

## 1.4 Active Device List

The following is a complete listing of all the active devices used in the EMCEE Model TUA100FA UHF Power Amplifier. The devices are grouped together as seen on each specific schematic or interconnection diagram. Given with each device is its schematic designator, EMCEE part number and function.

| DEVICE                                                             | PART #/DESIGNATOR | FUNCTION          |
|--------------------------------------------------------------------|-------------------|-------------------|
| <u>100 Watt UHF Amplifier</u><br><u>Schematic Diagram 40383163</u> |                   |                   |
| Integrated Circuit                                                 | MC1723CD/U1       | Current Regulator |
| Transistor                                                         | PTF10159/Q1, Q2   | RF Amplifier      |

### **3.4     Alignment:**

#### **3.4a    UHF Notch Filter:**

1. Place the Amplifier Drawer POWER ON switch to off. Disconnect the input cable from the Notch Filter and connect the filter's input directly to the sweep generator's RF output.
2. Place the RF Detector directly on the RF OUTPUT connector (J2) of the transmitter.
3. Tune the sweep generator to the center frequency of the transmitter's output channel employing a 20MHz sweep width display on the oscilloscope. Display the 1MHz markers.
4. The filter adjustments are the two threaded rods located on the short side of the filter accessible through the left side panel toward the rear of the drawer. If they are not marked, slowly adjust one and observe which notch moves on the scope and set accordingly. Do not switch the positions of the individual notches.

**Set the lower notch to (Visual Carrier Frequency – 4.5MHz).**

**Set the upper notch to (Aural Carrier Frequency + 4.5MHz).**

**The visual carrier frequency for the appropriate UHF channel can be found in Section 4, the Data Pak, or in Table 2–1.**

5. Remove the sweeper cable from the filter input and the RF Detector from the drawer output. Replace the Notch Filter input cable.

### **3.5     TTU100FA Transmitter Power Calibration:**

To ensure proper transmission, the output power level and % Power Meter calibration should be checked once every year. With the meter switch in the FWD position, the % Power Meter has been factory calibrated for 100% with the transmitter providing 100 watts peak visual and 10 watts average aural. The following calibration procedure assumes that the visual carrier has 87.5% video modulation and 0% average picture level (APL). In the following steps, the power levels stated are those expected at the output of the transmitter. Therefore, when measuring these power levels as shown in Figure 3–6, be sure to take into account the 30dB factor provided by the attenuator. Power levels at 50% APL (stair steps) are included in brackets following the power levels at 0% APL (SYNC only).

#### **3.5a    Forward Power:**

1. With the TTU20F in STANDBY and the TUA100FA Amplifier off (POWER ON circuit breaker down), set up the test equipment as shown in Figure 3–6.
2. Verify that the modulator is operating and providing 87.5% video modulation. Place the 100 Watt Amplifier POWER switch to ON and make sure the Amplifier's Meter Switch is in the FWD position. Place the TTU20F Transmitter STANDBY switch to OPERATE.

3. To set the output power, adjust the TTU20F POWER ADJUST for an external power meter reading of 69.5W [44W]. Note that 100W peak visual at 0% [50%] APL and 87.5% modulation plus 10W average aural equals 69.5W [44W] average power.
4. To check or adjust the visual to aural carrier ratio, replace the power meter in Figure 3–6 with a spectrum analyzer. Adjust the aural carrier level on the modulator for the desired ratio. Remove the spectrum analyzer and return the power meter to the Transmitter's output and reset the output power for an external power meter reading of 69.5W [44W].
5. With the external power meter showing the correct power, place the meter switch to FWD and check the TUA100FA front panel % Power Meter for a 100% indication. If this reading is not obtained, adjust potentiometer R9 of the Metering Detector (A3) for a 100% indication. The Metering Detector is mounted on the right-hand side wall near the front of the amplifier drawer and is accessible through the holes in the side wall. The % Power Meter on the TTU20F Transmitter/Driver will indicate less than 100% which is an appropriate reading.

### **3.5b Reflected Power (OPTIONAL):**

6. On the right side wall of the TUA100FA Power Amplifier drawer, adjust potentiometer R30 of the Metering Detector fully clockwise to disable the VSWR overload detection circuit. Place the amplifier drawer meter switch to REFL.
7. Place the Transmitter/Driver OPERATE/STANDBY switch to STANDBY and the OPERATE/ALIGN switch to ALIGN. Remove and reverse the forward power (J3) and reflected power (J4) coupling port cables on the Metering Coupler (DC1). J1 and J3 of the Metering Detector (A3) should now be connected to J4 and J3 of the Metering Coupler (DC1), respectively. This simulates an open circuit at the amplifier's RF OUTPUT (J2) delivering maximum returned power to the REFL port of the Metering Detector. Insert a step attenuator between the modulator's IF OUTPUT and the transmitter's IF INPUT and set the step attenuator for 10dB attenuation.
8. Place the Transmitter/Driver OPERATE/STANDBY switch to OPERATE. Remove the attenuation from the step attenuator for an external power meter reading of 69.5W [44W]. Check the amplifier drawer's front panel REFL meter for a 100% [70%] reading. If necessary, adjust potentiometer R27 of the amplifier Metering Detector for the proper reading. R7 is accessible through the right-hand side wall of the drawer.
9. Decrease the transmitter's power to 50% by increasing the step attenuator 3dB for an external power meter reading of 34.75W [22W]. This power level is used for setting the trip point of the VSWR overload detection circuit. Adjust R30 of the amplifier's Metering Detector slowly counterclockwise until the front panel VSWR OVLD indicator illuminates red and the Transmitter/Driver is placed in standby.
10. Check the VSWR OVLD trip point by setting the step attenuator for an additional 1dB of attenuation. Press the momentary VSWR RESET switch to reset the transmitter and remove the additional 1dB of attenuation from the step attenuator. The VSWR OVLD circuit should again trip. If it does not, repeat this section beginning at step #6.
11. Place the OPERATE/STANDBY switch to STANDBY. Return the Metering Coupler cables to their original ports, J3 and J4. Reinstall the top cover, slide the drawer back into the

cabinet and secure it properly. Properly load the transmitter and place the Driver OPERATE/ALIGN and OPERATE/STANDBY switches to OPERATE.

### **3.6 TU100FA Translator Power Calibration:**

To ensure proper transmission, the output power level and % Power Meter calibration of the translator should be checked once every year. With the meter switch in the FWD position, the TUA100FA Amplifier % Power Meter has been factory calibrated for 100% with the translator providing 100 watts peak visual and 10 watts average aural. The following calibration procedure assumes that the composite signal received by the translator has the aural carrier 10dB down from the visual with the visual carrier having 87.5% video modulation and 0% average picture level (APL). In the following steps, the power levels stated are those expected at the output of the translator. Therefore, when measuring these power levels as shown in Figure 3–7, be sure to take into account the 30dB factor provided by the attenuator. Power levels at 50% APL (stair steps) are included in brackets following the power levels at 0% APL (SYNC only).

This procedure also assumes the setup in Figure 3–7 is being used and that the output of the receiver drawer has been correctly calibrated. If the received broadcast channel frequency is in the VHF band (Ch.2-13), the mixer can be deleted from the test setup and a VHF agile modulator set on the correct channel may be connected directly to the RF INput (J1) of the Receiver drawer through an attenuator.

#### **3.6a Forward Power:**

1. With the TU20F Translator drawer in STANDBY and the TUA100FA Amplifier POWER ON circuit breaker switch open (down), set up the test equipment as shown in Figure 3–7.
2. Verify that the modulator is providing 87.5% video modulation with the aural 10dB below the visual and that the input signal is at the correct frequency (Receiver's input channel) and at an amplitude between –40dBm to –47dBm. Place the TUA100FA 100 Watt Power Amplifier into operation and make sure the Meter Switch is displaying FWD power. Turn the TU20F Transmitter/Driver ON and place both the OPERATE/STANDBY and OPERATE/ALIGN switches to OPERATE.
3. To set the output power, adjust the Driver's POWER ADJUST control for an external power meter reading of 69.5W [44W]. Note that 100W peak visual at 0% [50%] APL and 87.5% modulation plus 10W average aural equals 69.5W [44W].
4. With the external power meter reading the correct output power, place the meter switch to FWD and check the TUA100FA Amplifier front panel % Power Meter for a 100% indication. If this reading is not obtained, adjust potentiometer R9 of the Metering Detector (A3) for a 100% indication. The Metering Detector is mounted on the right-hand side wall near the front of the amplifier drawer and is accessible through the holes in the side wall. The % Power Meter on the TU20F Driver will read less than 100% which is an appropriate indication.

### **3.6b Reflected Power (OPTIONAL):**

5. On the right side wall of the 100W Power Amplifier drawer, adjust potentiometer R30 of the Metering Detector fully clockwise to disable the VSWR overload detection circuit and place the meter switch to REFL.
6. Place the Transmitter/Driver OPERATE/STANDBY switch to STANDBY and the OPERATE/ALIGN switch to ALIGN. In the amplifier drawer remove and reverse the forward power (J3) and reflected power (J4) coupling port cables on the Metering Coupler (DC1). J1 and J3 of the Metering Detector (A3) should now be connected to J4 and J3 of the Metering Coupler (DC1), respectively. This simulates an open circuit at the amplifier's RF OUTPUT (J2) delivering maximum returned power to the REFL port of the Metering Detector. Insert a step attenuator between the Receiver's IF OUTPUT and the Transmitter's IF INPUT and set the step attenuator for 10dB attenuation.
7. Place the Transmitter's OPERATE/STANDBY switch to OPERATE. Remove attenuation from the stepper for an external power meter reading of 69.5W [44W]. Check the amplifier drawer's front panel meter for a 100% [70%] reading and, if necessary, adjust potentiometer R27 of the Amplifier's Metering Detector for the proper reading. R27 is accessible through the right-hand side wall of the drawer.
8. Decrease the translator's power to 50% by increasing the step attenuator 3dB for an external power meter reading of 34.75W [22W]. This power level is used for setting the trip point of the VSWR overload detection circuit. Adjust R30 of the Amplifier's Metering Detector slowly counterclockwise until the front panel VSWR OVLD indicator illuminates red and the Translator/Driver drops into standby.
9. Check the VSWR OVLD trip point by increasing the step attenuator an additional 1dB. Press the momentary VSWR RESET switch to reactivate the Translator and remove the additional 1dB of attenuation from the attenuator. The VSWR OVLD circuit should again trip. If it does not, repeat this section beginning at step #5.
10. Place the OPERATE/STANDBY switch to STANDBY. Return the Amplifier Metering Coupler cables to their original ports, J3 and J4. Reinstall the top cover, slide the drawer back into the cabinet and secure it properly. Properly load the Translator and place both the OPERATE/ALIGN and the OPERATE/STANDBY switches to OPERATE.