CGTM NO. 131

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CASH* PROGRAM DOCUMENTATION

A PROGRAM TO PROCESS LOGICAL DESIGN DATA

*Computer Automated Systems Hardware
 Standard Logic, Inc.

I. PROGRAM DESCRIPTION

The CASH Program is used to process logical design data. The program was developed by Standard Logic, Inc. and obtained for use at SLAC from Los Alamos. The input file consists of a master file of IC types and a list of IC's and pin information for a particular hardware assembly. The data is checked for consistency and various listings are generated. Optionally, a from-to wiring list and the control information for the automatic wire wrap machines at Standard Logic may also be generated. An auxiliary program (CDTP) is then used to transfer the latter data set to the magnetic tape on the Graphic Interpretation Facility (GIF) where a paper tape can be punched in the format required by the wire wrap machines.

The input data may reside in a WYLBUR sequential data set and be edited from WYLBUR. The listings produced by the program will help in pointing out errors in the input data as well as in the logical design it-self. Until the user is satisfied that his input data is correct, he should run with column nine of the header card equal to 2, i.e., the wiring list is not generated.

The usual procedure to follow is:

1. Run CASH to produce listings but no wiring list or punch output. See JCL example below.

2. Correct input data from WYLBUR.

3. Run CASH and generate wiring list and punch output.

4. If a paper tape to control the wire wrap machines at Standard Logic is desired, notify M.A. Fisherkeller (x2454) with the data set name and volume of the punch output.

II. INPUT FORMAT

Header Card

Card 1   Cols.

Cols.	Description
2-3	No. of 14 and 16 pin IC's in master file (.LE.45)
5-6	No. of 24 pin IC's in master file (.LE.5)
9	1 Produce from-to list and punch output
	2 Do not produce from-to list and punch output
12	1 Assign VC and GD names
	2 Do not assign VC and GD names
15	1 A special CASH card configuration is used (see VII)
	2 No special CASH card configuration is used
16-21	X-Axis off-set in inches
22-27	Y-Axis off-set in inches

Three cards for each of the 14 and 16 pin IC's in the master file

Card 1   Cols.

        3-4   IC index (.GT.0)
        6-7   No. of ground pin
        8-9   No. of VCC pin
        17-26   IC type

Card 2   1-2   Pin number
              3-5   User identification
              6   Blank for load, S for source
              7-8   No. of unit loads or no. it can drive
              Repeat these 8 cols. for pins 2-8

Card 3   Repeat like card 2 for pins 9-14 or 9-16

Four cards for each of the 24 pin IC's in the master file similar to the above.

Two cards defining the CASH cards

Card 1   Cols.

        9   Row number
        10   Card number
        11-12   Grid code for CASH card
        Repeat four cols. for each type of CASH card used

Card 2   Same as card 1 beginning in Col. 9
(May be blank but not omitted)

The grid codes are:

CASH Card	Grid Code	CASH Card	Grid Code
61-XX	1	60-XX	8
16-20P-14	2	46-23	9
14-25P	3	46-12P	10
14-30	4	54-05	11
24-06P	5	26-08	12
16-20P	6	14-20IO	13
46-23P	7	46-12P-14	14
		Special Config.	15

Three title cards (may be blank but not omitted)

Card 1   Cols.

        1-30   User's name and group
        31-34   User's phone number
        35-40   User's job number

Card 2   1-80   Title for listed output

Card 3   1-12   Drawing number
             13-20   Date (e.g., 12-31-71)

Data cards for each IC in this assembly

Card 1   Cols.

Cols.	
1-4	IC index (.GT.0)
5-14	IC type (same as in master file)
15	Bay no. (optional)
16	Drawer no. (optional)
17	Row no. in drawer
18	Card no. in row (1-6)
19-20	Row position of IC on CASH card
21-22	Column position of IC on CASH card
23	0 if two sources tied together is to be considered an error 1 if sources from this IC can be tied together to form an 'OR' tie
24	0 check master file entry 1 bypass master file checking

Subsequent cards for each IC

Cols.

Cols.	
1-2	Pin number
3-8	Signal name
9-12	Optional user identification
13	Blank for load, S for source (if not in master)
14-15	No. of unit loads (if not in master)
16-18	Functional notation
19-20	00 if this is not last pin used for this IC 01 if this is last pin used for this IC

Repeat these 20 cols. for each pin, 4 pins per card

III.   OUTPUT

Hardware summary of IC's used, by type and quantity

Error check listing

    Error Types:

        Source with no loads

        Loads with no source

        Invalid 'OR' tie

        Overloaded source

    Errors are listed by signal name, but only the first one associated with a signal will be listed.

VCXXXX Signal Listing

GDXXXX Signal Listing

Single Point Listing

String List (alphanumerically sorted by signal name)

From-to Wire Listing (levels 1 and 2)

Punched output to control the wire wrap machine

Abbreviations used in the listings:

S   -   Source

D/L   -   Drive/Load

B/D   -   Bay/Drawer

SKT   -   Socket

L   -   Wiring Level

DUR   -   Drive units remaining (a negative number
            indicates an overload)

IV.   DATA SET INFORMATION

Loadmodules

CASH

Input is from FT22F001

(May be edited from WYLBUR using card option; e.g., save
wired rep card)

List output is to FT12F001

Punch output is to FT21F001

Temporary Data set is FT50F001

CDTP

Input is FT21F001 (punch output from above)

Output is GIF magnetic tape in 100 byte records

DTUT (GIF stand-alone program)

Input is GIF magnetic tape

Output is GIF paper tape

V.   JCL EXAMPLES

```
//MAF 33      JOB 'MAF$CG,(BOX 35)',REGION=300K,PRTY=5,CLASS=E,          X
//            LINES=10K,CARDS=1K
//JOBLIB      DD DSNAME=LMODS,DISP=SHR,VOLUME=SER=CG0003,UNIT=2314
//S1          EXEC PGM=CASH
//SYPRINT     DD SYSOUT=A
//SYSUDUMP    DD SYSOUT=A
//FT06F001    DD SYSOUT=A
//FT12F001    DD SYSOUT=A,DCB=(LRECL=133,BLKSIZE=3458,RECFM=FBA)
//FT21F001    DD DSN=WYL.CG.MAF.CARDS,UNIT=2314,DISP=SHR,
//            VOL=SER=WYL001,DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//FT22F001    DD DSN=WYL.CG.MAF.WIRED,UNIT=2314,DISP=SHR,
//            VOL=SER=WYL001,DCB=(RECFB,LRECL=80,BLKSIZE=3520)
//FT50F001    DD DSN=&TEMP,SPACE=(84,(5000)),DCB=DSORG=DA,UNIT=SYSDA
//
```

This will produce the listings and save the punch output in a WYLBUR data set. For the initial run with no punch output, make FT21F001 DD DUMMY.

```
//MAF33       JOB 'MAF $ CG,(BOX 35)',REGION=150K,PRTY=8,CLASS=G,        X
//            LINES=10K,CARDS=1K
//JOBLIB      DD DSNAME=LMODS,DISP=SHR,VOLUME=SER=CG0003,UNIT=2314
//S1          EXEC PGM=CDTP
//SYSPRINT    DD SYSOUT=A
//SYSUDUMP    DD SYSOUT=A
//FT06F001    DD SYSOUT=A
//GIFLINK     DD UNIT=6E8
//FT21F001    DD DSN=WYL.CG.MAF.CARDS,UNIT=2314,DISP=SHR,
//            VOL=SER=WYL001,DCB=(RECFM=FB,LRECL=80,BLKSIZE=3200)
//
```

This will write the punch output on the GIF mag tape. The GIF program DTUT (Drum-Tape Utility) is used to punch a paper tape when desired. The command 'PU' to this program reads the mag tape to an EOF and punches a paper tape in the ASCII code required to control Standard Logic's semi-automatic wire wrap machine. Sense switch 1 can be used to stall the program when it is necessary to change paper tape reels.

VI.   ERROR MESSAGES

Message	Program Action
IC type XXXXXXXXXX is not in master file	Terminate
Error-wiring pin to itself	Continue
Record number -- out of range on unit 50	Terminate

(The number of records as shown on the FT50F001 DD card -- 5000 in the example -- must be greater than the number of signal names plus the number of wires. The DD card must be changed and the program must be recompiled.)

Convert - illegal decimal character	Terminate

(This is probably an input data error.)

VII.   SPECIAL CONFIGURATION

If a special card configuration (i.e., not a standard CASH card) is to be included, a FORTRAN subroutine must be written describing the configuration and the CASH program recompiled.