Test Procedures Plan

LPFM Third-adjacent Channel Interference Analysis

The MITRE Corporation

Contract No. 50181

Under Prime Contract No. CON01000020

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1. Overview

1.1. Operational Cautions

- The following sections contain information and instructions pertaining to the setup and performance of the LPFM transmit and receive tests. These instructions shall only be performed by personnel that have been trained on the setup and use of the equipment described below. Complete instructions may be found in the specific instruction manual that originally accompanied each piece of LPFM and test equipment.
- Caution shall be taken when towing the trailer-mounted tower to avoid overhead obstructions and objects during turning maneuvers. When backing the trailer and tow vehicle a spotter ***shall always*** be used.
- Wheel chocks shall be used when trailer is parked prior to disconnecting from the vehicle or erecting the tower.
- Do not erect tower in areas containing power or telephone lines. Contact with power lines may cause injury or death to personnel operating in close proximity to tower and trailer.
- A log of all instances of transmission shall be kept with the Transmit Test Vehicle at all times. All changes in power, height above ground level (AGL) and RF ON/OFF must be recorded. No RF transmissions shall occur without consent of the Field Test Lead. If contact is lost for any reason between the Transmit Test Vehicle and the Receiver Test Vehicle for a period of greater than 15 minutes, the engineer operating the transmitter shall disable the transmitter until contact is re-established. No other changes shall be made until directed to do so.
- **Do not turn off power to Yamaha AW 4416 without initiating the correct shutdown process listed in Section 3.6 as damage to the files on the hard drive may result. Data loss will be from the last time of save. At no**

time will there be more than one test receiver location of test data at risk.

1.2. Miscellaneous Test Equipment Specifications

1.2.1. RF System Gains and Losses

- See Figure 1, Transmit Vehicle RF/Audio Block Diagram, for the system gain and loss information.
- 129 foot main cable - 1.9 dB loss
- Divider jumper cables - 0.5 dB loss
- The transmit antenna has a gain of 0.0 dBd when using 2 bay antenna system. This is an antenna system that includes the 2-way splitter but not the jumper cables, which are considered separately in the calculation of ERP.
- Directional Coupler 'Incident' and 'Reflected' ports are approximately 40 dB down. Specific coupling factors are listed in each specific LPFM site section of the TPP

1.3. Initial Equipment Setup Instructions

1.3.1. Trailer Mounted Tower Equipment

- At least 2 persons are required for completion of this section.
- Refer to operations manual located in trailer toolbox for additional information.
- Place wheel chocks between wheels on both sides of trailer.
- Disconnect trailer from tow vehicle
- Deploy all outriggers.

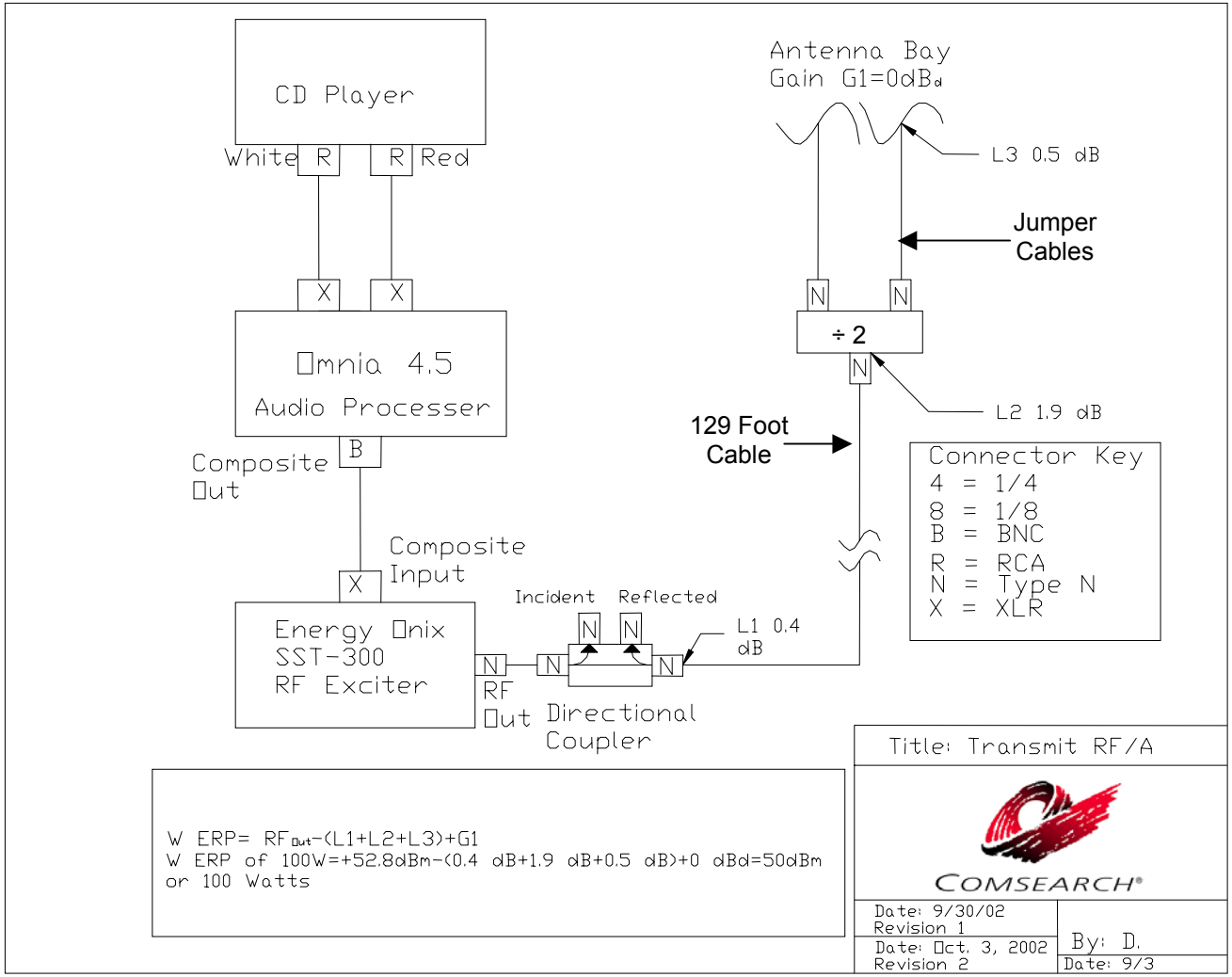
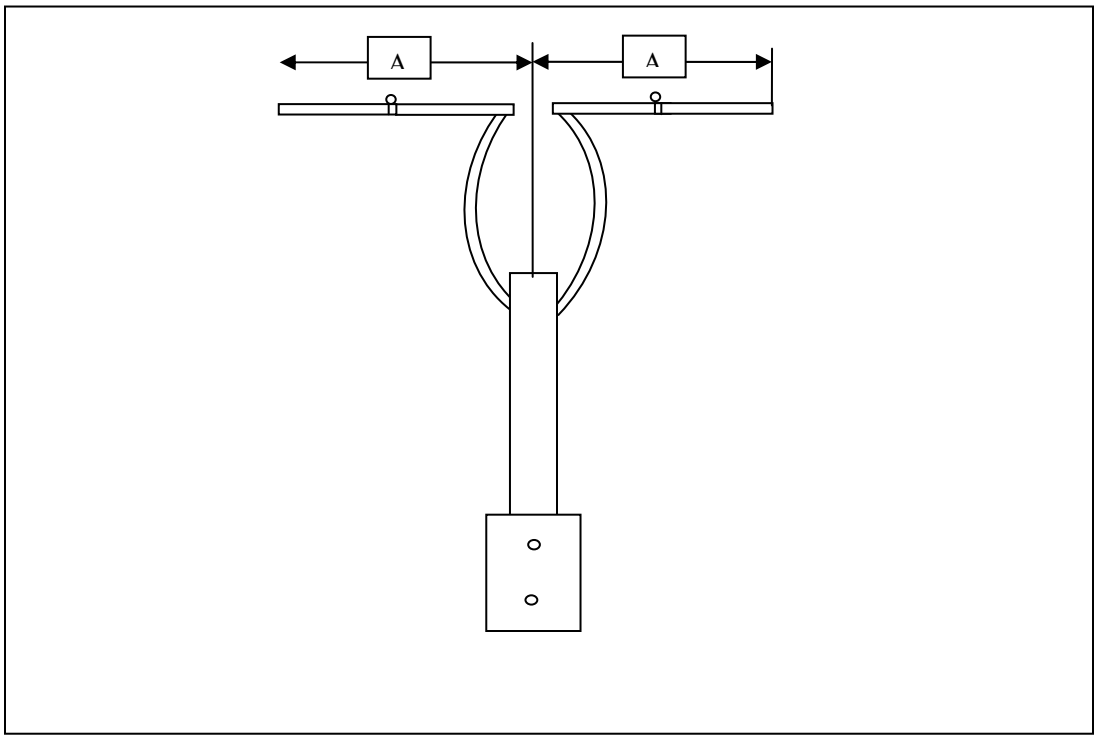


Figure 1 - Transmit Vehicle RF/Audio Block Diagram

- Using level supplied in toolbox, carefully level the trailer using jacks mounted in outriggers. Recheck in all directions until no further adjustment is required.
- Install mast and antenna bay to top of tower. Position lower antenna at fixed location as marked on mast. Position upper antenna according to LPFM site to be tested. Placement of the upper antenna is determined by the manufacturer supplied equation of: Spacing between bays (Wavelength) in inches = 11803 divided by the Frequency in MHz. These have been pre-marked on mast.
- Set stubs on antenna to the correct dimension using the supplied template, per data in Figure 2. Note that there are two stub sizes listed in the figure. Ensure the correct size is used for the frequency of the LPFM site.
- Install RF divider to mast at center of mast pole
- Install and carefully route cables to RF divider on antenna bay mast. Route cables so as to enable the raising and lowering of the tower during the test routines. Secure as necessary so as to not apply stress to the cable, the divider or the antennas.
- Check for clearance in all directions of tower and trailer.
- Apply power from generator and raise mast from horizontal to vertical position.
- Install bolts in bottom of mast to secure it to lower mount.
- Re-check level of trailer.



Long Stubs for 88-99 MHz		Short Stubs for 97-108 MHz	
MHz	A (Dist cm)	MHz	A (Dist cm)
88	52.5	97	41
89	51	98	39.5
90	50	99	38
91	48	100	37
92	46.5	101	36.5
93	45.5	102	35.5
94	44.5	103	34.5
95	43	104	34
96	42	105	33
97	41	106	32
98	39.5	107	31
99	38	108	29.5

Figure 2 – Antenna Configuration Data

1.3.2. LPFM Transmit Vehicle Equipment

1.3.2.1. General LPFM Vehicle Setup

See the block diagram in Figure 1 in this document for additional connection information.

- Ensure that power switch is turned off on Energy-Onix SST-300 exciter. Connect RF cable from antenna bay to 'load' port on directional coupler mounted to RF rack.
- With vehicle engine running, energize the AC power inverter mounted in the vehicle.
- Set RF Mute switch in transmitter rack to the Mute position. Do not transmit until authorized to do so by the Field Test Lead.
- Apply power to the CD player, Omnia 4.5 FM and the Energy-Onix SST-300.
- Apply power to the spectrum analyzer and power meter.

1.3.2.2. Individual Equipment Setup Procedures

1.3.2.2.1. Power Meter

- Allow a minimum of 10 minutes of warm-up. Connect power head to Power Ref connector of power meter.
- Calibrate Power Meter
    - Press button marked 'Frequency'
    - Change frequency to read 98 MHz using buttons on front panel
    - Press button marked 'Zero/Cal'
    - Press button marked 'Zero' then wait up to one minute until complete as indicated on front panel.

- Press button marked ‘Cal’ then wait up to one minute until complete as indicated on front panel.

- Calibration is now complete. Disconnect power head from Ref connector and place in a safe place until ready to use.

1.3.2.2.2. Spectrum Analyzer

- Apply power to Spectrum Analyzer and allow at least 10 min. for warm-up
- Press ‘PRESET’
- Set center frequency to FPFM using the ‘CENTER’ button
- Set span to “1 MHz” using the ‘SPAN’ button
- Set RBW to “3kHz” using the ‘CPL’ button
- Set VBW to “3 kHz” using the ‘CPL’ button
- Set REF LEVEL to an appropriate level so that all of the signal will appear on the screen using the ‘REF LEVEL’ button
- Press ‘MENU’, then select TRACE DET, then select POSI on the menu
- Press ‘MEAS 2’, then select ACP, then select CH SP/BS (SP will be highlighted), and set the channel spacing to “200 kHz”
- Select CH SP/BS (BS will be highlighted), and set the Channel bandwidth to “180 kHz”
- Press ‘MEAS 2’, then select POWER MEAS, then select CHANNEL POWER on the menu
- NOTE: Level will be shown on screen beside the signal
- Wait until counter is finished and the level stabilizes, then record the reading

- Set center frequency to LPFM frequency using the 'CENTER' button, and perform the same measurement

1.3.2.2.3. Omnia 4.5 and CD Player

- Apply power to Omnia 4.5 using switch located on rear of unit.
- Apply power to CD player.
- Connect headphones to monitor jack on front of Omnia 4.5.
- Using multi purpose control knob on front of Omnia 4.5 check the following settings:
  - ✓ 1 Input Gain set to 0.0 dB
  - ✓ 2 Master Drive set to +4 dB
  - ✓ 3 De-emphasis set to 75 µs
  - ✓ 4 Pilot Injection set to 9 %
  - ✓ 5 Pilot Phase set to 0.0º
  - ✓ 6 Load a preset condition corresponding to the first format to be tested
- Push play on CD unit while monitoring with headphones. Audio should be present without any noticeable distortion.

1.3.3. Receiver Test Vehicle Equipment

See the block diagram in Figure 3 of this document for connection information.

- Apply power to all equipment.
- Tune all receivers to desired station per specific section of FPFM station under test in Section 2.

- Perform a 1-minute functional test recording on all receivers using parameters listed for the FPFM station to be tested prior to starting test. This test is required one time at the beginning of each day.
- Move Receiver Test Vehicle to first test location.
- LPFM field strength measurements will be taken with a spectrum analyzer at all twelve (12) combinations of AGL/ERP/program content for each measurement location. FPFM field strength measurements will be taken with a spectrum analyzer at the first combination of AGL/ERP/program content at each measurement location. Other FPFM field strength measurements may need to be taken during the remaining combinations of AGL/ERP/program content if over an hour of time has passed since the first FPFM field strength measurement or a perceived degradation or loss of FPFM signal is detected. Changing propagation/fading conditions may also require that another FPFM field strength measurement is required.
- Proceed to Section 2 of the TPP for the specific LPFM site under test.

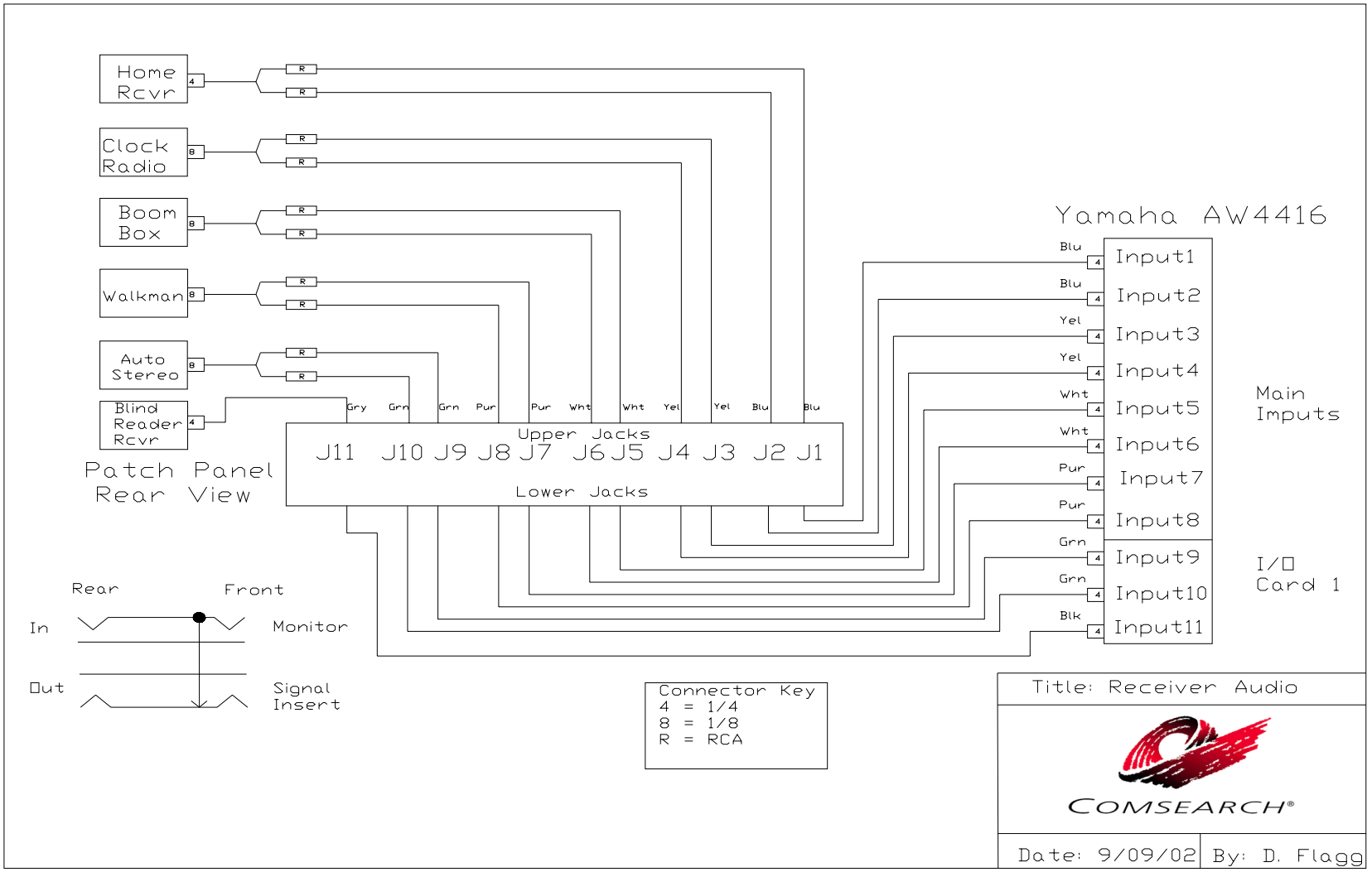


Figure 3 - Receiver Audio Block Diagram

2. LPFM Site Specific Instructions

2.1. Avon, Connecticut

2.1.1. Conduct Site Surveys

- Contact LPFM operators only where necessary to arrange for access to conduct on-site survey.
- Using a GPS receiver and topographic maps, locate and conduct an on-site survey to determine if LPFM site listed on the LPFM license application is usable for testing purposes.
- If LPFM applicant site is not usable, contact Engineering Lead to determine possible alternative sites. Any alternate site identified will be located as close as possible to the LPFM applicant location maintaining the distance ratio determined during the initial LPFM site selection process. Any alternate site selection that has a greater than one-mile separation from the LPFM applicant will require approval from MITRE.
- Using a computer-mapping program, plot radius line on map from the FPFM through the LPFM and outward to determine locations for recording receiver data during test phase.
- Using a GPS receiver and topographic maps, drive along the proposed radius observing the feasibility of stopping the vehicle and conducting measurements during the test phase. Look for pull off areas, parking lots, local streets with parking, etc.

2.1.1.1. Determine HAAT for LPFM Test Site

- Locate selected LPFM sites and FPFM stations using license application coordinates from FCC database.
- Using data from the topographic maps and internal Comsearch software programs, determine the Height AMSL of each LPFM site.

- Two LPFM radiation centerline heights will be used for the LPFM interference testing. They are 10- and 30-meter radiation centerlines above ground level (RCAGL). For each of the sites that the portable LPFM will be placed, the determination of HAAT for the two antenna RCAGL heights will be calculated and recorded. The calculation method to be used in the HAAT determination is described in FCC Rules Part 73. In general, the Part 73 calculation method takes eight radials (45° apart) from the point of interest, and at distances between 2 and 10 miles from the point of interest takes 50 equally spaced increments and determines the height at each of the 50 points. For each radial the average height along it is determined by summing the height at each point and dividing by 50. Then, the average terrain height of the eight radials is determined by summing the average of the eight radials and dividing by eight. If there are significant bodies of water along any of the radials, the entire radial, or portions of it, may be eliminated in the calculation to determine height of the average terrain for the point of interest.
- Enter points and other details on topographic maps detailing distances and proposed radius for testing.

2.1.1.2. Verify Test Locations

- Using data collected in Section 2.1.1, mathematically determine the nearest and farthest receiver test locations with relation to the LPFM site. Plot these locations on a topographic map. See Figure 4 for LPFM to test location distances.

Avon	Distance from LPFM
Location #	in miles
1	0.010
2	0.024
3	0.059
4	0.143
5	0.349
6	0.847
7	2.058
8	5.000
Multiplier	2.43

Figure 4 – Avon LPFM to Test Location Distances

2.1.2. Initial Equipment Setup Instructions

2.1.2.1. Energy-Onix SST-300 FM Exciter Setup Instruction

- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 107.5 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power
- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.

- Set output power to approximately 10 W using the meter on front of the SST-300.
- Enter measurement of incident power in Transmitter Test Vehicle Log.
- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 39.0 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 5. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 6 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable exciter.

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	Avon	107.5MHz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	WCCC	106.9 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	-39.0 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (Avon, CT)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 5 – Avon LPFM Transmitter Test Vehicle Log

Transmitter Actions (Avon, CT)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 5 (Cont) – Avon LPFM Transmitter Test Vehicle Log

Transmitter Actions (Avon,CT)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 5 (Cont) – Avon LPFM Transmitter Test Vehicle Log

Transmitter Actions (Avon, CT)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 5 (Cont) – Avon LPFM Transmitter Test Vehicle Log

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 6 – Power Increase Required to Establish Desired ERP

2.1.3. Receiver / Transmitter Equipment Setup for Data Collection

1. Data will be entered in the Receiver Test Data Sheet, Figures 7 through 14.
2. With the LPFM transmitter disabled, listen to the audio output of the vehicle receiver. If interference is detected check the remaining receivers. If **all** receivers under test are not able to receive the signal from the FPFM station, a multipath or interference condition may exist. Move the Receiver Test Vehicle laterally from the test radial, maintaining the distance from the LPFM. The move shall not be more than 0.10 miles or 10% of the distance from the LPFM to the desired test location whichever is less. If any of the receivers is able to receive the FPFM station signal clearly, then the original test location will be used and the interference to the other receivers will be considered a normal condition of that location.
3. Using the GPS receiver, enter into the Receiver Test Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until the full eight test locations have been completed.***
4. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section. Receiver Test Vehicle technician continue to step 7 of Section 2.1.3.
5. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.1.4 of the TPP. Section 2.1.4 of the TPP also directs the specific rotation of tests to be followed.
6. At direction of Field Test Lead enable LPFM. Call technician in Receiver Test Vehicle to confirm transmission.
7. Make entry in Transmitter Test Vehicle Log.

8. Turn off the engine on the receiver test vehicle prior to recording the test data. Ensure that the car stereo has power applied and that the headphones jack is enabled in the rear of the vehicle.
9. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 7 through 14.
10. Contact Transmit Vehicle to mute the exciter and wait for confirmation.
11. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
12. Make entry on Receiver Test Data Sheet by circling 'Y' or 'N' in the 'W/O LPFM' row
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start /stop time, the recording ID, and any additional notes regarding monitored quality on Receiver Test Data Sheet, Figures 7 through 14.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.
17. Change Height AGL, ERP or Program to next selection in Section 2.1.4 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable.

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		WCCC 106.9 MHz	107.5 MHz	-39.0 dB	100 W	13.8 dBm					
	W		Processed			10 W	3.8 dBm					
	Location 1 Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV115P1	AV111P1	AV118P1	AV115T1	AV111T1	AV118T1	AV125P1	AV121P1	AV128P1	AV125T1	AV121T1	AV128T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV115P2	AV111P2	AV118P2	AV115T2	AV111T2	AV118T2	AV125P2	AV121P2	AV128P2	AV125T2	AV121T2	AV128T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV115P3	AV111P3	AV118P3	AV115T3	AV111T3	AV118T3	AV125P3	AV121P3	AV128P3	AV125T3	AV121T3	AV128T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV115P4	AV111P4	AV118P4	AV115T4	AV111T4	AV118T4	AV125P4	AV121P4	AV128P4	AV125T4	AV121T4	AV128T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV115P5	AV111P5	AV118P5	AV115T5	AV111T5	AV118T5	AV125P5	AV121P5	AV128P5	AV125T5	AV121T5	AV128T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 7 – Avon Receiver Test Data Sheet # 1

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCCC 106.9 MHz		107.5 MHz	-39.0 dB	100 W	13.8 dBm			
	W			Processed				10 W	3.8 dBm			
	Location 2											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV215P1	AV211P1	AV218P1	AV215T1	AV211T1	AV218T1	AV225P1	AV221P1	AV228P1	AV225T1	AV221T1	AV228T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV215P2	AV211P2	AV218P2	AV215T2	AV211T2	AV218T2	AV225P2	AV221P2	AV228P2	AV225T2	AV221T2	AV228T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV215P3	AV211P3	AV218P3	AV215T3	AV211T3	AV218T3	AV225P3	AV221P3	AV228P3	AV225T3	AV221T3	AV228T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV215P4	AV211P4	AV218P4	AV215T4	AV211T4	AV218T4	AV225P4	AV221P4	AV228P4	AV225T4	AV221T4	AV228T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV215P5	AV211P5	AV218P5	AV215T5	AV211T5	AV218T5	AV225P5	AV221P5	AV228P5	AV225T5	AV221T5	AV228T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 8 – Avon Receiver Test Data Sheet # 2

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCCC 106.9 MHz		107.5 MHz	-39.0 dB	100 W	13.8 dBm			
	W			Processed				10 W	3.8 dBm			
	Location 3											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV315P1	AV311P1	AV318P1	AV315T1	AV311T1	AV318T1	AV325P1	AV321P1	AV328P1	AV325T1	AV321T1	AV328T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV315P2	AV311P2	AV318P2	AV315T2	AV311T2	AV318T2	AV325P2	AV321P2	AV328P2	AV325T2	AV321T2	AV328T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV315P3	AV311P3	AV318P3	AV315T3	AV311T3	AV318T3	AV325P3	AV321P3	AV328P3	AV325T3	AV321T3	AV328T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV315P4	AV311P4	AV318P4	AV315T4	AV311T4	AV318T4	AV325P4	AV321P4	AV328P4	AV325T4	AV321T4	AV328T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV315P5	AV311P5	AV318P5	AV315T5	AV311T5	AV318T5	AV325P5	AV321P5	AV328P5	AV325T5	AV321T5	AV328T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 9 – Avon Receiver Test Data Sheet # 3

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCCC 106.9 MHz		107.5 MHz	-39.0 dB	100 W	13.8 dBm			
	W			Processed				10 W	3.8 dBm			
	Location 4											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV415P1	AV411P1	AV418P1	AV415T1	AV411T1	AV418T1	AV425P1	AV421P1	AV428P1	AV425T1	AV421T1	AV428T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV415P2	AV411P2	AV418P2	AV415T2	AV411T2	AV418T2	AV425P2	AV421P2	AV428P2	AV425T2	AV421T2	AV428T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV415P3	AV411P3	AV418P3	AV415T3	AV411T3	AV418T3	AV425P3	AV421P3	AV428P3	AV425T3	AV421T3	AV428T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV415P4	AV411P4	AV418P4	AV415T4	AV411T4	AV418T4	AV425P4	AV421P4	AV428P4	AV425T4	AV421T4	AV428T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV415P5	AV411P5	AV418P5	AV415T5	AV411T5	AV418T5	AV425P5	AV421P5	AV428P5	AV425T5	AV421T5	AV428T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 10 – Avon Receiver Test Data Sheet # 4

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		WCCC 106.9 MHz	107.5 MHz	-39.0 dB	100 W	13.8 dBm					
	W		Processed			10 W	3.8 dBm					
	Location 5											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV515P1	AV511P1	AV518P1	AV515T1	AV511T1	AV518T1	AV525P1	AV521P1	AV528P1	AV525T1	AV521T1	AV528T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV515P2	AV511P2	AV518P2	AV515T2	AV511T2	AV518T2	AV525P2	AV521P2	AV528P2	AV525T2	AV521T2	AV528T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV515P3	AV511P3	AV518P3	AV515T3	AV511T3	AV518T3	AV525P3	AV521P3	AV528P3	AV525T3	AV521T3	AV528T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV515P4	AV511P4	AV518P4	AV515T4	AV511T4	AV518T4	AV525P4	AV521P4	AV528P4	AV525T4	AV521T4	AV528T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV515P5	AV511P5	AV518P5	AV515T5	AV511T5	AV518T5	AV525P5	AV521P5	AV528P5	AV525T5	AV521T5	AV528T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 11 – Avon Receiver Test Data Sheet # 5

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		WCCC 106.9 MHz	107.5 MHz	-39.0 dB	100 W	13.8 dBm					
	W		Processed			10 W	3.8 dBm					
	Location 6											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV615P1	AV611P1	AV618P1	AV615T1	AV611T1	AV618T1	AV625P1	AV621P1	AV628P1	AV625T1	AV621T1	AV628T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV615P2	AV611P2	AV618P2	AV615T2	AV611T2	AV618T2	AV625P2	AV621P2	AV628P2	AV625T2	AV621T2	AV628T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV615P3	AV611P3	AV618P3	AV615T3	AV611T3	AV618T3	AV625P3	AV621P3	AV628P3	AV625T3	AV621T3	AV628T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV615P4	AV611P4	AV618P4	AV615T4	AV611T4	AV618T4	AV625P4	AV621P4	AV628P4	AV625T4	AV621T4	AV628T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV615P5	AV611P5	AV618P5	AV615T5	AV611T5	AV618T5	AV625P5	AV621P5	AV628P5	AV625T5	AV621T5	AV628T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 12 – Avon Receiver Test Data Sheet # 6

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCCC 106.9 MHz		107.5 MHz	-39.0 dB	100 W	13.8 dBm			
	W			Processed				10 W	3.8 dBm			
	Location 7											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV715P1	AV711P1	AV718P1	AV715T1	AV711T1	AV718T1	AV725P1	AV721P1	AV728P1	AV725T1	AV721T1	AV728T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV715P2	AV711P2	AV718P2	AV715T2	AV711T2	AV718T2	AV725P2	AV721P2	AV728P2	AV725T2	AV721T2	AV728T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV715P3	AV711P3	AV718P3	AV715T3	AV711T3	AV718T3	AV725P3	AV721P3	AV728P3	AV725T3	AV721T3	AV728T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV715P4	AV711P4	AV718P4	AV715T4	AV711T4	AV718T4	AV725P4	AV721P4	AV728P4	AV725T4	AV721T4	AV728T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV715P5	AV711P5	AV718P5	AV715T5	AV711T5	AV718T5	AV725P5	AV721P5	AV728P5	AV725T5	AV721T5	AV728T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 13 – Avon Receiver Test Data Sheet # 7

Avon, Connecticut LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCCC 106.9 MHz		107.5 MHz	-39.0 dB	100 W	13.8 dBm			
	W			Processed				10 W	3.8 dBm			
	Location 8											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	AV815P1	AV811P1	AV818P1	AV815T1	AV811T1	AV818T1	AV825P1	AV821P1	AV828P1	AV825T1	AV821T1	AV828T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	AV815P2	AV811P2	AV818P2	AV815T2	AV811T2	AV818T2	AV825P2	AV821P2	AV828P2	AV825T2	AV821T2	AV828T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	AV815P3	AV811P3	AV818P3	AV815T3	AV811T3	AV818T3	AV825P3	AV821P3	AV828P3	AV825T3	AV821T3	AV828T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	AV815P4	AV811P4	AV818P4	AV815T4	AV811T4	AV818T4	AV825P4	AV821P4	AV828P4	AV825T4	AV821T4	AV828T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	AV815P5	AV811P5	AV818P5	AV815T5	AV811T5	AV818T5	AV825P5	AV821P5	AV828P5	AV825T5	AV821T5	AV828T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 14 – Avon Receiver Test Data Sheet # 8

18. Repeat steps 5 through 15 for each Height/ERP/Format combination in Section 2.1.4 of the TPP. Data will be entered in the Receiver Test Data Sheet, Figures 7 through 14, corresponding to the location under test.
19. Move vehicle to next designated test location and repeat steps 1 through 17 until all locations associated with the FPFM/LPFM under test have been completed. If the field engineer conducting the test is still able to detect interference at the eighth location, then an additional test will be conducted. The ninth test will follow the same rules of distance from the last test location. Prior to conducting the ninth test, the Field Test Lead must be contacted.

2.1.4. Height AGL, RF Output Level, and Program Format Test Plan

- 30 m AGL, 10 W ERP, processed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, processed programming
- 30 m AGL, 10 W ERP, news/talk programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, news/talk programming
- 10 m AGL, 10 W ERP, processed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP processed programming
- 10 m AGL, 10 W ERP, news/talk programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP, news/talk programming

2.2. Brunswick, Maine

2.2.1. Conduct Site Surveys

- Contact LPFM operators where possible to arrange for access to conduct on-site survey.
- Using a GPS receiver and topographic maps locate and conduct an on-site survey to determine if LPFM site listed on the LPFM license application is usable for testing purposes.
- If LPFM applicant site is not usable, contact Engineering Lead to determine possible alternative sites. Any alternate site identified will be located as close as possible to the LPFM applicant location maintaining the distance ratio determined during the initial LPFM site selection process. Any alternate site selection that has a greater than one-mile separation from the LPFM applicant will require approval from MITRE.
- Using a computer-mapping program, plot radius line on map from the FPFM through the LPFM and outward to determine locations for recording receiver data during test phase.
- Using a GPS receiver and topographic maps, drive along the proposed radius observing the feasibility of stopping the vehicle and conducting measurements during the test phase. Look for pull off areas, parking lots, local streets with parking, etc.

2.2.1.1. Determine HAAT for LPFM Test Site

- Locate selected LPFM sites and FPFM stations using license application coordinates from FCC database
- Using data from the topographic maps and internal Comsearch software programs, determine the Height AMSL of each LPFM site.
- Two LPFM radiation centerline heights will be used for the LPFM interference testing. They are 10- and 30-meter radiation

centerlines above ground level (RCAGL). For each of the sites that the portable LPFM will be placed, the determination of HAAT for the two antenna RCAGL heights will be calculated and recorded. The calculation method to be used in the HAAT determination is described in FCC Rules Part 73. In general, the Part 73 calculation method takes eight radials (45° apart) from the point of interest, and at distances between 2 and 10 miles from the point of interest takes 50 equally spaced increments and determines the height at each of the 50 points. For each radial the average height along it is determined by summing the height at each point and dividing by 50. Then the average terrain height of the eight radials is determined by summing the average of the eight radials and dividing by eight. If there are significant bodies of water along any of the radials, the entire radial, or portions of it, may be eliminated in the calculation to determine height of the average terrain for the point of interest.

- Enter points and other details on topographic maps detailing distances and proposed radius for testing.

2.2.1.2. Verify Test Locations

- Using data collected in Section 2.2.1, mathematically determine the nearest and farthest receiver test locations with relation to the LPFM site. Plot these locations on a topographic map. See Figure 15 for LPFM to test location distances.

Brunswick	Distance from LPFM
Location #	in miles
1	0.010
2	0.028
3	0.076
4	0.210
5	0.578
6	1.592
7	4.389
8	12.100
Multiplier	2.76

Figure 15 – Brunswick LPFM to Test Location Distances

2.2.2. Initial Equipment Setup Instructions

2.2.2.1. Energy-Onix SST-300 FM Exciter Setup Instruction

- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 97.3 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power

- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.
- Set output power to approximately 10 W using the meter on front of the SST-300.
- Enter measurement of incident power in Transmitter Test Vehicle Log, Figure 16.
- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 39.9 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 16. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 17 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable exciter.

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	Brunswick	97.3 MHz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	WCME	96.7 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	-39.9 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (Brunsick, ME)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 16 – Brunswick LPFM Transmitter Test Vehicle Log

Transmitter Actions (Brunswick, ME)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 16 (Cont) – Brunswick LPFM Transmitter Test Vehicle Log

Transmitter Actions (Brunswick, ME)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 16 (Cont) – Brunswick LPFM Transmitter Test Vehicle Log

Transmitter Actions (Brunswick, ME)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 16 (Cont) – Brunswick LPFM Transmitter Test Vehicle Log

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 17 – Power Increase Required to Establish Desired ERP

2.2.3. Receiver / Transmitter Equipment Setup for Data Collection

1. Data will be entered in the Receiver Test Data Sheet, Figures 18 through 25.
2. With the LPFM transmitter disabled, listen to the audio output of the vehicle receiver. If interference is detected check the remaining receivers. If **all** receivers under test are not able to receive the signal from the FPFM station, a multipath or interference condition may exist. Move the Receiver Test Vehicle laterally from the test radial, maintaining the distance from the LPFM. The move shall not be more than 0.10 miles or 10% of the distance from the LPFM to the desired test location whichever is less. If any of the receivers is able to receive the FPFM station signal clearly, then the original test location will be used and the interference will be considered a normal condition of that location.
3. Using the GPS receiver, enter into the Receiver Test Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until the full eight test locations have been completed.***
4. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section. Receiver Test Vehicle technician continue to step 7 of Section 2.2.3.
5. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.2.4 of the TPP. Section 2.2.4 of the TPP also directs the specific rotation of tests to be followed.
6. At direction of Field Test Lead enable LPFM. Call technician in Receiver Test Vehicle to confirm transmission.

7. Make entry in Transmitter Test Vehicle Log.
8. Turn off the engine on the receiver test vehicle prior to recording the test data. Ensure that the car stereo has power applied and that the headphones jack is enabled in the rear of the vehicle.
9. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 18 through 25.
10. Contact Transmit Vehicle to mute the exciter and wait for confirmation
11. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
12. Make entry on Receiver Test Data Sheet by circling 'Y' or 'N' in the 'W/O LPFM' row
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start /stop time, the recording ID, and any additional notes regarding monitored quality on Receiver Test Data Sheet.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.
17. Change Height AGL, ERP or Program to next selection in Section 2.2.4 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable.

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCME 96.7 MHz		97.3 MHz	-39.9 dB	100 W	13.0 dBm			
	W			News/Talk				10 W	3.0 dBm			
	Location 1											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR115U1	BR111U1	BR118U1	BR115T1	BR111T1	BR118T1	BR125U1	BR121U1	BR128U1	BR125T1	BR121T1	BR128T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR115U2	BR111U2	BR118U2	BR115T2	BR111T2	BR118T2	BR125U2	BR121U2	BR128U2	BR125T2	BR121T2	BR128T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR115U3	BR111U3	BR118U3	BR115T3	BR111T3	BR118T3	BR125U3	BR121U3	BR128U3	BR125T3	BR121T3	BR128T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR115U4	BR111U4	BR118U4	BR115T4	BR111T4	BR118T4	BR125U4	BR121U4	BR128U4	BR125T4	BR121T4	BR128T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR115U5	BR111U5	BR118U5	BR115T5	BR111T5	BR118T5	BR125U5	BR121U5	BR128U5	BR125T5	BR121T5	BR128T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 18 – Brunswick Receiver Test Vehicle Data Sheet # 1

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value				
	N			WCME 96.7 MHz	97.3 MHz	-39.9 dB	100 W	13.0 dBm				
	W			News/Talk			10 W	3.0 dBm				
	Location 2 Lat Lon:			N		W						
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR215U1	BR211U1	BR218U1	BR215T1	BR211T1	BR218T1	BR225U1	BR221U1	BR228U1	BR225T1	BR221T1	BR228T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR215U2	BR211U2	BR218U2	BR215T2	BR211T2	BR218T2	BR225U2	BR221U2	BR228U2	BR225T2	BR221T2	BR228T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR215U3	BR211U3	BR218U3	BR215T3	BR211T3	BR218T3	BR225U3	BR221U3	BR228U3	BR225T3	BR221T3	BR228T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR215U4	BR211U4	BR218U4	BR215T4	BR211T4	BR218T4	BR225U4	BR221U4	BR228U4	BR225T4	BR221T4	BR228T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR215U5	BR211U5	BR218U5	BR215T5	BR211T5	BR218T5	BR225U5	BR221U5	BR228U5	BR225T5	BR221T5	BR228T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 19 – Brunswick Receiver Test Vehicle Data Sheet # 2

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCME 96.7 MHz		97.3 MHz	-39.9 dB	100 W	13.0 dBm			
	W			News/Talk				10 W	3.0 dBm			
	Location 3 Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR315U1	BR311U1	BR318U1	BR315T1	BR311T1	BR318T1	BR325U1	BR321U1	BR328U1	BR325T1	BR321T1	BR328T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR315U2	BR311U2	BR318U2	BR315T2	BR311T2	BR318T2	BR325U2	BR321U2	BR328U2	BR325T2	BR321T2	BR328T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR315U3	BR311U3	BR318U3	BR315T3	BR311T3	BR318T3	BR325U3	BR321U3	BR328U3	BR325T3	BR321T3	BR328T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR315U4	BR311U4	BR318U4	BR315T4	BR311T4	BR318T4	BR325U4	BR321U4	BR328U4	BR325T4	BR321T4	BR328T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR315U5	BR311U5	BR318U5	BR315T5	BR311T5	BR318T5	BR325U5	BR321U5	BR328U5	BR325T5	BR321T5	BR328T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 20 – Brunswick Receiver Test Vehicle Data Sheet # 3

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCME 96.7 MHz		97.3 MHz	-39.9 dB	100 W	13.0 dBm			
	W			News/Talk				10 W	3.0 dBm			
	Location 4											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR415U1	BR411U1	BR418U1	BR415T1	BR411T1	BR418T1	BR425U1	BR421U1	BR428U1	BR425T1	BR421T1	BR428T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR415U2	BR411U2	BR418U2	BR415T2	BR411T2	BR418T2	BR425U2	BR421U2	BR428U2	BR425T2	BR421T2	BR428T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR415U3	BR411U3	BR418U3	BR415T3	BR411T3	BR418T3	BR425U3	BR421U3	BR428U3	BR425T3	BR421T3	BR428T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR415U4	BR411U4	BR418U4	BR415T4	BR411T4	BR418T4	BR425U4	BR421U4	BR428U4	BR425T4	BR421T4	BR428T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR415U5	BR411U5	BR418U5	BR415T5	BR411T5	BR418T5	BR425U5	BR421U5	BR428U5	BR425T5	BR421T5	BR428T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 21 – Brunswick Receiver Test Vehicle Data Sheet # 4

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCME 96.7 MHz		97.3 MHz	-39.9 dB	100 W	13.0 dBm			
	W			News/Talk				10 W	3.0 dBm			
	Location 5											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR515U1	BR511U1	BR518U1	BR515T1	BR511T1	BR518T1	BR525U1	BR521U1	BR528U1	BR525T1	BR521T1	BR528T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR515U2	BR511U2	BR518U2	BR515T2	BR511T2	BR518T2	BR525U2	BR521U2	BR528U2	BR525T2	BR521T2	BR528T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR515U3	BR511U3	BR518U3	BR515T3	BR511T3	BR518T3	BR525U3	BR521U3	BR528U3	BR525T3	BR521T3	BR528T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR515U4	BR511U4	BR518U4	BR515T4	BR511T4	BR518T4	BR525U4	BR521U4	BR528U4	BR525T4	BR521T4	BR528T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR515U5	BR511U5	BR518U5	BR515T5	BR511T5	BR518T5	BR525U5	BR521U5	BR528U5	BR525T5	BR521T5	BR528T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 22 – Brunswick Receiver Test Vehicle Data Sheet # 5

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCME 96.7 MHz		97.3 MHz	-39.9 dB	100 W	13.0 dBm			
	W			News/Talk				10 W	3.0 dBm			
	Location 6											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR615U1	BR611U1	BR618U1	BR615T1	BR611T1	BR618T1	BR625U1	BR621U1	BR628U1	BR625T1	BR621T1	BR628T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR615U2	BR611U2	BR618U2	BR615T2	BR611T2	BR618T2	BR625U2	BR621U2	BR628U2	BR625T2	BR621T2	BR628T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR615U3	BR611U3	BR618U3	BR615T3	BR611T3	BR618T3	BR625U3	BR621U3	BR628U3	BR625T3	BR621T3	BR628T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR615U4	BR611U4	BR618U4	BR615T4	BR611T4	BR618T4	BR625U4	BR621U4	BR628U4	BR625T4	BR621T4	BR628T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR615U5	BR611U5	BR618U5	BR615T5	BR611T5	BR618T5	BR625U5	BR621U5	BR628U5	BR625T5	BR621T5	BR628T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 23 – Brunswick Receiver Test Vehicle Data Sheet # 6

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		WCME 96.7 MHz	97.3 MHz	-39.9 dB	100 W	13.0 dBm					
	W		News/Talk			10 W	3.0 dBm					
	Location 7											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR715U1	BR711U1	BR718U1	BR715T1	BR711T1	BR718T1	BR725U1	BR721U1	BR728U1	BR725T1	BR721T1	BR728T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR715U2	BR711U2	BR718U2	BR715T2	BR711T2	BR718T2	BR725U2	BR721U2	BR728U2	BR725T2	BR721T2	BR728T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR715U3	BR711U3	BR718U3	BR715T3	BR711T3	BR718T3	BR725U3	BR721U3	BR728U3	BR725T3	BR721T3	BR728T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR715U4	BR711U4	BR718U4	BR715T4	BR711T4	BR718T4	BR725U4	BR721U4	BR728U4	BR725T4	BR721T4	BR728T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR715U5	BR711U5	BR718U5	BR715T5	BR711T5	BR718T5	BR725U5	BR721U5	BR728U5	BR725T5	BR721T5	BR728T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 24 – Brunswick Receiver Test Vehicle Data Sheet # 7

Brunswick, Maine LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			WCME 96.7 MHz		97.3 MHz	-39.9 dB	100 W	13.0 dBm			
	W			News/Talk				10 W	3.0 dBm			
	Location 8											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W T	30m 0W T	30m 100W T	10m 10W U	10m 0W U	10m 100W U	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BR815U1	BR811U1	BR818U1	BR815T1	BR811T1	BR818T1	BR825U1	BR821U1	BR828U1	BR825T1	BR821T1	BR828T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BR815U2	BR811U2	BR818U2	BR815T2	BR811T2	BR818T2	BR825U2	BR821U2	BR828U2	BR825T2	BR821T2	BR828T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BR815U3	BR811U3	BR818U3	BR815T3	BR811T3	BR818T3	BR825U3	BR821U3	BR828U3	BR825T3	BR821T3	BR828T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BR815U4	BR811U4	BR818U4	BR815T4	BR811T4	BR818T4	BR825U4	BR821U4	BR828U4	BR825T4	BR821T4	BR828T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BR815U5	BR811U5	BR818U5	BR815T5	BR811T5	BR818T5	BR825U5	BR821U5	BR828U5	BR825T5	BR821T5	BR828T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 25 – Brunswick Receiver Test Vehicle Data Sheet # 8

18. Repeat steps 5 through 15 for each Height/ERP/Format combination in Section 2.2.4 of the TPP. Data will be entered in the Receiver Test Data Sheet, Figures 18 through 25, corresponding to the location under test.

19. Move vehicle to next designated test location and repeat steps 1 through 17 until all locations associated with the FPFM/LPFM under test have been completed. If the field engineer conducting the test is still able to detect interference at the eighth location, then an additional test will be conducted. The ninth test will follow the same rule of distance from the last test location. Prior to conducting the ninth test, the Field Test Lead must be contacted.

2.2.4. Height AGL, RF Output Level, and Output Format Test Plan

- 30 m AGL, 10 W ERP, unprocessed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, unprocessed programming
- 30 m AGL, 10 W ERP, news/talk programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, news/talk programming
- 10 m AGL, 10 W ERP, unprocessed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP unprocessed programming
- 10 m AGL, 10 W ERP, news/talk programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP, news/talk programming

2.3. East Bethel, Minnesota

2.3.1. Conduct Site Surveys

- Conduct Site Surveys Contact LPFM operators where possible to arrange for access to conduct on-site survey.
- Using a GPS receiver and topographic maps locate and conduct an on-site survey to determine if LPFM site listed on the LPFM license application is usable for testing purposes.
- If LPFM applicant site is not usable, contact Engineering Lead to determine possible alternative sites. Any alternate site identified will be located as close as possible to the LPFM applicant location maintaining the distance ratio determined during the initial LPFM site selection process. Any alternate site selection that has a greater than one-mile separation from the LPFM applicant will require approval from MITRE.
- Using a computer-mapping program, plot radius line on map from the FPFM through the LPFM and outward to determine locations for recording receiver data during test phase.
- Using a GPS receiver and topographic maps, drive along the proposed radius observing the feasibility of stopping the vehicle and conducting measurements during the test phase. Look for pull off areas, parking lots, local streets with parking, etc.

2.3.1.1. Determine HAAT for LPFM Test Site

- Locate selected LPFM sites and FPFM stations using license application coordinates from FCC database
- Using data from the topographic maps and internal Comsearch software programs, determine the Height AMSL of each LPFM site.
- Two LPFM radiation centerline heights will be used for the LPFM interference testing. They are 10- and 30-meter radiation

centerlines above ground level (RCAGL). For each of the sites that the portable LPFM will be placed, the determination of HAAT for the two antenna RCAGL heights will be calculated and recorded. The calculation method to be used in the HAAT determination is described in FCC Rules Part 73. In general, the Part 73 calculation method takes eight radials (45° apart) from the point of interest, and at distances between 2 and 10 miles from the point of interest takes 50 equally spaced increments and determines the height at each of the 50 points. For each radial the average height along it is determined by summing the height at each point and dividing by 50. Then the average terrain height of the eight radials is determined by summing the average of the eight radials and dividing by eight. If there are significant bodies of water along any of the radials, the entire radial, or portions of it, may be eliminated in the calculation to determine height of the average terrain for the point of interest.

- Enter points and other details on topographic maps detailing distances and proposed radius for testing.

2.3.1.2. Verify Test Locations

- Using data collected in Section 2.3.1, mathematically determine the nearest and farthest receiver test locations with relation to the LPFM site. Plot these locations on a topographic map. See Figure 26 for LPFM to test location distances.

East Bethel	Distance from LPFM
Location #	in miles
1	0.010
2	0.024
3	0.059
4	0.143
5	0.349
6	0.847
7	2.058
8	5.000
Multiplier	2.43

Figure 26 – East Bethel LPFM to Test Location Distances

2.3.2. Initial Equipment Setup Instructions

2.3.2.1. Energy-Onix SST-300 FM Exciter Setup Instruction

- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 91.7 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power

- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.
- Set output power to approximately 10 W using the meter on front of the SST-300.
- Enter measurement of incident power in Transmitter Test Vehicle Log, Figure 27.
- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 40.5 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 27. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 28 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable exciter.

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	East Bethel	91.7 Hz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	KNOW	91.1 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	-40.5 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (East Bethel, MN)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 27 – East Bethel LPFM Transmitter Test Vehicle Log

Transmitter Actions (East Bethel, MN)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 27 (Cont) – East Bethel LPFM Transmitter Test Vehicle Log

Transmitter Actions (East Bethel, MN)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 27 (Cont) – East Bethel LPFM Transmitter Test Vehicle Log

Transmitter Actions (East Bethel, MN)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 27 (Cont) – East Bethel LPFM Transmitter Test Vehicle Log

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 28 – Power Increase Required to Establish Desired ERP

2.3.3. Receiver / Transmitter Equipment Setup for Data Collection

1. Data will be entered in the Receiver Test Data Sheet, Figures 29 through 36.
2. With the LPFM transmitter disabled, listen to the audio output of the vehicle receiver. If interference is detected check the remaining receivers. If **all** receivers under test are not able to receive the signal from the FPFM station, a multipath or interference condition may exist. Move the Receiver Test Vehicle laterally from the test radial, maintaining the distance from the LPFM. The move shall not be more than 0.10 miles or 10% of the distance from the LPFM to the desired test location whichever is less. If any of the receivers is able to receive the FPFM station signal clearly, then the original test location will be used and the interference will be considered a normal condition of that location.
3. Using the GPS receiver, enter into the Receiver Test Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until the full eight test locations have been completed.***
4. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section. Receiver Test Vehicle technician continue to step 7 of Section 2.3.3.
5. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.3.4 of the TPP. Section 2.3.4 of the TPP also directs the specific rotation of tests to be followed.
6. At direction of Field Test Lead enable LPFM. Call technician in Receiver Test Vehicle to confirm transmission.

7. Make entry in Transmitter Test Vehicle Log.
8. Turn off the engine on the receiver test vehicle prior to recording the test data. Ensure that the car stereo has power applied and that the headphones jack is enabled in the rear of the vehicle.
9. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 29 through 36.
10. Contact Transmit Vehicle to mute the exciter and wait for confirmation.
11. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
12. Make entry on Receiver Test Data Sheet by circling 'Y' or 'N' in the 'W/O LPFM' row
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start /stop time, the recording ID, and any additional notes regarding monitored quality on Receiver Test Data Sheet.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.

East Bethel, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KNOW 91.1 MHz	91.7 MHz	-40.5 dB	100 W	12.3 dBm					
	W		Unprocessed			10 W	2.3 dBm					
	Location 1 Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	EB115U1	EB111U1	EB118U1	EB115P1	EB111P1	EB118P1	EB125U1	EB121U1	EB128U1	EB125P1	EB121P1	EB128P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	EB115U2	EB111U2	EB118U2	EB115P2	EB111P2	EB118P2	EB125U2	EB121U2	EB128U2	EB125P2	EB121P2	EB128P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	EB115U3	EB111U3	EB118U3	EB115P3	EB111P3	EB118P3	EB125U3	EB121U3	EB128U3	EB125P3	EB121P3	EB128P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	EB115U4	EB111U4	EB118U4	EB115P4	EB111P4	EB118P4	EB125U4	EB121U4	EB128U4	EB125P4	EB121P4	EB128P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	EB115U5	EB111U5	EB118U5	EB115P5	EB111P5	EB118P5	EB125U5	EB121U5	EB128U5	EB125P5	EB121P5	EB128P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Blind Reader Rec ID#	EB115U6	EB111U6	EB118U6	EB115P6	EB111P6	EB118P6	EB125U6	EB121U6	EB128U6	EB125P6	EB121P6	EB128P6
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 29 – East Bethel Receiver Test Data Sheet # 1

East Bethel, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KNOW 91.1 MHz	91.7 MHz	-40.5 dB	100 W	12.3 dBm					
	W		Unprocessed			10 W	2.3 dBm					
	Location 2 Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	EB215U1	EB211U1	EB218U1	EB215P1	EB211P1	EB218P1	EB225U1	EB221U1	EB228U1	EB225P1	EB221P1	EB228P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	EB215U2	EB211U2	EB218U2	EB215P2	EB211P2	EB218P2	EB225U2	EB221U2	EB228U2	EB225P2	EB221P2	EB228P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	EB215U3	EB211U3	EB218U3	EB215P3	EB211P3	EB218P3	EB225U3	EB221U3	EB228U3	EB225P3	EB221P3	EB228P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	EB215U4	EB211U4	EB218U4	EB215P4	EB211P4	EB218P4	EB225U4	EB221U4	EB228U4	EB225P4	EB221P4	EB228P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	EB215U5	EB211U5	EB218U5	EB215P5	EB211P5	EB218P5	EB225U5	EB221U5	EB228U5	EB225P5	EB221P5	EB228P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Blind Reader Rec ID#	EB215U6	EB211U6	EB218U6	EB215P6	EB211P6	EB218P6	EB225U6	EB221U6	EB228U6	EB225P6	EB221P6	EB228P6
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 30 – East Bethel Receiver Test Data Sheet # 2

East Bethel, Minnesota LPFM Site													
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value				
	N			KNOW 91.1 MHz		91.7 MHz	-40.5 dB	100 W	12.3 dBm				
	W			Unprocessed				10 W	2.3 dBm				
	Location 3 Lat Lon:		N		W								
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P	
Start Time of Recording													
FPFM SpecAn (dBm)													
LPFM SpecAn (dBm)													
Auto RX Rec ID#	EB315U1	EB311U1	EB318U1	EB315P1	EB311P1	EB318P1	EB325U1	EB321U1	EB328U1	EB325P1	EB321P1	EB328P1	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Clock Radio Rec ID#	EB315U2	EB311U2	EB318U2	EB315P2	EB311P2	EB318P2	EB325U2	EB321U2	EB328U2	EB325P2	EB321P2	EB328P2	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Boom Box Rec ID#	EB315U3	EB311U3	EB318U3	EB315P3	EB311P3	EB318P3	EB325U3	EB321U3	EB328U3	EB325P3	EB321P3	EB328P3	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Walkman RX Rec ID#	EB315U4	EB311U4	EB318U4	EB315P4	EB311P4	EB318P4	EB325U4	EB321U4	EB328U4	EB325P4	EB321P4	EB328P4	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Home RX Rec ID#	EB315U5	EB311U5	EB318U5	EB315P5	EB311P5	EB318P5	EB325U5	EB321U5	EB328U5	EB325P5	EB321P5	EB328P5	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Blind Reader Rec ID#	EB315U6	EB311U6	EB318U6	EB315P6	EB311P6	EB318P6	EB325U6	EB321U6	EB328U6	EB325P6	EB321P6	EB328P6	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	

Figure 31 – East Bethel Receiver Test Data Sheet # 3

East Bethel, Minnesota LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KNOW 91.1 MHz		91.7 MHz	-40.5 dB	100 W	12.3 dBm			
	W			Unprocessed				10 W	2.3 dBm			
	Location 4											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	EB415U1	EB411U1	EB418U1	EB415P1	EB411P1	EB418P1	EB425U1	EB421U1	EB428U1	EB425P1	EB421P1	EB428P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	EB415U2	EB411U2	EB418U2	EB415P2	EB411P2	EB418P2	EB425U2	EB421U2	EB428U2	EB425P2	EB421P2	EB428P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	EB415U3	EB411U3	EB418U3	EB415P3	EB411P3	EB418P3	EB425U3	EB421U3	EB428U3	EB425P3	EB421P3	EB428P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	EB415U4	EB411U4	EB418U4	EB415P4	EB411P4	EB418P4	EB425U4	EB421U4	EB428U4	EB425P4	EB421P4	EB428P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	EB415U5	EB411U5	EB418U5	EB415P5	EB411P5	EB418P5	EB425U5	EB421U5	EB428U5	EB425P5	EB421P5	EB428P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Blind Reader Rec ID#	EB415U6	EB411U6	EB418U6	EB415P6	EB411P6	EB418P6	EB425U6	EB421U6	EB428U6	EB425P6	EB421P6	EB428P6
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 32 – East Bethel Receiver Test Data Sheet # 4

East Bethel, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KNOW 91.1 MHz	91.7 MHz	-40.5 dB	100 W	12.3 dBm					
	W		Unprocessed			10 W	2.3 dBm					
	Location 5 Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	EB515U1	EB511U1	EB518U1	EB515P1	EB511P1	EB518P1	EB525U1	EB521U1	EB528U1	EB525P1	EB521P1	EB528P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	EB515U2	EB511U2	EB518U2	EB515P2	EB511P2	EB518P2	EB525U2	EB521U2	EB528U2	EB525P2	EB521P2	EB528P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	EB515U3	EB511U3	EB518U3	EB515P3	EB511P3	EB518P3	EB525U3	EB521U3	EB528U3	EB525P3	EB521P3	EB528P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	EB515U4	EB511U4	EB518U4	EB515P4	EB511P4	EB518P4	EB525U4	EB521U4	EB528U4	EB525P4	EB521P4	EB528P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	EB515U5	EB511U5	EB518U5	EB515P5	EB511P5	EB518P5	EB525U5	EB521U5	EB528U5	EB525P5	EB521P5	EB528P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Blind Reader Rec ID#	EB515U6	EB511U6	EB518U6	EB515P6	EB511P6	EB518P6	EB525U6	EB521U6	EB528U6	EB525P6	EB521P6	EB528P6
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 33 – East Bethel Receiver Test Data Sheet # 5

East Bethel, Minnesota LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KNOW 91.1 MHz		91.7 MHz	-40.5 dB	100 W	12.3 dBm			
	W			Unprocessed				10 W	2.3 dBm			
	Location 6											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	EB615U1	EB611U1	EB618U1	EB615P1	EB611P1	EB618P1	EB625U1	EB621U1	EB628U1	EB625P1	EB621P1	EB628P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	EB615U2	EB611U2	EB618U2	EB615P2	EB611P2	EB618P2	EB625U2	EB621U2	EB628U2	EB625P2	EB621P2	EB628P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	EB615U3	EB611U3	EB618U3	EB615P3	EB611P3	EB618P3	EB625U3	EB621U3	EB628U3	EB625P3	EB621P3	EB628P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	EB615U4	EB611U4	EB618U4	EB615P4	EB611P4	EB618P4	EB625U4	EB621U4	EB628U4	EB625P4	EB621P4	EB628P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	EB615U5	EB611U5	EB618U5	EB615P5	EB611P5	EB618P5	EB625U5	EB621U5	EB628U5	EB625P5	EB621P5	EB628P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Blind Reader Rec ID#	EB615U6	EB611U6	EB618U6	EB615P6	EB611P6	EB618P6	EB625U6	EB621U6	EB628U6	EB625P6	EB621P6	EB628P6
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 34 – East Bethel Receiver Test Data Sheet # 6

East Bethel, Minnesota LPFM Site													
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value						
	N		KNOW 91.1 MHz	91.7 MHz	-40.5 dB	100 W	12.3 dBm						
	W		Unprocessed			10 W	2.3 dBm						
	Location 7 Lat Lon:		N		W								
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P	
Start Time of Recording													
FPFM SpecAn (dBm)													
LPFM SpecAn (dBm)													
Auto RX Rec ID#	EB715U1	EB711U1	EB718U1	EB715P1	EB711P1	EB718P1	EB725U1	EB721U1	EB728U1	EB725P1	EB721P1	EB728P1	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Clock Radio Rec ID#	EB715U2	EB711U2	EB718U2	EB715P2	EB711P2	EB718P2	EB725U2	EB721U2	EB728U2	EB725P2	EB721P2	EB728P2	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Boom Box Rec ID#	EB715U3	EB711U3	EB718U3	EB715P3	EB711P3	EB718P3	EB725U3	EB721U3	EB728U3	EB725P3	EB721P3	EB728P3	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Walkman RX Rec ID#	EB715U4	EB711U4	EB718U4	EB715P4	EB711P4	EB718P4	EB725U4	EB721U4	EB728U4	EB725P4	EB721P4	EB728P4	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Home RX Rec ID#	EB715U5	EB711U5	EB718U5	EB715P5	EB711P5	EB718P5	EB725U5	EB721U5	EB728U5	EB725P5	EB721P5	EB728P5	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
Blind Reader Rec ID#	EB715U6	EB711U6	EB718U6	EB715P6	EB711P6	EB718P6	EB725U6	EB721U6	EB728U6	EB725P6	EB721P6	EB728P6	
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	

Figure 35 – East Bethel Receiver Test Data Sheet # 7

East Bethel, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KNOW 91.1 MHz	91.7 MHz	-40.5 dB	100 W	12.3 dBm					
	W		Unprocessed			10 W	2.3 dBm					
	Location 8 Lat Lon: N W											
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	EB815U1	EB811U1	EB818U1	EB815P1	EB811P1	EB818P1	EB825U1	EB821U1	EB828U1	EB825P1	EB821P1	EB828P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	EB815U2	EB811U2	EB818U2	EB815P2	EB811P2	EB818P2	EB825U2	EB821U2	EB828U2	EB825P2	EB821P2	EB828P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	EB815U3	EB811U3	EB818U3	EB815P3	EB811P3	EB818P3	EB825U3	EB821U3	EB828U3	EB825P3	EB821P3	EB828P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	EB815U4	EB811U4	EB818U4	EB815P4	EB811P4	EB818P4	EB825U4	EB821U4	EB828U4	EB825P4	EB821P4	EB828P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	EB815U5	EB811U5	EB818U5	EB815P5	EB811P5	EB818P5	EB825U5	EB821U5	EB828U5	EB825P5	EB821P5	EB828P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Blind Reader Rec ID#	EB815U6	EB811U6	EB818U6	EB815P6	EB811P6	EB818P6	EB825U6	EB821U6	EB828U6	EB825P6	EB821P6	EB828P6
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 36 – East Bethel Receiver Test Data Sheet # 8

17. Change Height AGL, ERP or Program to next selection in Section 2.3.4 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable. **NOTE: The format for the LPFM station in East Bethel, Minnesota when testing the unprocessed FPFM (NPR) will always be processed music / unprocessed or processed / news/talk. The combination of unprocessed / news/talk will not be used.**
18. Repeat steps 5 through 15 for each Height/ERP/Format combination in Section 2.3.4 of the TPP. Data will be entered in the Receiver Test Data Sheet, Figures 29 through 36, corresponding to the location under test.
19. Move vehicle to next designated test location and repeat steps 1 through 17 until all locations associated with the FPFM/LPFM under test have been completed. If the field engineer conducting the test is still able to detect interference at the eighth location, then an additional test will be conducted. The ninth test will follow the same rule of distance from the last test location. Prior to conducting the ninth test, the Field Test Lead must be contacted.

2.3.4. Height AGL, RF Output Level, and Program Format Test Plan

NOTE: The combination of unprocessed and news/talk will not be used for this series of tests.

- 30 m AGL, 10 W ERP, unprocessed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, unprocessed programming
- 30 m AGL, 10 W ERP, processed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, processed programming

- 10 m AGL, 10 W ERP, unprocessed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP unprocessed programming
- 10 m AGL, 10 W ERP, processed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP, processed programming

2.4. Owatonna, Minnesota (Third Adjacent Channel Test)

2.4.1. Conduct Site Surveys

- Contact LPFM operators where possible to arrange for access to conduct on-site survey.
- Using a GPS receiver and topographic maps locate and conduct an on-site survey to determine if LPFM site listed on the LPFM license application is usable for testing purposes.
- If LPFM applicant site is not usable, contact Engineering Lead to determine possible alternative sites. Any alternate site identified will be located as close as possible to the LPFM applicant location maintaining the distance ratio determined during the initial LPFM site selection process. Any alternate site selection that has a greater than one-mile separation from the LPFM applicant will require approval from MITRE.
- Using a computer-mapping program, plot radius line on map from the FPFM through the LPFM and outward to determine locations for recording receiver data during test phase.
- Using a GPS receiver and topographic maps, drive along the proposed radius observing the feasibility of stopping the vehicle and conducting measurements during the test phase. Look for pull off areas, parking lots, local streets with parking, etc.

2.4.1.1. Determine HAAT for LPFM Test Site

- Locate selected LPFM sites and FPFM stations using license application coordinates from FCC database
- Using data from the topographic maps and internal Comsearch software programs, determine the Height AMSL of each LPFM site.
- Two LPFM radiation centerline heights will be used for the LPFM interference testing. They are 10- and 30-meter radiation centerlines above ground level (RCAGL). For each of the sites that the portable LPFM will be placed, the determination of HAAT for the two antenna RCAGL heights will be calculated and recorded. The calculation method to be used in the HAAT determination is described in FCC Rules Part 73. In general, the Part 73 calculation method takes eight radials (45° apart) from the point of interest, and at distances between 2 and 10 miles from the point of interest takes 50 equally spaced increments and determines the height at each of the 50 points. For each radial the average height along it is determined by summing the height at each point and dividing by 50. Then the average terrain height of the eight radials is determined by summing the average of the eight radials and dividing by eight. If there are significant bodies of water along any of the radials, the entire radial, or portions of it, may be eliminated in the calculation to determine height of the average terrain for the point of interest.
- Enter points and other details on topographic maps detailing distances and proposed radius for testing.

2.4.1.2. Verify Test Locations

- Using data collected in Section 2.4.1, mathematically determine the nearest and farthest receiver test locations with relation to the LPFM site. Plot these locations on a topographic map. See Figure 37, for LPFM to test location distances.

Owatonna	Distance from LPFM
Location #	in miles
1	0.010
2	0.027
3	0.072
4	0.195
5	0.524
6	1.409
7	3.791
8	10.200
Multiplier	2.69

Figure 37 – Owatonna LPFM to Test Location Distances

2.4.2. Initial Equipment Setup Instructions

2.4.2.1. Energy-Onix SST-300 FM Exciter Setup Instruction

- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 106.3 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power
- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.

- Set output power to approximately 10 W using the meter on front of the SST-300.
- Enter measurement of incident power in Transmitter Test Vehicle Log, Figure 38.
- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 39.1 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 38. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 39 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable exciter.

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	Owatonna (3rd Adj)	106.3 MHz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	KGAC	105.7 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	-39.1 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (Owatonna, MN)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 38 – Owatonna LPFM Transmitter Test Vehicle Log

Transmitter Actions (Owatonna, MN)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 38 (Cont) – Owatonna LPFM Transmitter Test Vehicle Log

Transmitter Actions (Owatonna, MN)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 38 (Cont) – Owatonna LPFM Transmitter Test Vehicle Log

Transmitter Actions (Owatonna, MN)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 38 (Cont) – Owatonna LPFM Transmitter Test Vehicle Log

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 39 – Power Increase Required to Establish Desired ERP

2.4.3. Receiver / Transmitter Equipment Setup for Data Collection

1. Data will be entered in the Receiver Test Data Sheet, Figures 40 through 47.
2. With the LPFM transmitter disabled, listen to the audio output of the vehicle receiver. If interference is detected check the remaining receivers. If **all** receivers under test are not able to receive the signal from the FPFM station, a multipath or interference condition may exist. Move the Receiver Test Vehicle laterally from the test radial, maintaining the distance from the LPFM. The move shall not be more than 0.10 miles or 10% of the distance from the LPFM to the desired test location whichever is less. If any of the receivers is able to receive the FPFM station signal clearly, then the original test location will be used and the interference will be considered a normal condition of that location.
3. Using the GPS receiver, enter into the Receiver Test Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until the full eight test locations have been completed.***
4. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section. Receiver Test Vehicle technician continue to step 7 of Section 2.4.3.
5. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.4.4 of the TPP. Section 2.4.4 of the TPP also directs the specific rotation of tests to be followed.
6. At direction of Field Test Lead enable LPFM. Call technician in Receiver Test Vehicle to confirm transmission.

7. Make entry in Transmitter Test Vehicle Log.
8. Turn off the engine on the receiver test vehicle prior to recording the test data. Ensure that the car stereo has power applied and that the headphones jack is enabled in the rear of the vehicle.
9. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 40 through 47.
10. Contact Transmit Vehicle to mute the exciter and wait for confirmation.
11. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
12. Make entry on Receiver Test Data Sheet by circling 'Y' or 'N' in the 'W/O LPFM' row.
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start /stop time, the recording ID, and any additional notes regarding monitored quality on Receiver Test Data Sheet.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KGAC/K289AE 105.7 MHz		106.3 MHz	-39.1 dB	100 W	13.7 dBm			
	W			Un-processed				10 W	3.7 dBm			
	Location 1 Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW115P1	OW111P1	OW118P1	OW115T1	OW111T1	OW118T1	OW125P1	OW121P1	OW128P1	OW125T1	OW121T1	OW128T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW115P2	OW111P2	OW118P2	OW115T2	OW111T2	OW118T2	OW125P2	OW121P2	OW128P2	OW125T2	OW121T2	OW128T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW115P3	OW111P3	OW118P3	OW115T3	OW111T3	OW118T3	OW125P3	OW121P3	OW128P3	OW125T3	OW121T3	OW128T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW115P4	OW111P4	OW118P4	OW115T4	OW111T4	OW118T4	OW125P4	OW121P4	OW128P4	OW125T4	OW121T4	OW128T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW115P5	OW111P5	OW118P5	OW115T5	OW111T5	OW118T5	OW125P5	OW121P5	OW128P5	OW125T5	OW121T5	OW128T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 40 – Owatonna Receiver Test Data Sheet # 1

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KGAC/K289AE 105.7 MHz		106.3 MHz	-39.1 dB	100 W	13.7 dBm			
	W			Un-processed				10 W	3.7 dBm			
	Location 2 Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW215P1	OW211P1	OW218P1	OW215T1	OW211T1	OW218T1	OW225P1	OW221P1	OW228P1	OW225T1	OW221T1	OW228T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW215P2	OW211P2	OW218P2	OW215T2	OW211T2	OW218T2	OW225P2	OW221P2	OW228P2	OW225T2	OW221T2	OW228T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW215P3	OW211P3	OW218P3	OW215T3	OW211T3	OW218T3	OW225P3	OW221P3	OW228P3	OW225T3	OW221T3	OW228T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW215P4	OW211P4	OW218P4	OW215T4	OW211T4	OW218T4	OW225P4	OW221P4	OW228P4	OW225T4	OW221T4	OW228T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW215P5	OW211P5	OW218P5	OW215T5	OW211T5	OW218T5	OW225P5	OW221P5	OW228P5	OW225T5	OW221T5	OW228T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 41 – Owatonna Receiver Test Data Sheet # 2

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
		N		KGAC/K289AE 105.7 MHz		106.3 MHz	-39.1 dB	100 W	13.7 dBm			
	EB215U6	W		Un-processed				10 W	3.7 dBm			
	Location 3 Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW315P1	OW311P1	OW318P1	OW315T1	OW311T1	OW318T1	OW325P1	OW321P1	OW328P1	OW325T1	OW321T1	OW328T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW315P2	OW311P2	OW318P2	OW315T2	OW311T2	OW318T2	OW325P2	OW321P2	OW328P2	OW325T2	OW321T2	OW328T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW315P3	OW311P3	OW318P3	OW315T3	OW311T3	OW318T3	OW325P3	OW321P3	OW328P3	OW325T3	OW321T3	OW328T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW315P4	OW311P4	OW318P4	OW315T4	OW311T4	OW318T4	OW325P4	OW321P4	OW328P4	OW325T4	OW321T4	OW328T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW315P5	OW311P5	OW318P5	OW315T5	OW311T5	OW318T5	OW325P5	OW321P5	OW328P5	OW325T5	OW321T5	OW328T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 42 – Owatonna Receiver Test Data Sheet # 3

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KGAC/K289AE 105.7 MHz	106.3 MHz	-39.1 dB	100 W	13.7 dBm					
	W		Un-processed			10 W	3.7 dBm					
	Location 4 Lat Lon:			N		W						
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW415P1	OW411P1	OW418P1	OW415T1	OW411T1	OW418T1	OW425P1	OW421P1	OW428P1	OW425T1	OW421T1	OW428T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW415P2	OW411P2	OW418P2	OW415T2	OW411T2	OW418T2	OW425P2	OW421P2	OW428P2	OW425T2	OW421T2	OW428T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW415P3	OW411P3	OW418P3	OW415T3	OW411T3	OW418T3	OW425P3	OW421P3	OW428P3	OW425T3	OW421T3	OW428T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW415P4	OW411P4	OW418P4	OW415T4	OW411T4	OW418T4	OW425P4	OW421P4	OW428P4	OW425T4	OW421T4	OW428T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW415P5	OW411P5	OW418P5	OW415T5	OW411T5	OW418T5	OW425P5	OW421P5	OW428P5	OW425T5	OW421T5	OW428T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 43 – Owatonna Receiver Test Data Sheet # 4

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KGAC/K289AE 105.7 MHz	106.3 MHz	-39.1 dB	100 W	13.7 dBm					
	W		Un-processed			10 W	3.7 dBm					
	Location 5											
	Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW515P1	OW511P1	OW518P1	OW515T1	OW511T1	OW518T1	OW525P1	OW521P1	OW528P1	OW525T1	OW521T1	OW528T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW515P2	OW511P2	OW518P2	OW515T2	OW511T2	OW518T2	OW525P2	OW521P2	OW528P2	OW525T2	OW521T2	OW528T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW515P3	OW511P3	OW518P3	OW515T3	OW511T3	OW518T3	OW525P3	OW521P3	OW528P3	OW525T3	OW521T3	OW528T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW515P4	OW511P4	OW518P4	OW515T4	OW511T4	OW518T4	OW525P4	OW521P4	OW528P4	OW525T4	OW521T4	OW528T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW515P5	OW511P5	OW518P5	OW515T5	OW511T5	OW518T5	OW525P5	OW521P5	OW528P5	OW525T5	OW521T5	OW528T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 44 – Owatonna Receiver Test Data Sheet # 5

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KGAC/K289AE 105.7 MHz	106.3 MHz	-39.1 dB	100 W	13.7 dBm					
	W		Un-processed			10 W	3.7 dBm					
	Location 6 Lat Lon:	N	W									
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW615P1	OW611P1	OW618P1	OW615T1	OW611T1	OW618T1	OW625P1	OW621P1	OW628P1	OW625T1	OW621T1	OW628T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW615P2	OW611P2	OW618P2	OW615T2	OW611T2	OW618T2	OW625P2	OW621P2	OW628P2	OW625T2	OW621T2	OW628T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW615P3	OW611P3	OW618P3	OW615T3	OW611T3	OW618T3	OW625P3	OW621P3	OW628P3	OW625T3	OW621T3	OW628T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW615P4	OW611P4	OW618P4	OW615T4	OW611T4	OW618T4	OW625P4	OW621P4	OW628P4	OW625T4	OW621T4	OW628T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW615P5	OW611P5	OW618P5	OW615T5	OW611T5	OW618T5	OW625P5	OW621P5	OW628P5	OW625T5	OW621T5	OW628T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 45 – Owatonna Receiver Test Data Sheet # 6

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KGAC/K289AE 105.7 MHz		106.3 MHz	-39.1 dB	100 W	13.7 dBm			
	W			Un-processed				10 W	3.7 dBm			
	Location 7 Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW715P1	OW711P1	OW718P1	OW715T1	OW711T1	OW718T1	OW725P1	OW721P1	OW728P1	OW725T1	OW721T1	OW728T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW715P2	OW711P2	OW718P2	OW715T2	OW711T2	OW718T2	OW725P2	OW721P2	OW728P2	OW725T2	OW721T2	OW728T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW715P3	OW711P3	OW718P3	OW715T3	OW711T3	OW718T3	OW725P3	OW721P3	OW728P3	OW725T3	OW721T3	OW728T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW715P4	OW711P4	OW718P4	OW715T4	OW711T4	OW718T4	OW725P4	OW721P4	OW728P4	OW725T4	OW721T4	OW728T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW715P5	OW711P5	OW718P5	OW715T5	OW711T5	OW718T5	OW725P5	OW721P5	OW728P5	OW725T5	OW721T5	OW728T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 46 – Owatonna Receiver Test Data Sheet # 7

Owatonna, Minnesota LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KGAC/K289AE 105.7 MHz	106.3 MHz	-39.1 dB	100 W	13.7 dBm					
	W		Un-processed			10 W	3.7 dBm					
	Location 8 Lat Lon:		N		W							
	30m 10W P	30m 0W P	30m 100W P	30m 10W T	30m 0W T	30m 100W T	10m 10W P	10m 0W P	10m 100W P	10m 10W T	10m 0W T	10m 100W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OW815P1	OW811P1	OW818P1	OW815T1	OW811T1	OW818T1	OW825P1	OW821P1	OW828P1	OW825T1	OW821T1	OW828T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OW815P2	OW811P2	OW818P2	OW815T2	OW811T2	OW818T2	OW825P2	OW821P2	OW828P2	OW825T2	OW821T2	OW828T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OW815P3	OW811P3	OW818P3	OW815T3	OW811T3	OW818T3	OW825P3	OW821P3	OW828P3	OW825T3	OW821T3	OW828T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OW815P4	OW811P4	OW818P4	OW815T4	OW811T4	OW818T4	OW825P4	OW821P4	OW828P4	OW825T4	OW821T4	OW828T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OW815P5	OW811P5	OW818P5	OW815T5	OW811T5	OW818T5	OW825P5	OW821P5	OW828P5	OW825T5	OW821T5	OW828T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 47 – Owatonna Receiver Test Data Sheet # 8

17. Change Height AGL, ERP or Program to next selection in Section 2.4.4 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable.
18. Repeat steps 5 through 15 for each Height/ERP/Format combination in Section 2.4.4 of the TPP. Data will be entered in the Receiver Test Data Sheet, Figures 40 through 47, corresponding to the location under test.
19. Move vehicle to next designated test location and repeat steps 1 through 17 until all locations associated with the FPFM/LPFM under test have been completed. If the field engineer conducting the test is still able to detect interference at the eighth location, then an additional test will be conducted. The ninth test will follow the same rule of distance from the last test location. Prior to conducting the ninth test, the Field Test Lead must be contacted.

2.4.4. Height AGL, RF Output Level, and Program Format Test Plan

- 30 m AGL, 10 W ERP, processed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, processed programming
- 30 m AGL, 10 W ERP, news/talk programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, news/talk programming
- 10 m AGL, 10 W ERP, processed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP processed programming
- 10 m AGL, 10 W ERP, news/talk programming

- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP, news/talk programming

2.5. Owatonna, Minnesota (Translator Distance Separation Test)

2.5.1. LPFM Transmitter Setup

- Position LPFM as near as possible to the translator, keeping the tower in the receive path of the signal that is being received by the translator. The coordinates will correspond to a location near the license data of the translator.
- Raise the tower to its 10 m position
- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 91.1 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power
- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.
- Set the transmitter power such that the measurement at the incident port is +2.3 dBm using the power meter. This corresponds to an ERP of 10 W.
- Enter measurement of incident power in Transmitter Test Vehicle Log.

- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 40.5 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 57. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 58 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable the LPFM by putting the switch in the ‘Mute’ position
- Raise the tower to place the RCAGL as close as possible to the main beam of the receive antenna of the translator
- Decrease the output of the Energy-Onix SST-300 so that ERP of the antenna bay is equal to 1 W ERP. See Figure 48 for required ERP and coinciding incident power specifications.

ERP	Incident Port
0	<-70 dBm
1	-7.7 dBm
2	-4.7 dBm
5	-0.7 dBm
10	+2.3 dBm
20	+5.3 dBm
50	+9.3 dBm
100	+12.3 dBm

Figure 48 - Owatonna Transmitter ERP Settings (Translator)

2.5.2. Receiver Setup Instructions

2.5.2.1. Frequency and Audio Level

1. Locate vehicle at the point on the map that is designated as ½ the distance of the F (50,50) contour.
2. Set all receivers to 105.7 MHz, the translator **output** frequency.
3. Set receiver audio output levels by monitoring them through the headphones connected to the Yamaha Digital Workstation, listening to make sure the volume is satisfactory. This procedure is in Section 3.1.
4. In the Receiver Test Vehicle Data Sheet, create a new entry for the test location. See Figures 49 through 56.
5. Using the GPS receiver, enter into the Receiver Test Vehicle Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until both test locations have been completed.***
6. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section.

7. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.5.3.1 and Section 2.5.3.2 of the TPP. Section 2.5.3.1 and Section 2.5.3.2 of the TPP also directs the specific rotation of tests to be followed.
8. At direction of Field Test Lead enable LPFM.
9. Make entry in Transmitter Test Vehicle Log, Figure 57.
10. Turn off the engine on the receiver test vehicle prior to recording the test data.
11. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 49 through 56.
12. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start / stop time, the recording ID, and any additional notes regarding monitored quality in log.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.

17. Change Height/ERP/Format to next selection in Section 2.5.3.1 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable.
18. Move Receiver Test Vehicle to the location shown as ½ the distance of the F (50,50) contour. Repeat steps 2 through 17 for Height/ERP/Format combination in Section 2.5.3.2 of the TPP

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port	
	N		KGAC 90.5 MHz	91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm	
	W		Unprocessed			50 W	9.3 dBm	5 W	-0.7 dBm			
						20 W	5.3 dBm	2 W	-4.7 dBm			
	Location 1											
	Lat Lon:		N		W							
	30m 100W_P	30m 100W_U	30m 100W_T	30m 50W_P	30m 50W_U	30m 50W_T	30m 20W_P	30m 20W_U	30m 20W_T	30m 10W_P	30m 10W_U	30m 10W_T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT118P1	OT118U1	OT118T1	OT117P1	OT117U1	OT117T1	OT116P1	OT116U1	OT116T1	OT115P1	OT115U1	OT115T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT118P2	OT118U2	OT118T2	OT117P2	OT117U2	OT117T2	OT116P2	OT116U2	OT116T2	OT115P2	OT115U2	OT115T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT118P3	OT118U3	OT118T3	OT117P3	OT117U3	OT117T3	OT116P3	OT116U3	OT116T3	OT115P3	OT115U3	OT115T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT118P4	OT118U4	OT118T4	OT117P4	OT117U4	OT117T4	OT116P4	OT116U4	OT116T4	OT115P4	OT115U4	OT115T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT118P5	OT118U5	OT118T5	OT117P5	OT117U5	OT117T5	OT116P5	OT116U5	OT116T5	OT115P5	OT115U5	OT115T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 49 - Owatonna Receiver Test Vehicle Data Sheet (Translator) # 1

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM		LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
		N	KGAC 90.5 MHz		91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
		W	Unprocessed				50 W	9.3 dBm	5 W	-0.7 dBm		
							20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 1 Lat Lon:			N		W						
	30m 5W P	30m 5W U	30m 5W T	30m 2W P	30m 2W U	30m 2W T	30m 1W P	30m 1W U	30m 1W T	30m 0W P	30m 0W U	30m 0W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT114P1	OT114U1	OT114T1	OT113P1	OT113U1	OT113T1	OT112P1	OT112U1	OT112T1	OT111P1	OT111U1	OT111T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT114P2	OT114U2	OT114T2	OT113P2	OT113U2	OT113T2	OT112P2	OT112U2	OT112T2	OT111P2	OT111U2	OT111T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT114P3	OT114U3	OT114T3	OT113P3	OT113U3	OT113T3	OT112P3	OT112U3	OT112T3	OT111P3	OT111U3	OT111T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT114P4	OT114U4	OT114T4	OT113P4	OT113U4	OT113T4	OT112P4	OT112U4	OT112T4	OT111P4	OT111U4	OT111T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT114P5	OT114U5	OT114T5	OT113P5	OT113U5	OT113T5	OT112P5	OT112U5	OT112T5	OT111P5	OT111U5	OT111T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 50 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 2

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM		LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
		N	KGAC 90.5 MHz		91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
		W	Unprocessed				50 W	9.3 dBm	5 W	-0.7 dBm		
							20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 1 Lat Lon:			N		W						
	10m 100W P	10m 100W U	10m 100W T	10m 50W P	10m 50W U	10m 50W T	10m 20 W P	10m 20W U	10m 20W T	10m 10W P	10m 10W U	10m 10W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT128P1	OT128U1	OT128T1	OT127P1	OT127U1	OT127T1	OT126P1	OT126U1	OT126T1	OT125P1	OT125U1	OT125T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT128P2	OT128U2	OT128T2	OT127P2	OT127U2	OT127T2	OT126P2	OT126U2	OT126T2	OT125P2	OT125U2	OT125T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT128P3	OT128U3	OT128T3	OT127P3	OT127U3	OT127T3	OT126P3	OT126U3	OT126T3	OT125P3	OT125U3	OT125T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT128P4	OT128U4	OT128T4	OT127P4	OT127U4	OT127T4	OT126P4	OT126U4	OT126T4	OT125P4	OT125U4	OT125T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT128P5	OT128U5	OT128T5	OT127P5	OT127U5	OT127T5	OT126P5	OT126U5	OT126T5	OT125P5	OT125U5	OT125T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 51 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 3

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM		LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
	N		KGAC 90.5 MHz		91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
	W		Unprocessed				50 W	9.3 dBm	5 W	-0.7 dBm		
							20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 1											
	Lat Lon:		N		W							
	10m 5W P	10m 5W U	10m 5W T	10m 2W P	10m 2W U	10m 2W T	10m 1W P	10m 1W U	10m 1W T	10m 0W P	10m 0W U	10m 0W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT124P1	OT124U1	OT124T1	OT123P1	OT123U1	OT123T1	OT122P1	OT122U1	OT122T1	OT121P1	OT121U1	OT121T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT124P2	OT124U2	OT124T2	OT123P2	OT123U2	OT123T2	OT122P2	OT122U2	OT122T2	OT121P2	OT121U2	OT121T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT124P3	OT124U3	OT124T3	OT123P3	OT123U3	OT123T3	OT122P3	OT122U3	OT122T3	OT121P3	OT121U3	OT121T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT124P4	OT124U4	OT124T4	OT123P4	OT123U4	OT123T4	OT122P4	OT122U4	OT122T4	OT121P4	OT121U4	OT121T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT124P5	OT124U5	OT124T5	OT123P5	OT123U5	OT123T5	OT122P5	OT122U5	OT122T5	OT121P5	OT121U5	OT121T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 52 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 4

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM		LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
		N	KGAC 90.5 MHz		91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
		W	Unprocessed				50 W	9.3 dBm	5 W	-0.7 dBm		
							20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 2 Lat Lon:			N		W						
	30m 100W_P	30m 100W_U	30m 100W_T	30m 50W_P	30m 50W_U	30m 50W_T	30m 20W_P	30m 20W_U	30m 20W_T	30m 10W_P	30m 10W_U	30m 10W_T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT218P1	OT218U1	OT218T1	OT217P1	OT217U1	OT217T1	OT216P1	OT216U1	OT216T1	OT215P1	OT215U1	OT215T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT218P2	OT218U2	OT218T2	OT217P2	OT217U2	OT217T2	OT216P2	OT216U2	OT216T2	OT215P2	OT215U2	OT215T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT218P3	OT218U3	OT218T3	OT217P3	OT217U3	OT217T3	OT216P3	OT216U3	OT216T3	OT215P3	OT215U3	OT215T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT218P4	OT218U4	OT218T4	OT217P4	OT217U4	OT217T4	OT216P4	OT216U4	OT216T4	OT215P4	OT215U4	OT215T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT218P5	OT218U5	OT218T5	OT217P5	OT217U5	OT217T5	OT216P5	OT216U5	OT216T5	OT215P5	OT215U5	OT215T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 53 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 5

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM		LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
		N	KGAC 90.5 MHz		91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
		W	Unprocessed				50 W	9.3 dBm	5 W	-0.7 dBm		
							20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 2 Lat Lon:			N		W						
	30m 5W_P	30m 5W_U	30m 5W_T	30m 2W_P	30m 2W_U	30m 2W_T	30m 1W_P	30m 1W_U	30m 1W_T	30m 0W_P	30m 0W_U	30m 0W_T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT214P1	OT214U1	OT214T1	OT213P1	OT213U1	OT213T1	OT212P1	OT212U1	OT212T1	OT211P1	OT211U1	OT211T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT214P2	OT214U2	OT214T2	OT213P2	OT213U2	OT213T2	OT212P2	OT212U2	OT212T2	OT211P2	OT211U2	OT211T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT214P3	OT214U3	OT214T3	OT213P3	OT213U3	OT213T3	OT212P3	OT212U3	OT212T3	OT211P3	OT211U3	OT211T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT214P4	OT214U4	OT214T4	OT213P4	OT213U4	OT213T4	OT212P4	OT212U4	OT212T4	OT211P4	OT211U4	OT211T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT214P5	OT214U5	OT214T5	OT213P5	OT213U5	OT213T5	OT212P5	OT212U5	OT212T5	OT211P5	OT211U5	OT211T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 54 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 6

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
		N	KGAC 90.5 MHz	91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
		W	Unprocessed			50 W	9.3 dBm	5 W	-0.7 dBm		
						20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 2										
	Lat Lon:		N		W						
	10m 100W P	10m 100W U	10m 100W T	10m 50W P	10m 50W U	10m 50W T	10m 20W P	10m 20W U	10m 20W T	10m 10W P	10m 10W U	10m 10W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT228P1	OT228U1	OT228T1	OT227P1	OT227U1	OT227T1	OT226P1	OT226U1	OT226T1	OT225P1	OT225U1	OT225T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT228P2	OT228U2	OT228T2	OT227P2	OT227U2	OT227T2	OT226P2	OT226U2	OT226T2	OT225P2	OT225U2	OT225T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT228P3	OT228U3	OT228T3	OT227P3	OT227U3	OT227T3	OT226P3	OT226U3	OT226T3	OT225P3	OT225U3	OT225T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT228P4	OT228U4	OT228T4	OT227P4	OT227U4	OT227T4	OT226P4	OT226U4	OT226T4	OT225P4	OT225U4	OT225T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT228P5	OT228U5	OT228T5	OT227P5	OT227U5	OT227T5	OT226P5	OT226U5	OT226T5	OT225P5	OT225U5	OT225T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 55 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 7

Owatonna, Minnesota (Translator Input) LPFM Site												
Date of Test	Site Lat/Lon		FPFM		LPFM	Dir. Coup.	ERP	Incident Port	ERP	Incident Port	ERP	Incident Port
	N		GAC 90.5 MHz		91.1 MHz	-40.5 dB	100 W	12.3 dBm	10 W	2.3 dBm	1 W	-7.7 dBm
	W		Unprocessed				50 W	9.3 dBm	5 W	-0.7 dBm		
							20 W	5.3 dBm	2 W	-4.7 dBm		
	Location 2 Lat Lon:			N		W						
	10m 5W P	10m 5W U	10m 5W T	10m 2W P	10m 2W U	10m 2W T	10m 1W P	10m 1W U	10m 1W T	10m 0W P	10m 0W U	10m 0W T
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	OT224P1	OT224U1	OT224T1	OT223P1	OT223U1	OT223T1	OT222P1	OT222U1	OT222T1	OT221P1	OT221U1	OT221T1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	OT224P2	OT224U2	OT224T2	OT223P2	OT223U2	OT223T2	OT222P2	OT222U2	OT222T2	OT221P2	OT221U2	OT221T2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	OT224P3	OT224U3	OT224T3	OT223P3	OT223U3	OT223T3	OT222P3	OT222U3	OT222T3	OT221P3	OT221U3	OT221T3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	OT224P4	OT224U4	OT224T4	OT223P4	OT223U4	OT223T4	OT222P4	OT222U4	OT222T4	OT221P4	OT221U4	OT221T4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	OT224P5	OT224U5	OT224T5	OT223P5	OT223U5	OT223T5	OT222P5	OT222U5	OT222T5	OT221P5	OT221U5	OT221T5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 56 – Owatonna Receiver Test Vehicle Data Sheet (Translator) # 8

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	Owatonna (Translator)	91.1 MHz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	KGAC	90.5 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	-40.5 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (Owatonna, MN Transator Test)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 57 – Owatonna LPFM Transmitter Test Vehicle Log (Translator)

Transmitter Actions (Owatonna, MN Translator Test)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 57 (Cont) – Owatonna LPFM Transmitter Test Vehicle Log (Translator)

Transmitter Actions (Owatonna, MN Translator Test)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 57 (Cont) – Owatonna LPFM Transmitter Test Vehicle Log (Translator)

Transmitter Actions (Owatonna, MN Translator Test)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 57 (Cont) – Owatonna LPFM Transmitter Test Vehicle Log (Translator)

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 58 – Power Increase Required to Establish Desired ERP

2.5.3. Height AGL, RF Output Level, and Program Format Test Plan

2.5.3.1. Measurement criteria for location 1

- 30 m AGL, 100 W ERP, processed programming
- 30 m AGL, 100 W ERP, unprocessed programming
- 30 m AGL, 100 W ERP, news/talk programming
- 30 m AGL, 50 W ERP, processed programming
- 30 m AGL, 50 W ERP, unprocessed programming
- 30 m AGL, 50 W ERP, news/talk programming
- 30 m AGL, 20 W ERP, processed programming
- 30 m AGL, 20 W ERP, unprocessed programming
- 30 m AGL, 20 W ERP, news/talk programming
- 30 m AGL, 10 W ERP, processed programming
- 30 m AGL, 10 W ERP, unprocessed programming
- 30 m AGL, 10 W ERP, news/talk programming
- 30 m AGL, 5 W ERP, processed programming
- 30 m AGL, 5 W ERP, unprocessed programming
- 30 m AGL, 5 W ERP, news/talk programming
- 30 m AGL, 2 W ERP, processed programming
- 30 m AGL, 2 W ERP, unprocessed programming
- 30 m AGL, 2 W ERP, news/talk programming
- 30 m AGL, 1 W ERP, processed programming
- 30 m AGL, 1 W ERP, unprocessed programming
- 30 m AGL, 1 W ERP, news/talk programming

- 30 m AGL, 0 W ERP
- 10 m AGL, 100 W ERP, processed programming
- 10 m AGL, 100 W ERP, unprocessed programming
- 10 m AGL, 100 W ERP, news/talk programming
- 10 m AGL, 50 W ERP, processed programming
- 10 m AGL, 50 W ERP, unprocessed programming
- 10 m AGL, 50 W ERP, news/talk programming
- 10 m AGL, 20 W ERP, processed programming
- 10 m AGL, 20 W ERP, unprocessed programming
- 10 m AGL, 20 W ERP, news/talk programming
- 10 m AGL, 10 W ERP, processed programming
- 10 m AGL, 10 W ERP, unprocessed programming
- 10 m AGL, 10 W ERP, news/talk programming
- 10 m AGL, 5 W ERP, processed programming
- 10 m AGL, 5 W ERP, unprocessed programming
- 10 m AGL, 5 W ERP, news/talk programming
- 10 m AGL, 2 W ERP, processed programming
- 10 m AGL, 2 W ERP, unprocessed programming
- 10 m AGL, 2 W ERP, news/talk programming
- 10 m AGL, 1 W ERP, processed programming
- 10 m AGL, 1 W ERP, unprocessed programming
- 10 m AGL, 1 W ERP, news/talk programming
- 10 m AGL, 0 W ERP

2.5.3.2. Measurement criteria for location 2

- 30 m AGL, 100 W ERP, processed programming
- 30 m AGL, 100 W ERP, unprocessed programming
- 30 m AGL, 100 W ERP, news/talk programming
- 30 m AGL, 50 W ERP, processed programming
- 30 m AGL, 50 W ERP, unprocessed programming
- 30 m AGL, 50 W ERP, news/talk programming
- 30 m AGL, 20 W ERP, processed programming
- 30 m AGL, 20 W ERP, unprocessed programming
- 30 m AGL, 20 W ERP, news/talk programming
- 30 m AGL, 10 W ERP, processed programming
- 30 m AGL, 10 W ERP, unprocessed programming
- 30 m AGL, 10 W ERP, news/talk programming
- 30 m AGL, 5 W ERP, processed programming
- 30 m AGL, 5 W ERP, unprocessed programming
- 30 m AGL, 5 W ERP, news/talk programming
- 30 m AGL, 2 W ERP, processed programming
- 30 m AGL, 2 W ERP, unprocessed programming
- 30 m AGL, 2 W ERP, news/talk programming
- 30 m AGL, 1 W ERP, processed programming
- 30 m AGL, 1 W ERP, unprocessed programming
- 30 m AGL, 1 W ERP, news/talk programming
- 30 m AGL, 0 W ERP
- 10 m AGL, 100 W ERP, processed programming

- 10 m AGL, 100 W ERP, unprocessed programming
- 10 m AGL, 100 W ERP, news/talk programming
- 10 m AGL, 50 W ERP, processed programming
- 10 m AGL, 50 W ERP, unprocessed programming
- 10 m AGL, 50 W ERP, news/talk programming
- 10 m AGL, 20 W ERP, processed programming
- 10 m AGL, 20 W ERP, unprocessed programming
- 10 m AGL, 20 W ERP, news/talk programming
- 10 m AGL, 10 W ERP, processed programming
- 10 m AGL, 10 W ERP, unprocessed programming
- 10 m AGL, 10 W ERP, news/talk programming
- 10 m AGL, 5 W ERP, processed programming
- 10 m AGL, 5 W ERP, unprocessed programming
- 10 m AGL, 5 W ERP, news/talk programming
- 10 m AGL, 2 W ERP, processed programming
- 10 m AGL, 2 W ERP, unprocessed programming
- 10 m AGL, 2 W ERP, news/talk programming
- 10 m AGL, 1 W ERP, processed programming
- 10 m AGL, 1 W ERP, unprocessed programming
- 10 m AGL, 1 W ERP, news/talk programming
- 10 m AGL, 0 W ERP

2.6. Winters, California

2.6.1. Conduct Site Surveys

- Contact LPFM operators where possible to arrange for access to conduct on-site survey.
- Using a GPS receiver and topographic maps locate and conduct an on-site survey to determine if LPFM site listed on the LPFM license application is usable for testing purposes.
- If LPFM applicant site is not usable, contact Engineering Lead to determine possible alternative sites. Any alternate site identified will be located as close as possible to the LPFM applicant location maintaining the distance ratio determined during the initial LPFM site selection process. Any alternate site selection that has a greater than one-mile separation from the LPFM applicant will require approval from MITRE.
- Using a computer-mapping program, plot radius line on map from the FPFM through the LPFM and outward to determine locations for recording receiver data during test phase.
- Using a GPS receiver and topographic maps, drive along the proposed radius observing the feasibility of stopping the vehicle and conducting measurements during the test phase. Look for pull off areas, parking lots, local streets with parking, etc.

2.6.1.1. Determine HAAT for LPFM Test Site

- Locate selected LPFM sites and FPFM stations using license application coordinates from FCC database
- Using data from the topographic maps and internal Comsearch software programs, determine the Height AMSL of each LPFM site.
- Two LPFM radiation centerline heights will be used for the LPFM interference testing. They are 10- and 30-meter radiation

centerlines above ground level (RCAGL). For each of the sites that the portable LPFM will be placed, the determination of HAAT for the two antenna RCAGL heights will be calculated and recorded. The calculation method to be used in the HAAT determination is described in FCC Rules Part 73. In general, the Part 73 calculation method takes eight radials (45° apart) from the point of interest, and at distances between 2 and 10 miles from the point of interest takes 50 equally spaced increments and determines the height at each of the 50 points. For each radial the average height along it is determined by summing the height at each point and dividing by 50. Then the average terrain height of the eight radials is determined by summing the average of the eight radials and dividing by eight. If there are significant bodies of water along any of the radials, the entire radial, or portions of it, may be eliminated in the calculation to determine height of the average terrain for the point of interest.

- Enter points and other details on topographic maps detailing distances and proposed radius for testing.

2.6.1.2. Verify Test Locations

- Using data collected in Section 2.6.1, mathematically determine the nearest and farthest receiver test locations with relation to the LPFM site. Plot these locations on a topographic map. See Figure 59, for LPFM to test location distances.

Winters	Distance from LPFM
Location #	in miles
1	0.010
2	0.024
3	0.059
4	0.143
5	0.349
6	0.847
7	2.058
8	5.000
Multiplier	2.43

Figure 59 - Winters LPFM to Test Location Distances

2.6.2. Initial Equipment Setup Instructions

2.6.2.1. Energy-Onix SST-300 FM Exciter Setup Instruction

- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 103.1 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power
- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.

- Set output power to approximately 10 W using the meter on front of the SST-300.
- Enter measurement of incident power in Transmitter Test Vehicle Log, Figure 60.
- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 39.4 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 60. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 61 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable exciter.

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	Winters	103.1 MHz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	KSFM	102.5 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	-39.4 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (Winters, CA)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 60 – Winters LPFM Transmitter Test Vehicle Log

Transmitter Actions (Winters, CA)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 60 (Cont) – Winters LPFM Transmitter Test Vehicle Log

Transmitter Actions (Winters, CA)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 60 (Cont) – Winters LPFM Transmitter Test Vehicle Log

Transmitter Actions (Winters, CA)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 60 (Cont) – Winters LPFM Transmitter Test Vehicle Log

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 61 – Power Increase Required to Establish Desired ERP

2.6.3. Receiver / Transmitter Equipment Setup for Data Collection

1. Data will be entered in the Receiver Test Data Sheet, Figures 62 through 69.
2. With the LPFM transmitter disabled, listen to the audio output of the vehicle receiver. If interference is detected check the remaining receivers. If **all** receivers under test are not able to receive the signal from the FPFM station, a multipath or interference condition may exist. Move the Receiver Test Vehicle laterally from the test radial, maintaining the distance from the LPFM. The move shall not be more than 0.10 miles or 10% of the distance from the LPFM to the desired test location whichever is less. If any of the receivers is able to receive the FPFM station signal clearly, then the original test location will be used and the interference will be considered a normal condition of that location.
3. Using the GPS receiver, enter into the Receiver Test Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until the full eight test locations have been completed.***
4. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section. Receiver Test Vehicle technician continue to step 7 of Section 2.6.3.
5. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.6.4 of the TPP. Section 2.6.4 of the TPP also directs the specific rotation of tests to be followed.
6. At direction of Field Test Lead enable LPFM. Call technician in Receiver Test Vehicle to confirm transmission.

7. Make entry in Transmitter Test Vehicle Log.
8. Turn off the engine on the receiver test vehicle prior to recording the test data. Ensure that the car stereo has power applied and that the headphones jack is enabled in the rear of the vehicle.
9. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 62 through 69.
10. Contact Transmit Vehicle to mute the exciter and wait for confirmation.
11. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
12. Make entry on Receiver Test Data Sheet by circling 'Y' or 'N' in the 'W/O LPFM' row
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start /stop time, the recording ID, and any additional notes regarding monitored quality on Receiver Test Data Sheet.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.
17. Change Height AGL, ERP or Program to next selection in Section 2.6.4 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable.

Winters, California LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KSFM 102.5 MHz		103.1 MHz	-39.4 dB	100 W	13.4 dBm			
	W			Processed				10 W	3.4 dBm			
	Location 1											
	Lat Lon:		N		W							
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI115T1	WI111T1	WI118T1	WI115U1	WI111U1	WI118U1	WI125T1	WI121T1	WI128T1	WI125U1	WI121U1	WI128U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI115T2	WI111T2	WI118T2	WI115U2	WI111U2	WI118U2	WI125T2	WI121T2	WI128T2	WI125U2	WI121U2	WI128U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI115T3	WI111T3	WI118T3	WI115U3	WI111U3	WI118U3	WI125T3	WI121T3	WI128T3	WI125U3	WI121U3	WI128U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI115T4	WI111T4	WI118T4	WI115U4	WI111U4	WI118U4	WI125T4	WI121T4	WI128T4	WI125U4	WI121U4	WI128U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI115T5	WI111T5	WI118T5	WI115U5	WI111U5	WI118U5	WI125T5	WI121T5	WI128T5	WI125U5	WI121U5	WI128U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 62 - Winters Receiver Test Data Sheet # 1

Winters, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KSFM 102.5 MHz	103.1 MHz	-39.4 dB	100 W	13.4 dBm					
	W		Processed			10 W	3.4 dBm					
	Location 2 Lat Lon:		N		W							
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI215T1	WI211T1	WI218T1	WI215U1	WI211U1	WI218U1	WI225T1	WI221T1	WI228T1	WI225U1	WI221U1	WI228U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI215T2	WI211T2	WI218T2	WI215U2	WI211U2	WI218U2	WI225T2	WI221T2	WI228T2	WI225U2	WI221U2	WI228U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI215T3	WI211T3	WI218T3	WI215U3	WI211U3	WI218U3	WI225T3	WI221T3	WI228T3	WI225U3	WI221U3	WI228U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI215T4	WI211T4	WI218T4	WI215U4	WI211U4	WI218U4	WI225T4	WI221T4	WI228T4	WI225U4	WI221U4	WI228U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI215T5	WI211T5	WI218T5	WI215U5	WI211U5	WI218U5	WI225T5	WI221T5	WI228T5	WI225U5	WI221U5	WI228U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 63 - Winters Receiver Test Data Sheet # 2

Winters, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KSFM 102.5 MHz	103.1 MHz	-39.4 dB	100 W	13.4 dBm					
	EB215U6 W		Processed			10 W	3.4 dBm					
	Location 3 Lat Lon: N W											
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI315T1	WI311T1	WI318T1	WI315U1	WI311U1	WI318U1	WI325T1	WI321T1	WI328T1	WI325U1	WI321U1	WI328U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI315T2	WI311T2	WI318T2	WI315U2	WI311U2	WI318U2	WI325T2	WI321T2	WI328T2	WI325U2	WI321U2	WI328U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI315T3	WI311T3	WI318T3	WI315U3	WI311U3	WI318U3	WI325T3	WI321T3	WI328T3	WI325U3	WI321U3	WI328U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI315T4	WI311T4	WI318T4	WI315U4	WI311U4	WI318U4	WI325T4	WI321T4	WI328T4	WI325U4	WI321U4	WI328U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI315T5	WI311T5	WI318T5	WI315U5	WI311U5	WI318U5	WI325T5	WI321T5	WI328T5	WI325U5	WI321U5	WI328U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 64 - Winters Receiver Test Data Sheet # 3

Winters, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KSFM 102.5 MHz	103.1 MHz	-39.4 dB	100 W	13.4 dBm					
	W		Processed			10 W	3.4 dBm					
	Location 4											
	Lat Lon:	N	W									
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI415T1	WI411T1	WI418T1	WI415U1	WI411U1	WI418U1	WI425T1	WI421T1	WI428T1	WI425U1	WI421U1	WI428U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI415T2	WI411T2	WI418T2	WI415U2	WI411U2	WI418U2	WI425T2	WI421T2	WI428T2	WI425U2	WI421U2	WI428U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI415T3	WI411T3	WI418T3	WI415U3	WI411U3	WI418U3	WI425T3	WI421T3	WI428T3	WI425U3	WI421U3	WI428U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI415T4	WI411T4	WI418T4	WI415U4	WI411U4	WI418U4	WI425T4	WI421T4	WI428T4	WI425U4	WI421U4	WI428U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI415T5	WI411T5	WI418T5	WI415U5	WI411U5	WI418U5	WI425T5	WI421T5	WI428T5	WI425U5	WI421U5	WI428U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 65 - Winters Receiver Test Data Sheet # 4

Winters, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KSFM 102.5 MHz	103.1 MHz	-39.4 dB	100 W	13.4 dBm					
	W		Processed			10 W	3.4 dBm					
	Location 5 Lat Lon:		N		W							
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI515T1	WI511T1	WI518T1	WI515U1	WI511U1	WI518U1	WI525T1	WI521T1	WI528T1	WI525U1	WI521U1	WI528U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	U U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI515T2	WI511T2	WI518T2	WI515U2	WI511U2	WI518U2	WI525T2	WI521T2	WI528T2	WI525U2	WI521U2	WI528U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI515T3	WI511T3	WI518T3	WI515U3	WI511U3	WI518U3	WI525T3	WI521T3	WI528T3	WI525U3	WI521U3	WI528U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI515T4	WI511T4	WI518T4	WI515U4	WI511U4	WI518U4	WI525T4	WI521T4	WI528T4	WI525U4	WI521U4	WI528U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI515T5	WI511T5	WI518T5	WI515U5	WI511U5	WI518U5	WI525T5	WI521T5	WI528T5	WI525U5	WI521U5	WI528U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 66 - Winters Receiver Test Data Sheet # 5

Winters, California LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KSFM 102.5 MHz		103.1 MHz	-39.4 dB	100 W	13.4 dBm			
	W			Processed				10 W	3.4 dBm			
	Location 6											
	Lat Lon:		N		W							
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI615T1	WI611T1	WI618T1	WI615U1	WI611U1	WI618U1	WI625T1	WI621T1	WI628T1	WI625U1	WI621U1	WI628U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI615T2	WI611T2	WI618T2	WI615U2	WI611U2	WI618U2	WI625T2	WI621T2	WI628T2	WI625U2	WI621U2	WI628U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI615T3	WI611T3	WI618T3	WI615U3	WI611U3	WI618U3	WI625T3	WI621T3	WI628T3	WI625U3	WI621U3	WI628U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI615T4	WI611T4	WI618T4	WI615U4	WI611U4	WI618U4	WI625T4	WI621T4	WI628T4	WI625U4	WI621U4	WI628U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI615T5	WI611T5	WI618T5	WI615U5	WI611U5	WI618U5	WI625T5	WI621T5	WI628T5	WI625U5	WI621U5	WI628U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 67 - Winters Receiver Test Data Sheet # 6

Winters, California LPFM Site												
Date of Test	Site Lat/Lon			FPFM		LPFM	Dir. Coup.	ERP	Incident Point Value			
	N			KSFM 102.5 MHz		103.1 MHz	-39.4 dB	100 W	13.4 dBm			
	W			Processed				10 W	3.4 dBm			
	Location 7											
	Lat Lon:		N		W							
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI715T1	WI711T1	WI718T1	WI715U1	WI711U1	WI718U1	WI725T1	WI721T1	WI728T1	WI725U1	WI721U1	WI728U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI715T2	WI711T2	WI718T2	WI715U2	WI711U2	WI718U2	WI725T2	WI721T2	WI728T2	WI725U2	WI721U2	WI728U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI715T3	WI711T3	WI718T3	WI715U3	WI711U3	WI718U3	WI725T3	WI721T3	WI728T3	WI725U3	WI721U3	WI728U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI715T4	WI711T4	WI718T4	WI715U4	WI711U4	WI718U4	WI725T4	WI721T4	WI728T4	WI725U4	WI721U4	WI728U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI715T5	WI711T5	WI718T5	WI715U5	WI711U5	WI718U5	WI725T5	WI721T5	WI728T5	WI725U5	WI721U5	WI728U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 68 - Winters Receiver Test Data Sheet # 7

Winters, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KSFM 102.5 MHz	103.1 MHz	-39.4 dB	100 W	13.4 dBm					
	W		Processed			10 W	3.4 dBm					
	Location 8 Lat Lon:		N		W							
	30m 10W T	30m 0W T	30m 100W T	30m 10W U	30m 0W U	30m 100W U	10m 10W T	10m 0W T	10m 100W T	10m 10W U	10m 0W U	10m 100W U
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	WI815T1	WI811T1	WI818T1	WI815U1	WI811U1	WI818U1	WI825T1	WI821T1	WI828T1	WI825U1	WI821U1	WI828U1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	WI815T2	WI811T2	WI818T2	WI815U2	WI811U2	WI818U2	WI825T2	WI821T2	WI828T2	WI825U2	WI821U2	WI828U2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	WI815T3	WI811T3	WI818T3	WI815U3	WI811U3	WI818U3	WI825T3	WI821T3	WI828T3	WI825U3	WI821U3	WI828U3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	WI815T4	WI811T4	WI818T4	WI815U4	WI811U4	WI818U4	WI825T4	WI821T4	WI828T4	WI825U4	WI821U4	WI828U4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	WI815T5	WI811T5	WI818T5	WI815U5	WI811U5	WI818U5	WI825T5	WI821T5	WI828T5	WI825U5	WI821U5	WI828U5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 69 - Winters Receiver Test Data Sheet # 8

18. Repeat steps 5 through 15 for each Height/ERP/Format combination in Section 2.6.4 of the TPP. Data will be entered in the Receiver Test Data Sheet, Figures 62 through 69, corresponding to the location under test.

19. Move vehicle to next designated test location and repeat steps 1 through 17 until all locations associated with the FPFM/LPFM under test have been completed. If the field engineer conducting the test is still able to detect interference at the eighth location, then an additional test will be conducted. The ninth test will follow the same rule of distance from the last test location. Prior to conducting the ninth test, the Field Test Lead must be contacted.

2.6.4. Height AGL, RF Output Level, and Program Format Test Plan

- 30 m AGL, 10 W ERP, news/talk programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, news/talk programming
- 30 m AGL, 10 W ERP, unprocessed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, unprocessed programming
- 10 m AGL, 10 W ERP, news/talk programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP news/talk programming
- 10 m AGL, 10 W ERP, unprocessed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP, unprocessed programming

2.7. Benicia, California

2.7.1. Conduct Site Surveys

- Contact LPFM operators where possible to arrange for access to conduct on-site survey.
- Using a GPS receiver and topographic maps locate and conduct an on-site survey to determine if LPFM site listed on the LPFM license application is usable for testing purposes.
- If LPFM applicant site is not usable, contact Engineering Lead to determine possible alternative sites. Any alternate site identified will be located as close as possible to the LPFM applicant location maintaining the distance ratio determined during the initial LPFM site selection process. Any alternate site selection that has a greater than one-mile separation from the LPFM applicant will require approval from MITRE.
- Using a computer-mapping program, plot radius line on map from the FPFM through the LPFM and outward to determine locations for recording receiver data during test phase.
- Using a GPS receiver and topographic maps, drive along the proposed radius observing the feasibility of stopping the vehicle and conducting measurements during the test phase. Look for pull off areas, parking lots, local streets with parking, etc.

2.7.1.1. Determine HAAT for LPFM Test Site

- Locate selected LPFM sites and FPFM stations using license application coordinates from FCC database
- Using data from the topographic maps and internal Comsearch software programs, determine the Height AMSL of each LPFM site.
- Two LPFM radiation centerline heights will be used for the LPFM interference testing. They are 10- and 30-meter radiation

centerlines above ground level (RCAGL). For each of the sites that the portable LPFM will be placed, the determination of HAAT for the two antenna RCAGL heights will be calculated and recorded. The calculation method to be used in the HAAT determination is described in FCC Rules Part 73. In general, the Part 73 calculation method takes eight radials (45° apart) from the point of interest, and at distances between 2 and 10 miles from the point of interest takes 50 equally spaced increments and determines the height at each of the 50 points. For each radial the average height along it is determined by summing the height at each point and dividing by 50. Then the average terrain height of the eight radials is determined by summing the average of the eight radials and dividing by eight. If there are significant bodies of water along any of the radials, the entire radial, or portions of it, may be eliminated in the calculation to determine height of the average terrain for the point of interest.

- Enter points and other details on topographic maps detailing distances and proposed radius for testing.

2.7.1.2. Verify Test Locations

Using data collected in Section 2.7.1, mathematically determine the nearest and farthest receiver test locations with relation to the LPFM site. Plot these locations on a topographic map. See Figure 70, for LPFM to test location distances.

Benicia	Distance from LPFM
Location #	in miles
1	0.010
2	0.027
3	0.073
4	0.199
5	0.538
6	1.458
7	3.950
8	10.700
Multiplier	2.71

Figure 70 – Benicia LPFM to Test Location Distances

2.7.2. Initial Equipment Setup Instructions

2.7.2.1. Energy-Onix SST-300 FM Exciter Setup Instruction

- Ensure that the Mute switch on the transmitter rack is in the 'Mute' position.
- Ensure that the SST-300 output cable is securely connected to the 'N' connector on the 'Transmitter' port of the directional coupler.
- Ensure that the cable from the tower/antenna bay is securely connected to the 'N' connector on the 'Load' port of the directional coupler.
- Set frequency to 100.3 MHz using front panel switches. The three green 'internal voltage' LED's should be lit, and if lit, the red 'UNLOCK' LED should be extinguished within 30 seconds.
- Connect power meter to 'Incident' 'N' connector on the directional coupler in order to determine the transmitter ERP.
- Set monitor switch on front panel to Forward Power
- At the direction of the Field Test Lead, set the mute switch to off, enabling the transmitter.

- Set output power to approximately 10 W using the meter on front of the SST-300.
- Enter measurement of incident power in Transmitter Test Vehicle Log, Figure 71.
- Move power meter connection to the port marked ‘Reflected’ on directional coupler. The directional coupler ‘Incident’ and ‘Reflected’ monitor points are both 39.6 dB down from actual level. The reflected power value must be more than 10 dB below that of the incident power level. Damage to the transmitter may result from a delta less than 10 dB. If the level at the ‘Reflected’ port is less than 10 dB below the level at the ‘Incident’ port, refer to Section 4 of the TPP for adjustment procedures.
- Enter the reflected power measured at the port marked ‘Reflected’ on the directional coupler into the Transmitter Test Vehicle Log, Figure 71. The ratio of the reflected to incident power readings provide the power reflection coefficient at the directional coupler (R_{dc}). The value of the required power increase is then determined and added to the output level of the exciter so that the desired ERP can be achieved. The increased output power (dB) will be monitored at the ‘Incident’ port of the directional coupler. See Figure 72 for data regarding the amount of power in dB to add for a specific reflected power reading at the ‘Reflected’ port of the directional coupler.
- Disable exciter.

LPFM Transmit Test Vehicle Log

Date	LPFM Site Name:	LPFM Freq.	Test Site GPS Coordinates	Local Time of Test
	Benicia	100.3 MHz	N	
	FPFM Call Sign:	FPFM Freq.	W	
	KFRC	99.7 MHz		

Cable Losses		Directional Coupler Coupling Factor
129 ' Cable	1.9 dB	Incident and Reflected
10' Jumper Cable	0.5 dB	39.6 dB

VSWR Check Power Meter Readings	
Incident	Reflected

NOTES:

Transmitter Actions (Benicia, CA)

Time on	Time Off	Height AGL	Format	Watts ERP

Figure 71 – Benicia LPFM Transmitter Test Vehicle Log

Transmitter Actions (Benicia, CA)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 71 (Cont) – Benicia LPFM Transmitter Test Vehicle Log

Transmitter Actions (Benicia, CA)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 71 (Cont) – Benicia LPFM Transmitter Test Vehicle Log

Transmitter Actions (Benicia, CA)				
Time on	Time Off	Height AGL	Format	Watts ERP

Figure 71 (Cont) – Benicia LPFM Transmitter Test Vehicle Log

Reflection Cofficient	Line Loss	Power Increase at Load	
(R_{dc})	(dB)	(I %)	(dB)
-10	2.8	36.31	1.35
-11	2.8	28.84	1.10
-12	2.8	22.91	0.90
-13	2.8	18.20	0.73
-14	2.8	14.45	0.59
-15	2.8	11.48	0.47
-16	2.8	9.12	0.38
-17	2.8	7.24	0.30
-18	2.8	5.75	0.24
-19	2.8	4.57	0.19
-20	2.8	3.63	0.15
-21	2.8	2.88	0.12
-22	2.8	2.29	0.10
-23	2.8	1.82	0.08
-24	2.8	1.45	0.06
-25	2.8	1.15	0.05
-26	2.8	0.91	0.04
-27	2.8	0.72	0.03
-28	2.8	0.58	0.02
-29	2.8	0.46	0.02
-30	2.8	0.36	0.02
-31	2.8	0.29	0.01
-32	2.8	0.23	0.01

Figure 72 – Power Increase Required to Establish Desired ERP

2.7.3. Receiver / Transmitter Equipment Setup for Data Collection

1. Data will be entered in the Receiver Test Data Sheet, Figures 73 through 80.
2. With the LPFM transmitter disabled, listen to the audio output of the vehicle receiver. If interference is detected check the remaining receivers. If **all** receivers under test are not able to receive the signal from the FPFM station, a multipath or interference condition may exist. Move the Receiver Test Vehicle laterally from the test radial, maintaining the distance from the LPFM. The move shall not be more than 0.10 miles or 10% of the distance from the LPFM to the desired test location whichever is less. If any of the receivers is able to receive the FPFM station signal clearly, then the original test location will be used and the interference will be considered a normal condition of that location.
3. Using the GPS receiver, enter into the Receiver Test Data Sheet the exact coordinates of the receiver test vehicle. ***After completing this step no further movement of either LPFM or receiver test vehicle is allowed. When the tests are completed for a given location only the receiver test vehicle may be moved to the next test location. No movement of the LPFM shall occur until the full eight test locations have been completed.***
4. Confirm that both transmit and receive technicians are synchronized to the same step in the test configuration section. Receiver Test Vehicle technician continue to step 7 of Section 2.7.3.
5. At transmitter site, configure Height AGL, W ERP and audio program format for test per Section 2.7.4 of the TPP. Section 2.7.4 of the TPP also directs the specific rotation of tests to be followed.
6. At direction of Field Test Lead enable LPFM. Call technician in Receiver Test Vehicle to confirm transmission.

7. Make entry in Transmitter Test Vehicle Log.
8. Turn off the engine on the receiver test vehicle prior to recording the test data. Ensure that the car stereo has power applied and that the headphones jack is enabled in the rear of the vehicle.
9. Using the spectrum analyzer, measure and record the levels for both the LPFM and FPFM transmitters as described in Section 1.3.3 at the receiver vehicle and make entry on Receiver Test Data Sheet, Figures 73 through 80.
10. Contact Transmit Vehicle to mute the exciter and wait for confirmation
11. Insert monitor headphones in a monitor jack in the test patch panel. Repeat for each receiver to ensure that all receivers have an output. Notate the log for each receiver whether or not engineer was able to detect interference in the headset. Re-orient antennas, as necessary, for best reception, but do not move vehicle.
12. Make entry on Receiver Test Data Sheet by circling 'Y' or 'N' in the 'W/O LPFM' row
13. The FPFM program content at the time of the recording will be marked in the appropriate worksheet. Recordings will not be started if the FPFM station is airing commercials. Once the commercials are completed recordings will be initiated.
14. Perform instructions in TPP Section 3.1 to create recorded data.
15. Record start /stop time, the recording ID, and any additional notes regarding monitored quality on Receiver Test Data Sheet.
16. When recording is complete, notify the Transmit Test Vehicle to disable the LPFM transmitter.

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 1											
	Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE115U1	BE111U1	BE118U1	BE115P1	BE111P1	BE118P1	BE125U1	BE121U1	BE128U1	BE125P1	BE121P1	BE128P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE115U2	BE111U2	BE118U2	BE115P2	BE111P2	BE118P2	BE125U2	BE121U2	BE128U2	BE125P2	BE121P2	BE128P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE115U3	BE111U3	BE118U3	BE115P3	BE111P3	BE118P3	BE125U3	BE121U3	BE128U3	BE125P3	BE121P3	BE128P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE115U4	BE111U4	BE118U4	BE115P4	BE111P4	BE118P4	BE125U4	BE121U4	BE128U4	BE125P4	BE121P4	BE128P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE115U5	BE111U5	BE118U5	BE115P5	BE111P5	BE118P5	BE125U5	BE121U5	BE128U5	BE125P5	BE121P5	BE128P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 73 - Benicia Receiver Test Data Sheet # 1

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 2 Lat Lon:		N		W							
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE215U1	BE211U1	BE218U1	BE215P1	BE211P1	BE218P1	BE225U1	BE221U1	BE228U1	BE225P1	BE221P1	BE228P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE215U2	BE211U2	BE218U2	BE215P2	BE211P2	BE218P2	BE225U2	BE221U2	BE228U2	BE225P2	BE221P2	BE228P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE215U3	BE211U3	BE218U3	BE215P3	BE211P3	BE218P3	BE225U3	BE221U3	BE228U3	BE225P3	BE221P3	BE228P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE215U4	BE211U4	BE218U4	BE215P4	BE211P4	BE218P4	BE225U4	BE221U4	BE228U4	BE225P4	BE221P4	BE228P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE215U5	BE211U5	BE218U5	BE215P5	BE211P5	BE218P5	BE225U5	BE221U5	BE228U5	BE225P5	BE221P5	BE228P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 74 - Benicia Receiver Test Data Sheet # 2

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 3 Lat Lon:		N	W								
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE315U1	BE311U1	BE318U1	BE315P1	BE311P1	BE318P1	BE325U1	BE321U1	BE328U1	BE325P1	BE321P1	BE328P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE315U2	BE311U2	BE318U2	BE315P2	BE311P2	BE318P2	BE325U2	BE321U2	BE328U2	BE325P2	BE321P2	BE328P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE315U3	BE311U3	BE318U3	BE315P3	BE311P3	BE318P3	BE325U3	BE321U3	BE328U3	BE325P3	BE321P3	BE328P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE315U4	BE311U4	BE318U4	BE315P4	BE311P4	BE318P4	BE325U4	BE321U4	BE328U4	BE325P4	BE321P4	BE328P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE315U5	BE311U5	BE318U5	BE315P5	BE311P5	BE318P5	BE325U5	BE321U5	BE328U5	BE325P5	BE321P5	BE328P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 75 - Benicia Receiver Test Data Sheet # 3

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 4											
	Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE415U1	BE411U1	BE418U1	BE415P1	BE411P1	BE418P1	BE425U1	BE421U1	BE428U1	BE425P1	BE421P1	BE428P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE415U2	BE411U2	BE418U2	BE415P2	BE411P2	BE418P2	BE425U2	BE421U2	BE428U2	BE425P2	BE421P2	BE428P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE415U3	BE411U3	BE418U3	BE415P3	BE411P3	BE418P3	BE425U3	BE421U3	BE428U3	BE425P3	BE421P3	BE428P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE415U4	BE411U4	BE418U4	BE415P4	BE411P4	BE418P4	BE425U4	BE421U4	BE428U4	BE425P4	BE421P4	BE428P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE415U5	BE411U5	BE418U5	BE415P5	BE411P5	BE418P5	BE425U5	BE421U5	BE428U5	BE425P5	BE421P5	BE428P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 76 - Benicia Receiver Test Data Sheet # 4

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 5											
	Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE515U1	BE511U1	BE518U1	BE515P1	BE511P1	BE518P1	BE525U1	BE521U1	BE528U1	BE525P1	BE521P1	BE528P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE515U2	BE511U2	BE518U2	BE515P2	BE511P2	BE518P2	BE525U2	BE521U2	BE528U2	BE525P2	BE521P2	BE528P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE515U3	BE511U3	BE518U3	BE515P3	BE511P3	BE518P3	BE525U3	BE521U3	BE528U3	BE525P3	BE521P3	BE528P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE515U4	BE511U4	BE518U4	BE515P4	BE511P4	BE518P4	BE525U4	BE521U4	BE528U4	BE525P4	BE521P4	BE528P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE515U5	BE511U5	BE518U5	BE515P5	BE511P5	BE518P5	BE525U5	BE521U5	BE528U5	BE525P5	BE521P5	BE528P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 77 - Benicia Receiver Test Data Sheet # 5

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 6											
	Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE615U1	BE611U1	BE618U1	BE615P1	BE611P1	BE618P1	BE625U1	BE621U1	BE628U1	BE625P1	BE621P1	BE628P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE615U2	BE611U2	BE618U2	BE615P2	BE611P2	BE618P2	BE625U2	BE621U2	BE628U2	BE625P2	BE621P2	BE628P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE615U3	BE611U3	BE618U3	BE615P3	BE611P3	BE618P3	BE625U3	BE621U3	BE628U3	BE625P3	BE621P3	BE628P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE615U4	BE611U4	BE618U4	BE615P4	BE611P4	BE618P4	BE625U4	BE621U4	BE628U4	BE625P4	BE621P4	BE628P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE615U5	BE611U5	BE618U5	BE615P5	BE611P5	BE618P5	BE625U5	BE621U5	BE628U5	BE625P5	BE621P5	BE628P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 78 - Benicia Receiver Test Data Sheet # 6

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 7											
	Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE715U1	BE711U1	BE718U1	BE715P1	BE711P1	BE718P1	BE725U1	BE721U1	BE728U1	BE725P1	BE721P1	BE728P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE715U2	BE711U2	BE718U2	BE715P2	BE711P2	BE718P2	BE725U2	BE721U2	BE728U2	BE725P2	BE721P2	BE728P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE715U3	BE711U3	BE718U3	BE715P3	BE711P3	BE718P3	BE725U3	BE721U3	BE728U3	BE725P3	BE721P3	BE728P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE715U4	BE711U4	BE718U4	BE715P4	BE711P4	BE718P4	BE725U4	BE721U4	BE728U4	BE725P4	BE721P4	BE728P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE715U5	BE711U5	BE718U5	BE715P5	BE711P5	BE718P5	BE725U5	BE721U5	BE728U5	BE725P5	BE721P5	BE728P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 79 - Benicia Receiver Test Data Sheet # 7

Benicia, California LPFM Site												
Date of Test	Site Lat/Lon		FPFM	LPFM	Dir. Coup.	ERP	Incident Point Value					
	N		KFRC 99.7 MHz	100.3 MHz	-39.6 dB	100 W	13.2 dBm					
	W		Processed			10 W	3.2 dBm					
	Location 8											
	Lat Lon:	N	W									
	30m 10W U	30m 0W U	30m 100W U	30m 10W P	30m 0W P	30m 100W P	10m 10W U	10m 0W U	10m 100W U	10m 10W P	10m 0W P	10m 100W P
Start Time of Recording												
FPFM SpecAn (dBm)												
LPFM SpecAn (dBm)												
Auto RX Rec ID#	BE815U1	BE811U1	BE818U1	BE815P1	BE811P1	BE818P1	BE825U1	BE821U1	BE828U1	BE825P1	BE821P1	BE828P1
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Clock Radio Rec ID#	BE815U2	BE811U2	BE818U2	BE815P2	BE811P2	BE818P2	BE825U2	BE821U2	BE828U2	BE825P2	BE821P2	BE828P2
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Boom Box Rec ID#	BE815U3	BE811U3	BE818U3	BE815P3	BE811P3	BE818P3	BE825U3	BE821U3	BE828U3	BE825P3	BE821P3	BE828P3
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Walkman RX Rec ID#	BE815U4	BE811U4	BE818U4	BE815P4	BE811P4	BE818P4	BE825U4	BE821U4	BE828U4	BE825P4	BE821P4	BE828P4
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
Home RX Rec ID#	BE815U5	BE811U5	BE818U5	BE815P5	BE811P5	BE818P5	BE825U5	BE821U5	BE828U5	BE825P5	BE821P5	BE828P5
Interf. W/O LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N
FPFM Format	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T	P U T
Interf. W/ LPFM	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N	Y N

Figure 80 - Benicia Receiver Test Data Sheet # 8

17. Change Height AGL, ERP or Program to next selection in Section 2.7.4 of the TPP. Do not enable transmitter until notified by the receiver test vehicle that the 0 W recording is complete, if applicable.
18. Repeat steps 5 through 15 for each Height/ERP/Format combination in Section 2.7.4 of the TPP. Data will be entered in the Receiver Test Data Sheet, Figures 73 through 80, corresponding to the location under test.
19. Move vehicle to next designated test location and repeat steps 1 through 17 until all locations associated with the FPFM/LPFM under test have been completed. If the field engineer conducting the test is still able to detect interference at the eighth location, then an additional test will be conducted. The ninth test will follow the same rule of distance from the last test location. Prior to conducting the ninth test, the Field Test Lead must be contacted.

2.7.4. Height AGL, RF Output Level, and Program Format Test Plan

- 30 m AGL, 10 W ERP, unprocessed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, unprocessed programming
- 30 m AGL, 10 W ERP, processed programming
- 30 m AGL, 0 W ERP (mute on)
- 30 m AGL, 100 W ERP, processed programming
- 10 m AGL, 10 W ERP, unprocessed programming
- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP unprocessed programming
- 10 m AGL, 10 W ERP, processed programming

- 10 m AGL, 0 W ERP (mute on)
- 10 m AGL, 100 W ERP, processed programming

3. Yamaha AW 4416 Professional Recording Workstation

3.1. Test Data Recording Instructions

- Press ‘SONG’ button to access the song list menu
- Use the cursor keys to go to New Song in the menu, then press ‘ENTER’
- The confirmation menu will come up, then press ‘NO’
- The New Song menu will come up, set the Fs to 44.1kHz and Recbit to 16 bit, then press ‘ENTER’
- At the Mixer Data Import menu select OK, then press ‘ENTER’
- At the Name Edit menu input a song name using the cursor, then select OK, then press ‘ENTER’
- At the Comment Edit menu select OK, then press ‘ENTER’
- Once the song is created the Track View menu will come up
- Press the ‘QUICK REC’ button in the WORK NAVIGATE section
- Move the cursor down to the second block under the input
- Use the DATA/JOG dial to select SLOT1, then move the cursor to EXECUTE, then press ‘ENTER’, then select OK, then press ‘ENTER’
- Go to the MIXER section and press the ‘VIEW’ button
- Press the ‘1-16’ button above INPUT in the MIXER LAYER section.
- The View Input menu will come up, then use the ‘SEL’ button above the faders to select INPUT 1.
- Go through the settings for INPUT 1 and make sure each setting is as follows: ATT 0 dB, Phase ‘N’, EQ Off, Dynamics Off, Delay Off, Pan/Rout ST and center, Effect Insert Off, Fader 0.0 and ON

- Set these parameters for all inputs that are to be monitored or recorded
- Press ‘MONI’ button above ‘RECORDER’ in the ‘MIXING LAYER’ section
- The ‘MONI’ input menu will come up, then use the ‘SEL’ button above the faders to select ‘MONI 1’
- Go through the settings for ‘MONI1’ and make sure each setting is as follows: ATT 0 dB, Phase ‘N’, EQ Off, Dynamics Off, Delay Off, Pan/Rout ST and hard left, Effect Insert Off, Fader 0.0 and ON
- Set these parameters for all inputs that are to be monitored or recorded, ensuring ‘PAN/ROUT’ even inputs are hard right/ ST and all odd inputs are hard left/ ST
- Hit ‘PAN’ button in the ‘MIXER’ section, then ‘F3’
- The ‘MONI 1-16’ window will appear
- Confirm that all odds are hard left and evens are hard right
- Next go to the Track View menu by pressing the ‘TRACK’ button in the RECORDER section.'
- In the REC TRACK SELECT section all input buttons will be lit, de-select the ones you are not going to use by depressing the appropriate input button; the ones you are going to use will stay lit.
- At this point verify that all the receivers are turned on and tuned to the appropriate FPFM station
- Contact Transmit Vehicle to confirm that the LPFM is still muted
- Adjust the Line/Mic level knobs at the top of the unit; increase the level until they are greater than 12, but less than 2 on the inputs shown on the LED readout on the right side of the unit. Ensure the ‘PEAK’ lights on ‘LINE/MIC’ do not illuminate.
- Go through all the line inputs and monitor them through the headphone, listening to make sure the volume is satisfactory. This is accomplished by

pressing the ‘SOLO’ button, which will cause all ‘input’ buttons to flash. Press the ‘ON’ button for the receiver to be monitored. All other ‘ON’ buttons will extinguish. Repeat for all receivers.

- Hit the ‘SOLO’ button to extinguish. This will cause all inputs to be simultaneously monitored in the headphones.
- Once all the input volumes are correctly set, select inputs 1-10 (1-11 when testing the Blind Reader Service receiver at the LPFM site in East Bethel, MN) that are being recorded using the ‘ON’ buttons. Those buttons that are selected will now be illuminated.
- Contact LPFM to un-mute exciter.
- Unit is now ready to record. Press and hold the ‘REC’ button while pressing the ‘PLAY’ button. This will start the recording.
- During the 2-minute recording, make entries on the Receiver Test Data Sheet by circling the appropriate selections for format and interference on the W/LPFM row.
- When the time at the top of the TRACK VIEW menu shows 2 minutes, then press the ‘STOP’ button.
- Hit ‘RTZ’ button to return current recording to its zero point.
- Listen to each track for approximately 2 seconds to confirm that data was recorded.
- Next go to the SONG menu using the ‘SONG’ button, move the cursor to select SAVE, then press ‘ENTER’, then select OK, then press ‘ENTER’.
- Repeat steps for each test at each receiver test location.

3.2. Create Back-up Media (Create Back-up CD)

3.2.1. Backups will be created at the mid point of each day

- For mid point backups, remove hard drive tray from AW 4416 installed in Receiver Test Vehicle and from AW 4416 backup unit.
- Install drive tray from Receiver Test Vehicle into backup unit and drive tray from backup unit in Receiver Test Vehicle.
- Continue data collection process with Receiver Test Vehicle while backup unit proceeds to create backup.
- End of day backups will skip Section 3.2.1 and continue with Section 3.2.2

3.2.2. Selecting Backup Format

- Press the 'UTILITY' button, then press 'F4'
- Move the cursor to the Removable Backup area, then press 'ENTER'
- Type1 should be selected, if not use cursor to select, then press 'ENTER'

3.2.3. Executing the Backup

- Press the 'FILE' button, then press 'F1'
- Insert the CD-R disk into the CD drive of the Yamaha AW 4416
- Move the cursor to the upper part of the display and select All Enable to select all the songs to backup at once
- Move the cursor to Destination area and select ATAPI
- Move the cursor to Execute, then press 'ENTER'
- Insert new blank CD-R media when requested

3.3. Restoring Back-ups from CDs

- Backups will be restored not be restored on the machine from which they were created. This allows cross checking of the data prior to sending the backup CD's to Comsearch for further processing.
- Press the 'FILE' button under the UNIT section, then press the 'F2' button
- Insert the CD by pressing 'SHIFT' then 'F2', insert CD, then 'SHIFT', then 'F1'
- Select ATAPI as the source drive, then press 'ENTER'
- The unit will begin to read the CD, when done the list of names that where on the CD will appear above
- Select ALL ENABLE, then press 'ENTER', then select Execute, then press 'ENTER'
- NOTE: If more then 1 CD, the unit will prompt you to insert the next CD

3.4. Creating a Stereo Track From the Multi-track Song

- Press the 'SONG' button in the WORK NAVIGATE section
- Move cursor to NEW SONG, then press 'ENTER'
- Confirmation menu will come up, select YES, then press 'ENTER'
- Next, select 44.1 kHz, 16 Bit Song using the cursor, then select OK, then press 'ENTER'
- MIXER DATA IMPORT menu will appear, select OK, then press 'ENTER'
- Next, input the name of the new song, select OK, and then press 'ENTER'. Section 3.4.1.1 contains a description that will be used to name the songs.

3.4.1. Song Naming Conventions

3.4.1.1. For a Multi-track song name:

First and second digit = Site abbreviation (ex. AV = Avon; BR = Brunswick; EB = East Bethel; OW = Owatonna; OT = Owatonna Translator; BE = Benicia; WI = Winters)

Third digit = Distance from LPFM to test location (1-8)

Fourth digit = Height AGL.

1 30 m AGL

2 10 m AGL

Fifth digit = W ERP

1 0 W ERP

2 1 W ERP

3 2 W ERP

4 5 W ERP

5 10 W ERP

6 20 W ERP

7 50 W ERP

8 100 W ERP

Sixth digit = Format of LPFM Programming

P = Processed

U = Un-Processed

T = News/Talk

3.4.1.2. For a stereo track song name:

All the digits above plus a Seventh digit = the receiver number (1-6) listed below:

1 Blue receiver (Auto Stereo)

2 Yellow receiver (Clock Radio)

3 White receiver (Boombox)

4 Purple receiver (Walkman)

5 Green receiver (Home Stereo)

6 Gray receiver (Blind Reader receiver)

Example: OW825T5 = Owatonna, test location 8, 10 m AGL, 10 W ERP, News/Talk, and the Home stereo.

1 Next in the Commits select OK, then press 'ENTER'

2 Press the 'EDIT' button in the RECORDER Section, then press 'F5' (TR IMPORT)

3 Select the original Multi-track song to be used to import songs from by using the DATA/JOG dial

4 Select LOAD, then press 'ENTER'

5 Confirmation menu will appear, select OK, then press 'ENTER'

6 Choose the Source Track (the tracks from the original song) ex. 1-1 = track 1, virtual track 1. NOTE: virtual track will always be 1

7 Select TRACK CLIP, then press 'ENTER'

8 Confirmation menu will appear, select OK, then press 'ENTER'

9 Next, choose the Destination Track for the New Song (first track will be 1-1)

10 Select Execute, then press ‘ENTER’

11 Confirmation menu will appear, select OK, then press ‘ENTER’

12 Repeat step 3 through 11 above until there are no more tracks from the original multi-track song to import.
NOTE: The new songs will only have two tracks (1-1, and 2-1), so each pair of tracks (1-1and 2-1, 3-1 and 4-1, etc.) from the original song will be imported into a new song.

13 Press the ‘SONG’ button, and then select the new song you created.

14 Select LOAD, then press ‘ENTER’

15 Confirmation menu will appear, select OK, then press ‘ENTER’

16 At the Track View menu press ‘F3’

17 Press the ‘ST’ button in the REC TRACK SELECT section (the light will illuminate)

18 Make sure that the ‘MONI’ button is pressed in the MIXING LAYER, and that the ‘ON’ buttons are lit above the 1, 2 and stereo faders

19 Press and hold the ‘REC’ button while pressing the ‘PLAY’ button

20 At the end of 2 minutes press the ‘STOP’ button

21 Press the ‘SONG’ button again, select SAVE, then press ‘ENTER’

3.5. Burning Stereo Tracks to a CD

- Press the 'MASTERING' button in the WORK NAVIGATE section
- Select ATAPI, then press 'ENTER'
- Load a CD into the drive by pressing 'SHIFT' then 'F2', then press 'SHIFT', then press 'F1'
- Select Disk AT ONCE, then press 'ENTER'
- Select the X6 speed, then press 'ENTER'
- Select NEW, then press 'ENTER' (The next track will appear in the Track Song List)
- Select NEW until there are 30 tracks on the screen
- Move the cursor to the Track Song List and highlight the last track, move down to track 1 using the DATA/JOG dial
- Use the cursor to move over to the track song name
- Change the name to reflect the next name in the naming convention
- Use the cursor to move to the next track and repeat the two previous steps to change the song name. Repeat this for all 30 tracks
- Select Execute, then press 'ENTER'

3.6. Shutdown Procedure

Caution: Failure to follow the instructions below may result in a loss of data on the hard drive. Avoid turning off the Yamaha until a CD is made of the collected data as a backup.

1. Push the 'SONG' button in Work Navigate section.
2. Press the 'F5' button. The screen heading shows "shutdown".
3. Press the 'ENTER' button, which is located to the lower right of the jog wheel.

4. Move the curser to OK and then press 'ENTER'.
5. Wait until the screen says "Now safe to turn off".
6. Turn off power on rear of unit.

3.7. Verification of Digital Audio Recordings

- Data will be verified by listening to recorded tracks at the end of each processing phase.
    - Phase one: recording will be listened to at the end of each 2-minute recording (per instructions in Section 3.1.
    - Phase two: Recordings will be listened to when each half days data is restored to the backup workstation
    - Phase three: Recordings will be listened to when restored to the AW 4416 in the lab at Comsearch, Ashburn VA

4. Circular Polarized Antenna Bay Alignment Procedures

4.1. Frequency Adjustment Procedure

- Adjust stubs on both antennas to desired pre-marked position.
- Attach lower antenna to mast.
- Move top mounted antenna to pre-marked position on mast for frequency desired and align it to the same vertical plane as the lower antenna using the scribed marks on the mast for guidance.
- **Do not move lower antenna!**
- Connect power meter to 'Incident' monitor port. Note level.
- Connect power meter to 'Reflected' monitor port. Note level.
- If the reflected level is greater than 10% of the incident level, the VSWR will have to be adjusted. See Section 4.2 of the TPP.

- Raise antenna to desired Height AGL and retest. Repeat above steps as necessary to minimize the VSWR.

4.2. VSWR Adjustment Procedure

- Mute transmitter using rack mounted mute switch.
- Lower tower to its horizontal position.
- Connect power meter to 'Incident' monitor port on the directional coupler.
- Slightly loosen the VSWR adjustment screws on both antennas. Strap should be able to be moved, but not able to move on its own.
- Move one of the adjustment straps no more than ¼ inch in one direction.
- Check to be sure that the area around the antenna bay is clear including ladders, personnel, etc.
- Enable the transmitter and set the power to the lowest ERP. The Energy-Onix ST300 will have an output of approximately 10 W when turned to the minimum level.
- Measure the 'Incident' and 'Reflected' power monitor points. Mute the transmitter.
- If the reflected level has improved but is still over 10% of the incident level, move strap an additional ¼ inch in the same direction.
- Clear area and enable transmitter. Check monitor ports and make a note of the levels. Disable transmitter.
- Once a peak is reached but is still outside the limits, make changes to the other antenna. It is best to make changes to only one antenna at a time.
- If the reading is within limits, gently tighten the screws and recheck the levels.
- Raise the tower to vertical and recheck to be sure VSWR is still within limits.