

How to Improve Transmission Range and Quality with Antenna Systems?

• Single-Channel Fixed Frequency and Multiple Single-Channel Fixed Frequencies, Indoor or Outdoor, Short-Range Applications.

This is the basic installation for home karaoke, small conference or concert venues. Select MIPRO MR-series receiver(s) and fit each with a pair of whip antennas ~ simply mount them securely on the antenna connectors. Place the antennas vertically, away from metallic objects and noise sources. Note that the receiving efficiency deteriorates if more than three receivers are installed together.

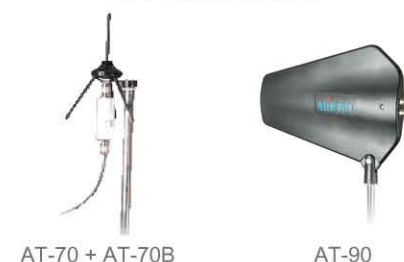


• Single, Dual and Quad Channels, Indoor or Outdoor, long-Range Application.

Live stages need professional true diversity receiver models such as the MIPRO ACT-series. Antenna selection becomes a crucial issue in these applications. A pair of coaxial antennas is provided with all ACT-series receivers ~ simply mount them securely on the antenna connectors.



An AT-70 extension antenna is needed for extended range. Place it as high as possible above the floor, keeping in mind that signal loss occurs if the connecting cable is too long. To compensate for such signal loss, the addition of AT-70B boosters is recommended. An AT-70B booster can be powered by either the AD-707 antenna divider system or an ACT-series receiver.



It is recommended that an AT-90 Transmitting / Receiving Directional Wideband Antenna be used instead of the AT-70 in difficult, multiple-system environments. It has superb receiving and transmitting performance when pointing at specific direction. It is simple to install and gives better results. AT-90 Transmitting / Receiving Directional Wideband Antenna can be considered if long cable is needed. It is pre-installed 1.6dB low-noise analog and 13dB low-noise amplifier to compensate for signal loss from the coaxial cable when connecting to a receiver.



If three or more receivers are installed in the same location, adding a 4-channel antenna divider system with extension antenna will enhance the receiving range and effect.

• Four or More Channels, Indoor or Outdoor, long-Range Applications.

An AD-707 antenna divider system and extension antenna are highly recommended for four or more ACT receivers in the same installation. To save rack space, one ACT-747 professional is a good choice. It is compact, space-saving and has a built-in antenna divider system, thus there is no need for an external antenna divider system to achieve the same performance.



• 16 Channels, Indoor or Outdoor, long-Range Applications.

Four receiver systems of ACT-747, a total of 16 channels, connected to one AD-707 antenna divider system and a pair of AT-90 Transmitting / Receiving Directional Wideband Antenna are highly recommended for large live stage requiring long, reliable transmission and under difficult RF environments. System output gain equals 1. AT-90 Transmitting / Receiving Directional Wideband Antenna with high gains. It has superb receiving and transmitting performance when pointing at specific direction connecting to AD-707 antenna divider system, resulting in high S/N ratio.



How to Design Receiver's Antenna System.

- First, estimate antenna's transmission distance and frequency of transmitting signals. Then, find a suitable cable specification accordingly to its tolerance.
- Classifications of tolerance range on receiver system's signal loss:
 - ⊙ Wider tolerance on signal loss : < -10dB~-6dB
 - ⊙ Acceptable tolerance on signal loss : -6dB~-2dB
 - ⊙ Narrower tolerance on signal loss : < -2dB
- Greater cable loss will decrease receiving distance and system stability, booster must be added to offer enough gain to make up the loss. However, booster should not offer excessive gain as it will cause receiver's intermodulation distortion and create unnecessary interference to affect receiving quality.
- Following chart tells specification of cable, suitable antenna and booster needed based on transmitting distance and tolerance range of signal loss.

Distance Combination	<10m	<20m	<50m	<100m
<-6dB	Use 3D-2V cable and require no booster	Use 3D-2V cable with AT-90	Use 5D-2V cable with booster	Use 5D-SFA cable with booster
<-2dB	Use 3D-2V cable with AT-90	Use 3D-2V cable with booster	Use 5D-2V cable with AT-90	Use 5D-SFA cable with AT-90

- Below is the formula to calculate gain of antenna:
System Gain of antenna system = antenna gain - signal loss of coaxial cable + booster gain
- Below is the example of calculating gain of antenna system transmitting 800 MHz frequency based on the components of 1/2 wavelength antenna, AT-70B booster, and 50 meters of 5D-2V coaxial cable.
 - ⊙ From Chart A, gain of 1/2 wavelength antenna and AT-70B booster is 2 dBi and 12 dB.
 - ⊙ From Chart B, loss of 5D-2V cable=3.8 db / 10m @ 1 GHz
 - ⊙ Hence, total lost of 50 meter cable = 3.8 dB X 5 = 19 dB
 - ⊙ Put 6a, 6b, 6c, into #5 formula. Total gain of antenna system = 2 dB (Antenna) - 19 dB (Coaxial cable) + 12 dB(Booster) = -5 dB.
 - ⊙ Refer to #2 tolerance of signal loss. Above design can be classified as 2B (see above)
 - ⊙ When making antenna cables, please use genuine connectors. For VHF band, select BNC connectors. For UHF band, it would be better to use TNC connectors.

Chart A: Gain specification of MIPRO's antenna and booster.

Type	1/2 wavelength antenna	AT-90 antenna	AT-70B booster
Gain	2dBi	12dBi	12dBi

Chart B: General specifications of 50Ω coaxial cable

Cable Type	Signal Loss (dB/10m)				Outer Diameter (mm)
	10MHz	100MHz	200MHz	1.0GHz	
1.5D-2V	0.85	2.95	4.15	10.5	2.9
3D-2V	0.33	1.5	2.1	5.2	5.7
5D-2V	0.026	1.1	1.5	3.8	7.5
8D-2V	0.02	0.54	0.9	2.2	11.6
5D-SFA				1.8	7.5
8D-SFA				1.2	11.6
RG-58A/U	0.427	1.74	2.3	5.83	5.0
RG-174/U		2.9	4.0	10.0	2.24
RG-188/U		3.8	4.73	10.33	2.06

Remark: Characteristics of above coaxial cables are industry standard. Signal loss might vary from its brands and specifications. Hence, for the most accurate calculation, please always refer to the specifications provided by the manufacturers.