

LP1200-1
LOOP POWER SUPPLY

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LP1200-1

LOOP POWER SUPPLY

The LP1200-1 is a special version of the LP120/LP1200 Loop Power Supplies specifically designed to be used with the HAL ST-8000 HF MODEM and a Seimens T-1000 Polar Loop Teleprinter. The receive data output to the printer is +/- 80VDC @ 20 ma. The transmit data input from the keyboard will accept polar voltages up to +/- 80VDC @ 20 - 60 ma. Either an isolated 4-wire or common return 3-wire teleprinter data connection may be used. The interface to the ST-8000 HF MODEM is RS-232C data to the ST-8000 Terminal Data Connector. The LP1200-1 includes an internal relay that may be used to switch printer motor power ON and OFF. The motor relay is controlled by a front panel switch or automatically by the ST-8000 motor control timer circuit. The LP1200-1 is wired for operation from 200-240 VAC, 50/60 Hz power mains. The LP1200-1 cabinet is the same style and size as the ST-8000 HF MODEM.

1.0 UNPACKING AND INSPECTION

Carefully inspect the packing carton and LP1200-1 for shipping damage when unpacking. Any damage should be reported immediately to the shipping carrier. All claims must be made to the shipping carrier, not to HAL Communications. The following items are included in the shipping carton:

900-12001	LP1200-1 Loop Power Supply
870-12001	LP1200-1 Manual
333-17250	AC Power Cord
960-12001	Jumper Wire
960-08120	ST-8000 to LP1200 Data Cable

2.0 INSTALLATION

Installation of the LP1200-1 involves four steps: (1) connection to the ST-8000, (2) connection to the teleprinter data circuits, (3) connection to the teleprinter motor circuit, and (4) installation in the station rack.

2.1 ST-8000 Connections

Refer to Section 2.4.5 (page 36) of the ST-8000 OPERATOR'S MANUAL. The referenced 960-08120 cable is provided with the LP1200-1. Connect one end of the data cable to the "TERMINAL DATA" connector on the ST-8000 and the other end to the "ST-8000" connector on the LP1200-1. Since it is intended that the ST-8000 and LP1200-1 be mounted one above the other, this cable is intentionally short. The user may elect to make a longer cable if required for his installation, but care should be taken to avoid pick-up of stray RF from the radio transmitter. Custom cables with lengths up to 10 feet are available for purchase from HAL Communications. Be sure to tighten the retaining screws on both ends of the cable. Connect a SEPARATE ground wire between the ground terminals of the ST-8000 and LP1200-1.

2.2 Teleprinter Data Circuit Connections

The T-1000 printer and keyboard circuits may be supplied as either isolated 4-wire connections or a 3-wire circuit with a common signal return between keyboard and printer. The LP1200-1 may be used with either version of the T-1000.

2.2.1 3-Wire Connection

As received, the LP1200-1 has a jumper wire (960-12001) connected between the negative (-) PNTR and negative (-) KBD screw terminals. Leave this jumper in place for a 3-wire T-1000 connection. Connect the T-1000 common lead to one of the jumpered negative terminals (-PNTR or -KBD). Connect the printer data wire to the +PNTR screw terminal and the keyboard data wire to the +KBD terminal. Also be sure to connect a SEPARATE wire ground between the T-1000 chassis and the ground terminal of the LP1200-1. These are the only data connections required to the T-1000 teleprinter.

2.2.2 4-Wire Connection

If the T-1000 teleprinter has four separate wires for connection to the printer and keyboard circuits, REMOVE the jumper between the -PNTR and -KBD screw terminals. Connect the two printer wires to +PNTR and -PNTR terminals. Connect the two keyboard wires to +KBD and -KBD terminals. Connect a SEPARATE ground wire between the T-1000 chassis and the LP1200-1 ground terminal. These are the only data connections required.

2.3 Motor Connection

This is an optional feature for control of the T-1000 motor power circuit. The user may wish to temporarily skip installation of this feature until proper operation of the data circuit is assured. When the printer motor is wired to the LP1200-1, the motor power may be manually controlled by the LP1200-1 front panel switch (MOTOR ON - OFF) or automatically by the ST-8000 motor control circuitry (MOTOR - AUTO).

The LP1200-1 is wired for nominal 220VAC power mains. The relay-switched motor output is also 220VAC. The motor circuit should be fused AT THE T-1000 - the LP1200-1 fuse does NOT protect the motor power circuit. Motor power connections are made to a three terminal barrier strip INSIDE the LP1200-1 cabinet. The top cover of the cabinet must be removed to make these connections.

CAUTION USE EXTREME CARE WHEN CONNECTING TO THE INTERNAL
MOTOR POWER TERMINAL STRIP. BE SURE THAT ALL
POWER IS TURNED OFF AND DISCONNECTED FROM THE
LP1200-1 AND T-1000 BEFORE CONNECTING THE PRINTER
MOTOR.

Route the printer motor power cable through the strain-relief provided on the LP1200-1 rear panel (labeled "MOTOR"). Connect the "safety" ground motor wire (usually green) to the GREEN terminal of the barrier strip (center terminal). Connect the other two power wires (usually black and white, black and red, or black and black) to the BLACK and WHITE screw terminals. As noted in sections 2.2.1 and 2.2.2, be sure that a SEPARATE ground wire is used to connect the chassis of the T-1000 teleprinter to the LP1200-1 ground terminal. When the motor connections are complete, re-install the LP1200-1 top cover before applying power.

2.4 Physical Installation

The LP1200-1 is designed to be rack or table mounted in close proximity to the ST-8000. The LP1200-1 may be placed either directly above or below the ST-8000. Be sure that air flow to the cooling holes in the ST-8000 and LP1200-1 top and bottom covers is not obstructed. The LP1200-1 generates very little heat (less than 10 Watts).

3.0 INITIAL TESTING

Due to the polar nature of the data connections, there is a finite probability that either or both the PNTR and KBD data polarities may be reversed when first connected. This is easily tested by connecting the ST-8000, LP1200-1, and T-1000 to a radio receiver.

3.1 Printer Polarity

Connect the ST-8000 AUDIO INPUT to the receiver audio output and tune-in a teletype signal of known polarity and content. Adjust the ST-8000 NORMAL/REVERSE switch to obtain correct print-out. If correct print is obtained when the ST-8000 set to REVERSE, the polarity of the LP1200-1 PNTR connections should be reversed. Before making any changes, check that the receiver sideband (LSB) and ST-8000 tones (Mark = lower frequency) are set correctly. To change the LP1200-1 printer polarity, interchange BOTH PNTR screw terminal connections. This may be done for either the 3-Wire or 4-Wire T-1000 connections and includes movement of the jumper wire to the +PNTR terminal.

3.2 Keyboard Polarity

AFTER the printer polarity has been correctly set as described above, connect the ST-8000 AUDIO INPUT to the ST-8000 XMTR AUDIO OUTPUT and set the ST-8000 to TX-ON. Set-up the ST-8000 to send and receive the same tone frequencies for MARK and SPACE. Type some text on the T-1000 keyboard. If the text is printed correctly on the T-1000, the KBD polarity is correct. If not, reverse the connections to the +KBD and -KBD LP1200-1 screw terminals (including the jumper wire if used).

3.3 Other Tests

The LP1200-1 should now function correctly for both receive and transmit data. There are NO other adjustments to be made to the LP1200-1. Loop current and voltage are fixed internally in the LP1200-1 and are not user-adjustable.

4.0 OPERATION

The LP1200-1 serves as a data level converter and its operation is normally transparent to the user. The LP1200-1 must be turned ON whenever the ST-8000 is used to drive the T-1000 teleprinter. The front panel MOTOR switch may be used as desired to provide Motor ON, OFF, or AUTOMatic control by the ST-8000.

The ST-8000 has a three-step control of printed data when automatic motor control is used. Upon loss of a valid RTTY signal, the PRINT SQUELCH sets the data to continuous MARK condition (MARK-hold). Use the front panel PRINT SQUELCH to set this threshold, indicated by the PRINT ST-8000 LED. Second, the AGC SQUELCH forces a MARK-hold approximately 5-10 seconds after loss of signal strength. This threshold is set by the ST-8000 DIVERSITY control, indicated by the "A" LED. Finally, the motor control circuit turns the printer motor OFF approximately 20 seconds after PRINT SQUELCH or AGC SQUELCH go to the no signal condition. Thus, the motor power is maintained if PRINT SQUELCH or AGC SQUELCH are set so that a weak signal causes rapid ON-OFF switching of the MARK-hold feature. Also, the motor will stay turned ON during the short breaks of signal as one station turns OFF and another turns ON.

If two ST-8000 HF MODEMS are connected for diversity, the printer motor will not be automatically turned OFF unless BOTH ST-8000's go to a no-signal condition. This assures that print will be obtained from the diversity system, even if one channel completely fades out for a long period of time.

5.0 CIRCUIT DESCRIPTION

The schematic diagrams of the LP1200-1 are shown in Figures 1 through 4. The location of the on-board jumpers and those used in the LP1200-1 are shown in Figure 5. Do NOT change these jumpers as they have been specially configured for the custom requirements of the LP1200-1. The LP1200-1 uses a circuit board and circuitry that is common to many variations of the LP120 and LP1200 models required to support various polar and non-polar loop situations. Only a portion of the part locations on the circuit board are used for a given variation.

The LP1200-1 includes six internal power supplies: (1) a ± 80 VDC (open circuit voltage) loop supply, (2) and (3) ± 12 VDC regulated, (4) and (5) ± 6 VDC regulated, and (6) $+5$ VDC regulated supplies. The low-voltage outputs are required to assure compatibility with RS-232C, MIL-188, and TTL-level logic signals.

RS-232C data from the ST-8000 RXD output is converted to TTL logic levels in stage U7, a type 1489 line receiver IC. The TTL signal is then converted to a balanced or "push-pull" logic signal in stage U6, a 7406 IC. The balanced TTL data signal then drives identical optically-isolated high-voltage switches (U3 and U4). This produces a data output that is switched between $+80$ V and -80 V for MARK/SPACE conditions. A power resistor between this switched signal and the $+PNTR$ rear panel screw terminal sets the loop current to ± 20 ma. The $-PNTR$ terminal connects to the common return of the high-voltage loop power supply. No other connections are made to the high-voltage power supply and it is completely isolated from the logic circuits and the KBD circuit by the optically-isolated HV switches.

Polar high-voltage and current-limited data from the T-1000 keyboard is connected to the $+KBD$ and $-KBD$ rear panel terminals. Two optical-isolators (U1 and U2) sense this polar signal and provide TTL-level data signals that are converted to RS-232C levels in stage U5, a 1458 line driver. This RS-232C signal then drives the TXD input of the ST-8000.

The motor control signal from the ST-8000 is the collector output of a power NPN switch transistor (motor ON = low impedance to ground). This output controls the motor power relay as does the manual LP1200-1 front panel MOTOR switch. The motor relay switches BOTH sides of the AC power line to the motor.

The LP1200-1 is powered through a rear panel 0.5 Amp, slow-blow fuse. This fuse protects ONLY the LP1200-1 circuitry and NOT the motor power circuit. Motor power fuse protection should be provided in the T-1000 or external to the LP1200-1. The LP1200-1 operates from AC power mains of 200 to 250 VAC, 50 to 60 Hz. The LP1200-1 is housed in a 3.5" high x 17" wide x 14" deep cabinet, identical in style and size to that of the ST-8000. The cabinet is supplied for either table or 19" equipment rack mounting.

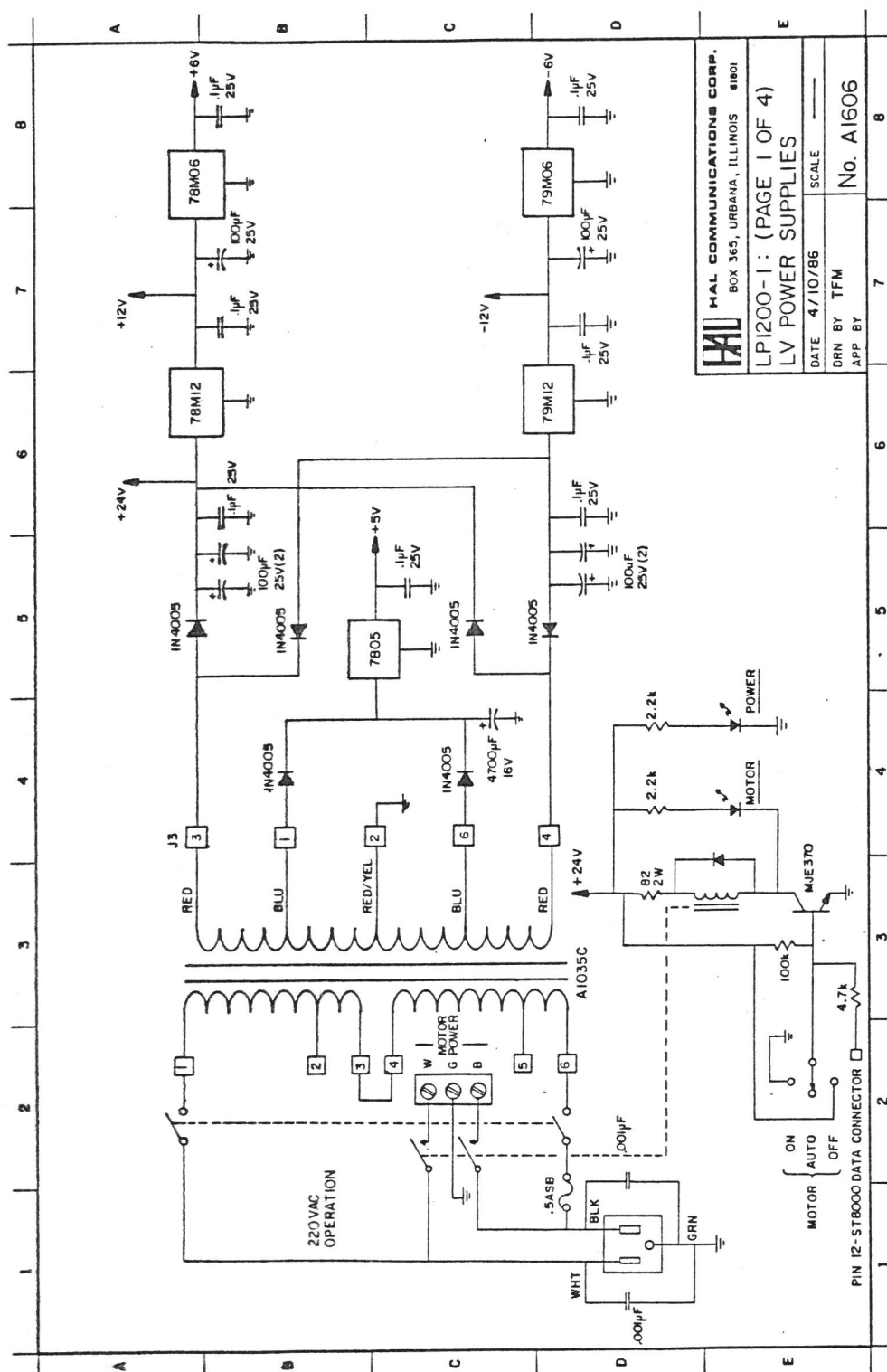


Figure 1. LP1200-1 LV Power Supplies

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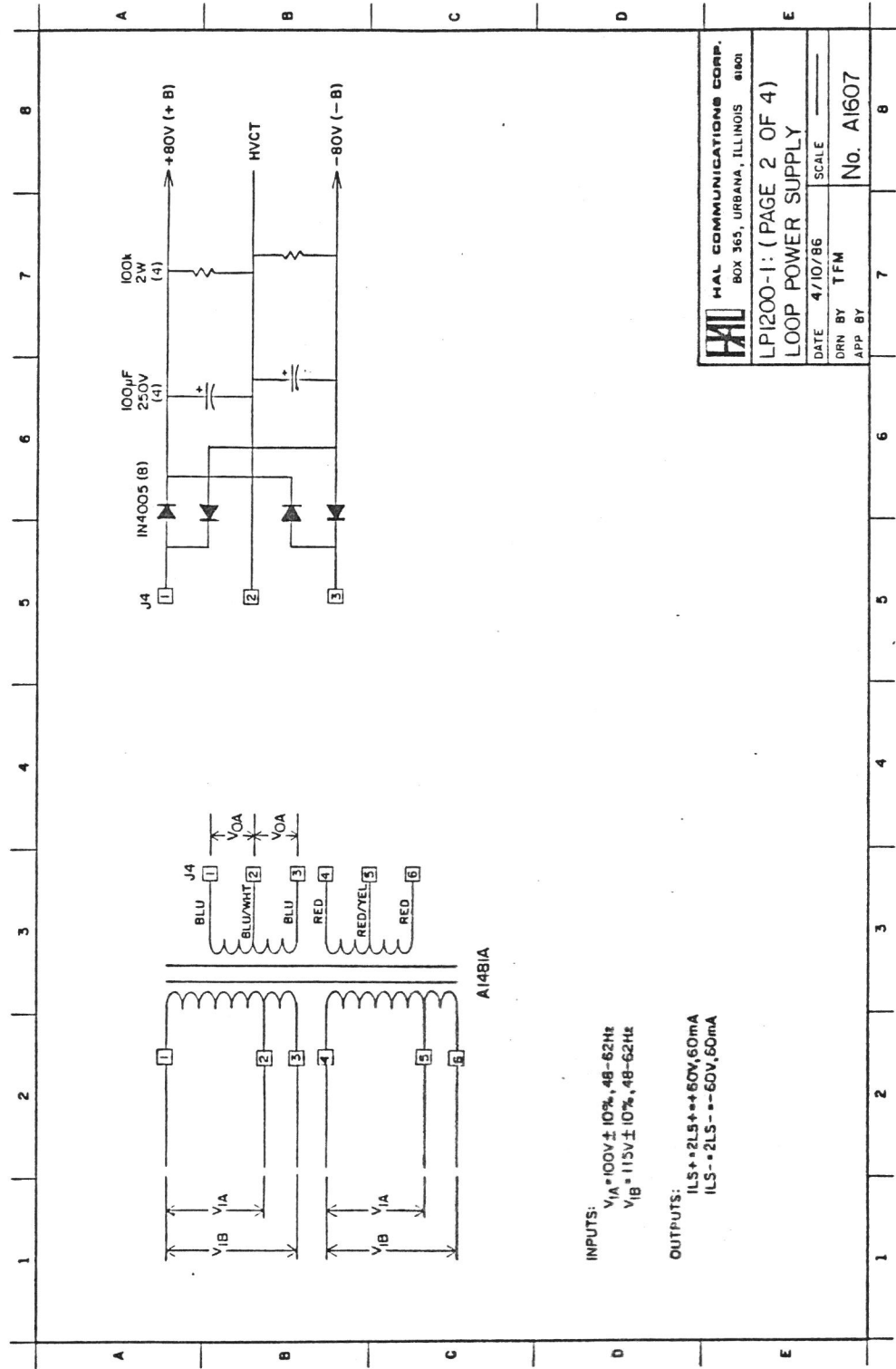


Figure 2. LP1200-1 Loop Power Supply

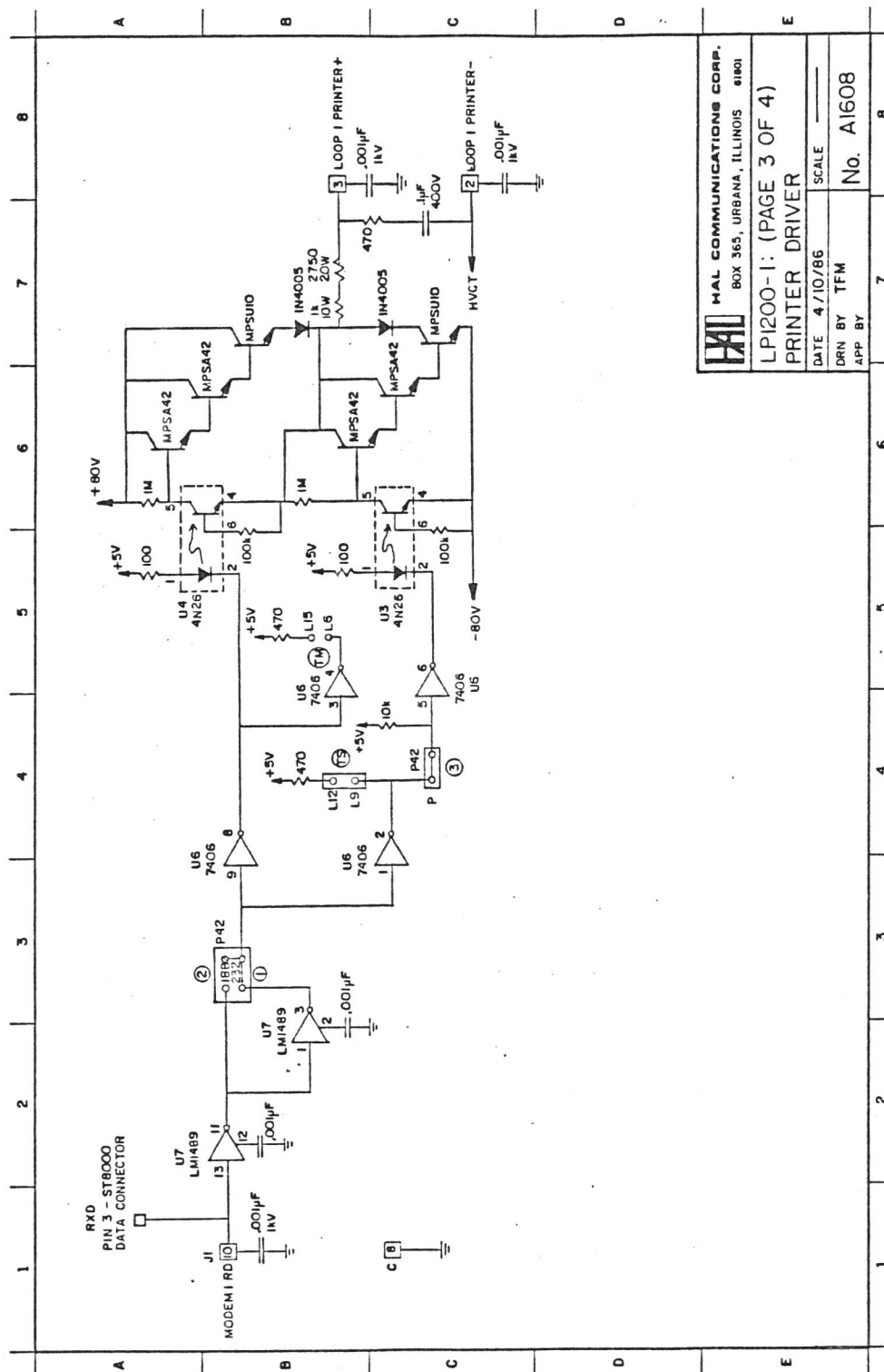


Figure 3. LP1200-1 Printer Driver

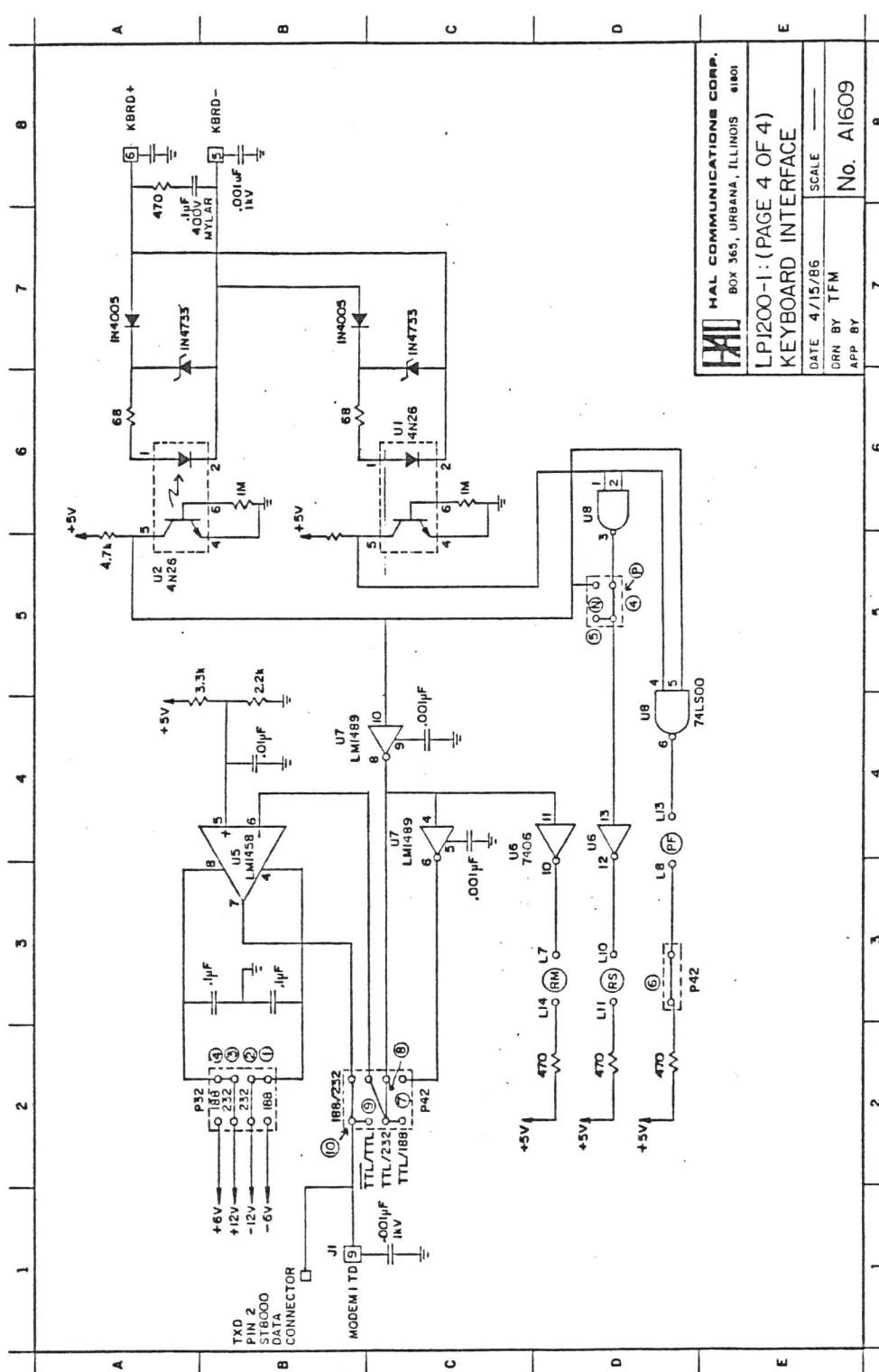


Figure 4. LP1200-1 Keyboard Interface

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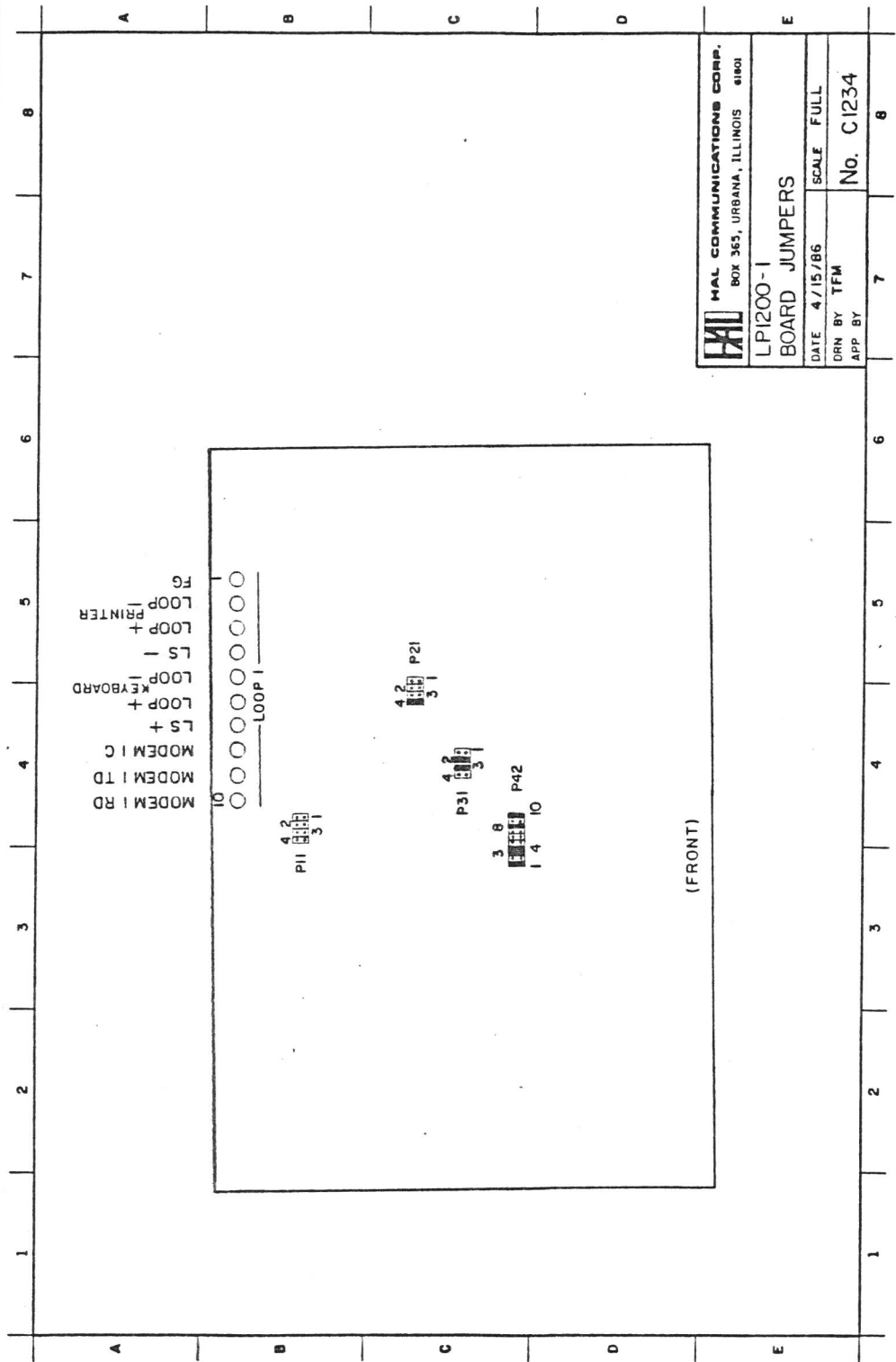


Figure 5. LP1200-1 Board Jumpers

LIMITED WARRANTY

HAL Communications Corp. of Urbana, Illinois, hereby warrants to the purchaser that the product herein described shall be free from defects in materials and workmanship, and from failure of operation from ordinary use, for a period of one year from the date of sale to the purchaser.

In the event of a defect in materials or workmanship during the warranty period, HAL Communications Corp. will, at its own expense, repair the defective unit and replace any defective parts. Cost of shipping the unit to HAL Communications Corp. as well as costs of removal and reinstallation of the unit shall be paid by the purchaser. HAL Communications Corp. will pay the shipping costs incurred in returning the unit to the purchaser.

To obtain warranty service, the customer should:

1. Notify, as soon as possible, the Customer Service Department of HAL Communications Corp., Box 365, Urbana, Illinois, 61801, of the existence of a possible defect.
2. At the time of notification, identify the serial number, and the possible defect.
3. HAL Communications will issue a Return Authorization Number at this time.
4. Return the unit, freight prepaid. Include in the shipping carton a reference to the Return Authorization Number and a brief description of the problem.

Correct installation, use, maintenance, and repair are essential for proper performance of this product. The purchaser should carefully read the equipment manual. The purchaser will be billed for labor and shipping charges on any unit determined by HAL to be in working order when received for repair.

This warranty does not apply to any defect which HAL Communications Corp. determines is due to any of the following:

1. Improper maintenance or repair, including the installation of parts or accessories that do not conform to the quality and specifications of the original parts;
2. Misuse, abuse, neglect, improper installation, or improper operation (including operation without a proper safety ground connection);
3. Accidental or intentional damage.

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