

## SECTION XIX

### DISPLAY BACKLIGHT OPTION

#### SECTION XIX-I - GENERAL INFORMATION

##### 1-1 INTRODUCTION

1-2 The TrueTime Display Backlight option provides improved numeric display visibility in environments with dim ambient light. Backlight is standard on the alphanumeric display but is an option of the numeric display. Both backlights are controlled from the front-panel keypad.

##### 1-3 DISPLAY BACKLIGHT SPECIFICATIONS

EL Size: 7.15 x 1.275"

Luminescence:

## SECTION XIX-II - INSTALLATION

### 2-1 INTRODUCTION

2-2 No installation is required when the Display Backlight Option is purchased at the same time as the receiver. It is factory-installed. The following installation instructions apply to those options purchased after the original instrument.

### 2-3 FIELD INSTALLATION

2-4 Supplied with the backlight option are the following items:

1. Electroluminescent (EL) panel.
2. DC to AC converter.
3. 20-turn 100 Ohm pot
4. 1000 uF capacitor

2-5 **Warning:** Only a qualified technician should attempt installation of this option. Dangerous voltages are present which can cause electric shock that could result in severe injury or even death. Disconnect all power before disassembling the unit!

2-6 The following equipment is required for installation:

1. A phillips screwdriver
2. A soldering iron
3. solder

2-7 If the receiver is rack-mounted first remove it from the rack as described in Section II of this manual. Installation requires removing the front-panel Assembly and removing two circuit boards from this assembly. One part is soldered into each circuit board and then the Front Panel Assembly is reassembled and reinstalled.

2-8 Remove the top lid and retain the screws. Disconnect the ribbon cable connector and the Power Supply connector at the right front corner of the unit. Remove and save the two phillips-head screws at the front of each side panel then slide the Front Panel Assembly free of the chassis. Remove the Keypad/Display Interface Assembly 86-313 and the Numeric Display Assembly 86-312 and save the hardware.

2-9 Slide the EL panel between the Liquid Crystal Display and the circuit card with the electroluminescent side against the display as shown in Assembly drawing 87-313 in Section XIX-VI. Note that one side of the EL panel emits light and the other doesn't. Be absolutely certain that the cream colored side is toward the back surface of the LCD display and the aluminum foiled surface is toward the circuit card. Solder the leads to the two solder pads on the circuit board.

2-10 Solder the DC to AC converter into position U10 **on the solder side** of the Keypad/Display Interface Assembly. Solder the 1000 uF capacitor into position C4 and the 100 Ohm pot into position R4 on the component side of the same assembly.

2-11 Reassemble the Front Panel Assembly with the previously saved hardware and slide it back into the chassis. Replace the side-panel screws and reconnect the ribbon connector and the Power Supply connector. Before replacing the top lid adjust the level of luminescence as described in "ADJUSTMENT PROCEDURES" in Section XIX-V. Replace the lid and secure with the previously saved screws.

## SECTION XIX-III - OPERATION

### 3-1 INTRODUCTION

3-2 Both backlights are controlled via the front-panel keypad. Refer to "KEYPAD FUNCTION 31 - BACKLIGHT ENABLE" in Section III of this manual for an explanation of how to turn the backlights on and off.

## SECTION XIX-IV - THEORY OF OPERATION

### 4-1 INTRODUCTION

4-2 The backlight is controlled by the processor in response to keypad entry. Refer to Section III, "KEYPAD ASSEMBLY 76-300", "KEYPAD/DISPLAY INTERFACE ASSEMBLY 86-313" and "PROCESSOR ASSEMBLY 86-320" for a detailed explanation of the circuits involved.

## SECTION XIX-V - MAINTENANCE AND TROUBLESHOOTING

### 5-1 INTRODUCTION

5-2 The Display Backlight Option has been designed to provide maintenance-free operation. However, even under normal use the EL panel has a limited life span. After approximately one year the panel may dim to an unacceptable light level. If this happens, a simple adjustment will increase the luminence. Adjustment procedures are provided for use after field installation or repair. This section contains troubleshooting techniques and adjustment procedures.

### 5-3 TROUBLESHOOTING

5-4 **Warning:** Only a qualified electronics technician should attempt repairs. Exercise caution while working on or near power supply assemblies.

5-5 The following are only general troubleshooting procedures. Since an apparent problem may be the result of operator error, the technician will need a thorough understanding of the normal operation of the clock. Refer to Section III of this manual for a description of normal operation. Use the following paragraphs to isolate the problem to a specific assembly. Use the assembly drawings and schematics in Section VI and the detailed circuit descriptions in Section IV to troubleshoot the individual assemblies.

### 5-6 EQUIPMENT REQUIRED

5-7 The following test equipment is required to troubleshooting and adjustments:

1. Digital Voltmeter (1 mv resolution)
2. Slot Screwdriver
3. Oscilloscope (10 MHz  $\pm$ 1 Hz)

5-8 Symptoms of a Backlight malfunction fall into two broad categories:

1. Intermittent or flickering backlight.
2. No backlight response to keypad control.

The possible causes for the symptoms in each category are discussed below.

### 5-9 INTERMITTENT OR FLICKERING BACKLIGHT

5-10 If the backlight goes on and off periodically or flickers the problem may be a bad Processor Assembly, a bad

Keypad/Display Interface Assembly, a bad EL panel or bad connections between these assemblies.

5-11 NO BACKLIGHT RESPONSE

5-12 Before assuming a clock malfunction, first be sure that you understand proper keypad entry. Refer to "KEYPAD FUNCTION 31 - BACKLIGHT ENABLE" in Section III of this manual. Verify that the Keypad Lock has not been enabled. Refer to "KEYPAD FUNCTION 06 - KEYPAD LOCK ENABLE".

5-13 If the backlight fails to respond to Keypad Function 31 the problem may be a bad Keypad Assembly, a bad Processor Assembly, a bad Keypad/Display Interface Assembly, a bad EL panel or bad connections between these assemblies.

5-14 ADJUSTMENT PROCEDURES

5-15 LUMINESCENCE LEVEL ADJUSTMENT

5-16 To adjust the level of luminescence first remove the top lid of the unit and save the screws. Use function 31 to turn on the backlight. Locate pot R4 on the Keypad/Display Interface Assembly 86-313. Use a slot screwdriver to adjust R4 until the luminescence is satisfactory. Replace the top lid.

SECTION XIX-VI - PARTS LIST AND SCHEMATIC

6-1 PARTS LIST - ASSEMBLY 87-313

6-2 ASSEMBLY DRAWING 87-313