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# *Instruction Bulletin*

*Subject:* **SY/MAX®**

**CLASS 8030 TYPE DLM-110, 120**
**D-LOG DATA CONTROLLER MODULE**

## DESCRIPTION

This bulletin provides all the information necessary to operate and program both the DLM-110 and DLM-120 D-LOG Data Controller Modules. The D-LOG Module provides an inexpensive and easy method for managing data and generating messages and reports from SY/MAX Programmable Controllers. The D-LOG Modules are programmed in Extended BASIC. To assist the first time user, an application section is included to demonstrate typical D-LOG application programs. The user should note that the only statements that differ between the DLM-110 and DLM-120 are the OUT and POKE locations. The DLM-110 provides 9K bytes of user memory and the DLM-120 contains 29K bytes of user memory.

Note: The DLM-110 cannot be upgraded to a DLM-120.




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Supersedes 30598-272-02, October, 1984 AJR
Printed in U.S.A.

SQUARE D

Minor Rev. August, 1986

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# PREFACE

## INTRODUCTION

It is recommended that the user of this bulletin be familiar with the computer program language known as BASIC. In addition, the user should be familiar with the proper procedures for constructing efficient, structured programs. For those users who do not possess such knowledge, a number of books are available which deal with the BASIC language in detail. One of many books that have been found to be comprehensive and complete is the manual entitled "BASIC and the Personal Computer" by Dwyer and Critchfield and can be found in most quality book stores.

## FIRST TIME USER

As a first-time user of the manual, familiarity of sections one through four is a must. These sections describe the possible uses of the D-LOG module, the hardware involved, the installation procedure, and the connection and power up procedure. Only after a thorough understanding of this information should the user attempt to install and program the D-LOG module.

## HOW TO USE THIS BULLETIN

Once the user is acquainted with the basics of the D-LOG module, the initial point of reference becomes Section 13. Sample applications are listed and explained in Section 13 and it contains examples of most D-LOG capabilities. This will allow the user to become familiar with the program instructions which best satisfy the application needs. The rest of the bulletin contains the details of all instructions, in addition to editing and programming considerations unique to the D-LOG module. Also included in this bulletin are appendices specifically provided to aid in program development.

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# 1.0 INTRODUCTION TO THE D-LOG MODULE

## 1.1 What Is It?

The Class 8030 Type DLM-110 and DLM-120 D-LOG Data Controller Module can be thought of as a plug-in computer with a built-in real time clock which has the capability of communicating directly with SY/MAX devices or over the SY/NET Local Area Network. The programming language used by the D-LOG Module is EXTENDED BASIC along with a few additional commands which allow the D-LOG Module to communicate with SY/MAX Family devices such as processors. This communications capability allows the D-LOG module to accumulate information from any device on the SY/NET network, manipulate the data, and then print out the data in virtually any format on either a CRT or printer.

Other instructions allow the D-LOG program to be interrupted by alarm conditions, keyboard inputs, and a built-in real-time clock. Special instructions also allow the D-LOG module to interface directly with the SY/MAX Class 8010 Type SLR-100 or SLR-110 Cartridge Tape Loader/Recorder. The Loader/Recorder can be automatically controlled by the D-LOG Module to store and load a complete program, portions of a program or data.

## 1.2 What Are Typical Applications?

Because the D-LOG module has many of the instructions that a computer has, its capabilities are virtually limitless. However, there are many typical applications for the D-LOG module:

ALARM MESSAGES—Because the D-LOG module has the capability of accessing data from SY/MAX Family processors, this gives it the capability to generate alarm messages as machine or process alarm conditions occur. The D-LOG module can then generate a comprehensive alarm message which explains the alarm conditions and corrective actions in detail. This is superior to alarm annunciation where the PC processor indicates the alarm by simply energizing a light or horn. Also, a special D-LOG instruction allows critical alarm conditions to interrupt the D-LOG program.

PRODUCTION REPORTS—The D-LOG module is ideal for generating production reports. The production reports can be easily displayed on a CRT or printer in virtually any format. These reports normally contain such information as number of parts produced, number of parts rejected, down time, etc. Because the D-LOG module is able to communicate over the SY/NET Local Area Network, the production report can generate production information for many individual machines which may be controlled by separate processors. Also, by using the D-LOG real-time clock, it is very easy to indicate the time of day at which a particular machine failed, the total downtime of a machine, etc.

KEYBOARD CONTROL INTERACTION—There are D-LOG instructions which allow the operator to interact with the operation of the D-LOG program. It is possible for the D-LOG program to prompt the operator to enter information through the keyboard. Providing the D-LOG module is connected to the SY/NET Local Area Network or directly with one processor, it is possible to use the operator keyboard inputs to send data to a processor, which in turn would affect the control program.

ENERGY MANAGEMENT—Due to the fact that the D-LOG module contains a real-time clock and can communicate with SY/MAX processors, thus affecting control actions, it is possible to use the D-LOG module as an energy management controller. It is a simple procedure to enter a program which utilizes the real-time clock to cycle loads and control loads on a time of day basis.

ASCII INPUT—Using D-LOG instructions, it is possible to use the D-LOG module to accept ASCII information from various devices such as computers, bar code readers, and scales. After the D-LOG module reads the ASCII information and deciphers it, it can then initiate control actions through communication to a SY/MAX processor or send an ASCII reply back to the connected device.

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## 1.3 SPECIFICATIONS

Weight ..... 3.0 lbs.(1.36 Kg)

Ambient Temperature Rating ..... 32-140°F (0-60°C)

Storage Temperature Rating. −40 to 176°F (−40 to 80°C)

Dimensions (WXHXD)
(without Key) ..... 1.47 X 13.1 X 6.59 inches
(37 X 332 X 167mm)

DLM-110 Memory size (approx.) 9,400 words (8 bit words)
DLM-120 Memory size (approx.) 29,900 words (8 bit words)

DLM-110 Draw on SY/MAX Power Supply .....725 ma
DLM-120 Draw on SY/MAX Power Supply .....800 ma

DLM-110 Draw on Batteries in Power Supply .....14 uA
(with no power to power supply)
DLM-120 Draw on Batteries in Power Supply .....30 uA
(with no power to power supply)

Accuracy of Real Time
Clock ..... within 10 seconds/month

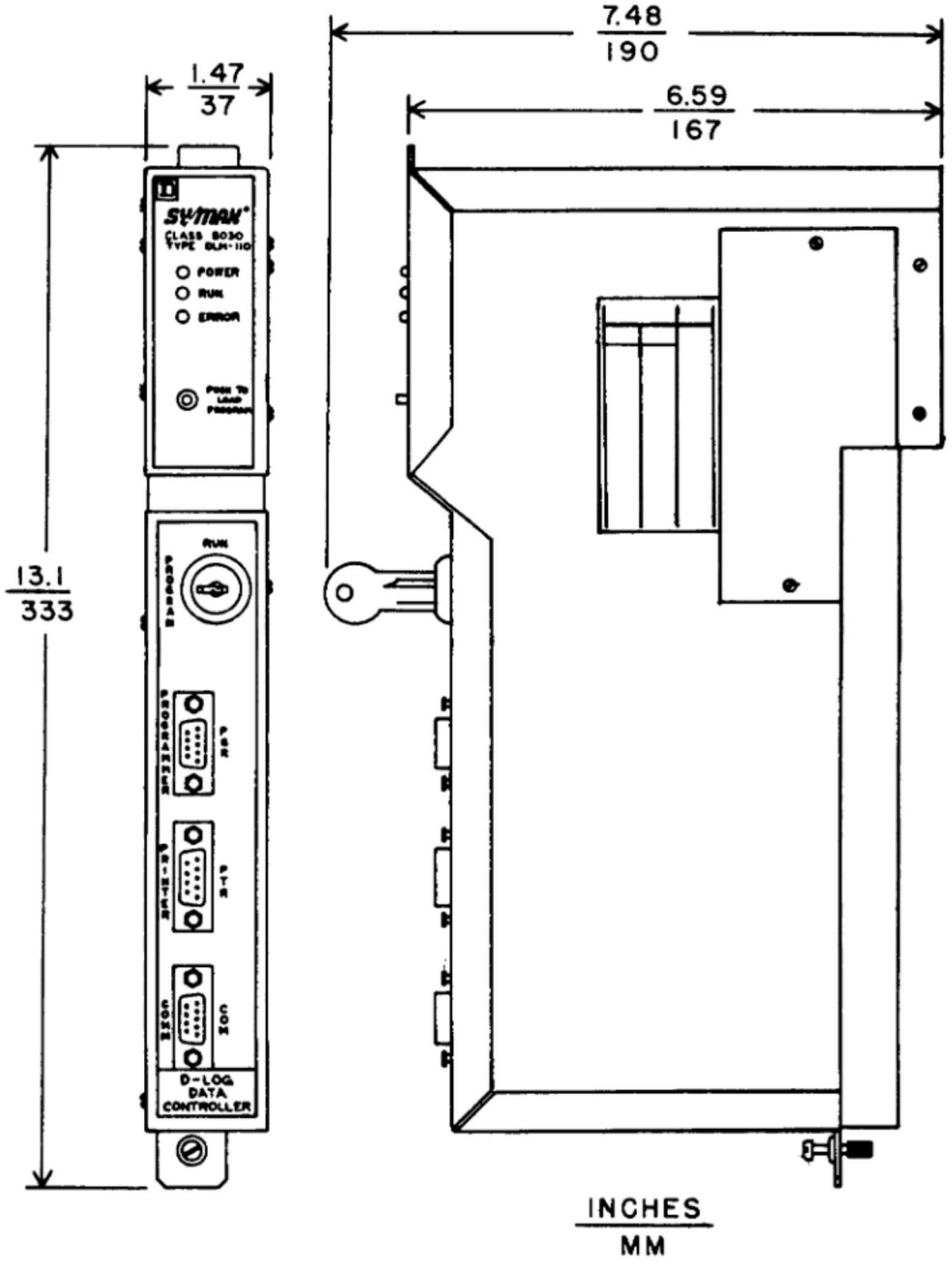



Figure I

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## 2.0 DESCRIPTION OF HARDWARE

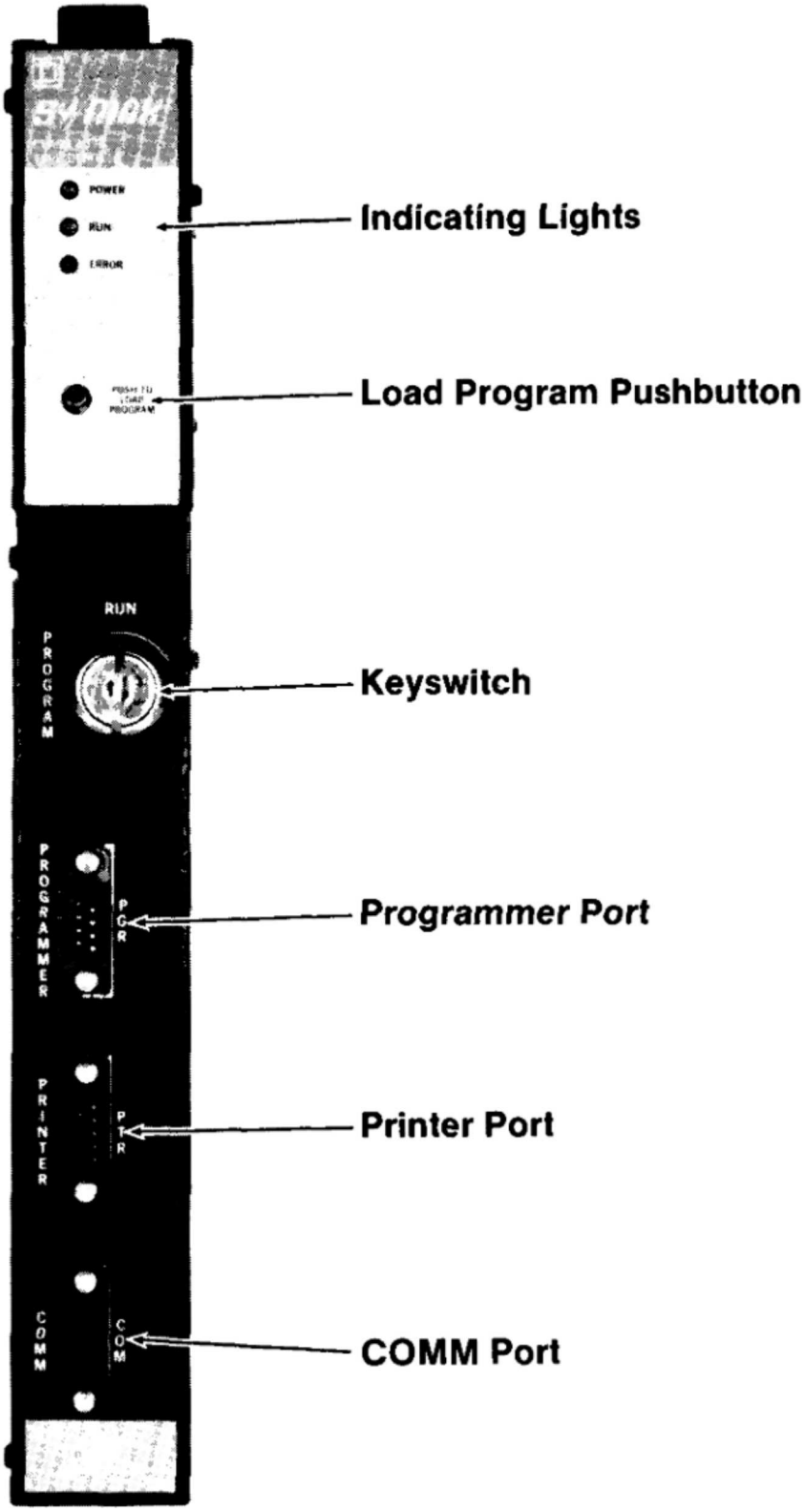



Figure 2.0
D-LOG Module Hardware

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## 2.1 Indicating Lights

As shown in Figure 2.0, there are three LED indicators located on the front of the D-LOG module. These three indicators (POWER, RUN, and ERROR) are used to visually indicate the status of the D-LOG module without necessitating the use of the programming equipment. The function of these lights are described in the following sections.

### 2.1.1 POWER

The POWER LED is illuminated when the D-LOG module is receiving +5 VDC from the power supply. The power is supplied to the D-LOG module by inserting the module into any register slot of a Class 8030 I/O rack, which in turn is connected via a cable to a Class 8030 power supply. See Section 3.0 for installation procedures.

### 2.1.2 RUN

The RUN LED is illuminated whenever the D-LOG module is executing the program in memory. The D-LOG module can be placed in the RUN condition either by entering the RUN command on the CRT programmer or by turning the keyswitch, located on the front of the module, to the RUN position. Providing a program exists in memory and no errors occur, the RUN light will illuminate.

If the D-LOG module is instructed to RUN but the RUN LED and ERROR LED do not illuminate, this indicates that there is no program in memory. If the D-LOG module is instructed to RUN and the RUN and ERROR LED illuminate, this indicates the D-LOG module attempted to RUN, but an error occurred in the program or as the result of a communication with another device.

### 2.1.3 ERROR

The ERROR LED allows the operator to determine if an error has been generated, without necessitating the connection of the CRT programmer. The ERROR LED is illuminated whenever an illegal command is entered on the CRT (SYNTAX error), an error occurs in the program or if an error is detected upon power-up of the D-LOG module. If the CRT programmer is connected to the D-LOG module when an error occurs, an error message is generated. The specific error messages are explained in Section 10.0.

## 2.2 Keyswitch

As shown in Figure 2.0, there is a two position keyswitch located on the front of the D-LOG module. This key provides security by allowing the operator to select either the RUN or PROGRAM positions. It should be noted that the D-LOG key only works with the D-LOG module and does not work in any other SY/MAX device such as a processor or programmer.

### 2.2.1 PROGRAM

When in the PROGRAM position, program changes can be made. In this position the D-LOG module will not execute the program unless the RUN command has been entered by the CRT programmer.

### 2.2.2 RUN

When the keyswitch is in the RUN position, the D-LOG module is executing the program, and the RUN light should be illuminated. If the keyswitch is turned to the RUN position and the RUN LED is not illuminated, this indicates that there is no program in memory. If the keyswitch is turned to RUN and the ERROR LED illuminates, this indicates that a program error was encountered. The cause of the error can be investigated by connecting the CRT programmer and referring to Section 10.0.

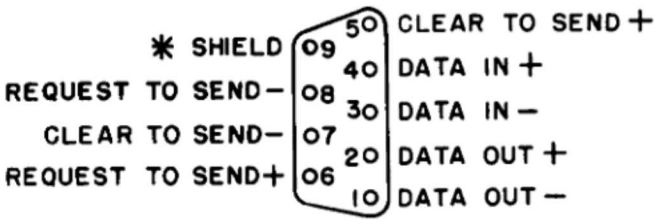
## 2.3 Load Program Pushbutton

As shown in Figure 2.0, this pushbutton is located directly below the indicating LED's. This pushbutton allows the operator to load programs from the Class 8010 Type SLR-100 or SLR-110 Cartridge Tape Loader/Recorder without the use of the CRT programmer. Simply connect the cartridge tape loader/recorder to the PRINTER port and then the program may be loaded using the manual mode of the loader/recorder. Programs cannot be loaded unless the keyswitch is in the PROGRAM position. If the program is not the first file on tape, it will be necessary to use the FILE SKIP function in order to load the desired program. These specific operations are described in detail in Section 11.0 "CARTRIDGE TAPE OPERATION".

## 2.4 Differential Ports

As shown in Figure 2.0, there are three differential communication ports located on the front of the D-LOG module. These three ports are labeled PROGRAMMER, PRINTER, and COMM. These designations are found directly to the left of the ports. Also, note that directly to the right of each port, there is another designation. These designations are PGR, PTR, and COM and are abbreviations for the ports which are used in the ASSIGN instruction. The ASSIGN instruction allows the D-LOG program to control the operation of the three differential ports. (See Section 8.2).

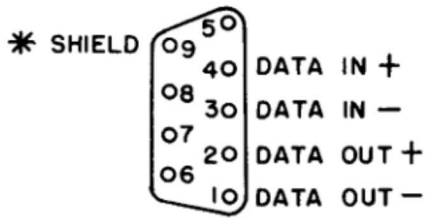
All three communication ports use the differential mode of communications. It should be noted that this differential communications utilizes a signal which is RS-422 compatible. The differential signal allows peripheral devices such as CRT's, printers, and loader/recorders to be located up to 10,000 feet from the D-LOG module. The required cable for differential communications is Belden number 8723 or equivalent. The pin-out of the three communications ports is shown in Figure 2.4.




*The shield is capacitively coupled to the D-LOG module chassis.

Figure 2.4a - Programmer and Printer Ports Pinout

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*The shield is capacitively coupled to the D-LOG module chassis.

Figure 2.4b - COMM Port Pinout

Note: The following description of the PROGRAMMER, *PRINTER, and COMM ports applies only to the* operation of these ports when the ASSIGN statement is *not* used. The use of the ASSIGN instruction allows the operation of these ports to change. The ASSIGN statement is described in Section 8.2.

### 2.4.1 PROGRAMMER PORT

The PROGRAMMER port is used for connection of the CRT programmer. This port accepts the commands and instructions from the CRT programmer and is used to list out the program and PRINT messages. As PRINT statements are executed in the program, the messages will be sent out the PROGRAMMER port. As mentioned above, the ASSIGN instruction can be used to change the print out to other ports. Typically, the Square D Class 8020 Type SPR-200, 201, 210, 211, 300, or 310 are connected to the PROGRAMMER port via the Class 8010 Type CC-100 or CC-101 cable. However, there are many other CRT terminals which are also compatible with the D-LOG PROGRAMMER port. The PROGRAMMER port is discussed in Section 4.0. This port transmits 7 bit odd parity.

### 2.4.2 PRINTER PORT

The PRINTER port is used for connection to printers or the Cartridge Tape Loader/Recorder. When the loader/recorder is connected to this port, D-LOG programs and data can be saved or loaded using commands which are generated by the CRT Programmer. It is also possible to load tapes without the CRT Programmer by using the LOAD PROGRAM PUSHBUTTON which is located on the front of the D-LOG module. All tape operations are explained in Section 11.0.

To generate PRINT messages from the PRINTER port, the ASSIGN instruction must be used because the D-LOG module automatically initializes the PROGRAMMER port for message print out. The PRINTER port is automatically initialized for a word structure of 8 bit even parity to accommodate the Cartridge Tape Loader/Recorder. This port can be changed if the ASSIGN or OUT statements are used.

### 2.4.3 COMM PORT

The COMM port is used for connecting the D-LOG module to a Class 8030 Type CRM-510 SY/NET Network Interface Module or directly to the COMM port of a SY/MAX processor or another D-LOG Module.

The ASSIGN instruction allows the input of data and print out of messages through the COMM port. This allows the D-LOG module to read CRT keyboards and print messages to CRT's and printers over the SY/NET Local Area Network.

The COMM port always has a word structure of 8 bits even parity.

### 2.4.4 BAUD RATE SELECTOR SWITCHES

The three Baud rate selector switches can be accessed by removing the cover plate located on the right side of the D-LOG module (See Figure 2.4.4). The function of these switches and the switch settings are indicated on a label located directly next to the cover plate. This label is also reproduced below. The top selector switch is used for *selecting the Baud rate of the PROGRAMMER port, the* middle selector switch for the PRINTER port, and the bottom selector switch is used for the COMM port.

The different Baud rates are selected by inserting a screw driver into the slot located on the top of the selector switch. Then simply rotate the switch until the arrow lines up with the desired number. Figure 2.4.4 shows the position of the selector switches when the CRT port is selected for 9600 Baud (typical setting for SY/MAX CRT programmers), the PRINTER port is selected for 1200 Baud (dependent upon the printer used) and the COMM port is selected for 9600 Baud operation, (typical setting for SY/MAX processors).

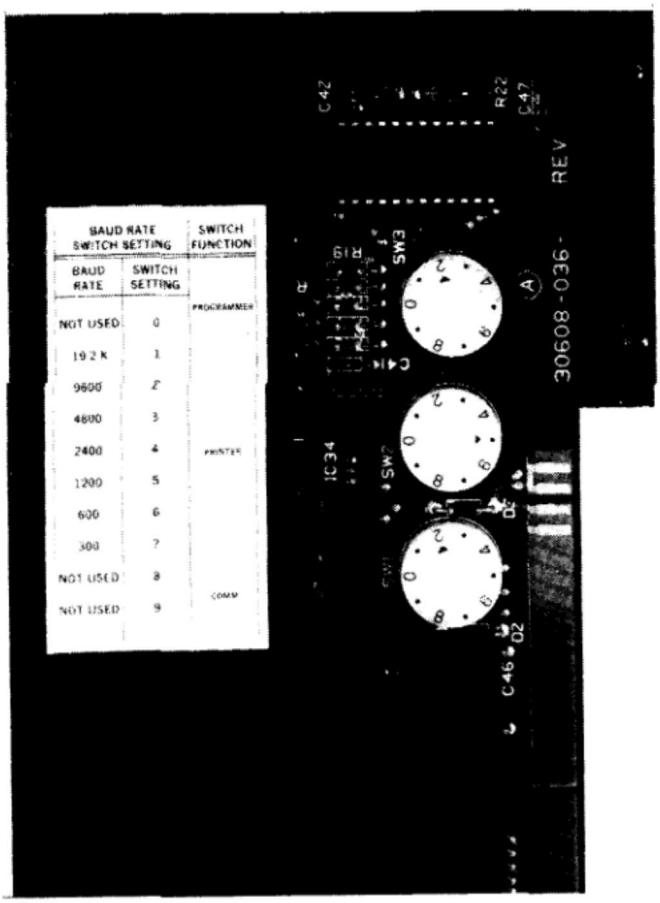



Figure 2.4.4 - Baud Rate Selector Switches

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