



# RESEARCH NOTES

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## CONVERSION PROGRAMS FOR THE MTU CFI STANDARD PROGRAM

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### INTRODUCTION

Input of data to the Michigan Technological University (MTU) Standard Program for Continuous Forest Inventory (CFI) should be on a standard format (2). This basic decision has considerable bearing on the structure and working of the standard CFI program. Thus, the first task in processing forest inventory data is the conversion of port-apunch field records into the standard layout. In original concept, this procedure would also convert the records from card to tape. However in ordinary practice, standard 80 column cards are produced. These are suitable for error checking on card machines which are usually locally available. A tape system is not required until time for computation of volumes and growth. Procedures outlined below apply for conversion to tape as well as to card programs.

### TREE DETAIL DATA CONVERSION

Conversion routines are written as special, non-standard programs for each job. They serve three purposes:

1. To move data into the standard data fields. See Figure 1.
2. To convert certain codes into standard codes required for subsequent program operation.
3. To perform a few simple checks for error; especially those not subject to checking in the standard error check program.

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## STANDARD DATA FIELDS UTILIZED

Appropriate data are entered into the proper standard field in the conversion process. This sometimes requires more than a mere moving of fields.

Where two kinds of data occur in a single column or field, it is desirable to split the field, placing each in its own separate columns. There are several cases where this procedure should be followed. Cordwood and sawlog useable lengths are often found in the same field. The length data for these two products are transferred to separate fields in the standard layout. Cordwood and sawlog soundness are handled in like manner. Similarly, hardwood quality butt log grades for sawlog trees are often coded in the same column as softwood and cordwood quality grades.

Unused fields are left blank, though no unpunched column should be left in a field for which data are coded.

## STANDARD TREE DATA CODES

Certain codes should be standardized as a prerequisite to the use of the Standard Program. This is one of the important functions performed in conversion.

Species: Standard Program tree volume computations use species correction factors. Standard species codes (Appendix A) are required for the selection of the appropriate factors in the tree computing segment. Printed results list species by alphabetic codes to avoid confusion in interpreting computed answers. The Standard Error Check segment also requires standard species codes.

Tree Status: The Standard Program segments must use the tree status codes listed in Table 1 for classification of growth components (1) (4). These codes also comprise an integral part of the standard error check segment. If this item is not coded, then the converting routine must be used to construct appropriate tree status codes from other tree description data.

DBH: Diameter is coded in inches and tenths without decimal point.

Useable Length: Merchantable height is coded in feet. Cordwood and sawlog heights are entered in separate fields.

Soundness: Tree soundness grades are converted to direct-reading soundness percent. Only two columns are provided, so any 100% sound trees are coded 99. Since gross volumes are computed, cull trees must be coded 00 soundness to insure correct net volume computation. Cordwood and sawlog soundness data are entered in separate fields.

Table 1. Standard Tree Status Codes for MTU CFI Program.

Measurement 1	Description	Measurement 2
0	Ingrowth tree	-
2	Cordwood tree	2
3	Sawtimber tree	3
4	Cull tree	4
-	Mortality (including cut and wasted)	5
-	Cut tree	6
9	Chemical, chipper, or charcoal - wood	9

As far as the main portion of the Standard Program (3) is concerned--tree volume computation, plot totals, and tables construction--requirements for uniformity of input data could be met by the above prescriptions. However, it has been found necessary to specify further standardization to meet error check requirements. To use the present Standard Error Check segment, the following codes are required:

Quality: Standard codes for hardwood sawtimber tree quality are:

- 0 - Cull, cordwood, chemical wood tree; or softwood tree.
- 1 - Tree Grade 1
- 2 - Tree Grade 2
- 3 - Tree Grade 3
- 5-9 - No standardization required except that this field should be limited to use of hardwood sawtimber (including veneer) quality grades.

Vigor: The tree vigor grades defined and published by the U.S. Forest Service Region 9 staff (5) (6) (7) have experienced widespread use in CFI. Since these grades are in common use, error checking makes use of the following standard codes:

- 1 - A or high vigor
- 2 - B or medium vigor
- 3 - C or low vigor
- 4 - D or cull tree

Earlier versions of the Standard Error Check segments included checks for management potential and product codes. However, it was found that adoption of standard coding schemes for these variables has not been widespread (as in the case of quality and vigor). As a result it was decided--for the time being--to drop the routines for these checks from the MTU Standard Program. This means that--although original field codes can be used and no code conversion is needed--special error routines must be written into the converting programs (as needed) to check valid codes and relationships for these variables.

## SUMMARY AND CONCLUSIONS

Except for species and tree status, the MTU Standard CFI Program requires standard codes only for those measurements and variables programmed for error checking. This requirement was adopted in order to develop an error check program which would be easy to understand and use.

The relatively simple but non-standard procedure of data and code conversion (with appropriate checks for error) is an important step in the preparation of data for the Standard CFI Program. Once data are converted into the suggested form, the processing becomes much simpler and easier to understand by those who choose to use the MTU Program, or who may want to alter it to fit their own particular needs.

## LITERATURE CITED

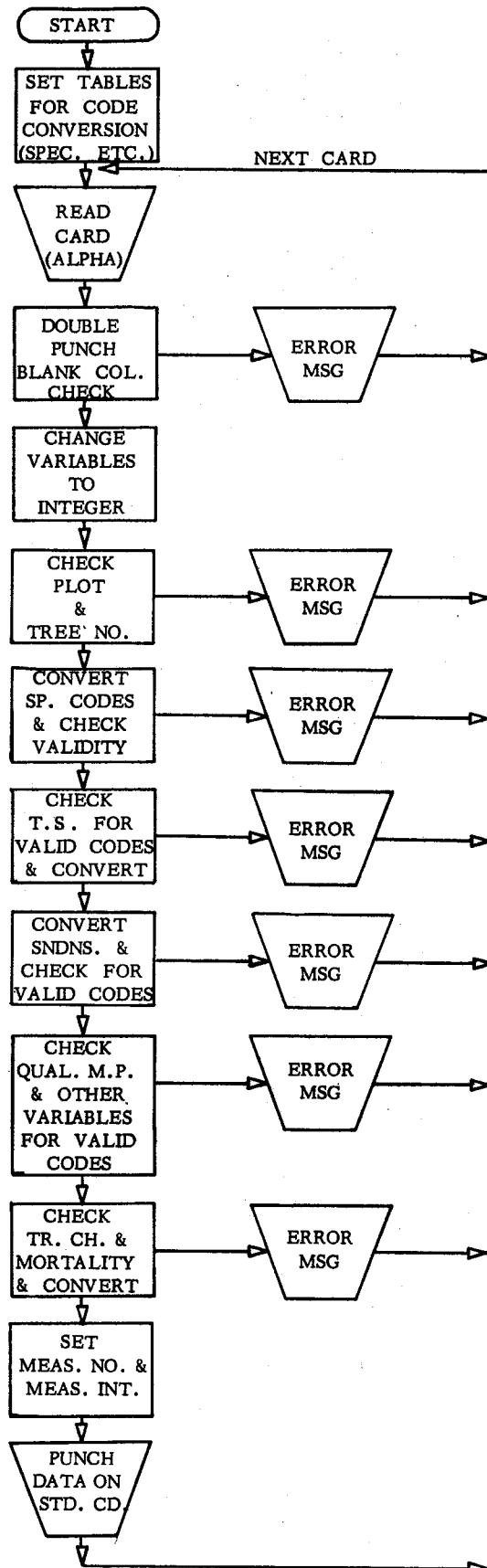
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APPENDIX A

LAKE & CENTRAL STATES SPECIES - STANDARD CODES FOR MTU STANDARD CFI PROGRAM

<u>Code</u>	<u>Abb.</u>	<u>Species</u>	<u>Code</u>	<u>Abb.</u>	<u>Species</u>
1	HM	Sugar Maple	55	BG	Black Gum
2	AE	American Elm	56	RG	Red Gum
3	RM	Red Maple	57	HAK	Hackberry
4	YB	Yellow Birch	58	SH	Shag & Shell-Bark Hickory
5	BWD	Basswood	59	OH	Other Hickories
6	WA	White Ash			
7	BE	Beech	60	HL	Honeylocust
8	NRO	N. Red Oak	61	IW	Ironwood
9	WO	White Oak	62	BL	Black Locust
			63	SIL	Silver Maple
10	PB	Paper Birch	64	SAS	Sassafras
11	QA	Quaking Aspen	65	SYC	Sycamore
12	BTA	Bigtooth Aspen	66	BW	Black Walnut
13	BP	Balsam Poplar	67	WIL	Willow
14	COT	Cottonwood	68	YP	Yellow Poplar
20	BF	Balsam Fir	70	BO	Black Oak
21	WS	White Spruce	71	BJO	Blackjack Oak
22	BS	Black Spruce	72	BUR	Bur Oak
23	NS	Norway Spruce	73	CHO	Chestnut Oak
24	RS	Red Spruce	74	CQO	Chinquapin Oak
25	NWC	No. White Cedar	75	NPO	Northern Pin Oak
26	RC	Red Cedar	76	PO	Pin Oak
27	TAM	Tamarack	77	POO	Post Oak
28	EUL	European Larch	78	SCO	Scarlet Oak
29	CYP	Cypress	79	SWO	Swamp White Oak
30	WP	White Pine	80	SHO	Shingle Oak
31	RP	Red Pine	81	OVO	Overcup Oak
32	JP	Jack Pine	82	WIO	Willow Oak
33	LOP	Loblolly Pine			
34	PP	Pitch Pine	90	MNC	Misc. Non-Comm. Species
35	SLP	Shortleaf Pine			Alder
36	VP	Virginia Pine			Wild Apple (Crab)
37	AP	Austrian Pine			Mountain Ash
38	SKP	Scotch Pine			Blue Beech
39	HEM	Hemlock			Choke Cherry
					Pin Cherry
40	AIL	Ailanthus			Dogwood
41	BA	Black Ash			Winged Elm
42	BLA	Blue Ash			Juneberry
43	RA	Red Ash			Mountain Maple
44	RB	River Birch			Striped Maple
45	BEL	Boxelder			Mulberry
46	BUC	Buckeye			Osage Orange
47	BTN	Butternut			Pawpaw
48	CAT	Catalpa			Persimmon
49	WBC	Wild Black Cherry			Redbud
50	SBC	Sweet Black Cherry			Silverbell
51	CUC	Cucumber Tree			Sourwood
52	KC	Kentucky Coffee Tree			Sumac
53	ROE	Rock Elm			Thornapple
54	SLE	Slippery Elm (Red)	91	OCS	Other Comm. Species

APPENDIX B  
 M T U STANDARD C F I PROGRAM  
 (SAMPLE) SYSTEM DIAGRAM TREE DETAIL CONVERSION



NOTE: - The term "Convert" means to convert non-standard data to those standard codes required in MTU Standard Program. No standard card is produced unless data is error-free.