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no. 94-5

**NOAA Techniques Development Laboratory
Computer Program NWS TDL CP 94-5**



AFOS TERMINAL FORECAST QUALITY CONTROL

**Silver Spring, Md.
July 1994**

**U. S. DEPARTMENT OF
COMMERCE**

**National Oceanic and
Atmospheric Administration**

**National Weather
Service**

PREFACE

The Techniques Development Laboratory's (TDL's) computer program (CP) series is a subset of TDL's technical memorandum series. The CP series documents computer programs written at TDL primarily for the Automation of Field Operations and Services (AFOS) computers.

The format for the series follows that given in the AFOS Handbook 5, Reference Handbook, Volume 6: Applications Programs, Part 1: Policy and Procedures, published by the Office of Technical Services/AFOS Operations Division.

NOAA Techniques Development Laboratory Computer Program NWS TDL

- CP 83-1 Gross Sectional Analysis of Wind Speed and Richardson Number. Gilhousen, Kemper, and Vercelli, May 1983. (PB83-205062)
- CP 83-2 Simulation of Spilled Oil Behavior in Bays and Coastal Waters. Hess, October 1983. (PB84-122597)
- CP 83-3 AFOS-Era Forecast Verification. Heffernan, Newton, and Miller, October 1983. (PB84-129303)
- CP 83-4 AFOS Monitoring of Terminal Forecasts. Vercelli, December 1983. (PB84-145697LL)
- CP 83-5 Generalized Exponential Markov (GEM) Updating Procedure for AFOS. Herrmann, December 1983. (PB84-154822LL)
- CP 84-1 AFOS Display of MDR Data on Local Map Background. Newton, July 1984. (PB84-220797)
- CP 84-2 AFOS Surface Observation Decoding. Perrotti, September 1984. (PB85-137586)
- CP 84-3 AFOS-Era Forecast Verification. Miller, Heffernan, and Ruth, September 1984. (PB86-148319LL)
- CP 85-1 AFOS Monitoring of Terminal Forecasts. Vercelli and Norman, May 1985. (PB85-236388LL)
- CP 85-2 AFOS Terminal Forecast Decoding. Vercelli, Norman, and Heffernan, October 1985. (PB86-147360LL)
- CP 85-3 AFOS-Era Forecast Verification. Ruth, Miller, and Heffernan, October 1985. (PB86-148319LL)
- CP 87-1 AFOS Terminal Aerodrome Forecast Formatting. Wantz and Eggers, July 1987. (PB88-10449LL)
- CP 87-2 AFOS-Era Forecast Verification. Ruth and Alex, July 1987. (PB88-125570LL)
- CP 87-3 Forecast Review. Wolf, July 1987. (PB88-125588LL)
- CP 87-4 AFOS Monitoring of MDR Data Using Flash Flood Guidance. Norman and Newton, October 1987. (PB88-137450LL)
- CP 87-5 AFOS Terminal Forecast Quality Control. Vercelli and Leaphart, December 1987. (PB88-169925LL)
- CP 88-1 AFOS Terminal Forecast Decoding. Vercelli and Leaphart, August 1988. (PB89-101240LL)
- CP 89-1 Structure Flow Diagram Generator. Adams, March 1989. (PB89-195978AS)
- CP 89-2 String Search. Adams, March 1989. (PB89-195986AS)
- CP 89-3 Extended Memory Library for AFOS Applications. Leaphart, June 1989. (PB92-216290)

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**UNITED STATES
Department of Commerce
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**National Oceanic and
Atmospheric Administration
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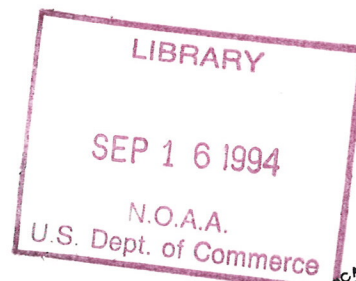


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AFOS TERMINAL FORECAST QUALITY CONTROL

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1. INTRODUCTION

Terminal forecasts (FT's) are issued by Weather Service Forecast Offices (WSFO's) for approximately 500 airports nationwide. These forecasts are issued both on a scheduled and non-scheduled basis to ". . . serve the pre-flight and in-flight meteorological service requirements of domestic aviation operations by providing . . . definitive weather information about cloud heights and amounts, visibility, weather, obstructions to visibility, and wind" (NWS 1988). Each FT is written according to the guidelines published in NWS (1984, 1985, 1988, 1990, 1991, 1992, 1993, 1994).

To assist WSFO's in preparing error free FT's, an Automation of Field Operations and Services (AFOS) applications program has been written to perform quality control checks for the forecaster. The program, called FTQC, checks FT's for typographical errors, format inconsistencies, and some meteorological inconsistencies. It can be used either on multiple FT's stored together in a workfile or on individual FT products. FTQC produces a summary of its findings which can be displayed on the forecaster's alphanumeric display module (ADM).

This document, which is an update of NWS TDL CP 87-5 with the same name, provides a description of the FTQC program's operation, definitions of the error messages, and suggested corrective measures. Forecasters should also carefully note the cautions provided in Section 4.

2. METHODOLOGY AND SOFTWARE STRUCTURE

FT's are prepared manually each day at all WSFO's which have FT responsibilities. When they are prepared, they are stored in the local AFOS database and are transmitted over the AFOS communications circuits to other users. Each regularly scheduled FT is valid for the 24-h period following its issuance. It is subdivided into one or more forecast groups depending on expected weather changes. Additionally, the forecast groups are divided into two segments--the prevailing conditions and the remarks.

Forecast offices enter their FT's into the AFOS system in one of three ways. First, when multiple FT's are to be composed, the forecaster can use the AFOS message composition or edit modes to enter all the forecasts into an AFOS workfile product. An AFOS applications program (e.g., ALEMBIC) is then run to separate the individual FT's from the workfile and to store them under their respective cccFTAxxx product identifiers. Here, and in the remainder of this document, ccc is the WSFO's call letters, FTA is the AFOS product category identifier for terminal forecasts, and xxx represents the call letters of the individual terminals.

In the second method, the FT's are entered into a workfile in a micro-computer. That file is then transmitted to the AFOS system where it is stored as an AFOS workfile. The remainder of the process is the same as the first method. The third method is the direct creation of the individual cccFTAxxx

products. This method is generally used only when a limited number of FT's are being edited, such as when amendments are necessary.

The FTQC program can perform the quality control checking on either individual cccFTAXxx products or an AFOS workfile product which contains multiple FT's. This is shown by the data flow and program relationships illustrated in Fig. 1. In most instances, the forecaster will want to run the FTQC program on the workfile rather than the individual cccFTAXxx products. This is because, when an individual cccFTAXxx product is created and stored, the AFOS operating system usually queues it for transmission over the communications circuits. A workfile, on the other hand, is not automatically queued for transmission so that any errors detected by FTQC can be corrected first.

The FTQC program uses the current version of the FT decoder, DCDFT (Vercelli and Leaphart 1994). DCDFT will return specific error messages when it does not recognize or cannot interpret a word, abbreviation, or phrase in an FT which it expects was written according to the guidelines outlined in NWS (1984, 1985, 1994). In addition, the main FTQC program will produce error messages if it has trouble reading products from the AFOS database, extracting FT's from a workfile, or decoding the header information in the products.

The results of the quality control checking for each FT are added to an AFOS product called cccTAPxxx, where xxx is set to "ERR" unless the appropriate runtime switch is used to override the default (see Section 3). The forecaster is alerted to program completion by activation of the alarm light on the console. The product can then be displayed on the ADM by depressing the alarm light button. An example of such a product is shown in Fig. 2a with the FT's used to produce the output shown in Fig. 2b. All of the error messages which can be produced by the program are shown in the Appendix along with a discussion on what the program was looking for at the time the error occurred, and suggestions on how to correct the problem.

The software structure and load line for the FTQC program are shown in Fig 3. The software structure charts for DCDFT and several subordinate subroutines are shown in Figs. 4-8. FTQC begins by interpreting the information passed to it in the command line. The program assumes that it will find all the FT's contained in a workfile product called cccWRKFTA. The forecaster can override this default product identifier by setting one or more of the optional runtime switches. These switches are described in more detail in Section 3.

If individual cccFTAXxx products are to be checked, FTQC will retrieve them one at a time from the AFOS database and pass them to the DCDFT subroutines to be decoded. If a workfile, which contains multiple FT's, is to be checked, the program will extract the individual FT's and pass them to the decoder.

The DCDFT subroutines will first search through the unpacked, undecoded FT array for the required FT terminator of two consecutive periods (...). Once the terminator has been located, the program will remove carriage returns and line feeds and compress the array so that no more than one blank separates characters in the FT.

In the next step, FTQC decodes the header portion of the FT which consists of all information from the call letters to the start of the cloud phrase in the first time group. FTQC then locates the starting and ending positions for each FT group, and finally the starting position is the location of the first

character of the group time (first character after the heading for the first group) while the ending position is the location of the period (.) at the end of the group. Once these positions have been determined, the information within each group is decoded.

The program will attempt to narrow down the location of each error in an FT to the specific time group and phrase. If available, this additional information will precede the error messages (Fig. 2a), and will consist of the terminal's call letters and one of the phrases shown in Table 1. Note, however, that the nature of the error dictates just how specific the error message will be. Also, note that there will be cases where, upon visual inspection, the actual error is different than that specified by FTQC. This is because, even though specific structures may be typed correctly, they may be placed out of sequence, so that the program's left to right scanning will not find them. For example, the message "35 COULDN'T FIND 6 DIGIT DATE/TIME GROUP (DDHHHH)," where "35" is the error number, would be produced for the following FT:

xxx FT AMD COR 201209 1220Z ...

This message is produced because, after the call letters are found (xxx FT), the program looks for either the six-digit date/time group, or the words RTD, AMD, or COR to immediately follow "FT." In this case, AMD was found which tells the program that it should be followed by the six-digit date/ time group. The next word is "COR", not the time group. The error message reflects the fact that FTQC did not find the time group where it was expected. The correct structure is:

xxx FT COR AMD 201209 1220Z ...

If an error is detected while decoding the header information or while locating the starting or ending positions of the groups, all decoding will stop on that FT; the program will write out the necessary error message to the output product and move on to the next terminal. If an error is detected while decoding the information contained within a particular group, decoding will stop on that group but FTQC will attempt to decode the next group. Therefore, only one error message per time group is possible even though there may be more than one error in that group. Also, if any errors are encountered during the decoding process, no consistency checking of the individual decoded values can be done on that FT since the decoded array used for this purpose cannot be built. Therefore, to ensure that the full range of quality control checking is done, the FTQC program should be run at least a second time, after the errors detected in the earlier run have been corrected. After the decoding and checking have been completed for the terminal, FTQC will either write out the appropriate error messages to the output product or write out "xxx OK" to signify that no errors were detected. Any terminal for which the message "xxx OK" is displayed has passed all of the programs decoding and consistency checks.

The above process will continue until all specified terminals have been checked. Then FTQC will activate the alarm light at the forecaster's console to signify that the program has completed and that the product is available for display on the ADM.

3. PROCEDURES

FTQC should be installed in the WSFO's applications directory with links from the master directory to the program. If the WSFO uses the MONITR program (Vercelli and Norman, 1985), then an appropriate link should be made to the MONITR.D1 RDOS file if it is not physically located in the same directory as the FTQC program. Several switches are available to pass information to the program at runtime. The switches are needed only if the program defaults are to be changed. The switches and their defaults are shown in Table 2.

The FTQC program is initiated from the ADM by entering:

RUN:FTQC

Since no switches were set, the program assumes that all of the FT's to be checked are located in the product with the identifier cccWRKFTA and that the output will be stored in cccTAPERR, where the ccc is obtained from the SKEL file. This run command is the simplest available for FTQC. If the WSFO cannot use cccWRKFTA as the workfile to hold the FT's prior to transmission, or cccTAPERR for the output, then one or more of the optional switches must be used to provide the program with the workfile or the output product name identifiers.

There are three local switches which can be used to redefine the workfile name. They are the /C, /N, and /X local switches (Table 2) and can be used to redefine the ccc, nnn, and xxx portions of the product identifier, respectively. In general, the /C switch will not need to be used at a WSFO since the information can be obtained from the SKEL file.

Consider the following example of how the /N and /X switches might be used to redefine the default values for the workfile. If a dummy product (DUM) is used to hold the FT's prior to storage under their individual product identifiers, and the xxx portion of this dummy workfile is "001," then the proper run command for FTQC would be:

RUN:FTQC DUM/N 001/X

This would cause FTQC to build the product identifier cccDUM001 and to read all of the FT's found in it.

Another use of the switches would be for those situations where FTQC is to be run on individual FTA products of the form cccFTAxxx. This could very easily be the case if amendments are issued and the individual FTA products are edited directly. To run FTQC for a single FTA product (e.g., DCA), the user could enter either of the following two run commands with the same result:

RUN:FTQC FTA/N DCA/X
RUN:FTQC FTA/N DCA

Notice that the only difference between the two is that the /X is absent from the second command. That is because, if data are found but no local switch is used, FTQC assumes that data should be interpreted as the xxx portion of the nine-character product identifier. Although a maximum of four terminals can be entered this way, the actual number will be determined by the number of additional switches used since there is a 31 character limit on the ADM

command line. With the /X switch, only one xxx can be entered at a time. If the FTA products for the WSFO Washington (WBC) terminals DCA, IAD, BWI, and RIC are to be checked, then the following run command would be used:

RUN:FTQC FTA/N DCA IAD BWI RIC

The program would then read and check the following four products. The WBC would have been obtained from the SKEL file:

WBCFTADCA
WBCFTAIAD
WBCFTABWI
WBCFTARIC

The default output product is cccTAPERR, where the ccc is obtained from the SKEL file. To redefine the xxx from "ERR" to some other identifier, the /Z switch is used. Any xxx can be used except "AMD" and "ALT," which are used by the MONITR program (Vercelli and Norman 1985). For those locations which use MONITR, the FTQC program provides a simple way to check all cccFTAxxx products. When the global "A" switch is used, FTQC will read the ccc and xxx portions of the product identifier from the MONITR.D1 station directory file, and it will force the nnn portion of the identifier to be set to FTA. Here, as with MONITR, the limit is 25 terminals. Note, the ccc for the output product will be obtained from the SKEL file, not from MONITR.D1. An example of the run command would be:

RUN:FTQC/A

Based upon 10 terminals, the runtime of the program is approximately 5 seconds per terminal when individual cccFTAxxx products are checked and 4 seconds per terminal when a multiterminal workfile is used. The alarm light will be activated at the forecaster's console to signify program completion. The product can then be displayed on the ADM by depressing the alarm light button on the console.

4. FILE FTQC.D1

FTQC makes available to the user, in a RDOS file, FTQC.D1 the decoded information passed back from the FT decoder (Vercelli and Leaphart 1994). You can obtain this information by using the global "T" switch on the current run of FTQC.

RUN:FTQC/T FTA/N BWI DCA IAD

All FT's that pass the FT decoder and the supplemental checks of FTQC are written to FTQC.D1.

5. CAUTIONS

1. It is better to run FTQC on workfiles rather than individual cccFTAxxx products. This is because any errors found in a workfile FT can be corrected prior to product transmission, while cccFTAxxx products will usually be transmitted before the forecaster has a chance to run FTQC.
2. Consecutive weather and/or obstruction to vision characters cannot be separated by blanks nor continued on a separate line (the program will

replace the carriage return/line feed characters with blanks). For example, "3RW F" is not acceptable but "3RWF" is acceptable. This format requirement is necessary to allow proper interpretation of the following structure:

. . . 3RWF TRW VCNTY

If blanks were allowed between the weather types, then "RWF" and "TRW" would be treated as being part of the same weather group. Finding the word "VCNTY" would then result in an error. With the blank signifying the end of the prevailing weather string, DCDFT can properly decode the "RWF" associated with the 3 mi visibility and the "TRW" with "VCNTY." An exception to splitting weather types between lines is when the "/" symbol is used (e.g., RW/TRW). This structure will be handled properly if the "/" is either the last character on one line or the first non-blank character on the next line. The following two examples illustrate acceptable formats:

1.) xxx FT 20181810 SCT 1816 OCNL C50 BKN 3RW/
TRW..

2.) xxx FT 20181810 SCT 1816 OCNL C50 BKN 3RW
/TRW..

3. The characters "FT" must follow the call letters (xxx FT . . .). If they are missing, DCDFT does not know which three- or four-character string to use for the call letters so the error message will read "??? HEADING: 33 CAN'T FIND CALL LETTERS ('XXX FT OR '|XXX FT')." Here, the "|" character is an optional control character used in many workfile formats.

4. At a minimum, each FT specific group is required to contain a cloud phrase in the prevailing section. If it is missing, it is possible that DCDFT will not realize it or decode it improperly. For example, decoding "XXX FT 200909 1/4F.." would produce:

XXX 03Z (PREVAIL): 46 EXPECTED WX OR OBSTRUC TO VIS

5. For those circumstances when an "either/or" situation exists, forecasters should use the "/" symbol to separate the weather types rather than the word "OR" (3RW/TRW instead of 3RW OR TRW).

6. It is strongly suggested that, once the errors have been corrected, the FTQC program be run again to ensure the full range of quality control checks have been made. This is because certain errors will prevent the program from using all of its error checking capabilities. All error checking has been completed when the message "xxx OK" is displayed for each terminal.

7. Special care must be taken when FTQC is run on FT's contained in a workfile. The program will work for multi-FT workfiles with or without the use of the vertical bar (|) to signify the start of an FT. If two vertical bars are found without the intervening double period (..) to signify the end of an FT, an appropriate error message will be generated.

If the vertical bar is not used at the start of an FT, FTQC will use the double period terminator alone to distinguish individual workfile FT's. If the double period is missing, the program will continue reading the next FT and append it to the array for the preceeding FT until either the second FT's terminator is found or the maximum number of characters is exceeded. If this occurs, FTQC will encounter decoding problems for the first FT due to the inadvertant inclusion of the second FT in the array, and the second FT will appear to have been skipped by the program in the output display.

8. FTQC will use the three or four consecutive, non-blank characters immediately preceeding the "FT" character string as the call letter sequence. If four characters are found, the first must be the vertical bar symbol (|) which will be stripped off in the output display. The following examples illustrate what will be displayed when those characters are not the call letters (first two examples) and when they are the call letters (last example):

<u>FT's</u>	<u>FTQC Output</u>
AA FT 150808 CLR..	AA OK
BBB COR FT RTD 151208 1145Z CLR..	COR OK
CCC FT COR RTD 151208 1145Z CLR..	CCC OK

Therefore, the user should routinely scan the call letters in the output display to look for unexpected characters.

9. LLWS phrases are not decoded nor checked for consistency. FTQC will scan past a LLWS phrase until it finds another valid phrase (e.g., OCNL) or the end of the group (i.e., the period).

6. REFERENCES

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- _____, 1985: Aviation terminal forecasts. NWS Operations Manual, Chapter D-21, Manual Issuance 85-1 (Rev. 1), National Oceanic and Atmospheric Administration, U.S. Department of Commerce, 10 pp.
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7. PROGRAM INFORMATION AND PROCEDURES FOR INSTALLATION AND EXECUTION

AFOS TERMINAL FORECAST QUALITY CONTROL

PART A: PROGRAM INFORMATION and INSTALLATION PROCEDURE

PROGRAM NAME: FTQC

AAL ID: DBC079

Revision No.: 02.00

FUNCTION: Performs quality control checks on FT's while they are still in a workfile, or on individual cccFTAxXX products, at the user's option. Creates a local use alphanumeric product which can be displayed on the ADM.

PROGRAM INFORMATION:

Development Programmers:

David J. Vercelli
Mark A. Leaphart

Maintenance Programmers:

Mark A. Leaphart

Location: Techniques Development
Laboratory

Location: Techniques Development
Laboratory

Phone: FTS 713-0056

Phone: FTS 713-0056

Language: FORTRAN IV/ Rev 5.20

Type: Overlay

Save file creation dates: FTQC.SV

Original release/ Rev 01.01	-	April 1987
Release/Rev 1.02	-	September 1987
Release/Rev 1.10	-	September 1987
Release/Rev 1.20	-	October 1987
Release/Rev 1.30	-	December 1987
Release/Rev 1.40	-	October 26, 1988
Release/Rev 1.41	-	July 11, 1989
Release/Rev 1.50	-	January 26, 1991
Release/Rev 1.60	-	September 28, 1991
Release/Rev 1.70	-	May 28, 1993
Release/Rev 2.00	-	May 18, 1994

Running time (based upon 10 terminals):

Workfile - 4 sec/FT
cccFTAxXX - 5 sec/FT

Disk space: Program files
Data files

- 206 RDOS blocks
- 5 RDOS blocks

PROGRAM REQUIREMENTS

Program Files:

NAME
FTQC.SV
FTQC.OL

COMMENTS
None

Data files:

<u>NAME</u>	<u>READ/WRITE</u>	<u>COMMENTS</u>
MONITR.D1	R	Used to obtain ccc and xxx's for individual FTA products. Only available at those sites which use the FT monitoring program MONITR. The global /A switch must be used to access the file.
FTQC.D1	W	Contains the decoded FT's that pass all the quality control checks. The global /T switch must be used to produce FTQC.D1.

AFOS Products:

cccTAPxxx	W	Output product which contains results of the quality control checks. The ccc will be obtained from the SKEL file. The xxx will be set to "ERR" unless overridden by the local /Z switch.
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LOAD LINE

```

RLDR FTQC URREV BLANK CLDS DCDFT DCDGRP DCDWX DUBWX INITAR JUANDEC KOUNT
NBLANK NXTWRD OBVISCK PERBLAN POUT SEARCH SLARG WMOVE WXCHKR
[GETNODE BANNER CHARCK CKEY CONVERT DSPLAY FNDEOH HEADER NXTBLK OPNOUT
 RCOMLN RDSDIR SETEND WRITIT WRD1,
FTCOMP AMD CATPHR CKDLAU CKINDNT COMPCAT CONLINE DDSHEH DFTYPE DIAD FENDFT
FINDGRPS FINDSCL FNL1 FNL2 FNL3 FNL4 FNL5 FNL6 FNL7 FNL8 FNL9 FNL10 FNL11
FNL12 FNL13 FNL14 FNLCHK POSFIND SPLTWX,
FRONTAL CDVSSPWX CHC CPYPRV DRVWW GTCLDS LLWS NEWPH OBWX OCNL PHRCLD
REMARKS SLGTCHC SPWCHKR SPWIND TQCHKR VBWXWD VCNTY VSBLTY WND WNDTQ]
BG.LB UTIL.LB FORT.LB SYS.LB AFOSE.LB

```

NOTE: Routines BLANK, NBLANK, and WMOVE are assembly written routines taken out of UTIL.LB.

PROGRAM INSTALLATION

1. Move FTQC.SV and FTQC.OL to applications directory. Create links in master directory to FTQC.SV, FTQC.OL, MONITR.D1, and FTQC.D1.
2. Make sure the cccTAPxxx key for the output product is in the PIL. To avoid the need to use the /Z switch, it is recommended that the xxx be set to "ERR." Note, the MONITR program (Vercelli and Norman 1985) uses cccTAPAMD and cccTAPALT for its output. Therefore, "AMD" and "ALT" are not acceptable alternatives to "ERR;" any other xxx identifier is acceptable. The light alarm should be set to alert the forecaster to product storage.

AFOS TERMINAL FORECAST QUALITY CONTROL

PART B: PROGRAM EXECUTION and ERROR CONDITIONS

PROGRAM NAME: FTQC

AAL ID: DBC079

Revision No.: 02.00

PROGRAM EXECUTION

1. The simplest way to run the FTQC program is to enter "RUN:FTQC" at the ADM. In this case, the program expects to find all of the FT's contained in a workfile called cccWRKFTA and the output will be stored in cccTAPERR, where the ccc is obtained by FTQC from the SKEL file.
2. If the workfile identifier is not cccWRKFTA, then one or more of three local switches will need to be used. These switches are the /C, /N, and /X switches which allow the user to redefine the ccc, nnn, and xxx portions of the nine-character product identifier, respectively. If the output product identifier is not cccTAPERR, then the /Z local switch will be used to redefine the xxx portion of the identifier. Note, use of "AMD" and "ALT" is not advisable since these are used by the MONITR program (Vercelli and Norman 1985).
3. If individual cccFTAxxx products are to be checked, then either of two methods can be used. First, if only one FTA product is to be checked, the user can enter either "RUN:FTQC FTA/N xxx/X" or "RUN:FTQC FTA/N xxx." These commands tell FTQC to build the nine-character identifier cccFTAxxx, where the ccc is obtained from the SKEL file and the xxx is the terminal's call letters. Second, if several individual FTA's are to be checked, then "RUN:FTQC FTA/N xx1 xx2 xx3 xx4" can be used, where xx1, xx2, xx3, and xx4 are the call letters for up to four individual terminals. (Note, if the /C switch must also be used, only two terminals can be checked at a time. This is because of the character limit allowed on the command line. Use of the /Z switch will limit this even further.)
4. If the WSFO uses the FT monitoring program, MONITR, there is a simple way to check all cccFTAxxx products with one RUN: command. The global /A switch will tell FTQC to obtain the ccc and xxx identifiers from the MONITR.D1 file and to force the nnn = FTA. This switch cannot be used in conjunction with any of the local switches used to redefine the workfile (/C, /N, or /X), but can be used if the output product identifier is redefined (/Z). The command would be "RUN:FTQC/A" or "RUN:FTQC/A xxx/Z."
5. If you want the decoded FT data to be saved to FTQC.D1, use the global /T switch. The data for the FT will be saved only if it passes all the quality control checks. The command for saving the decoded FT data is "RUN:FTQC/T".

ERROR CONDITIONS

All error conditions are described in the Appendix.

Table 1. Whenever possible, FTQC will precede an error message (see Appendix) with one of the following phrases. This is done to aid the forecaster in locating the error. The "xxx" is the terminal's call letters and "hh" is the group time.

xxx	HEADING:
xxx	hhZ (PREVAIL):
xxx	hhZ (OCNL):
xxx	hhZ (CHC):

Table 2. Runtime switches and their default values.

Switch	Type	Default
A	Global	Do not access MONITR.D1 file
T	Global	Do not create FTQC.D1
C	Local	ccc set from SKEL file for input product identifier
N	Local	nnn = WRK (input)
X	Local	xxx = FTA (input)
Z	Local	xxx = ERR (output)

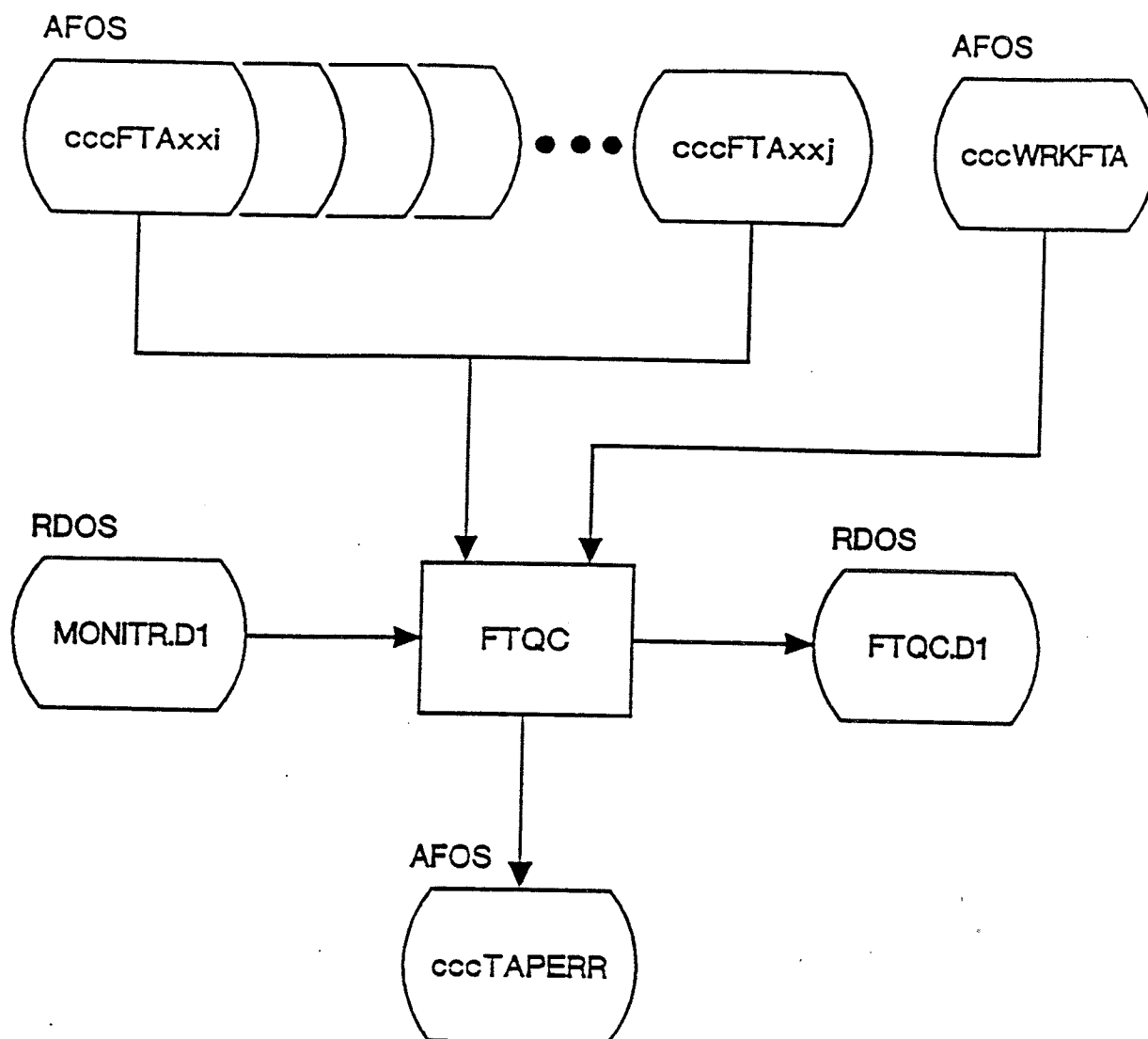


Figure 1. Data flow and program relationships for the FT quality control program, FTQC. The program task is designated by the box and AFOS and RDOS disk files by cylinders. The FT's are obtained either from individual cccFTAxxx products (designated cccFTAxxi through cccFTAxvj in the figure) or from a multi-FT workfile (cccWRKFTA). The output will be stored as an AFOS product with the identifier cccTAPxxx, where the default xxx is ERR. The decoded FT's will be output to a RDOS file, FTQC.D1.

FTQC SUMMARY 031808

AAA 150 UNKNOWN PHRASE FOUND - 'WND'
151 INTERMED. TIME REF. FOUND, (AFT, TIL, OR XXZ-YYZ)

BBB (HEADING): 92 IMPROPER INDENTATION (MUST BE 4 SPACES)

CCC (HEADING): 105 MORE THAN ONE SENTENCE PER LINE

DDD OK

EEE 133 CHECK FOR POSSIBLE DATE ERR IN 6-DIGIT DATE/TIME
135 STARTING VALID TIME INCONSISTENT W/ 4-DIGIT ISS.
139 CHECK FOR ILLEGAL WIND DIRECTION (< 0 OR > 36)
140 CHECK FOR INVALID VISIBILITY VALUE (SEE CHAP D21)

Figure 2a. Sample run of FTQC program. FT's used are shown in Fig. 2b.

TDLFTAWRK

TTAA00 KTDL 031807

AAA FT 030808 250 -BKN WND 0708 AFT 127.
20Z 100 SCT C250 OVC 1210.
02Z CLR 3214..

BBB FT AMD 1 031210 1211Z C13 BKN 2608 OCNL C7 OVC 5L-F.
17Z C15 BKN 150 OVC 2712 OCNL 15 SCT C150 BKN.
19Z 20 SCT C120 BKN200 OVC 2820.
05Z 20 SCTC100OVC2618..

CCC FT 030808 C35 BKN 3612. 14Z C35 BKN 3513 OCNL 35 SCT.
16Z 35 SCT 0212. 18Z CLR 0408. 23Z C12 BKN 3210G20.

DDD FT 030808 11 SCT C25 BKN 50 OVC 4R-F 0913 OCNL C11 OVC 1 1/2F.
15Z 15 SCT C45 BKN 5H 0910 OCNL C15 OVC 2RW-/TRW-.
03Z CLR..

EEE FT AMD 020908 0825Z 12 SCT C50 BKN OCNL C50 OVC 1/3RWF.
133 135 140
05Z 25 SCT C80 OVC 6HF 4510 OCNL C20 OVC 2FH..
140 139

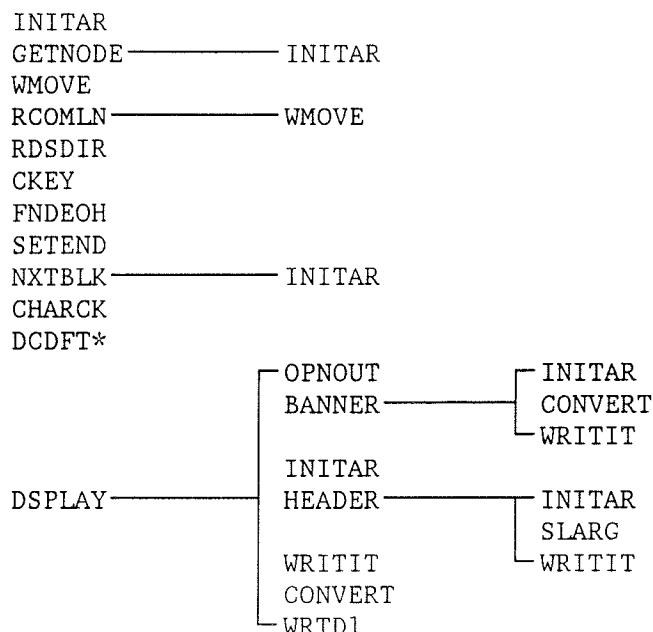
Figure 2b. Workfile of FT's used as input to FTQC. Errors are underlined in the first three FT's. In the fifth FT, the error numbers are also included for clarity.

FTQC

MAIN PROGRAM

FTQC

SUBROUTINES



LOAD LINE

RLDR FTQC URREV BLANK CLDS DCDFT DCDGRP DCDWX DUBWX INITAR JUANDEC KOUNT
NBLANK NXTWRD OBVISCK PERBLAN POUT SEARCH SLARG WMOVE WXCHKR
[GETNODE BANNER CHARCK CKEY CONVERT DSPLAY FNDEOH HEADER NXTBLK OPNOUT
RCOMLN RDSDIR SETEND WRITIT WRTD1,
FTCOMP AMD CATPHR CKDLAU CKINDNT COMPCAT CONLINE DDSHEH DFTYPE DLAD FENDFT
FINDGRPS FINDSCL FNL1 FNL2 FNL3 FNL4 FNL5 FNL6 FNL7 FNL8 FNL9 FNL10 FNL11
FNL12 FNL13 FNL14 FNLCHK POSFIND SPLTWX,
FRONTAL CDVSSPWX CHC CPYPRV DRVWW GTCLDS LLWS NEWPH OBWX OCNL PHRCLD REMARKS
SLGTCHC SPWCHKR SPWIND TQCHKR VBWXWD VCNTY VSBLTY WIND WNDTQ] BG.LB UTIL.LB
FORT.LB SYS.LB AFOSE.LB

NOTE: Routines BLANK, NBLANK, and WMOVE are assembly written routines taken out of UTIL.LB.

Figure 3. Software structure and load line for the FTQC program. *See Fig. 4. for the structure of DCDFT.

DCDFT

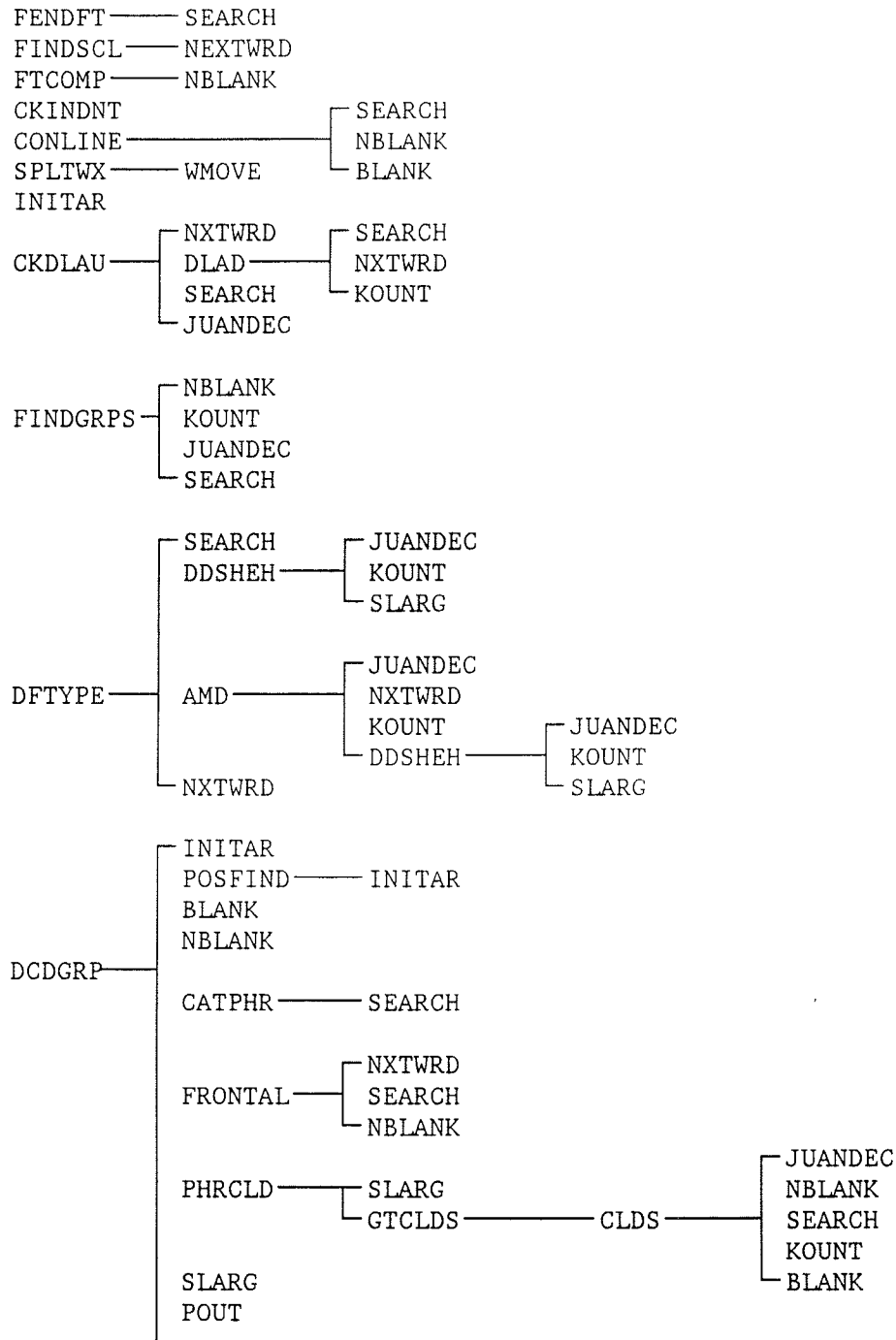


Figure 4. Software structure for the DCDFT subroutines.

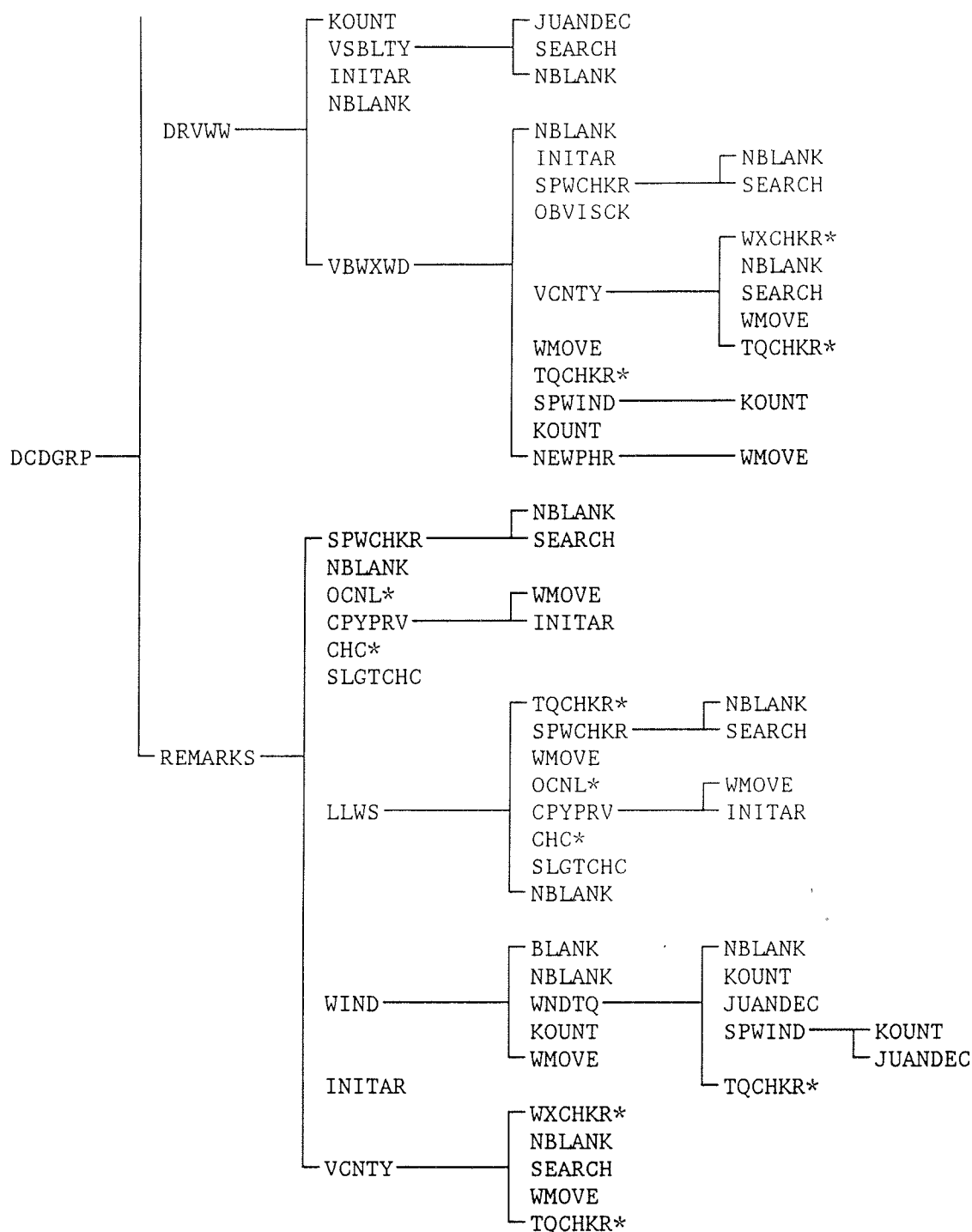


Figure 4. Continued. *See Figs. 5, 6, 7, and 8 for the structure of subroutines OCNL, CHC, TQCHKR, and WXCHKR, respectively.

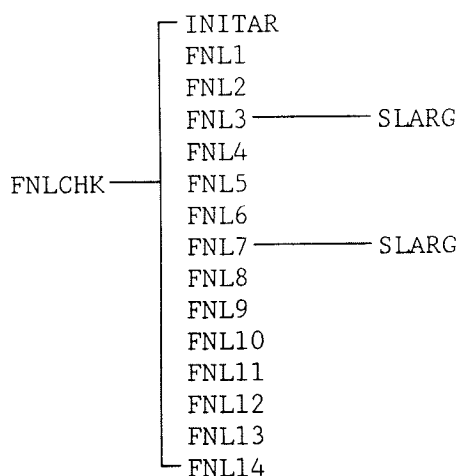


Figure 4. Continued.

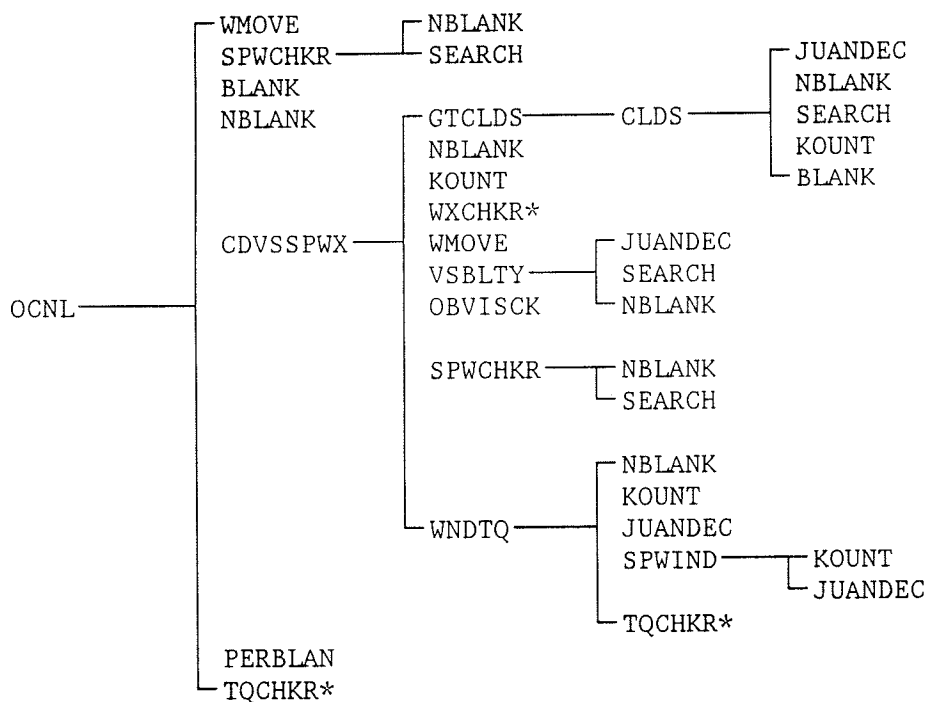


Figure 5. Software structure for subroutine OCNL. *See Figs. 7 and 8 for the structure of subroutines TQCHKR and WXCHKR, respectively.

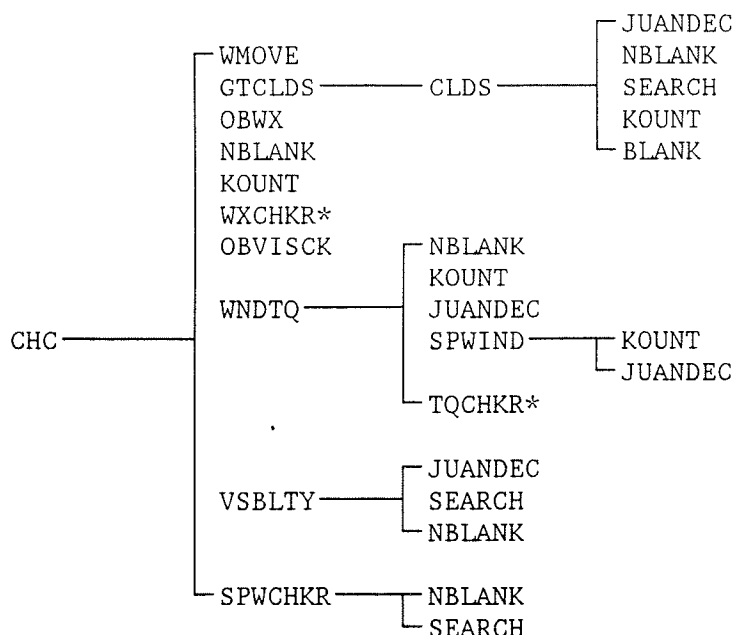


Figure 6. Software structure for subroutine CHC. *See Figs. 7 and 8 for the structures of subroutines TQCHKR and WXCHKR, respectively.

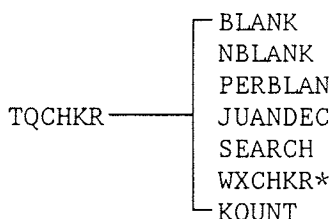


Figure 7. Software structure for subroutine TQCHKR. *See Fig. 8. for the structure of subroutine WXCHKR.

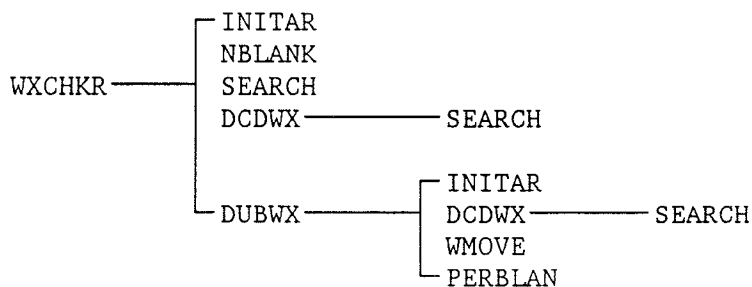


Figure 8. Software structure for subroutine WXCHKR.

APPENDIX

FTQC Error Messages

For each error message, the discussion provides information on likely causes for the error, and suggested actions which may be followed by the user to correct the problem. Note, the numbers listed in the left column are used for descriptive purposes in this document and on the ADM display for easy user reference.

Number	Error Message	Discussion	Suggested Action
1	ERROR - GROUP NUMBER NOT RECOGNIZED USER SHOULD PERFORM FT QUALITY CONTROL	Each FTQC routine has a unique error number associated with it. This error indicates that the error number itself was not recognized. This is a safety feature to prevent a possible "computed go to" error.	Check dasher for message "DISPLAY ERR - # IS NOT A LEGAL NCRP VALUE," where # is the unrecognized value. Make hard copy of product being checked and send # and hard copy to TDL.
2	ERROR - ROUTINE NUMBER NOT RECOGNIZED USER SHOULD PERFORM FT QUALITY CONTROL	Similar to # 1, except these values are internal to the individual subroutines.	Same as # 1. Dasher message will read "DISPLAY ERR - # IS NOT A LEGAL VALUE."
3	ERROR FINDING PRODUCT (KSRCF)	The identified product could not be found in the AFOS database.	RUN:FTQC (no switches) - workfile cccWKFQA does not exist. Rerun program and use appropriate switches to define file name. RUN:FTQC (with local switches) - probably a typographical error in command line; rerun. RUN:FTQC/A - Product cccFTAXXX does not exist, where ccc and xxx were obtained from MONTR.DI file. May need to correct MONTR.DI file (see Vercelli and Norman, 1985).
4	ERROR READING PRODUCT FROM DATABASE	Error occurred while reading an AFOS block with subroutine RDBKF. Possible database problem.	Verify product was stored correctly. Call up product in edit mode, save it, rerun program.
5	EOF (203K) EXPECTED BUT NOT FOUND	AFOS block just read indicated no additional blocks would follow. End of file (203K) should have been found in this block but was not.	Verify product was stored correctly. See # 4.
6	FT EXCEEDS 2 BLOCKS, TERMINATOR (...) NOT FOUND	FTQC will accommodate an FT up to 512 characters in length (2 AFOS blocks). Either the FT was exceptionally long or the FT terminator (two consecutive periods) was missing. Missing terminator in a workfile may result in error for following FT as well since a portion of it may be read in with first FT.	Verify that FT (or all FT's if in a workfile) ends with two consecutive periods. If FT exceeds 512 characters, then perform visual quality control check on it.
7	END OF BUFFER FOUND BEFORE END OF FT	FT terminator (...) not found before end of file (203K).	Verify that each FT ends with two consecutive periods.
8	ERROR GETTING CHANNEL TO READ SKEL FILE (GCHN)	The ccc portion of the product identifier is obtained from the SKEL file. A problem was encountered while reading the ccc from the SKEL file.	If SKEL file appears correct and rerunning program does not work, then FPRINT SKEL file in binary form (FPRINT/Z/B) and send to TDL. Also, try overriding SKEL entry by setting /C local switch to the proper ccc.
9	ERROR OPENING SKEL FILE (OPENN)	Same as # 8.	Same as # 8.
10	ERROR POSITIONING POINTER IN SKEL FILE (SPOS)	Same as # 8.	Same as # 8.
11	ERROR READING CCC FROM SKEL FILE (RDS)	Same as # 8.	Same as # 8.

12	ERROR GETTING CHANNEL TO READ COMMAND LINE (FCOM)	Trouble reading the RUN: command line.	Try rerunning FTQC.
13	ERROR READING COMMAND LINE (COMCM-A)	Same as # 12.	Probable typing error; rerun FTQC.
14	ERROR READING COMMAND LINE (COMCM-B)	Same as # 12.	Same as # 13.
15	DIAGNOSTIC SWITCH VAL OUT OF RANGE (0-9999)	Same as # 12. Used by TDL programmers for debugging.	Contact TDL for instructions.
16	COMMAND LINE LOCAL SWITCH SET BUT DATA MISSING	Same as # 12.	Probable typing error; rerun FTQC.
17	TROUBLE READING MONITR.D1 FILE - SEE DASHER	Global A switch was used in command line. FTQC will attempt to open and read MONITR.D1 RDOIS file to get ccc and xxx pairs.	Verify proper links to MONITR.D1 exist. See dasher for additional messages. See Vercelli and Norman (1985) for information on creating MONITR.D1 file.
18	COULD NOT FIND EOH <305K><200K> IN FIRST 50 CHAR	FTQC searches through first 50 characters of product for the EOH sequence to signal the start of the product text. This error indicates that the <305K><200K> sequence was not found.	Same as # 4.
19	ERR READING EOH <305K><200K> IN PRODUCT HEADER	Similar to # 18, except that the <305K> was found but the <200K> did not immediately follow it.	Same as # 4.
20	TROUBLE WRITING FTQC.D1 FILE	Global T switch was used in command line. FTQC will delete any existing FTQC.D1 file, create a random file, get a channel, and open it.	Verify proper links to FTQC.D1 exist. Make sure FTQC.D1 is not a permanent file.
21 - 30	RESERVED FOR FUTURE USE		
31	UNDEFINED PROBLEM - PERFORM VISUAL CK	Problem was encountered during decoding but nature of problem could not be determined.	Perform visual quality control on FT. Make hard copy of FT and forward to TDL.
32	COULDN'T FIND PERIODS TO END FT (...)	Similar to # 6. This is a redundant check in DCDFT which is used to set loop indices.	Same as # 6.
33	CAN'T FIND CALL LETTERS ('XXX FT' OR 'XXX FT')	DCDFT uses the characters "FT" to key on the location of the call letters, where " " signifies a required blank. It will use the three or four preceding nonblank characters as the call letters. This error may also occur if there is an error immediately following the "FT," such as the date/time group, amendment number, or issuance time being typed wrong or placed in the wrong order.	Make sure call letters are followed by at least one blank and then the "FT" characters. If this appears correct, then check the date/time group (must be six digits); AMD, RID, or COR characters if present; or the issuance time (four digits followed by "Z"). See NWS (1984) for the correct ordering of the words.
34	EXPECT 'FT' THEN 'DDHHHH', 'AMD', 'RTD', OR 'COR'	Similar to # 33. Sequence of events will determine which error message appears.	Same as # 33.
35	COULDN'T FIND 6 DIGIT DATE/TIME GROUP (DDHHHH)	Similar to # 33.	Same as # 33.
36	AMENDMENT NUMBER WAS FOUND	Word AMD was found with a single digit following it, (i.e., AMD 1).	Updated FT's no longer have an associated amendment number.
37	EXPECT 'COR' THEN 'RTD', 'AMD', OR 'DDHHHH'	Word COR was found but program expected it to be followed by RTD, AMD, or the six digit date/time group.	Make sure that, if this is a corrected FT, word COR immediately follows the "FT" characters separated by at least one blank.

38	EXPECTED 'DLAD...', 'DLAD TIL HHZ (OR HHMMZ)...	Sequence of characters found indicated this would be a delayed FT.	Make sure format is correct for delayed FT. FTQC will look for the following three structures: DLAD... DLAD TIL HHZ... DLAD TIL HHMMZ... There can be no blanks between the last character and the two periods, the " " is a required blank, and the hh and mm are hours and minutes, respectively.
39	NO CATEGORICAL OUTLOOK GROUP FOUND (EG. VFR)	At least one categorical outlook group is expected to be found.	Check for missing or misspelled word.
40	EXPECTED GRP TIME (FORMAT: HHZ OR HHMMZ)	Program begins by searching for the period (.) following each group and the group time for each (two or four digits followed immediately by "Z").	Make sure all groups (except first) begin with a two or four digit time followed by a "Z." This applies to the first group only for a nonscheduled issuance.
41	TOO MANY SENTENCES - PROGRAM LIMIT OF 14	FTQC will decode a maximum of 14 FT groups (sentences) where a period (.) terminates a group.	If there are more than 14 groups, perform visual quality control on FT. Otherwise, look for extraneous period(s) in text, delete them, and rerun FTQC.
42	TROUBLE FINDING USER SPECIFIED TIME GROUP	FT group valid for the specified time could not be found.	Not available for use in FTQC.
43	INVALID REMARK APPENDED TO CATEGOR (EG. VFR CIG)	FTQC checks that any words which follow the categorical forecast are acceptable. For example, "VFR CIG" would not be acceptable.	Verify that words following the categorical forecast are acceptable for the stated condition.
44	MORE THAN 3 CLOUD DECKS FOUND	FTQC will allow for a maximum of three consecutive cloud decks in any FT phrase (prevailing or remark). Note, a partial (-X) obscuration will be counted as a cloud deck towards the limit.	Make sure that no more than three consecutive cloud decks are used in any one cloud phrase (two decks if a partial obscuration is included).
45	INVALID WORD FOLLOWING VISIBILITY (EG. 5 CHC)	Value appearing to be visibility was found but following word could not be decoded as the weather group.	Check for missing or misspelled weather words.
46	EXPECTED WX OR OBSTRUC TO VIS	After the cloud group has been decoded, FTQC looks for a visibility followed by weather and/or obstructions to vision or the weather and/or obstructions to vision alone if the visibility is not present (i.e., greater than 6 mi).	Check for words out of order or words which have been combined because of a missing blank or split by an extra blank (e.g. "CLR 2 510." will interpret the "2" as the visibility and expect the weather to follow it.)
47	INTENSITY SYMBOL NOT ALLOWED	Obstructions to vision should not have an intensity symbol and weather types should only have light (-), moderate (no symbol), or heavy (+) following them.	Check intensities for all weather and obstruction elements in the specified group.
48	WX INTENSITY NOT ALLOWED IN CATEGORICAL GROUP	According to NWS (1985), standard weather abbreviations are to be used "without precipitation intensities."	Delete intensity symbols from weather types in categorical outlook group.
49	EXPECTED END OF SENTENCE (.)	FTQC was looking for a period (.) to end a group but did not find it.	Make sure each FT group ends with a period and that there are no extraneous periods in the FT. Occasionally, a misspelled word or unusual character string will disrupt the left to right scanning sequence resulting in this error. For example, "hhZ 50 -OVC KLYR." will produce this error.

50	MUST HAVE PRECIP IN CHC REMARK	According to NWS (1994), "'Chance' (CHC) shall only be used to indicate probability forecast values for thunder storms or precipitation." Therefore, precipitation and/or thunderstorms must be part of a CHC phrase.	Make sure that a CHC group has precipitation and/or thunderstorm as part of the phrase. CHC with only obstructions, clouds, and/or winds is not acceptable.
51	DOESN'T START WITH VALID REMARK WORD (EG. OCNL)	According to NWS (1985), "Each remarks section shall begin with a valid remarks indicator (e.g., OCNL)." Phrases such as "SCT OCNL BKN" do not meet this criterion.	Rephrase remarks (such as "SCT OCNL BKN") to ensure each phrase begins with a valid remarks indicator. An exception is with the use of the word VCNTY. Here, a valid weather type will be accepted prior to VCNTY.
52	REWORD PHRASE TO AVOID USE OF LWR(S) OR LWR	Similar to # 51.	Same as # 51.
53	EXPECTED WIND DIRECTION AND SPEED AFTER 'WIND'	Word WND found without corresponding ddf group.	Check for missing or misplaced wind group.
54	UNKNOWN PHRASE- 'SLGT OR 'SLGT CHC'	'SLGT CHC' is no longer a valid remark.	Eliminate from forecast or raise probability to chance.
55	CK PREVAILING AND REMARK CLD PHRASES - REDUNDANCY	FTQC looks for phrases which repeat themselves (e.g., CLR OCNL CLR).	Reword phrase to avoid redundancy.
56	NEED CLD HGT SINCE PREVAILING WAS CLR	FTQC checks to see that any cloud amount in a remark has a height associated with it if the prevailing amount was clear. For example, "CLR OCNL SCT" would not be accepted.	Check that all cloud amounts have a height value.
57	FOUND MORE THAN 1 LLWS PHRASE IN GRP	FTQC will not decode any LLWS phrase. It will read past the entire phrase until it finds another remark phrase (e.g., OCNL) or a period. Program will only allow for one LLWS phrase for each group.	Reword remark to include only one LLWS phrase or perform visual quality control.
58	UNEXPECTED/UNKN WORD FOUND - PERFORM VISUAL CK	Program checks for a variety of standard words and abbreviations which are common to FT's. If it does not recognize a word, it checks to see if it is a weather type or combination of weather types. If this fails, then program will produce this error message.	Look for misspelled words (e.g., CLR instead of CLR, etc.).
59	EXPECTED 'VCNTY' TO FOLLOW WX TYPE IN REMARK	Once DCDFT has decoded the prevailing information, it begins to decode the remarks. It expects each remark phrase to begin with a valid remark indicator (OCNL, CHC, etc.). If these are not found, but non-numeric characters are found, then DCDFT attempts to decode them as weather types. If all characters can be associated with weather and/or obstruction to vision, then DCDFT expects to find the word VCNTY immediately after them.	Check for a misspelled word where each character in the word could be a weather and/or obstruction to vision element.
60	EXPECT WX IN DESCENDING SIGNIF ORDER (EG. TRWF)	Program expects to find weather and obstructions to vision in decreasing order of significance (i.e., TRWF, not FRFT).	Check order of weather types.
61	INVALID TIME FOUND (< 0000 OR > 2400)	Character string expected to be a time (two or four digits followed by "Z").	Check character strings which consist of two or four numeric digits which may be incorrectly placed in the specified group.
62	NEED CLD HGT FOR CLD AMT	When a cloud amount is found, a corresponding height is expected. For example, "OCNL BKN" is not acceptable.	Check the specified FT group for a cloud amount without a corresponding height.

63	MISSING 'Z' IN HHZ-HHZ TIME STRUCTURE	Decoder has located a character string which it expects to be a time, however, to be a time a "Z" is required to immediately follow it.	Check for group times which may have a blank between the time and the "Z" or a missing "Z." Also, check for a misplaced wind group.
64	CK FOR REDUNDANT PHRASE (EG. OCNL--- OCNL---)	Multiple occurrences of the same remark indicator in the same group will be flagged.	Reword phrase to avoid redundancy.
65	UNEXPECTED/UNKN WORD/PHRASE - PERFORM VISUAL CHECK	Similar to # 58.	Similar to # 58.
66	ILLEGAL VISIBILITY, VALUE IS 7 MI OR GREATER	Numeric value found where visibility was expected but value is too large.	Check for misplaced numeric value or mistyped visibility (e.g., 12 instead of 1/2).
67	PROBLEM WITH VISIBILITY	Searching for expected visibility value. Found a.) "/" indicating possible fractional value or b.) non-numeric character in possible visibility string (e.g., 1 1/c).	Same as # 66; also check for possible error in weather string.
68	NEED BLANK BETWEEN CALL LETTERS AND 'FT'	Possible call letter string found immediately preceding the "FT" which indicates there is no blank separating them (e.g., xxxFT).	Check for missing blank between call letters and word "FT."
69	FT CALL LETTERS DON'T MATCH THOSE REQUESTED	Verifies that call letters passed to program match those found in FT. Only used when cccFTxxx products are being checked, not for workfile.	Verify that cccFTxxx product contains the proper "xxx FT" (i.e., the xxx's match).
70	ILLEGAL VALUE FOR DATE	Gross date check for first two digits of six-digit date/time group (DDhhhh) indicates that the "DD" is not between 01 and 31, inclusive.	Check for mistyped date in six-digit date/time group.
71	ILLEGAL START TIME (6 DIGIT GROUP)	Similar to # 70 except for the middle two digits which make up the FT starting valid time (ddHHhh). Allowable values are 00 through 23, inclusive.	Check the FT starting valid time for error.
72	ILLEGAL END TIME (6 DIGIT GROUP)	Similar to # 71 except for the last two digits which make up the ending time (ddhhHH). Allowable values are 01 through 24, inclusive.	Check the FT ending valid time for error.
73	NEED BLANK AFTER 'AMD'	Found the word AMD but nonblank character found immediately following the last character (e.g., AMD012206).	Check for nonblank character immediately after last character in the word AMD.
74	NEED BLANK AFTER 'RTD'	Similar to # 73 but for word RTD.	Similar to # 73.
75	NEED BLANK AFTER 'COR'	Similar to # 73 but for word COR.	Similar to # 73.
76	NEED BLANK AFTER 'TIL'	In process of decoding "DLAD" phrase. Found word TIL but nonblank character found immediately after the "L."	Check for missing blank after word TIL in "DLAD TIL hbmz..." phrase.
77	EXPECTED TWO CONSECUTIVE PERIODS AFTER DLAD TIME	Similar to # 76 but the FT terminator (...) does not immediately follow the "Z" in the "DLAD TIL hbmz..." phrase.	Check for extraneous character following the "Z" in the "DLAD" phrase.
78	CHECK DLAD FOR TIME PROBLEM	Expected to find two numeric characters (hours) or four numeric characters (hours and minutes) in "DLAD" phrase indicating time.	Check for mistyped or extraneous characters in the time portion of the "DLAD" phrase.
79	NEED 'Z' FOLLOWING DLAD TIME	Expected to find "Z" immediately following the time portion of the "DLAD" phrase (hbmzZ).	Check for missing "Z" in "DLAD" time.
80	'Z' MISSING FROM AFT/TIL TIME STRUCTURE	Time group found following words AFT or TIL (e.g., TRW AFT 15Z) but the "Z" does not immediately follow the time (e.g., 15 Z).	Check for mistyped or misplaced character following time field in "AFT" or "TIL" phrase.

81	INVALID WIND GUST FIELD FOLLOWING 'G'	Found wind gust field but value is less than 10 or greater than 999.	Check for mistyped or misplaced wind gust field.
82	NEED BLANK OR PERIOD AFTER WIND FIELD	After wind direction and speed are found, program looks for either a blank, period, or gust field.	Check for mistyped or misplaced character after wind field (ddff).
83	TIME PROBLEM FOUND - EXPECTED 2 OR 4 DIGITS	A time field of two or four consecutive numeric digits was expected but not found.	Check for error in time group (e.g., 155Z instead of 15Z or 1550Z).
84	MISSING CLOUD DECK	According to NWS(1984), "A forecast group may contain any number of elements", but, at a minimum, it must contain the sky amount."	Make sure that the prevailing sentence of the specific group contains at least "CLR".
85	UNKNOWN CHARACTERS AROUND CLOUD AMOUNT	FTQC found unknown characters around the cloud amount.	Delete any characters that do not pertain to the cloud amount (e.g., 10 #SCT or C20 BKN\$).
86	NEED BLANK FOLLOWING CLOUD HEIGHT	Found the cloud height but nonblank character found immediately following the last character (e.g., 10SCT).	Check for nonblank character immediately following the cloud height.
87	CLOUD AMOUNT CAN NOT HAVE CEILING INDICATOR	FTQC found a scattered cloud amount with a ceiling indicator (e.g., C10 SCT).	Either drop the ceiling indicator or change the scattered cloud amount to a broken cloud amount (e.g., 10 SCT or C10 BKN).
88	MISSING CEILING INDICATOR	According to NWS (1984), "The lowest layer at which the cumulative forecast cloud coverage constitutes a ceiling shall be identified by the letter 'C' immediately preceding the height value."	Insert a ceiling indicator in front of the cloud height of the first broken or overcast cloud amount. (e.g., 5 SCT 70 BKN should be 5 SCT C70 BKN)
89	TOO MANY CEILING INDICATORS	FTQC found in the phrase the use of more than one ceiling indicators.	Delete all ceiling indicators after the first ceiling indicator. (e.g., 10 SCT C20 BKN C50 OVC should be 10 SCT C20 BKN 50 OVC)
90	END OF FT FOUND BEFORE LINE FEED	FTQC found a carriage return as the last character in the FT.	Edit the FT and hit the RETURN key after the last line in the FT.
91	FOUND CARRIAGE RETURN, BUT NO LINE FEED	FTQC found only a carriage return at the end of a line in the FT. FTQC expects a carriage return and a line feed at the end of every line.	Edit the FT and hit the RETURN key after every line in the FT.
92	IMPROPER IDENTATION (MUST BE 4 SPACES)	With the exception of the first line in the FT, and continuation lines, every other line in the FT must be indented four spaces. See # 105.	Insert or delete the number of spaces it takes so that every line in the FT (with the exception of the first line and continuation lines) is indented four spaces.
93	NEED BLANK AFTER 'FT'	Found the word FT but a nonblank character was found immediately following the 'T'.	Check for the nonblank character immediately after the 'T'.
94	ONLY 'T NR ARPT' CAN BE FORECASTED IN THIS FT	According to NWS (1990), "Thunderstorms shall be the only weather/obstruction element forecast in AOFIs. The term "Near Airport" ("NR ARPT") shall be used as part of all thunderstorm forecasts in AOFIs."	Take out the weather/obstruction element and/or replace it with "T NR ARPT".
95	'NR ARPT' CAN NOT BE USED IN A STANDARD FT	FTQC found "NR ARPT" in a standard FT.	Take out "NR ARPT". "NR ARPT" can only be used in a AOFI.
96	NEED BLANK BEFORE 'T NR ARPT'	No blank was found between the visibility and "T NR ARPT".	Insert a space between the visibility and "T NR ARPT".

97	CAN'T USE 'I NR ARPT' IN CHC/SLGT CHC	"I NR ARPT" was found in a Chance or Slight Chance remark. According to NWS (1990), "There shall be no probability term, i.e., CHC or SLGT CHC, used in conjunction with 'I NR ARPT'. The term 'occasional' may be used in the same manner as in standard FTs."	Take out the "CHC/SLGT CHC I NR ARPT" remark. Also, you will get this error if FTQC finds any CHC/SLGT CHC remarks containing ANY weather in an AOFI.
98	NEED BLANK BETWEEN 'CLR' AND 'BLO'	No blank was found between "CLR" and "BLO".	Insert a space between "CLR" and "BLO".
99	NEED BLANK AFTER 'BLO'	No blank was found between "BLO" and the cloud height.	Insert a space between "BLO" and the cloud height.
100	MUST HAVE HEIGHT WITH 'CLR BLO'	No cloud height was specified with "CLR BLO".	Insert cloud height of 120 after "CLR BLO".
101	'CLR BLO' CAN'T BE USED IN A STANDARD FT	FTQC found "CLR BLO" in a standard FT.	Take out "CLR BLO 120" and replace it with "CLR".
102	CAN'T USE 'CLR BLO' IN CHC/SLGT CHC REMARK	FTQC found "CLR BLO" in a CHC/SLGT CHC remark.	Take out "CLR BLO 120" from the CHC/SLGT CHC remark.
103	MUST HAVE VISIBILITY WITH OBSTRUCTION TO VIS	FTQC found an obstruction to vision with a visibility greater than 6 miles.	Either add a visibility less than 7 miles or delete the obstruction to vision from the sentence.
104	UNKNOWN CHAR AFTER REMARK, (EG. OCNLK)	FTQC found an unknown character following the remark.	Inspect the remark and remove the incorrect character.
105	MORE THAN ONE SENTENCE PER LINE	According to NWS (1993), "FT's shall be issued in a format which segments by forecast group. The initial forecast group shall consist of a body of prevailing conditions, followed by any appropriate remarks. Any subsequent forecast change groups shall be started one line below the 'end of forecast group' indicator (.) and be indented four spaces. The second line of a forecast group, when unavoidable, shall be indented five spaces."	Edit the product and make sure all forecast change groups (sentences) start on separate lines.
106	CONTINUATION LINE NOT INDENTED 5 SPACES	FTQC found a continuation line that was not indented five spaces. See # 105.	Indent the continuation line five spaces.
107	'AMDTS' WAS FOUND, USE 'UPDTS' INSTEAD	Some form of 'NO AMDTS' was found, (e.g., 'NO AMDTS AVBL', 'NO AMDTS AFT hhz').	Use 'UPDTS' instead of 'AMDTS' (e.g., 'NO UPDTS AVBL').
108 - 130	RESERVED FOR FUTURE USE		
131	SYSTEM DATE READ ERR - CAN'T VERIFY DATE/TIME	A comparison is made between the system's date and the date found in the FT. This indicates a problem reading the system date.	Possible system error. Check system clock and rerun FTQC.
132	SYSTEM TIME READ ERR - CAN'T VERIFY DATE/TIME	Similar to # 131 but for the system time (hours and minutes).	Same as # 131.
133	CHECK FOR POSSIBLE DATE ERR IN 6-DIGIT DATE/TIME	Comparison between system date and FT date indicates possible error in the date portion of the six-digit FT date/time group.	Check for possible error in first two digits of six-digit date/time group (e.g., system date = 15, FT date = 18).
134	FT END TIME (6-DIGIT CRP) SHOULD BE 24, NOT 00	If the FT ending valid time is the change of day, then the value should be "24" and not "00." The opposite is true for the FT starting time (e.g., xxx FT dd0024).	Check the last two digits in the six-digit date/time group and ensure that they are not set to "00."
135	STARTING VALID TIME INCONSISTENT W/ 4-DIGIT ISS.	The starting FT valid time (middle two digits in six-digit date/time group) is compared to the four-digit issuance time (e.g., amended FT's). Current hour (H) should be used if issuance time is H + 00 through H + 29, inclusive; H + 1 is used if issuance time is H + 30 through H + 59, inclusive.	Check that starting FT valid time and issuance time are consistent.

136	CHECK FOR ISSUANCE TIME PROBLEM	Check is made to ensure issuance time is between 0000 and 2359, inclusive.	Check for mistyped numeric characters in issuance time.
137	START/END VALID TIMES (6-DIGIT GRP) DON'T MATCH	For a regularly scheduled FT (i.e., four-digit issuance time not required), the starting and ending valid times in the six-digit date/time group should match (exception - 0024 is allowed).	Check six-digit date/time group for error in the starting and ending valid times.
138	AMENDMENT ISSUANCE TIME NOT FOUND	"AMD" was found but the required four-digit issuance time was not found.	Check for mistyped or misplaced issuance time.
149	CHECK FOR ILLEGAL WIND DIRECTION (< 0 OR > 36)	Gross wind direction check is made for directions less than 0 or greater than 360 deg.	Check for illegal wind direction value.
140	CHECK FOR INVALID VISIBILITY VALUE (SEE CHAP D21)	According to NWS (1984) only visibility values of 0, 1/4, 1/2, 3/4, 1, 1 1/2, 2, 3, 4, 5, and 6+ are allowed in the FT.	Make sure visibility values are only those allowed by NWS (1984). Check for mistyped values (e.g., 2 1/2 instead of 1 1/2).
141	REVIEW CLD HGTS-SEE CHAP D21 FOR SUGGESTED VALS	According to NWS (1984) heights should be expressed in hundreds of feet up to 3,000; 500 foot increments from 3,000 to 5,000; and 1,000 foot increments above 5,000. Since specified increments are not mandatory, FTQC will only suggest the user check the values for correctness.	Make sure cloud height values are as desired. For example, "C33 OVC" would be flagged and "C30 OVC" would not be flagged, but both are acceptable.
142	-X OR X APPEARS FOR MID OR HIGH CLOUD DECK	Up to three cloud layers can be included in an FT group. A check is made that a cloud layer does not precede a partial (-X) or total (X) obscuration.	Check for misplaced cloud layer or obscuration (-X or X).
143	CLOUD AMOUNTS APPEAR OUT OF ORDER (EG. BKN SCT)	Cloud amounts are cumulative with increasing altitude. A check is made that each higher cloud amount is equal to or greater than the previous layer.	Check for misplaced or mistyped cloud amounts (e.g., C30 BKN 50 SCT).
144	CLOUD HEIGHTS DECREASE UPWARDS	Cloud heights increase with each succeeding cloud layer. Program compares cloud heights within each group to ensure heights increase.	Check for mistyped cloud heights (e.g., C30 BKN 5 OVC).
145	CAN'T FIND PREVAILING CONDITIONS IN FIRST GROUP	The first phrase in each FT group should be the prevailing conditions. Decoder detected remarks information before the prevailing conditions.	Check for misplaced remark phrase.
146	CHECK GRP TIME AND REMARK TIME QUALIFIER (EG AFT)	Program compares group times with each other. There is an error if successive times are the same (e.g., 15Z CLR. 15Z 30 SCT.). If time qualifier is used, it must fall within the time range of the group.	Check that group time was entered correctly and that qualified time range is within that of the overall group time.
147	GROUP TIMES ARE NOT IN SEQUENTIAL ORDER	Program checks that each successive group time is later than the previous group time (change of day is accounted for by program).	Check for mistyped group time which results in out of order sequence (e.g., 15Z CLR. 20Z 30 SCT. 17Z C30 BKN.)
148	HEIGHT OF 'CLR BLO' MUST BE 120, (CLR BLO 120)	Program checks the heights of all "CLR BLO" statements to see if they are 12,000 feet.	Change the heights of all "CLR BLO" statements to 120.
149	'CHC' USED IN FORECAST WITHIN 1ST 6HRS	Program checks the starting time of each CHC group to see if the group starts within the first six hours of the valid start time of FT.	Check for mistyped times in CHC phrase.
150	UNKNOWN PHRASE FOUND --'WND'	'WND' is no longer a valid remark.	Start a new forecast change group to include the new wind information.
151	INTERMED. TIME REF. FOUND, (AFT, TIL OR XXZ-YYZ)	Intermediate time references are no longer allowed.	Start a new forecast change group to include the conditions that will or have change(d) for the specified time.

152 IMPROPER USE OF 'VCNTY'

According to NWS (1994), "The term vicinity (VCNTY) may be used in the prevailing section of forecast groups to describe fog (visibility below 3 miles), showers, or thunder storms that develop, or are expected to develop, beyond the FT's 5-nautical mile radius out to about 25 miles; ...If the phenomenon is expected to move to within 5 nautical miles of the airport, a VCNTY statement is not appropriate." The following example is not allowed:
20Z 40 SCT 1812 TSW+ VCNTY OCNL C4 X 1/2SW.

Include the phenomenon in the main prevailing and/or remarks portions of the forecast group. One possible way to rewrite the previous example is:
20Z 40 SCT 1812 OCNL C4 X 1/2SW.

Note: Error codes 94-102 all deal with the format for AOFT's (NWS 1990). According to the directive (NWS 1992), the special format for AOFT's is to be discontinued at all automated sites with augmentation are to issue FT's in the standard format. Because NWS (1992) entirely supercedes NWS (1990), these errors should not appear if AOFT's are properly prepared.

(Continued from inside front cover)

Computer Program NWS TDL

- CP 92-1 Separating Individual Synoptics from within Synoptic Collectives. Beasley, August 1992. (PB92-232313)
- CP 93-1 AFOS Profiler Software System. Battel, Leaphart, Moeller, and Petrie, August 1993. (PB94-112711)
- CP 93-2 AFOS Surface Observation Decoding. Beasley, September 1993. (PB94-112042)
- CP 93-3 Decoding Satellite Cloud Products. Beasley, October 1993. (PB94-116845)
- CP 93-4 Decoding Nested Grid Model Statistical Forecasts. Beasley, October 1993. (PB94-129210)
- CP 93-5 Retrieving Alphanumeric and Graphic Products from the AFOS Database through the Background Partition. Beasley, November 1993. (PB94-143245)
- CP 93-6 NOAA Weather Radio Climatological Data Reports. Calkins and Battel, December 1993. (PB94-143252)
- CP 94-1 NOAA Weather Radio Hourly Weather Roundup Formatter. Battel, Kokolis, and Calkins, March 1994. (PB94-164126)
- CP 94-2 Miscellaneous Disk Utility Application Programs for the AFOS Background Partition. Beasley, April 1994. (PB94-181328)
- CP 94-3 AFOS Terminal Aerodrome Forecast Encoding. Wantz, June 1994.
- CP 94-4 A Utility for Examining the Contents of DATAKEY0. Beasley, July 1994.