ASYNCHRONOUS COMMUNICATIONS SUBROUTINES

The asynchronous communications package contains five subroutines callable either from COBOL programs or from FORTRAN programs. These subroutines allow the user to initialize a TTY line for communications with another computer, place a call out on that line to the other computer (if dial out hardware exists for that line), initiate the counterpart communications job in the other computer, then send and receive data to and from the other computer with complete error detection and error correction, and finally disconnect the communications line at the termination of the data transfer.

The following is a description of the five subroutines, their calling sequence, their error codes, and sample programs demonstrating the use of each of the subroutines.
INIT - THE INITIALIZATION SUBROUTINE

FORTRAN CALL:
CALL INITF(IOINDX, IERROR, ITYPE)

COBOL CALL:
ENTER MACRO INITC USING IOINDX, IERROR, ITYPE

WHERE THE ARGUMENTS ARE DEFINED AS:

IOINDX FORTRAN:
IOINDX MUST BE AN INTEGER VARIABLE CONTAINING THE UNIVERSAL I/O INDEX OF THE TTY LINE TO BE USED AS THE COMMUNICATIONS LINE. THIS INDEX IS OCTAL 200000 PLUS THE TTY LINE NUMBER. THE UNIVERSAL I/O INDEX IS DESCRIBED IN THE DECSYSTEM-10 MONITOR CALLS MANUAL.

COBOL:

IERROR FORTRAN:
IERROR IS AN INTEGER VARIABLE WHICH IS SET EITHER TRUE (-1) OR FALSE (0) DEPENDING ON WHETHER THE INITIALIZATION WAS COMPLETED SUCCESSFULLY. IF IERROR IS FALSE, THEN ITYPE CONTAINS THE TYPE OF FAILURE THAT OCCURRED.

COBOL:
IERROR IS A COMPUTATIONAL ITEM WHICH IS SET TO EITHER TRUE (-1) OR FALSE (0) AS INDICATED ABOVE FOR THE FORTRAN CALL. IERROR IS DEFINED AS: IERROR PIC 9(10) COMP.

ITYPE FORTRAN:
ITYPE IS AN INTEGER VARIABLE SET TO THE TYPE OF ERROR ENCOUNTERED BY THE SUBROUTINE. IF IERROR IS FALSE THEN ITYPE IS RETURNED WITH THE FOLLOWING VALUES:
1 - TTY LINE IS NOT AVAILABLE
2 - TTY NOT ASSIGNED TO THIS JOB
3 - NO CHANNELS ARE AVAILABLE

COBOL:
ITYPE IS A COMPUTATIONAL ITEM WHICH
WILL CONTAIN AN ERROR TYPE VALUE AS INDICATED ABOVE FOR THE FORTRAN CALL. ITYPE IS DEFINED AS:
ITYPE PIC 9(10) COMP.

THE INIT SUBROUTINE REQUIRES THAT THE COMMUNICATIONS TTY LINE BE ASSIGNED TO THE JOB IN ORDER TO USE THAT LINE IN IMAGE MODE. THE INIT SUBROUTINE ALSO REQUIRES THAT THE CALLING ROUTINE LEAVE I/O CHANNELS 16 AND 17 FREE FOR COMMUNICATING WITH THE COMMUNICATIONS TTY LINE.
DIAL - THE DIALER SUBROUTINE

FORTRAN CALL:
    CALL DIALF(IDIAL, N, IERROR, ITYPE)

COBOL CALL:
    ENTER MACRO DIALC USING IDIAL, N, IERROR, ITYPE

WHERE THE ARGUMENTS ARE DEFINED AS:

FORTRAN:

IDIAL    
  IDIAL IS AN INTEGER ARRAY CONTAINING 
  THE DIGITS TO BE DIALED. THE DIGITS 
  MUST BE IN THE RANGE OF 1 TO 10, 
  STORED ONE DIGIT TO A WORD. THE 
  NUMBER 14 DECIMAL WILL CAUSE A FIVE 
  SECOND PAUSE IN DIALING. THIS IS 
  USEFUL FOR GETTING AN "OUTSIDE LINE" 
  WHERE A SECOND DIAL TONE MUST BE 
  WAITED FOR.

N    
  IS THE NUMBER OF DIGITS IN THE 
  ARRAY TO BE DIALED. (INCLUDING ANY 
  PAUSE REQUESTS) N MUST BE LESS THAN 
  OR EQUAL TO 16 DECIMAL. IF N IS 
  ZERO, THEN NO DIAL TAKES PLACE. TO 
  COMMUNICATE OVER A LEASED OR HARD 
  WIRED LINE, DIAL CAN BE CALLED WITH 
  N=0.

IERROR    
  IERROR IS AN INTEGER VARIABLE WHICH 
  IS SET TRUE (-1) IF THE DIAL WAS 
  SUCCESSFUL OR TO FALSE (0) IF THE 
  CALL DID NOT GO THROUGH.

COBOL:

IDIAL IS A GROUP LEVEL ITEM 
CONTAINING N (DEFINED BELOW) 
ELEMENTARY ITEMS DEFINED AS:
  DIGIT- PIC 9 COMP VALUE -. 
NOTE THAT EACH DIGIT DIALED IS 
PLACED IN A SEPARATE ITEM (WORD).

N    
IS A COMPUTATIONAL ITEM CONTAINING 
THE NUMBER OF DIGITS TO BE DIALED. 
N MUST BE LESS THAN OR EQUAL TO 16 
DECIMAL. N IS DEFINED AS: 
N PIC 99 COMP VALUE -. 

IERROR IS A COMPUTATIONAL ITEM WHICH 
IS SET TO EITHER TRUE (-1) OR FALSE 
(0) AS INDICATED ABOVE FOR THE 
FORTRAN CALL. IERROR IS DEFINED AS:
IERROR PIC 9(10) COMP.

ITYPE

FORTRAN:
ITYPE IS AN INTEGER VARIABLE WHICH IS SET TO THE FOLLOWING VALUES IF IERROR IS FALSE:
0 - UNDEFINED ERROR
1 - TTY LINE NOT A DATASET LINE
2 - CALL DID NOT GO THROUGH
3 - MORE THAN 16 DIGITS WERE SPECIFIED IN N

COBOL:
ITYPE IS A COMPUTATIONAL ITEM WHICH WILL CONTAIN AN ERROR TYPE VALUE AS INDICATED ABOVE FOR THE FORTRAN CALL. ITYPE IS DEFINED AS:
ITYPE PIC 9(10) COMP.

AFTER COMPLETING THE CALL (IF ONE WAS SPECIFIED) THE DIAL SUBROUTINE DIRECTLY COUPLES THE JOB'S CONTROLLING TTY WITH THE COMMUNICATIONS TTY LINE. THIS ENABLES THE USER TO LOG ONTO THE OTHER COMPUTER AND TO START UP THE COUNTERPART COMMUNICATIONS PROGRAM ON THE OTHER COMPUTER.
SEND - THE DATA SENDING SUBROUTINE

FORTRAN CALL:
CALL SENDF(ISEND, N, IERROR, ITYPE)

COBOL CALL:
ENTER MACRO SENDC USING ISEND, N, IERROR, ITYPE

WHERE THE ARGUMENTS ARE DEFINED AS:

FORTRAN:
ISEND IS AN INTEGER ARRAY CONTAINING
THE DATA TO BE TRANSMITTED. THE
DATA IS REPRESENTED AS 8-BIT
CHARACTERS PACKED RIGHT-ADJUSTED ONE
PER WORD IN THE ARRAY.

COBOL:
ISEND IS A GROUP LEVEL ITEM
CONTAINING N ITEMS DEFINED AS:
02 CHARX PIC X SYNC RIGHT VALUE 'X'.
NOTE THAT EACH CHARACTER SENT
REQUIRES A SEPARATE ITEM (WORD) AND
IS POSITIONED IN BITS 30 THRU 35.
IF "USAGE IS DISPLAY-7" WERE ADDED
TO THE DEFINITION, THE CHARACTER
APPEARS IN BITS 28 THRU 34 WITH BIT
35 EQUAL TO ZERO.

FORTRAN:
N IS AN INTEGER VARIABLE CONTAINING
THE NUMBER OF DATA ELEMENTS TO BE
SENT. THERE IS NO SIZE LIMIT FOR N.
HOWEVER, THE COMMUNICATIONS PACKAGE
WILL TRANSMIT THE ARRAY AS A SERIES
OF MESSAGES CONTAINING UP TO 72 DATA
ELEMENTS PER MESSAGE. THE SIZE OF
THE MESSAGES IS NORMALLY TRANSPARENT
TO THE USER, BUT IF THE USER WANTS
TO MINIMIZE TRANSMISSION OVERHEAD
THEN DATA SHOULD BE PACKED INTO
ARRAYS WHICH ARE A MULTIPLE OF 72
WORDS LONG.

COBOL:
N IS A COMPUTATIONAL ITEM CONTAINING
THE NUMBER OF CHARACTERS TO BE SENT
AS DESCRIBED ABOVE FOR THE FORTRAN
CALL. N IS DEFINED AS:
N PIC 9(10) VALUE -. 

FORTRAN:
IERROR IS A INTEGER VARIABLE WHICH
IS SET TRUE (-1) IF THE DATA WAS
RECEIVED SUCCESSFULLY BY THE OTHER
COMPUTER AND FALSE (0) IF THE OTHER
COMPUTER DID NOT GET THE DATA.

**COBOL:**

*IEROR IS A COMPUTATIONAL ITEM WHICH IS SET TO EITHER TRUE (-1) OR FALSE (0) AS INDICATED ABOVE FOR THE FORTRAN CALL.  *IEROR IS DEFINED AS:  
*IEROR PIC 9(10) COMP.  

**FORTRAN:**

*ITYPE IS AN INTEGER VARIABLE WHICH IS SET TO THE FOLLOWING VALUES IF IERROR IS FALSE:
- 1 - IF THE OTHER COMPUTER IS TRYING TO TRANSMIT DATA CONCURRENTLY WITH THIS PROGRAM.
N - THE NUMBER OF RETRIES BEFORE GIVING UP.

IF IERROR IS TRUE, ITYPE WILL BE SET TO THE NUMBER OF TRIES THAT WERE NECESSARY BEFORE THE DATA WAS SUCCESSFULLY RECEIVED BY THE OTHER COMPUTER.

**COBOL:**

*ITYPE IS A COMPUTATIONAL ITEM WHICH WILL CONTAIN AN ERROR TYPE VALUE AS INDICATED ABOVE FOR THE FORTRAN CALL.  ITYPE IS DEFINED AS:  
ITYPE PIC 9(10) COMP.
RECV - THE DATA RECEIVER SUBROUTINE

FORTRAN CALL:
CALL RECVF(IRECV, N, IERROR, ITYPE)

COBOL CALL:
ENTER MACRO RECVC USING IRECVC, N, IERROR, ITYPE

WHERE THE ARGUMENTS ARE DEFINED AS:

IRECV FORTRAN:
IRECV IS AN INTEGER ARRAY INTO WHICH
THE DATA RECEIVED FROM THE OTHER
COMPUTER IS PACKED RIGHT ADJUSTED
ONE 8-BIT CHARACTER PER WORD.

COBOL:
IRECV IS A GROUP LEVEL ITEM
CONTAINING N ELEMENTARY ITEMS INTO
WHICH EACH DATA CHARACTER IS
RECEIVED. EACH CHARACTER EXPECTED
IS DEFINED AS:
02 CHRX PIC X SYNC RIGHT.
NOTE THAT EACH CHARACTER RECEIVED
REQUIRES A SEPARATE ITEM (WORD) AND
IS POSITIONED IN BITS 30 THRU 35.
IF "USAGE IS DISPLAY-7" WERE ADDED
TO THE DEFINITION, THE CHARACTER
WOULD APPEAR IN BITS 28 THRU 34 WITH
BIT 35 EQUAL TO 0.

N FORTRAN:
N IS AN INTEGER VARIABLE CONTAINING
THE NUMBER OF DATA ELEMENTS TO BE
RECEIVED FROM THE OTHER COMPUTER. N
CAN BE ANY SIZE, BUT IT SHOULD AGREE
WITH THE NUMBER OF DATA ELEMENTS
BEING SENT FROM THE OTHER COMPUTER.
IF N IS SMALLER THAN THE NUMBER OF
DATA ELEMENTS SENT FROM THE OTHER
COMPUTER, THE FIRST N DATA ELEMENTS
WILL BE RETURNED IN IRECVC AND THE
REMAINING ELEMENTS WILL BE LOST.

COBOL:
N IS A COMPUTATIONAL ITEM CONTAINING
THE NUMBER OF DATA CHARACTERS TO BE
RECEIVED AS INDICATED ABOVE IN THE
FORTRAN CALL. N IS DEFINED AS:
N PIC 9(10) VALUE -. 

IERROR FORTRAN:
IERROR IS AN INTEGER VARIABLE WHICH
IS SET TO TRUE (-1) IF THE DATA IS
RECEIVED PROPERLY, AND SET TO FALSE
(0) IF 30 SECONDS PASS BEFORE ANY DATA IS RECEIVED.

CODOL:
IERROR IS A COMPUTATIONAL ITEM WHICH IS SET TO EITHER TRUE \((-1)\) OR FALSE \((0)\) AS INDICATED ABOVE FOR THE FORTRAN CALL. IERROR IS DEFINED AS: IERROR PIC 9(10) COMP.

FORTRAN:
ITYPE IS AN INTEGER VARIABLE WHICH IS SET TO THE NUMBER OF DATA ELEMENTS SUCCESSFULLY RECEIVED BEFORE RETURNING. IF IERROR IS TRUE, ITYPE WILL EQUAL N.

CODOL:
ITYPE IS A COMPUTATIONAL ITEM WHICH WILL CONTAIN AN ERROR TYPE VALUE AS INDICATED ABOVE FOR THE FORTRAN CALL. ITYPE IS DEFINED AS: ITYPE PIC 9(10) COMP.
HINGUP - THE DISCONNECT SUBROUTINE

FORTRAN CALL:
CALL HINGUPF

COBOL CALL:
ENTER MACRO HINGUPC

There are no arguments to this subroutine. The HINGUP subroutine restores the communications TTY line to its normal state, and then hangs up the modem if the TTY line is a dataset. It is important to call this subroutine before exiting from the communications job to leave the TTY line in a reasonable state for the next transfer. This is especially important if the job's controlling TTY is also the communications TTY.
MESSENGES WHICH MIGHT APPEAR ON THE CONTROLLING TTY:

? COMMUNICATIONS TTY LINE NO LONGER ASSIGNED TO JOB

THIS IS A FATAL ERROR MESSAGE WHICH COULD APPEAR IF THE COMMUNICATIONS TTY WAS SOMEHOW LOST BY THE COMMUNICATIONS JOB.

? COMMUNICATIONS TTY LINE NO LONGER AVAILABLE

THIS IS A FATAL ERROR MESSAGE WHICH OCCURS IF THE COMMUNICATIONS JOB CANNOT INIT THE COMMUNICATIONS TTY ANY LONGER. THE REASON IS THE SAME AS ABOVE.

? DISK NOT AVAILABLE TO WRITE DEBUG FILE

THIS MESSAGE AND THE NEXT ONE CAN ONLY APPEAR IF "PTDEBUG" IS TURNED ON IN DIAL.MAC. THE MESSAGE MEANS THAT THE INIT SUBROUTINE COULD NOT INIT THE DISK.

? CANNOT ENTER DEBUG FILE

THIS MESSAGE OCCURS IF THERE WAS AN ERROR WHILE TRYING TO ENTER THE DEBUG FILE (DEBUG.FIL). IT MIGHT OCCUR IF THE DISK WERE FULL, OR DEBUG.FIL CANNOT BE SUPERCEDED.

CONTROLLING TTY IS NOW DIRECTLY CONNECTED TO COMMUNICATIONS LINE. TYPE ^X TO CONTINUE.

THIS MESSAGE ORIGINATES FROM THE DIAL SUBROUTINE AFTER SUCCESSFULLY CALLING INTO THE OTHER COMPUTER. AT THIS POINT THE COMMUNICATIONS TTY LINE IS CONNECTED TO THE CONTROLLING TTY LINE SUCH THAT ALL CHARACTERS TYPED ON THE CONTROLLING TTY ARE SENT OUT OVER THE COMMUNICATIONS LINE, AND ALL CHARACTERS RECEIVED FROM THE COMMUNICATIONS LINE ARE TYPED ON THE CONTROLLING TTY. THIS ALLOWS THE USER TO LOG ONTO THE OTHER COMPUTER AND START UP A PROGRAM WHICH WILL RECEIVE OR SEND THE DESIRED DATA IN THE CORRECT FORMAT. CONTROL CHARACTERS CAN BE SENT TO THE OTHER COMPUTER BY TYPING AN UP-ARROW (^) FOLLOWED BY THE DESIRED ASCII CHARACTER. FOR EXAMPLE: ^C, ^O, OR ^Z. TO EXIT FROM THIS MODE AND RETURN TO THE MAIN PROGRAM, THE USER MUST TYPE A CONTROL-X OR ^X (AK: UP-ARROW FOLLOWED BY AN X).
SAMPLE PROGRAMS:

FORTRAN RECEIVER PROGRAM

DIMENSION IREC(100)
CALL INITF("20043,IERROR,ITYPE")
IF (.NOT.IERROR)GO TO 1
CALL RECF(I_REC,100,IERROR,ITYPE)
IF (.NOT.IERROR)GO TO 2
TYPE 100
CALL HNGUPF
CALL EXIT
1
TYPE 101
IF (ITYPE.EQ.1)TYPE 102
IF (ITYPE.EQ.2)TYPE 103
CALL HNGUPF
CALL EXIT
2
TYPE 104,ITYPE
CALL HNGUPF
CALL EXIT
100 FORMAT('SUCCESSFUL TRANSFER')
101 FORMAT('COM LINE INITIALIZATION FAILURE')
102 FORMAT('TTY NOT AVAILABLE')
103 FORMAT('TTY NOT ASSIGNED')
104 FORMAT('TIME OUT AFTER RECEIVING 'I3,
       ' OUT OF 100 WORDS')
END
FORTRAN SENDER PROGRAM

DIMENSION ISEND(100),IDIAL(9)
DATA IDIAL/9,14,8,9,7,5,7,10,2/
CALL INITF("200046,IERROR,ITYPE")
IF (.NOT.IERROR)GO TO 1
CALL DIALF(IDIAL,9,IERROR,ITYPE)
IF (.NOT.IERROR)GO TO 3
CALL SENDF(ISEND,100,IERROR,ITYPE)
IF (.NOT.IERROR)GO TO 2
TYPE 100
CALL INGUPF
CALL EXIT

1
TYPE 101
IF (ITYPE.EQ.1)TYPE 102
IF (ITYPE.EQ.2)TYPE 103
CALL INGUPF
CALL EXIT

2
TYPE 104,ITYPE
CALL INGUPF
CALL EXIT

3
TYPE 105
IF (ITYPE.EQ.1)TYPE 106
IF (ITYPE.EQ.2)TYPE 107
CALL INGUPF
CALL EXIT

100 FORMAT(' SUCCESSFUL TRANSFER')
101 FORMAT(' COMM LINE INITIALIZATION FAILURE')
102 FORMAT(' TTY NOT AVAILABLE')
103 FORMAT(' TTY NOT ASSIGNED')
104 FORMAT(' TIME OUT AFTER RECEIVING 'I3, ' OUT OF 100 WORDS')
105 FORMAT(' ERROR IN DIAL')
106 FORMAT(' TTY NOT A DATASET')
107 FORMAT(' CALL DID NOT GO THROUGH')
END
COBOL EXAMPLE PROGRAM

IDENTIFICATION DIVISION.
PROGRAM-ID. DIAL.
ENVIRONMENT DIVISION.
DATA DIVISION.
WORKING-STORAGE SECTION.
77 IOINDX PIC 9(10) COMP VALUE 65548.
77 IERROR PIC 9(10) COMP.
77 ITYPE PIC 9(10) COMP.
77 N PIC 999 COMP.
01 IDIAL.
   02 IDIG1 PIC 99 COMP VALUE 9.
   02 IDIG2 PIC 99 COMP VALUE 14.
   02 IDIG3 PIC 99 COMP VALUE 8.
   02 IDIG4 PIC 99 COMP VALUE 9.
   02 IDIG5 PIC 99 COMP VALUE 7.
   02 IDIG6 PIC 99 COMP VALUE 5.
   02 IDIG7 PIC 99 COMP VALUE 7.
   02 IDIG8 PIC 99 COMP VALUE 10.
   02 IDIG9 PIC 99 COMP VALUE 2.
01 ISEND.
   02 CHAR1 PIC X SYNC RIGHT VALUE 'A'.
   02 CHAR2 PIC X SYNC RIGHT VALUE 'B'.
   02 CHAR3 PIC X SYNC RIGHT VALUE 'C'.
   02 CHAR4 PIC X SYNC RIGHT VALUE 'D'.
   02 CHAR5 PIC X SYNC RIGHT VALUE 'E'.
   02 CHAR6 PIC X SYNC RIGHT VALUE 'F'.
   02 CHAR7 PIC X SYNC RIGHT VALUE 'G'.
   02 CHAR8 PIC X SYNC RIGHT VALUE 'H'.
   02 CHAR9 PIC X SYNC RIGHT VALUE 'I'.
   02 CHAR10 PIC X SYNC RIGHT VALUE 'J'.
01 IRECV.
   02 CHARX PIC X SYNC RIGHT OCCURS 10 TIMES.
PROCEDURE DIVISION.
RECEIVER-Routine.
ENTER MACRO INITC USING IOINDX, IERROR, ITYPE.
IF IERROR NOT EQUAL TO 0 GO TO ONE.
   MOVE 10 TO N.
ENTER MACRO RECVC USING IRECV, N, IERROR, ITYPE.
IF IERROR NOT EQUAL TO 0 GO TO TWO.
DISPLAY 'SUCCESSFUL TRANSFER'.
ENTER MACRO HNGUPC.
STOP RUN.

ONE.
DISPLAY 'COMMUNICATIONS LINE INITIALIZATION FAILURE'.
IF ITYPE EQUAL TO 1 DISPLAY 'TTY NOT AVAILABLE'.
IF ITYPE EQUAL TO 2 DISPLAY 'TTY NOT ASSIGNED'.
ENTER MACRO HNGUPC.
STOP RUN.

TWO.
DISPLAY 'TIME OUT AFTER RECEIVING ' ITYPE ' WORDS'.
ENTER MACRO HNGUPC.
STOP RUN.

SENDER-SUBROUTINE.
ENTER MACRO INITC USING IOINDX, IERROR, ITYPE.
IF IERROR EQUAL TO 0 GO TO ONES.
MOVE 9 TO N.
ENTER MACRO DIALC USING IDIAL, N, IERROR, ITYPE.
IF IERROR EQUAL TO 0 GO TO THREES.
MOVE 10 TO N.
ENTER MACRO SENDC USING ISEND, N, IERROR, ITYPE.
IF IERROR EQUAL TO 0 GO TO TWOS.
DISPLAY 'SUCCESSFUL TRANSFER'.
ENTER MACRO HNGUPC.
STOP RUN.

ONES.
DISPLAY 'COMMUNICATIONS LINE INITIALIZATION FAILURE'.
IF ITYPE EQUAL TO 1 DISPLAY 'TTY NOT AVAILABLE'.
IF ITYPE EQUAL TO 2 DISPLAY 'TTY NOT ASSIGNED'.
ENTER MACRO HNGUPC.
STOP RUN.

TWOS.
DISPLAY 'TIME OUT AFTER RECEIVING ' ITYPE ' WORDS'.
ENTER MACRO HNGUPC.
STOP RUN.

THREES.
DISPLAY 'ERROR IN DIAL'.
IF ITYPE EQUAL TO 1 DISPLAY 'TTY NOT A DATASET'.
IF ITYPE EQUAL TO 2 DISPLAY 'CALL DID NOT GO THROUGH'.
ENTER MACRO HNGUPC.
STOP RUN.