APPENDIX III
USER-CONTRIBUTED COMPONENT LIBRARY

A3.1 INTRODUCTION

This appendix contains documentation covering additional TRNSYS components which have been supplied by researchers outside the University of Wisconsin Solar Energy Laboratory. These components and their documentation are included in TRNSYS on an experimental basis with the understanding that support responsibility is in the hands of the contributor, not the Solar Energy Laboratory.

Components in this library have been reviewed by the Lab staff to ensure compatibility with the current version of TRNSYS. Documentation is supplied as received from the contributor, with editorial revisions made as required if the documentation was written for an earlier version of the program.

The Solar Energy Lab collects and distributes user-written component routines for TRNSYS. If you have written a routine which may be of interest to other users, or wish to browse the list of user-contributed routines, contact the TRNSYS administrator at the address provided at the beginning of this manual.

A3.2 PHOTOVOLTAIC-THERMAL COMPONENTS

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This group of four components may be used to simulate PV-thermal and PV-only systems made up of PV arrays, batteries, regulator-inverters and utility interfaces.

The components, listed by their TYPE numbers are as follows:

TYPE 47 - Electrical Storage Battery
TYPE 48 - Regulator/Inverter
TYPE 49 - Combined PV System (PV/Thermal Array; Reg/Inv; Battery)
TYPE 50 - Flat Plate Solar Collector Supplement
SOLCEL - Models silicon cell I-V characteristics (subroutine)

The SOLCEL subroutine is called by TYPEs 49 and 50 and uses a set of empirical values to model the cells. Data for Spectrolab type cells, provided by Professor Evans, is "built-in" and is used by default if no other data are supplied by the user. Users may supply their own data by adding an extra parameter to the list of TYPE 49 or TYPE 50 in modes 5-8. This extra parameter is interpreted as the logical unit number of the file containing the cell characteristics. The data are read using 9F10.0 format and should be ordered as follows; (default values are listed after the definition of the parameter):

FIRST RECORD:

- ICELL - Cell type indicator, 0 for Spectrolab and Solarix Types, 1 for RCA types (peak power tracking only for RCA); (0).
- CELLPF - Ratio of cell area to absorber area; if ICELL = 1, the numerical value is ignored, but a number must be present; (0.8).

SECOND RECORD:

- TL - A low temperature reference (˚ C); (43)
- TH - A high temperature reference (˚ C); (175)
- CL - A low reference concentration; (6)
- CH - A high reference concentration; (20)
- VOCLL - Open circuit voltage of a cell at temperature TL and concentration CL (volts); (0.625)
- ISCLL - Short circuit current of the cell at temperature TL and concentration CL (amps); (0.649)
- ISCLH - Short circuit current of the cell at temperature TL and concentration CH (amps); (0.625)

ISCHL - Short circuit current of the cell at temperature TH and concentration CL(amps); (2.16)

ISCHH - Short circuit current of the cell at temperature TH and concentration CH(amps); (2.16)

THIRD RECORD: (Not used if ICELL = 1):

ACELL - Gross cell area (m^2); (0.0004)

EG - Cell band gap at 0 Kelvin; (14000)

AOMIN - Value of A_o. at concentration of 0; (1)

DAODC - Slope of the A_o. vs concentration curve; (0.018)

RSH - Shunt resistance (ohms); (10000)

RSMIN - Value of series resistance when it becomes essentially independent of concentration (ohms); (0.01)

CONTR - Minimum concentration for which the series resistance can be considered to be equal to RSMIN; (10)

DRSDC - Slope of the series resistance vs concentration curve below a concentration CONTR; (-0.005)

NSER - Number of cells to be wired in series in the array (10)