2A.2.7 Telegraph Line Module - The G854 Telegraph Line Module has several split lug tie points. Jumpers are connected between the split lugs to condition the module for different types of operation. A pictorial view of the single height, double thickness FLIP CHIP module contained in Figure 2A-9 identifies the components, split lug locations and the DC10C card slots in which the modules are located. Sixteen G854 modules are supplied with each DC10C, one for each KYBD and PRNTR line.

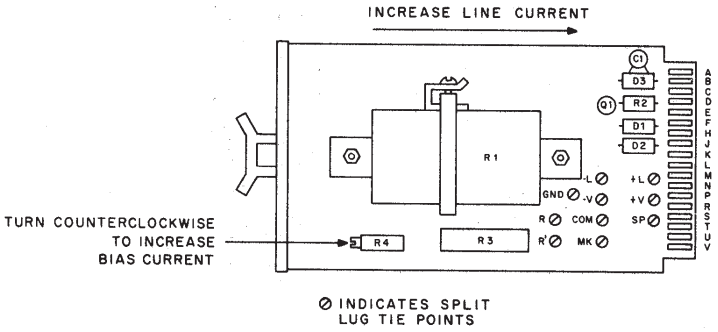
Since a G854 is used in both the transmit and receive circuits, Figure 2A-10 contains a schematic of each type of circuit to show the typical wiring. The split lug strapping required for the different applications is provided in tabular form below the associated schematic.

The polar relay bias circuit provides a high impedence bias circuit to set the operating point of the low resistance polar relay. Bias current I_b may be adjusted over a range of 3.5 to 60 mA. The bias voltage V_b across the polar relay should be approximately 4V or less to allow for transient voltage swings caused by relay operation without cutting off the bias circuit.

The following limitations apply (refer to Figure 2A-10):

$8 - V_b$ less than 20V (transistor breakdown)

$I_b\ (8 - V_b)$ less than 500 mW (transistor power limit)



KYBD		PRNTR	
LINE NO.	CARD SLOTS	LINE NO.	CARD SLOTS
0	A12	0	B12
1	A14	1	B14
2	A18	2	B18
3	A20	3	B20
4	A24	4	B24
5	A26	5	B26
6	A30	6	B30
7	A32	7	B32

Figure 2A-9 Telegraph Line Module G854 (DC10C)

Both of these limitations assume that the polar relay bias winding is returned to ground as shown in Figure 2A-10.

An adjustable resistor, R1, in the line resistance circuit controls the current in the telegraph line by padding out the total dc circuit resistance (wire resistance plus R1) to the required value.

Example: A 60 mA circuit with a 120V power supply requires a total circuit resistance of 2 kilohms. If the wire resistance is 500 ohms, R1 must be set at 1.5 kilohms to obtain the required total circuit resistance.

In addition to the line resistance, two clamp diodes, D1 and D2, are provided to partially meet the telegraph line interface requirements of various telecommunication administrations throughout the world. The diodes have a peak-inverse-voltage rating of 400V.

Example: The Borogardian Telecommunication Authority requires that telegraph line interfaces have the following properties:

a.	Open circuit voltage	-50V
b.	Current with line resistance of 2 kilohms	20 mA
c.	Short circuit current	30 mA

Refer to Figure 2A-11 for the following explanation. The first requirement is met by having a clamp power supply of -50V. (The clamp power supply does not supply power, but must absorb it instead. Most power supplies must be preloaded with a load resistor to allow this type of operation.)

The second requirement provides -40V across the interface terminals when rated load is applied which is not inconsistent with the first requirement. It requires

$$V_{supply} = 20\ mA\ (R1 + 2\ kilohms)$$

The third requirement requires

$$V_{supply} = 30\ mA\ (R1)$$

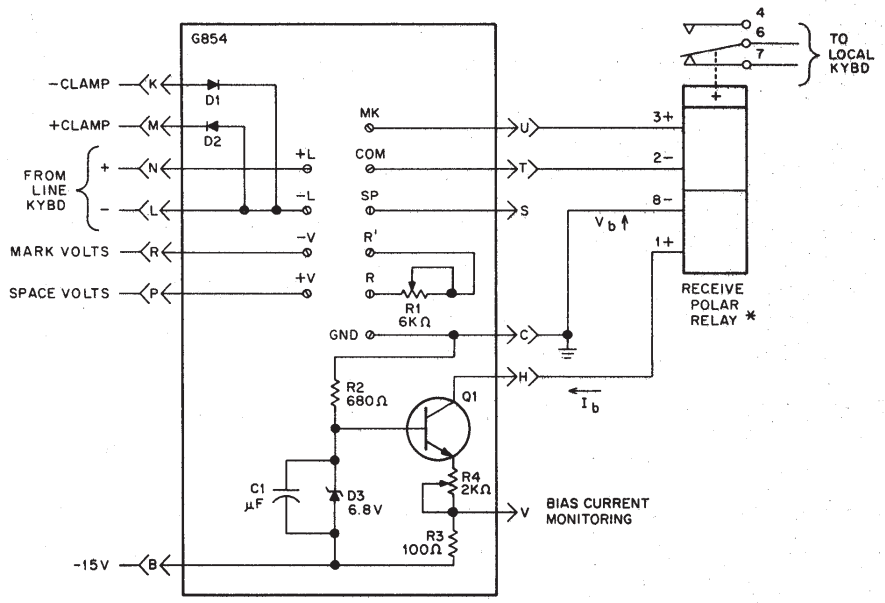
If V supply = -120V and R1 = 4 kilohms, requirements 2 and 3 are satisifed.

A 10 W adjustable power resistor, R1, is used to pad the total dc circuit resistance and obtain the desired line current. A trimpot, R4, is used to adjust the polar relay bias current and established the operating point of the polar relay. Perform the following procedures for each line during installation.

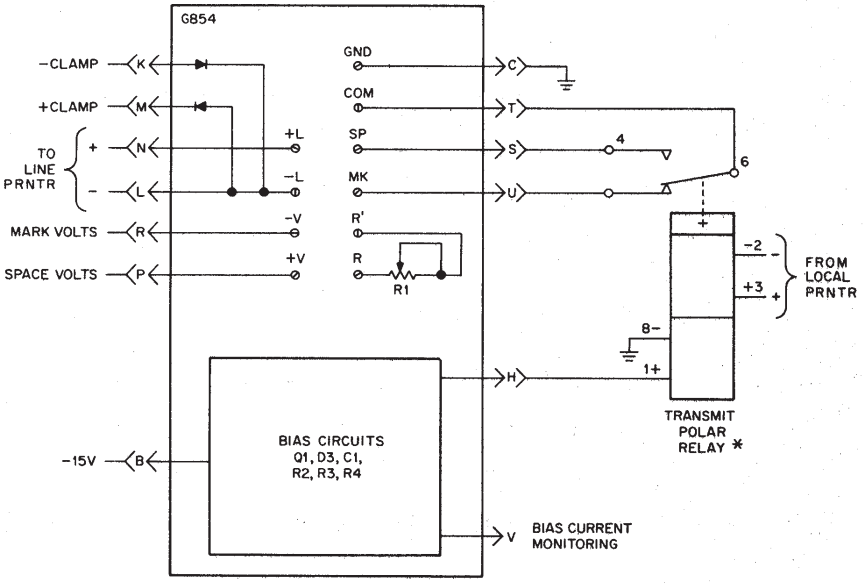
a. Line Current Adjustment - The following procedure provides the recommended line current adjustment procedure for the G854 Telegraph Line Module. Refer to Figure 2A-9 for component location and Figure 2A-10 for circuit schematic.

CAUTION

The adjustment slider of the line resistor R1 is connected to the 125V dc line. Injury to personnel or damage to equipment may result if the line current is adjusted with the line voltage applied.



TYPE OF OPERATION	SPLIT LUG STRAPPING			
NEUTRAL RECEIVER NEGATIVE MARK	GND TO +L	-L TO R	R' TO MK	COM TO -V
NEUTRAL RECEIVER EXTERNAL PWR. SUPPLY	+L TO COM	-L TO MK	—	—
POLAR RECEIVER	+L TO COM	-L TO MK	SET POLAR RELAY BIAS TO ZERO	



* TYPICAL POLAR RELAY : CURRENT FROM (+) TO (-) MOVES CONTACT TOWARD 7. CONTACTS ARE BISTABLE.

TYPE OF OPERATION	SPLIT LUG STRAPPING				
NEUTRAL TRANSMITTER NEGATIVE MARK	GND TO +L	-L TO R	R' TO COM	MK TO -V	—
NEUTRAL TRANSMITTER EXTERNAL PWR. SUPPLY	+L TO COM	-L TO MK	—	—	—
POLAR TRANSMITTER	GND TO +L	-L TO R	R' TO COM	MK TO -V	SP TO +V

Figure 2A-10 G854 Strapping (DC10C)

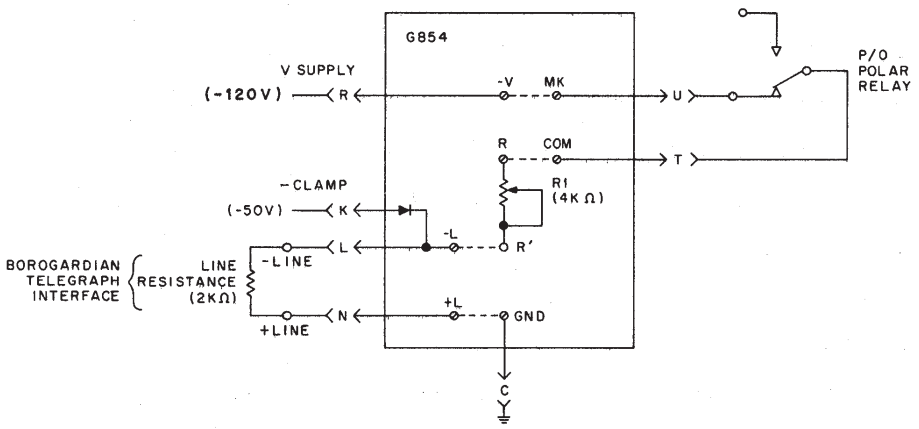


Figure 2A-11 Interface for the Borogardian Telecommunication Administration

1. Turn line voltage off and remove the G854 module to be adjusted from its connector.

2. Set the line resistor at maximum resistance (minimum line current). See Figure 2A-9.

3. Replace the G854 module. A W980 or G998 module extender may be used to extend the module during the adjustment procedure.

4. Set up an ammeter to measure the line current. (A Hewlett-Packard 428B Clip-On dc milliammeter is convenient for this purpose).

5. Turn on the line voltage. Read and compare the line current with the desired value of line current.

6. If the desired line current value is not observed, turn line voltage off and remove the G854 module, if a module extender is not used. Decrease the line resistance to increase the current or increase the line resistance to decrease line current (see Figure 2A-9).

7. Repeat steps (5) and (6) as a trial-and-error procedure until the measured line current equals the desired value.

b. Bias Current Adjustment - The bias current of the G854 Telegraph Line Module is adjusted in the following manner. Refer to Figure 2A-9 for component location and Figure 2A-10 for circuit schematic.

1. Determine the desired bias current I_b (normally one-half of the signal current).

2. Turn on the line voltage and connect a voltmeter (or suitable voltage measuring device) from pin B (-) to pin V (+) of the module's connecting block.

CAUTION

Use a plastic tuning tool or an insulated screwdriver to avoid shock if the adjusting tool should slip.

3. Observe the voltmeter and adjust R4 until the voltmeter reading equals .1 I_b in mA. Variations from this nominal value may be used in an attempt to correct for signal distortion.