INTRODUCTION TO AMCCANN

AMCCANN (AMCC Annotation) allows the simulation to be performed with loading delays included for both internal nets and for output loads.

The Front-Annotation delay file includes the loading delays on internal nets as follows:
- Actual fan-out load delay
- Actual wire-or load delay
- Statistical estimate of the metal load delay based on the number of pins in the net.

The Front-Annotation delay file includes the loading delays on output nets as follows:
- Actual system load delay, system load defined by the user
- Estimated package pin capacitive delay

Pre-layout, the AMCCANN software will provide Front-Annotation delay files to be used in simulation.

After layout is complete, the Back-Annotation program provides the metal load delay information based on the actual net length.

The Back-Annotation delay file includes the loading delays on internal nets as follows:
- Actual fan-out load delay
- Actual wire-or load delay
- Actual metal load delay from etch length, metal level, and edge direction

The Back-Annotation delay file includes the loading delays on output nets as follows:
- Actual system load delay, system load defined by the user
- Actual package pin capacitive delay from packaging database

After layout, with CIRCUIT.PKG and the CORxxx.ews files available in the directory, the AMCCANN software will provide the Back-Annotation delay files that would be substituted for the Front-Annotation delay files in the simulations.

AMCCANN contains an AMCC user-interface designed to allow the user to supply information on the system capacitive load and package pin capacitance to the annotation software. The annotation delays files will then include the output nets capacitive load delay. Using Front-Annotation files in a simulation allows a more accurate estimate of system performance.

AMCCANN should be run once prior to any simulation.   It
is possible to call AMCCANN and respond to the first
prompt with "N", in which case defaults are assumed and
the program proceeds.

AMCCANN can be run successively, each previous edit
session is cummulatively available in the data file
OUTPUT.DLY.   AMCCANN can be run as many times as required
to fine-tune the simulation.   The file OUTPUT.DLY is the
data file created in the first session and then edited by
successive executions.

For drastic editing, the file output.dly can be deleted
and the definition process started over.

If there are no errors in erc/amccerc.1st, AMCCANN will
run.

This will calculate estimated wire delays and format a
file for annotation into the simulation design file.
AMCCANN will also prompt the user for an edit session
(all default is one option).   The user may enter package
type, package pin capacitance and system load capacitance
values for both global defaults and for individual pins.
Commentary data on toggle frequency and ECL load
resistance may also be added.

Output load delays are computed from the data (stored in
erc/output.dly) and added to the annotation delay files.

INPUT FILES

The required input files to the AMCCANN program are:
  ● The erc/circuit.sdi netlist

The optional input files to the AMCCANN program are:
  ● An existing erc/output.dly
  ● The package data file CIRCUIT.PKG
  ● The CORxxx.ews files

OUTPUT.DLY will exist if there has been a previous
execution of AMCCANN.   The first pass through AMCCANN
creates ERC/OUTPUT.DLY.

CIRCUIT.PKG will exist if place and route have been
performed by AMCC and the file has been sent to the EWS
(via magnetic media).

The CORxxx.ews files will exist if place and route have
been performed by AMCC and the files have been sent to
the EWS (via magnetic media).

The files CORxxx.ews, for core-delays, and CIRCUIT.PKG,
containing package pad-post-pin and specific-pin package
pin capacitance data, must be in the erc sub-directory.

OUTPUT FILES

The output files produced are:
- The report file ERC/AMCCPKG.LST
- The data file ERC/OUTPUT,DLY
- Delay files are named FNTxxx.ews where xxx
  is replaced by MIN, NOM, COM or MIL and ews
  is the system notation, DAISY=DSY, VALID=VAL,
  MENTOR=MEN, etc. for Front-Annotation, or
  BCKxxx.ews for Back-Annotation.
- The error file AMCCANN.LST (revieew and discard)

DEFAULT VALUES

The default system load is 15pF for TTL and 5pF for ECL.
The output macros for the AMCC arrays in the Q14000,
Q5000, Q20000 and future arrays are specified under no
load.

The default package is the largest available for that
array in the parameters supplied to the program.

The default package pin capacitance is that specified for
the largest package, if the package was defaulted, or
that specified for the package selected.

USER INTERFACE VALUES

- The program will prompt for a responce which can be as
simple as defaulting all values or specifying global
defaults for package pin capacitance, ECL system load
and/or TTL system load, or as intricate as specifying
different system and package capacitance loading for each
of the primary output signals in the circuit.

WAYS TO SPECIFY CAPACITITIVE LOAD

package	default	SELECT FROM MENU	
			SPECIFY BY:
package pin capacitance	default	global	pin-specific
TTL system load	default	global	pin-specific
ECL system load	default	global	pin-specific

- The package is selected from the menu offered for that
array. For a different package (by AMCC agreemeent),
default the package selection and directly enter
package-specific data via other menu prompts. The
package, specified or defaulted to, will set the default
value for package pin capacitance. There are three

values, minimum, typical and maximum. At this time, all
of the annotation values are computed using the maximum
value supplied.   The same value is used in the
computations for the MINIMUM, NOMINAL and COMMERCIAL or
MILITARY annotation files.

● The package pin capacitance may be specified as a
global value (all package pin data defaults to this
specified value). When a value is so specified, it is
used as the minimum, typical and maximum values (i.e.,
all three are identical).

● The package pin capacitance may be specified for an
individual pin or group of pins. When a value is so
specified, it is used as the minimum, typical and maximum
values (i.e., all three are identical).The frequency for
any primary input or output may be specified (commentary
documentation). Frequency should be entered for any TTL
I/O toggling faster than 50MHz and any ECL I/O toggling
faster than 100MHz.

● The ECL resistive loading for any ECL output may be
specified (also commentary). Resistive loads should be
specified when they do not match that assumed for the
macro (25 or 50 ohms).

● A previously entered specific pin capacitance or load
capacitance for a signal is deleted (reverting to the
default value) by giving its name and typing an * for the
new value.

DELAY FILES - ANNOTATION

In the delay files produced, each net is identified by name (user-defined or default) and is followed by six numbers representing the min, typ and max net delay for both rising and falling edges.   Only one file is referenced in the simulation at one time.   These delay files provide the internal net interconnect delays due to fan-out, wire-ORs and metal loading.   The metal load delay is estimated in the Front-Annotation files.

The output net delays due to system and package pin capacitance loading is also computed.

FRONT-ANNOTATION:

When AMCCANN is completed, it will have generated the Front-Annotation files FNTMIL.ews or FNTCOM.ews, FNTNOM.ews and FNTMIN.ews as well as the report file AMCCPKG.LST and the data file OUTPUT.DLY.   All of these files are to be submitted.

BACK-ANNOTATION

AMCCANN software will take package data from CIRCUIT.PKG and system load data from OUTPUT.DLY to compute output load delays.   The output load delay values will be added to the internal net loading delays in the CORxxx.ews files and the Back-Annotation delay files will be generated, called BCKxxx.ews, in the ERC subdirectory.

The final version of ERC/AMCCPKG.LST will also be generated.

BICMOS PRODUCT GRADE

Note: The BiCMOS library has two commercial timing libraries, one for COMMERCIAL circuits running with a -4.5V power supply (COM4) and one for all other COMMERCIAL circuits (COM5).   The Front-Annotation file is still named FNTCOM.ews and provides correct timing based on the ARRAY_FAMILY, PRODUCT_GRADE and the POWER_SUPPLY parameters.

CALLING AMCCANN

Netlist circuit.sdi must exist prior to calling AMCCANN.
AMCCANN is called diferently on eash EWS.   Refer to
Volume II, Section 7 for the specific instructions for
the system to be used.

On all EWS, AMCCANN invocation exists as a menu option in
the run_amcc shell script.

SCREEN PROMPTS

On calling AMCCANN, the screen will prompt:

        Need to Edit Package Pin Data?   (YES or NO)   : y

AMCC Delay Annotation VERSION   3.40
Loading Netlist ...
Welcome to the output loading system.

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pin
(6) Edit the package pin capacitance for a specific pin or p
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 1
        0) OTHER.
        1) 84 leaded flat pack cavity up.
        2) 68 PGA cavity down
        3) 84 PGA cavity down
        4) 100 PGA cavity down
        5) 100 PGA cavity up
        6) 100 leaded chip carrier cavity up.

Type the number of the package that this design will be using.
4   <---- FIRST TIME OR A CHANGE

100-PGA-CD   <---- SELECTED PACKAGE

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pins.
(6) Edit the package pin capacitance for a specific pin or pins.
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 2

The current default value for package pin capacitance is 4.60 pf.

Enter <Retn> for no change or enter a new value: 5.3

● SELECTING "2" RESULTS IN A PROMPT THAT DEFINES THE
EXISTING DEFAULT PACKAGE PIN CAPACITANCE AND PROMPTS FOR
A NEW VALUE OR A CARRIAGE RETURN TO LEAVE THE CURRENT
VALUE UNCHANGED.

● AS ANNOTATE SCANS THE OLD OUTPUT.DLY FILE, IT WILL
REPORT ERRORS THAT WERE NOT YET FIXED (left uncorrected
from a previous session).

● ALWAYS READ THE EXISTING AMCCPKG.LST BEFORE EDITING
OUTPUT.DLY VIA THE AMCCANN SOFTWARE OR YOU MAY RECEIVE AN
ERROR MESSAGE LIKE THIS:

Please notify an AMCC Applications Engineer.
A system load of less than five pf is not standard.

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pins.
(6) Edit the package pin capacitance for a specific pin or pins.
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 4

The current default value for ECL system capacitance is 5.00 pf.

Enter <Retn> for no change or enter a new value: 6

● SELECTING "4" RESULTS IN A PROMPT THAT DEFINES THE
EXISTING DEFAULT ECL SYSTEM LOAD CAPACITANCE AND PROMPTS
FOR A NEW VALUE OR A CARRIAGE RETURN TO LEAVE THE CURRENT
VALUE UNCHANGED.

● SELECTION "3" WORKS IN THE SAME WAY FOR TTL

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pins.
(6) Edit the package pin capacitance for a specific pin or pins.
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 5

● SELECTING "5", THE SYSTEM PROMPTS WITH A LIST OF ALL
OUTPUTS AND BIDIRECTIONAL SIGNALS:

OUT001   OUTC   OUTE   PARAM   YOUTPT

● IT THEN PROMPTS FOR A LIST OF ONE OR MORE SIGNAL NAMES.
A CARRIAGE RETURN WILL RETURN IT TO THE MAIN MENU.

Enter the signal name or signal names separated by spaces.

param

● WHEN A CARRIAGE RETURN IS DETECTED ON A NON-EMPTY LIST,
THE SYSTEM PROMPTS FOR A NEW VALUE FOR THE PIN.   THE
EXISTING VALUE IS NOT DISPLAYED.   REFER TO THE EXISTING
AMCCPKG.LST FOR PREVIOUS EDIT SESSIONS.

Enter the new value (pf): 50

● THE SYSTEM REPROMPTS FOR A LIST:

Enter the signal name or signal names separated by spaces.

● ON CARRIAGE RETURN ON AN EMPTY LIST, THE MAIN MENU IS
DISPLAYED.

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pins.
(6) Edit the package pin capacitance for a specific pin or pins.
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 6

● SELECTING "6", THE SYSTEM PROMPTS WITH A LIST OF ALL
OUTPUTS AND BIDIRECTIONAL SIGNALS:

OUT001   OUTC   OUTE   PARAM   YOUTPT

Enter the signal name or signal names separated by spaces.

youtpt

Enter the new value (pf): 18

Enter the signal name or signal names separated by spaces.

● A "6" OPERATES THE SAME AS "5" EXCEPT THAT IT IS
DEFINING A PACKAGE PIN CAPACITANCE RATHER THAN A SYSTEM
LOAD.

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pins.
(6) Edit the package pin capacitance for a specific pin or pins.
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 7

● SELECTION "7" RESPONDS WITH A LIST OF ALL PRIMARY I/O
SIGNALS.

DAT0	DAT1	DAT10	DAT11	DAT12
DAT13	DAT14	DAT15	DAT2	DAT3
DAT4	DAT5	DAT6	DAT7	DAT8
DAT9	EXTCLK	EXTRST	IN001	OUT001
OUTC	OUTE	PARAM	SELCT0	SELCT1
SELCT2	SELCT3	YOUTPT		

Enter the signal name or signal names separated by spaces.
param

● THE LIST IS ONE OR MORE SIGNALS

Enter the new value (Ohms): 40

● A NON-EMPTY LIST WILL PROMPT FOR AN ECL TERMINATION
VALUE.

Enter the signal name or signal names separated by spaces.

(0) Generate a report and exit.
(1) Change the package type.
(2) Edit the default package pin capacitance.
(3) Edit the default system capacitive load for TTL outputs.
(4) Edit the default system capacitive load for ECL outputs.
(5) Edit the system capacitive load for a specific pin or pins.
(6) Edit the package pin capacitance for a specific pin or pins.
(7) Edit the ECL Resistive Load for a specific pin or pins.
(8) Edit the Frequency for a specific pin or pins.

Enter the number of the item you wish to perform: 8

● SELECTION "8" RESPONDS WITH A LIST OF ALL PRIMARY I/O
SIGNALS.

DAT0	DAT1	DAT10	DAT11	DAT12
DAT13	DAT14	DAT15	DAT2	DAT3
DAT4	DAT5	DAT6	DAT7	DAT8
DAT9	EXTCLK	EXTRST	IN001	OUT001
OUTC	OUTE	PARAM	SELCT0	SELCT1
SELCT2	SELCT3	YOUTPT		

Enter the signal name or signal names separated by spaces.

extclk

● THE LIST IS ONE OR MORE SIGNALS

Enter the new value (MHz): 100

● A NON-EMPTY LIST WILL PROMPT FOR A FREQUENCY IN MHz.

Enter the signal name or signal names separated by spaces.

● ALWAYS, A SECOND, THIRD, ... LIST CAN BE ENTERED OR A
CARRIAGE RETURN USED TO GO TO THE MAIN MENU.