**III Required Test Equipment for Alignment/Product Acceptance Testing**

Required test equipment (or engineering approved equivalent or superior models):

| | |
| --- | --- |
| Production ATE Test Fixture: (for alignment in mfg. facility) | Shure PA821SWB ATE Fixture |
| Digital Multimeter (DMM): | Fluke 8060A |
| RF Spectrum Analyzer with Tracking Generator: | Agilent E4407B |
| RF Signal Generator: | Agilent E4422B |
| RF Power Meter: | HP 436A |
| RF Power Sensor: | HP 8482H |
| Low VSWR 50 Ohm BNC Termination: | Mini Circuits BTRM-50 |

**IV Alignment Procedure.**

For Production, the Antenna Combiner will be aligned in a production test fixture where the PCB assembly is manufactured. 16 voltage tuning adjustments will be required and coordinated via the ATE software. No RF tuning or alignment is required.

The Antenna Combiner requires an initial alignment to set the bias (Drain) current for each of 16 single ended amplifiers that make up 8 balanced amplifiers. The Drain current for each amplifier will be sensed by measuring the voltage drop across a 1 ohm resistor in the drain circuit (i.e. R101 for FET Q102). The gate bias voltage will be set by adjusting a potentiometer (i.e. R190 for FET Q102) to obtain a drain current within the required limits set by software (and specified below). The alignment procedure is performed on the PA821SWB circuit board prior to being installed in the Chassis.

STEP 1: Apply 12VDC to BOTH J904 and J906 simultaneously.

STEP 2: Verify that the current into J904 and J906 are as follows:
J904: 4.0 Amps Maximum, 2.0 Amps Typical
J906: 3.7 Amps Maximum, 2.0 Amps Typical

STEP 3: Monitor the voltage from TP101 (+) to TP102 (-) with a DMM. Adjust R190 to get a voltage reading of 300 mVDC +/-5 mVDC.

STEP 4: Repeat Step 3 for the following resistor/test point combinations:

| | (+) | (-) |
| --- | --- | --- |
| R191: | TP104, | TP105 |
| R290: | TP201, | TP202 |
| R291: | TP204, | TP205 |
| R390: | TP301, | TP302 |
| R391: | TP304, | TP305 |
| R490: | TP401, | TP402 |
| R491: | TP404, | TP405 |
| R590: | TP501, | TP502 |
| R591: | TP504, | TP505 |
| R690: | TP601, | TP602 |
| R691: | TP604, | TP605 |
| R790: | TP701, | TP702 |
| R791: | TP704, | TP705 |
| R890: | TP801, | TP802 |
| R891: | TP804, | TP805 |

STEP 5: Verify that the current into J904 and J906 are as follows (after completion of STEPS 1-4):

J904: 2.0 Amps Maximum
J906: 2.0 Amps Maximum

STEP 6: Remove power from J904 and J906 simultaneously. Install PCA in PA821SWB Chassis.

**V Test For Product Acceptance.**

STEP 1: Apply input power to the PA821SWB. The PA821SWB power supply uses any AC voltage between 100V and 240V AC, 47-63Hz. Turn power switch on front panel on and verify that the POWER LED turns on. Verify that the cooling fan is running.

Verify that the following voltages are within the specified ranges:

| | |
| --- | --- |
| Power Supply Output: | 12VDC +/-3% (+/-0.36VDC) |
| 8VA Regulator Output: | 8.5VDC +/-0.25VDC |
| 8VB Regulator Output: | 8.5VDC +/-0.25VDC |
| -3.3V Regulator Output: | -3.3VDC +/-0.1VDC |

STEP 2: Connect a short BNC-BNC coaxial cable to the Signal Generator output. Set signal generator frequency to 470 MHz. Connect the power meter to the other end of the coaxial cable and adjust signal generator output power level for a reading of 10.0 dBm on the power meter.

STEP 3: Remove power meter from end of coaxial cable. Connect cable to Channel 1 input on the back panel of the PA821SWB. Connect the power meter to the Main Output on the front panel of the PA821SWB. Measure the power level on the power meter. Subtract the input power level (+10.0 dBm) to determine the gain in dB of that channel at 470 MHz.

STEP 4: Repeat steps 2 and 3 above for channels 2-8 with a signal generator frequency of 470 MHz. Repeat measurements on all channels at 860 and 952 MHz. Verify that the gain of each channel meets the requirements below:

| FREQUENCY | GAIN (EACH CHANNEL): |
| --- | --- |
| 470 MHz | +0/-5.0 dB |
| 860 MHz | +0/-5.0 dB |
| 952 MHz | +0/-5.0 dB |

-OR-

SWEEP 470-952 MHz +0/-5.0 dB

STEP 5: Connect 50 Ohm termination (low VSWR) to main output connector on the front panel. Connect one end of a BNC coaxial cable to the tracking generator output on the spectrum analyzer. Connect a 2nd BNC cable to the input of the spectrum analyzer. Connect the unterminated ends of the cables to each other through a BNC Female-Female adaptor. Set up spectrum analyzer with tracking generator as follows:

| | |
| --- | --- |
| Start Frequency: | 470 MHz |
| Stop Frequency: | 952 MHz |
| Swp Coupling: | SR |
| Amplitude: | -10 dBm |
| Resolution Bandwidth: | 1 KHz |

Perform a tracking peak.
Store Reference Trace.
Turn Normalize ON.

STEP 6: Remove the BNC adaptor between the 2 cables and verify that the port to port isolation between the following channel pairs is 45 dB Minimum:

CH 1 – 2
CH 1 – 3
CH 1 – 5
CH 3 – 4
CH 5 – 6
CH 5 – 7
CH 7 - 8

STEP 7: Disconnect 50 ohm termination from the "MAIN OUT" connector on the front panel, and reconnect it to the "A + B OUT" connector of the expansion port (2 way passive combiner). Using the same setup from STEPS 6 and 7 above, measure the isolation between the "A IN" and "B IN" connectors on the front panel. Verify that the isolation is 25 dB minimum.

STEP 8: Connect the 50 ohm termination to the "B IN" connector on the front panel. Measure the insertion loss from "A IN" to "A + B OUT". Verify that it is 4.0 dB maximum. Repeat measurement for "B IN" to "A + B OUT" with the 50 ohm termination on the "A IN" connector and verify that the insertion loss is 4.0 dB maximum.

STEP 9: Set signal generator frequency to 470 MHz and output power level to +4.0 dBm (at the end of a coaxial cable). Connect cable to channels 1 – 8, one at a time, and verify that the LED on the front panel corresponding to the channel that the cable is connected to lights up.