

Table of contents

2-	1	MSGINI	-- Message system initialization
3-	1	MSEND	-- Queue a message
4-	1	MSGCK	-- Check for pending message
5-	1	MSGWT	-- Wait for a message
6-	1	MSRCPL	-- Read message with completion routine
7-	1	MSGACT	-- Check message requests that may be satisfied
8-	1	MSGCPL	-- Completion routine processing for messages
9-	1	MSGGET	-- Move message text into internal buffer
10-	1	MSGMOV	-- Move message text to user's buffer
11-	1	MBSRCH	-- Search for message channel block
12-	1	MSGNAM	-- Set up name of message channel
13-	1	ADDMRB	-- Add new message request block
14-	1	MSGABT	-- Abort all message requests for a job
15-	1	GETMCB	-- Get a new message control block
16-	1	GETMTB	-- Get a free message text block
17-	1	FREMCB	-- Free a message control block
18-	1	FREMRB	-- Free a message request block

```

1          .TITLE  TSMSG -- TSX-Plus Message Transfer System
2          .ENABL  LC
3          .DSABL  GBL
4          .ENABL  AMA
5          ;
6          ; Copyright (c) 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984.
7          ;
8          ; S&H Computer Systems, Inc.
9          ; Nashville, Tennessee
10         ;
11         ; The routines in this module implement the TSX-Plus interjob
12         ; message communication system.
13         ;
14 000000          .CSECT  TSMSG
15 000000 052077  TSMSG: .RAD50 /MSG/          ; System overlay ID
16         ;
17         ; Global definitions
18         ;
19         .GLOBL  MSEND, MSGCK, MSGWT, TSMSG
20         .GLOBL  MSGINI, MSGTOP, MSGABT, MBMHD
21         ;
22         ; Global references
23         ;
24         .GLOBL  MB$BUF, MB$FLK, EMTBLK, VMAXMC, EB$BUF, EB$RTN
25         .GLOBL  CORUSR, MR$LNK, MR$JOB, MB$FLK, MR$RTN, QF$SCR
26         .GLOBL  MB$NAM, PUTUCH, S$HICP, EB$NAM, GETUCH, S$IIOFN
27         .GLOBL  MB$REQ, MU$SIZ, QCOMPL, LITIME, GETQ, CQ$PRI
28         .GLOBL  MB$$SZ, CHKABT, INTERR, QHDSPN, EB$SIZ, CQ$RO
29         .GLOBL  MU$TXT, VMSCHR, QHIPRI, URO, CQ$RTN, VPAR6, CQ$FLG
30         .GLOBL  LPRI, VMXMRB, LPRI, S$MSWT, MR$$SZ, MR$BUF, VMXMSG
31         .GLOBL  MR$UBA, MR$UBS, LSTATE, CQ$RNS, MU$FLK, LCMQHD, CQ$JOB
32         .GLOBL  KPAR5, CQ$PA5, MU$JOB, CQ$R1, CQ$CP, CP$STD
33         ;
34         ; Symbolic equates for EMT error codes
35         ;
36         000001  ERRO1  =      1          ; All message channels are busy
37         000002  ERRO2  =      2          ; No free message queue entries
38         000003  ERRO3  =      3          ; No message was queued on specified channel
39         000004  ERRO4  =      4          ; Message was longer than specified buffer
40         000005  ERRO5  =      5          ; No free message request blocks
41         ;
42         ; Data areas
43         ;
44 000002 000000  MBMHD: .WORD  0          ; List head of active message channel blocks
45 000004 000000  MCBFHD: .WORD  0          ; List of free message channel blocks
46 000006 000000  MRBFHD: .WORD  0          ; List of free message request blocks
47 000010 000000  MTBFHD: .WORD  0          ; List of free message text blocks
48 000012          CHNNAM: .BLKW  3          ; Used to hold channel name string

```

MSGINI -- Message system initialization

```

1          .SBTTL  MSGINI -- Message system initialization
2          ;-----
3          ; MSGINI is called during system initialization to initialize the
4          ; data areas used for message communication.
5          ; The message tables are allocated within this system overlay
6          ; starting just beyond the end of the code.
7          ;
8 000020 010246 MSGINI: MOV      R2, -(SP)
9 000022 010346      MOV      R3, -(SP)
10 000024 010446      MOV      R4, -(SP)
11 000026 010546      MOV      R5, -(SP)
12          ;
13          ; Start data areas above top of code
14          ;
15 000030 012702 002412'      MOV      #MSGTOP, R2      ;Get address above top of code
16          ;
17          ; Allocate message channel blocks
18          ;
19 000034 010237 000004'      MOV      R2, MCBFHD      ;Set pointer to 1st free message channel blk
20 000040 013700 000000G      MOV      VMAXMC, R0      ;Get # blocks to allocate
21 000044 010203 1$:      MOV      R2, R3      ;Get address of current block
22 000046 062703 000000G      ADD      #MB$$SZ, R3      ;Get address of next block
23 000052 010362 000000G      MOV      R3, MB$FLK(R2) ;Set pointer to next block
24 000056 010302      MOV      R3, R2      ;Get address of next block
25 000060 077007      SOB      R0, 1$      ;Loop if need to allocate more
26 000062 005062 000000C      CLR      MB$FLK-MB$$SZ(R2);Clear link in last block
27          ;
28          ; Allocate message request blocks
29          ;
30 000066 013700 000000G      MOV      VMXMRB, R0      ;Get # to allocate
31 000072 001413      BEQ      3$      ;Br if none needed
32 000074 010237 000006'      MOV      R2, MRBFHD      ;Set pointer to 1st free block
33 000100 010203 2$:      MOV      R2, R3      ;Get address of current block
34 000102 062703 000000G      ADD      #MR$$SZ, R3      ;Get address of next block
35 000106 010362 000000G      MOV      R3, MR$LNK(R2) ;Set pointer to next block
36 000112 010302      MOV      R3, R2      ;Get address of next block
37 000114 077007      SOB      R0, 2$      ;Loop if need to allocate more
38 000116 005062 000000C      CLR      MR$LNK-MR$$SZ(R2);Clear link in last block
39          ;
40          ; Allocate message text blocks
41          ;
42 000122 013700 000000G 3$:      MOV      VMXMSG, R0      ;Get # buffers to allocate
43 000126 001433      BEQ      9$      ;Br if none wanted
44 000130 005037 000000G      CLR      VMXMSG      ;Count actual buffers allocated
45 000134 010237 000010'      MOV      R2, MTBFHD      ;Set pointer to 1st free block
46 000140 013704 000000G      MOV      VMSCHR, R4      ;Get space needed for message text
47 000144 062704 000001G      ADD      #<MU$TXT+1>, R4 ;Add space for message header
48 000150 042704 000001      BIC      #1, R4      ;Make sure size is even
49 000154 012705 000000G      MOV      #VPAR6, R5      ;Get highest legal address for data areas
50 000160 160405      SUB      R4, R5      ;Reduce by size of a block
51 000162 160405      SUB      R4, R5
52 000164 010203 4$:      MOV      R2, R3      ;Get address of current block
53 000166 060403      ADD      R4, R3      ;Get address of next block
54 000170 020305      CMP      R3, R5      ;Would this block overflow?
55 000172 103006      BHIS    6$      ;Br if yes
56 000174 005237 000000G      INC      VMXMSG      ;Count another actual block
57 000200 010362 000000G      MOV      R3, MU$FLK(R2) ;Set link to next block

```

MSGINI -- Message system initialization

```

58 000204 010302          MOV      R3,R2          ;Get address of next block
59 000206 077012          SOB      R0,4$          ;Loop if more to allocate
60 000210 160403          6$:     SUB      R4,R3          ;Get address of last block
61 000212 005063 000000G  CLR      MU$FLK(R3)      ;Say it is at end of list
62                          ;
63                          ; Finished
64                          ;
65 000216 012605          9$:     MOV      (SP)+,R5
66 000220 012604          MOV      (SP)+,R4
67 000222 012603          MOV      (SP)+,R3
68 000224 012602          MOV      (SP)+,R2
69 000226 000207          RETURN
    
```

MSEND -- Queue a message

```

1          .SBTTL  MSEND  -- Queue a message
2          ;-----
3          ; The message send EMT is used to queue a message for another job.
4          ;
5          ; Inputs:
6          ;   RO = Address of EMT argument block.
7          ;
8 000230  MSEND:
9          ;
10         ; See if there is an existing message channel block for the specified
11         ; message channel.
12         ;
13 000230 004737 001562'      CALL  MBSRCH      ;Search for existing message channel block
14 000234 103007              BCC   1$           ;Br if found existing message channel block
15         ;
16         ; There is no existing message channel block for this message channel.
17         ; Create a new message channel block.
18         ;
19 000236 004737 002152'      CALL  GETMCB      ;Get a new message channel block
20 000242 103004              BCC   1$           ;Br if got a message channel block
21 000244 112737 000001 000000G  MOVB  #ERRO1,INTERR ;Return error 1
22 000252 000453              BR    20$
23         ;
24         ; At this point, R2 contains the address of the message channel block.
25         ; Create a message text block.
26         ;
27 000254 004737 002242'      1$:  CALL  GETMTB      ;Get a message text block
28 000260 103006              BCC   3$           ;Br if got one
29 000262 112737 000002 000000G  MOVB  #ERRO2,INTERR ;Return error # 2
30 000270 004737 002272'      CALL  FREMCB      ;Free the MCB we got if it is idle
31 000274 000442              BR    20$
32         ;
33         ; At this point,
34         ;   R2 = Address of message control block.
35         ;   R4 = Address of message text block
36         ; Link the new message text block onto the list for the message channel.
37         ;
38 000276 010205              3$:  MOV   R2,R5      ;Get address of message control block
39 000300 062705 000000G      ADD   #MB$BUF,R5 ;Point to cell with addr of 1st text block
40 000304 005715              4$:  TST   (R5)       ;Is there another text block on chain?
41 000306 001404              BEQ   5$           ;Br if reached end of chain
42 000310 011505              MOV   (R5),R5    ;Chain forward to next text block
43 000312 062705 000000G      ADD   #MU$FLK,R5  ;Point to cell with forward link in text blk
44 000316 000772              BR    4$           ;Continue following chain
45 000320 010415              5$:  MOV   R4,(R5)    ;Add new message text block to end of chain
46         ;
47         ; Save job index number of job sending the message in message text block
48         ;
49 000322 113764 000000G 000000G  MOVB  CORUSR,MU$JOB(R4); Save index # of job sending message
50         ;
51         ; Move the message text from the user's buffer into the message text buffer
52         ;
53 000330 013705 000000C      MOV   EMTBLK+EB$SIZ,R5; Get size of user's message
54 000334 020537 000000G      CMP   R5,VMSCHR   ;Is it longer than buffer space?
55 000340 101405              BLOS  6$           ;Br if length ok
56 000342 112737 000004 000000G  MOVB  #ERRO4,INTERR ;Return error code 4 if message is too long
57 000350 013705 000000G      MOV   VMSCHR,R5   ;Truncate message length

```

MSEND -- Queue a message

```

58 000354 010564 000000G      6#:      MOV      R5,MU$SIZ(R4)    ;Set message size in message text block
59 000360 001406                BEQ      7#                    ;Br if message length is zero
60 000362 062704 000000G      ADD      #MU$TXT,R4           ;Point to start of message text buffer
61 000366 013703 000000C      MOV      EMTBLK+EB$BUF,R3    ;Get address of user's message buffer
62 000372 004737 001346'      CALL     MSGGET              ;Get message into buffer
63                               ;
64                               ; We have created a message control block and a message text block
65                               ; and added the message text block to the end of the list of pending
66                               ; messages for the message channel.
67                               ; Now call routine to see if any users are waiting for a message on
68                               ; this message channel.
69                               ;
70 000376 004737 000672'      7#:      CALL     MSGACT              ;Try to activate any waiting users
71                               ;
72                               ; Finished
73                               ;
74 000402 000207      20#:     RETURN

```

MSGCK -- Check for pending message

```

1          .SBTTL  MSGCK  -- Check for pending message
2          ;-----
3          ; The message check EMT is used to determine if a message is pending
4          ; on a message channel.  If there is a message, the message is passed
5          ; to the user.  If there is no message, an error return occurs.
6          ;
7 000404   MSGCK:
8          ;
9          ; See if there is an existing message channel block
10         ;
11 000404   004737   001562'   CALL    MBSRCH      ;Search for existing message channel block
12 000410   103403           BCS     1$          ;Br if no messages
13         ;
14         ; There is an existing message channel block.
15         ; See if there are any pending messages for this channel.
16         ;
17 000412   005762   000000G   TST     MB$BUF(R2)  ;Are there any pending messages?
18 000416   001006           BNE     MSGWT      ;Br if yes -- Go move 1st to user
19         ;
20         ; There are no pending messages.
21         ; Return error code 3.
22         ;
23 000420   112737   000003   000000G 1$:  MOVB   #ERRO3,INTERR ;Return error code 3
24 000426   005037   000000G           CLR     URO        ;Say message length = 0
25 000432   000207           RETURN

```

MSGWT -- Wait for a message

```

1          .SBTTL  MSGWT  -- Wait for a message
2          ;-----
3          ; The message wait EMT attempts to get a pending message and if none
4          ; is available suspends the job until one becomes available.
5          ;
6 000434   MSGWT:
7          ;
8          ; See if this is a request to get a message with wait or with a
9          ; completion routine.
10         ;
11 000434   105737   000000G   TSTB   EMTBLK   ;If channel # non-zero then compl routine
12 000440   001063       BNE   MSRCPL   ;Read with completion
13         ;
14         ; See if there is an existing message channel block for the specified
15         ; message channel.
16         ;
17 000442   004737   001562'   CALL   MBSRCH   ;Search for existing message channel block
18 000446   103007       BCC   1$        ;Br if found one
19         ;
20         ; There is no existing message channel block.
21         ; Create a new one.
22         ;
23 000450   004737   002152'   CALL   GETMCB   ;Get a new message channel block
24 000454   103004       BCC   1$        ;Br if we got a message control block
25 000456   112737   000001   000000G   MOVB   #ERR01,INTERR ;Return error code 1
26 000464   000450       BR    20$
27         ;
28         ; Create a message request block for this job
29         ;
30 000466   004737   001710'   1$:   CALL   ADDMRB   ;Add message request block
31 000472   103006       BCC   6$        ;Br if we got a message request block
32         ;
33         ; Error, we could not get a free message request block
34         ;
35 000474   112737   000005   000000G   MOVB   #ERR05,INTERR ;Return error code 5
36 000502   004737   002272'   CALL   FREMCB   ;See if we need to free the message control bk
37 000506   000437       BR    20$
38         ;
39         ; At this point we have created a message request block and added it to
40         ; the list of pending request blocks for this channel.
41         ; Call MSGACT to see if the request can be satisfied immediately.
42         ; R2 = Address of message channel block.
43         ; R4 = Address of message request block.
44         ;
45 000510   004737   000672'   6$:   CALL   MSGACT   ;Try to satisfy request immediately
46         ;
47         ; Now wait until message request is satisfied
48         ;
49 000514   113701   000000G   2$:   MOVB   CORUSR,R1   ;Get our job index number
50 000520   004737   000000G       CALL   CHKABT   ;See if we have been aborted
51 000524   010105       MOV    R1,R5     ;Get job index number
52 000526   062705   000000G       ADD   #LCMQHD,R5 ;Point to list head of completed requests
53 000532   020415       5$:   CMP    R4,(R5)   ;Is request block we are waiting for next?
54 000534   001413       BEQ   3$        ;Br if yes
55 000536   005715       TST   (R5)      ;Are we at the end of the list?
56 000540   001404       BEQ   4$        ;Br if yes
57 000542   011505       MOV   (R5),R5   ;Follow chain to next entry

```


MSGWT -- Wait for a message

```

58 000544 062705 000000G          ADD    #MR$LNK,R5      ;Point to cell with forward link
59 000550 000770                   BR     5$              ;Continue following linked list
60                                     ;
61                                     ; Request has not been satisfied yet.
62                                     ; Suspend job until a message arrives.
63                                     ;
64 000552 012700 000000G          4$:   MOV    #S$MSWT,R0      ;Put job in message-wait state
65 000556 004737 000000G          CALL   QHDSPN          ;Change state and suspend job
66                                     ;
67                                     ; Job has been restarted.
68                                     ; See if request has been satisfied.
69                                     ;
70 000562 000754                   BR     2$              ;Go check again to see if request satisfied
71                                     ;
72                                     ; The request has been satisfied
73                                     ; Remove the completed request block from the list.
74                                     ;
75 000564 016415 000000G          3$:   MOV    MB$FLK(R4),(R5) ;Remove completed request block from list
76                                     ;
77                                     ; Move the message text to the user's buffer
78                                     ;
79 000570 010405                   MOV    R4,R5          ;Get address of request block
80 000572 004737 001420'          CALL   MSGMOV         ;Move message to user's buffer
81 000576 010037 000000G          MOV    RO,URO        ;Return message length to user in RO
82                                     ;
83                                     ; Free the message request block and associated message text block
84                                     ;
85 000602 004737 002352'          CALL   FREMRB        ;Free message request and text blocks
86                                     ;
87                                     ; Finished
88                                     ;
89 000606 000207          20$:  RETURN

```

```
1 .SBTTL MSRCPL -- Read message with completion routine
2 ;-----
3 ; This EMT is used to read a message with a completion routine signaling
4 ; that a message has arrived.
5 ;
6 000610 MSRCPL:
7 ;
8 ; See if there is an existing message channel block for the specified
9 ; message channel.
10 ;
11 000610 004737 001562' CALL MBSRCH ;Search for existing message channel block
12 000614 103007 BCC 1$ ;Br if found one
13 ;
14 ; There is no existing message channel block.
15 ; Create a new one.
16 ;
17 000616 004737 002152' CALL GETMCB ;Get a new message channel block
18 000622 103004 BCC 1$ ;Br if we got a message control block
19 000624 112737 000001 000000G MOVB #ERRO1,INTERR ;Return error code 1
20 000632 000416 BR 20$
21 ;
22 ; Create a message request block for this job
23 ;
24 000634 004737 001710' 1$: CALL ADDMRB ;Add message request block
25 000640 103006 BCC 6$ ;Br if we got a message request block
26 ;
27 ; Error, we could not get a free message request block
28 ;
29 000642 112737 000005 000000G MOVB #ERRO5,INTERR ;Return error code 1
30 000650 004737 002272' CALL FREMCB ;See if we need to free the message control bk
31 000654 000405 BR 20$
32 ;
33 ; Store address of user's completion routine in message request block
34 ;
35 000656 013764 000000C 000000G 6$: MOV EMTBLK+EB$RTN,MR$RTN(R4);Set address of user's compl routine
36 ;
37 ; At this point we have created a message request block and added it to
38 ; the list of pending request blocks for this channel.
39 ; Call MSGACT to see if the request can be satisfied immediately.
40 ; R2 = Address of message channel block.
41 ; R4 = Address of message request block.
42 ;
43 000664 004737 000672' CALL MSGACT ;Try to satisfy request immediately
44 ;
45 ; Finished
46 ;
47 000670 000207 20$: RETURN
```

MSGACT -- Check message requests that may be satisfied

```

1          .SBTTL  MSGACT -- Check message requests that may be satisfied
2          ;-----
3          ; MSGACT is called each time a message is queued for a message channel
4          ; to see if there are any jobs waiting to receive a message from the
5          ; channel.
6          ; If there are waiting users, the users are activated.
7          ;
8          ; Inputs:
9          ; R2 = Pointer to message channel block.
10         ;
11 000672 010146 MSGACT: MOV      R1, -(SP)
12 000674 010446      MOV      R4, -(SP)
13 000676 010546      MOV      R5, -(SP)
14         ;
15         ; If there are no requesting users or no pending messages, return.
16         ;
17 000700 016205 000000G 2$:      MOV      MB$BUF(R2),R5 ;Are there any pending messages?
18 000704 001507      BEQ      9$ ;Br if not
19 000706 016204 000000G      MOV      MB$REQ(R2),R4 ;Are there any requesting users?
20 000712 001504      BEQ      9$ ;Br if not
21         ;
22         ; There are waiting users and pending messages.
23         ; Remove the 1st message text block and the 1st request block from the
24         ; lists for this message channel.
25         ;
26 000714 016562 000000G 000000G      MOV      MU$FLK(R5),MB$BUF(R2);Remove 1st pending message from list
27 000722 016462 000000G 000000G      MOV      MR$LNK(R4),MB$REQ(R2);Remove 1st request block
28         ;
29         ; Assign the message to the request block
30         ;
31 000730 010564 000000G      MOV      R5,MR$BUF(R4) ;Set address of message text block in req blk
32         ;
33         ; Add the request block to the list of pending request blocks for this job
34         ;
35 000734 116401 000000G      MOVVB   MR$JOB(R4),R1 ;Get # of job that is receiving message
36 000740 062701 000000G      ADD      #LCMQHD,R1 ;Point to list head for job
37 000744 005711 4$:      TST      (R1) ;Have we reached end of list?
38 000746 001404      BEQ      5$ ;Br if yes
39 000750 011101      MOV      (R1),R1 ;Link to next pending request block
40 000752 062701 000000G      ADD      #MR$LNK,R1 ;Point to cell with forward link
41 000756 000772      BR      4$ ;Continue following chain
42 000760 010411 5$:      MOV      R4,(R1) ;Add new block to end of list
43 000762 005064 000000G      CLR      MR$LNK(R4) ;Say we are at the end of the chain
44         ;
45         ; If the user wants a completion routine entered to signal message
46         ; reception, queue the completion request.
47         ;
48 000766 026427 000000G 000001      CMP      MR$RTN(R4),#1 ;Is there a completion routine?
49 000774 101442      BLOS    1$ ;Br if not
50 000776 004737 000000G      CALL    GETQ ;Get a completion queue entry (addr in R1)
51 001002 116400 000000G      MOVVB   MR$JOB(R4),RO ;Get job index # of requesting job
52 001006 110061 000000G      MOVVB   RO,CQ$JOB(R1) ;Set job # in completion queue entry
53 001012 116061 000000G 000000G      MOVVB   LPRI(RO),CQ$PRI(R1);Set job priority
54 001020 112761 000000G 000000G      MOVVB   #S$IDFN,CQ$RNS(R1) ;Set job execution state for cpl rtn
55 001026 112761 000000G 000000G      MOVVB   #CP$STD,CQ$CP(R1);Set standard compl routine class priority
56 001034 005760 000000G      TST     LITIME(RO) ;Is this an interactive job?
57 001040 001403      BEQ     3$ ;Br if not

```

MSGACT -- Check message requests that may be satisfied

```

58 001042 112761 000000G 000000G      MOVVB  #S$HICP,CQ$RNS(R1);Set interactive state
59 001050 012761 001140' 000000G 3$:   MOV    #MSGCPL,CQ$RTN(R1);Set address of our completion routine
60 001056 013761 000000G 000000G      MOV    @#KPAR5,CQ$PA5(R1);Set PAR 5 mapping value for this region
61 001064 112761 000000G 000000G      MOVVB  #QF$SCR,CQ$FLG(R1);Say compl routine is part of system
62 001072 010104      MOV    R1,R4          ;Get address of completion block for QCOMPL
63 001074 004737 000000G      CALL   QCOMPL        ;Queue completion request for waiting job
64 001100 000677      BR     2$           ;See if there are more requests to satisfy
65      ;
66      ;   There is no completion routine for waiting user.
67      ;   Add completed wait block to pending list for user and
68      ;   restart execution of waiting user.
69      ;
70 001102 116401 000000G      1$:   MOVVB  MR$JOB(R4),R1  ;Get waiting user's job index number
71 001106 026127 000000G 000000G      CMP    LSTATE(R1),#S$MSWT;Is job waiting for a message?
72 001114 001271      BNE    2$           ;Br if not
73 001116 004737 000000G      CALL   QHIPRI       ;Restart waiting user
74 001122 000666      BR     2$           ;See if more message requests to satisfy
75      ;
76      ;   There are no more message requests that can be satisfied.
77      ;   If the message channel block is now idle, free it.
78      ;
79 001124 004737 002272' 9$:   CALL   FREMCB      ;Free message channel block if idle
80      ;
81      ;   Finished
82      ;
83 001130 012605      MOV    (SP)+,R5
84 001132 012604      MOV    (SP)+,R4
85 001134 012601      MOV    (SP)+,R1
86 001136 000207      RETURN

```

MSGCPL -- Completion routine processing for messages

```

1          .SBTTL  MSGCPL -- Completion routine processing for messages
2          ;-----
3          ; Whenever a message is received by a job that requested a message completion
4          ; routine, two completion routines are triggered.
5          ; The first completion routine executed is this routine (MSGCPL) which is
6          ; the system completion routine that moves the message text to the user's
7          ; buffer and then queues the user's completion routine.
8          ;
9 001140 010146 MSGCPL: MOV      R1, -(SP)
10 001142 010246      MOV      R2, -(SP)
11 001144 010446      MOV      R4, -(SP)
12 001146 010546      MOV      R5, -(SP)
13          ;
14          ; Begin loop to process all completed message request blocks.
15          ;
16 001150 113702 000000G      MOVVB   CORUSR, R2      ;Get current job index number
17 001154 062702 000000G      ADD      #LCMQHD, R2      ;Point to compl message request blk Q head
18 001160 011205      1$:      MOV      (R2), R5      ;Get address of next completed request block
19 001162 001464      BEQ      9$      ;Br if no more to process
20 001164 026527 000000G 000001      CMP      MR$RTN(R5), #1      ;Does this one have a compl routine?
21 001172 101004      BHI      2$      ;Br if yes
22 001174 010502      MOV      R5, R2      ;Link on and continue search
23 001176 062702 000000G      ADD      #MR$LNK, R2
24 001202 000766      BR       1$
25          ;
26          ; We have found a completed message request block for this job.
27          ; Remove the completed request block from the list for the job.
28          ;
29 001204 016512 000000G      2$:      MOV      MR$LNK(R5), (R2) ;Remove request block from list
30          ;
31          ; Move the message to the user's buffer.
32          ;
33 001210 004737 001420'      CALL     MSGMOV      ;Move message to user's buffer
34 001214 010004      MOV      R0, R4      ;Save message length in R4
35          ;
36          ; Queue a completion request to call the user's completion routine
37          ;
38 001216 004737 000000G      CALL     GETQ      ;Get a completion queue entry (addr in R1)
39 001222 010461 000000G      MOV      R4, CQ$R0(R1) ;Pass message length to user in R0
40 001226 016500 000000G      MOV      MR$BUF(R5), R0 ;Get address of message text buffer
41 001232 116000 000000G      MOVVB   MU$JOB(R0), R0 ;Get job index # of job that sent message
42 001236 006200      ASR      R0      ;Convert to job number
43 001240 010061 000000G      MOV      R0, CQ$R1(R1) ;Pass sending job number in R1
44 001244 116500 000000G      MOVVB   MR$JOB(R5), R0 ;Get job index # of requesting job
45 001250 110061 000000G      MOVVB   R0, CQ$JOB(R1) ;Set job # in completion queue entry
46 001254 116061 000000G 000000G      MOVVB   LPRI(R0), CQ$PRI(R1); Set job priority
47 001262 112761 000000G 000000G      MOVVB   #S$IDFN, CQ$RNS(R1) ;Set job execution state for cpl rtn
48 001270 112761 000000G 000000G      MOVVB   #CP$STD, CQ$CP(R1); Set standard compl rtn class priority
49 001276 005760 000000G      TST     LITIME(R0)      ;Is this an interactive job?
50 001302 001403      BEQ      3$      ;Br if not
51 001304 112761 000000G 000000G      MOVVB   #S$HICP, CQ$RNS(R1); Set interactive state
52 001312 016561 000000G 000000G      3$:      MOV      MR$RTN(R5), CQ$RTN(R1); Set address of completion routine
53 001320 010104      MOV      R1, R4      ;Get address of completion block for QCOMPL
54 001322 004737 000000G      CALL     QCOMPL      ;Queue completion request for waiting job
55          ;
56          ; Now free the message request block and the associated message text block
57          ;

```

```
58 001326 004737 002352'          CALL  FREMRB          ;Free the message request block
59                                ;
60                                ; Go back and see if there are any more completed message request
61                                ; blocks for this job.
62                                ;
63 001332 000712          BR      1$
64                                ;
65                                ; Finished all completed message request blocks for this job
66                                ;
67 001334 012605          9$:   MOV    (SP)+,R5
68 001336 012604          MOV    (SP)+,R4
69 001340 012602          MOV    (SP)+,R2
70 001342 012601          MOV    (SP)+,R1
71 001344 000207          RETURN
```

MSGGET -- Move message text into internal buffer

```

1          .SBTTL  MSGGET -- Move message text into internal buffer
2          ;-----
3          ; MSGGET is called to move a message text string from the user's buffer
4          ; into an internal buffer.
5          ;
6          ; Inputs:
7          ; R3 = Address of buffer in user's program space
8          ; R4 = Address of internal buffer where message is to be stored
9          ; R5 = Number of bytes to move
10         ;
11 001346 010346 MSGGET: MOV      R3,-(SP)
12 001350 010446      MOV      R4,-(SP)
13 001352 010546      MOV      R5,-(SP)
14         ;
15         ; If the user's buffer address is even, do a word-by-word move
16         ;
17 001354 032703 000001      BIT      #1,R3      ; Is user's buffer on word boundary?
18 001360 001007      BNE      3$      ; Br if not
19 001362 005205      INC      R5      ; Bound # bytes up to word multiple
20 001364 000241      CLC      ; Clear for rotate
21 001366 006005      ROR      R5      ; Get # words to move
22 001370 106523 2$: MFPD    (R3)+    ; Get a word from user's buffer
23 001372 012624      MOV      (SP)+,(R4)+ ; Move to internal buffer
24 001374 077503      SOB      R5,2$    ; Loop if more words to move
25 001376 000404      BR       9$
26         ;
27         ; Do byte-by-byte move
28         ;
29 001400 004737 000000G 3$: CALL    GETUCH    ; Get byte from user's buffer
30 001404 110024      MOVB     R0,(R4)+ ; Move to internal buffer
31 001406 077504      SOB      R5,3$    ; Loop if more to move
32         ;
33         ; Finished
34         ;
35 001410 012605 9$:  MOV      (SP)+,R5
36 001412 012604      MOV      (SP)+,R4
37 001414 012603      MOV      (SP)+,R3
38 001416 000207      RETURN

```

MSGMOV -- Move message text to user's buffer

```

1          .SBTTL  MSGMOV -- Move message text to user's buffer
2          ;-----
3          ; MSGMOV is called to move a message text string from a message text
4          ; buffer to a user's buffer.
5          ;
6          ; Inputs:
7          ;   R5 = Address of completed message request block.
8          ;
9          ; Outputs:
10         ;   R0 = Length of message passed to user.
11         ;
12 MSGMOV: MOV     R1,-(SP)
13         MOV     R2,-(SP)
14         MOV     R3,-(SP)
15         MOV     R4,-(SP)
16         CLR     -(SP)          ;Store message length here
17         ;
18         ; Set up pointers to the message in the internal buffer and to the
19         ; user's receiving buffer.
20         ;
21         MOV     MR$BUF(R5),R2  ;Get address of message text block
22         MOV     MU$SIZ(R2),R1  ;Get size of message
23         ADD     #MU$TXT,R2     ;Point to start of text string
24         MOV     MR$UBA(R5),R3  ;Get address of user's buffer
25         MOV     MR$UBS(R5),R4  ;Get size of user's buffer
26         CMP     R1,R4         ;Is text longer than user's buffer?
27         BLOS   1$            ;Br if not
28         MOV     R4,R1         ;Truncate to fit user's buffer
29         MOVB   #ERR04,INTERR   ;Return truncation error
30         MOV     R1,(SP)       ;Save actual message length
31         BEQ   9$            ;Br if 0 message length
32         ;
33         ; Move the message text to the user's buffer
34         ; If user's buffer is on word boundary, do word-by-word move.
35         ;
36 2$:     BIT     #1,R3         ;Is user's buffer address even?
37         BNE   6$            ;Br if not
38         MOV     R1,R0         ;Get # bytes we need to move
39         CLR     R1           ;Assume no bytes will be left over
40         CLC     R1           ;Clear carry for rotate
41         ROR     R0           ;Get # words to move
42         BCC   7$            ;Br if no odd byte left over
43         INC     R1           ;Remember to move last odd byte
44 7$:     TST     R0           ;Any words to move?
45         BEQ   6$            ;Br if not -- Must be 1 byte message
46 5$:     MOV     (R2)+,-(SP)   ;Get a word to be stored
47         MTPD   (R3)+       ;Store into user's buffer
48         SOB    R0,5$       ;Move required # of words
49         TST     R1           ;Did we have an odd byte left over?
50         BEQ   9$            ;Br if not
51         ;
52         ; Do byte-by-byte move
53         ;
54 6$:     MOVB   (R2)+,R0     ;Get next char of message
55         CALL   PUTUCH       ;Move to user's buffer
56         SOB    R1,6$       ;Loop till all of message moved
57         ;

```


MSGMOV -- Move message text to user's buffer

```
58          ; Finished
59          ;
60 001546 012600 9#:      MOV      (SP)+, R0      ; Get message length
61 001550 012604      MOV      (SP)+, R4
62 001552 012603      MOV      (SP)+, R3
63 001554 012602      MOV      (SP)+, R2
64 001556 012601      MOV      (SP)+, R1
65 001560 000207      RETURN
```

MBSRCH -- Search for message channel block

```

1          .SBTTL  MBSRCH -- Search for message channel block
2          ;-----
3          ; MBSRCH is called to attempt to find an existing message channel
4          ; block that matches the message channel whose name is specified
5          ; by the current EMT.
6          ;
7          ; Outputs:
8          ; C-flag cleared ==> Message channel block found.
9          ; C-flag set    ==> Could not find existing message channel block.
10         ; R2 = Address of message channel block if one found.
11         ;
12 001562 010346 MBSRCH: MOV     R3, -(SP)
13 001564 010446         MOV     R4, -(SP)
14         ;
15         ; Set up message channel name in CHNNAM
16         ;
17 001566 004737 001646'        CALL    MSGNAM      ;Set up message channel name
18         ;
19         ; Begin loop to search for existing message channel block
20         ;
21 001572 013702 000002'        MOV     MBMHD, R2    ;Point to 1st message channel block
22 001576 001417         BEQ     B#                ;Br if no message channel blocks
23         ;
24         ; Compare message channel names
25         ;
26 001600 010203 1$:          MOV     R2, R3                ;Get address of message channel block
27 001602 062703 000000G        ADD     #MB$NAM, R3    ;Point to name in channel block
28 001606 012700 000012'        MOV     #CHNNAM, R0   ;Point to target name
29 001612 012704 000006        MOV     #6, R4         ;Names are 6 chars long
30 001616 122023 2$:          CMPB   (R0)+, (R3)+    ;Compare names
31 001620 001003         BNE     3$                ;Br if mismatch
32 001622 077403         SOB     R4, 2$          ;Loop to compare rest of names
33         ;
34         ; We found the message channel block
35         ;
36 001624 000241         CLC                ;Signal success
37 001626 000404         BR     9$
38         ;
39         ; Names do not match.
40         ; See if there are more blocks to check.
41         ;
42 001630 016202 000000G        3$:          MOV     MB$FLK(R2), R2 ;Get address of next block
43 001634 001361         BNE     1$                ;Loop if there is another one
44         ;
45         ; We cannot find the message channel block
46         ;
47 001636 000261 8$:          SEC                ;Signal failure on return
48         ;
49         ; Finished
50         ;
51 001640 012604 9$:          MOV     (SP)+, R4
52 001642 012603         MOV     (SP)+, R3
53 001644 000207         RETURN

```

MSGNAM -- Set up name of message channel

```

1          .SBTTL  MSGNAM -- Set up name of message channel
2          ;-----
3          ; MSGNAM is called to acquire the message channel name specified
4          ; with the current EMT and move it to a temporary buffer.
5          ;
6          ; Outputs:
7          ; CHNNAM = Message channel name.
8          ;
9 001646   010246   MSGNAM: MOV      R2,-(SP)
10 001650   010346      MOV      R3,-(SP)
11 001652   010446      MOV      R4,-(SP)
12          ;
13          ; Move message channel name from user's area to internal temp cell
14          ;
15 001654   013703   000000C      MOV      EMTBLK+EB$NAM,R3;Get pointer to user's name cell
16 001660   012702   000012'      MOV      #CHNNAM,R2      ;Get pointer to temp cell
17 001664   012704   000006      MOV      #6,R4          ;Move 6 chars
18 001670   004737   000000G 1$:  CALL      GETUCH      ;Get char from user's buffer
19 001674   110022      MOV      RO,(R2)+      ;Move to temp buffer
20 001676   077404      SOB      R4,1$        ;Loop if more to move
21          ;
22          ; Finished
23          ;
24 001700   012604      MOV      (SP)+,R4
25 001702   012603      MOV      (SP)+,R3
26 001704   012602      MOV      (SP)+,R2
27 001706   000207      RETURN

```

ADDMRB -- Add new message request block

```

1          .SBTTL  ADDMRB -- Add new message request block
2          ;-----
3          ; ADDMRB creates a new message request block and adds it to the list
4          ; of message request blocks for a specified message channel block.
5          ; Information about the current job number, user's buffer address and
6          ; buffer size are set up in the message request block.
7          ;
8          ; Inputs:
9          ;   R2 = Address of message channel block.
10         ;
11         ; Outputs:
12         ;   C-flag cleared ==> We successfully added a message request block.
13         ;   C-flag set      ==> Error detected while creating message request block.
14         ;   R4 = Address of message request block we created.
15         ;
16 001710  ADDMRB:
17         ;
18         ;   Get a message request block off of the free list
19         ;
20 001710  013704  000006'      MOV      MRBFHD,R4      ;Get message request block off of free list
21 001714  001436              BEQ      B$              ;Br if there are no free blocks
22 001716  016437  000000G 000006'  MOV      MR$LNK(R4),MRBFHD;Remove block from free list
23         ;
24         ;   We got a free message request block.
25         ;   Initialize with values from EMT argument block.
26         ;
27 001724  013764  000000C 000000G  MOV      EMTBLK+EB$BUF,MR$UBA(R4) ;User's buffer address
28 001732  013764  000000C 000000G  MOV      EMTBLK+EB$SIZ,MR$UBS(R4) ;User's buffer size
29 001740  113764  000000G 000000G  MOVB    CORUSR,MR$JOB(R4) ;Job index number
30 001746  005064  000000G              CLR      MR$RTN(R4)      ;Say no completion routine
31 001752  005064  000000G              CLR      MR$BUF(R4)      ;Say no associated text block
32         ;
33         ;   Add message request block to tail of request blocks for message channel
34         ;
35 001756  010200              MOV      R2,R0          ;Get address of message channel block
36 001760  062700  000000G          ADD      #MB$REQ,R0      ;Point to list head of request blocks
37 001764  005710          2$:    TST      (R0)          ;Are we at the end of the list?
38 001766  001404              BEQ      3$              ;Br if yes
39 001770  011000              MOV      (R0),R0         ;Link to next one on list
40 001772  062700  000000G          ADD      #MR$LNK,R0      ;Point to cell with forward link
41 001776  000772              BR       2$              ;Continue following chain
42 002000  010410          3$:    MOV      R4,(R0)          ;Add new block to end of list
43 002002  005064  000000G          CLR      MR$LNK(R4)     ;Say we are at end of list
44 002006  000241              CLC              ;Signal success on return
45 002010  000401              BR       9$
46         ;
47         ;   Error -- No free message request blocks
48         ;
49 002012  000261          8$:    SEC              ;Signal failure on return
50         ;
51         ;   Finished
52         ;
53 002014  000207          9$:    RETURN

```

MSGABT -- Abort all message requests for a job

```

1          .SBTTL  MSGABT -- Abort all message requests for a job
2          ;-----
3          ; MSGABT is called when a job aborts to clean up all pending message
4          ; requests for the job.
5          ;
6          ; Inputs:
7          ; R1 = Job index number of aborting job.
8          ;
9 002016 010246 MSGABT: MOV      R2,-(SP)
10 002020 010346      MOV      R3,-(SP)
11 002022 010446      MOV      R4,-(SP)
12 002024 010546      MOV      R5,-(SP)
13          ;
14          ; Free all completed message request blocks that are pending for the job
15          ;
16 002026 016105 000000G      MOV      LCMQHD(R1),R5 ;Get addr of 1st completed message request
17 002032 001410      BEQ      2$ ;Br if there are none
18 002034 016504 000000G 1$:  MOV      MR$LNK(R5),R4 ;Get address of next request block
19 002040 004737 002352'      CALL     FREMRB ;Free the message request block
20 002044 010405      MOV      R4,R5 ;Get address of next completed block
21 002046 001372      BNE      1$ ;Loop if there is another block to free
22 002050 005061 000000G      CLR      LCMQHD(R1) ;Say there are no completed requests for job
23          ;
24          ; Free all pending message requests for this job
25          ;
26 002054 013702 000002' 2$:  MOV      MBMHD,R2 ;Get addr of 1st message channel block
27 002060 001427      BEQ      9$ ;Br if there are none
28 002062 010203      MOV      R2,R3 ;Get address of message channel block
29 002064 062703 000000G 7$:  ADD      #MB$REQ,R3 ;Get address of cell with ptr to request blk
30 002070 011305 6$:  MOV      (R3),R5 ;Get address of next message request block
31 002072 001414      BEQ      4$ ;Br if there are no more
32 002074 120165 000000G      CMPB     R1,MR$JOB(R5) ;Is this message request for aborting job?
33 002100 001005      BNE      5$ ;Br if not
34 002102 016513 000000G      MOV      MR$LNK(R5),(R3) ;Remove message block from list
35 002106 004737 002352'      CALL     FREMRB ;Free the message request block
36 002112 000766      BR      6$ ;Go see if there are more to free
37 002114 010503 5$:  MOV      R5,R3 ;Get address of current block
38 002116 062703 000000G      ADD      #MR$LNK,R3 ;Point to cell with forward link
39 002122 000762      BR      6$ ;Keep looking for more requests for this job
40 002124 016203 000000G 4$:  MOV      MB$FLK(R2),R3 ;Get pointer to next message channel block
41 002130 004737 002272'      CALL     FREMCB ;See if we need to free current channel block
42 002134 010302      MOV      R3,R2 ;Get address of next message channel block
43 002136 001352      BNE      7$ ;Br if more message channels to check
44          ;
45          ; Finished
46          ;
47 002140 012605 9$:  MOV      (SP)+,R5
48 002142 012604      MOV      (SP)+,R4
49 002144 012603      MOV      (SP)+,R3
50 002146 012602      MOV      (SP)+,R2
51 002150 000207      RETURN

```

GETMCB -- Get a new message control block

```

1          .SBTTL  GETMCB -- Get a new message control block
2          ;-----
3          ; GETMCB is called to get a new message control block.
4          ;
5          ; Inputs:
6          ;   CHNNAM = Message channel name string
7          ;
8          ; Outputs:
9          ;   C-flag cleared ==> Message control block gotten.
10         ;   C-flag set      ==> Could not get a free message control block.
11         ;   R2 = Address of message control block.
12         ;
13 002152  GETMCB:
14         ;
15         ; Get 1st message control block off of free list
16         ;
17 002152  013702  000004'      MOV      MCBFHD,R2      ;Get 1st free message control block
18 002156  001427                      BEQ      B#              ;Br if there are no free message blocks
19 002160  016237  000000G 000004'  MOV      MB$FLK(R2),MCBFHD ;Remove block from free list
20         ;
21         ; We got a free message control block.
22         ; Initialize it.
23         ;
24 002166  005062  000000G      CLR      MB$BUF(R2)      ;No pending messages
25 002172  005062  000000G      CLR      MB$REQ(R2)      ;No pending message requests
26 002176  013762  000012' 000000G  MOV      CHNNAM,MB$NAM(R2);Set 1st 2 chars of name
27 002204  013762  000014' 000002G  MOV      CHNNAM+2,MB$NAM+2(R2);Set 2nd 2 chars of name
28 002212  013762  000016' 000004G  MOV      CHNNAM+4,MB$NAM+4(R2);Set 3rd 2 chars of name
29         ;
30         ; Add message channel block to list of active message channels
31         ;
32 002220  013762  000002' 000000G  MOV      MBMHD,MB$FLK(R2);Add new block to list of active blocks
33 002226  010237  000002'      MOV      R2,MBMHD      ;Put new block at head of list
34         ;
35         ; We successfully got a block
36         ;
37 002232  000241                      CLC                          ;Signal success on return
38 002234  000401                      BR       9#
39         ;
40         ; There are no free message control blocks
41         ;
42 002236  000261      B#:      SEC                          ;Signal failure on return
43         ;
44         ; Finished
45         ;
46 002240  000207      9#:      RETURN

```

GETMTB -- Get a free message text block

```

1          .SBTTL  GETMTB -- Get a free message text block
2          ;-----
3          ; GETMTB is called to try to acquire a free message text block.
4          ; Message text blocks are used to hold message text strings.
5          ;
6          ; Outputs:
7          ; C-flag cleared ==> A free message text block was gotten.
8          ; C-flag set      ==> There are no free message text blocks.
9          ; R4 = Address of message text block if one was gotten.
10         ;
11 002242  GETMTB:
12         ;
13         ; Get 1st message text block off of free list
14         ;
15 002242  013704  000010'      MOV     MTBFHD,R4      ;Get pointer to 1st free message text block
16 002246  001407              BEQ     1$             ;Br if there are no free blocks
17 002250  016437  000000G 000010'  MOV     MU$FLK(R4),MTBFHD ;Remove block from free list
18 002256  005064  000000G          CLR     MU$FLK(R4)     ;Say block is not part of any list
19 002262  000241              CLC                     ;Signal success on return
20 002264  000401              BR      9$
21         ;
22         ; There are no free message text blocks
23         ;
24 002266  000261      1$:      SEC                     ;Signal failure on return
25         ;
26         ; Finished
27         ;
28 002270  000207      9$:      RETURN

```

FREMCB -- Free a message control block

```

1          .SBTTL  FREMCB -- Free a message control block
2          ;-----
3          ; FREMCB is called to attempt to return a message control block to the
4          ; free list. This routine checks to see if there are any pending
5          ; messages for the message channel or pending message requests.
6          ; If there are any pending messages or message requests, this routine
7          ; returns without freeing the message control block.
8          ;
9          ; Inputs:
10         ; R2 = Address of message control block to be freed.
11         ;
12         FREMCB:
13         ;
14         ; See if this message control block is idle
15         ;
16         002272 005762 000000G      TST     MB$BUF(R2)      ;Any pending messages?
17         002276 001024              BNE     9$              ;Br if yes
18         002300 005762 000000G      TST     MB$REQ(R2)     ;Any pending message requests?
19         002304 001021              BNE     9$              ;Br if yes
20         ;
21         ; This message control block is idle.
22         ; Remove it from the active list.
23         ;
24         002306 012700 000000C      MOV     #MBMHD-MB$FLK,R0;Point to active list head
25         002312 020260 000000G  1$:   CMP     R2,MB$FLK(R0)  ;Are we next block on list?
26         002316 001404              BEQ     2$              ;Br if yes
27         002320 016000 000000G      MOV     MB$FLK(R0),R0  ;Chain to next block
28         002324 001372              BNE     1$              ;Go check it
29         002326 000403              BR      3$              ;Block is not on active list
30         002330 016260 000000G  2$:   MOV     MB$FLK(R2),MB$FLK(R0);Remove from active list
31         ;
32         ; Return it to free list.
33         ;
34         002336 013762 000004' 000000G  3$:   MOV     MCBFHD,MB$FLK(R2);Add block to free list
35         002344 010237 000004'      MOV     R2,MCBFHD
36         ;
37         ; Finished
38         ;
39         002350 000207 9$:   RETURN

```


FREMRB -- Free a message request block

```

1          .SBTTL  FREMRB -- Free a message request block
2          ;-----
3          ; FREMRB is called to free a message request block.
4          ; It also frees any associated message text block.
5          ;
6          ; Inputs:
7          ; R5 = Address of message request block being freed.
8          ;
9 002352  FREMRB:
10         ;
11         ; See if there is an associated message text block that needs to be freed
12         ;
13 002352 016500 000000G          MOV    MR$BUF(R5),R0    ;Is there an associated message text block?
14 002356 001407                  BEQ    1$                ;Br if not
15 002360 013760 000010' 000000G  MOV    MTBFHD,MU$FLK(R0);Add message text block to free list
16 002366 010037 000010'          MOV    R0,MTBFHD
17 002372 005065 000000G          CLR    MR$BUF(R5)    ;Say message text block has been freed
18         ;
19         ; Free the message request block
20         ;
21 002376 013765 000006' 000000G 1$: MOV    MRBFHD,MR$LNK(R5);Add block to free list
22 002404 010537 000006'          MOV    R5,MRBFHD
23         ;
24         ; Finished
25         ;
26 002410 000207                  RETURN
27         ;
28         ; Top of TSMSG
29         ;
30 002412  MSGTOP:
31         .END

```

Errors detected: 0

*** Assembler statistics

Work file reads: 0
 Work file writes: 0
 Size of work file: 49 Words (1 Pages)
 Size of core pool: 18176 Words (71 Pages)
 Operating system: RT-11

Elapsed time: 00:00:21.33
 ,LP: TSMSG=DK: TSMSG/C/N: SYM

MSGACT	3-70	5-45	6-43	7-11#				
MSGCK	1-19	4-7#						
MSGCPL	7-59	8-9#						
MSGGET	3-62	9-11#						
MSGINI	1-20	2-8#						
MSGMOV	5-80	8-33	10-12#					
MSGNAM	11-17	12-9#						
MSGTOP	1-20	2-15	18-30#					
MSGWT	1-19	4-18	5-6#					
MSRCPL	5-12	6-6#						
MTBFHD	1-47#	2-45*	16-15	16-17*	18-15	18-16*		
MU\$FLK	1-31	2-57*	2-61*	3-43	7-26	16-17	16-18*	18-15*
MU\$JOB	1-32	3-49*	8-41					
MU\$SIZ	1-27	3-58*	10-22					
MU\$TXT	1-29	2-47	3-60	10-23				
PUTUCH	1-26	10-55						
QCOMPL	1-27	7-63	8-54					
QF\$SCR	1-25	7-61						
QHDSPN	1-28	5-65						
QHIPRI	1-29	7-73						
S\$HICP	1-26	7-58	8-51					
S\$IOFN	1-26	7-54	8-47					
S\$MSWT	1-30	5-64	7-71					
TSMMSG	1-15#	1-19						
URO	1-29	4-24*	5-81*					
VMAXMC	1-24	2-20						
VMSCHR	1-29	2-46	3-54	3-57				
VMXMRB	1-30	2-30						
VMXMSG	1-30	2-42	2-44*	2-56*				
VPAR6	1-29	2-49						