VI.2.2D   OPERATIONAL FORECAST SYSTEM FORECAST COMPONENT DEFINITIONS
          USING PROGRAM FCINIT

Introduction

The Forecast Component Initialization (FCINIT) program (Section VI.3.4
[Hyperlink]) is used to provide all Forecast Component parametric
input. The primary functions of FCINIT are:

   o Define Rating Curves which contain stage-discharge conversion
      data and some general forecast point information (Section
      VI.3.4B-DEF-RC [Hyperlink]).

   o Define all Segments which include the time series needed, the
      Operations Table and the parametric input for the hydrologic
      models and procedures used to produce a forecast (Section
      VI.3.4B-SEGDEF [Hyperlink]).

   o Define Forecast Groups which contain the computational order of
      the Segments for a river basin or major portion of the user area
      (Section VI.3.4B-FGDEF [Hyperlink]).

   o Define Carryover Groups which contain the computational order of
      the Forecast Groups and specifies the initial dates of available
      carryover (Section VI.3.4B-CGDEF [Hyperlink]).

   o Perform a variety of maintenance items after the initial
      definitions are complete such as:
         - define new Rating Curves or modify existing Rating Curves
         - define new Segments or modify existing Segments
         - make changes to the computational order of Segments within
             Forecast Groups or add new Forecast Groups
         - make changes to the Forecast Groups in a carryover group or
             add new Carryover Groups
         - define special Forecast Groups for use in generating special
             forecast products
         - delete Segments, Forecast Groups or Carryover Groups

   o Display all information that can be defined by FCINIT including
      the current status of the Forecast Component files.

Use of the Operations Table

The Operations Table concept is the basis of the Operational Forecast
System (OFS). Segments, Forecast Groups and Carryover Groups are a
way of organizing the Operations Tables to improve their application
to river forecasting over large areas. The Operations Table is
designed to allow the user to determine which models and displays are
to be used and to specify how they are used. Chapter V.3 [Hyperlink]
specifies what Operations are currently available in the Forecast
Component and gives the input needed to define an Operations Table.
New Operations can be added by following the procedures described in
Chapter VIII.4 [Hyperlink].

Some of the flexibility of the Operations Table concept can best be illustrated by an example. The example used is a mountainous watershed with significant snow accumulation. Some of the ways that such an area could be modeled using the Operations Table are:

   o lumped snow, rainfall-runoff and temporal distribution
      computations in sequence

   o subdivide area (possibly by elevation bands) for snow
      computations, but still use lumped rainfall-runoff and temporal
      distribution computations

   o subdivide area for both snow and rainfall-runoff computations,
      but use lumped temporal distribution function

   o subdivide area for all computations

The Operations Table allows alternative ways in other situations to get the best modeling solution.

FCINIT considerations

Following is a list explaining what occurs in the various FCINIT commands and some factors the user should consider when using FCINIT.

   o DEF-RC - Defines Rating Curves and some general forecast point
      information, plus includes the capability to replace the entire
      Rating Curve definition or just update all or part of the stage-
      discharge relationship.

        - Extensions to Rating Curves can be done in two ways: first,
           using the default log-log extension procedure, or second,
           using a hydraulic extension. The hydraulic extension
           requires that cross-sectional and roughness values be
           provided. It is recommended that the time be taken to obtain
           the data needed for the hydraulic extension wherever the
           log-log extension is not adequate.

        - The general forecast point information that is included with
           the Rating Curve definition can be used on hydrograph
           displays and may be needed by auxiliary programs that will
           interface with the OFS files.

   o SEGDEF - Defines the Operations Table, all parametric input and
      time series needed.

        - The UPSTREAM and DOWNSTREAM information requested at the
           beginning of the Segment definition is not currently used,
           but may eventually be used to determine the computational
           order for certain special types of runs.

        - The names used to identify the Segment, time series, or
           individual Operations are left up to the user to select.
           However, since these names (especially the Segment name) are

used frequently when run-time modifications are input, it is wise to select names that have meaning, are easy to remember and are concise.

- Most displays can either be set to 'on', 'off' or based on a user specified criteria when the Operations Table is defined. In most cases, it is best to use the criteria option since displays can be turned on or off at run-time, but criteria cannot be set at run-time.

- Time series can be specified as INPUT, OUTPUT, UPDATE or INTERNAL (default). All time series produced by the preprocessors or by preceding Segments must be INPUT, i.e., they are read from the Processed Data Base (PDB). All time series that are needed by a subsequent Segment must be OUTPUT, i.e., they are written to the PDB. Time series that are read from the PDB, modified and then written back to the PDB are UPDATE time series. Time series needed only to pass information from one Operation to another within a Segment are INTERNAL. Only time series that are needed by a subsequent Segment or by an auxiliary program outside the OFS should be labeled as OUTPUT. The storage of more information than necessary on the PDB just causes an increase in disk accesses and disk storage requirements.

   All INPUT and UPDATE time series are read at the beginning of the Segment execution. All OUTPUT and UPDATE time series are not written to the PDB until after the last Operation is executed.

- There is a maximum amount of space allocated to each Segment to hold parametric information, time series data and work space needed by some Operations. There is no reason to try to use all the space since the parametric files are variable length records and only contain the space actually used. If the space is exceeded, the remaining Operations will have to be put in the next Segment.

- Each of the Operations has various applications. Most can be used both in calibration and operational applications (ESP is an operational use). Others are only designed for specific uses. In some cases the input needed for a given Operation is the same for calibration and operational use, while in others the input varies with the use or the data available. Thus, after calibrating the Operations for a Segment, the user needs to make sure the Segment definition is properly modified for operational use. ESP uses the same Segment definition as the OFS so that the same files and carryover can be used; however, all displays are automatically bypassed during ESP runs.

- When the Segments are first defined there is a question as to the carryover values to be input. For many of the Operations, the memory time is so short that default carryover values are recommended. However, for others such

as rainfall-runoff models or snow models when there is snow on the ground, reasonable initial carryover values are needed. The values input should be based on conditions when forecast execution is to be initiated. Updates can be made later through the use of run-time modifications or Segment re-definitions to correct bad carryover values.

- The single reservoir model (RES-SNGL Operation) can be used to simulate the regulation of a reservoir. This simulation capability is especially valuable when release data are not available. Frequently the operating agency always provides observed and projected release data and the simulation model is not needed other than to monitor reservoir contents for display. If there is no need to monitor reservoir contents and release data are always provided then Operation RES-SNGL is not really needed. More information is in the model description (Chapter II.4-RES-SNGL [Hyperlink]) and the user input summary (Section V.3.3-RES-SNGL [Hyperlink]).

o FGDEF - Defines the Forecast Groups which primarily consist of specifying which Segments will be included in the Forecast Group and the computation order of the Segments.

- The number of Segments to be included in a Forecast Group is a user decision. Forecast points that should be run together is one consideration. There are three types of Forecast Component runs: a single Segment (seldom used operationally), a Forecast Group, or an entire carryover group. Portions of a user area assigned to individual forecasters may be another consideration.

There is no limitation on the number of Segments in a Forecast Group.

- There are checks within a Segment to make sure that all needed information is available for an Operation, but there are no checks between Segments. Thus, the user needs to take care when defining the computational order.

o CGDEF - Defines the Carryover Groups which consist of specifying the Forecast Groups included, the computational order and the initial carryover dates.

- Normally when a carryover group is first defined only one carryover date will be assigned. This date should be consistent with the initial carryover values supplied to the Operations and must be a date for which either all input time series exist in the Processed Data Base or time series values can be generated by the preprocessors based on the data in the Preprocessor Data Base.

o SPECIALFG - Defines special Forecast Groups.

- A Segment can only be part of one regular Forecast Group,
  but can be part of any number of special Forecast Groups.
  Regular Forecast Groups are set up for normal forecast
  operations and for saving carryover. Special Forecast
  Groups are established to produce special forecast products.
  For example, fast responding headwater areas could be
  combined in a special Forecast Group, no matter what regular
  forecast or carryover group they belong to, that could be
  run before the rest of the user area whenever heavy rain
  occurs. Another use of special Forecast Groups is to
  produce QPF or ESP forecasts for specific points that
  involve several regular Forecast Groups.

o RE-DEFINITIONS - Command is used to redefine a Rating Curves.
   Command RESEGDEF is used to redefine a Segment. Forecast and
   Carryover Groups cannot be redefined; they must be deleted and
   then defined again, usually within the same FCINIT run.

   - When a Segment is redefined a procedure called carryover
     transfer is run in an attempt to use as much of the old
     carryover as possible. Carryover transfer is needed to
     reduce input during re-definitions and because while only
     one set of carryover values can be input for an Operation,
     several sets normally exist for different dates on the file.
     Carryover transfer is useful because it insures that when
     there is a linkage between a parameter value and one or more
     state variables (carryover), that the state variables are
     adjusted for all dates to be consistent with parameter
     changes.

     The user can override the carryover transfer process by
     specifying that 'INPUT CO' (user specified carryover) be
     used instead of going through the carryover transfer
     process. In this case, the user specified values are used
     for all carryover dates. User specified values are also
     used for all Operations that did not appear in the previous
     definition of the Segment. If the Operation to be used for
     carryover transfer does not have the same Operation name in
     the old definition, the user can specify the name to be
     used. This is useful when going from a lumped definition to
     a subdivided definition (i.e., all subareas can be specified
     to use carryover from the lumped definition) or vice versa.

o DELETES - Used to delete Rating Curves, Segments, Forecast Group
   or Carryover Groups.

   - The general rule is that an item cannot be deleted if it is
     still referenced. The program checks to make sure the item
     is no longer referenced before the deletion occurs.

o DUMPS - Used to print or punch Forecast Component information.

The dump commands available are:

- PRINTOPS (print information about selected Operations in tabular form)

   PRINTRC and PUNCHRC (print or punch Rating Curve defini-tions)

- PRINTSEGS and PUNCHSEGS (print or punch Segment definitions)

The punch commands can be useful during re-definitions by retrieving the current definition in the exact form needed for modifying and re-submission.)

o STATUS - Used to print the current status of the Forecast Component files. Status information is printed for:

- Current carryover dates

- Forecast and Carryover Group definitions

- A summary of Segments and Rating Curves that have been defined

The STATUS command should be used frequently during the initialization process to monitor file usage.