TermiNet* DATA COMMUNICATION PRODUCTS

HONEYWELL INFORMATION SYSTEMS

LINE PRINTER INTERFACE (HIS) BOARD INSTRUCTION MANUAL

SECTION 1

INTRODUCTION

GENERAL INFORMATION

This publication discusses the Honeywell Information Systems Parallel Interface (HIS) circuit board, and any special printer considerations associated with it. The HIS board can be installed in a TermiNet 340 Family Line Printer to interface it to a data source (Central Processor Unit, CRT Terminal, Communications Controller, etc). Refer to the TermiNet 310/320/330/340 Line Printer Service Manual (GEK-49265) and Operator's Manual (GEK-49264) for general details on servicing and operating the Line Printer when the HIS Interface Circuit board is installed. Figure 1-3 illustrates a typical Honeywell Information Systems TermiNet 340 Line Printer.

NOTE

IN THE CASE OF CONFLICTING INFORMATION BETWEEN THIS PUBLICATION AND GEK-49265 AND/OR GEK-49264, THE INFORMATION FOUND HEREIN WILL BE MORE APPLICABLE TO HONEYWELL INFORMATION SYSTEMS TermiNet 340 LINE PRINTERS.

NAMEPLATE DATA

The nameplate attached to the Printer frame contains the model number and serial number of the Printer. The following discussion explains how to interpret the information which the model number and serial number contains.

MODEL NUMBER

The model number of the Honeywell Information Systems TermiNet 340 Line Printer is coded to indicate certain Printer configurations and options. The chart shown in Figure 1-1 below illustrates the model number code breakdown. As an example in interpreting the chart, assume a model number of: 3S3400FX015A21. Breaking this number down per the chart information yields the following information about the Printer: TermiNet 340 Printer, configured for 117V, 60 Hz power, with Carribean Blue painted pedestal accent panel and "Honeywell" control panel logo, with an HIS Interface circuit board, and with a vertical format unit.

GENERAL ELECTRIC

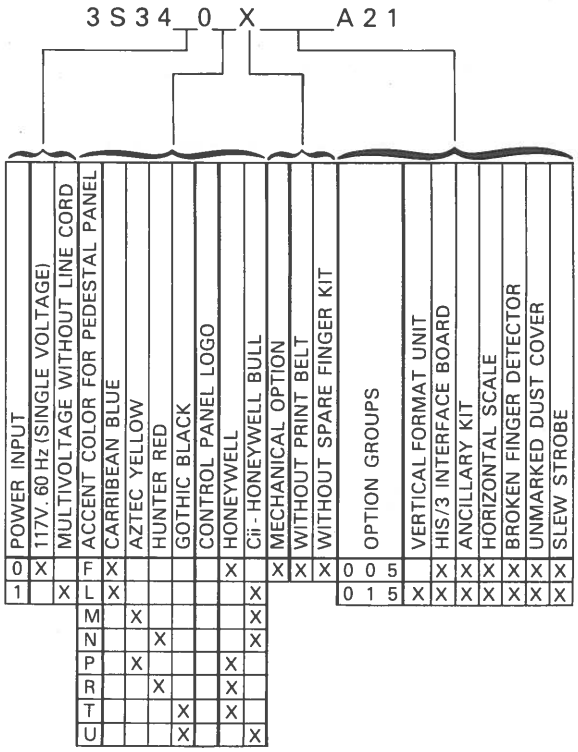


Figure 1-1 Honeywell Information System TermiNet 340 Printer Model Number Code Chart.

SERIAL NUMBER

The serial number of the Printer is a ten digit number broken down as illustrated in Figure 1-2.

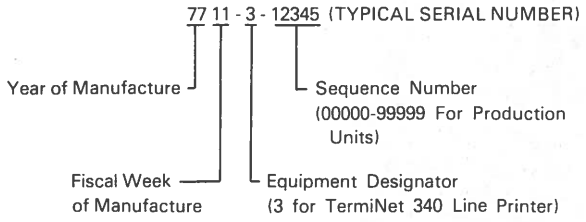


Figure 1-2 TermiNet 340 Line Printer Serial Number Breakdown

DESCRIPTION OF INTERFACE BOARD

The HIS circuit board is an unbuffered parallel interface with the part number of 44C417556-G03. The HIS requires a unique Printer control panel compatible to the functional operation of the board circuitry (see Operation Section for details).

The HIS board receives all data and control signals through a 25 pin connector. It contains logic to perform a parity check. It also contains decode circuitry to execute paper control commands such as line feed, vertical tabulation, form feed and slew. The HIS board also contains interface logic for other commands and status signals such as bell and low paper.

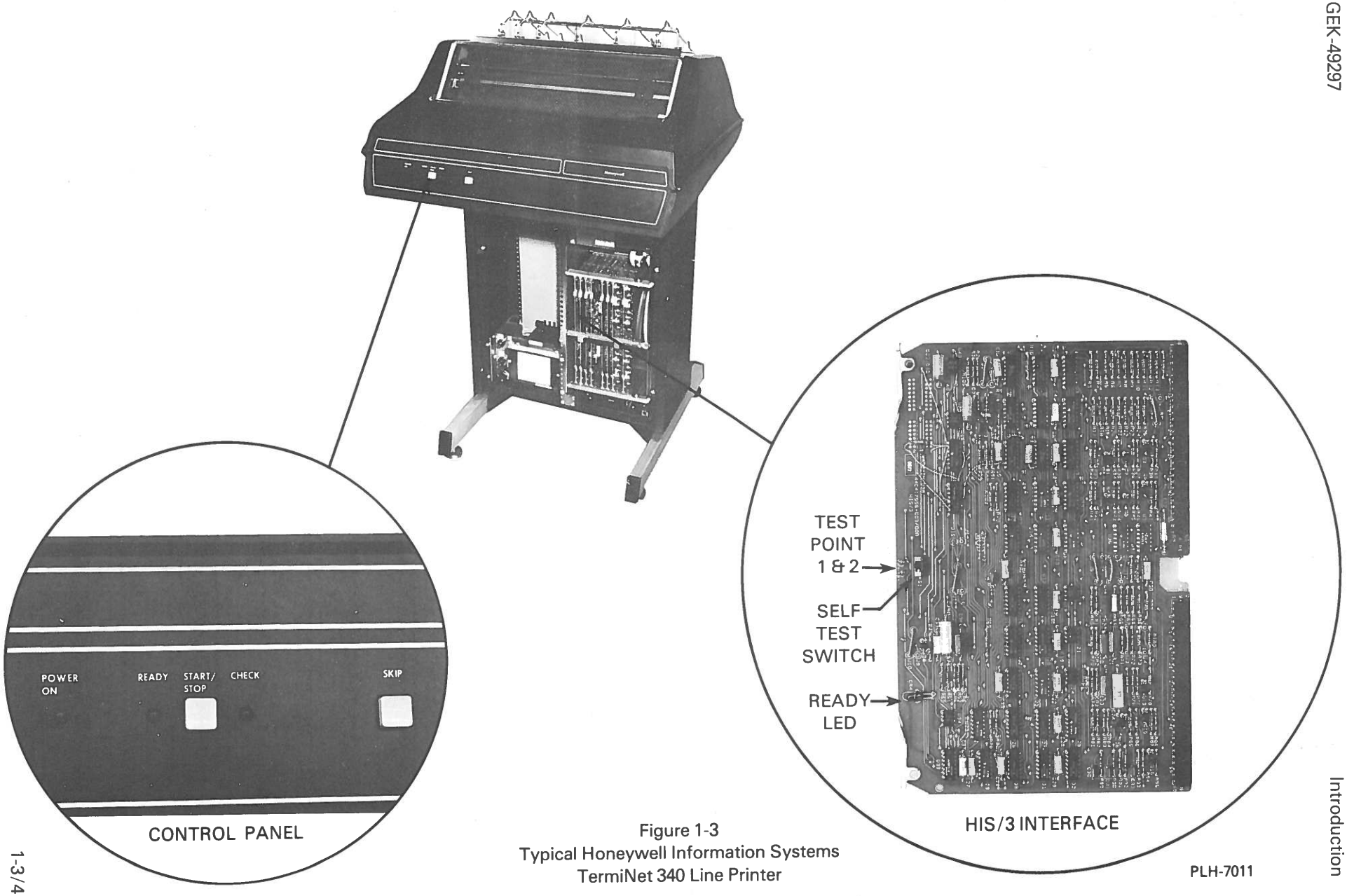


Figure 1-3
Typical Honeywell Information Systems
TermiNet 340 Line Printer

SECTION 2

INSTALLATION

The HIS circuit board is installed in the TermiNet Printer bustle slot labeled INT where it engages the Printer Mother Board. The data source is connected via an interconnecting cable to the Printer interface connector.

LINE PRINTER CHECKOUT

A Line Printer containing the HIS Interface board may be checked for proper operation by performing the following procedure.

1. Install paper in the Line Printer.

2. Turn the AC power switch on. The POWER ON indicator on the Control panel should turn on.

3. Enter the Printer into the Self Test Mode. Refer to Section 5 of this publication for details. Observe the Printer for proper printing action.

4. Remove the Printer from the Self Test Mode.

5. Tear off the paper where it enters the Printer. Turn the platen knob until the remaining paper clears the Printer mechanics. The Control Panel CHECK indicator should turn on.

6. Turn off the Printer AC power and reinstall the paper supply or special company forms.

NOTE

The remainder of the Printer check out requires a properly operating data source connected to the Printer.

7. Once the data source is prepared to send data to the Printer, it activates a Ready To Printer (RTP) signal on Pin 6 of the interface. When RTP is taken to a logic 1 state, the control panel READY indicator should turn on.

8. The control panel pushbutton switches provide signals to the data source. The Printer does not respond to these signals. Pressing the START/STOP pushbutton causes the Interrupt (INT) signal on pin 9 of the interface to change to a logic 1 state. Pressing the SKIP pushbutton causes the Answer (ANS) signal on pin 10 of the interface to change to a Logic 1 state.

NOTE

The following steps (9 and 10) are applicable only to units containing a Vertical Format Unit. These steps may be ignored if a VFU is not present.

9. Install a prepared VFU tape in the Printer (see the Printer Operator's Manual for preparation instructions).

10 With the proper form and the proper VFU tape installed in the Printer, data from the data source should cause the Printer to print at the correct places on the form.

SECTION 3

OPERATION

Operation of the TermiNet Line Printer is described in GEK-49264; however, certain control panel functions differ where the HIS parallel interface circuit board is employed. The illustration shown in Figure 3-1 shows the function of each panel switch and light in the HIS panel configuration.

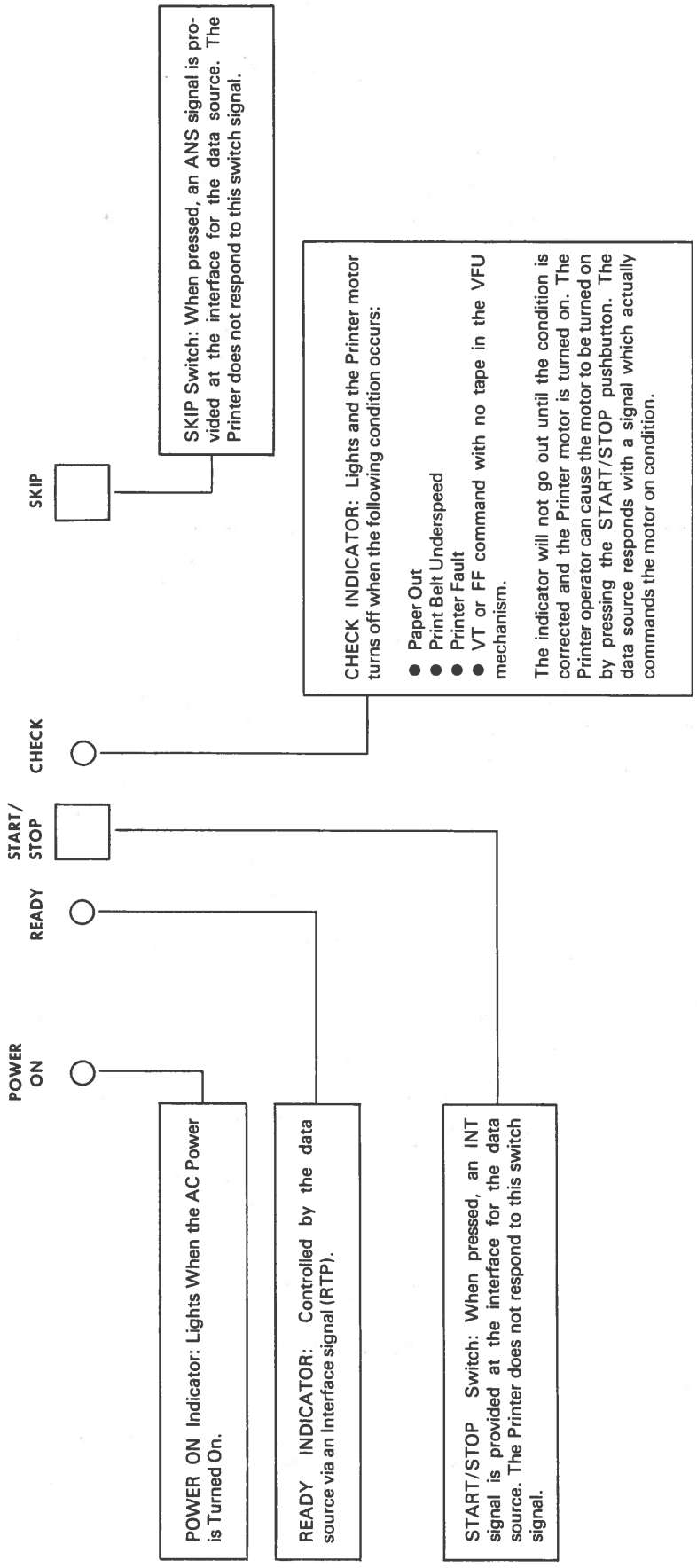


Figure 3-1. TermiNet Line Printer/HIS Interface Control Panel Functions.

SECTION 4

PRINCIPLES OF OPERATION

Detailed operation of the HIS Interface circuit board is described in the following paragraphs. This discussion is based upon the block diagram illustrated in Figure 4-1.

The Printer will receive one full line of data at the maximum transfer rate of 60,000 characters/sec. After the full line of data has been received by the LOG board from the HIS board, the LOG board will send a busy signal to the data source via the HIS board. During this "busy" time, the Printer will execute any paper feeding commands received via the first character received in the line of data, print the line of data, and execute a linefeed. While the linefeed is being executed, another line of data may be entered from the data source.

The actual data will enter the data line driver on the HIS board in parallel form over the eight lines $\overline{D1}$ -$\overline{D8}$. The data will be sent from the data line driver to the parity error detect circuit and the decode circuit as $\overline{D1}$ - $\overline{D8}$. Additionally, the data will go to the LOG Board, as $\overline{DB1}$ - $\overline{DB7}$.

If a character is received having a parity error, the parity generator will generate the PER signal which is used to inform the data source of the erroneous character. The PER signal is reset when the TRAN signal is taken to a logic 1 in preparation for sending a line of data.

The first character in each line of data is concerned with controling paper movement; however, if the motor is off, the first character may also be used to initiate the motor on sequence. The decode circuits are enabled for only the first character by the first character enable signal (FC). Along with each character, a strobe signal is received from the data source. A strap is in place to allow only positive going data strobes. The data strobe passes through a 2µs delay circuit and fires a 5 µsec one shot. This 5 µsec signal is called DS. Assuming that the first character is a valid paper moving code, the decode circuit will output the appropriate paper movement command (LF, FF, VT, or slew) to the Printer. A series of gating circuits are used so that only the appropriate decoded signal will cause the desired paper action to occur. The First Character (FC) signal is also sensed by the slew gate along with $\overline{D7}$. If D7 is a logic 1 (for the first character), the Slew Strobe (SSTB) will turn on. During First Character time, the Data Strobe to buffer (DSTB) which is used to clock data on lines $\overline{DB1}$ - $\overline{DB7}$, is inhibited. Also, DSTB will be inhibited anytime D6 and D7 are both a logic 0 (control characted). This means that no control codes or paper control codes are able to enter the Printer memory. Whenever the first character is a paper slew command ($\overline{DB7}$ = logic 0), the Slew Strobe (SSTB) will be sent to the LOG board so that $\overline{DB1}$ through $\overline{DB6}$ of that character can be clocked into the slew counter. This in turn will determine how many lines (up to 63) of paper will be slewed.

CONTROLS

The HIS board contains several control circuits to control Printer action from the data source or to inform the data source of certain Printer actions.

TRANSFER (XFR) AND READY FROM PRINTER (RFP)

The Transfer signal (XFR) is derived from the TRAN signal (pin 23) which is sent to the Printer from the data source. The XFR signal, in turn, enables the Ready From Printer (RFP) signal (pin 20) provided that the alarm, low voltage, or test conditions do not exist. A strap is in place to make RFP low when the Printer cannot receive data. The RFP signal is used to inform the data source that the Printer is ready for data. The RFP signal is used to light the READY LED indicator on the HIS board. The RFP signal will cause the data source to begin transferring data to the Printer. When a full line of data has been clocked into the Printer memory, the signal $\overline{FC}$ derived from Full Count (FCNT) will turn off XFR which will in turn cause RFP to turn off. This will cause the data source to go busy until the Previous line of data has been printed. After the line of data has been printed, the signal IPC which is derived from Print Complete (PC) will enable XFR and RFP which will again signal the data source to start transferring more data. When the data source has less than a full line of data to send, the data source will send the signal TRAN following the last character in the data line. This will turn off XFR and RFP causing the received data to be printed.

MOTOR ON

The motor will automatically turn on upon receipt of data or TRAN signal from the data source. Since the paper control character may be received by the Printer when the motor is off, this character may be used to initiate the motor on sequence.

MOTOR OFF

The motor will turn off approximately one minute after the last printing action occurs.

BELL SIGNAL (BEL)

The Printer bell will sound upon receipt of a signal on the BEL input line (pin 22) of longer than 2 μs in duration.

For multiple bell ringing, the pulses from the data source must be at least 500 ms apart.

READY TO PRINTER (RTP)

When the RTP lead (pin 6) from the interface to the Printer is a logic "1", the READY indicator on the Printer control panel will light.

INTERRUPT (INT)

The signal INT (pin 9) will be sent to the data source after the START/STOP pushbutton is pressed on the Printer control panel and the generated switch signal is debounce conditioned.

ANSWERBACK (ANS)

The signal ANS (pin 10) is sent to the data source after the pushbutton is pressed on the Printer control panel, and the generated switch signal is debounce conditioned.

LOW PAPER (LPFP)

The signal LPFP (pin 25) is sent to the data source when the low paper switch on the Printer senses the absence of paper.

ACKNOWLEDGE (ACK)

The signal ACK (pin 13) is sent to the data source after each character has been received by the Printer logic board. This signal will limit data transfer to one character every 14 to 20 μs. A maximum data transfer rate of 60,000 cps is possible when the ACK signal is not used.

MOTOR OR FEEDING (M/F)

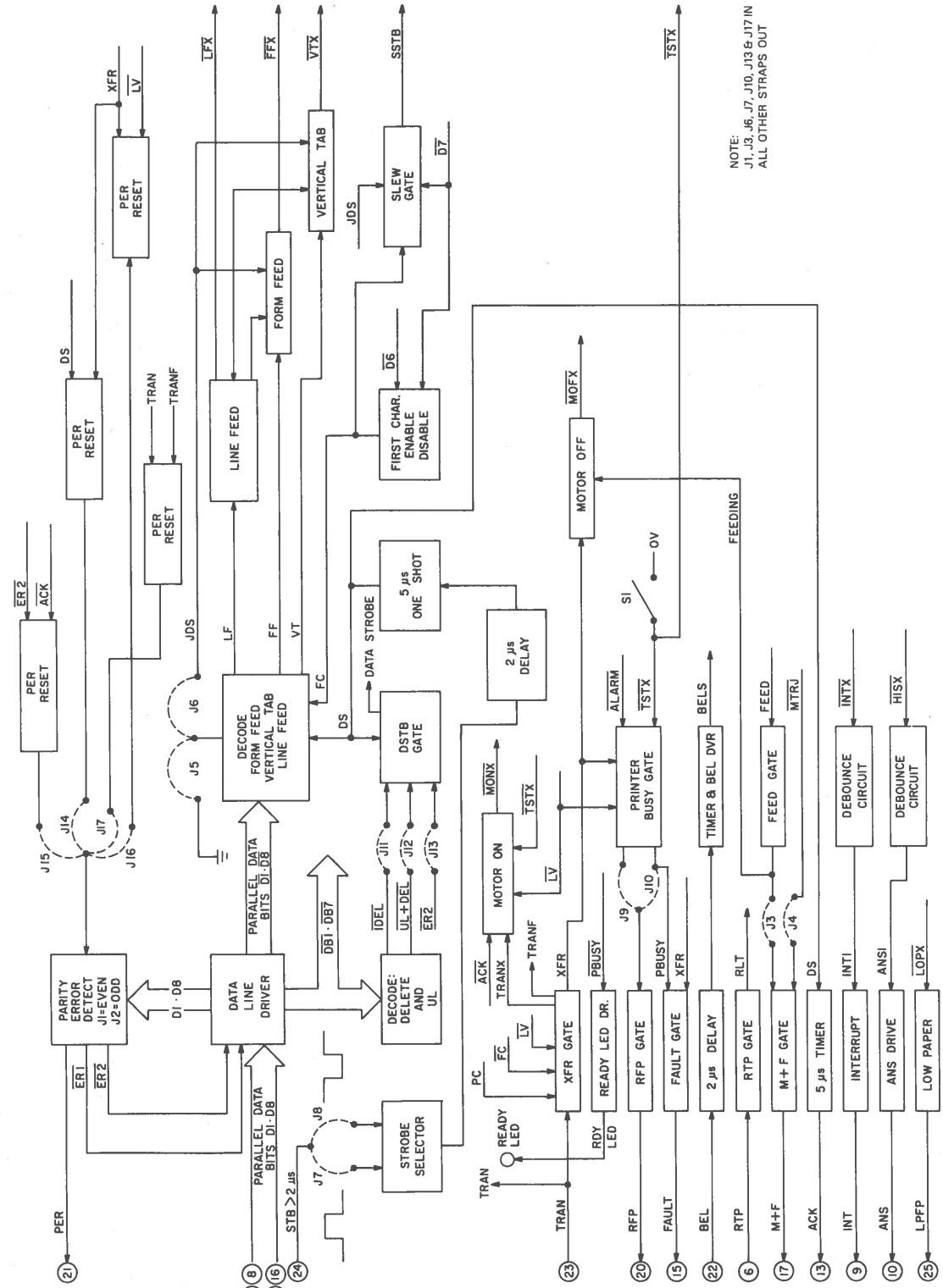
Motor or Feeding (M + F signal (pin 17) is used to signal the data source on the status of the Printer. Depending on the strapping arrangement used on the HIS board, the data source can be informed through M + F lead when paper is in motion or when the motor is off.

FAULT

A fault signal (pin 15) is generated and sent to the data source when an alarm condition exists, or Printer voltage is too low.

TEST

A board mounted switch (S1) will cause the Line Printer to enter the self test sequence. When the switch is energized, the TSTX Signal is taken to a logic 0 and applied to the Line Printer Logic board.



PLH - 7010

Figure 4-1
HIS/3 Interface Board Block Diagram

SECTION 5

MAINTENANCE

PREVENTIVE

There are no special preventive maintenance precautions which concern the HIS Interface board, or the Printer when the HIS board is installed in it.

TROUBLESHOOTING

STATUS INDICATOR

The HIS board contains one LED status indicator. This board mounted LED is a READY indicator.

When the HIS is in the transfer cycle, and data can be strobed across the interface, the LED will be on. When a print cycle is commanded, the LED will turn off and stay off for as long as the print cycle is held active. The LED will be off whenever the interface is busy to the data source. This includes times such as Printer test, alarm, etc. conditions.

INTERFACE SIGNALS

The table below (Table 5-1) illustrates the pin assignments of the Interface connector between the data source and the Printer.

The signal levels of the Interface are as follows:

LOGIC 1 2.4V to 5.5V Load≤400 μa
LOGIC 0 0.5 to 0.4V Sink≤16 ma

TABLE 5-1

INTERFACE CONNECTOR PIN ASSIGNMENTS

SIGNAL ROUTING	CONNECTOR PIN NO.	SIGNAL NAME	SIGNAL DESCRIPTION	SIGNAL LOGIC STATE (WHEN ACTIVE)
SIGNALS TO PRINTER	24	STB	Data Strobe	Logic 1 Pulse ≥ 2 μsec wide reoccurring no more often than 17.5 μsec.
	11	D1	Data Bits	Taken to a Logic 0 level or held at a Logic 1 level depending upon ASCII character being sent and for as long as the STB signal is active.
	2	D2		
	3	D3		
	8	D4		
	18	D5		
	12	D6		
	14	D7		
	16	D8		
	6	RTP	Ready to Printer	Taken to a Logic 1 level whenever the data source wants the READY control panel LED to turn on
	23	TRAN	Transfer	Taken to a Logic 1 level when data is being strobed across the interface. Switched to a logic 0 to initialize printing.
	22	BEL	Bell	Logic 1 pulse ≥ 2 μsec wide. Causes Printer bell to ring once. Multiple bell rings are possible when BEL pulses occur at least 500 msec. apart.

TABLE 5-1 continued

SIGNAL ROUTING	CONNECTOR PIN NO.	SIGNAL NAME	SIGNAL DESCRIPTION	SIGNAL LOGIC STATE (WHEN ACTIVE)
SIGNALS FROM PRINTER	5	PON	Power On	Logic 1 signal when Printer AC power is turned on.
	9	INT	Interrupt	Logic 1 signal. Becomes active when START/STOP control panel pushbutton is pressed.
	10	ANS	Answer	Logic 1 signal. Becomes active when SKIP control panel pushbutton is pressed.
	13	ACK	Acknowledge	Logic 1 pulse generated by the receipt of each data character at the HIS board from the data source.
	15	FAULT	Printer Fault	Logic 1 signal. Active whenever the Printer experiences an alarm or low voltage condition.
	20	RFP	Ready From Printer	Active when Printer is ready to accept data from the data source.
	21	PER	Parity Status	Logic 0 signal when data is received with good parity. Switches to Logic 1 to indicate bad parity on received data. Printer action determined by strap placement.
	17	M + F	Paper Motion and Printer Motor On	Logic 1 signal when: 1. Printer is moving paper. 2. Printer motor is on.
	25	LPFP	Low Paper Status From Printer	Logic 1 signal when Printer experienced a low paper condition.
	1	FRAME GROUND		Chassis Ground.
	7	SIGNAL GROUND		0 Volts.

TEST MODE

The HIS circuit board has a provision for placing the Printer into the self test mode. By sliding the board mounted slide switch to the on position, the Printer self test mode can be energized.

It should be noted that this is the only way in which HIS equipped Printers can be placed in the self test mode. There is no control panel switch available to command this self test function.

CIRCUIT BOARD STRAPPING

The strapping available on the HIS board allows the Printer to interface into a specific hardware and software requirement. The following chart (Table 5-2) discusses the HIS board strapping. Any straps not shown on Table 5-2 are not installed on the circuit board.

TABLE 5-2
HIS BOARD STRAPPING

DESCRIPTION OF STRAP FUNCTION	STRAP REQUIRED
Determines Even Parity Checking	J1 IN
Paper Motion Information Conveyed When M + F Status Signal Equals Logic 1	J3 IN
Determines Normal Printer Response to Form Feed, Vertical Tab or Vertical Slew Commands	J6 IN
Sets a Logic 1 State for Data Strobe	J7 IN
Sets a Logic 0 State for Ready Signal When Printer Cannot Receive Data	J10 IN
No Character Printed When Parity Error is Detected	J13 IN
PER Signal Reset by Negative to Positive Transition of TRAN Signal	J17 IN

REPLACEMENT PARTS

In addition to the standard Printer parts detailed in the Illustrated Parts Manual, GEK-49266, certain parts are unique when the HIS circuit board is used.

These parts are as follows:

Control Panel Assembly	44C414621-G05
Control Panel Circuit Board (LCP/3)	44C417530-G03
HIS Interface Board	44C417556-G03
Wiring Harness for Printers with HIS Interface Board	44D415861 with 44A419929-005 Wire routing

SERVICE DRAWINGS

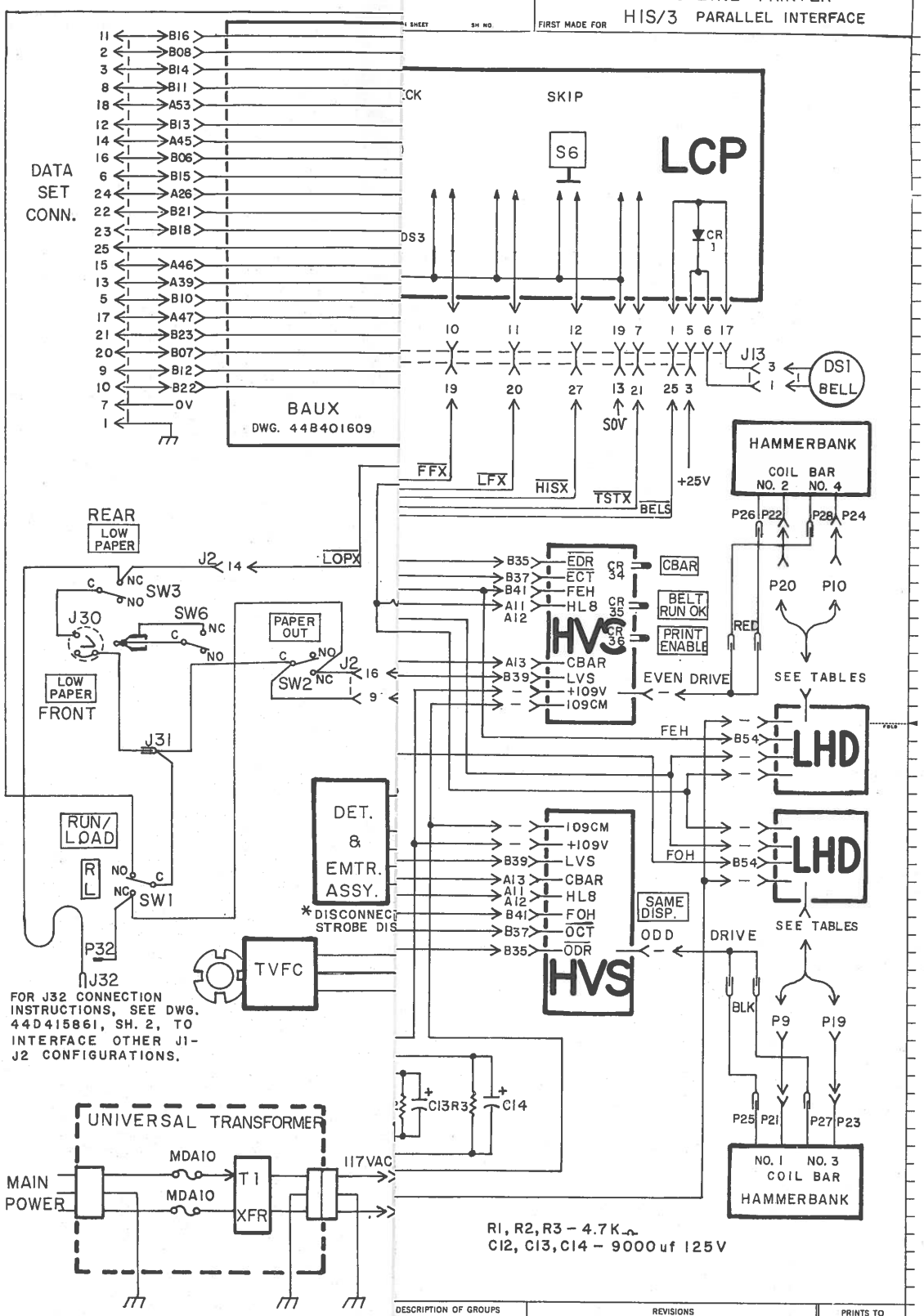
Standard service drawings for the TermiNet 340 Line Printer are contained in GEZ-5787. The HIS circuit board wiring diagram is contained herein.

Interconnection Diagram HIS Interface Circuit Board	44D401706, Sh. 2

GENERAL ELECTRIC

TITLE TERMINET 340 LINE PRINTER

FIRST MADE FOR HIS/3 PARALLEL INTERFACE



DESCRIPTION OF GROUPS	REVISIONS	PRINTS TO

APPROVALS

W. F. Edwards
Jan 23, 1978

DCPD Training DIV. OR DEPT.
Waynesboro, Va. LOCATION

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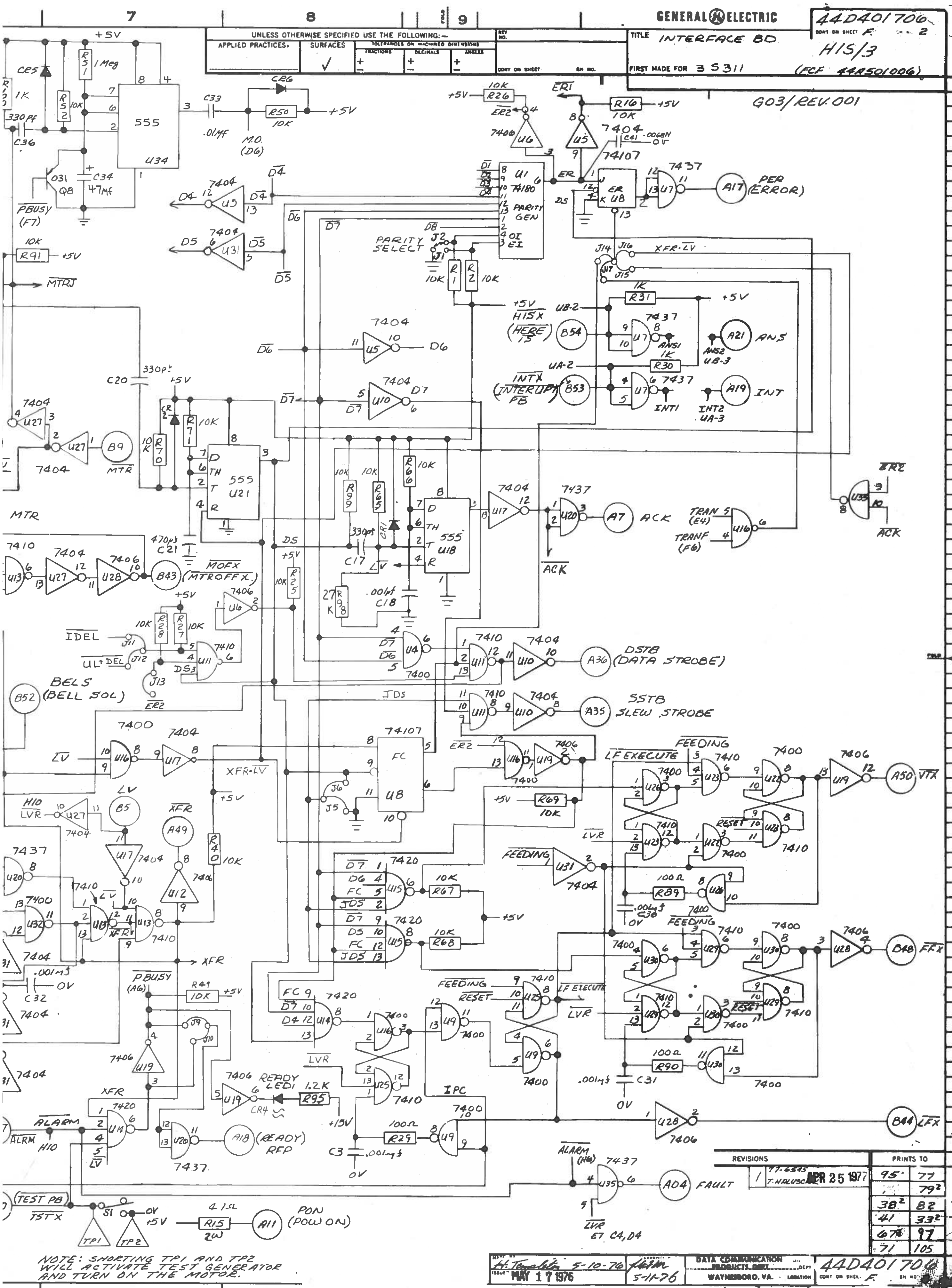

GENERAL ELECTRIC
44D401706
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UNLESS OTHERWISE SPECIFIED USE THE FOLLOWING:
APPLIED PRACTICES
SURFACES
TOLERANCES ON MACHINED DIMENSIONS
FRACTIONS
DECIMALS
ANGLES
TITLE INTERFACE BD
H/S/3
FIRST MADE FOR 3S311
(FCF 44A501006)
G03/REV.001
555
U34
74180
PARITY GEN
PARITY SELECT
PER (ERROR)
ANS
INT
HISX (HERE)
INTX (INTERUPT PB)
MTRJ
MTR
MOFX (MTROFFX)
IDEL
UL+DEL
BELS (BELL SOL)
ACK
TRAN (E4)
TRANF (F6)
DSTB (DATA STROBE)
SSTB SLEW STROBE
74107
FC
U8
XFR·LV
LF EXECUTE
FEEDING
RESET
VTX
FFX
LFX
IPC
READY LED
READY RFP
ALARM
ALRM
FAULT
TEST PB
TSTX
PON (POW ON)
PBUSY
NOTE: SHORTING TP1 AND TP2 WILL ACTIVATE TEST GENERATOR AND TURN ON THE MOTOR.
REVISIONS
1 77-6595 T.HALUSCAK APR 25 1977
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H. Templeton 5-10-76
ISSUED MAY 17 1976
5-11-76
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