SAVE REGISTERS
 58     003F              END

TOTAL ASSEMBLY ERRORS =   0     SIZE =     63
```

```
                                PGM         F$FMT
                                INT         F:FMT,F:CHK,F:TRD,F:USE,F:CVT
                                INT         F.DBF,F.MTP
M                               EXT         E:SKD,B.STT,B:IOR,E.35I,F:DDD
M                               EXT         E:SKD,B.STT,B:IOR,E.35I,F:DDD
                        * THIS PROGRAM GIVES THE OPERATOR THE OPERTUNITY TO CHECK
                        *   THE DR FUD TAPE FORMAT.  IF THE FORMAT PASSES, HE CAN
                        *   BE REASONABLY SURE THAT THE DATA IS VALID.
     0000     7601  F:FMT TBRB,0,1    $+3
     0001  R  0003
     0002     F705        HOP,$+5
     0003     ED40        LDI,4       #3700
     0004  A  3700
     0005     E640        STM,4       F.MTP
     0006  R  0119
     0007     E7F0        BLM,15      B:IOR           REQUEST NO. OF BLOCKS
M    0008  X  0008
     0009  A  5000        DFC         #5000
     000A  R  00D5        DFC         NUMBK           CANNED REQUEST
                        * RE-ENTRY POINT
     000B     E740        BLM,4       F:CVT
     000C  R  008D
     000D     6F1B        TTR,1,11
     000E     7D11        TRRB,1,1    CIR
     000F  R  0012
     0010     E700        BRU         FINI
     0011  R  0084
     0012     E740  CIR   BLM,4       F:USE
     0013  R  011A
     0014     E740        BLM,4       F:CHK           GO CHECK FORMAT
     0015  R  001C
     0016     6600        NOP
     0017     6600        NOP
     0018     701F        ABRB,1,15   CIR             INCRIMENT BLOCK COUNTER
     0019  R  0012
     001A     E700        BRU         FINI            FINISHED
     001B  R  0084
     001C     ED20  F:CHK LDI,2       C
     001D  A  0000
     001E     ED30        LDI,3       #FCF0           FORMAT CHECKER CODE
     001F  A  FCF0
     0020     FD60        LDI,6       #F8F0           DITTO
     0021  A  F8F0
     0022     E552        LDM,5,2     FUDBF           LOAD FIRST WORD FROM FUDBF
     0023  R  0141
     0024     7E53        TERB,5,3    F.BAD           COMPARE DATA WITH FORMAT CHECK
     0025  R  0052
     0026     602F        ABR,2,15                    IF GOOD GO TO NEXT WORD
     0027     E552        LDM,5,2     FUDBF
     0028  R  0141
```

```
 34   0029     7E56        TERB,5,6     F.BAD+3     COMPARE SECOND WORD
      002A  R  0055
 35   002B     602F        ABR,2,15                 IF GOOD GO ON
 36   002C     E552        LDM,5,2      FUDBF
      002D  R  0141
 37   002E     7E56        TERB,5,6     F.BAD+3     COMPARE THIRD WORD
      002F  R  0055
 38   0030     602F        ABR,2,15                 IF GOOD GO ON
 39   0031     E552        LDM,5,2      FUDBF
      0032  R  0141
 40   0033     7E53        TERB,5,3     F.BAD       COMPARE FOURTH WORD
      0034  R  0052
 41   0035     ED30        LDI,3        #F0F0       FORMAT CHECKER FOR LOOP
      0036  A  F0F0
 42   0037     ED60        LDI,6        -22         COUNTER FOR LOOP
      0038  A  FFEA
 43   0039     602F  FLOOP ABR,2,15
 44   003A     E552        LDM,5,2      FUDBF
      003B  R  0141
 45   003C     7E53        TERB,5,3     F.BAD+6     COMPARE
      003D  R  0058
 46   003E     706F        ABRB,6,15    FLOOP       INC COUNTER
      003F  R  0039
 47   0040     602F        ABR,2,15                 OUT OF LOOP, GET NEXT WORD
 48   0041     ED60        LDI,6        #3132
      0042  A  3132
 49   0043     E552        LDM,5,2      FUDBF
      0044  R  0141
 50   0045     6C56        XOR,5,6
 51   0046     7D55        TRRB,5,5     F.BAD+8
      0047  R  005A
 52   0048     ED60        LDI,6        #3400
      0049  A  3400
 53   004A     602F        ABR,2,15
 54   004B     E552        LDM,5,2      FUDBF
      004C  R  0141
 55   004D     6C56        XOR,5,6
 56   004E     7D55        TRRB,5,5     F.BAD+8
      004F  R  005A
 57   0050     604E        ABR,4,14                 NORMAL RETURN
 58   0051     FF04        BRX,4
 59   0052     FA50  F.BAD ETI,5        #030F
      0053  A  030F
 60   0054     F706        HOP,$+6
 61   0055     EA50        ETI,5        #070F
      0056  A  070F
 62   0057     F703        HOP,$+3
 63   0058     EA50        ETI,5        #0F0F
      0059  A  0F0F
 64   005A     0865        MBR,6,5                  MOVE LEFT BYTE
```

```
65      005B      7D66        TRRB,6,6    $+3
        005C  R   005E
66      005D      F70A        HOP,CKRTB
67      005E      6C33        ZRR,3                   BIT COUNTER
68      005F      2961        RLS,6,1                 SHIFT BIT OUT
69      0060      7D66        TRRB,6,6    $+4         IS BIT STILL SET
        0061  R   0064
70      0062      E700        BRU         FNDBT       NO THAN YOU HAVE FOUND IT
        0063  R   0070
71      0064      603F        ABR,3,15
72      0065      E700        BRU         $-6
        0066  R   005F
73      0067      6C33  CKRTB ZRR,3
74      006B      2951        RLS,5,1                 SHIFT BIT OUT
75      0069      7D55        TRRB,5,5    $+4
        006A  R   006D
76      006B      E700        BRU         FNDBT
        006C  R   0070
77      006D      603F        ABR,3,15
78      006E      E700        BRU         $-6
        006F  R   0068
79      0070      E553  FNDBT LDM,5,3      TAB
        0071  R   010A
80      0072      E650        STM,5       X.VAL+9
        0073  R   00EE
81      0074      E7F0        BLM,15      B:IOR
    M   0075  X   0008
82      0076  A   9000        DFC         #9000
83      0077  R   00E5        DFC         X.VAL
84      007B      E7E0        BLM,14      F:DDD
    M   0079  X   000A
85      007A      7600        TBRB,0,0    $+4
        007B  R   007E
86      007C      E700        BRU         ABORT
        007D  R   007F
87      007E      FF04        BRX,4                   ERROR RETURN
88      007F      E7F0  ABORT BLM,15      B:IOR
    M   00B0  X   000B
89      00B1  A   9000        DFC         #9000
90      0082  R   00FB        DFC         QUIT
91      00B3      F705        HOP,$+5
92      0084      E7F0  FINI  BLM,15      B:IOR
    M   00B5  X   000B
93      0086  A   9000        DFC         #9000
94      00B7  R   00F1        DFC         FINSH
95      008B      6C55        ZRR,5
96      0089      E650        STM,5       B.STT
    M   008A  X   0007
97      008B      E700        BRU         E:SKD
    M   008C  X   0006
```

```
 98      008D      6C33  F:CVT ZRR,3
 99      008E      EDC0        LDI,12        10
         008F  A   000A
100      0090      E5B3        LDM,11,3      E.35I
    M    0091  X   0009
101      0092      7DBB        TRRB,11,11    $+4             LAST DIGIT, FALL THRU
         0093  R   0096
102      0094      E700        BRU           CONV1-4
         0095  R   00A1
103      0096      6DFB        TRR,15,11
104      0097      E9F0        SUI,15        #30
         0098  A   0030
105      0099      76F0        TBRB,15,0     CTMSG
         009A  R   00BC
106      009B      E9F0        SUI,15        10
         009C  A   000A
107      009D      76F0        TBRB,15,0     CONV1-2
         009E  R   00A3
108      009F      E700        BRU           CTMSG
         00A0  R   00BC
109      00A1      6CBB        ZRR,11                        AND RETURN
110      00A2      FF04        BRX,4
111      00A3      E9B0        SUI,11        #30
         00A4  A   0030
112      00A5      603F  CONV1 ABR,3,15                      POINT TO NEXT DIGIT
113      00A6      E5E3        LDM,14,3      E.35I           GET NEXT DIGIT
    M    00A7  X   0009
114      00A8      7DEE        TRRB,14,14    $+3
         00A9  R   00AB
115      00AA      FF04        BRX,4
116      00AB      6DFE        TRR,15,14
117      00AC      E9F0        SUI,15        #30
         00AD  A   0030
118      00AE      76F0        TBRB,15,0     CTMSG
         00AF  R   00BC
119      00B0      E9F0        SUI,15        10
         00B1  A   000A
120      00B2      76F0        TBRB,15,0     GOOD
         00B3  R   00B6
121      00B4      E700        BRU           CTMSG
         00B5  R   00BC
122      00B6      20AC  GOOD  MPR,10,12
123      00B7      E9E0        SUI,14        #30             CONVERT NEXT DIGIT
         00B8  A   0030
124      00B9      68BE        ADR,11,14                     ADD THE TWO DIGITS
125      00BA      E700        BRU           CONV1
         00BB  R   00A5
126      00BC      E7F0  CTMSG BLM,15        B:IOR
    M    00BD  X   0008
127      00BE  A   9000        DFC           #9000
```

```
128      00BF  R  00C5          DFC          BADNO
129      00C0     6C55          ZRR,5
130      00C1     E650          STM,5        B.STT
     M   00C2  X  0007
131      00C3     E700          BRU          E:SKD
     M   00C4  X  0006
132      00C5  A  0D0A  BADNO   DFC          #0D0A,|INVALID CHAR, TASK ABORTED|
         00C6  A  494E
         00C7  A  5641
         00C8  A  4C49
         00C9  A  4420
         00CA  A  4348
         00CB  A  4152
         00CC  A  2C20
         00CD  A  5441
         00CE  A  534B
         00CF  A  2041
         00D0  A  424F
         00D1  A  5254
         00D2  A  4544
133      00D3  A  0D0A          DFC          #0D0A,#0000
         00D4  A  0000
134      00D5  A  0D0A  NUMBK   DFC          #0D0A,|NO. OF BLOCKS TO BE CHECKED?|,0
         00D6  A  4E4F
         00D7  A  2E20
         00D8  A  4F46
         00D9  A  2042
         00DA  A  4C4F
         00DB  A  434B
         00DC  A  5320
         00DD  A  544F
         00DE  A  2042
         00DF  A  4520
         00E0  A  4348
         00E1  A  4543
         00E2  A  4B45
         00E3  A  443F
         00E4  A  0000
135      00E5  A  0D0A  X.VAL   DFC          #0D0A,|FORMAT ERROR BIT 4|,#0D0A,0
         00E6  A  464F
         00E7  A  524D
         00E8  A  4154
         00E9  A  2045
         00EA  A  5252
         00EB  A  4F52
         00EC  A  2042
         00ED  A  4954
         00EE  A  2034
         00EF  A  0D0A
         00F0  A  0000
```

```
136      00F1  A  0D0A  FINSH DFC          #0D0A,|TASK COMPLETED|,#0D0A,0
         00F2  A  5441
         00F3  A  534B
         00F4  A  2043
         00F5  A  4F4D
         00F6  A  504C
         00F7  A  4554
         00F8  A  4544
         00F9  A  0D0A
         00FA  A  0000
137      00FB  A  0D0A  QUIT  DFC          #0D0A,|FORMAT CHECK TERMINATED |,#0D0A,0
         00FC  A  464F
         00FD  A  524D
         00FE  A  4154
         00FF  A  2043
         0100  A  4845
         0101  A  434B
         0102  A  2054
         0103  A  4552
         0104  A  4D49
         0105  A  4E41
         0106  A  5445
         0107  A  4420
         0108  A  0D0A
         0109  A  0000
138      010A  A  2031  TAB   DFC          | 1|
139      010B  A  2032        DFC          | 2|
140      010C  A  2034        DFC          | 4|
141      010D  A  2038        DFC          | 8|
142      010E  A  2041        DFC          | A|
143      010F  A  2042        DFC          | B|
144                     * THIS ROUTINE FILLS THE BIG BAD BUFFER WITH
145                     *   FRESH FUD.
146      0110     E7F0  F:TRC BLM,15       B:IOR
     M   0111  X  0008
147      0112  A  2000        DFC          #2000
148      0113  A  6176        DFC          MTBUF              START LOCATION
149      0114  A  1B80        DFC          7040
150      0115     6C33        ZRR,3
151      0116     E630        STM,3        F.MTP
         0117  R  0119
152      0118     FF07        BRX,7
153                     * RESET WORD POINTER
154           A  6176  MTBUF EQU           24950
155      0119  A  0000  F.MTP DFC          0
```

```
157                     * F:USE IS THE USER PROGRAM THAT TRANSFERS
158                     *   55 BYTE BLOCKS OUT OF THE BBB AND STORES
159                     *   THEM IN THE FUDBF.
160     011A    A510    F:USE SFM,1         FRS
        011B  R 015D
161     011C    E530          LDM,3         F.MTP             MAG TAPE POINTER
        011D  R 0119
162     011E    ED20          LDI,2         MTBUF
        011F  A 6176
163     0120    EDD0          LDI,13        0
        0121  A 0000
164     0122    EDC0          LDI,12        FUDBF
        0123  R 0141
165     0124    6D63          TRR,6,3
166     0125    E960          SUI,6         14080
        0126  A 3700
167     0127    7660          TBRB,6,0      $+4
        0128  R 0128
168     0129    E770          BLM,7         F:TRD
        012A  R 0110
169     012B    AE72    USE   LBX,7,2
170     012C    6D57          TRR,5,7                         SAVE ORIGINAL VALUE
171     012D    E950          SUI,5         10                CHECK FOR TEN
        012E  A 000A
172     012F    7D55          TRRB,5,5      $+4               STORE ORIGINAL NO.
        0130  R 0133
173     0131    AF5C          SBX,5,12                        STORE THE CONVERSION
174     0132    F702          HOP,$+2
175     0133    AF7C          SBX,7,12
176     0134    603F          ABR,3,15                        INC MTPNT
177     0135    60DF          ABR,13,15                       INC FUDBF POINT
178     0136    6D6D          TRR,6,13                        SAVE R13
179     0137    E960          SUI,6         55
        0138  A 0037
180     0139    7660          TBRB,6,0      USE
        013A  R 012B
181     013B    E630          STM,3         F.MTP
        013C  R 0119
182     013D    AF6C          SBX,6,12
183     013E    A410          LFM,1         FRS
        013F  R 015D
184     0140    FF04          BRX,4                           RETURN
185           R 0141  F.DBF   EQU           $
186     0141  A 0000  FUDBF   RES           28,0
187     015D  A 0000  FRS     RES           7,0
188     0164                  END

TOTAL ASSEMBLY ERRORS =  15    SIZE =   356
```

```
 1                              PGM          F$DMP
 2                               INT          F:DMP,F:FST,F:BBT,F:TIM,F:DDD
 3                               EXT          F.DBF,F:CHK,B:IOR,F:CVT,B.STT
 4                               EXT          E:SKD,F:USE,E.35I,F.MTP
 5                          *    CAT NO.  400200-002
 6                          * THIS PROGRAM ENABLES THE OPERATOR TO DUMP
 7                          *   DR FUD DATA ONTO THE ASR 35 TTY IN A
 8                          *   USEABLE FORMAT.  HE CAN SPECIFY THE PARAM.
 9                          *   OF THE DUMP IN EITHER TIME OR NO. OF DATA
10                          *   BLOCKS.
11     0000      7601   F:DMP TBRB,0,1     $+3            DESIRE NEW DATA?
       0001   R  0003
12     0002      F705         HOP,$+5
13     0003      ED40         LDI,4         #3700
       0004   A  3700
14     0005      E640         STM,4         F.MTP
       0006   X  0009
15     0007      E700         BRU           F:FST          FIND START TIME
       0008   R  00DD
16     0009      E6B0         STM,11        BLKBF
       000A   R  00DC
17     000B      657F         LBR,7,15
18     000C      E740         BLM,4         F:CHK          CHECK FOR GOOD DATA
       000D   X  0002
19     000E      F704         HOP,$+4
20     000F      6600         NOP
21     0010      E7E0   CLOOP BLM,14        F:DDD
       0011   R  0024
22     0012      E520         LDM,2         BLKBF
       0013   R  00DC
23     0014      7927         SURB,2,7      $+7            DONE ENOUGH YET
       0015   R  001B
24     0016      6C55   CLOP1 ZRR,5
25     0017      E650         STM,5         B.STT
       0018   X  0005
26     0019      E700         BRU           E:SKD
       001A   X  0006
27     001B      E740         BLM,4         F:USE
       001C   X  0007
28     001D      607F         ABR,7,15
29     001E      E740         BLM,4         F:CHK
       001F   X  0002
30     0020      E700         BRU           CLOOP+2        BYPASS 2ND DUMP
       0021   R  0012
31     0022      E700         BRU           CLOOP          DUMP ANOTHER BLOCK
       0023   R  0010
32     0024      A510   F:DDD SFM,1         SVDDD
       0025   R  00CF
33     0026      A5A0         SFM,10        SVDDD+7
       0027   R  00D6
```

```
34      0028      ED10        LDI,1       3
        0029  A   0003
35      002A      E551        LDM,5,1     F.DBF           FIRST 2 DIGITS OF DOY
        002B  X   0001
36      002C      E850        ADI,5       #3030           CONVERT
        002D  A   3030
37      002E      E650        STM,5       HEADR+9
        002F  R   00A1
38      0030      EDA0        LDI,10      F.DBF
        0031  X   0001
39      0032      65BC        LBR,11,12
40      0033      AE5A        LBX,5,10                    LOAD 3RD DIGIT OF DOY
41      0034      0955        MBL,5,5
42      0035      E850        ADI,5       #3020           CONVERT
        0036  A   3020
43      0037      E650        STM,5       HEADR+10        PUT 3RD DIGIT DOY IN HEADR
        0038  R   00A2
44      0039      ED20        LDI,2       -3              SET UP FOR SIX DIGITS OF TIME
        003A  A   FFFD
45      003B      ED50        LDI,5       F.DBF
        003C  X   0001
46      003D      FD35  TIM1  LDX,3,5
47      003E      E830        ADI,3       #3030           CONVERT
        003F  A   3030
48      0040      E632        STM,3,2     HEADR+6         PUT DIGITS IN HEADR.
        0041  R   009E
49      0042      605F        ABR,5,15
50      0043      702F        ABRB,2,15   TIM1
        0044  R   003D
51      0045      ED80        LDI,11      9               START GETTING THE DET NO.
        0046  A   0009
52      0047      EDC0        LDI,12      HEADR
        0048  R   0098
53      0049      EDD0        LDI,13      29               READY TO GO.
        004A  A   001D
54      004B      AE5A        LBX,5,10
55      004C      E850        ADI,5       #30
        004D  A   0030
56      004E      AF5C        SBX,5,12
57      004F      ED10        LDI,1       5
        0050  A   0005
58      0051      E551        LDM,5,1     F.DBF
        0052  X   0001
59      0053      E850        ADI,5       #3030           CONVERT
        0054  A   3030
60      0055      E650        STM,5       HEADR+15        STORE DET IN HEADR
        0056  R   00A7
61      0057      E7F0        BLM,15      B:IOR           OUTPUT HEADR.
        0058  X   0003
62      0059  A   9000        DFC         #9000
```

```
63      005A  R  0098          DFC         HEADR
64      005B     ED20          LDI,2       -32
        005C  A  FFE0
65      005D     EDB0          LDI,11      12
        005E  A  000C
66      005F     AE5A  LOOP    LBX,5,10                LOAD BYTE FROM F.DBF
67      0060     0965          MBL,6,5                 SHIFT BYTE TO LEFT
68      0061     60BF          ABR,11,15               MOVE TO NEXT BYTE
69      0062     AE5A          LBX,5,10                LOAD NEXT BYTE
70      0063     6B65          ORR,6,5                 OR THE TWO REGISTERS
71      0064     E860          ADI,6       #3030       CONVERT
        0065  A  3030
72      0066     E662          STM,6,2     DATA+32     PUT IN PROPER PLACE IN DATA
        0067  R  00CA
73      0068     602F          ABR,2,15                MOVE DATA POINTER ONE
74      0069     60BF          ABR,11,15               MOVE TO NEXT BYTE
75      006A     AE6A          LBX,6,10                LOAD IT
76      006B     E860          ADI,6       #2E30       CONVERT
        006C  A  2E30
77      006D     E662          STM,6,2     DATA+32
        006E  R  00CA
78      006F     602F          ABR,2,15                MOVE DATA POINTER TWO WORDS
79      0070     60BF          ABR,11,15               MOVE TO NEXT BYTE IN F.DBF
80      0071     AE5A          LBX,5,10
81      0072     E850          ADI,5       #2030
        0073  A  2030
82      0074     E652          STM,5,2     DATA+32
        0075  R  00CA
83      0076     602F          ABR,2,15
84      0077     60BF          ABR,11,15
85      0078     AE5A          LBX,5,10                LOAD NEXT BYTE
86      0079     0955          MBL,5,5
87      007A     E850          ADI,5       #3020
        007B  A  3020
88      007C     E652          STM,5,2     DATA+32     STORE IN DATA
        007D  R  00CA
89      007E     60BF          ABR,11,15
90      007F     702F          ABRB,2,15   LOOP        FINISHED YET
        0080  R  005F
91      0081     ED60          LDI,6       -3
        0082  A  FFFD
92      0083     AE4A  DLOOP   LBX,4,10
93      0084     60BF          ABR,11,15
94      0085     2844          RLD,4,4
95      0086     2D44          LLS,4,4
96      0087     2C44          LLD,4,4
97      0088     E840          ADI,4       #3030
        0089  A  3030
98      008A     E642          STM,4,2     DATA+32
        008B  R  00CA
```

```
 99      008C       602F          ABR,2,15
100      008D       706F          ABRB,6,15     DLOOP
         008E   R   0083
101      008F       E7F0          BLM,15        B:IOR          OUTPUT DATA INFORMATION
         0090   X   0003
102      0091   A   9000          DFC           #9000
103      0092   R   00AA          DFC           DATA
104      0093       A410          LFM,1         SVDDD
         0094   R   00CF
105      0095       A4A0          LFM,10        SVDDD+7
         0096   R   00D6
106      0097       FF0E          BRX,14
107      0098   A   0D0A  HEADR   DFC           #0D0A,|TOD 123456  DOY 123 |
         0099   A   544F
         009A   A   4420
         009B   A   3132
         009C   A   3334
         009D   A   3536
         009E   A   2020
         009F   A   444F
         00A0   A   5920
         00A1   A   3132
         00A2   A   3320
108      00A3   A   2020          DFC           |   DET 515|,#0D0A,#0000
         00A4   A   2044
         00A5   A   4554
         00A6   A   2035
         00A7   A   3135
         00A8   A   0D0A
         00A9   A   0000
109      00AA   A   5050  DATA    DFC           |PP.P AA PP.P AA PP.P AA |
         00AB   A   2E50
         00AC   A   2041
         00AD   A   4120
         00AE   A   5050
         00AF   A   2E50
         00B0   A   2041
         00B1   A   4120
         00B2   A   5050
         00B3   A   2E50
         00B4   A   2041
         00B5   A   4120
110      00B6   A   5050          DFC           |PP.P AA PP.P AA PP.P AA |
         00B7   A   2E50
         00B8   A   2041
         00B9   A   4120
         00BA   A   5050
         00BB   A   2E50
         00BC   A   2041
         00BD   A   4120
```

```
         00BE   A  5050
         00BF   A  2E50
         00C0   A  2041
         00C1   A  4120
111      00C2   A  5050          DFC             |PP.P AA PP.P AA 313234|,#0D0A,0
         00C3   A  2E50
         00C4   A  2041
         00C5   A  4120
         00C6   A  5050
         00C7   A  2E50
         00C8   A  2041
         00C9   A  4120
         00CA   A  3331
         00CB   A  3332
         00CC   A  3334
         00CD   A  0D0A
         00CE   A  0000
112      00CF   A  0000  SVDCD   RES             13,0
113      00DC   A  0000  BLKBF   RES             1,0
114                      ********************************************************************
```

```
116                     ****************************************************************
117                     * THIS PROGRAM SETS THE DRFUD TAPE TO THE
118                     *   DESIRED START TIME AND GIVES THE OPERATOR
119                     *   THE OPTIONS OF USING:
120                     *     1.  START TIME AND STOP TIME.
121                     *     2.  START TIME AND NUMBER OF DATA BLOCKS.
122                     *     3.  START IMMEDIATE AND NUMBER OF DATA BLOCKS.
123  00DD     E7F0  F:FST BLM,15        B:IOR           REQUEST OPER. TO SPECIFY
     00DE   X 0003
124  00DF   A 5000       DFC           #5000            ONE OF THE ABOVE OPTIONS.
125  00E0   R 0145       DFC           OPTS
126                     * RE-ENTRY HERE AFTER OPERATORS RESPONSE
127  00E1     E510       LDM,1         E.35I           GET HIS REQUEST
     00E2   X 0008
128  00E3     6D51       TRR,5,1
129  00E4     ED60       LDI,6         #33
     00E5   A 0033
130  00E6     7956       SURB,5,6      TIM             HE WANTS A START TIME HUH!
     00E7   R 00F2
131  00E8     E740  BLOCK BLM,4         F:USE
     00E9   X 0007
132  00EA     E7F0       BLM,15        B:IOR           REQUEST NO. OF BLOCKS
     00EB   X 0003
133  00EC   A 5000       DFC           #5000
134  00ED   R 0159       DFC           NOBLK
135                     * RE-ENTRY AFTER RESPONSE, CONVERT TO BINARY
136                     *   AND HOLD IN BLKBF.
137  00EE     E740       BLM,4         F:CVT
     00EF   X 0004
138  00F0     E700       BRU           F:DMP+9
     00F1   R 0009
139  00F2     E7F0  TIM   BLM,15        B:IOR           REQUEST START TIME
     00F3   X 0003
140  00F4   A 5000       DFC           #5000
141  00F5   R 0169       DFC           TIME
142  00F6     E7F0       BLM,15        RFC
     00F7   R 0112
143  00F8     E740       BLM,4         F:TIM           FIND CORRECT TIME ON TAPE
     00F9   R 01B8
144  00FA     ED60       LDI,6         #31
     00FB   A 0031
145  00FC     7916       SURB,1,6      BLOCK+2         STOP TIME OR NO. OF BLOCKS
     00FD   R 00EA
146  00FE     E7F0       BLM,15        B:IOR           REQUEST STOP TIME
     00FF   X 0003
147  0100   A 5000       DFC           #5000
148  0101   R 0179       DFC           QUIT            CANNED MSG.
149  0102     E7F0       BLM,15        RFC
     0103   R 0112
150  0104     E740       BLM,4         PACK            GO GET RESPONSE
```

```
        0105  R  01A7
151     0106     E7F0        BLM,15        F:BBT
        0107  R  026E
152     0108  R  019A        DFC           T.MBF
153     0109     E540        LDM,4         NGSTR
        010A  R  026C
154     010B     E550        LDM,5         NGSTR+1
        010C  R  026D
155     010D     224C        DAR,4,12
156     010E     E650        STM,5         BLKBF
        010F  R  00DC
157     0110     E700        BRU           F:DMP+11
        0111  R  000B
158                          * CANNED OUTPUT MESS, BUFFERS, AND FORMAT CHECKER.
159     0112     A510  RFC   SFM,1         RFCRS
        0113  R  01A0
160     0114     ED20        LDI,2         E.35I
        0115  X  0008
161     0116     ED30        LDI,3         -3
        0117  A  FFFD
162     0118     FD42  RFC1  LDX,4,2
163     0119     E940        SUI,4         #30
        011A  A  0030
164     011B     7640        TBRB,4,0      BADTM
        011C  R  013F
165     011D     E940        SUI,4         #10
        011E  A  0010
166     011F     7640        TBRB,4,0      $+4
        0120  R  0123
167     0121     E700        BRU           BADTM
        0122  R  013F
168     0123     602F        ABR,2,15
169     0124     703F        ABRB,3,15     RFC1
        0125  R  0118
170     0126     FD42        LDX,4,2
171     0127     E940        SUI,4         #20
        0128  A  0020
172     0129     7D44        TRRB,4,4      BADTM
        012A  R  013F
173     012B     602F        ABR,2,15
174     012C     ED30        LDI,3         -6
        012D  A  FFFA
175     012E     FD42  RFC2  LDX,4,2
176     012F     E940        SUI,4         #30
        0130  A  0030
177     0131     7640        TBRB,4,0      BADTM
        0132  R  013F
178     0133     E940        SUI,4         #10
        0134  A  0010
179     0135     7640        TBRB,4,0      $+4
```

```
        0136  R  0139
180     0137     E700          BRU           BADTM
        0138  R  013F
181     0139     602F          ABR,2,15
182     013A     703F          ABRB,3,15     RFC2
        013B  R  012E
183     013C     A410          LFM,1         RFCRS
        013D  R  01A0
184     013E     FF0F          BRX,15
185     013F     E7F0  BADTM BLM,15          B:IOR
        0140  X  0003
186     0141  A  9000          DFC           #9000
187     0142  R  0188          DFC           FORM
188     0143     E700          BRU           CLOP1
        0144  R  0016
189     0145  A  0D0A  OPTS    DFC           #0D0A,|SPECIFY ACTION DESIRED, 1, 2, OR 3. |,0
        0146  A  5350
        0147  A  4543
        0148  A  4946
        0149  A  5920
        014A  A  4143
        014B  A  5449
        014C  A  4F4E
        014D  A  2044
        014E  A  4553
        014F  A  4952
        0150  A  4544
        0151  A  2C20
        0152  A  312C
        0153  A  2032
        0154  A  2C20
        0155  A  4F52
        0156  A  2033
        0157  A  2E20
        0158  A  0000
190     0159  A  0D0A  NOBLK   DFC           #0D0A,|NO. OF BLOCKS TO BE DUMPED. |,0
        015A  A  4E4F
        015B  A  2E20
        015C  A  4F46
        015D  A  2042
        015E  A  4C4F
        015F  A  434B
        0160  A  5320
        0161  A  544F
        0162  A  2042
        0163  A  4520
        0164  A  4455
        0165  A  4D50
        0166  A  4544
        0167  A  2E20
```

```
                0168  A  0000
191             0169  A  0D0A  TIME  DFC          #0D0A,|SPECIFY START TIME DESIRED. |,0
                016A  A  5350
                016B  A  4543
                016C  A  4946
                016D  A  5920
                016E  A  5354
                016F  A  4152
                0170  A  5420
                0171  A  5449
                0172  A  4D45
                0173  A  2044
                0174  A  4553
                0175  A  4952
                0176  A  4544
                0177  A  2E20
                0178  A  0000
192             0179  A  0D0A  QUIT  DFC          #0D0A,|SPECIFY STOP TIME DESIRED.|,0
                017A  A  5350
                017B  A  4543
                017C  A  4946
                017D  A  5920
                017E  A  5354
                017F  A  4F50
                0180  A  2054
                0181  A  494D
                0182  A  4520
                0183  A  4445
                0184  A  5349
                0185  A  5245
                0186  A  442E
                0187  A  0000
193             0188  A  0D0A  FORM  DFC          #0D0A,|INVALID FORMAT ON |
                0189  A  494E
                018A  A  5641
                018B  A  4C49
                018C  A  4420
                018D  A  464F
                018E  A  524D
                018F  A  4154
                0190  A  204F
                0191  A  4E20
194             0192  A  5449        DFC          |TIME REQUEST|,#0D0A,0
                0193  A  4D45
                0194  A  2052
                0195  A  4551
                0196  A  5545
                0197  A  5354
                0198  A  0D0A
                0199  A  0000
```

```
195     019A  A  0000  T.MBF RES          6,0
196     01A0  A  0000  RECRS RES          7,0
197                    * CHANGE OPERATOR RESPONSE TO BCD AND PUT INTO T.MBF IN A FORMAT
198                    *   COMPATABLE WITH F.DBF.
199                    *      |123 123456 IS REPACKED TO 123456 DROP DOY|
200     01A7     651D  PACK  LBR,1,13
201     01A8     ED70        LDI,7         -3
        01A9  A  FFFD
202     01AA     E531        LDM,3,1       E.35I          TENS OF HOURS
        01AB  X  0008
203     01AC     0933        MBL,3,3
204     01AD     601F        ABR,1,15
205     01AE     E331        ORM,3,1       E.35I          UNITS OF HOURS
        01AF  X  0008
206     01B0     E930        SUI,3         #3030
        01B1  A  3030
207     01B2     E637        STM,3,7       T.MBF+3
        01B3  R  019D
208     01B4     601F        ABR,1,15
209     01B5     707F        ABRB,7,15     PACK+3
        01B6  R  01AA
210     01B7     FF04        BRX,4                        RETURN
211     01B8     A510  F:TIM SFM,1         SAVER
        01B9  R  0265
212     01BA     ED20        LDI,2         #A
        01BB  A  000A
213     01BC     E550        LDM,5         E.35I          GET HOD.
        01BD  X  0008
214     01BE     E950        SUI,5         #30
        01BF  A  0030
215     01C0     2042        MPR,4,2                      X 10
216     01C1     651F        LBR,1,15
217     01C2     E561        LDM,6,1       E.35I          GET TOD
        01C3  X  0008
218     01C4     E960        SUI,6         #30
        01C5  A  0030
219     01C6     6856        ADR,5,6
220     01C7     601F        ABR,1,15
221     01C8     E561        LDM,6,1       E.35I          GET UOD
        01C9  X  0008
222     01CA     E960        SUI,6         #30
        01CB  A  0030
223     01CC     2042        MPR,4,2
224     01CD     6856        ADR,5,6                      RESULT IN R5
225     01CE     F650        STM,5         CPDOY          SAVE RESULT
        01CF  R  0264
226     01D0     E740        BLM,4         PACK           REPACK OPERATOR RESPONSE
        01D1  R  01A7
227     01D2     E7F0        BLM,15        F:BRT          CONVERT IT TO BIN
        01D3  R  026E
```

```
228     01D4  R  019A        DFC         T.MBF
229     01D5     6FDD        TTR,13,13
230     01D6     0DCC        TOR,12,12
231     01D7     7DDD        TRRB,13,13  $+3
        01D8  R  01DA
232     01D9     60CF        ABR,12,15
233     01DA     E6C0        STM,12      NGSTR
        01DB  R  026C
234     01DC     E6D0        STM,13      NGSTR+1
        01DD  R  026D
235     01DE     E740        BLM,4       F:USE
        01DF  X  0007
236     01E0     E740        BLM,4       F:CHK
        01E1  X  0002
237     01E2     E700        BRU         NOGO          BAD FORMAT ON FUD
        01E3  R  0292
238                       * CONVERT F.DBF DOY TO BIN FOR COMPARISON
239     01E4     ED20  FDOY  LDI,2       #A            R2=10
        01E5  A  000A
240     01E6     ED10        LDI,1       3
        01E7  A  0003
241     01E8     E561        LDM,6,1     F.DBF         GET DOY
        01E9  X  0001
242     01EA     0856        MBR,5,6                   GET HOD IN R4
243     01EB     0C66        MLR,6,6                   GET ONLY TOD IN R6
244     01EC     2042        MPR,4,2                   MULT R4 X 10
245     01ED     6856        ADR,5,6                   ADD RESULT TO R6
246     01EE     601F        ABR,1,15
247     01EF     E561        LDM,6,1     F.DBF         GET UOD AND PART OF DET
        01F0  X  0001
248     01F1     0866        MBR,6,6                   GET RID OF DET
249     01F2     2042        MPR,4,2
250     01F3     6856        ADR,5,6
251     01F4     E560        LDM,6       CPDOY
        01F5  R  0264
252     01F6     7956        SURB,5,6    GOON3         COMPARE TWO DOYS
        01F7  R  0216
253     01F8     E7F0  CRAP  BLM,15      F:BBT
        01F9  R  026E
254     01FA  X  0001        DFC         F.DBF
255                       * BOTH TIMES ARE NOW IN BINARY, DO A DOUBLE PRECISION
256                       *   SUBTRACT AND SEE HOW THEY COMPARE.
257     01FB     E540        LDM,4       NGSTR
        01FC  R  026C
258     01FD     E550        LDM,5       NGSTR+1
        01FE  R  026D
259     01FF     224C        DAR,4,12
260     0200     7D44        TRRB,4,4    GOON
        0201  R  0207
261     0202     7D55        TRRB,5,5    GOON
```

```
                0203  R  0207
262             0204     A410          LFM,1       SAVER          GET REGISTERS
                0205  R  0265
263             0206     FF04          BRX,4                      RETURN AND DUMP
264             0207     7640  GOON    TBRB,4,0    GOON1          NEG. READ ANOTHER BLOCK
                0208  R  0212
265             0209     E7F0          BLM,15      B:IOR          TELL OPERATOR HE HAS
                020A  X  0003
266             020B  A  9000          DFC         #9000           GONE TOO FAR
267             020C  R  0225          DFC         PASTT
268             020D     6C55          ZRR,5
269             020E     E650          STM,5       B.STT
                020F  X  0005
270             0210     E700          BRU         E:SKD
                0211  X  0006
271             0212     E740  GOON1   BLM,4       F:USE          READ ANOTHER BLOCK
                0213  X  0007
272             0214     E700          BRU         CRAP
                0215  R  01F8
273             0216     7650  GOON3   TBRB,5,0    GOON4
                0217  R  0221
274             0218     E7F0          BLM,15      B:IOR
                0219  X  0003
275             021A  A  9000          DFC         #9000
276             021B  R  023B          DFC         PASTD
277             021C     6C55          ZRR,5
278             021D     E650          STM,5       B.STT
                021E  X  0005
279             021F     E700          BRU         E:SKD
                0220  X  0006
280             0221     E740  GOON4   BLM,4       F:USE
                0222  X  0007
281             0223     E700          BRU         FDOY
                0224  R  01E4
282             0225  A  0D0A  PASTT   DFC         #0D0A,|FUD TAPE POSITIONED PAST|
                0226  A  4655
                0227  A  4420
                0228  A  5441
                0229  A  5045
                022A  A  2050
                022B  A  4F53
                022C  A  4954
                022D  A  494F
                022E  A  4E45
                022F  A  4420
                0230  A  5041
                0231  A  5354
283             0232  A  2054          DFC         | TIME DESIRED.|,#0D0A,0
                0233  A  494D
                0234  A  4520
```

```
                0235  A  4445
                0236  A  5349
                0237  A  5245
                0238  A  442E
                0239  A  0D0A
                023A  A  0000
284             023B  A  0D0A  PASTC DFC          #0D0A,|FUD TAPE POSITIONED PAST|
                023C  A  4655
                023D  A  4420
                023E  A  5441
                023F  A  5045
                0240  A  2050
                0241  A  4F53
                0242  A  4954
                0243  A  494F
                0244  A  4E45
                0245  A  4420
                0246  A  5041
                0247  A  5354
285             0248  A  2044        DFC          | DAY DESIPED. |,#0D0A,0
                0249  A  4159
                024A  A  2044
                024B  A  4553
                024C  A  4952
                024D  A  4544
                024E  A  2E20
                024F  A  0D0A
                0250  A  0000
286             0251  A  0D0A  NOGO1 DFC          #0D0A,|SEARCH ABORTED DUE TO |
                0252  A  5345
                0253  A  4152
                0254  A  4348
                0255  A  2041
                0256  A  424F
                0257  A  5254
                0258  A  4544
                0259  A  2044
                025A  A  5545
                025B  A  2054
                025C  A  4F20
287             025D  A  464F        DFC          |FORMAT ERROR|,0
                025E  A  524D
                025F  A  4154
                0260  A  2045
                0261  A  5252
                0262  A  4F52
                0263  A  0000
288             0264  A  0000  OPDOY RES          1,0
289             0265  A  0000  SAVER RES          7,0
290             026C  A  0000  NGSTR RES          2,0
```

```
                                ************************************************************
                                * F:BBT CONVERTS BCD TO BINARY TIME
                                *   CALLING SEQUENCE*
                                *      BLM,15          F:BBT
                                *      DFC             (ADDR OFFIRST BCD WORD)
                                * RETURN WITH BINARY EQUIVALENT IN R12 AND R13
026E      A510  F:BBT SFM,1         BBTSV
026F  R   028B
0270      FD7F        LDX,7,15                        PARM. LOC.
0271      60FF        ABR,15,15                       MODIFY RET. ADDR.
0272      ED10        LDI,1         #A
0273  A   000A
0274      ED20        LDI,2         #6
0275  A   0006
0276      6CDD        ZRR,13
0277      ED30        LDI,3         -3
0278  A   FFFD
0279      FD57  BBT01 LDX,5,7                         NEXT WORD
027A      607F        ABR,7,15
027B      0845        MBR,4,5
027C      68D4        ADR,13,4
027D      20C1        MPR,12,1
027E      0C55        MLR,5,5
027F      703F        ABRB,3,15     $+3
0280  R   0282
0281      F705        HOP,BBT02
0282      68D5        ADR,13,5
0283      20C2        MPR,12,2
0284      E700        BRU           BBT01
0285  R   0279
0286      6C44  BBT02 ZRR,4
0287      22C4        DAR,12,4
0288      A410        LFM,1         BBTSV
0289  R   028B
028A      FF0F        BRX,15
028B  A   0000  BBTSV RES           7,0
                      * TIME SEARCH ABORT
0292      E7F0  NOGO  BLM,15        B:IOR
0293  X   0003
0294  A   9000        DFC           #9000
0295  R   0251        DFC           NOG01
0296      E700        BRU           CLOP1
0297  R   0016
0298                  END
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TOTAL ASSEMBLY ERRORS = 0 SIZE = 664

FORM NBS-114A (1-71)

U.S. DEPT. OF COMM. BIBLIOGRAPHIC DATA SHEET	1. PUBLICATION OR REPORT NO. NBSIR 73-235	2. Gov't Accession No.	3. Recipient's Accession No.

4. TITLE AND SUBTITLE
FIELD SERVICE TEST MODEL: COMPUTER-CONTROLLED U SYSTEM OPERATIONS MANUAL AND SOFTWARE OPERATING SYSTEM APPENDICES FOR THE AUTOMATED SYSTEM VOLUME II

5. Publication Date

6. Performing Organization Code

7. AUTHOR(S)
K. M. Gray and J. R. Ellis

8. Performing Organization
NBSIR 73-235

9. PERFORMING ORGANIZATION NAME AND ADDRESS
NATIONAL BUREAU OF STANDARDS
DEPARTMENT OF COMMERCE
WASHINGTON, D.C. 20234

10. Project/Task/Work Unit No.
6505413

11. Contract/Grant No.
AFTAC T/2301/U/NBS

12. Sponsoring Organization Name and Address
Department of the Air Force
HQ USAF (AFTAC/TAP)
Patrick A.F.B., Florida 32925

13. Type of Report & Period Covered
Instruction Manual

14. Sponsoring Agency Code

15. SUPPLEMENTARY NOTES

16. ABSTRACT (A 200-word or less factual summary of most significant information. If document includes a significant bibliography or literature survey, mention it here.)

Volume II of the "Automated U System" describes the software listings and the operator's manual. This volume is intended to instruct the station technician in the procedure to load programs and operate, under computer control, the automated U system.

17. KEY WORDS (Alphabetical order, separated by semicolons)

Operating system; program listings; software utilization

18. AVAILABILITY STATEMENT

☐ UNLIMITED.

☒ FOR OFFICIAL DISTRIBUTION. DO NOT RELEASE TO NTIS.

19. SECURITY CLASS (THIS REPORT)
UNCLASSIFIED

21. NO. OF PAGES

20. SECURITY CLASS (THIS PAGE)
UNCLASSIFIED

22. Price