T H E   U N I V E R S I T Y   O F   M I C H I G A N

Memorandum 16

PDP-8 TO 103A DATAPHONE AND/OR ONLINE
TELETYPE INTERFACE

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CONCOMP: Research in Conversational Use of Computers
F.H. Westervelt, Project Director
ORA Project 07449

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UMRC857

PDP-8 TO 103A DATAPHONE AND/OR ONLINE
TELETYPE INTERFACE

K.E. Burkhalter, Jr.

Further Notes on PDP-8/103A Interface*

This report supersedes two previous reports on this subject, and reflects changes incorporated to improve performance (that is, level converters have been added between the PDP-8 TTY lines, and the following logic). The accompanying diagrams illustrate an interface between AT&T 103A data sets and a standard PDP-8 processor and its associated online teletype (TTY).. The interfaces provide:

a. connection of the DEC online TTY to the dial switch network;

b. connection of the DEC online TTY to the PDP-8;

c. connection of the PDP-8 to the dial switch network.

Figure 1 illustrates the possible modes of operation.

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* See also, Mills, D.L., Notes on PDP-8/103A Interfaces, Concomp Project internal memorandum, 25 September 1966; and Lundstrom, Stephen F., PDP-8/103A Dataphone Interface, Concomp Memorandum, November 1966.

Telephone Dial Network
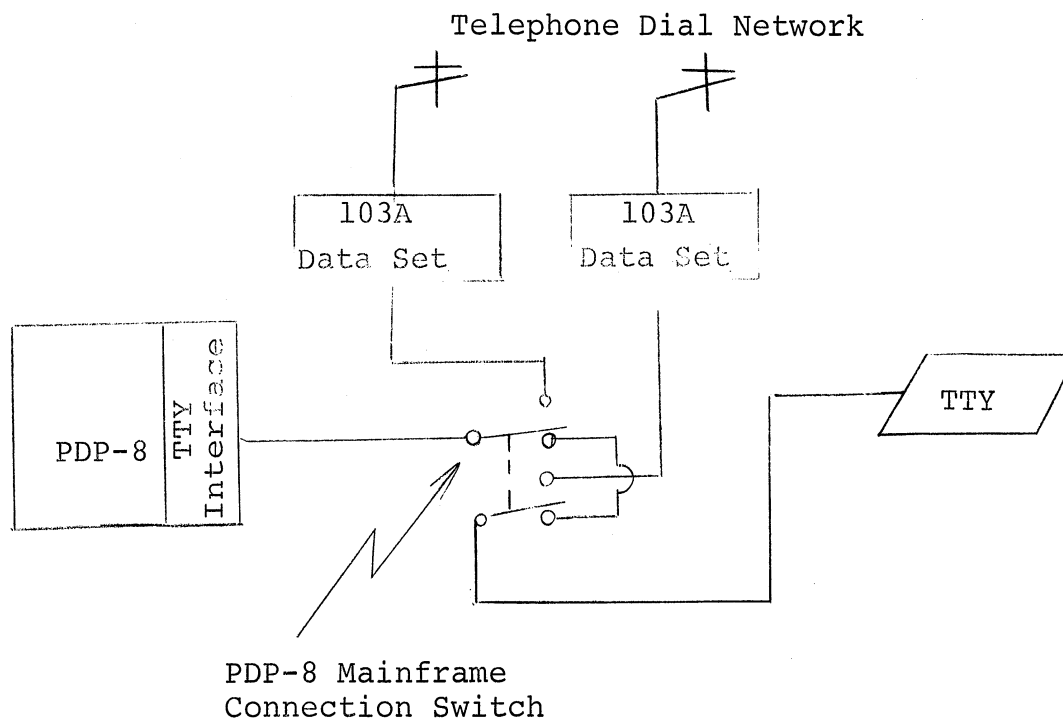

PDP-8 Mainframe
Connection Switch

Figure 1

The interface takes care of interlocking the various

features so that chaos can not reign supreme. Thus, the TTY

can be used with its data set only if it is not attached to

the 8. When the TTY is switched to the PDP-8, terminal

ready drops on the TTY data set, disconnecting it from further

use, so that contention is not a problem. The reader advance

solenoid of the TTY is also brought TRUE at this time, so

that the reader may be used with the data set by throwing

the reader advance switch, on the reader, on and off. This

is necessary since the data set does not have an extra chan-

nel available to control the reader, as is the case with the

local processor. Note that the terminal ready lead of the

mainfraim data set is brought out to a switch so that it may

be dropped if necessary to initiate a disconnect (a feature

that has often been found handy).

The PDP-8 may be switched back and forth between

the two I/O devices (TTY, mainframe data set). If, however,

either is actively engaged in data transmission, a few garbled

characters will result. The interface forces a MARK condition

on the unused port so that it will not chatter for the case

of the TTY, or space disconnect for the data set. Also,

since the switchover is done rapidly and while in MARK states

(assuming no transmission) there is no SPACE transition and

thus no "burping" of the teletype.

The state of the PDP-8 keyboard input and printer

output lines is indicated on a lamp panel attached to the

logic mounting bays. The lamps light for the SPACE rather

than for the MARK state, thus allowing the lights to be

normally off. The terminal ready lines of both data sets

are also monitored via a front panel lamp each. In addition,

as noted before, the terminal ready line for the mainframe

data set is brought out to a front panel switch, which will

normally be left in the on position.

One special board is required for the interface,

to restore standard logic levels, since the PDP-8 TTY inter-

face is designed to interface with solenoids rather than with

logic gates. The solenoid driver used within the computer

is the W050 which produces an output between -2 (on) and

-15 (off) volts. To restore these to ground and about -3 volts, a three-diode string (3-IN457As) is added at the printer and reader output leads. The extra IN270 diode on this board is used to pull the mainframe data set transmit lead to the MARK state when the PDP-8 is connected to the TTY.
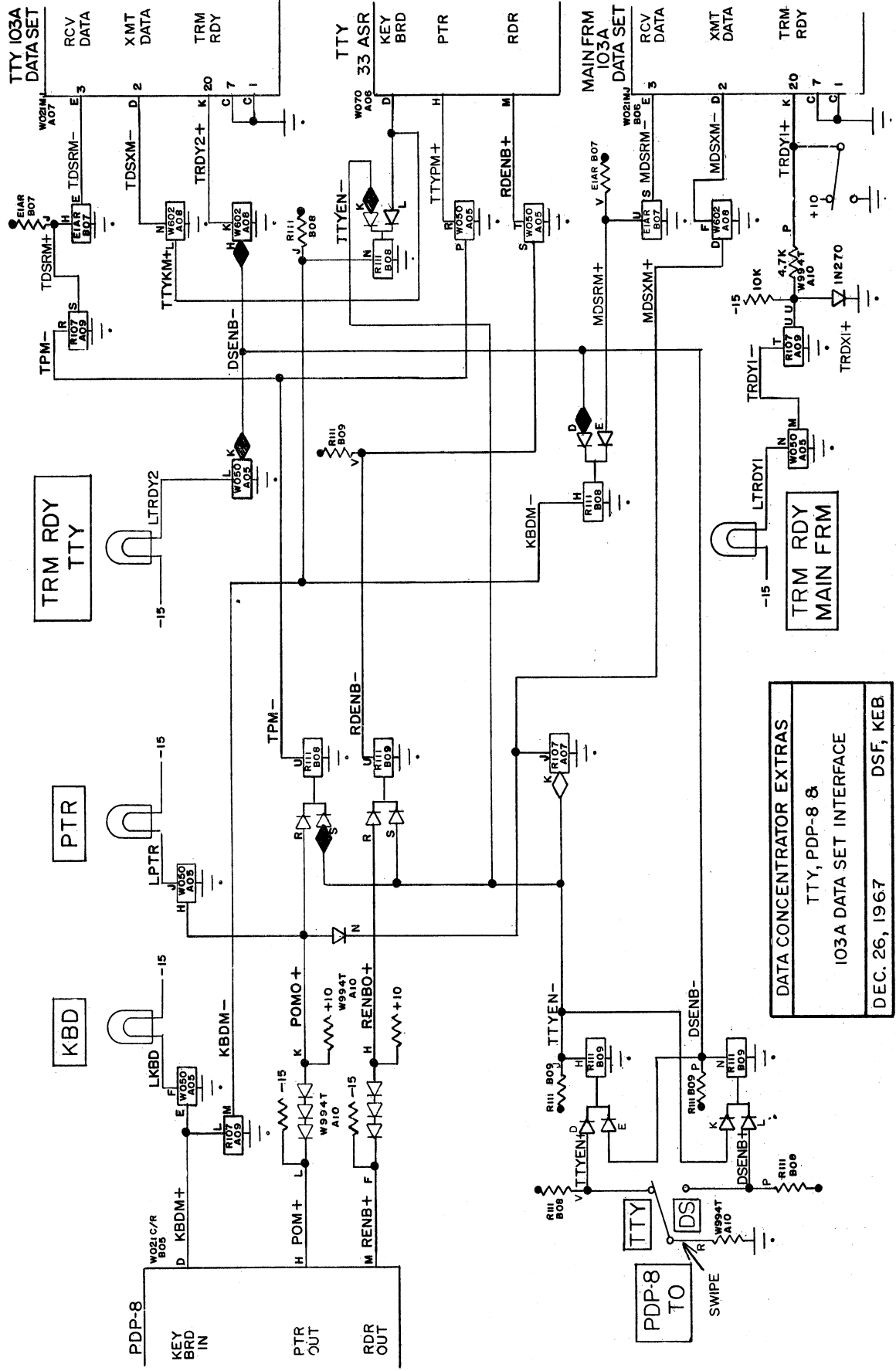
DATA CONCENTRATOR EXTRAS
TTY, PDP-8 &
103A DATA SET INTERFACE

DEC. 26, 1967   DSF, KEB.

APPENDIX

APPENDIX

Wire wrap documentation is reproduced on the following pages as a servicing aid to those responsible for that function in the future.

WIRE WRAP (VERSION 27 JUNE)

INPUT LISTS

1A05 W050	DSENB-K	LTRDY2L	TRDY1-M	LTRDY1N	TPM-P	TTYPM+R	RDENB-S
1A05 W050	KBDM+E	LKBDF	POMO+H	LPTRJ	RDENB+T		
1A06 W070	TTYKM+D	TTYPM+H	RDENB+M				
1A07 W021MJ	TDSXM-D	TDSRM-E	TRDY2+K				
1A08 W602	MDSXM+D	MDSXM-F	DSENB-H	TRDY2+K	TTYKM+L	TDSXM-N	
1A08 W602	TMDS+P	TMDS-R	TMDS+S	TMDS-V			
1A09 R107	TTYEN-K	MDSXM+J	KBDM-M	KBDM+L	TDSRM+S	TPM-R	
1A09 R107	TRDX1+U	TRDY1-T					
1A10 W994T	RENB+F	RENBO+H	POMO+K	POM+L	MDSXM+N	TRDY1+P	
1A10 W994T	SWIPER	TRDX1+U					
1B05 W021RC	KBDM+D	POM+H	RENB+M				
1B06 W021M	MDSXM-D	MDSRM-E	TRDY1+K	STD10+A	STDGNDC		
1B07 EIAR	GTDSR-D	GTDSR-C	TDSRM-E	TDSRM+J	TDSRM+H	GTDSR-R	
1B07 EIAR	MDSRM-S	MDSRM+V	MDSRM+U				
1B08 R111	DSENB+P	KBDM-N	POMO+R	TTYEN-S	TTYEN+V	TPM-U	
1B08 R111	DSENB-D	MDSRM+E	KBDM-J	KBDM-H	TTYEN-K	TTYKM+L	
1B09 R111	TTYEN+D	DSENB-E	TTYEN-J	TTYEN-H	TTYEN-K	DSENB+L	
1B09 R111	DSENB-P	DSENB-N	RENBO+R	TTYEN-S	RDENB-V	RDENB-U	

***** PDP-8 TO TTY/103A ADAPTER *****

CONCATONATED CIRCUIT LISTS

D SENB+	1B09L,1B08P
DSENB-	1A05K,1A08H,1B08D,1B09E,1B09N,1B09P
GTDSR-	1B07C,1B07D,1B07R
KBDM+	1B05D,1A05E,1A09L
KBDM-	1A09M,1B08H,1B08J,1B08N
LKBD	1A05F
LPTR	1A05J
LTRDY1	1A05N
L TRDY2	1A05L
MDSRM+	1B08E,1B07U,1B07V
MDSRM-	1B06E,1B07S
MDSXM+	1A08D,1A09J,1A10N
MDSXM-	1A08F,1B06D
POM+	1A10L,1B05H
POMO+	1A05H,1A10K,1B08R
RDENB+ ·	1A06M,1A05T
RDENB-	1A05S,1B09U,1B09V
RENB+	1A10F,1B05M
RENBO+	1A10H,1B09R
STD10+	1B06A
STDGND	1B06C
SWIPE	1A10R
TDSRM+	1A09S,1B07H,1B07J
TDSRM-	1A07E,1B07E
TDSXM-	1A07D,1A08N
TMDS+	1A08P,1A08S
TMDS-	1A08R,1A08V
TPM-	1A05P,1A09R,1B08U
TRDX1+	1A09U,1A10U
TRDY1+	1A10P,1B06K
TRDY1-	1A05M,1A09T
TRDY2+	1A07K,1A08K
TTYEN+	1B09D,1B08V
TTYEN-	1B09S,1B08S,1B08K,1B09K,1B09H,1B09J,1A09K
TTYKM+	1A06D,1A08L,1B08L
TTYPM+	1A06H,1A05R

***** PDP-8 TO TTY/103A ADAPTER *****

CROSS-REFERENCE TABLES (****DENOTES LOCATION OF PIN BEINGREFERENCE

1A05E	KBDM+	1B05D,*****,1A09L
1A05F	LKBD	*****
1A05H	POMO+	*****,1A10K,1B08R
1A05J	LPTR	*****
1A05K	DSENB-	*****,1A08H,1B08D,1B09E,1B09N,1B09P
1A05L	LTRDY2	*****
1A05M	TRDY1-	*****,1A09T
1A05N	LTRDY1	*****
1A05P	TPM-	*****,1A09R,1B08U
1A05R	TTYPM+	1A06H,*****
1A05S	RDENB-	*****,1B09U,1B09V
1A05T	RDENB+	1A06M,*****
1A06D	TTYKM+	*****,1A08L,1B08L
1A06H	TTYPM+	*****,1A05R
1A06M	RDENB+	*****,1A05T
1A07D	TDSXM-	*****,1A08N
1A07E	TDSRM-	*****,1B07E
1A07K	TRDY2+	*****,1A08K
1A08D	MDSXM+	*****,1A09J,1A10N
1A08F	MDSXM-	*****,1B06D
1A08H	DSENB-	1A05K,*****,1B08D,1B09E,1B09N,1B09P
1A08K	TRDY2+	1A07K,*****
1A08L	TTYKM+	1A06D,*****,1B08L
1A08N	TDSXM-	1A07D,*****
1A08P	TMDS+	*****,1A08S
1A08R	TMDS-	*****,1A08V
1A08S	TMDS+	1A08P,*****
1A08V	TMDS-	1A08R,*****
1A09J	MDSXM+	1A08D,*****,1A10N
1A09K	TTYEN-	1B09S,1B08S,1B08K,1B09K,1B09H,1B09J,*****
1A09L	KBDM+	1B05D,1A05E,*****
1A09M	KBDM-	*****,1B08H,1B08J,1B08N
1A09R	TPM-	1A05P,*****,1B08U
1A09S	TDSRM+	*****,1B07H,1B07J
1A09T	TRDY1-	1A05M,*****
1A09U	TRDX1+	*****,1A10U
1A10F	RENB+	*****,1B05M
1A10H	RENBO+	*****,1B09R
1A10K	POMO+	1A05H,*****,1B08R
1A10L	POM+	*****,1B05H
1A10N	MDSXM+	1A08D,1A09J,*****
1A10P	TRDY1+	*****,1B06K
1A10R	SWIPE	*****
1A10U	TRDX1+	1A09U,*****
1B05D	KBDM+	*****,1A05E,1A09L
1B05H	POM+	1A10L,*****
1B05M	RENB+	1A10F,*****
1B06A	STD10+	*****
1B06C	STDGND	*****
1B06D	MDSXM-	1A08F,*****
1B06E	MDSRM-	*****,1B07S
1B06K	TRDY1+	1A10P,*****
1B07C	GTDSR-	*****,1B07D,1B07R
1B07D	GTDSR-	1B07C,*****,1B07R

***** PDP-8 TO TTY/103A ADAPTER *****

1B07E	TDSRM-	1A07E,*****
1B07H	TDSRM+	1A09S,*****,1B07J
1B07J	TDSRM+	1A09S,1B07H,*****
1B07R	GTDSR-	1B07C,1B07D,*****
1B07S	MDSRM-	1B06E,*****
1B07U	MDSRM+	1B08E,*****,1B07V
1B07V	MDSRM+	1B08E,1B07U,*****
1B08D	DSENB-	1A05K,1A08H,*****,1B09E,1B09N,1B09P
1B08E	MDSRM+	*****,1B07U,1B07V
1B08H	KBDM-	1A09M,*****,1B08J,1B08N
1B08J	KBDM-	1A09M,1B08H,*****,1B08N
1B08K	TTYEN-	1B09S,1B08S,*****,1B09K,1B09H,1B09J,1A09K
1B08L	TTYKM+	1A06D,1A08L,*****
1B08N	KBDM-	1A09M,1B08H,1B08J,*****
1B08P	DSENB+	1B09L,*****
1B08R	POMO+	1A05H,1A10K,*****
1B08S	TTYEN-	1B09S,*****,1B08K,1B09K,1B09H,1B09J,1A09K
1B08U	TPM-	1A05P,1A09R,*****
1B08V	TTYEN+	1B09D,*****
1B09D	TTYEN+	*****,1B08V
1B09E	DSENB-	1A05K,1A08H,1B08D,*****,1B09N,1B09P
1B09H	TTYEN-	1B09S,1B08S,1B08K,1B09K,*****,1B09J,1A09K
1B09J	TTYEN-	1B09S,1B08S,1B08K,1B09K,1B09H,*****,1A09K
1B09K	TTYEN-	1B09S,1B08S,1B08K,*****,1B09H,1B09J,1A09K
1B09L	DSENB+	*****,1B08P
1B09N	DSENB-	1A05K,1A08H,1B08D,1B09E,*****,1B09P
1B09P	DSENB-	1A05K,1A08H,1B08D,1B09E,1B09N,*****
1B09R	RENBO+	1A10H,*****
1B09S	TTYEN-	*****,1B08S,1B08K,1B09K,1B09H,1B09J,1A09K
1B09U	RDENB-	1A05S,*****,1B09V
1B09V	RDENB-	1A05S,1B09U,*****

***** PDP-8 TO TTY/103A ADAPTER *****

OUTPUT LISTS

LKBD	1A05F	SINGLE I/O OR TEST CONNECTION
LPTR	.1A05J	SINGLE I/O OR TEST CONNECTION
LTRDY1	1A05N	SINGLE I/O OR TEST CONNECTION
LTRDY2	1A05L	SINGLE I/O OR TEST CONNECTION
STD10+	1B06A	SINGLE I/O OR TEST CONNECTION
STDGND	1B06C	SINGLE I/O OR TEST CONNECTION
SWIPE	1A10R	SINGLE I/O OR TEST CONNECTION

***** PDP-8 TO TTY/103A ADAPTER *****

BAY 1 TO BAY 1, LEVEL 1

TMDS+	1	001	1A	08P	1A	08S
GTDSR-	1	001	1B	07C	1B	07D
DSENB-	1	001	1B	08D	1B	09E
TTYEN-	1	001	1B	09H	1B	09J
DSENB-	1	001	1B	09N	1B	09P
TRDY2+	1	002	1A	07K	1A	08K
TMDS-	1	002	1A	08R	1A	08V
TRDX1+	1	002	1A	09U	1A	10U
KBDM-	1	002	1B	08J	1B	08N
TTYEN-	1	002	1B	08K	1B	09K
TTYEN-	1	002	1B	08S	1B	09S
MDSXM+	1	003	1A	08D	1A	09J
RDENB+	1	003	1A	06M	1A	05T
DSENB+	1	003	1B	09L	1B	08P
TTYPM+	1	004	1A	06H	1A	05R
TTYKM+	1	005	1A	06D	1A	08L
TDSXM-	1	005	1A	07D	1A	08N
DSENB-	1	006	1A	08H	1A	05K
MDSRM-	1	006	1B	06E	1B	07S
MDSRM+	1	007	1B	08E	1B	07U
TTYEN+	1	008	1B	09D	1B	08V
TRDY1-	1	009	1A	05M	1A	09T
TPM-	1	009	1A	05P	1A	09R
TDSRM+	1	009	1A	09S	1B	07H
POMO+	1	010	1A	05H	1A	10K
KBDM-	1	010	1A	09M	1B	08H
KBDM+	1	011	1A	05E	1B	05D
TDSRM-	1	011	1A	07E	1B	07E
MDSXM-	1	012	1A	08F	1B	06D
TRDY1+	1	013	1A	10P	1B	06K
RENBO+	1	015	1A	10H	1B	09R
POM+	1	015	1A	10L	1B	05H
RDENB-	1	016	1A	05S	1B	09U
RENB+	1	019	1A	10F	1B	05M

***** PDP-8 TO TTY/103A ADAPTER *****

BAY 1 TO BAY 1, LEVEL 2

TDSRM+	2	001	1B	07H	1B	07J
KBDM-	2	001	1B	08H	1B	08J
TTYEN-	2	001	1B	09H	1B	09K
MDSRM+	2	001	1B	07U	1B	07V
RDENB-	2	001	1B	09U	1B	09V
MDSXM+	2	003	1A	09J	1A	10N
TTYEN-	2	003	1B	08K	1B	08S
DSENB-	2	004	1B	09E	1B	09N
GTDSR-	2	005	1B	07D	1B	07R
KBDM+	2	009	1A	05E	1A	09L
DSENB-	2	010	1A	08H	1B	08D
TTYEN-	2	011	1A	09K	1B	09J
TTYKM+	2	011	1A	08L	1B	08L
TPM-	2	014	1A	09R	1B	08U
POMO+	2	015	1A	10K	1B	08R

49 WIRES @.10 $4.90, @.15 $7.35

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TOTAL LENGTH OF WIRE 19

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R107	1	24.00
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1. ORIGINATING ACTIVITY (Corporate author)	2a. REPORT SECURITY CLASSIFICATION
THE UNIVERSITY OF MICHIGAN CONCOMP PROJECT	Unclassified
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3. REPORT TITLE

PDP-8 TO 103A DATAPHONE AND/OR ONLINE TELETYPE INTERFACE

4. DESCRIPTIVE NOTES *(Type of report and inclusive dates)*
Memorandum

5. AUTHOR(S) *(Last name, first name, initial)*

K.E. Burkhalter, Jr.

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
April 1968	20	

8a. CONTRACT OR GRANT NO.	9a. ORIGINATOR'S REPORT NUMBER(S)
DA-49-083 OSA-3050	Memorandum 16
b. PROJECT NO.	
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