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COMPUTER-AIDED DEVELOPMENT OF CONTROL CONSOLE, CONTROL PANEL, A--ETC(U)
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Author	Subject Category	No
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		Date October 1980

Title: COMPUTER-AIDED DEVELOPMENT OF CONTROL CONSOLE, CONTROL PANEL, AND DISPLAY USER INSTRUCTIONS AND TRAINING MATERIALS

Copies Available at	GE Class	No. of Pages
MESO TIS Distribution Center Box 4840 (CSP 4-18) Syracuse, New York 13221	1	12
	Govt Class Unclassified	

Summary

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3. Facilitates allocating the preparation of large numbers of instructions to several people.
4. Facilitates incremental development of instructions.
5. Provides direct output of reproducible copy.
6. Ensures complete coverage.
7. Reduces development time.
8. Reduces composition time.
9. Reduces change and update costs over 90%.

The process is described in this TIS as it is applied to the preparation of information for the tactical towed array sonar (TACTAS) System Operator's Manual. However, it can be applied with slight modification to systems having similarly complex man-machine interfaces.

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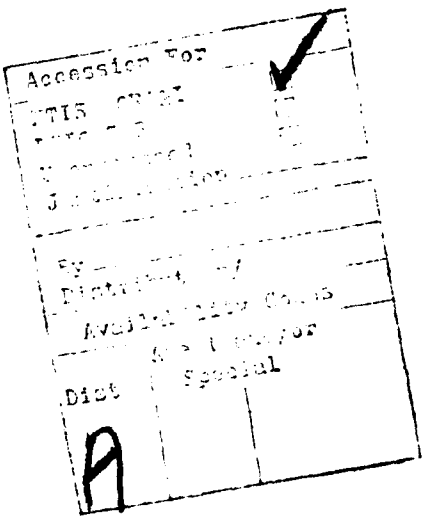

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Data input, storage, processing, and output are performed by the time-share subsystem (TSS) of the Honeywell 520 Data Processing System (level 66).

Figure 1 depicts the process. Physical data including location, identification nomenclature, and possible states of each item of interest are entered incrementally as they are developed into working files (TCD-A1) (see Exhibit A). The data for each item is stored as a separate line-numbered record.

The entry media can be punched cards, remote terminal, or Diablo 1650 composer. In order to minimize keyboarding time the data is not formatted, however, the data must be entered in the correct order. The beginning of each data field is delimited by a comma. The unformatted working files (TCD-A1) are formatted and concatenated into file TCD-A (see Exhibit B) by the timeshare command:

CONV TCD-A; TCD-A1 = TCD-A: TAB (, , t, t+1, t+2, t+n), RESE (001, 1)

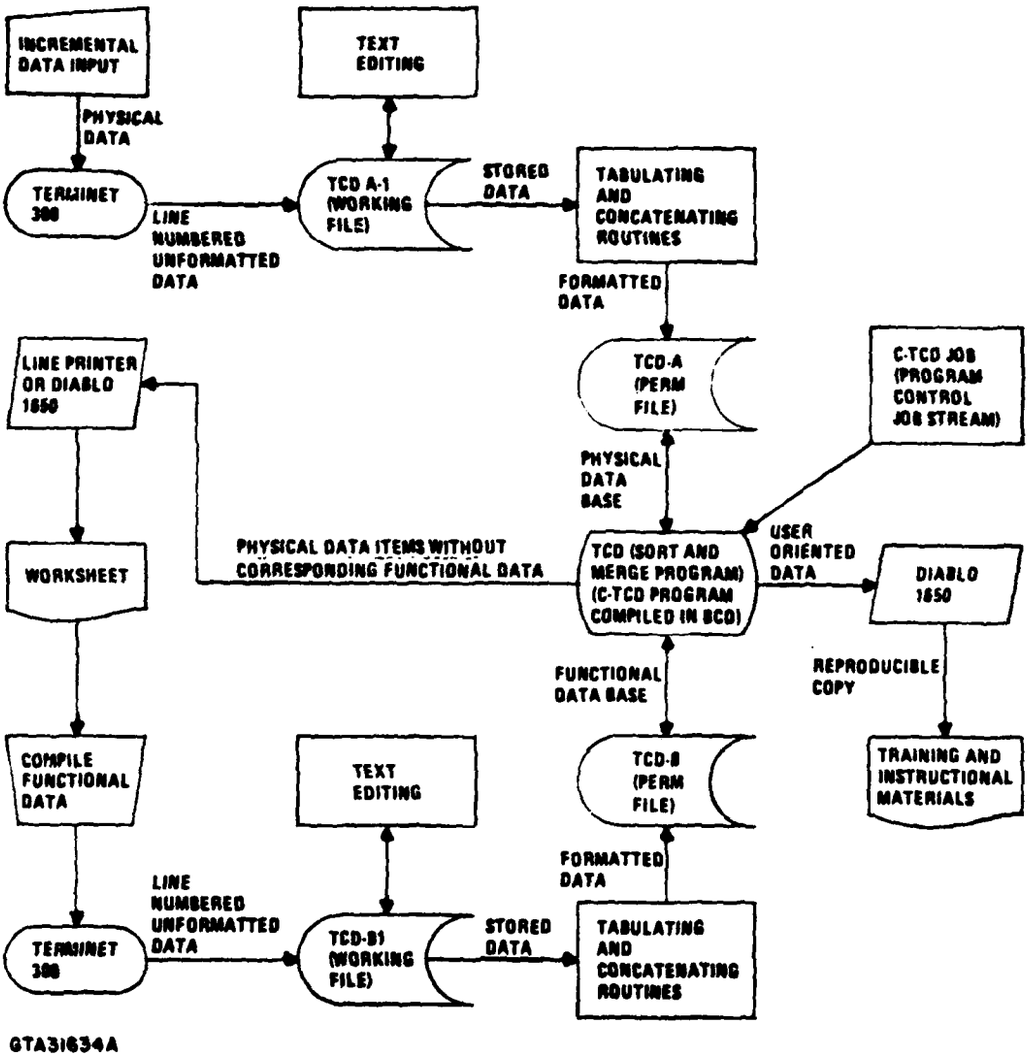


Figure 1. TACTAS Control and Display (TCD) User Data Development Process

```
1 ,SCP,REQ DPS NORM,WHITE
2 ,SCP,DPS FAULT,GREEN
3 ,SCP,DPS FAULT,RED
4 ,SCP,DPS FAULT,DARK
5 ,SCP,DPS NORM IN,WHITE
6 ,SCP,DPS NORM IN,DARK
7 ,SCP,DPS ALT IN,WHITE
8 ,SCP,DPS ALT IN,DARK
9 ,SCP,DPS NORM,WHITE
10 ,SCP,REQ DPS NORM,DARK
11 ,SCP,REQ DPS ALT,WHITE
12 ,SCP,REQ DPS ALT,DARK
13 ,SCP,REQ DPS NORM/REQ DPS ALT
14 ,SCP,DPS RESTART,WHITE
15 ,SCP,DPS RESTART,DARK
16 ,SCP,DPS RESTART
17 ,SCP,CSL GP POWER APPLIED,GREEN
18 ,SCP,CSL GP POWER APPLIED,YELLOW
19 ,SCP,CSL GP POWER APPLIED,DARK
20 ,SCP,CSL GP ON,WHITE
```

Exhibit A. TCD-A1 Unformatted Physical Data Working File

```
*LIST TCD-A

001   SCP REQ DPS NORM          WHITE
002   SCP DPS FAULT             GREEN
003   SCP DPS FAULT             RED
004   SCP DPS FAULT             DARK
005   SCP DPS NORM IN           WHITE
006   SCP DPS NORM IN           DARK
007   SCP DPS ALT IN            WHITE
008
```

Exhibit B. TCD-A Formatted Physical Data Perm File

The t-values specify the tab settings for the data fields in file TCD-A delimited by the commas in the unformatted file TCD-A1. The commas are automatically deleted in the process.

The time-share program TCD (see Exhibit C) is compiled into binary coded decimal (BCD) and stored in file TCD-C which is run under the control of jobstream file C-TCD JOB (see Exhibit D) when time-share command JRN C-TCD JOB is entered. The initial output of the program are worksheets which indicate the functional information required to complete the instructions and training materials (see Exhibit E). When the worksheet is complete (see Exhibit F) the data is entered into working file TCD-B1 in the same unformatted records as described above for file TCD-A1 (see Exhibit G). The line number used must match those in TCD-A. Working file TCD-B1 is formatted and concatenated into TCD-B (see Exhibit H) by the command:

CONV TCD-B; TCD-B1 = TCD-B: TAB (, , t, t_1, t_2, t_3, t_4) , RESE (001, 1)

The physical data on TCD-A is correlated and merged with the functional data on file TCD-B (see Exhibit I) by program TCD. The merged data is sorted by field priorities to provide the user with the ability to locate the information pertinent to the task. There are two types of sorts: the first based upon functional parameters: action, function, range; the second by physical parameters: units, assembly, and item. Both sorts are printed out in reproducible copy format by a Diablo 1650 terminal.

```
*LIST TCD

10* FILE PROVIDES A JOBSTREAM TO MERGE & PRINT TCD DATA FILE
20 CHARACTER*80 LNA*3,LNB*3,RECA,RECB,LINE*132,DASH *1
30*FC 10 = DATA FILE A
40*FC 20 = DATA FILE B
50 CALL ATTACH (10,"TCD-A$",1,0,I,)
60 CALL ATTACH (20,"TCD-B$",1,0,I,)
70 LNCNT = 99
80 READ (20,900,END=10) LNB,RECB
90 900 FORMAT (A3,1X,A80)
100 10 READ (10,900,END=20) LNA,RECA
110 ENCODE (LINE,905) LNA,RECA
120 DASH = "-"
130 905 FORMAT (A3,1X,A56,"[",10X,"][",22X,"][",18X,"][",
140 &10X,"]")
150 IF (LNA.NE.LNB) GOTO 30
160 ENCODE (LINE,910) RECB
170 910 FORMAT (T61,A72)
180 DASH = " "
190 READ (20,900,END=30) LNB,RECB
200 30 IF (LNCNT.LT.25) GOTO 40
210 LNCNT = 0
220 WRITE (6,915)
230 915 FORMAT (2H1 ,"LNO UNIT  DISP/CONT/IND",
240 & T32, "PG/PS/ST",T50, "ITEM",
250 & T65, "ACTION",T75, "PARAMETER/FUNCTION",T99,
260 & "RANGE/LIMITS", T119, "REFERENCE",//)
270 40 WRITE (6,920) LINE, (DASH, K=1,72)
280 920 FORMAT (2X,A128,/T61,72A1)
290 LNCNT = LNCNT + 1
300 GOTO 10
310 20 STOP
320 END
```

Exhibit C. TCD,Merge/Sort/Output Program

```
*LIST C-TCD JOB

10$$NORM,ROUT(H1)
20$$IDENT$278573-462-2993,SAS
30$$OPTION$FORTRAN,NOMAP
40$$USE$.GTLIT
50$$SELECT$TTM/C-TCD
60$$EXECUTE
70$$ENDJOB
```

Exhibit D. C-TCD JOB, Control Jobstream

IND	UNIT	DISP/CONT/IND	PARM/POS/STAT	ITEM	ACTION	PARAMETER/FUNCTION	RANGE/LIMITS	REFERENCE
36	SCP	MASS MEMORY READY	YELLOW					
37	SCP	SES POWER APPLIED	GREEN					
38	SCP	SES POWER APPLIED	YELLOW					
39	SCP	SES POWER APPLIED	DARK					
10	SCP	SES ON	WHITE					
11	SCP	SES ON	DARK					
12	SCP	SES OFF	WHITE					
13	SCP	SES OFF	DARK					
14	SCP	SES ON/SES OFF						
15	SCP	COOLANT FLOW	DARK					
16	SCP	COOLANT FLOW	GREEN					
17	SCP	COOLANT FLOW	RED					
18	SCP	ALARM CANCEL	WHITE					
19	SCP	ALARM CANCEL	DARK					
40	SCP	ALARM CANCEL						
41	SCP	APS POWER APPLIED	GREEN					
42	SCP	APS POWER APPLIED	YELLOW					
43	SCP	APS POWER APPLIED	DARK					
44	SCP	APS ON	WHITE					
45	SCP	APS ON	DARK					
46	SCP	APS OFF	WHITE					
47	SCP	APS OFF	DARK					
48	SCP	APS ON/APS OFF						
49	SCP	CABINET OVERTEMP	GREEN					
50	SCP	CABINET OVERTEMP	RED					

Exhibit E. Sample Worksheet

NO	UNIT	DISP/CONT/IND	PAGE/POS/STAT	ITEM	ACTION	PARAMETER/FUNCTION	RANGE/LIMITS	REFERENCE
26	SCP	MASS MEMORY READY	YELLOW		OBSERVE	UNIT 18 STATUS	NOT READY	
27	SCP	SES POWER APPLIED	GREEN		OBSERVE	SES POWER STATUS	ENABLED	
28	SCP	SES POWER APPLIED	YELLOW		OBSERVE	SES POWER STATUS	NOT USED	
29	SCP	SES POWER APPLIED	DARK		OBSERVE	SES POWER STATUS	OFF	
30	SCP	SES ON	WHITE		OBSERVE	SES PWR CONTROL SIG STATUS	ENABLE ON	
31	SCP	SES ON	DARK		OBSERVE	SES PWR CONTROL SIG STATUS	OFF	
32	SCP	SES OFF	WHITE		OBSERVE	SES PWR CONTROL SIG STATUS	NOT USED	
33	SCP	SES OFF	DARK		OBSERVE	SES PWR CONTROL SIG STATUS	NO SIGNIFICANCE	
34	SCP	SES ON/SES OFF			TURN ON/OFF	SES PWR CONTROL SIG SIGNAL	SIGNAL ENABLED/OFF	
35	SCP	COOLANT FLOW	DARK		OBSERVE	COOLANT FLOW RATE	NO FUNCTION	
36	SCP	COOLANT FLOW	GREEN		OBSERVE	COOLANT FLOW RATE	NORMAL	
37	SCP	COOLANT FLOW	RED		OBSERVE	COOLANT FLOW RATE	BELOW NORMAL	
38	SCP	ALARM CANCEL	WHITE		OBSERVE	ALARM RESET	NO SIGNIFICANCE	
39	SCP	ALARM CANCEL	DARK		OBSERVE	ALARM RESET	NO SIGNIFICANCE	
40	SCP	ALARM CANCEL			TURN OFF	ALARM RESET	RESETS AUDIBLE ALARM	
41	SCP	APS POWER APPLIED	GREEN		OBSERVE	APS POWER STATUS	ENABLED	
42	SCP	APS POWER APPLIED	YELLOW		OBSERVE	APS POWER STATUS	OFF	
43	SCP	APS POWER APPLIED	DARK		OBSERVE	APS POWER STATUS	SES PWR CNTRL SIG OFF	
44	SCP	APS ON	WHITE		OBSERVE	APS PWR CNTRL SIG STATUS	ENABLE ON	
45	SCP	APS ON	DARK		OBSERVE	APS PWR CNTRL SIG STATUS	OFF	
46	SCP	APS OFF	WHITE		OBSERVE	APS PWR CNTRL SIG STATUS	OFF & SES POWER ON	
47	SCP	APS OFF	DARK		OBSERVE	APS PWR CNTRL SIG STATUS	ENABLED IF ON WHITE	
48	SCP	APS ON/APS OFF			TURN ON/OFF	APS POWER CONTROL SIGNAL	ENABLED/OFF	
49	SCP	CABINET OVERTEMP	GREEN		OBSERVE	SES CABINET TEMP LIMITS	NORMAL	
50	SCP	CABINET OVERTEMP	RED		OBSERVE	SES CABINET TEMP LIMITS	OVER TEMP	

Exhibit F. Sample Completed Worksheet

```
026 ,OBSERVE,UNIT 18 STATUS,POWER ON & NOT READY
027 ,OBSERVE,SES POWER STATUS,ENABLED
028 ,OBSERVE,SES POWER STATUS,NOT USED
029 ,OBSERVE,SES POWER STATUS,OFF
030 ,OBSERVE,SES PWR CONTROL SIG STATUS,ENABLE ON
031 ,OBSERVE,SES PWR CONTROL SIG STATUS,OFF
032 ,OBSERVE,SES PWR CONTROL SIG STATUS,NOT USED
033 ,OBSERVE,SES
```

Exhibit G. TCD-B1 Unformatted Functional Data Working File

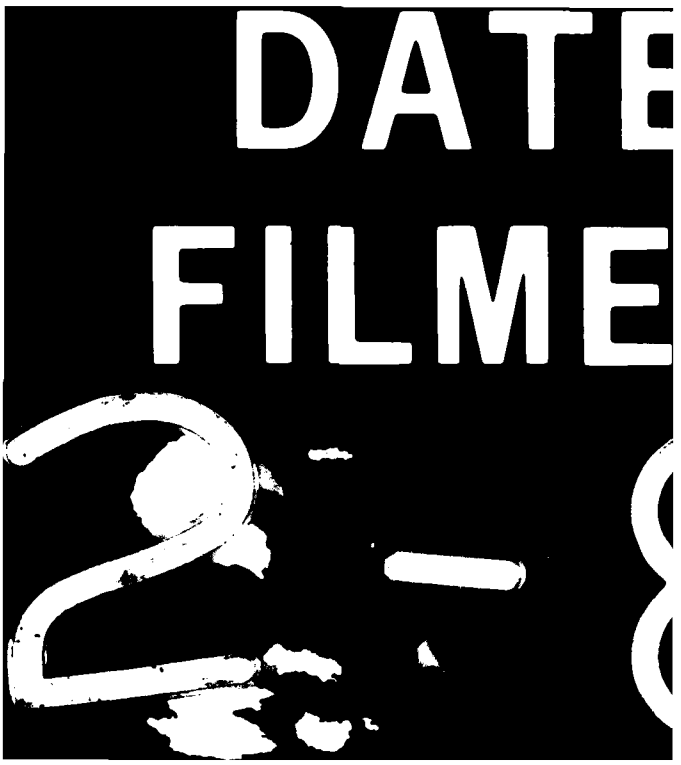
```
*LIST TCD-B

026  OBSERVE        UNIT 18 STATUS              PWR ON & NOT READY
027  OBSERVE        SES POWER STATUS            ENABLED
028  OBSERVE        SES POWER STATUS            NOT USED
029  OBSERVE        SES POWER STATUS            OFF
030  OBSERVE        SES PWR CNTR SIG ST         ENABLE ON
031  OBSERVE        SES PWR CNTRL SIG ST        OFF
032  OBSERVE        SES PWR CNTRL SIG ST        NOT USED
033  OBSERVE
```

Exhibit H. TCD-B Formatted Functional Data Perm File

LNO	UNIT	DISP/CONT/IND	PB/PS/ST	ITEM	ACTION	PARAMETER/FUNCTION	RANGE/LIMITS	REFERENCE
026	SCP	MASS MEMORY READY	YELLOW		OBSERVE	UNIT ID STATUS	PWR ON & NOT READY	
027	SCP	SFS POWER APPLIED	GREEN		OBSERVE	SFS POWER STATUS	ENABLED	
028	SCP	SES POWER APPLIED	YELLOW		OBSERVE	SFS POWER STATUS	NOT USED	
029	SCP	SFS POWER APPLIED	DARK		OBSERVE	SFS POWER STATUS	OFF	
030	SCP	SES ON	WHITE		OBSERVE	SFS PWR CNTRL SIG ST	ENABLE ON	
031	SCP	SES ON	DARK		OBSERVE	SFS PWR CNTRL SIG ST	OFF	
032	SCP	SES OFF	WHITE		OBSERVE	SFS PWR CNTRL SIG ST	NOT USED	
033	SCP	SES OFF	DARK		OBSERVE	SFS PWR CNTRL SIG ST	NO SIGNIFICANCE	
034	SCP	SES ON/SES OFF			TURN ON/OFF	SFS PWR CNTRL SIG	SIGNAL ENABLED/OFF	
035	SCP	COOLANT FLOW	DARK		OBSERVE	COOLANT FLOW RATE	NO FUNCTION	
036	SCP	COOLANT FLOW	GREEN		OBSERVE	COOLANT FLOW RATE	NORMAL	
037	SCP	COOLANT FLOW	RED		OBSERVE	COOLANT FLOW RATE	BELOW NORMAL	
038	SCP	ALARM CANCEL	WHITE		OBSERVE	ALARM RESET	NO SIGNIFICANCE	
039	SCP	ALARM CANCEL	DARK		OBSERVE	ALARM RESET	NO SIGNIFICANCE	
040	SCP	ALARM CANCEL			TURN OFF	ALARM RESET	RESETS AUDIO ALARM	
041	SCP	APS POWER APPLIED	GREEN		OBSERVE	APS POWER ST	ENABLED	
042	SCP	APS POWER APPLIED	YELLOW		OBSERVE	APS POWER STATUS	OFF	
043	SCP	APS POWER APPLIED	DARK		OBSERVE	APS POWER STATUS	SES PWR CNTRL SIG OFF	
044	SCP	APS ON	WHITE		OBSERVE	APS PWR CNTRL SIG ST	ENABLE ON	
045	SCP	APS ON	DARK		OBSERVE	APS PWR CNTRL SIG ST	OFF	
046	SCP	APS OFF	WHITE		OBSERVE	APS PWR CNTRL SIG ST	OFF & SES POWER ON	
047	SCP	APS OFF	DARK		OBSERVE	APS PWR CNTRL SIG ST	ENABLED IF ON WHITE	
048	SCP	APS ON/APS OFF			TURN ON/OFF	APS PWR CNTRL SIG	ENABLED/OFF	
049	SCP	CABINET OVERTEMP	GREEN		OBSERVE	SFS LAB TEMP LMTS	NORMAL	
050	SCP	CABINET OVERTEMP	RED		OBSERVE	SFS LAB TEMP LMTS	OVERTEMP	

Exhibit I. Unsorted Control and Display Table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