

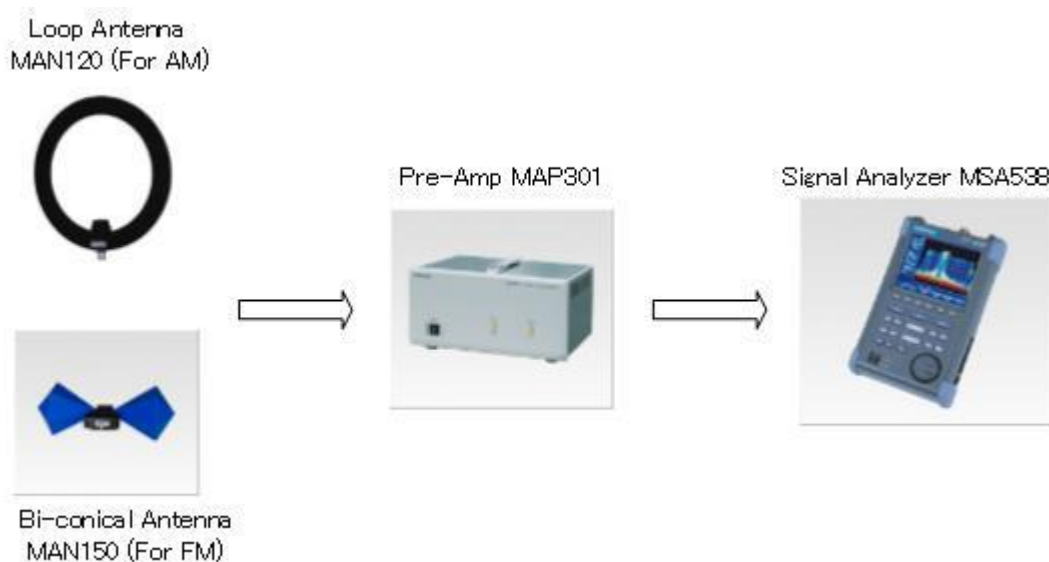
Antenna Location Effect on Mobile Field Intensity Measurement

On the field intensity measurement in the car using the signal analyzer MSA538 or the application software MAS9501, the location of the antenna can effect to the result.

We investigated to find the best antenna location to make the measurement in the car.

1. AM/FM radio wave measurement

We used the system below to make the field intensity measurement in the car. The antenna location is changed to find the best place.



The frequency related parameters and the information of the radio station are shown in below.

AM Measurement Center Frequency: 594 kHz

AM Measurement Span: 50 kHz

AM Radio Station: NHK1st Station (Kuki-city in Saitama)

FM Measurement Center Frequency: 79.5 MHz

FM Measurement Span: 10 MHz

FM Radio Station: NACK5 (Hiki-county in Saitama)

2. Antenna Location and the Waveform (AM)

Photo 1A: Luggage Space Window



Photo 2A: Luggage Space



Photo 3A: Rear Seat



Photo 4A: Front Seat



Photo 5A: Out of the car



Fig. 1A

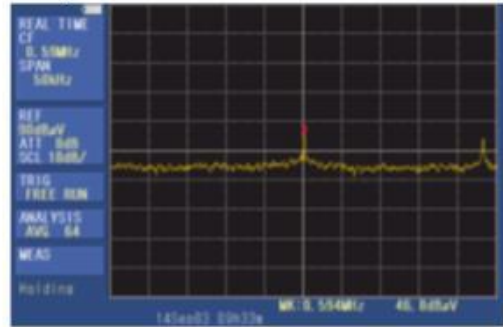


Fig. 2A

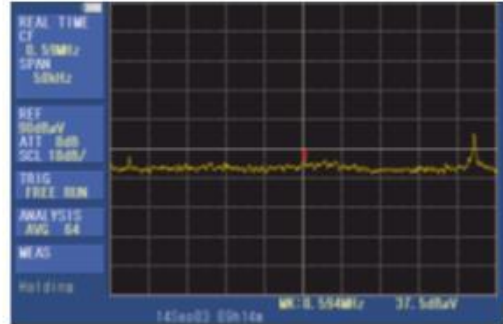


Fig. 3A

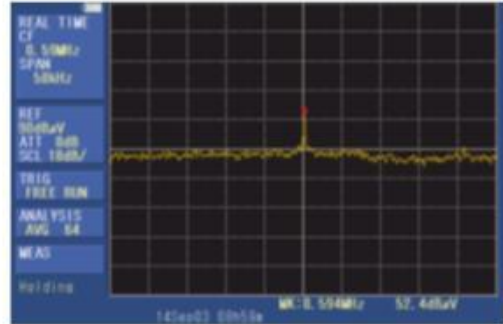


Fig. 4A

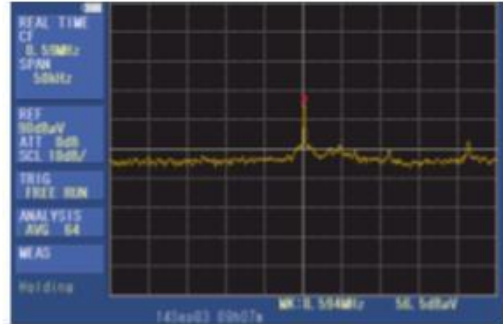
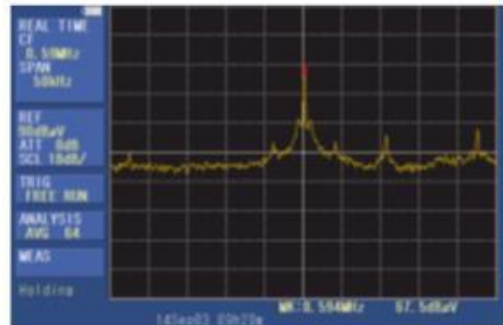


Fig. 5A



3. Antenna Location and the Waveform (FM)

Photo1: Luggage Space Window



Photo2: Luggage Space



Photo3: Rear Seat



Photo4: Front Seat



Photo5: Out of the car



Fig.1F

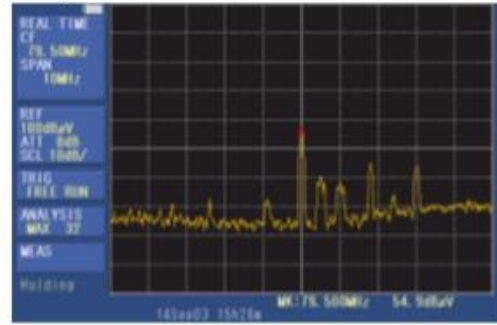


Fig.2F

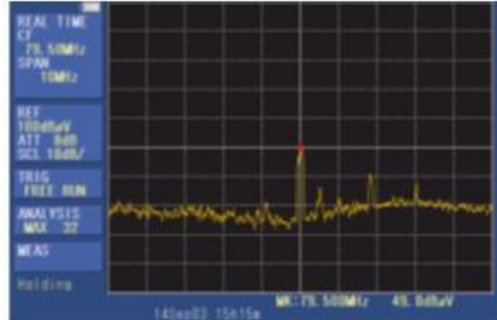


Fig.3F

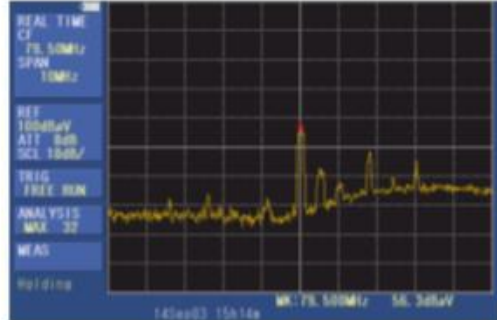


Fig.4F

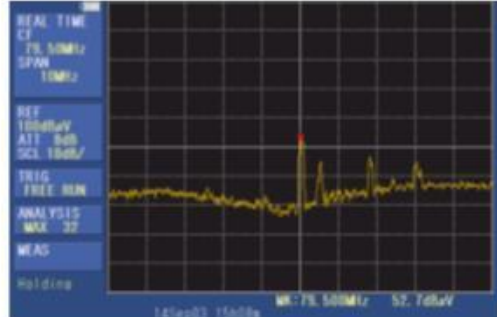
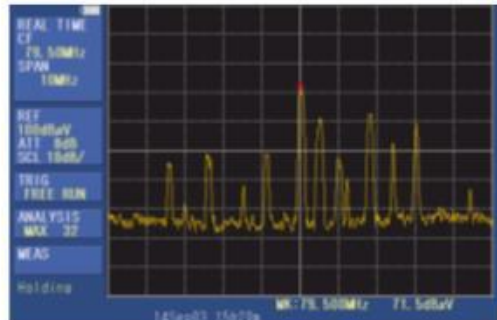


Fig.5F



4. Conclusion

The test results are concluded as follows.

Antenna Location	AM Field Intensity	FM Field Intensity
Luggage Space Window (Photo 1A, 1F)	46.8 dB μ V/m (Fig. 1A)	54.9 dB μ V/m (Fig. 1F)
Luggage Space (Photo 2A, 2F)	37.5 dB μ V/m (Fig. 2A)	49.0 dB μ V/m (Fig. 2F)
Rear Seat (Photo 3A, 3F)	52.4 dB μ V/m (Fig. 3A)	56.3 dB μ V/m (Fig. 3F)
Front Seat (Photo 4A, 4F)	56.5 dB μ V/m (Fig. 4A)	52.7 dB μ V/m (Fig. 4F)
Out of the car (Photo 5A, 5F)	67.5 dB μ V/m (Fig. 5A)	71.5 dB μ V/m (Fig. 5F)

For the case of AM, the best place is the front seat. On the other hand, the best place for FM is the luggage space window with the consideration of the noise floor. Comparing the out of the car, AM degraded around 11dB and FM degraded around 15 dB or more. It is recommended to apply the software correction when the measurement should be calibrated for the value at outside of the car.

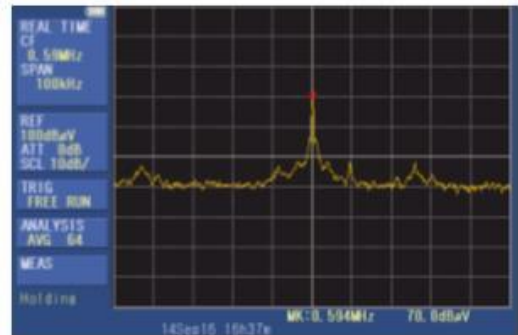
5. Appendix – AM loop antenna is located on the dashboard in flat

The additional experiment was performed with AM antenna is located on the dashboard in flat as shown in Photo 6A. On this case measured field intensity is as strong as the one when the antenna is located out of the car. Since the loop antenna responds to the strength of the magnetic field, the iron components around the antenna should be minimum for the best location.

Photo 6A Dash Board



Fig. 6A



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