```
MMM      MMM    AAAAAAAAA       CCCCCCCCCCCC   RRRRRRRRRRRR           000000000
MMM      MMM    AAAAAAAAA       CCCCCCCCCCCC   RRRRRRRRRRRR           000000000
MMM      MMM    AAAAAAAAA       CCCCCCCCCCCC   RRRRRRRRRRRR           000000000
MMMMMM  MMMMMM  AAA      AAA    CCC            RRR      RRR      000          000
MMMMMM  MMMMMM  AAA      AAA    CCC            RRR      RRR      000          000
MMM MMM MMM MMM AAA      AAA    CCC            RRR      RRR      000          000
MMM  MMM MMM MMM AAA     AAA    CCC            RRR      RRR      000          000
MMM   MMM  MMM  AAA      AAA    CCC            RRR      RRR      000          000
MMM      MMM    AAA      AAA    CCC            RRRRRRRRRRRR      000          000
MMM      MMM    AAA      AAA    CCC            RRRRRRRRRRRR      000          000
MMM      MMM    AAAAAAAAAAAAAA  CCC            RRR   RRR        000          000
MMM      MMM    AAAAAAAAAAAAAA  CCC            RRR   RRR        000          000
MMM      MMM    AAAAAAAAAAAAAA  CCC            RRR   RRR        000          000
MMM      MMM    AAA      AAA    CCC            RRR      RRR      000          000
MMM      MMM    AAA      AAA    CCC            RRR      RRR      000          000
MMM      MMM    AAA      AAA    CCC            RRR      RRR      000          000
MMM      MMM    AAA      AAA    CCCCCCCCCCCC   RRR      RRR        000000000
MMM      MMM    AAA      AAA    CCCCCCCCCCCC   RRR      RRR        000000000
MMM      MMM    AAA      AAA    CCCCCCCCCCCC   RRR      RRR        000000000
```

FILEID**CRFMACROS

```
CCCCCCCC   RRRRRRRR    FFFFFFFFFF   MM      MM    AAAAAA        CCCCCCCC   RRRRRRRR     000000      SSSSSSSS
CCCCCCCC   RRRRRRRR    FFFFFFFFFF   MM      MM    AAAAAA        CCCCCCCC   RRRRRRRR     000000      SSSSSSSS
CC         RR    RR    FF           MMMM  MMMM    AA    AA      CC         RR    RR    00    00    SS
CC         RR    RR    FF           MMMM  MMMM    AA    AA      CC         RR    RR    00    00    SS
CC         RR    RR    FF           MM MM MM      AA    AA      CC         RR    RR    00    00    SS
CC         RR    RR    FF           MM  MM MM     AA    AA      CC         RR    RR    00    00    SS
CC         RRRRRRRR    FFFFFFFF     MM      MM    AA    AA      CC         RRRRRRRR    00    00    SSSSSS
CC         RRRRRRRR    FFFFFFFF     MM      MM    AA    AA      CC         RRRRRRRR    00    00    SSSSSS
CC         RR  RR      FF           MM      MM    AAAAAAAAAA    CC         RR  RR      00    00         SS
CC         RR   RR     FF           MM      MM    AAAAAAAAAA    CC         RR   RR     00    00         SS
CC         RR    RR    FF           MM      MM    AA    AA      CC         RR    RR    00    00         SS
CC         RR    RR    FF           MM      MM    AA    AA      CC         RR    RR    00    00         SS
   CCCCCCC    RR    RR FF           MM      MM    AA    AA         CCCCCCC    RR    RR    000000      SSSSSSSS
   CCCCCCC    RR    RR FF           MM      MM    AA    AA         CCCCCCC    RR    RR    000000      SSSSSSSS


MM      MM    AAAAAA     RRRRRRRR
MM      MM    AAAAAA     RRRRRRRR
MMMM  MMMM   AA    AA    RR    RR
MMMM  MMMM   AA    AA    RR    RR
MM MM MM     AA    AA    RR    RR
MM MM MM     AA    AA    RR    RR
MM      MM   AA    AA    RRRRRRRR
MM      MM   AAAAAAAAAA  RR  RR
MM      MM   AAAAAAAAAA  RR   RR
MM      MM   AA    AA    RR    RR
MM      MM   AA    AA    RR    RR
MM      MM   AA    AA    RR    RR
```

```
        .TITLE  CRF_MACROS
        .IDENT  'V04-000'


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;*******************************************************************
;
;++
; FACILITY:  CROSS REFERENCE PROGRAM
;
; ABSTRACT:  ACCEPTS CROSS REFERENCE DATA AND PRODUCES A SUMMARY
;
;
; ENVIRONMENT: LINKABLE IMAGE TO BE USED WITH THE NATIVE MODE LINKER AND COMPILERS
;
; AUTHOR: K.D. MORSE   , CREATION DATE:  12-APR-77
;
; MODIFIED BY:
;
;  01      .  : VERSION
;--
```

```
        .SBTTL  DECLARATIONS
; INCLUDE FILES:
;
;
;
; MACROS:
;
;
;
; MACRO TO INITIALIZE THE OUTPUT LINE DESCRIPTION TABLE
;
; $CRFCONTROLTBL        OUT_RTN,ERR_RTN,KEY_TYPE,KEY1TABLE,KEY2TABLE,-
;                       VAL1TABLE,VAL2TABLE,REF1TABLE,REF2TABLE
;
; WHERE
;
;       ERR_RTN = ADDRESS OF USER'S ERROR ROUTINE
;       OUT_RTN = ADDRESS OF USER'S OUTPUT ROUTINE
;       KEY_TYPE = TYPE OF KEY, 0=ASCIC, 1=BINARY LONGWORD
;       KEY1TABLE = ADDRESS OF KEY1 FIELD DESCRIPTION TABLE
;       KEY2TABLE = ADDRESS OF KEY2 FIELD DESCRIPTION TABLE
;       VAL1TABLE = ADDRESS OF VAL1 FIELD DESCRIPTION TABLE
;       VAL2TABLE = ADDRESS OF VAL2 FIELD DESCRIPTION TABLE
;       REF1TABLE = ADDRESS OF REF1 FIELD DESCRIPTION TABLE
;       REF2TABLE = ADDRESS OF REF2 FIELD DESCRIPTION TABLE

        .MACRO  $CRFCONTROLTBL  OUT_RTN,ERR_RTN,KEY_TYPE=0,KEY1TABLE,-
                                KEY2TABLE,VAL1TABLE,VAL2TABLE,REF1TABLE,-
                                REF2TABLE

        .LONG   0                               ; TREE LISTHEAD-ROOT
        .WORD   CRF$K_ENTSIZE                   ; SIZE OF ONE CRF ENTRY
        .WORD   CRF$K_NODSIZE                   ; SIZE OF ONE CRF NODE
        .BYTE   KEY_TYPE                        ; TYPE OF KEY
        .BYTE   0                               ; CRF FLAGS
        .WORD   0                               ; SECONDARY ERROR STATUS CODE
        .LONG   ERR_RTN                         ; ADDR OF ERROR ROUTINE
        .LONG   OUT_RTN                         ; ADDR OF OUTPUT ROUTINE
                                                ; ADDRESSES OF FIELD DESCRIPTIONS
        .LONG   KEY1TABLE                       ; KEY1 FIELD DESCRIPTIONS
        .LONG   KEY2TABLE                       ; KEY2 FIELD DESCRIPTIONS
        .LONG   VAL1TABLE                       ; VAL1 FIELD DESCRIPTIONS
        .LONG   VAL2TABLE                       ; VAL2 FIELD DESCRIPTIONS
        .LONG   REF1TABLE                       ; REF1 FIELD DESCRIPTIONS
        .LONG   REF2TABLE                       ; REF2 FIELD DESCRIPTION
        .ENDM                                   ; END OF INIT MACRO


; MACRO TO DEFINE ONE FIELD OF THE OUTPUT LINE
;
; $CRFFIELD     BIT_MASK,FAO_STRING,FIELD_WIDTH,SET_CLEAR
;
; WHERE:
;
;
```

```
;       BIT_MASK=MASK OF BITS INDICATING THIS OUTPUT DESCRIPTION HOLDS
;       FAO_STRING=FAO CONTROL STRING FOR THIS FIELD
;       FIELD_WIDTH=MAXIMUM SIZE OF THIS OUTPUT LINE FIELD
;       SET_CLEAR=INDICATOR HOW TO TEST MASK BITS, I.E. ONE OF THE FOLLOWING:
;               SET=MASK BITS ARE TO BE TESTED AS SET
;               CLEAR=MASK BITS ARE TO BE TESTED AS CLEAR
;
;
        .MACRO  $CRFFIELD       BIT_MASK=0,FAO_STRING,FIELD_WIDTH,SET_CLEAR

        .SAVE                                   ; REMEMBER USER'S PSECT
        .PSECT  $$CRFSTRNG,RD,WRT,REL,NOEXE,NOSHR
$$$LNG1=.                                       ; ADDRESS OF FAO CONTROL STRING
        .ASCII  \FAO_STRING\                    ; OUTPUT FIELD CONTROL STRING
$$$LNG2=.                                       ; INDICATOR FOR LENGTH

        .RESTORE                                ; RESTORE USER'S PSECT
        .WORD   BIT_MASK!^X8000                 ; RECORD MASK BITS

        .IF     IDN     <SET_CLEAR>,<CLEAR>     ; DETERMINE WHETHER
        .BYTE   0                               ; MASK IS TO BE CLEAR
        .IFF                                    ; OR IF
        .BYTE   1                               ; MASK IS TO BE SET
        .ENDC                                   ;

        .BYTE   FIELD_WIDTH                     ; MAXIMUM SIZE OF FIELD

        .LONG   $$$LNG2-$$$LNG1                 ; STRING DESCRIPTOR
        .LONG   $$$LNG1                         ; FOR FAO CONTROL STRING

        .ENDM                                   ; END OF FIELD DESCRIPTION MACRO

; MACRO TO INDICATE END OF OUTPUT LINE DESCRIPTION TABLE
;
; $CRFFIELDEND
;
; WHERE:
;
;       THERE ARE NO FORMAL PARAMETERS.
;
        .MACRO  $CRFFIELDEND            ;

        .WORD   0                               ; END FIELD DESCRIPTIONS

        .ENDM                                   ; END OF MACRO
```

DEFINE
MAR

LOGINCMD
LIS

ACTONE
LIS

MESSAGES
LIS

ACTCHR
LIS

VALIDATE
LIS

ACTIF
LIS

PROTCLI
LIS

CRFMACROS
MAR

MACRO

MACRO32
MAP