

Recipient of the prestige 2013 “Rising Star Award”

Owing to MIPRO's outstanding performance in international sales, product innovation and development and branding achievement, MIPRO won the prestige 2013 “Rising Star Award” from Taiwan's Ministry of Economic Affairs in addition to “National Invention & Creation Award” in 2012 and “First Brand” & “Gold Medal Quality Products” awards in 2011.



MIPRO[®]
MICROPHONE PROFESSIONALS

Wireless Microphone Systems

2014
General Catalog

The Relentless Pursuit of Innovation



MIPRO[®]
MICROPHONE PROFESSIONALS

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Company Profile

MIPRO was founded in 1995 in Chiayi, Taiwan by founder K. C. Chang. Solomon Chang is the company president and leads a team of 200 employees in developing and manufacturing wireless microphone and wireless PA systems. Our motto is "innovation, quality and satisfied users".

A US\$10 million corporate headquarters was built in 1996 and is housed in a modern, 5,000-square-meter production and office facility. This modern facility is ISO-9001 certified by German TÜV and implemented quality assurance and efficient computerized production management systems. Taipei showroom and office started operation in 1999.

With 50 years of wireless microphone know-how and expertise accumulated over the years, the founder has nurtured a team of seasoned R&D engineers. Together they have developed over hundreds of wireless microphone systems.

Thanks to continued sales growth, size of headquarters was expanded twice to 13,000 square meters by 2006. Furthermore, adjacent land and buildings were purchased to anticipate future sales growth and expansion needs. Today, total corporate headquarters covers an area of more than 14,000 square meters.

After 18 years of steady growth, MIPRO has won the "National Invention and Creation Award" and president, Solomon Chang, won the "National Executive Manager Award". In 2013, MIPRO received the prestige "Rising Star Award" from Taiwan's Ministry of Economic Affairs.

MIPRO adheres to the "Made in Taiwan" principle to ensure quality assurance products, increase employment opportunity for local Taiwanese and contribute to country's economy.



Corporate Headquarters



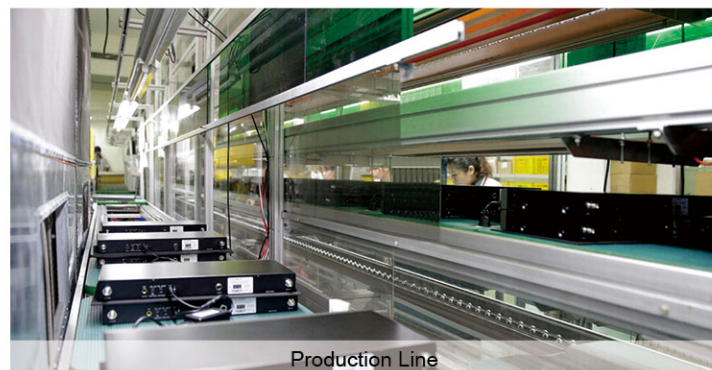
Solomon Chang, president



K. C. Chang, CEO



R & D



Production Line



Shipping Bay

Products Profile

MIPRO products include professional / consumer categories of digital & analog wireless microphones, wireless portable PAs, wired microphones, wireless IEM, wireless tour guide & language interpretation systems, wireless musical instrument microphones, wireless ENG receivers and antenna systems. Each system has exclusive style, innovative design and adheres to Taiwan, European Union, North America, Asia, and meet telecom regulations and safety certifications of respective countries.

The list of industry-leading innovations by MIPRO includes handheld transmitter microphone housings with graceful modeling of Guanyin vase and interchangeable microphone capsule modules. The ACT receivers feature color VFD panel, Auto scan, ACT synchronization functions, and can be remotely controlled & monitored by proprietary software.

MIPRO introduced Taiwan's first "true digital" wireless microphone system in 2006 to lead into the digital era. The innovative wideband analog ACT-7 series was launched in 2010 for the professional markets to great success due to the advanced features and stable performance.

MIPRO has industry's most complete & high performance antenna systems to complement the receivers, including AT-90W wideband directional log antenna, AT-70W wideband omni-directional bi-functional antenna and industry's first AT-100 wideband circularly polarized antenna as well as antenna splitters, antenna dividers, antenna amplifiers & boosters. Two latest innovative products are AD-708 wideband UHF 4-channel auto gain control antenna divider and MPB-30 gain controllable boosters.

MTG-100 is world's most compact digital tour guide & language interpretation system. It is features-loaded and has crystal-clear sound quality and extremely easy to use. Recently introduced exclusive wireless musical instrument microphones accurately capture the fidelity sound of musical instruments and are easy to operate.

MIPRO has superior manufacturing environments and an experienced and skilled human resource to fulfill our mission in developing and manufacturing high quality products that are 100% made in Taiwan.



Wireless Microphones



Antenna Systems



Wireless Tour Guide Systems



Portable Wireless PA Systems



Wireless Musical Instrument Microphones

Brand Profile

MIPRO specializes in designing and manufacturing professional wireless microphone systems. Founder named the company "MIPRO" which derived from the words "Microphone Professionals". Products are marketed in 80 countries globally and it is one of the well-known wireless microphone brands as well as the top wireless microphone brand in Taiwan.

MIPRO is well known for innovative design products and has won Taiwan Excellence award and often nominated in the TEC awards' Wireless Technology category. MIPRO wireless systems have been used during the Vienna Festival Opening Ceremony and exhibits in key professional audio trade shows worldwide. Gary Kaye, A/V consultant & educator, stated MIPRO is "Top Five New Companies to Watch".

In 2011, MIPRO wireless systems was selected by the musical for the Taiwan's 100th anniversary celebration and performed flawlessly during the show. At the same year, MIPRO received the prestige "First Brand" & "Taiwan Gold Metal Quality Product" awards.

MIPRO's mission is "to develop best wireless microphone products and to create a world-class brand in the wireless microphone industry."



Rising Star Award



National Invention & Creation Award



National Executive Manager Award



First Brand



Taiwan Gold Medal Quality Product



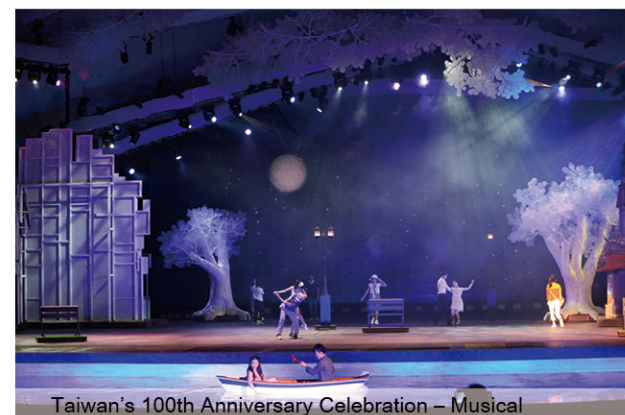
TEC Award



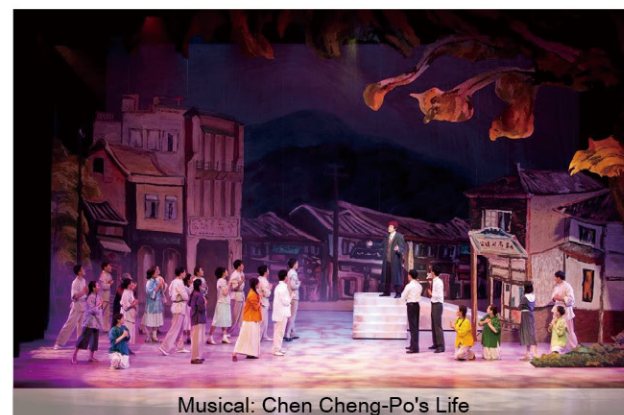
Received The 16th Rising Star Award



Vienna Festival Opening Ceremony



Taiwan's 100th Anniversary Celebration – Musical



Musical: Chen Cheng-Po's Life

Capsule Profile

MIPRO founder is Taiwan's pioneer in electret condenser microphone technology and is the first to develop and patent the wireless condenser microphone in Taiwan. After the company was established, developing high quality microphone capsules was set as an important R&D goal because microphone capsule is the heart of a microphone.

The historic RET Electronics is a Japanese manufacture of electret condenser microphone (ECM) capsules for professional vocal applications. President, Abe Takao, has been designing and manufacturing ECM capsules which have been sold to NHK, San-Ken, JVC and other well-known microphone companies to be fitted in their high-end microphones.

For 18 years since inception, MIPRO has collaborated with RET exclusivity for its ECM capsules to be fitted in MIPRO's professional wireless vocal microphones. MIPRO has continuously enjoyed praises and affirmations from audio professionals in both domestic and overseas markets.

In 2012, MIPRO founder has successfully developed true condenser microphone (TCM) capsule and designed as interchangeable modules to be integrated into the handheld transmitters. It is the Taiwan's first wireless true condenser microphone for the professional stage applications and makes MIPRO become one of the world-class microphone brands.

In 2013, MIPRO purchased RET and its ECM manufacturing technology. In April, president Abe and its seasoned technicians came to Taiwan and transferred his know-how and proprietary technology to MIPRO, allowing MIPRO to enter the new era with in-house manufacturing of high-end ECM capsules.

In the past, MIPRO is renowned for wireless transmission technology. Today, MIPRO can develop our own TCM, ECM and dynamic microphone capsule modules providing the best sound quality for performances to suit users' preferences.



Abe Takao & CEO



Anechoic Chamber



MIPRO & RET Microphone Capsule Team



Production Equipment

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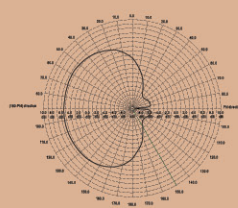
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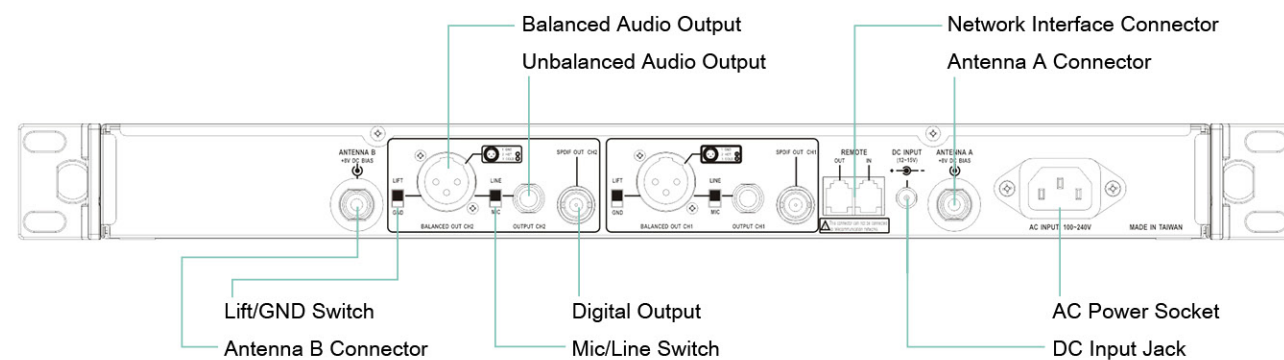


ACT-828 Wideband Dual-Channel Digital Receiver

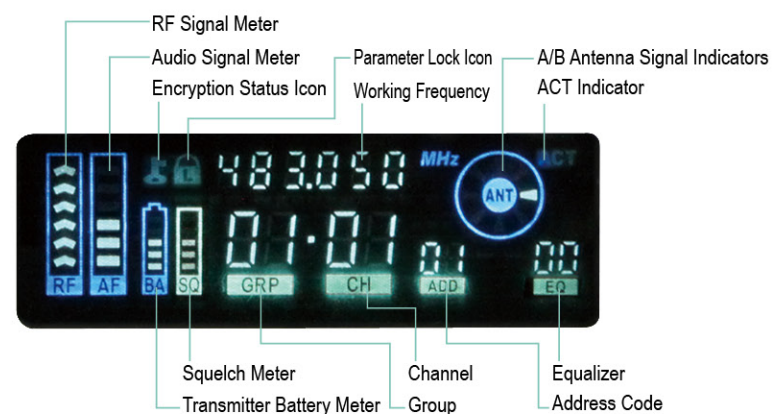
NEW



Rear Panel



VFD Screen

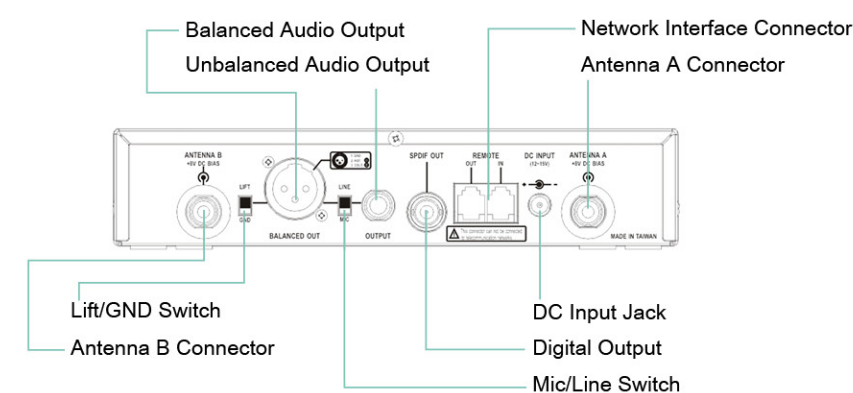


ACT-818 Wideband Single-Channel Digital Receiver

NEW



Rear Panel



Transmitter



Profile

MIPRO's industry-leading digital wireless microphone systems feature an excellent sound quality that truly rivals any wired cable transmission. The handheld microphone transmitter is equipped with a true condenser microphone (TCM) and dynamic microphone capsules that delivers an exceptionally clear, accurate sonic image to the listener.

Building on their highly successful line of true digital wireless, MIPRO has introduced the ACT-818 & ACT-828 which deliver outstanding features at an affordable price. An expanded 64 MHz bandwidth ensures optimal flexibility, allowing more interference-free, compatible channels to select from.

ACT-818 & ACT-828 can work with the transmitters powered by AA battery like ACT-80H and ACT-80T, or the transmitters powered by rechargeable battery like ACT-80HC and ACT-80TC.

Features

1. The ACT-828 is an EIA standard 1U dual channel and the ACT-818 is a 1/2U single channel rack-mountable receiver with metal chassis.
2. Full-color VFD (vacuum fluorescent display) for clear viewing of all parameters. All controls are intuitive and easily accessible, allowing for quick and easy system setup via a single rotary control.
3. Enhanced RF circuitry improves anti-interference characteristics and system compatibility with 64 MHz wide bandwidth allows more interference-free channels to be selected.
4. New digital diversity receiving technology eliminates signal dropout and enhances receiving range.
5. Full-Range sound quality won't be changed by the strength of RF signals or operation distance.
6. Digitally-processed RF circuitry and DigitnamicPlus™ technology eliminates compander noise, assuring a wireless sound quality that easily rivals cable transmission.
7. Improved proprietary Audio A/D Converter provides a true dynamic range of 115 dBA, T.H.D. < 0.03% at 1 kHz with < 2.7 ms latency.
8. SPDIF Digital Audio Interface facilitates a direct connection to digital mixing consoles and transmits signal without distortion, ensuring a stable S/N ratio which will not deteriorate in long distance transmission.
9. Proprietary 256-bit encryption, provides secure audio transmission, preventing unauthorized listening.
10. 10 built-in SmartEQ™ presets and user-defined microphone capsule equalization allows faithful sound reproduction to suit artists' preferences.
11. 10 built-in digital anti-feedback SmartEQ™ presets minimize feedback effectively without sacrificing sound quality.
12. Optional MIPRO RCS2.Net software allows real-time network remote-controlling and monitoring of 64 systems.

Specifications

Overall System		
Model	ACT-828	ACT-818
Frequency Range	(5E) 480~544 MHz (US & EU) (6E) 636~700 MHz (EU)	(5F) 540~604 MHz (US & EU) (6F) 696~760 MHz (EU)
Bandwidth	64 MHz	
Preset Frequency	12 non-interference compatible frequencies in group 1-10. 16 non-interference compatible frequencies in group 11-16. 16 user-defined frequencies can be stored in group 18 216 preset frequencies in total	
Channel Grid	25 kHz	
Channel Set-up	Scan & ACT sync	
Audio Sampling	24-bit / 44.1 kHz Rate	
Audio Compression	2nd Generation DSP inertial coding	
Latency	< 2.7ms	
Audio Frequency Response	20 Hz~20 kHz (-2dB)	
S/N Ratio (analog output)	> 115dB(A)	
T.H.D.	< 0.03 % @ 1 kHz	
Encryption	256 bit	

Receivers		
Model	ACT-828	ACT-818
Chassis /Channel	EIA Standard 19" 1U, Dual	EIA Standard 19" 1/2U, Single
Sensitivity	15 dB μ V at S/N \approx 118 dBA	
Image and Spurious Rejection	> 85dB	
Receiving Mode	Digital Diversity	
Analog Output	Balanced XLR \times 2 Unbalanced 6.3 mm (1/4") \times 2	Balanced XLR \times 1 Unbalanced 6.3 mm (1/4") \times 1
Analog Output Switch	Mic / Line \times 2	Mic / Line \times 1
Digital Audio Interface	SPDIF output. BNC female \times 2	SPDIF output. BNC female \times 1
Digital Equalizer	Preset 10 Microphone Capsule Modeling	
Digital Anti-feedback Equalizer	Preset 10 Anti-feedback Microphone Capsule Modeling	
PC Interface	USB or RS-232 Interface. Proprietary MIPRO ACT-BUS	
Display	Full-color VFD	
Battery Meter	Transmitter battery status	
Antenna Input	50 Ω TNC Female Connector \times 2	
Power Supply	Built-in 100~240V AC Switching Power Supply	External AC Power Supply, 12~15V DC, 1A
Dimensions (W \times H \times D)	420 \times 44 \times 245 mm (16.5 \times 1.7 \times 9.6")	210 \times 44 \times 230 mm (8.3 \times 1.7 \times 9")
Weight	Approx. 2.2 kg (4.8 lbs)	Approx. 1.1 kg (2.4 lbs)
Environment Conditions	-10~+60 °C	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-80H Wideband Digital Handheld Transmitter

Standard Color Champagne

NEW

Patents :
Taiwan Utility M426236
Utility M426237
China Utility ZL201220005942.5
Utility ZL201220005924.7
Utility ZL201220574217.X



Features

1. Innovatively designed housing combines aesthetics and ergonomic style.
2. Standard champagne-color housing. Optional custom-made colors are available.
3. Turn upper housing for 2 AA battery installation and replacement.
4. The unique flat top multi-layered metal grille for condenser capsules and round top for dynamic capsules protect the capsule against impact, rolling and pop noise. The upper grille is able to be detached easily for cleaning and hygiene practices.
5. Patented capsule suspension design virtually eliminates vibration and handling noises.
6. Interchangeable capsule module with premium condenser or dynamic options for easy and fast changeovers.
7. True condenser capsule exhibits high fidelity, wide dynamic range, fast transient responses, good feedback rejection, accurate sound image characteristics, transparent sound quality, and withstands maximum SPL.
8. Backlit LCD displays frequency band, group, channel, battery status, encryption status, RF and audio levels.
9. The bottom housing with built-in high-efficiency antenna features power switch, mute and setup buttons for programmable gain, limiter, low cut and RF output power.
10. Patented end-cap cover with color-coded channel identification clips. Detach the end-cap cover for parameters set-up. Reversible end-cap allows shielding of power on/off or mute switches during performance.
11. Three selectable mute settings: Auto, Manual & Disabled. "Auto" mute activates automatically when handheld transmitter points down towards the ground.
12. Three selectable gain settings: 0 dB (same as microphone sensitivity), +3 dB, +6 dB.
13. An interference-free channel can be synchronized automatically and quickly without error by stable PLL circuit and MIPRO's patented ACT™ sync function.
14. Two selectable transmitter output power settings: HI (high-power) & LOW (low-power).

The capsule module is detachable from the upper housing

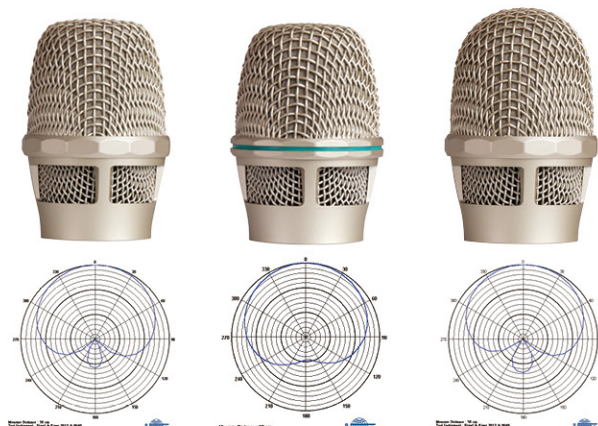


Interchangeable Capsule Modules

MU-90

MU-79

MU-59



Assembled



Color-coded ID Caps



ACT-80HC Rechargeable Wideband Digital Handheld Transmitter

Standard Color Champagne

NEW

Patents :
Taiwan Design 115708
China Design ZL200630006688.0
U.S. Invention 7978869



Features

1. Innovatively designed housing combines aesthetics and ergonomic style.
2. Power by a plug-n-play rechargeable lithium battery. Store the microphone in charger for charging when not in use.
3. Turn upper housing for plug-n-play rechargeable lithium battery installation and replacement.
4. Standard champagne-color housing. Optional custom-made colors are available.
5. Other features are same as ACT-80H.

The rechargeable battery can be replaced easily



Specifications

Model	ACT-80H	ACT-80HC
Battery	2 AA alkaline	Rechargeable lithium battery 18500 type X 1
Battery Hours	Up to 12 hours (Low Power)	
Frequency Range	(5E) 480~544 MHz (US & EU) (5F) 540~604 MHz (US & EU) (6E) 636~700 MHz (EU) (6F) 696~760 MHz (EU)	
Oscillation Mode	PLL Synthesized, Frequency Stability $\pm 0.005\%$ (-10~+60°C)	
RF Power Output	10 mW / 50 mW switchable (country dependent)	
Spurious Emission	$\leq -60\text{dBc}$	
Modulation Type	New Digital Modulation	
Audio Compression	DSP Inertial Coding	
Gain Setting	+6 dB, +3 dB, 0 dB (3 settings). 0 dB = MU-89 microphone sensitivity	
Dimensions (Ø × L)	50 × 258 mm (2 × 10.1 ")	50 × 250 mm (2 × 9.8 ")
Weight	Approx. 292 g (10.3 oz), excluding batteries	Approx. 281 g (9.9 oz), excluding batteries
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-80T Wideband Digital Bodypack Transmitter



Features

1. Ultra slim bodypack transmitter with sturdy magnesium alloy housing.
2. Detachable antenna, mini power switch and XLR input connector are located on the top of transmitter.
3. Backlit LCD displays various operation information.
4. Innovatively designed battery cover allows easy access to operate buttons and prevents accidental operation.
5. Mute button with remote-control jack for easy activation of mute function.
6. Stable PLL circuit. Synchronized with the receiver's frequency by MIPRO's patented ACT™ function automatically.
7. Selection of polarization for audio input to match different capsules of different polarizations.
8. Six selectable gain settings.
9. Mini-XLR input with secure screw lock connector for lavalier / headworn mics and guitar.
10. 2 AA batteries provide up to 12 hours of operation for ACT-80T. 1 18500 rechargeable lithium battery provides up to 12 hours of operation for ACT-80TC.
11. Adjustable belt clip allows wearing transmitter in up or down position.

ACT-80TC Rechargeable Digital Wideband Bodypack Transmitter

NEW



Specifications

Model	ACT-80T	ACT-80TC
Housing	Magnesium alloy	
Frequency Range	(5E) 480~544 MHz (US & EU) (5F) 540~604 MHz (US & EU) (6E) 636~700 MHz (EU) (6F) 696~760 MHz (EU)	
RF Power Output	10 mW / 50 mW switchable (country dependent)	
Spurious Emission	≤ -60dBc	
Oscillation Mode	PLL Synthesized, Frequency Stability ±0.005% (-10~+60°C)	
Display	Backlit LCD displays frequency band, group channel, AF gain, limiter, low cut, phase, output power, mute, battery status, encryption status & error codes.	
Modulation Type	New Digital Modulation	
Audio Compression	DSP Inertial Coding	
Gain Setting	+18 dB, +12 dB, +6 dB, 0 dB, -6 dB, -12dB (6 settings). 0 dB = microphone sensitivity	
Mute Connector	Optional MJ-70 remote mute switch	
Battery	2 AA Alkaline	Lithium (18500) X 1
Battery Hours	Up to 12 hours (Low Power)	
Dimensions (W × H × D)	63 × 70 × 25 mm (2.5 × 2.7 × 1.0 ")	
Weight	Approx. 78 g (2.8 oz), excluding batteries	Approx. 122 g (4.3 oz), excluding batteries
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

MP-80 3-in-1 Transmitter Charger Station

NEW

Profile

MP-80 is a new generation of rechargeable transmitter charging station exclusively designed for MIPRO transmitters. Each station has two charging slots. Each slot has a 3-in-1 charging design enables multiple charging options :

- two handheld transmitters
- two bodypack transmitters
- two ICR18500 lithium battery
- one handheld & one bodypack transmitter
- one handheld transmitter & one ICR18500
- one bodypack transmitter & one ICR18500

Each station also provides two storage slots for 2 spare ICR18500 lithium battery. Precise charging status with red charging & green charged indicator for easy reading by the users. Multiple charging stations can be easily connected for more charging options.

Features

1. Two charger slots provide convenient charging for MIPRO rechargeable handheld & bodypack transmitters and ICR18500 rechargeable battery.
2. Intelligent charging circuitry provides efficient and safe charging.
3. Precise charging status with red charging & green charged indicator
4. The reverse polarity protection circuit prevents charging errors.
5. Two spare ICR18500 battery storage slots
6. Storage compartment for charging cable.
7. Two or more chargers can be easily interconnected for more charging options.

Specifications

Input Voltage Range	DC 10V~15V /1A
Battery Type	ICR18500 3.7V Li-ion Battery × 2
Charge Methods	Termination by 20% Regulation Current
Charge Current	Approx. 500mA by Current Regulation
Current Consumption	Approx.600mA /12V, for two batteries charging at the same time
Dimension (W × H × D)	92 × 87 × 158mm (3.6 × 3.4 × 6.2")
Weights	Approx. 300g (10.6 oz)
Environmental	-10~+ 60 °C

Parts



Interconnected Multiple Chargers

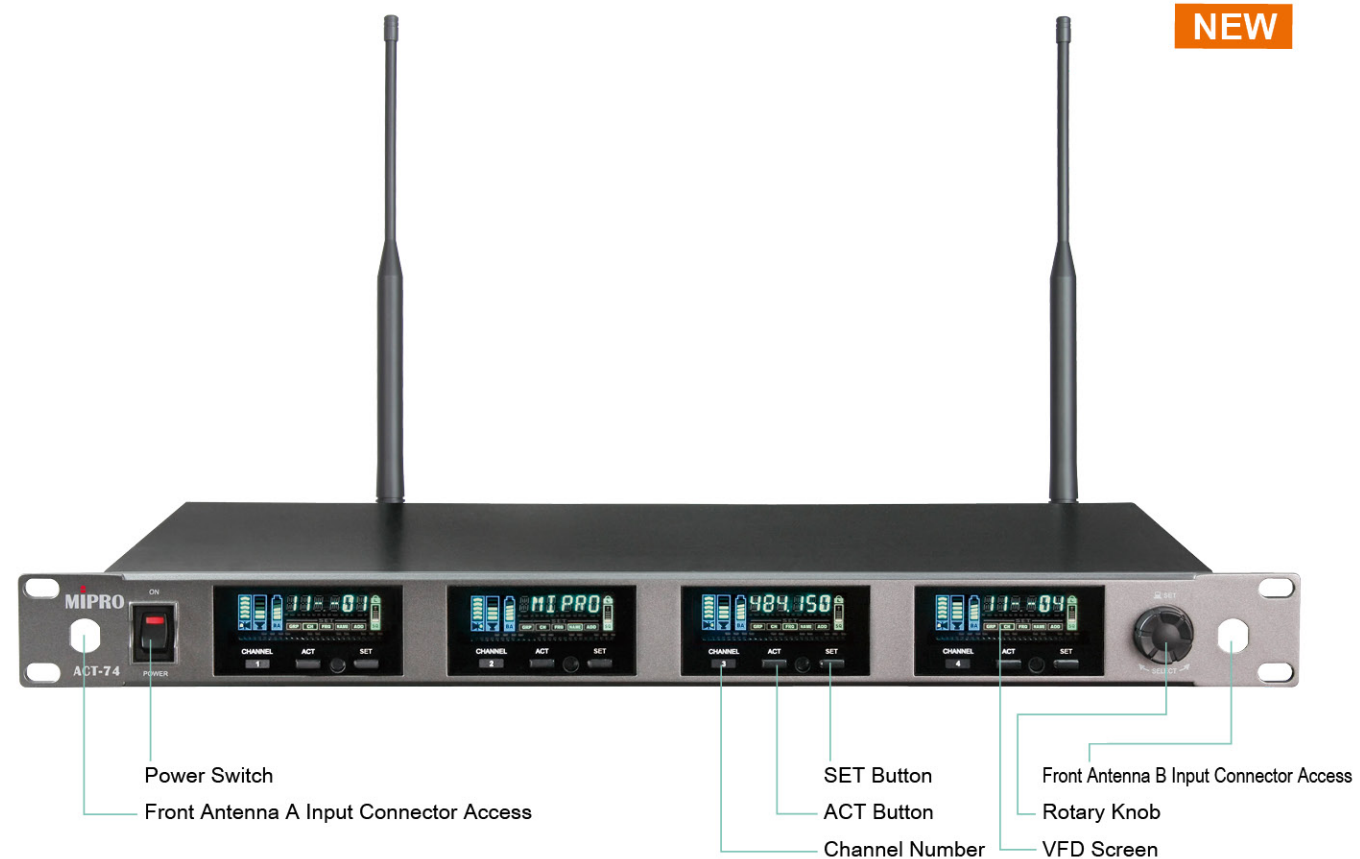


Charging Methods

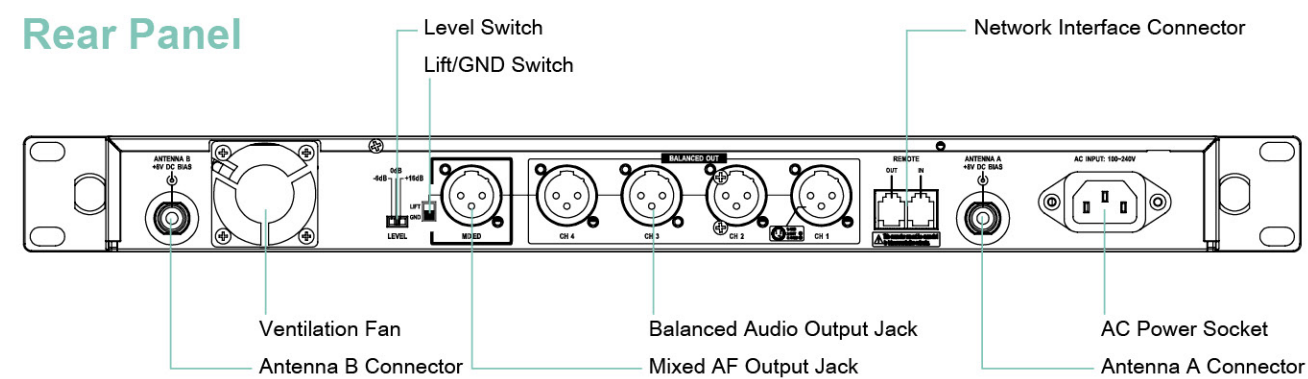


ACT-74 Wideband Quad-Channel True Diversity Receiver

NEW



Rear Panel



Transmitter

ACT-70H



ACT-70HC



ACT-70T



ACT-70TC

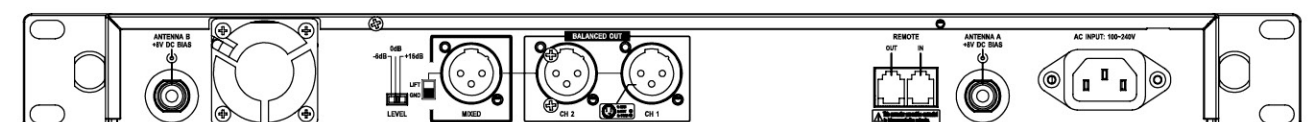


ACT-72 Wideband Dual-Channel True Diversity Receiver

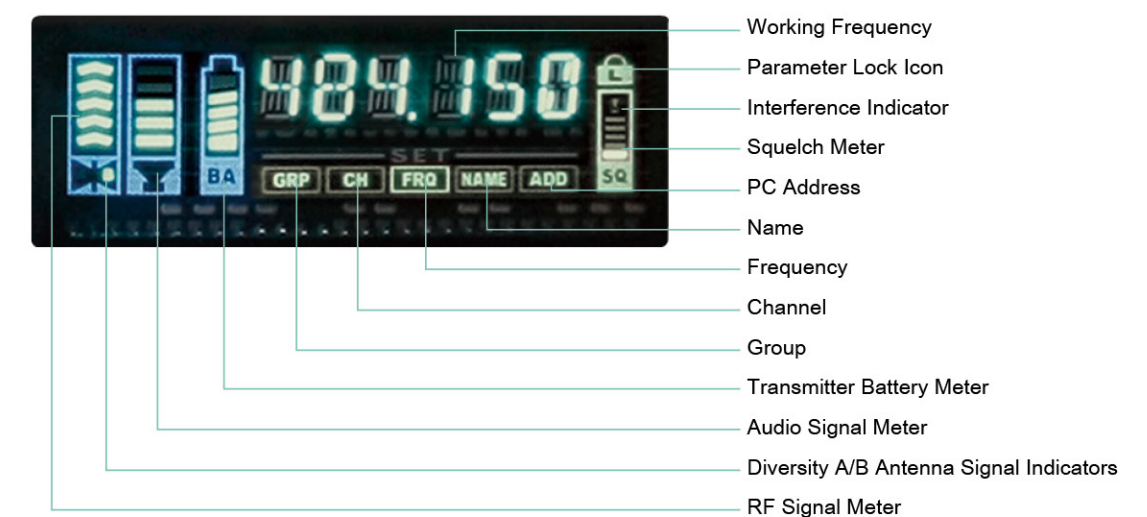
NEW



Rear Panel



VFD Screen



ACT-71 Wideband Single-Channel True Diversity Receiver

NEW



Rear Panel

Profile

- 1. Featuring latest wireless features and functions such as excellent multi-channel systems compatibility and RF stability. Moreover, the handheld microphone transmitter fitted with the latest true condenser microphone capsule (TCM) and dynamic microphone capsule for unsurpassed audio quality.
- 2. Three receiver configurations are available:
ACT-74: Wideband Quad-Channel True Diversity Receiver
ACT-72: Wideband Dual-Channel True Diversity Receiver
ACT-71: Wideband Single-Channel True Diversity Receiver
- 3. Matching Transmitters: Using AA battery on ACT-70H handheld transmitter and ACT-70T bodypack transmitter, or Using lithium rechargeable battery on ACT-70HC rechargeable handheld transmitter and ACT-70TC Rechargeable bodypack transmitter.
- 4. Below are ACT-70 frequency codes

USA Frequency Codes

5UA 482~554	5UB 554~626	6UA 626~698
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Europe Frequency Codes

5UA 482~554	5UB 554~626	6UA 626~698	7UA 718~790
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Features

- 1. ACT-74 & ACT-72 receivers are EIA standard 1U rack-mountable & ACT-71 receiver is EIA standard 1/2U rack-mountable metal chassis with excellent heat dissipation & RF shielding characteristics.
- 2. UHF PLL-synthesized technology for enhanced RF stability, lowered spurious emissions and increased frequency agility.
- 3. 400 preset channels with 1-set of user-defined group that saves up to 16 channels.
- 4. Industry's first ACT syncs automatically and quickly a working channel.
- 5. Dual "PiloTone & NoiseLock" circuits minimize interference.
- 6. Industry's only full-color VFD screen delivers a bright, clear viewing in day/night environments with automatic lit (Working) and dim (Standby) display during performance.
- 7. All controls are intuitive and easily setup via a single rotary knob.
- 8. Industry's only RF interference warning indicator for properly adjusts the SQ level. Increase sensitivity to extend receiving range; decrease the sensitivity to reduce interference.
- 9. Single channel output or mixed output and switchable three levels for the best sound quality options.
- 10. High dynamic range and high fidelity characteristics for transparent audio performance.
- 11. Receiver provides bias voltage for MIPRO antenna systems to enhance reception range and signal stability.
- 12. MIPRO RCS.Net software allows real-time computer set up, control and monitoring.
- 13. Built-in 100~240V AC switching power supply ensures system safety and stability.
- 14. Design and made in Taiwan.

Specifications

Model	ACT-74	ACT-72	ACT-71
Channel	Quad	Dual	Single
Chassis	EIA-Standard 19 " 1U		EIA-Standard 19 " 1/2U
Display	Color VFD displays Frequency, Frequency Code, RF & Audio Meters, Transmitter Battery Meter, Diversity Signals, Interference Warning Indicator. Programmable User Name, Group, Channel, Squelch Meter, PC Address and Lock Status.		
Frequency Range	482~698 MHz (US) 480~790 MHz (EU) (country dependent)		
Bandwidth	72 MHz		
Preset Channels	400 preset channels Group 01~10: 16 compatible channels in each group Group 11~15: 48 compatible channels in each group Group 16: 16 channels can be saved & recalled (user-defined)		
Receiving Mode	True Diversity		
Oscillation Mode	PLL Synthesized		
Sensitivity	6dB μ V, at S/N > 80dB		
S/N Ratio	>108dB (A)		
T.H.D.	<0.5% @ 1kHz		
Frequency Response	50 Hz~18 kHz, with high pass filter		
Squelch	"PiloTone & NoiseLock" dual-squelch circuits. Rotary control for squelch adjustment.		
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity		
Max. Output Level	Balanced: +16dBV / 0dBV / - 6dB ; Unbalanced: +10dBV / 0dBV / - 6dB		
Output Connectors	Balanced XLR		Balanced XLR & Unbalanced 6.3 mm (1/4 ")
Output Switch	Single channel output or mixed output		Single channel output
Operation	Manual or PC remote control via optional software		
Power Supply	Built-in 100~240V AC Switching Power Supply		
Dimensions (W x H x D)	482 x 44 x 265 mm (19 x 1.7 x 10.5 ")		210 x 44 x 230 mm (8.3 x 1.7 x 9 ")
Weight	Approx. 3.4 kg (7.5 lbs)	Approx. 3.0 kg (6.6 lbs)	Approx. 1.4 kg (3.1 lbs)
Transmitter	ACT-70H / 70HC Handheld & ACT-70T / 70TC Bodypack		
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.		

ACT-747B Narrowband Quad-Channel True Diversity Receiver**NEW****ACT-727B** Narrowband Dual-Channel True Diversity Receiver**NEW****ACT-717B** Narrowband Single-Channel True Diversity Receiver**NEW****Transmitter**

ACT-72H

ACT-72HC

ACT-72T

ACT-72TC

**Features**

1. EIA Standard 1/2 RU (ACT-717B) & 1 RU (ACT-747B/727B) sturdy metal chassis with good heat dissipation and perfectly shields off spurious interference.
2. UHF PLL synthesized circuit featuring high stability and low spurious emissions is applied
3. Enhanced RF circuitry greatly reduces interference and intermodulation.
4. MIPRO's 3rd generation advanced RF and IF circuitry to improve anti-interference characteristics and increase more interference-free channels.
5. 104 preset channels under 10 groups and Auto Scan allows quick search for an interference-free working channel.
6. World's first ACT™ (Automatic Channel Targeting) provides precise and rapid frequency sync to the transmitters.
7. True diversity receiving for best reception quality. "Pilotone & NoiseLock" dual-squelch circuits prevent interference.
8. Industry's only bright color VFD (vacuum fluorescent display), providing wide angle of view for clear viewing all parameters. Automatic dim for stand-by and lit during performance
9. All controls are intuitive and easily setup via a single rotary knob
10. Adjust reception sensitivity according to the interference warning indicator. Increase sensitivity to extend receiving range; decrease the sensitivity to reduce interference
11. Single channel output or mixed output for switchable three levels. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance.
12. Receiver provides bias for booster where MIPRO antenna systems can be added for extended receiving range and stability
13. PC-control software for real-time controlling and monitoring
14. High SPL, high fidelity for transparent audio performance
15. Switching power supply keeps system with stable performance under 100~240V AC
16. 100% designed and made in Taiwan ensures high quality and value.

Specifications

Model	ACT-747B	ACT-727B	ACT-717B
Channel	Quad	Dual	Single
Chassis	EIA-Standard 19" 1U	EIA-Standard 19" 1/2U	EIA-Standard 19" 1/2U
Display	Color VFD displays Frequency, Frequency Code, RF & Audio Meters, Transmitter Battery Meter, Diversity Signals, Interference Warning Indicator. Programmable User Name, Group, Channel, Squelch Meter, PC Address and Lock Status.		
Frequency Range	UHF 480~934 MHz (country dependent)		
Bandwidth	24 MHz		
Preset Channels	104 selectable channels Group 1~6 > 8 compatible channels Group 7~8 > 12 compatible channels Group 9~10 > 16 compatible channels		
Receiving Mode	True Diversity		
Oscillation Mode	PLL Synthesized		
Stability	± 0.005% (-10~50°C)		
Sensitivity	6 dB μV, at S/N > 80 dB, 40 kHz deviation		
S/N Ratio	> 105 dB(A)		
T.H.D.	< 0.5% @ 1KHz		
Frequency Response	50 Hz~18 kHz, with high pass filter		
Squelch	"Pilotone & NoiseLock" dual-squelch circuit		
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity		
Max. Output Level	Balanced: +16dBV / 0dBV / - 6dB ; Unbalanced: +10dBV / 0dBV / - 6dB		
Output Connectors	Balanced XLR		Balanced XLR & Unbalanced 6.3 mm (1/4")
Output Switch	Single channel output or mixed output		Single channel output
Operation	Manual or PC remote control via optional software		
Squelch Adjustment	Rotary Controller		
Display	VFD Screen		
Power Supply	Built-in 100~240V AC Switching Power Supply		
Dimensions (W × H × D)	482 × 44 × 265 mm (19 × 1.7 × 10.5")		210 × 44 × 230 mm
Weight	Approx. 3.4 kg (7.5 lbs)	Approx. 3.0 kg (6.6 lbs)	Approx. 1.4 kg (3.1 lbs)
Transmitter	ACT-72H/ 72HC Handheld or ACT-72T/ 72TC Bodypack		
Notes	Refer to actual product in the event of product discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.		

ACT-70H Wideband Handheld Transmitter NEW

ACT-72H Narrowband Handheld Transmitter NEW

Patents :
Taiwan Utility M426236
Utility M426237
China Utility ZL201220005942.5
Utility ZL201220005924.7
Utility ZL201220574217.X



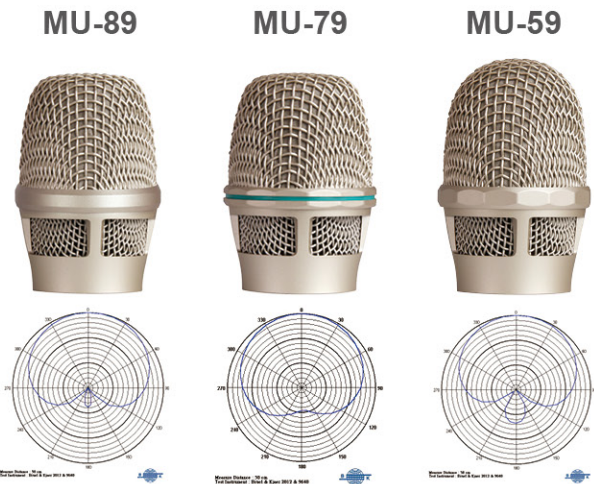
The capsule module is detachable from the upper housing



Interchangeable Capsule Modules

Assembled

Color-coded ID Caps



Features

- 1. Innovatively designed metal housing in MIPRO's aesthetics and ergonomic style.
- 2. Basic sterling gray color with other custom-made colors options.
- 3. Patented design of the integrated grille and battery housing make it easy to unscrew the grille and housing to open the battery compartment and install 2 AA batteries.
- 4. Interchangeable capsule module with premium condenser or dynamic options for easy and fast changeovers.
- 5. The unique multi-layered metal grille protects the capsule against impact, rolling and pop noise and ensures sound clarity.
- 6. Backlit LCD displays each operational information.
- 7. ACT-70H expanded to wider bandwidth for compatibility with wideband receivers.
- 8. ACT-72H for compatibility with narrowband receivers.
- 9. Five selectable gain settings with microphone input sensitivity of 0 dB level.
- 10. Switchable Manual/Disable audio mute options.
- 11. Switchable High/Low power options.
- 12. The bottom housing with built-in high-efficiency antenna features power switch, mute and setup buttons for programmable gain, limiter, low cut and RF output power.
- 13. Patented end-cap covers with colorcoded channel identification clips. Detach the end-cap cover for parameters set-up. Reversible end-cap allows shielding of power on/off or mute switches during performance.

Specifications

Model	ACT-70H	ACT-72H
Bandwidth	72 MHz	24 MHz
Frequency Range	US Band : 482~698 MHz EU Band : 482~790 MHz	480~934 MHz
Oscillation Mode	PLL Synthesized	
Channel Set-Up	ACT Sync	
RF Output Power	10 mW / 50 mW switchable (country dependent)	
Deviation	< ± 40kHz	
Spurious Emissions	<-55dBc	
Gain Setting	+6dB, 0dB, -6dB, -12dB, -18dB (5 settings) 0 dB = input microphone sensitivity	
Maximum SPL	142dB SPL	
Capsules	Interchangeable premium true condenser or dynamic options	
Battery	2 AA Alkaline	
Battery Hours	Up to 12 Hours (Low Power)	
Dimensions (Ø × L)	50 × 258 mm (2 × 10.1 ")	
Weight	Approx. 292 g (10.3 oz), excluding batteries	
Patents & Approvals	Patented. Telecom and safety regulation approved.	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-70HC Rechargeable Wideband Handheld Transmitter

NEW



Patents :
Taiwan Design D115708
China Design ZL200630006688.0
U.S. Invention 7978869

ACT-72HC Rechargeable Narrowband Handheld Transmitter

NEW



Patents :
Taiwan Design D115708
China Design ZL200630006688.0
U.S. Invention 7978869

The rechargeable battery can be replaced easily



Features

- 1. Innovatively designed metal housing in MIPRO's aesthetics and ergonomic style.
- 2. Basic sterling gray color with other custom-made colors options.
- 3. Use 1 rechargeable lithium battery and simply put the microphone back to charger after each use.
- 4. Patented design of the integrated grille and battery housing make it easy to unscrew the grille to open the battery compartment and remove the lithium battery or simply charge the transmitter in the charger.
- 5. Interchangeable capsule module with premium condenser or dynamic options for easy and fast changeovers.
- 6. The unique multi-layered metal grille protects the capsule against impact, rolling and pop noise and ensures sound clarity.
- 7. Backlit LCD displays settings & parameters.
- 8. ACT-70HC expanded to wider bandwidth for compatibility with wideband receivers.
- 9. Five selectable gain settings with microphone input sensitivity of 0 dB level.
- 10. Switchable Manual / Disable audio mute options.
- 11. Switchable High / Low power options.
- 12. The bottom housing with built-in high-efficiency antenna features power switch, mute and setup buttons for programmable gain, limiter, low cut and RF output power.
- 13. Patented end-cap cover with color-coded channel identification clips. Detach the end-cap cover for parameters set-up. Reversible end-cap allows shielding of power on/off or mute switches during performance.

Specifications

Model	ACT-70HC	ACT-72HC
Bandwidth	72 MHz	24 MHz
Frequency Range	US Band : 482~698 MHz EU Band : 482~790 MHz	480~934 MHz
Oscillation Mode	PLL Synthesized	
Channel Set-Up	ACT Sync	
RF Output Power	10 mW / 50 mW switchable (country dependent)	
Deviation	< ± 40kHz	
Spurious Emissions	<-55dBc	
Gain Setting	+6dB, 0dB, -6dB, -12dB, -18dB (5 settings) 0 dB = input microphone sensitivity	
Maximum SPL	142dB SPL	
Capsules	Interchangeable premium true condenser or dynamic options	
Battery	Rechargeable Lithium (18500) X 1	
Battery Hour	Up to 12 hours (low power)	
Dimensions (Ø × L)	50 × 250 mm (2 × 9.8 ")	
Weight	Approx. 276 g (9.7 oz), excluding batteries	
Patents & Approvals	Patented. Telecom and safety regulation approved.	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-70T Wideband Bodypack Transmitter



Features

1. Stable PLL circuits. Synchronized with the receiver's frequency by MIPRO's patented ACT™ function automatically.
2. ACT-70T is compatible with 72 MHz bandwidth ACT-71/72/74 receivers.
3. Industry's smallest bodypack transmitter with sturdy magnesium alloy housing for 2 AA batteries.
4. Antenna, mini power switch and XLR input connector are located on the top of transmitter.
5. Backlit LCD displays group, channel, gain, RF output power, mute, battery status, lock, and error information.
6. Innovatively designed battery cover allows easy access to operate buttons and prevents accidental operation.
7. Mute button with remote-control jack for easy activation of mute function.
8. Can be directly matched to high-low input impedance for microphone and guitar without switching and the input sensitivity is adjustable.
9. Six selectable gain settings.
10. Mini-XLR input with secure screw lock connector for lavalier / headworn mics and guitar.
11. Adjustable belt clip allows wearing transmitter in up or down position.

ACT-70TC Rechargeable Wideband Bodypack Transmitter

NEW



Features

1. Stable PLL circuit. Synchronized with the receiver's frequency by MIPRO's patented ACT™ function automatically.
2. ACT-70TC is compatible with 72 MHz bandwidth ACT-71/72/74 receivers.
3. Industry's smallest bodypack transmitter with sturdy magnesium alloy housing holds one rechargeable lithium battery. Store the transmitter in the battery charger to recharge when not in use.
4. Antenna, mini power switch and XLR input connector are located on the top of transmitter.
5. Backlit LCD displays group, channel, gain, RF output power, mute, battery status, lock, and error information.
6. Innovatively designed battery cover allows easy access to operate buttons and prevents accidental operation.
7. Mute button with remote-control jack for easy activation of mute function.
8. Can be directly matched to high-low input impedance for microphone and guitar without switching and the input sensitivity is adjustable.
9. Six selectable gain settings.
10. Mini-XLR input with secure screw lock connector for lavalier / headworn mics and guitar.
11. Adjustable belt clip allows wearing transmitter in up or down position.

ACT-72T Narrowband Bodypack Transmitter

NEW



Specifications

Model	ACT-70T	ACT-72T
Bandwidth	72 MHz	24 MHz
Housing	Magnesium Alloy	
Frequency Range	US Band : 482~698 MHz EU Band : 482~790 MHz	480~934 MHz
Oscillation Mode	PLL Synthesized	
Channel Set-Up	ACT Sync	
RF Output Power	10 mW / 50 mW switchable (country dependent)	
Deviation	< ± 40kHz	
Spurious Emissions	<-55dBc	
Max. Input Level	0dBV	
Gain Setting	+12 dB, +6 dB, 0 dB, -6 dB, -12 dB, -18dB (6 settings). 0 dB = input microphone sensitivity	
Mute Connector	Optional MJ-70 remote mute switch	
Headworn Microphone	MU-13 / MU-23 / MU-210 / MU-53HN / MU-55HN	
Lavalier Microphone	MU-53L / MU-55L	
Battery	2 AA alkaline	
Dimensions (W × H × D)	63 × 70 × 25 mm (2.5 × 2.8 × 1.0 ")	
Weight	Approx. 78 g (2.7 oz), excluding batteries	
Patents & Approvals	Patented. Telecom and safety regulations approved.	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-72TC Rechargeable Narrowband Bodypack Transmitter

NEW



Specifications

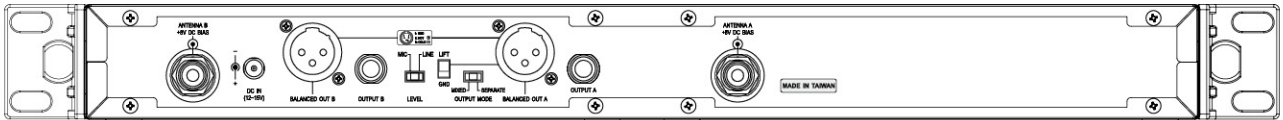
Model	ACT-70TC	ACT-72TC
Bandwidth	72 MHz	24 MHz
Housing	Magnesium Alloy	
Frequency Range	US Band : 482~698 MHz EU Band : 482~790 MHz	480~934 MHz
Oscillation Mode	PLL Synthesized	
Channel Set-Up	ACT Sync	
RF Output Power	10 mW / 50 mW switchable (country dependent)	
Deviation	< ± 40kHz	
Spurious Emissions	<-55dBc	
Max. Input Level	0dBV	
Gain Setting	+12 dB, +6 dB, 0 dB, -6 dB, -12 dB, -18dB (6 settings). 0 dB = input microphone sensitivity	
Mute Connector	Optional MJ-70 remote mute switch	
Headworn Microphone	MU-13 / MU-23 / MU-210 / MU-53HN / MU-55HN	
Lavalier Microphone	MU-53L / MU-55L	
Battery	Lithium (18500) X 1	
Dimensions (W × H × D)	63 × 70 × 25 mm (2.5 × 2.8 × 1.0 ")	
Weight	Approx. 122 g (4.3 oz), excluding batteries	
Patents & Approvals	Patented. Telecom and safety regulations approved. Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	
Notes		

ACT-525B Dual-Channel True Diversity Receiver

NEW



Rear Panel



ACT-515B Single-Channel True Diversity Receiver

NEW



Rear Panel

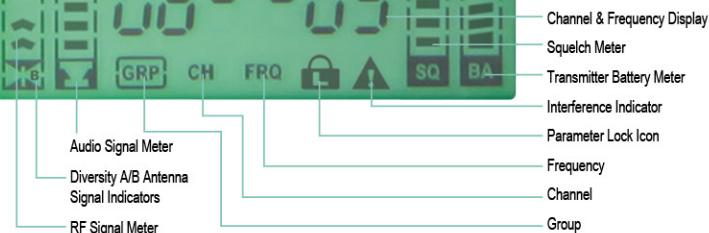
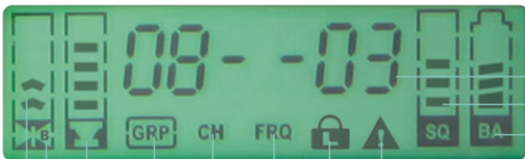


LCD Screen

Standby Mode (red)



Working Mode (green)



Profile

This series adapts dual-tuner true-diversity circuitry and delivers professional performance at affordable prices. Instead of low-cost plastic chassis and LED display, EIA standard metal chassis and dual-color backlit LCD displays are utilized for professional appearance. The new 5-series compatible metal transmitters are ACT-52H handheld and ACT-52T bodypack.

Features

1. ACT-515B is an EIA standard 1/2U true diversity receiver. ACT-525B is an EIA standard 1U true diversity receiver.
2. Dual "PiloTone & NoiseLock" circuits minimize interference.
3. Receiver provides bias voltage for MIPRO antenna systems to enhance reception range and signal stability.
4. Backlit LCD displays group, channel, frequency RF & audio strength, A/B antenna, transmitter battery status, interference warning indicator & panel lock.
5. Backlit LCD is lit in green when signal is received or button pressed. Backlit LCD is lit in red when no signal or button pressed. Easy to identify working mode (green) and standby mode (red) during performance.
6. Balanced XLR / unbalanced 1/4 " audio output jack, output level switch and DC input are on the rear panel.
7. UHF PLL-synthesized technology for enhanced RF stability, lowered spurious emissions and increased frequency agility. One-touch Autoscan for a clear, interference-free channel.
8. 80 preset channels in 24 MHz bandwidth. Built-in 10 groups and group 11 enables 8 user-defined channels can be saved & recalled
9. Adjustable 'SQ' for higher sensitivity to increase receiving distance or lower sensitivity to reduce interference.
10. Adjust SQ when Interference warning indicator is lit for ideal receiver sensitivity level

Transmitter

ACT-52H ACT-32HC ACT-72HC



ACT-52T ACT-32TC ACT-72TC



Specifications

Model	ACT-525B	ACT-515B
Chassis/Channel	EIA Standard 19 " 1U, Dual	EIA Standard 19 " 1/2U, Single
Frequency Range	480~934 MHz	
Bandwidth	24 MHz	
Receiving Mode	True Diversity	
Antenna	Rear Panel. Detachable. 80 preset channels.	
Preset Frequency	Group 1~10: 8 compatible channels in each group. Group 11: Up to 8 user-defined channels can be saved & recalled.	
Oscillation Mode	PLL Synthesized	
Deviation Range	< ± 40kHz	
Sensitivity	6 dB μ V, at S/N > 80 dB	
S/N Ratio	>106dB(A)	
T. H. D.	<0.5% @ 1kHz	
Frequency Response	50 Hz~18 kHz, with high pass filter	
Squelch	"PiloTone & NoiseLock" dual-squelch circuits	
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity	
Output Connectors	Unbalanced 6.3 mm (1/4 ") & Balanced XLR	
Max. Output Level	Unbalanced: +10 dBV / 0 dBV ; Balanced: +16 dBV / 0 dBV	
Power Supply	External AC Adapter, 12~15V DC, 1A	
Dimensions (W × H × D)	420 × 44 × 180 mm (16.5 × 1.7 × 7.1 ")	210 × 44 × 180 mm (8.3 × 1.7 × 7.1 ")
Weight	Approx. 1.65 kg (3.6 lbs)	Approx. 0.85 kg (1.9 lbs)
Transmitter	ACT-52H / 32HC / 72HC / 52T / 32TC / 72TC	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-52B Dual-Channel Diversity Receiver

NEW



Features

- 1. EIA standard 1/2U rack-mountable metal chassis for personal use.
- 2. All controls are intuitive and easily operating via electronic buttons, preventing accidental operation.
- 3. Full-color VFD (vacuum fluorescent display) displays all pertinent parameters on the same screen. Automatic dim for stand-by and lit during performance.
- 4. Each receiver presets 6 groups, and each group presets 8 interference-free channels. A total of 48 preset channels per band.
- 5. World's first ACT™ function provides precise and rapid frequency sync to the transmitters.
- 6. Advanced diversity receiving circuit for the best elimination of signal dropout and the "PiloTone & NoiseLock" dual-squelch circuits prevent noise interference.
- 7. Three switchable output levels. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance
- 8. Receiver provides bias for booster where MIPRO antenna systems can be added for extended receiving range and stability
- 9. Stable performance, easy installation and more non-interference channels ideal for stage and PA applications.

Transmitter

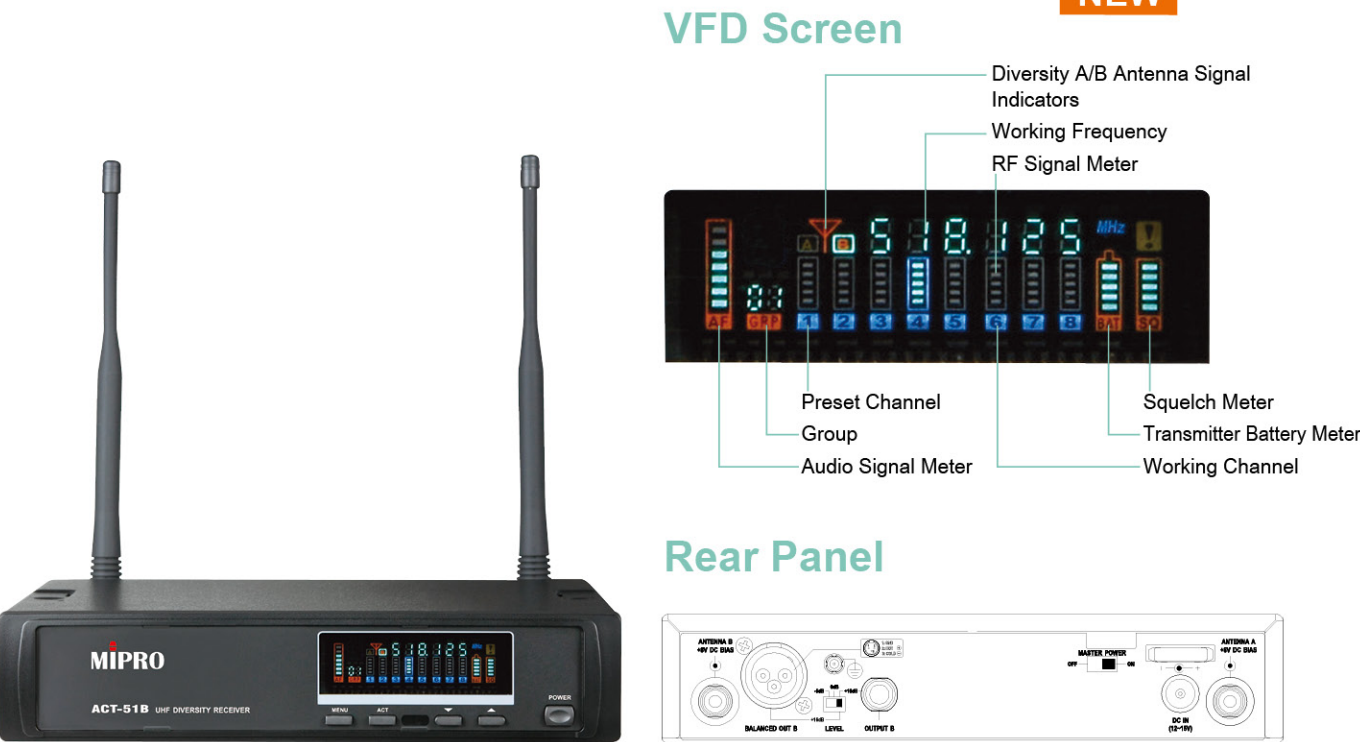


Specifications

Model	ACT-52B	ACT-51B
Channel	Dual	Single
Frequency Range	480~934 MHz	
Antenna	Rear Panel. Detachable	
Preset Frequency	48 selectable channels. 8 compatible channels in Groups 1~6	
Receiving Mode	Diversity	
Oscillation Mode	PLL Synthesized, stability $\leq \pm 0.005\%$ (-10~+60°C)	
Deviation	< $\pm 40\text{kHz}$	
Sensitivity	10 dB μV , at S/N > 80 dB	
S/N Ratio	>105dB(A)	
T.H.D.	<0.5% @ 1kHz	
Frequency Response	50 Hz~18 kHz	
Squelch	"PiloTone & NoiseLock" dual-squelch circuit	
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity	
Max. Output Level	3-Level Switch: +10 dBV / 0 dBV / -6 dBV	
Power Supply	External 100~240V AC Switching Power Supply	
Dimensions (W × H × D)	210 × 44 × 200 mm (8.3 × 1.7 × 7.9 ")	
Weight	Approx. 0.9 kg (2 lbs)	Approx. 0.7 kg (1.5 lbs)
Transmitter	ACT-52H / 32HC / 72HC / 52T / 32TC / 72TC	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-51B Single-Channel Diversity Receiver

NEW



ACT-52H Handheld Transmitter **NEW****Features**

1. Rugged, ergonomically designed metal housing.
2. Unique sturdy multi-layered steel grilles not only protect the capsule against impact, anti-roll and pop noise, but also ensure transparent sound clarity.
3. Interchangeable capsule module with premium condenser or dynamic options for easy and fast changeovers.
4. Proprietary true condenser capsule exhibits high fidelity, wide dynamic range, fast transient responses, good feedback rejection, accurate sound image characteristics, transparent sound quality, and withstands maximum SPL.
5. Proprietary dynamic capsule exhibits low handling & impact noise characteristics.
6. Proprietary lockable silent on/off switch to avoid accidental power-off during performance.
7. Patented, integrated grille and battery housing design enable fast and easy 2 AA battery installation and replacement.
8. Impact-resistant battery compartment holds 2 AA batteries with color-coded rings for easy channel identification on stage.
9. LCD displays working channel, battery status indicator, and error code messages.
10. Low spurious PLL-synthesized technology enhances frequency stability and reliability.
11. One-touch ACT syncs the transmitter and receiver frequency automatically.
12. Maximum 140dB SPL is achieved by the proprietary high dynamic range modulation circuitry.

Specifications

Housing	Metal
Oscillation Mode	PLL Synthesized
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Channel Set-Up	ACT Sync
RF Output Power	10~30mW (country dependent)
Deviation	< ± 40kHz
Spurious Emissions	<-55dBc
Max. Input Level	140dB SPL
Display	LCD displays group, channel, battery status & error codes
Battery	2 AA alkaline
Capsules	Choose from : MU-79 ECM, MU-89 TCM, or MU-59 Dynamic
Dimensions (Ø × L)	50 × 260 mm (2 × 10.2 ")
Weight	Approx. 282 g (9.9 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

ACT-52T Bodypack Transmitter **NEW****Features**

1. Lightweight, compact size with sturdy metal housing.
2. Antenna, mute button and XLR input connector are located on the top of transmitter.
3. Backlit LCD displays various parameters and status.
4. Innovatively designed battery cover allows easy access to operate buttons and prevents accidental operation.
5. Mute button and remote-control jack is equipped for easy activation of mute function.
6. PLL-synthesized technology enhances frequency stability and an interference-free working channel can be synchronized quickly and precisely by MIPRO's patented ACT™ function.
7. Can be directly matched to high-low input impedance for microphone and guitar without switching and the input sensitivity is adjustable.
8. Mini-XLR input connector for quick-lock or screw-lock with lavalier or headworn microphones and guitar.
9. High efficiency, low power consumption and low spurious emissions transmitting circuit for long battery hours of 2 AA batteries.
10. Adjustable belt clip allows wearing transmitter in up or down position.

Specifications

Housing	Composite of various metal
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Oscillation Mode	PLL Synthesized
Channel Set-Up	ACT Sync
Display	LCD displays working band-code, group, channel, frequency, AF input gain, RF output power, mute & lock status, battery status and error codes.
RF Output Power	10 mW / 50 mW (switchable) (country dependent)
Deviation	< ± 40kHz
Spurious	<-55dBc
Max. Input Level	0dBV
Mute Connector	Optional MJ-70 remote mute switch
Battery	2 AA alkaline
Dimensions (W × H × D)	63 × 82 × 22 mm (2.5 × 3.2 × 0.9 ")
Weight	Approx. 98 g (3.5 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

Profile

The innovative ACT-3B Series wireless microphone systems are a culmination of years of extensive design and manufacturing experience. No wiring and adjustment required as PCB, LCD and front panel are integrated. Featuring 1/2U receivers of single-channel ACT-311B & dual-channel ACT-312B and 1U receivers of single-channel ACT-300B & dual-channel ACT-312BT.

EIA standard 19" rack-mountable metal chassis is used instead of cheap plastics. Featuring backlit LCD instead LED display for ease of use and professional appearance. PLL-synthesized technology for RF stability and matched with rugged ACT-32H & ACT-32T transmitters.

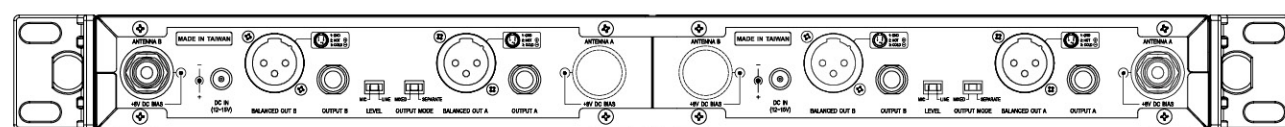
Design and made in Taiwan. Advanced features and functions make it ideal for professional applications with affordable prices.

ACT-312BT Quad-Channel Diversity Receiver

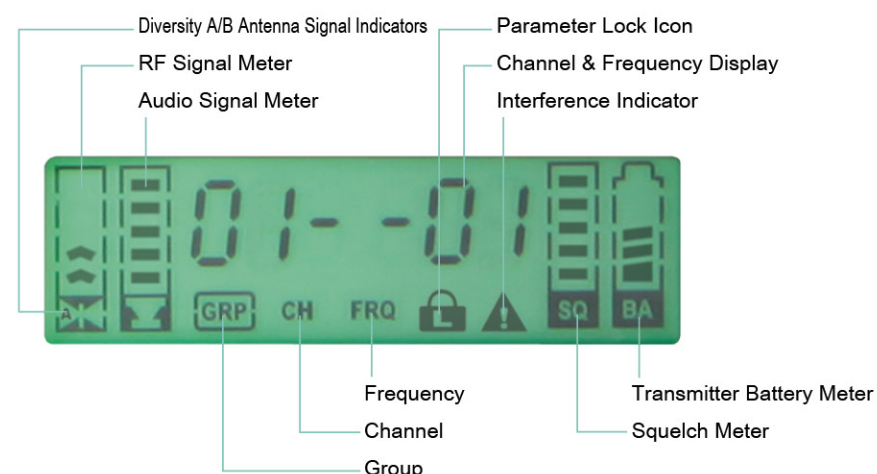
NEW



Rear Panel



LCD Screen

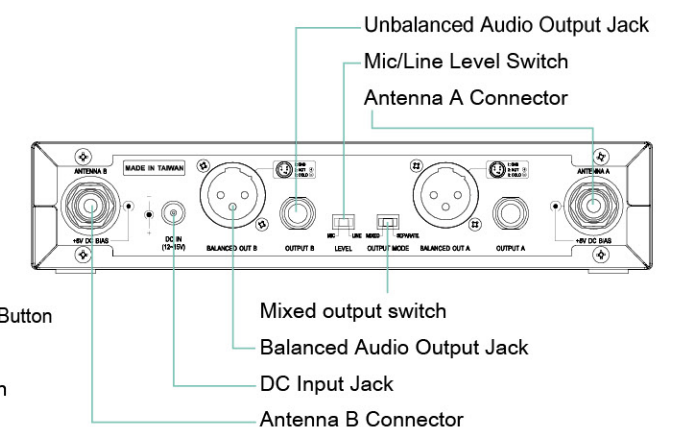


ACT-312B Dual-Channel Diversity Receiver

NEW



Rear Panel



ACT-311B Single-Channel Diversity Receiver

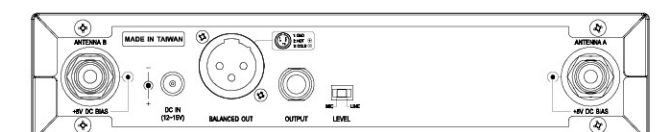
NEW



Transmitter

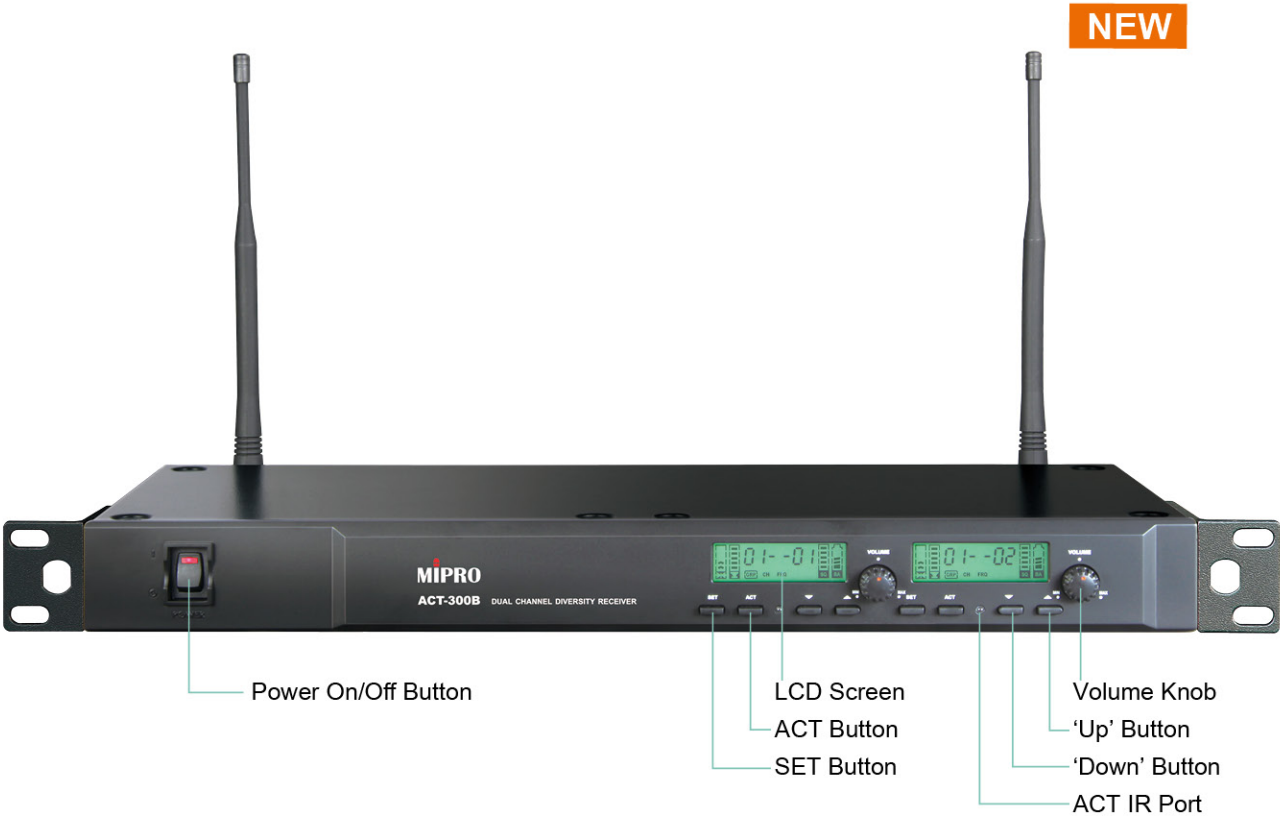


Rear Panel

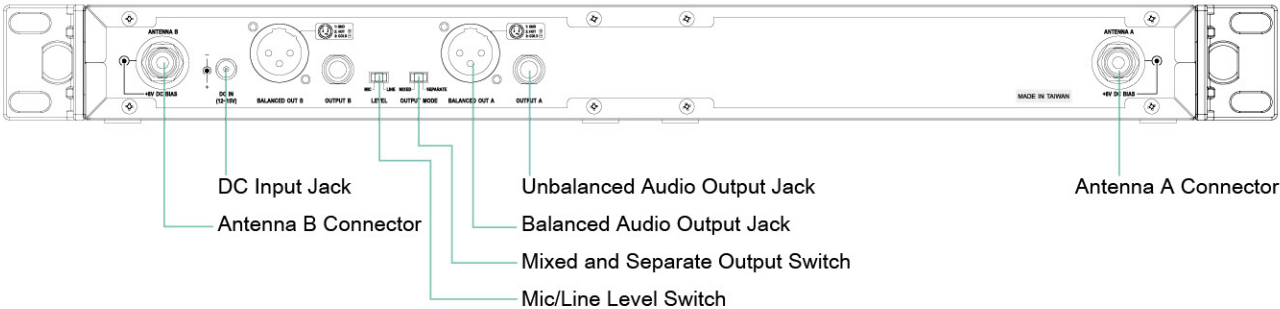


ACT-300B Dual-Channel Diversity Receiver

NEW



Rear Panel



Transmitter



Features

- 1. ACT-311B & ACT-312B are EIA standard 1/2U metal receivers. ACT-300B & ACT-312BT are EIA standard 1U metal receivers.
- 2. Receiver provides bias for booster where MIPRO antenna systems can be added for extended receiving range and stability.
- 3. Backlit LCD displays group, channel, frequency, RF level, antenna selection, AF level, battery level indicator, interference warning indicator, and panel lock indicator.
- 4. A lit green light indicates a working mode when receiver detects an incoming signal or buttons touched. Light dims automatically when receiver is idle for about 10 seconds.
- 5. Balanced XLR / unbalanced 1/4 " audio output jack, output level switch and DC input are on the rear panel. One mixed-output switch is available for dual-channel receivers.
- 6. High efficiency and low spurious PLL circuitry with Auto Scan function. Each receiver is presets with 11 groups, Groups 1~6, 7~10 have 8 & 16 compatible channels respectively. Up to 8 channels in group 11 can be saved and recalled within 961 user-defined frequencies. A total of 112 preset channels per band.
- 7. World's first ACT™ function provides precise and rapid frequency sync to the transmitters.
- 8. Advanced diversity technology for optimum reception range and reduces signal dropouts and the "PiloTone & NoiseLock" dual-squelch circuits prevent noise interference.
- 9. Adjustable 'SQ' for higher sensitivity to increase receiving distance and lower sensitivity to reduce interference.
- 10. Industry's only RF interference warning indicator for ideal SQ level adjustment.
- 11. DC input socket accepts 12~15V power supply.
- 12. Matching ACT-32H handheld and ACT-32T bodypack transmitters.

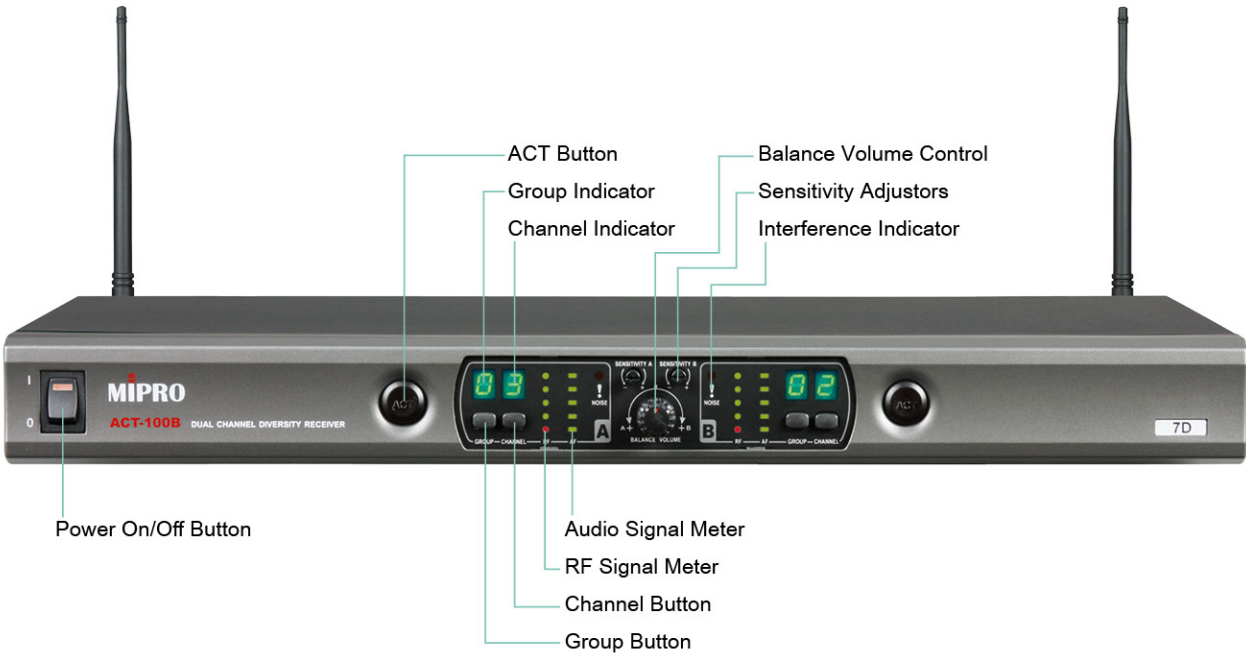
Specifications

Model	ACT-311B	ACT-312B	ACT-312BT	ACT-300B
Channel	Single	Dual	Quad	Dual
Chassis	EIA-Standard 19 " 1/2U		EIA-Standard 19 " 1U	
Receiving Mode	Diversity			
Frequency Range	480~934 MHz (country dependent)			
Bandwidth	24 MHz			
Antenna	Rear Panel. Detachable.			
Preset Channels	112 preset channels. Group 1-6: 8 compatible channels in each group. Group 7-10: 16 compatible channels in each group. Group 11: Up to 8 channels can be saved & recalled. 961 user-defined frequencies in group 11.			
Oscillation Mode	PLL Synthesized, Frequency Stability: ± 0.005% (-10~+60°C)			
Deviation	< ± 40kHz			
Sensitivity	10 dB μ V, at S/N > 80 dB			
S/N Ratio	>106dB(A)			
T.H.D.	<0.5% @ 1 kHz			
Frequency Response	50 Hz~18 kHz			
Squelch	"PiloTone & NoiseLock" dual-squelch circuit			
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity			Each channel has individual volume control
Max. Output Level	2-Level Switch: Line & Mic			
Power Supply	External AC Adapter, 12~15V DC, 1A			
Dimensions (W × H × D)	210 × 44 × 180 mm (8.3 × 1.7 × 7.1 ")		420 × 44 × 180 mm (16.5 × 1.7 × 7.1 ")	
Weight	Approx. 0.8 kg (1.8 lbs)	Approx. 0.95 kg (2.1 lbs)	Approx. 1.75 kg (3.9 lbs)	Approx. 1.4 kg (3.1 lbs)
Transmitter	ACT-32H Handheld, ACT-32T Bodypack or ACT-32HC Handheld, ACT-32TC Bodypack			
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.			

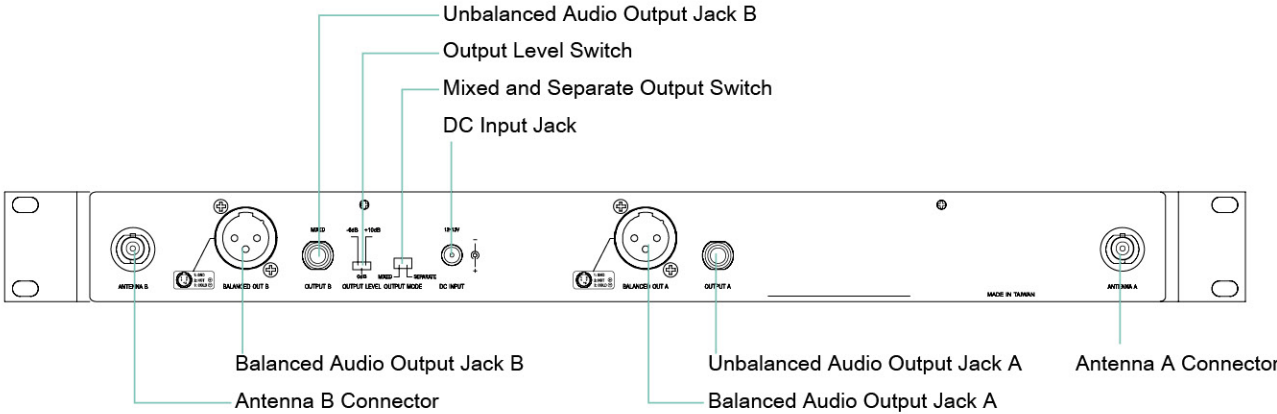
ACT-100B Dual-Channel Diversity Receiver

Patents :
Taiwan Utility M334588

NEW



Rear Panel



Transmitter



Features

1. EIA standard 1U rack-mountable metal receiver equipped with clear LED control panel. Receiver provides bias for booster where MIPRO antenna systems can be added for extended receiving range and stability.
2. Sensitivity adjustor to manage the sensitivity levels and interferences.
3. Industry's only RF interference warning indicator with adjustor.
4. Enhanced RF filter and circuitry for improved anti-interference characteristics and increased compatible systems.
5. 10 groups and a total of 102 selectable frequencies per band. One-touch Autoscan for a clear, interference-free frequency. World's first ACT™ function provides precise and rapid frequency sync to the transmitters.
6. Advanced diversity receiving circuit for the best elimination of signal dropout. "PiloTone & NoiseLock" dual-squelch circuits prevent noise interference.
7. Three switchable output levels. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance and no distortion during loud singing performance.
8. A balanced volume control enables users to adjust the mixed output volume of two wireless microphones.
9. Increased interference-free channels and ideal for large, multiple KTV rooms.

Specifications

Frequency Range	480~934 MHz
Antenna	Rear Panel. Detachable.
Channel	Dual
Preset Channels	102 preset channels. Group 1~6: 8 compatible channels in each group. Group 7~8: 12 compatible channels in each group. Group 9~10: 15 compatible channels in each group.
Receiving Mode	CPU-controlled Diversity
Oscillation Mode	PLL Synthesized, Frequency Stability: ± 0.005% (-10~+60°C)
Deviation	< ± 40kHz
Sensitivity	10 dB μ V, at S/N > 80 dB
S/N Ratio	>106dB(A)
T.H.D.	<0.5% @ 1kHz
Frequency Response	50 Hz~18 kHz
Squelch	"PiloTone & NoiseLock" dual-squelch circuit
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity
Max. Output Level	3-Level Switch: +10 dB / 0 dB / -6 dB
Power Supply	External AC Adapter, 12~15V DC , 1A
Dimensions (W × H × D)	420 × 44 × 204 mm (16.5 × 1.7 × 8 ")
Weight	Approx. 1.7 kg (3.7 lbs)
Transmitter	ACT-32H Handheld, ACT-32T Bodypack or ACT-32HC Handheld, ACT-32TC Bodypack
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

ACT-32H Handheld Transmitter

NEW



ACT-32HR Remote Volume Control Handheld Transmitter (for MA-708 & MA-808 portables)

NEW



Features

1. Extremely rugged, ergonomically designed housing.
2. The unique flat top multi-layered steel grille protects the capsule against impact, rolling, pop noise and ensures sound clarity.
3. The unique flat top multi-layered steel grille for condenser capsules and round top for dynamic capsules protect the capsule against impact, rolling and pop noise. The upper grille is able to be detached easily for cleaning and hygiene practices.
4. Premium true condenser microphone capsule provides high fidelity, wide frequency response, high dynamic range, rapid transient response, clarity and accurate sound reproduction.
5. Proprietary lockable silent on/off switch to avoid accidental power-off during performance.
6. Impact-resistant battery compartment holds 2 AA batteries.
7. Interchangeable colored rings for microphone channel identification on stage.
8. LCD displays group, channel, battery level & error message codes.
9. Low spurious PLL-synthesized technology enhances frequency stability and reliability. Patented "Built-in" antenna design.
10. World's first ACT™ function provides precise and rapid frequency sync to the transmitters.
11. Industry's only digital master control can be adjusted manually or wireless via new ACT-32HR handheld transmitter microphone. (for MA-708 & MA-808 portables)

Specifications

Model	ACT-32H	ACT-32HR
Built-in Volume Control	N/A	Yes. For MA-708 & MA-808 portables installed with MRM-70B or MRM-72B receiver modules
Housing	Rugged Plastic	
Oscillation Mode	PLL Synthesized	
Frequency Range	480~934 MHz	
Bandwidth	24 MHz	
Channel Set-Up	ACT Sync	
RF Output Power	10~30 mW (country dependent)	
Deviation	< ± 40kHz	
Spurious Emissions	<-55dBc	
Max. Input Level	140dB SPL	
Display	LCD displays group, channel, battery status & error codes	
Battery	2 AA alkaline	
Capsules	Standard: MU-79 ECM, Optional: MU-89 TCM or MU-59 Dynamic	
Dimensions (Ø × L)	50 × 233 mm (2.0 × 9.2 ")	
Weight	Approx. 246 g (8.68 oz), excluding batteries	
Patents & Approvals	Patented. Telecom and safety regulations approved.	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

ACT-32HC Rechargeable Handheld Transmitter

NEW

Patents :
Taiwan Design D115708
China Design ZL200630006688.0
U.S. Invention 7978869



The rechargeable battery can be replaced easily



Features

- 1. Robust, lightweight plastic housing.
- 2. Unique sturdy multi-layered steel grilles not only protect the capsule against impact, anti-roll and pop noise, but also ensure transparent sound clarity.
- 3. Interchangeable capsule module with premium condenser or dynamic options for easy and fast changeovers.
- 4. Interchangeable capsule module with premium condenser or dynamic options for easy and fast changeovers.
- 5. Lockable power on/off button ensures no accidental turn-offs during performance.
- 6. Integrated battery compartment with housing for a sturdy built and holds a 18500 rechargeable lithium battery.
- 7. Battery low LED indicator.
- 8. Low spurious PLL-synthesized technology enhances frequency stability and reliability.
- 9. World's first ACT™ function provides precise and rapid frequency sync to the receiver.

Specifications

Housing	Rugged Plastic
Oscillation Mode	PLL Synthesized
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Channel Set-Up	ACT Sync
RF Output Power	10~30 mW (country dependent)
Deviation	< ± 40kHz
Spurious Emissions	<-55dBc
Max. Input Level	140dB SPL
Display	LED Indicator
Battery	1 lithium polymer rechargeable battery 18500
Capsules	Standard: MU-79 ECM, Optional: MU-89 TCM or MU-59 Dynamic
Dimensions (Ø × L)	50 × 248 mm (2.0 × 9.8 ")
Weight	Approx. 249 g (8.8 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

ACT-32T Bodypack Transmitter **NEW****Features**

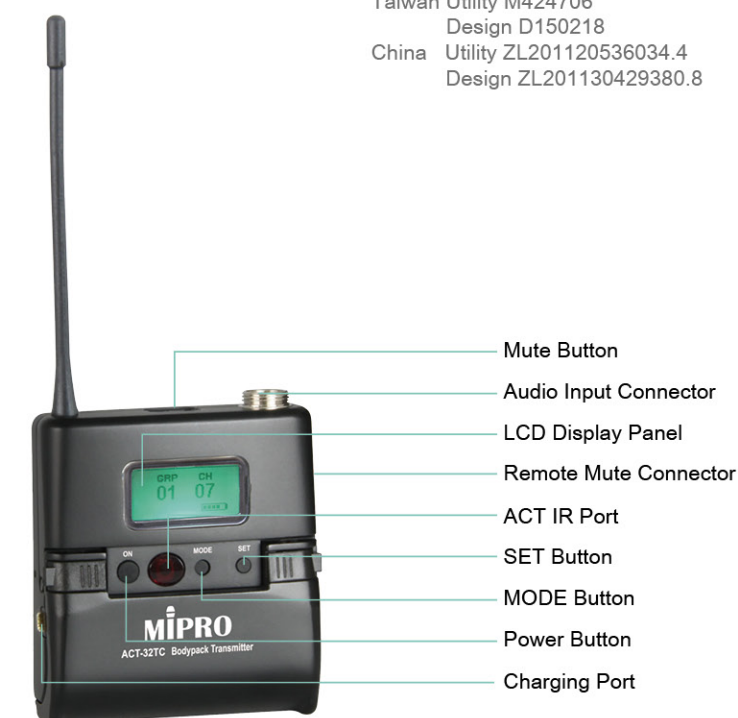
1. Miniature, compact design.
2. Top features mute switch, mini-XLR connector and antenna.
3. Backlit LCD displays various parameters and indicators.
4. Unique battery cover design provides easy access to operational controls and protects against accidental change of settings.
5. Connector for optional MJ-70 remote mute switch cable.
6. Low spurious PLL-synthesized technology enhances frequency stability and reliability. One-touch ACT syncs the transmitter and receiver frequency automatically.
7. Selectable impedance for microphone or guitar/line inputs.
8. 4-pin mini XLR connector is compatible with all MIPRO lavalier, headworn microphones and instrument cable.
9. Highly efficient power consumption circuitry ensures long operating hours from 2 AA batteries.
10. Adjustable belt clip allows wearing transmitter in up or down position.

Specifications

Housing	Rugged Plastic
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Oscillation Mode	PLL Synthesized
Channel Set-up	ACT Sync
LCD Display	LCD displays working band-code, group, channel, frequency, AF input gain, RF output power, mute & lock status, battery status and error codes.
RF Output Power	10 mW / 50 mW switchable (country dependent)
Deviation	< ± 40kHz
Spurious Emissions	<-55dBc
Max. Input Level	0dBV
Mute Connector	Optional MJ-70 remote mute switch
Battery	2 AA alkaline
Dimensions (W × H × D)	63 × 82 × 22 mm (2.5 × 3.2 × 0.9 ")
Weight	Approx. 81 g (2.9 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

ACT-32TC Rechargeable Bodypack Transmitter **NEW**

Patents :
 Taiwan Utility M424706
 Design D150218
 China Utility ZL201120536034.4
 Design ZL201130429380.8

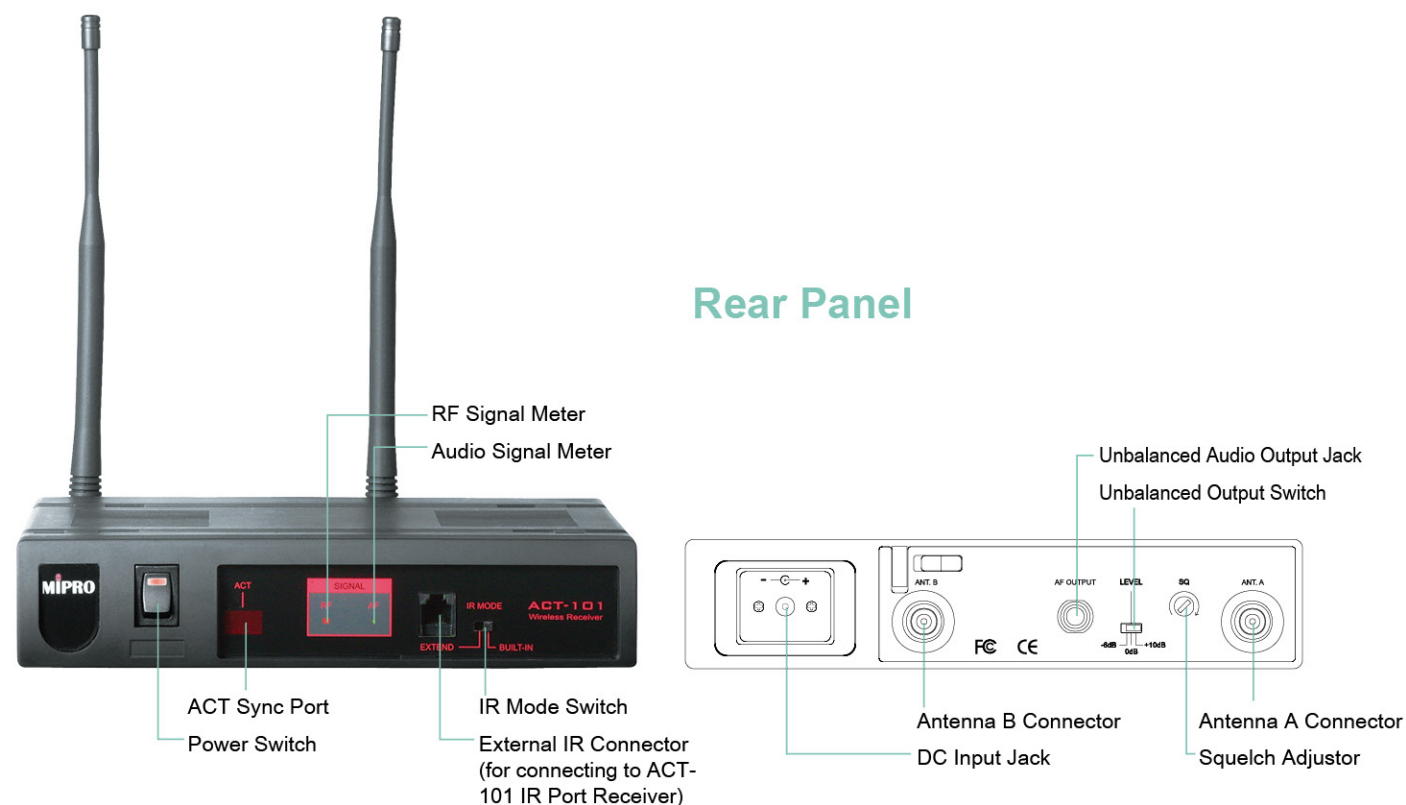
**Features**

1. Miniature, sturdy plastic compact design.
2. Top features mute switch, mini-XLR connector and antenna.
3. Backlit LCD displays various parameters and indicators.
4. Unique battery cover design provides easy access to operational controls and protects against accidental change of settings.
5. Connector for optional MJ-70 remote mute switch cable.
6. Low spurious PLL-synthesized technology enhances frequency stability and reliability. One-touch ACT syncs the transmitter and receiver frequency automatically.
7. Selectable impedance for microphone or guitar/line inputs.
8. 4-pin mini XLR connector is compatible with all MIPRO lavalier, headworn microphones and instrument cable.
9. Powered by a lithium polymer rechargeable battery 18500 for extended operating time.
10. Adjustable belt clip allows wearing transmitter in up or down position.

Specifications

Housing	Rugged Plastic
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Oscillation Mode	PLL Synthesized
Channel Set-up	ACT Sync
LCD Display	LCD displays working band-code, group, channel, frequency, AF input gain, RF output power, mute & lock status, battery status and error codes.
RF Output Power	10 mW / 50 mW switchable (country dependent)
Deviation	< ± 40kHz
Spurious Emissions	<-55dBc
Max. Input Level	0dBV
Mute Connector	Optional MJ-70 remote mute switch
Battery	1 lithium polymer rechargeable battery 18500
Dimensions (W × H × D)	63 × 70 × 25 mm (2.5 × 2.8 × 1.0 ")
Weight	Approx. 102 g (3.6 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

ACT-101 IR Remote-Controlled Single-Channel Diversity Receiver



Features

1. EIA standard 1/2U rack-mountable sturdy metal chassis with built-in single channel receiver module features shielding of spurious interference during performance.
2. Advanced diversity technology for the best elimination of signal dropout and the "PilotTone & NoiseLock" dual-squelch circuits prevent noise interference.
3. 97 built-in UHF frequencies and world first ACT function provides fast and automatic frequency set-up to the transmitters.
4. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance.
5. Switching power supply ensures system stability during 100~240V AC.
6. Ideal for classrooms, meeting rooms, lecture halls and similar environments.

Specifications

Channel	Single	S/N Ratio	>100dB(A)
Receiver Construction	Plastic Panel, Plastic Chassis	T.H.D.	<0.5% @ 1kHz
Assembly	Built-in Fixed Receiver Module	Frequency Response	50 Hz~18 kHz
Display	RF and AF indicator	Max. Output Level	Unbalanced Line-level: -4 dBV/5K Ω
Oscillation Mode	PLL Synthesized, Frequency Stability: $\pm 0.005\%$ (-10~+60 $^{\circ}\text{C}$)	Audio Output Connector	6.3 mm (1/4 ")
Frequency Range	480~934 MHz	Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity
Bandwidth	24 MHz	Squelch	PilotTone
Step	125 kHz	AC Power Supply	External 100-240V AC Switching Power Supply, 12~15V DC, 0.5A
Audio Input	Transmitter accepts Mic or Line input	Dimensions (W x H x D)	210 x 44 x 170 mm (8.3 x 1.7 x 6.7 ")
Operating Mode	Remote controlled with ACT multi-functional transmitter	Weight	Approx. 0.6 kg (1.3 lbs)
Receiving Mode	Diversity	Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.
Sensitivity	6 dB μV , at S/N > 80 dB, 40 kHz		

MT-101ACT Multi-Function Wireless Microphone



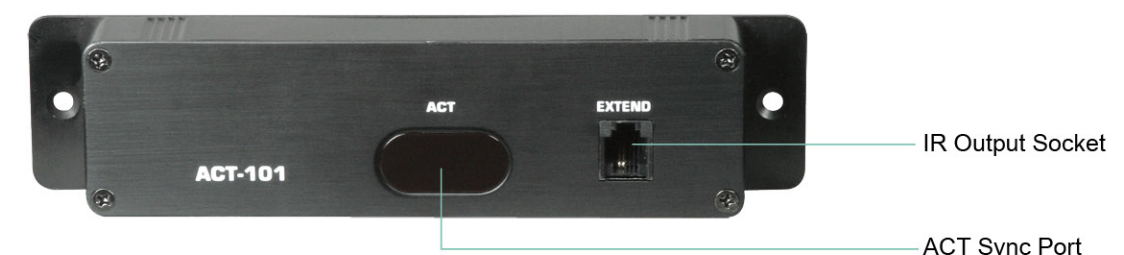
Specifications

Oscillation Mode	PLL Synthesized
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Operating Mode	Remote controlled with ACT multi-functional transmitter
Applications	Classrooms or multi-area installations
Programmable Frequencies	97
Preset Channel	1
Power Supply	Built-in rechargeable battery with battery charger
Channel Set-Up	ACT Sync
Charge Time	Up to 3 hours
Operating Time	Up to 24 hours
Dimensions (W x H x D)	182 x 40 x 32 mm (7.1 x 1.6 x 1.3 ")
Weight	Approx. 150 g (5.3 oz),
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

Features

1. Powerful and clarity sound, easy operation and unsurpassed value.
2. Once programmed, the same MT-101ACT transmitter can be wirelessly remote controlled the power and volume of each receiver.
3. Integrated antenna design prevents the annoyance of antenna's break in use.
4. MT-101ACT can be worn around the neck via a lanyard for easy adjusting a proper distance between the microphone and mouse for the best sound quality.
5. Built-in 3.5mm minijack line input accepts an external headset microphone or other audio sources like CD, MP3 or iPod player.
6. Built-in rechargeable battery can be recharged after use through plugging the transmitter into a special charger. Prevent inconvenience of battery replacement and save expense of replacing batteries.

ACT-101 ACT IR Port Receiver



Features

ACT-101 is an external IR port receiver that can be installed and positioned for improved power on/off reception angles if ACT-101 receiver is installed inside locked, shielded and unfriendly RF environments.

Specifications

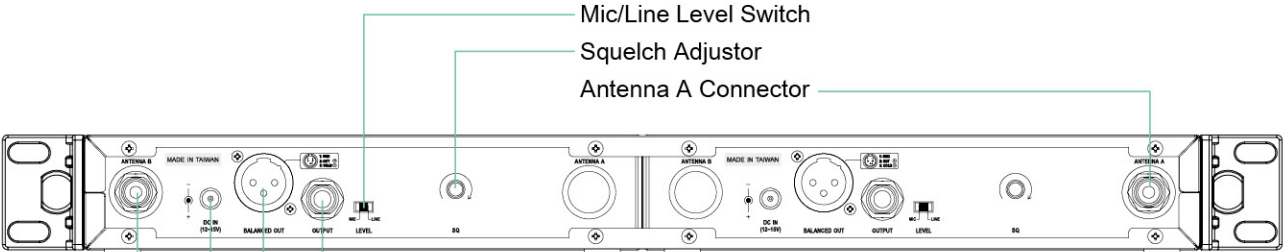
Transmitter	MT-101ACT
Output Socket	6-line telephone
Dimensions (W x H x D)	186 x 43 x 24 mm (7.3 x 1.7 x 0.9 ")
Weight	Approx. 138 g (4.9 oz)

MR-818T Dual-Channel True Diversity Receiver



Power Switch & Volume Control
Interference Indicator
RF Signal Meter
Audio Signal Meter

Rear Panel

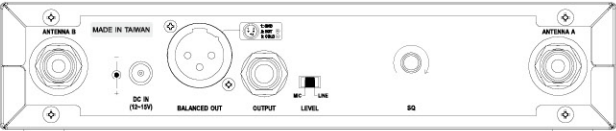


Mic/Line Level Switch
Squelch Adjustor
Antenna A Connector
Unbalanced Audio Output Jack
Balanced Audio Output Jack
DC Input Jack
Antenna B Connector

MR-818 Single-Channel True Diversity Receiver



Rear Panel



Transmitter

MH-80



MT-801a



Features

- 1. EIA Standard 19" metal housings improve heat dissipation and shielding from spurious interference.
- 2. MR-818 is a single-channel true diversity receiver. MR-818T is a dual-channel true diversity receiver.
- 3. PLL synthesized fixed frequency circuit for stability and effortless frequency setup.
- 4. Advanced true diversity technology ensures optimal reception range and eliminates signal drop-outs.
- 5. RF and audio level indicators.
- 6. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance.
- 7. Adjustable 'SQ' for increased or decreased sensitivity level for increased reception range or interference management.
- 8. Industry's only RF interference warning indicator for SQ adjustment.
- 9. Up to 24 compatible channels can be used simultaneously at the same venue (country dependent).
- 10. New MH-80 handheld transmitter features sturdy housing, high-efficiency transmitting circuit, and brilliant sound quality.
- 11. Quick to install and easy to operate with high reliability and affordability.
- 12. Ideal for entry-level stage and PA applications.

Specifications

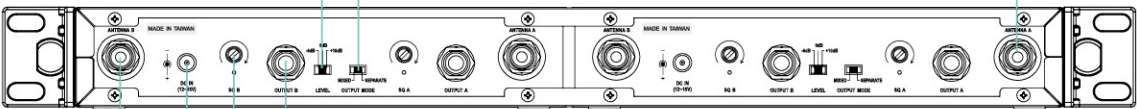
Model	MR-818	MR-818T
Channel	Single	Dual
Chassis	EIA-Standard 19 " 1/2U	EIA-Standard 19 " 1U
Receiving Mode	True Diversity	
Frequency Range	780~930 MHz (country dependent)	
Antenna	Rear Panel. Detachable.	
Oscillation Mode	PLL Synthesized Fixed-Frequency, Frequency Stability ± 0.005% (-10~+60°C)	
Sensitivity	8 dB μ V, at S/N > 80 dB	
S/N Ratio	> 106 dB(A)	
T.H.D.	< 0.5% @ 1 kHz	
Frequency Response	50 Hz~18 kHz	
Squelch	"NoiseLock" squelch circuit	
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity	
Max. Output Level	2-Level Switch: Line & Mic	
Power Supply	External AC Adapter, 12~15V DC, 1A	
Dimensions (W × H × D)	210 × 44 × 180 mm (8.3 × 1.7 × 7.1 ")	420 × 44 × 180 mm (16.5 × 1.7 × 7.1 ")
Weight	Approx. 0.8 kg (1.7 lbs)	Approx. 1.6 kg (3.5 lbs)
Transmitter	MH-80 , MT-801a	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.	

MR-812T Quad-Channel Diversity Receiver



Power Switch
Interference Indicator
RF Signal Meter
Audio Signal Meter

Rear Panel

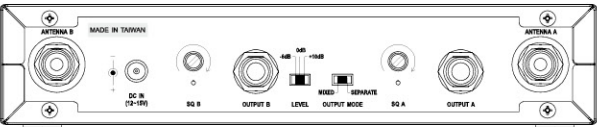


Level Switch
Mixed and Separate Output Switch
Antenna A Connector
Unbalanced Audio Output Jack
Squelch Adjustor
DC Input Jack
Antenna B Connector

MR-812 Dual-Channel Diversity Receiver



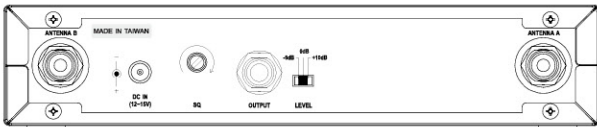
Rear Panel



MR-811 Single-Channel Diversity Receiver

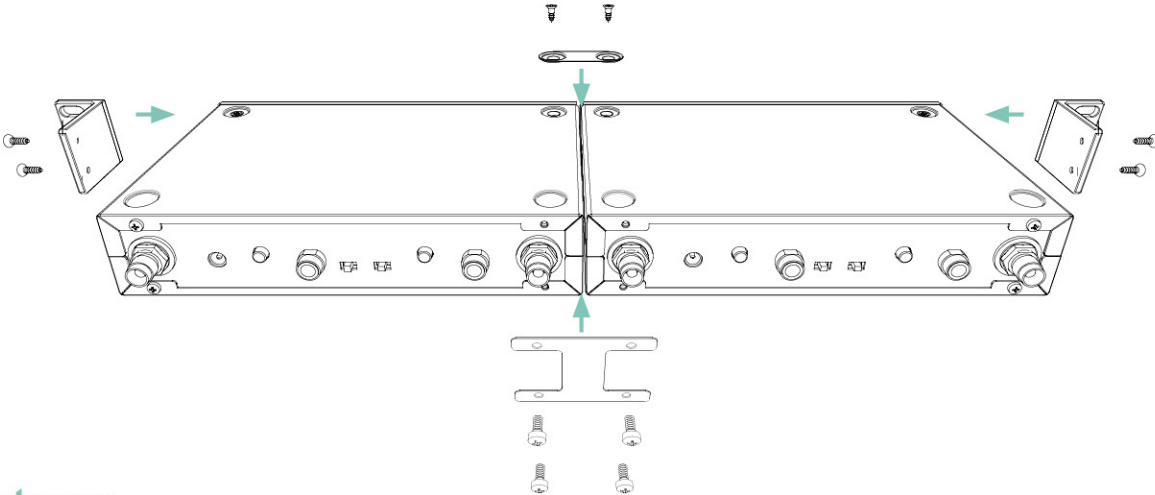


Rear Panel



Accessories for 2 half-rack receivers side by side assembly

Accessories and assembly figures for 2 half-rack receivers ACT-515B, ACT-311B, ACT-312B, MR-818, MR-811



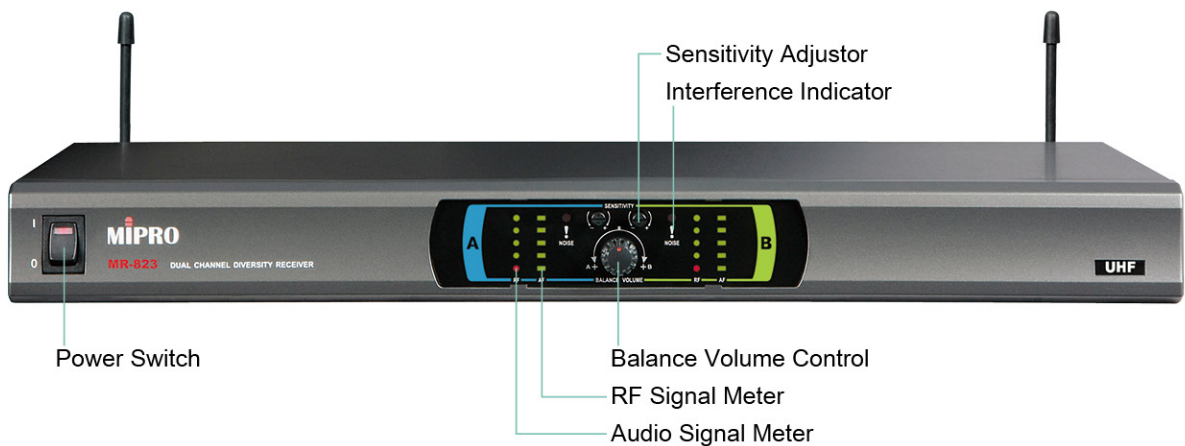
Features

1. EIA Standard metal housings improve heat dissipation and shielding from spurious interference.
2. MR-811 is a 1/2U single-channel diversity receiver. MR-812 is a 1/2U dual-channel diversity receiver.
3. MR-812T is a 1U quad-channel diversity receiver.
4. PLL synthesized fixed frequency circuit for stability and effortless frequency setup.
5. Advanced diversity technology ensures optimal reception range and eliminates signal drop-outs.
6. RF and audio level indicators.
7. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance.
8. Adjustable 'SQ' for increased or decreased sensitivity level for increased reception range or interference management.
9. Industry's only RF interference warning indicator for SQ adjustment.
10. Up to 24 compatible channels can be used simultaneously at the same venue (country dependent).
11. New MH-80 handheld transmitter features sturdy housing, high-efficiency transmitting circuit, and brilliant sound quality.
12. Quick to install and easy to operate with high reliability and affordability.
13. Ideal for entry-level stage and PA applications.

Specifications

Model	MR-811	MR-812	MR-812T
Channel	Single	Dual	Quad
Chassis	EIA-Standard 19 " 1/2U		EIA-Standard 19 " 1U
Receiving Mode	Diversity		
Frequency Range	480~934 MHz (country dependent)		
Antenna	Rear Panel. Detachable.		
Oscillation Mode	PLL Synthesized Fixed-Frequency, Frequency Stability : $\pm 0.005\%$ (-10~+60°C)		
Sensitivity	10 dB μ V, at S/N > 80 dB		
S/N Ratio	> 106 dB(A)		
T.H.D.	< 0.5% @ 1 kHz		
Frequency Response	50 Hz~18 kHz		
Squelch	"NoiseLock" squelch circuit		
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity		
Max. Output Level	3-Level Switch: +10 dB / 0 dB / -6 dB		
Power Supply	External AC Adapter, 12~15V DC, 1A		
Dimensions (W x H x D)	210 x 44 x 180 mm (8.3 x 1.7 x 7.1 ")		420 x 44 x 180 mm (16.5 x 1.7 x 7.1 ")
Weight	Approx. 0.8 kg (1.7 lbs)	Approx. 0.95 kg (2.1 lbs)	Approx. 1.75 kg (3.8 lbs)
Transmitter	MH-80 , MT-801a		
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.		

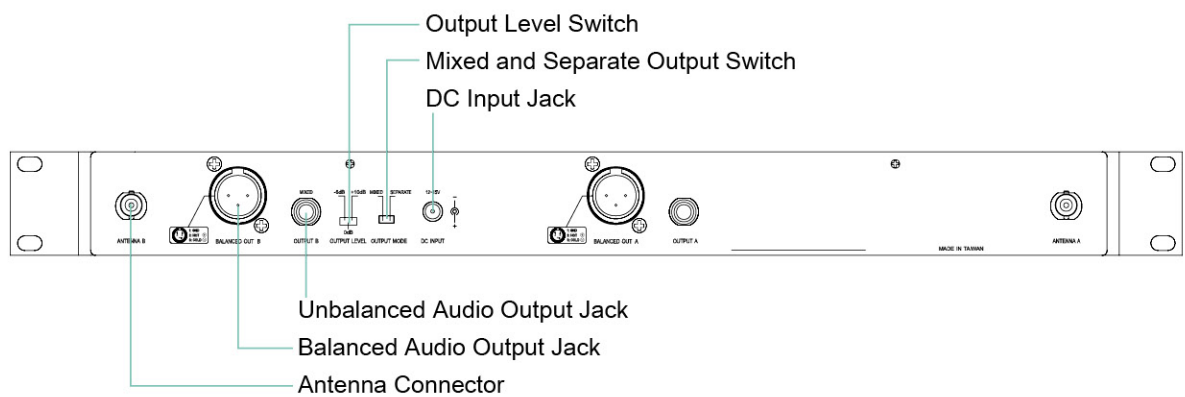
MR-823 Dual-Channel Diversity Receiver



Features

- 1. EIA Standard 19" metal housings improve heat dissipation and shielding from spurious interference.
- 2. PLL synthesized fixed frequency circuit for stability and effortless frequency setup.
- 3. Diversity technology ensures optimal reception range and eliminates signal drop-outs.
- 4. RF and audio level indicators.
- 5. Increased bandwidth from 480-934 MHz.
- 6. Adjustable 'SQ' for increased or decreased sensitivity level for increased reception range or interference management.
- 7. Industry's only RF interference warning indicator for SQ adjustment.
- 8. Output level is accurately pre-adjusted to equal to the microphone capsule sensitivity and ensures optimal performance.
- 9. A balanced volume control enables users to adjust the mixed output volume of two wireless microphones.
- 10. Ideal for entry-level stage and PA applications.

Rear Panel



Specifications

Chassis	EIA-Standard 19" 1U
Frequency Range	480~934 MHz (country dependent)
Receiving Mode	Diversity
Oscillation Mode	PLL Synthesized Fixed-Frequency, Frequency Stability: ± 0.005% (-10~+60°C)
Sensitivity	10 dB μ V, at S/N > 75 dB
S/N Ratio	> 105 dB(A)
T.H.D.	< 0.5% @ 1 kHz
Frequency Response	50 Hz~18 kHz
Squelch	"NoiseLock" squelch circuit
Audio Output Adjustment	Output level accurately pre-adjusted to equal to the microphone capsule sensitivity
Max. Output Level	3-Level Switch: +10 dB / 0 dB / -6 dB
Power Supply	External AC Adapter, 12~15V DC , 1A
Dimensions (W × H × D)	420 × 44 × 204 mm (16.5 × 1.7 × 8 ")
Weight	Approx. 1.7 kg (3.7 lbs)
Transmitter	MH-80 Handheld, MT-801a Bodypack
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

Transmitter

MH-80



MT-801a



MH-80 Handheld Transmitter



Metal Grille
Power Switch
Color-Coded Ring

Features

1. Fixed frequency with PLL synthesized technology ensures no need for frequency setup.
2. Innovatively designed housing combines aesthetics and ergonomic style.
3. Unique sturdy multi-layered steel grilles protect the capsule against impact, anti-roll and pop noise. Interior grille with fine metal mesh instead of sponge foam minimizes pop & breath noises and ensures transparent sound clarity.
4. Patented, integrated grille and battery housing design enable fast and easy 2 AA battery installation and replacement.
5. Sturdy housing with color-coded channel identification rings.
6. Low-battery warning indicator also determines battery freshness.
7. Patented lockable, silent on/off switch.
8. Proprietary quality condenser capsule exhibits high fidelity, wide dynamic range, transparent sound quality, and withstands maximum SPL.
9. Up to 24 hours of continuous operation with 2 AA alkaline batteries.

Specifications

Housing	Plastic
Frequency Range	480~934 MHz
Oscillation Mode	PLL Synthesized Fixed-Frequency
RF Output Power	10~30 mW (country dependent)
Spurious Emissions	< -55 dBc
Max. Input Level	140 dB SPL
Display	Battery-low & Battery is good LED indicator
Battery	2 AA alkaline
Capsules	MU-78b Condenser Capsule
Dimensions (Ø × L)	50 × 233 mm (2.0 × 9.2 ")
Weight	Approx. 245 g (8.6 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

MT-801a Bodypack Transmitter



Antenna
Power Switch
Audio Input Connector

Features

1. Lightweight, compact size with sturdy plastic housing.
2. Fixed frequency with PLL synthesized technology ensures no need for frequency setup.
3. High dynamic range modulation circuit sustains high SPL without distortion.
4. Accepts any MIPRO headworn, lavalier microphones or instrument cable.
5. Up to 24 hours of continuous operation with 2 AA alkaline batteries.

Specifications

Oscillation Mode	PLL Synthesized Fixed-Frequency
Frequency Range	480~934 MHz
RF Output Power	10~30 mW (country dependent)
Spurious Emissions	< -55 dBc
Max. Input Level	0 dBV
Headworn Microphone	MU-13 / MU-23 / MU-210 / MU-53HN / MU-55HN
Lavalier Microphone	MU-53L / MU-55L
Battery	2 AA alkaline
Dimensions (W × H × D)	63 × 105 × 21 mm (2.5 × 4.1 × 0.8 ")
Weight	Approx. 90g (3.2 oz), excluding batteries
Patents & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

VM-Series Violin Microphone Set

MIPRO VM-series violin set is designed after years of collaborating together with professional musicians. It fits snugly, easy to install and remove and protects the expensive instruments from surface scratches. Strategically placed in positions that pick up accurate sound reproduction while minimizing handling and hitting noises during performance. Each set includes the following components.

Patents : Taiwan Utility M431407
China Utility ZL201220047110.X

VM-10H Violin Microphone Clip

VM-10H clip holds VM-10M microphone and is specially designed for violin or viola application.

VM-10M Violin Microphone

The miniature VM-10M omni-directional microphone attaches to VM-10H and clamps onto violins.



VM-10C Violin Microphone Cable

For audio output, connect VM-10M with VM-10C. There are two connecting methods:

- (1) Wireless: Connect VM-10 with any MIPRO ACT series bodypack transmitter for wireless transmission to a matching receiver hooked up to a PA system.
- (2) Wired: Connect VM-10 with MJ-53 condenser microphone adaptor and plug into a PA system.



VT-Series Wireless Violin Set NEW

MIPRO VT Series Wireless Violin set is designed for a cable-free, wireless violin audio performances.

No external connecting cable is required. Simply integrate the miniature, lightweight transmitter to a proprietary violin holder. This holder clamps snugly to violins and is easy to install and remove and protects the expensive instruments from surface scratches. Strategically placed in flexible positions that will not interference during performances. Four optional sets are available.

Patents : Taiwan Utility M431407
China Utility ZL201220047110.X

VT-22 Wireless Violin Set

VT-22 includes VT-20H violin holder and ACT-22T(VT) mini transmitter. It is compatible with any existing ACT-3B, 5B, 7B series receivers.



VT-32 Wireless Violin Set

VT-32 includes VT-20H violin holder and ACT-22T(VT) mini transmitter. It is compatible with ACT-311B or other 3B-series receivers.



VT-52 Wireless Violin Set

VT-52 includes VT-20H violin holder and ACT-22T(VT) mini transmitter. It is compatible with ACT-515B or other 5B-series receivers.



VT-72 Wireless Violin Set

VT-72 includes VT-20H violin holder and ACT-22T(VT) mini transmitter. It is compatible with ACT-717B or other 7B-series receivers.



ST-32 Exclusive Saxophone & Wind Instrument Transmitter

MIPRO ST-32 exclusive saxophone & wind instrument transmitter is designed for a cable-free, wireless saxophone audio performances. Shock absorbing adapter accepts three detachable microphone modules to suit various wind instruments and preferences. Strategically placed in positions that pick up accurate sound reproduction while minimizing handling and hitting noises during performance. No external connecting cable is required. Simply integrate the miniature, lightweight transmitter to a proprietary saxophone holder. This holder clamp snugly to saxophones and is easy to install and remove and protects the expensive instruments from surface scratches.

For wireless saxophone performance, ST-32 requires additional ACT-series receiver.

ST-32 has a built-in high performance rechargeable lithium battery enables up to 6 hours of performance per full charge. A 10 minutes quick charge provides up to 40 minutes usage. It is a good practice to have an additional charged ST-32 as a standby backup transmitter during performance.

Three detachable microphone modules, MU-10, MU-16 or MU-20 fits into ST-32 and can be clamp onto a saxophone with a ST-30H saxophone microphone clip.



Patents :
Taiwan Utility M430691
Utility M465648
China Utility ZL201220047175.4

Specifications

Oscillation Mode	PLL Synthesized
Frequency Range	480~934 MHz
Bandwidth	24 MHz
Channel Set-up	ACT Sync
RF Output Power	10~30 mW (country dependent)
Spurious	<-55dBc
Deviation	< ± 40KHz
Battery	Built-in Rechargeable Lithium Battery
Operating Time	Up to 6 hours. 10 quick charges for up to 40 minutes
Dimensions (W × H × D)	57 × 28 × 20 mm (2.2 × 1.1 × 0.8 ")
Weight	Approx. 38 g (1.3 oz), battery included
Microphone Module	MU-10, MU-16 or MU-20
Accessory	ST-30H Microphone Clip
Receiver	MIPRO ACT Series receivers
Patent & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

ST-30H Saxophone Microphone Clip



SM-30M Saxophone Microphone



SM-30M+SM-20H+SM-10C+ACT-32T

Receivers

STR-Series Wireless Saxophone & Wind Instrument Set

ST-32 wireless transmitter is compatible with ACT series receivers in three configurations options: STR-32, STR-52 or STR-72. When ST-32 is strategically placed in positions it enable pick up of accurate sound reproduction.

STR-32 Wireless Saxophone & Wind Instrument Set

Affordable Wireless Set: ST-32 with ACT-311B.



STR-52 Wireless Saxophone & Wind Instrument Set

Stage Wireless Set: ST-52 with ACT-515B.



STR-72 Wireless Saxophone & Wind Instrument Set

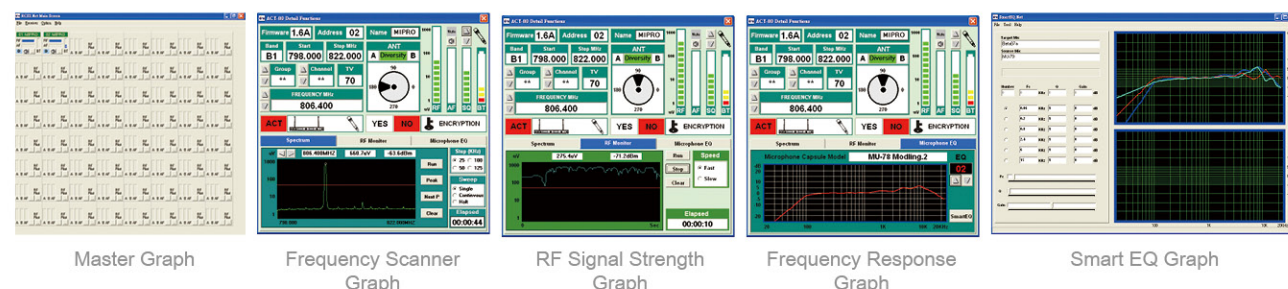
Professional Stage Wireless Set: ST-32 with ACT-717B.



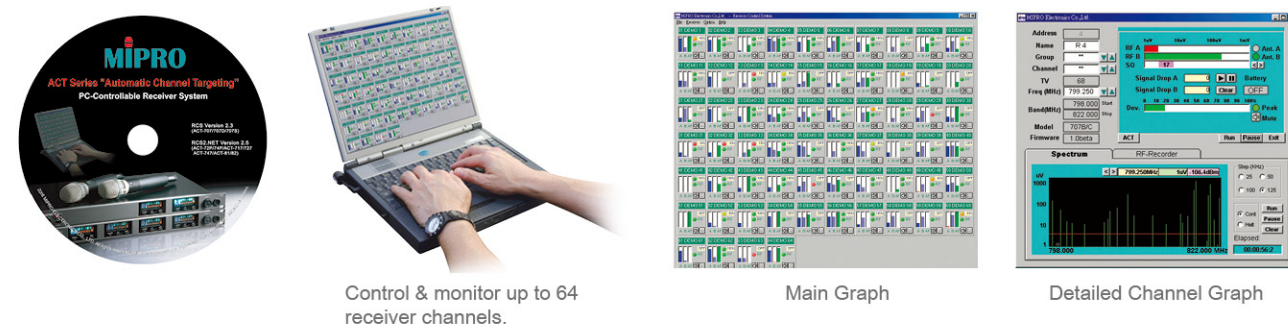
Specifications

Model	STR-32	STR-52	STR-72
Compatible Receiver	ACT-3B Series	ACT-5B Series	ACT-7B Series
Compatible Transmitter	ST-32		
Note	See compatible receivers for technical specifications.		

ACT-8D Digital Receivers PC Management Software



ACT-707SD Analog Receivers PC Management Software



Features

This software is an advanced and user-friendly PC interface management program. The interface uses a MIPRO DVU USB connector or DVJ RS-232 connector to link an IBM-compatible PC to receiver. Real time monitored, remote controlled up to 64 receiver modules simultaneously up to 300 meters away from PC. The management software has a built-in high performance spectrum analyzer allows direct setup of non-interference channels and monitors the wireless environment for all operating channels and interference signals.

The software is also capable of monitoring transmitter battery status, AF/RF & Antenna A/B strength. Features like signal dropouts recording system where history of signal path can be reviewed for analysis, real-time program editing, multi-function and status display are also included for your convenience.

MIPRO DVU Network Connection



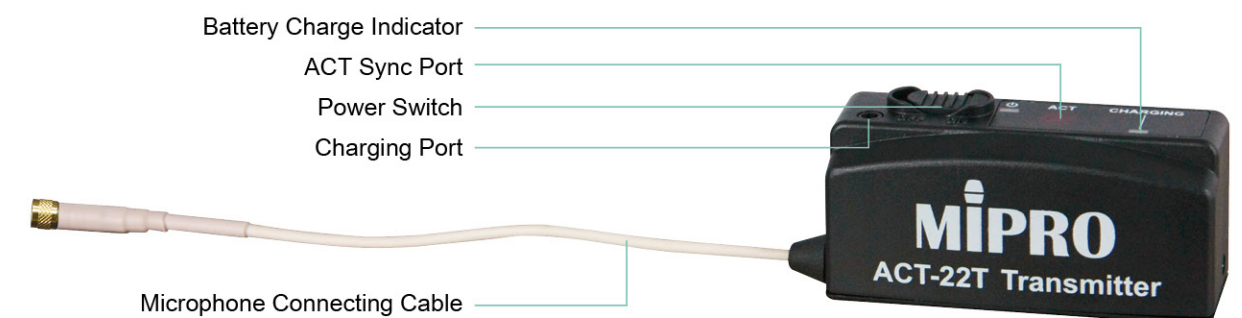
MIPRO DVJ Network Connection



Network Cable



ACT-22T Miniature Headworn Transmitter NEW



Profile

MIPRO introduces ACT-22T, a compact, miniature transmitter. It becomes a complete freedom of mobility when connected with a headworn microphone with no bodypack and no cable. This true wireless solution offers a hands-free operation without cable entanglement and poor connection problems.

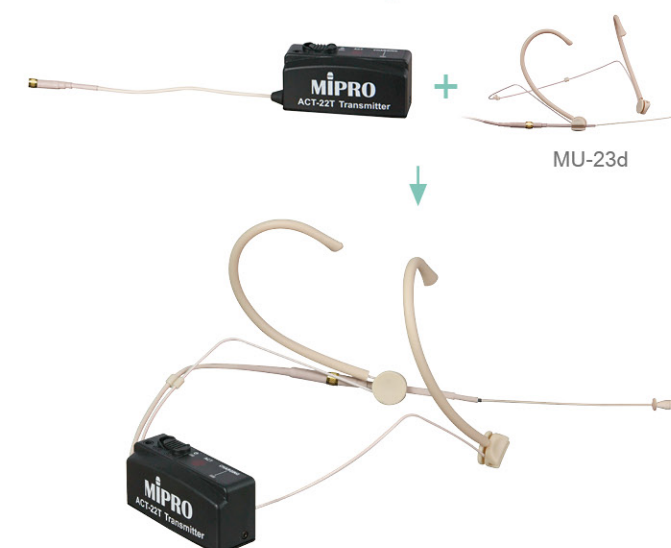
The ACT-22T utilizes PLL synthesized technology for increased RF stability and packed in a lightweight, miniature housing so transmitter can rest comfortably and secure behind the head of the performer for an unobtrusive view.

Featuring built-in rechargeable lithium battery with a quick charger for extended battery hours and patented ACT sync enables fast and easy transmitter setup from any MIPRO receivers.

ACT-22T can be connected to MU-210d or MU-23d headworn microphone or VM-10M instrument microphone. Coupled with an anti-scratch device, it can be attached to percussion, string and wind musical instruments for wireless audio amplification.

ACT-22T is easy to use and ideal for education, theater, aerobics/fitness, houses of worship applications.

Assembled with MU-23d Headworn Microphone



Specifications

Oscillation Mode	PLL Synthesized
Frequency Range	480~934 MHz (country dependent)
Bandwidth	24 MHz
Channel Set-up	ACT Sync
RF Output Power	10~30 mW (country dependent)
Spurious	< -55 dBc
Battery	Built-in Rechargeable Lithium Battery
Operating Time	Up to 6 hours
Matching Headset Mics	MU-23d / MU-210d
Dimensions (W x H x D)	57 x 28 x 20 mm (2.2 x 1.1 x 0.8 ")
Weight	Approx. 38 g (1.3 oz), rechargeable battery included
Patent & Approvals	Patented. Telecom and safety regulations approved.
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

Interchangeable Microphone Capsule Modules


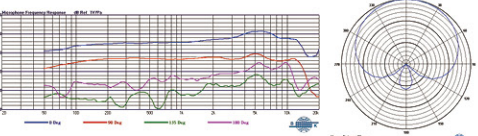
MU-90 is a new premium true condenser microphone capsule module from MIPRO. CNC-lathed copper unit and multi-layered anti-pop metal grille and it features full-range superb directionality, high-fidelity, wide frequency response, high dynamic range, rapid transient response, low feedback and low handling noise and accurate sound reproduction characteristics.

MU-59 is a premium dynamic capsule module with steel-made air chamber and multi-layered anti-pop metal grille and it features superb directionality, high-fidelity, wide frequency response, high dynamic range and low feedback characteristics.

MU-90

True Condenser Microphone Capsule


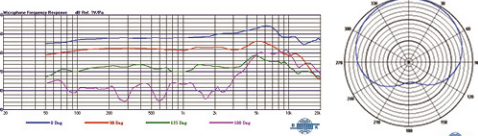
Suitable for any MIPRO handheld transmitters



MU-79

Electret Condenser Microphone Capsule


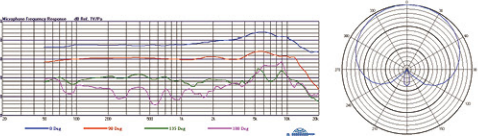
Suitable for any MIPRO handheld transmitters



MU-89

True Condenser Microphone Capsule


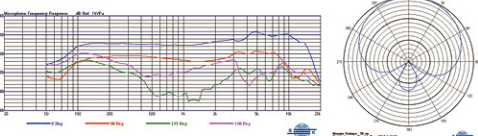
Suitable for any MIPRO handheld transmitters



MU-59

Professional Dynamic Microphone Capsule

Suitable for any MIPRO handheld transmitters



Patents :
Taiwan Utility M403863
Utility M408201
China Utility ZL201020608625.3
Utility ZL201120072749.9
Germany Utility 202011000597.6

Patents :
Taiwan Utility M449419

ECM Capsule Module

Available in MU-10, MU-16 and MU-20 detachable capsule modules. It is compatible with ST-32 saxophone and wind instrument transmitter to suit various wind instruments and preferences. When ST-32 is strategically placed in positions it enables pick up of accurate sound reproduction.

The three capsule modules are newly developed ECM capsule modules featuring full-range superb directionality, wide frequency response, high dynamic range, rapid transient response, low feedback and low handling noise characteristics.

MU-10

ECM Capsule Module

Suitable for Musical Instrument Mic Transmitter



MU-16

ECM Capsule Module

Suitable for Musical Instrument Mic Transmitter



MU-20

ECM Capsule Module

Suitable for Musical Instrument Mic Transmitter



MM-202C NEW
MM-202
MM-202B
Gooseneck Microphone



MM-202A Gooseneck Microphone



MM-202S Gooseneck Microphone



MM-202P Gooseneck Microphone

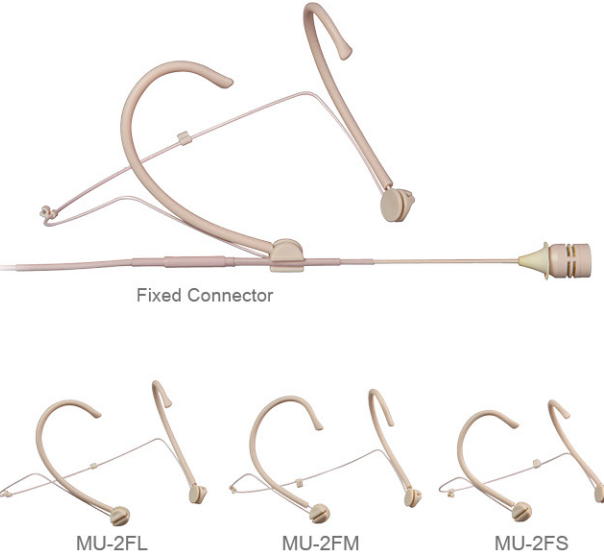


- Features
- 1. Ultra slim profile design for podiums, pulpit and lectern applications.
 - 2. Proprietary microphone mount design allows 110° up/down and 300° left/right angle adjustments.
 - 3. Shock isolation mount design minimizes handling and vibration noise.
 - 4. Multi-layered microphone grill minimizes pop noise.
 - 5. Can be connected to MJ-53 Condenser Microphone Adaptor and provides with 48V phantom power and used as a desktop gooseneck microphone.
 - 6. Unmatched high fidelity sound reproduction.
 - 7. MM-202P is designed to fit MTG-100T or MTG-100Ta digital miniature transmitter and used as a handheld microphone for either tour guides or language interpretation applications.

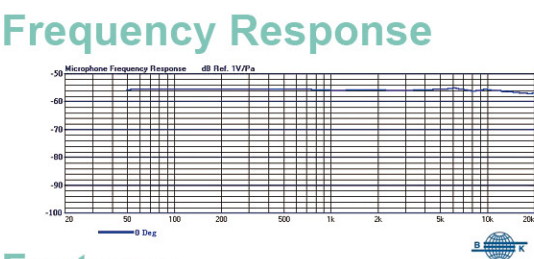
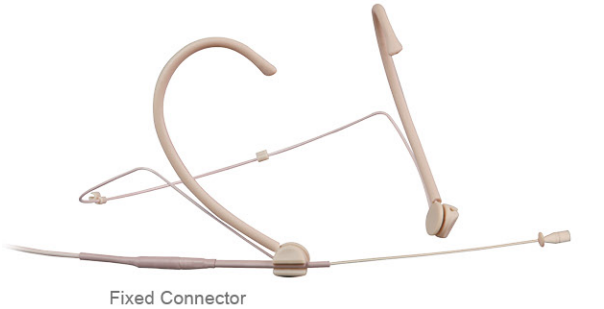
Specifications

Model	MM-202C	MM-202	MM-202B	MM-202A	MM-202S	MM-202P
Capsule Module	10 mm Ø uni-directional condenser microphone					
Frequency Response	50Hz~18kHz					
Sensitivity	-46 ± 3dBV/Pa (0dB=1V/Pa)					
Max. SPL	142dB(Typical , 1%THD)					136dB(Typical , 1%THD)
Plug	TA4F 4 PIN					3.5 mm Ø mini jack
Color	Black					
Length	600 mm (23.6 ")	470 mm (18.5 ")	370 mm (14.5 ")	130 mm (5.1 ")	130 mm (5.1 ")	136 mm (5.3 ")
Weight	Approx. 38 g (1.3 oz)	Approx. 36 g (1.3 oz)	Approx. 34 g (1.2 oz)	Approx. 27 g (1 oz)	Approx. 27 g (1 oz)	Approx. 22 g (0.8 oz)
Note	Refer to actual product in the event of product description discrepancy.					

MU-210
Dual-Sided Headworn Microphone

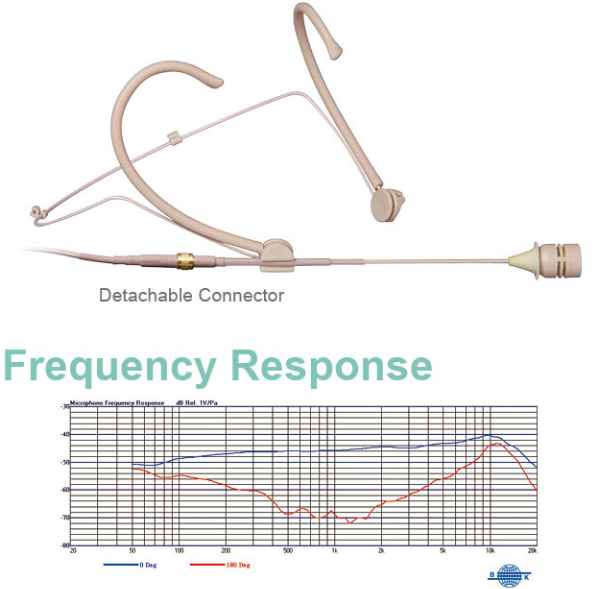


MU-23
Dual-Sided Headworn Microphone

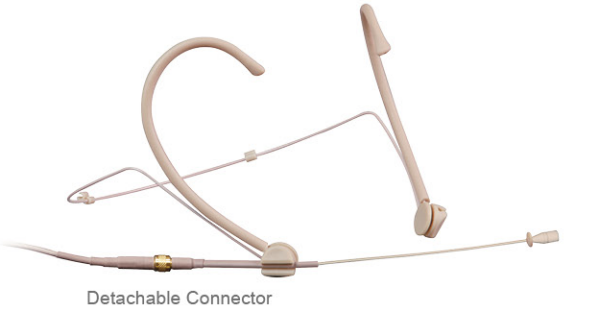


- Features
- 1. Compact ear-hook design for a secure, ultra comfortable fit.
 - 2. Supplied in three ear-hook sizes for ideal fit.
 - 3. Detachable boom can be worn on left or right & detached for replacement or servicing.
 - 4. MU-210/210d features a 10mm uni-directional capsule.
 - 5. MU-23/23d features a 3mm omni-directional capsule.
 - 6. Resistant to moisture, perspiration and salts.
 - 7. Detachable or fixed microphone boom options.
 - 8. Soft yet flexible thin boom bends 120 ° and holder can be height rotated for an ideal fit.
 - 9. Ideal for speech and vocal applications.

MU-210d
Dual-Sided Headworn Microphone



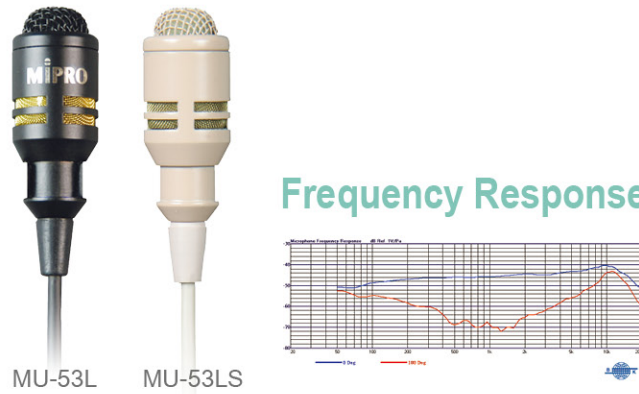
MU-23d
Dual-Sided Headworn Microphone



Specifications

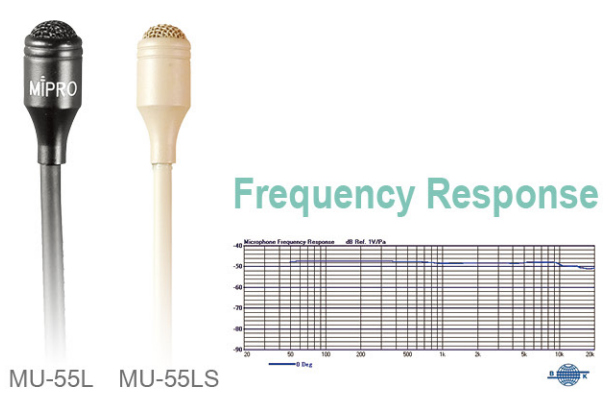
Model	MU-210 / MU-210d	MU-23 / MU-23d
Capsule Module	10 mm Ø uni-directional condenser microphone	3 mm Ø omni-directional condenser microphone
Frequency Response	50 Hz~18 kHz	40 Hz~20 kHz
Sensitivity	-46 ± 3 dBV/Pa (0dB=1V/Pa)	-56 ± 3 dBV/Pa (0dB=1V/Pa)
Max. SPL	142 dB (1%THD typical)	138 dB (1%THD typical)
Microphone Holder	Can be installed right or left side.	
Plug	4-pin mini XLR (screw-lock)	
Color	Beige	
Cable Length	150 cm (59.1 ")	
Weight	Approx. 27 g (1.0 oz)	Approx. 22 g (0.8 oz)
Note	Refer to actual product in the event of product description discrepancy.	

MU-53L / MU-53LS
Uni-Directional Lavalier Microphones



- Features
- 1. MU-53 features high dynamic range characteristic and sustains up to 142 dB SPL with 1% T.H.D.
 - 2. Miniature MU-55 is inconspicuous, lightweight and waterproof.
 - 3. Supplied with 4-pin mini XLR and fits all MIPRO bodypack transmitters.
 - 4. Featuring a smooth, warm, natural sound.
 - 5. Available in black or beige colors.
 - 6. Ideal for theater, houses of worship and educational applications.

MU-55L / MU-55LS
Omni-Directional Lavalier Microphones



Specifications

Models	MU-53L / MU-53LS	MU-55L / MU-55LS
Capsule Module	10 mm Ø uni-directional condenser microphone	4.5 mm Ø omni-directional condenser microphone
Frequency Response	50 Hz~18 kHz	40 Hz~20 kHz
Sensitivity	-46 ± 3 dBV/Pa (0dB=1V/Pa)	-49 ± 3 dBV/Pa (0dB=1V/Pa)
Max. SPL	142 dB (Typical , 1%THD)	135 dB (Typical , 1%THD)
Plug	4-pin mini XLR or TA4F	
Color	Black or Beige	
Cable Length	150 cm (59 ")	
Weight	Approx. 19 g (0.7 oz)	Approx. 14 g (0.5 oz)
Note	Refer to actual product in the event of product description discrepancy.	

MJ-53 Condenser Microphone Adaptor

MJ-53 enables condenser microphone with mini XLR plug to connect directly to the mixer input which has XLR jack and provides 12~48V DC phantom power. High output impedance of a condenser microphone will be transformed to low output impedance at about 200 Ohms.

- Features
- 1. Balanced OP amplifier for wide frequency response.
 - 2. Suitable for any mixer input due to constant output impedance.
 - 3. High S/N ratio prevents noise interference at long distance transmission.
 - 4. High dynamic range ensures accurate output level.
 - 5. No overload distortion under high SPL input.
 - 6. Mini XLR connector for input and XLR connector for output. Belt clip for easy wearing.
 - 7. Rugged metal housing ensures a long operating life.

Specifications

Frequency Response	80 Hz (-3 dB) ~ 20 kHz (0 dB) @ 94 dB SPL
Output Impedance (Balanced)	200 Ohms @ 1V/1 kHz
Max. Output Voltage	2.52 V @ 1% THD 1 kHz
Dynamic Range	120 dB (A-weighting)



Power Supply	Phantom Power : 12~48V DC Current Drain : 2.0 mA
Dimensions (Ø × L)	19 × 902 mm (0.7 × 35.5 ")
Weight	Approx. 72 g (2.5 oz)
Note	Refer to actual product in the event of product description discrepancy.

TC-18 Transmitter Shielding Case

Profile

TC-18 is an important accessory case for large-scale wireless microphone applications. The main function is the storage of up to 18 powered-on handheld or bodypack transmitters and acts as an ideal shielding solution for preventing intermodulation interference and ensures reliable RF transmission during performance.



Features

1. Rugged and durable carrying case.
2. Specialized shielding materials protects the transmitters from scratches and impact damage.
3. Ideal shielding solution prevents intermodulation interference and ensures reliable RF transmission during performances.
4. Divided storage spaces for fast and easy access to transmitters.

Specifications

Storage	Up to 18 handheld or bodypack transmitters
Intermodulation Attenuation	> 40 dB
Dimensions (W × H × D)	52 × 37 × 30 cm (20 × 14.6 × 11.8 ")
Weight	12.6 kg (27.8 lbs)

Microphone Stand

MS-80 Microphone Tripod Stand



Features

Robust design with stable base. Heights and angles adjustable. Durable, dependable performance.

MS-50 Desktop Mic Stand



MS-20 Desktop Mic Tripod

MD-20 is required for operation.



MD-20 Microphone Holder

MS-20 or any microphone stand is required for operation.



Other Accessories

FB-10 Rack Mount Kit

Fits 1 MR-823, MR-812T, MR-818T receiver alone.



FB-30 Front Antenna Rack Mounting Kit

Fits 1 MR-823, MR-812T, MR-818T receiver alone.



FB-70 Front-to-Rear Antenna Kit



FB-71 Rack Mount Kit

Fits 1 ACT-311B, ACT-312B, ACT-515B, ACT-51B, ACT-52B, ACT-71, ACT-818 receiver alone.
Fits 1 MR-811, MR-812, MR-818 receiver alone.
Fits 1 MI-808T, MI-909T, MT-92A, MTS-100, AD-90S, AD-90A, AD-808.



FB-72 Rack Mount Kit

Fits 2 ACT-71, ACT-51B, ACT-52B, ACT-311B, ACT-312B receivers side-by-side.
Fits 1 ACT-300B, ACT-312BT, ACT-515BT, ACT-828 receivers.



FBC-71 Rear-to-Front Cables

Fits FB-71, FB-72, FB-10 rack mount kits (1-pair).



MU-40G Instrument Cable

Fits all MIPRO bodypack transmitters. For guitar or bass.



MJ-70 Remote Mute Switch

Fits ACT-32T, ACT-32TC, ACT-52T, ACT-70T, ACT-70TC, ACT-72T, ACT-72TC, ACT-80T, ACT-80TC bodypack transmitters.



ASP-10 Neoprene Sports Pouch

Fits all MIPRO bodypack transmitters.



ASP-30 Neoprene Sports Pouch

Fits all MIPRO bodypack transmitters.



RH-77a Multi-Colored Rings

Fits ACT-32H, ACT-32HR, MH-80 handheld transmitters. (set of 10 colors)



RH-87 Multi-Colored Rear Clips

Fits ACT-80H, ACT-80HC, ACT-70H, ACT-70HC, ACT-72H, ACT-72HC handheld transmitters. (set of 10 colors)



SW-20 Foam Windscreens

Fits all MIPRO handheld transmitters. (set of 10 same colors)



PC-11 Controller



BC-100 Wireless Boundary Microphone

Gooseneck Mic Installation



installed with MM-202C/MM-202/202B mic

Boundary Mic Installation



Wireless Mic Installation



Features

1. BC-100 can be installed with MIPRO ACT-32T or ACT-52T bodypack transmitter to form a wireless boundary microphone or connected with any of three gooseneck microphones.
2. Back panel has a balanced XLR connector with switch for external gooseneck or wireless boundary microphone option.
3. Built-in MIPRO ECM (electret condenser microphone) for excellent sensitivity and clear, highly intelligible sound reinforcement.
4. Built-in unidirectional microphone is used as a desktop interface microphone. The BC-100 has accepts optional longer gooseneck MM-202C/ MM-202/ MM-202B longer gooseneck microphones or MM-202A short version.
5. Simply plug the mini XLR into a MIPRO bodypack transmitter connector and insert the transmitter into the back slot for an easy to use wireless conference system.
6. Talk/Mute button provides easy speaking or mute option.
7. Ideal solution for boardrooms and conference centers.

Specifications

Built-in Microphone	Input Microphone Sensitivity : 50 Hz~20 kHz, Uni-directional (hypercardioid) Frequency Response : 50 Hz~20 kHz Maximum SPL : 132 dB SPL (1% T.H.D@1 kHz)
Power Supply	built-in transmitter provides 12-48V DC phantom power
Input Connector	Mini TA4F XLR-4pin (male) x 1
Output Connector	Balanced XLR
TALK/MUTE Button	Mechanical PUSH-HOLD switch
Color	Black
Dimensions (W x H x D)	100 x 55 x 150 mm (4 x 2.2 x 6 ")
Weight	Approx. 170 g (6 oz)
Note	Refer to actual product in the event of product description discrepancy.

MD-101 Bodypack Transmitter Holder Base



Bodypack fitted with MM-202A

Features

1. MD-101 is a holder base for MIPRO bodypack transmitters.
2. Connects to MM-202C, MM-202, MM-202B or MM-202A gooseneck microphones for installation at podiums, lecterns, conference tables.
3. No set-up or power required. Simply insert the bodypack transmitter into the base slot.

Specifications

Dimensions (W x H x D)	92 x 61 x 120 mm (3.6 x 2.4 x 4.7 ")
Weight	221 g (7.8 oz)
Color	Black
Note	Refer to actual product in the event of product description discrepancy.

Wired Microphones

True Condenser Microphones 69

Dynamic Microphones 71



Profile

MM Series wired microphones include two types: condenser microphones and dynamic microphones. Equipped with cardioid microphone capsule, condenser microphones present a clear, crisp and detailed sound that is extremely close to the natural sound, thus it's the ideal choice for capturing vocals and acoustic instruments. Especially ideal for percussion instruments, high-pitched orchestral instruments, and places with low background noises such as concert halls, theaters and recording studios where the best sound quality is desired.

Equipped with hypercardioid microphone capsule, dynamic microphones present a softer, mellower and misty sound quality. Ideal for rock-and-roll singers or outdoor venues that have loud background noises and violent acoustic effects.

Dynamic and Condenser Microphones Comparison Chart

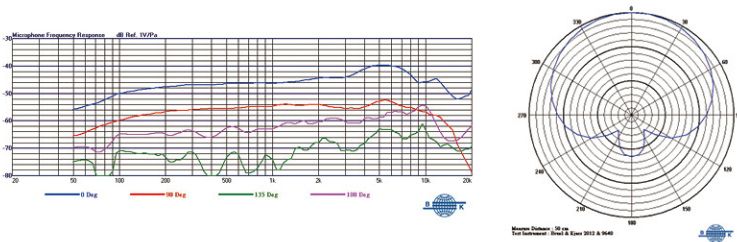
Item	Dynamic Microphone	Condenser Microphone
Design Principle	Based on the principle of an electromagnetic generator, a voice coil is attached to a thin plastic diaphragm in the magnetic field of the magnet. When the diaphragm picks up sound, the voice coil indirectly converts the sound into an electrical signal.	Based on the charging/discharging principle of a capacitor, it employs an extremely thin metal or metal-coated plastic diaphragm. Sound pressure changes a static electric voltage between two poles and converts it directly into an electrical signal.
Diaphragm	A dynamic microphone's diaphragm has to bear the weight of the voice coil, which is a hundred times more than itself, so the diaphragm cannot be too thin. The total weight of its vibration system is 1000 times more than a condenser's.	The diaphragm is 1/10 the thickness and 1/1000 the weight of a dynamic capsule's. Utilizing this extremely thin and light diaphragm to pick up sound pressure directly ensures excellent performance in frequency response, transient response, sensitivity, and touch noise.
Voice Coil	The voice coil is the main component that converts sound pressure on the diaphragm into an electrical signal.	No voice coil is required.
Signal Output	The output is either directly from the voice coil or through a coupling transformer.	The output signal is coupled by vacuum tube or FET.
Frequency Response	Due to the thickness of the diaphragm and heavy weight of the voice coil, the high-frequency response cannot be expanded; moreover, the low-frequency response drops rapidly because the impedance of the voice coil grows weaker as the frequency decreases.	Because the diaphragm is extremely thin and light, it can directly convert sound into signal output. Hence, its frequency response can be expanded from ultra-low frequencies to ultrasonic at a flat and wide response.
Sensitivity	Limited by the thick diaphragm and the number of voice coil turns, sensitivity to weak sounds is compromised.	Diaphragm does not carry any voice coil and is extremely thin; hence, it is very sensitive to even the weakest sound.
Touch Noise	The thick and heavy diaphragm and voice coil make it hard to overcome the touch noise problem, thus adversely affecting sound quality.	Because its diaphragm is extremely light and thin, it has the advantage of extremely low touch noise.
Durability	Since the capsule is large and heavy, it has a high failure rate if accidentally dropped.	The capsule itself is very light, so chances of accidental damage by dropping are very slim.
Dimension & Weight	Large size and heavy weight limits uses.	Advantage of miniature size.
Phantom Power	No phantom power is required.	Phantom power is required
Transient Response	Transient response is slow due to the much heavier diaphragm and voice coil. Thus, the response to the sound is just like a fully loaded truck that responds slowly when accelerating and braking.	Because the diaphragm is very thin and light, the transient response is fast. The sound pickup is just like a sport car that can accelerate and brake very quickly.
Sound Quality	Due to a slow transient response, these capsules present a softer, mellower and misty sound.	With its rapid transient response, these capsules present a clear, crisp and detailed sound that is extremely close to the natural sound.
Applications	Ideal for rock-and-roll club singers or outdoor venues that have loud background noises and violent acoustic effects.	Ideal especially for percussion instruments, high-pitched orchestral instruments, and places with low background noises such as concert halls, theaters and recording studios where the highest sound quality is desired.

MM-90 True Condenser Vocal Microphone

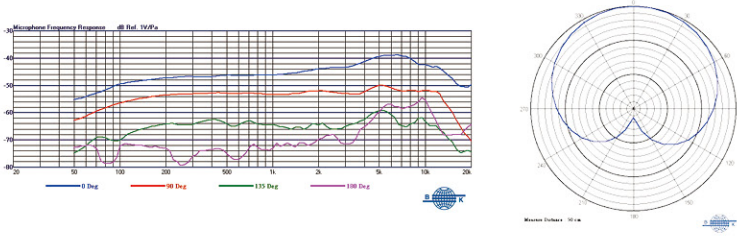
MM-89 True Condenser Vocal Microphone



MM-90 Frequency Response Polar Pattern



MM-89 Frequency Response Polar Pattern



Features

For over a decade, MIPRO wire & wireless condenser handheld microphones provide clear, detailed sound quality and become preference of audio professionals.

MM-90 is fitted with MU-90 capsule module and MM-89 with MU-89 capsule module. The exterior multi-layer metal grille protects the capsule to prevent impact and pop noise. The upper exterior grille is able to be detached easily for cleaning and hygiene practices.

They provide superb directionality and feedback suppression for bright and detailed sound quality. Proprietary capsule suspension design eliminates vibrations and touch noise characteristics for natural sound reproduction.

External 12~48V DC phantom power is required for MM-89 & MM-90 microphone. It's ideal for stage, broadcast, studios and musical hall applications.

Specifications

Housing	Die-cast Zinc Alloy Housing
Directionality	MM-90: Hypercardioid MM-89: Cardioid
Sensitivity	-46 ± 1 dBV / Pa (0dB=1V Open-circuit voltage)
Frequency Response	50 Hz~20 kHz @ 94 dB SPL
Self-Noise	< 22 dB SPL (Typical, A-weighted)
S/N Ratio	> 72 dB @ 94dB SPL (1 Pa)
Max. Input SPL	147 dB (Typical, 1% T.H.D.)
Dynamic Range	125 dB
Power Supply	External phantom power 12~52V DC
Current Consumption	5.6 mA
Output Impedance	200 Ω
Dimensions (Ø × L)	50 × 189 mm (2.0 × 7.4 ")
Weight	Approx. 285 g (10 oz)
Note	Refer to actual product in the event of product description discrepancy.

MM-109/107/105 Hypercardioid Dynamic Microphone

MM-109



MM-107



MM-105



MM-109 Frequency Response



Polar Pattern



MM-107 Frequency Response



Polar Pattern



MM-105 Frequency Response



Polar Pattern



MM-109 Features

- 1. Fitted with interchangeable MU-59 hypercardioid capsule module.
- 2. The exterior multi-layer metal grille protects the capsule to prevent impact and pop noise.
- 3. The upper exterior grille is able to be detached easily for cleaning and hygiene practices.
- 4. Superb directionality. Focuses on the main sound source and minimizes background noise and feedback.
- 5. Soft and mellow sound quality; Rich high- & low-frequency presence.
- 6. Sustains high SPL without distortion.
- 7. Low handling noise.

MM-107 Features

- 1. Fitted with MU-39 hypercardioid capsule module.
- 2. The exterior multi-layer metal grille protects the capsule to prevent impact and pop noise.
- 3. Focuses on the main sound source and minimizes background noise and feedback.
- 4. Soft and mellow sound quality; Rich high- & low-frequency presence.
- 5. Sustains high SPL without distortion.
- 6. Low handling noise.

MM-105 Features

- 1. Uniform hypercardioid pickup pattern.
- 2. Focuses on the main sound source and minimizes background noise.
- 3. Maximum gain-before-feedback.
- 4. Smooth sound quality and wide frequency response.
- 5. Sustains high SPL without distortion.

Specifications

Model	MM-109	MM-107	MM-105
Capsule	MU-59 Dynamic (interchangeable)	MU-39 Dynamic	MU-29 Dynamic
Housing	Die-cast Zinc Alloy		
Directionality	Hypercardioid		
Sensitivity	-54 dBV/Pa (0dB=1V Open-circuit voltage)		-53 dBV/Pa (0dB=1V Open-circuit voltage)
Frequency Response	50 Hz-18 kHz	50 Hz-16 kHz	50 Hz-14 kHz
Output Impedance	400 Ω± 30%		300 Ω± 30%
Dimensions (Ø × L)	51 × 204 mm (2.0 × 8.0 ")	51 × 178 mm (2.0 × 7.0 ")	
Weight	Approx. 348 g (12.3 oz)	Approx. 235 g (8.3 oz)	Approx. 375 g (13.2 oz)
Note	Refer to actual product in the event of product description discrepancy.		

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MTG-100R Digital Receiver (Rechargeable Battery)

Patents :
Taiwan Utility M393932
China Utility ZL201020281127.2
Germany Utility 202010012684.3



MTG-100T Digital Transmitter (Rechargeable Battery)



MTG-100Ra Digital Receiver (AA Battery)

Patents :
Taiwan Utility M393932
China Utility ZL201020281127.2
Germany Utility 202010012684.3



MTG-100Ta Digital Transmitter (AA Battery)



MTG-100Ha Handheld Transmitter



Wireless Tour Guide Systems

Profile

MTG-100 is an innovative digital wireless tour guide system. It is ultra compact, lightweight and easy to use. Digital design provides crystal-clear audio quality, secured and reliable transmission, and insensitive to interference attributes that are unmatched by the deficiency of simple analog design systems.

It operates in the license-free 865 & 928 MHz ISM band. ISM band requires no user licensing; thus, no worries about changing groups and channels when operating in multiple countries. Each band is preset with 16 switchable frequencies and ensures several different tours or groups can be operated at the same venue without interfering with each other.

This system comprises of two power models: rechargeable battery system and disposable battery system. Rechargeable battery system comprises MTG-100R receiver, MTG-100T transmitter and MTG-100C-12 or MTG-100C-28 storage and charger carry case. Built-in lithium polymer rechargeable battery is used to resolve the troubles of changing battery and save you a significant amount of money years to come.

Disposable battery system comprises of MTG-100Ra receiver and MTG-100Ta transmitter. 2 AA batteries are used for convenient personal usage.

This system is ideal for small to large, indoor or outdoor applications for guides, interpreters or presenters to communicate effectively to a group of people, rejecting irritating surrounding noise.

Manufacturers Comparison

Item	MTG-100	Other Brands
Modulation	Digital Narrow Band	Analog or Digital Wide Band
Frequency Range	UHF 865 & 928 MHz ISM band	VHF, UHF or 2.4 GHz industry band
Certification	No user licensing required	Only 2.4 GHz requires no licensing
Anti-Interference	Insensitive to Wi-Fi, Bluetooth and 2.4 GHz interference	2.4 GHz is susceptible to Wi-Fi, Bluetooth interference
Transmission Stability	True diversity design for reliable transmission and prevents signal dropouts	Non-diversity design is susceptible to interference and signal dropouts
Encryption	Digitally transmission prevents unauthorized listening	Analog transmission is susceptible to unauthorized listening
Operating Range	Approx. 100 m (line-of -sight)	Approx. 15~30 m (2.4 GHz)
RF Output Power	Switchable (High, Mid or Low)	Fixed
Audio Quality	16-bit Hi-Fi audio quality	Analog communication voice quality
System Channel Setting	MIPRO's proprietary ACT™ sync function: Synchronize all receivers and transmitters channel with a touch of 'Sync' button	Manual Setting
Operating Display	Backlit LCD displays parameters	LCD is available for higher-end systems
System Management	Ethernet interface allows system setting and management	Manual management
Dimensions & Weight	Compact and lightest	Bulky and heavier
Power Supply	High capacity lithium polymer rechargeable battery or 2 AA batteries for option	Regular disposable or lower quality rechargeable battery
Auto Shut-Off Time	Yes. To reduce battery consumption.	No
Affordability	Best Price / Quality ratio	Lower Price / Quality ratio
Country of Origin	100% designed & made in Taiwan.	Taiwan or other OEM manufacturers

Features

	MTG-100R / T	MTG-100Ra / Ta
1	Built-in rechargeable lithium battery for long time continuous use.	AA batteries for personal convenient use. Easy to carry and replace.
2	PC controllable Channel-Lock to prevent accidental change.	N/A
3	Convenient 12 or 28-slot storage and charger carry case for easy charging, storage and manage inventory.	N/A
4	Ethernet interface allows system setting and management.	N/A
5	Operates on user license-free ISM bands: EU 863~865 MHz and USA 926~928 MHz.	
6	Up to 100 m (330 ft) line-of-sight reception range.	
7	Interference-free from Bluetooth, Wi-Fi and 2.4 GHz wireless transmission.	
8	Digitally encrypted technology enables secure audio transmission, preventing unauthorized listening.	
9	Digital technology ensures crystal-clear audio quality and listeners have the best tour experience.	
10	Industry's only true diversity technology for exceptional reception quality.	
11	Durable, ultra-lightweight and pocket-sized portable receiver and transmitter. Incredibly easy to set-up and use.	
12	Industry's only auto shut-off timer for saving power consumption to extend the operation time.	
13	Backlit LCD screen displays all relevant parameters.	

Specifications

Model	MTG-100R	MTG-100T	MTG-100Ra	MTG-100Ta
Frequency Range	CEPT/EU: 863~865 MHz / USA: 926~928 MHz			
Oscillation Mode	PLL Synthesized			
Preset Channels	16			
Switching Bandwidth	2 MHz			
Channel Grid	125 kHz			
RF Output Power	N/A	< 10 mW (Low / Mid / High, switchable)	N/A	< 10 mW (Low / Mid / High, switchable)
Sensitivity	Approx. -90 dBm	N/A	Approx. -90 dBm	N/A
Operating Range	Up to 100 meters (330 feet) line-of-sight			
Frequency Response	50 Hz~10 kHz			
Power Supply	Built-in high capacity lithium polymer rechargeable battery		2 × AA batteries	
Operating Time	> 12 hours			
Automatic Shut-Off Time	10 minutes~42 hours (programmable)		6 hours	
Dimensions (W × H × D)	45 × 84 × 21 mm (1.8 × 3.3 × 0.8 ")		45 × 84 × 28 mm (1.8 × 3.3 × 1.1 ")	
Weight	Approx. 65 g (2.3 oz), Li-poly battery included		Approx. 72 g (2.5 oz), excluding AA batteries	
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.			

Wireless Tour Guide Systems - Accessories

MTG-100C-28 28-Slot Storage and Charger Carry Case



MTG-100C-12 12-Slot Storage and Charger Carry Case



MTG-100C-4 4-Slot Charger



Features

1. The protective case provides a convenient way to charge, carry and store your entire system.
2. Quick-charge in less than 4 hours.
3. Each charging slot has separate “red” charging and “green” ready indicator.
4. Innovative “Sync” button for automatic frequency synchronization from master to all MTG-100R receivers.
5. Built-in certified 100~250V AC switching power supply with well-vented design.
6. Organizes 24 earphones and 2 headset microphone neatly in one case.(MTG-100C-28)
7. Organizes 10 earphones and 2 headset microphone neatly in one case. (MTG-100C-12)

Specifications

Model	MTG-100C-28	MTG-100C-12
Charge Systems	28 (portable receivers and transmitters)	12 (portable receivers and transmitters)
Charge Time	< 4 hours	< 4 hours
Max. Power Consumption	80 W	26 W
Dimensions (W × H × D)	530 × 190 × 330 mm (20.9 × 7.5 × 13 ")	403 × 133 × 306 mm (15.9 × 5.2 × 12 ")
Weight	< 9 kg (20 lbs)	< 6 kg (13 lbs)
Ethernet Networking Interface	Yes	No
ACT-BUS static IP set up interface	Yes	No
Note	Refer to actual product in the event of product description discrepancy.	

Features

1. 4-slot convenient charging for up to 4 portable receivers or transmitters.
2. Quick-charge in less than 4 hours.
3. Each charging slot has separate "red" charging and "green" ready indicator
4. Battery charging via DC output, 8V/0.75A power supply

Specifications

Charge Systems	4 (portable receivers and transmitters)
Charge Time	< 4 hours
Max. Power Consumption	<6W
Dimensions (W × H × D)	112.5 × 85 × 158.5mm (4.4 × 3.3 × 6.2 ")
Weight	408 g (14.4 oz)
Power Supply	DC 8~15V max 0.75A
Note	Refer to actual product in the event of product description discrepancy.

Receiver Accessories



Transmitter Accessories



MM-10
Mini-gooseneck Microphone

Capsule Module	4.5 mm Ø omni-directional condenser microphone
Frequency Response	40 Hz~20 kHz
Maximum SPL	135 dB (Typical, 1% T.H.D.)
Sensitivity	-49 dBV ± 3 dB at 1 kHz (0 dB=1V/Pa)
Plug	3.5 mm Ø mini jack screw-lock
Length	11 cm (4.3 ")
Weight	Approx. 8 g (0.3 oz)
Note	Refer to actual product in the event of product description discrepancy.

MM-202P
Mini-gooseneck Microphone

Capsule Module	10 mm Ø uni-directional condenser microphone
Frequency Response	50 Hz~18 kHz
Maximum SPL	136 dB (Typical, 1% T.H.D.)
Sensitivity	-46 dBV ± 3 dB at 1 kHz (0 dB=1V/Pa)
Plug	3.5 mm Ø mini jack screw-lock
Length	13.6 cm (5.4 ")
Weight	Approx. 22 g (0.8 oz)
Note	Refer to actual product in the event of product description discrepancy.

MU-101P
Headworn Microphone

Capsule Module	10 mm Ø uni-directional condenser microphone
Frequency Response	50 Hz~18 kHz
Maximum SPL	135 dB (Typical, 1% T.H.D.)
Sensitivity	-49 dBV ± 3 dB at 1 kHz (0 dB=1V/Pa)
Plug	3.5 mm Ø mini jack screw-lock
Cable Length	150 cm (59.1 "), cable only
Weight	Approx. 24 g (0.8 oz)
Note	Refer to actual product in the event of product description discrepancy.

MU-53HNP
Headworn Microphone

Capsule Module	10 mm Ø uni-directional miniature condenser microphone
Frequency Response	50 Hz~18 kHz
Maximum SPL	136 dB (Typical, 1%THD)
Sensitivity	-46 dBV ± 3 dBV at 1 kHz (0 dB=1V/Pa)
Plug	3.5 mm Ø mini jack screw-lock
Cable Length	150 cm (59.1 "), cable only
Weight	Approx. 30 g (1.1 oz)
Note	Refer to actual product in the event of product description discrepancy.

MU-23P
Headworn Microphone

Capsule Module	3 mm Ø omni-directional condenser microphone
Frequency Response	40 Hz~20 kHz
Maximum SPL	138 dB (Typical, 1% T.H.D.)
Sensitivity	-56 dBV ± 3 dB at 1 kHz (0 dB=1V/Pa)
Plug	3.5 mm Ø mini jack screw-lock
Cable Length	150 cm (59.1 "), cable only
Weight	Approx. 22 g (0.8 oz)
Note	Refer to actual product in the event of product description discrepancy.

E-5S
Stereo Earphones

Driver Unit	24 mm Ø
Frequency Response	100 Hz~20 kHz
Sensitivity	108 dB ± 3 dB at 1 mW
Max. Input Power	100 mW
Impedance	32 ± 15% Ω at 1 kHz 1 mW
Plug	3.5 mm Ø stereo mini jack
Cable Length	120 cm (47.2 ")
Weight	Approx. 10 g (0.35 oz), cable included
Note	Refer to actual product in the event of product description discrepancy.

E-10S
Stereo Earphones

Driver Unit	10 mm Ø
Frequency Response	20 Hz~15 kHz
Sensitivity	103 dB ± 3 dB at 1 mW
Max. Input Power	20 mW
Impedance	16 Ω at 1 kHz 1 mW
Plug	3.5 mm Ø stereo mini jack
Cable Length	R side: 40 cm + 55 cm (15.7 " + 21.7 ") L side: 10 cm + 55 cm (3.9 " + 21.7 ")
Weight	Approx. 20 g (0.7 oz), cable included
Note	Refer to actual product in the event of product description discrepancy.

E-20S
Stereo Headphones

Driver Unit	30 mm Ø
Frequency Response	20 Hz~20 kHz
Sensitivity	105 dB ± 3 dB at 1 mW
Max. Input Power	100 mW
Impedance	24 Ω at 1 kHz 1 mW
Plug	3.5 mm Ø stereo mini jack
Cable Length	120 cm (47.2 ")
Weight	Approx. 80 g (2.8 oz), cable included
Note	Refer to actual product in the event of product description discrepancy.

MI-909 Digital Stereo IEM System

Profile

MI-909 is a professional quality and industry's first digital wireless stereo IEM system. Featuring digitally encrypted technology with unparalleled digital audio performance and transmission reliability. Superior frequency response characteristics from 20Hz low-frequency sound clearly exceeds analog systems. Combine DSP & digital diversity technologies this upgraded MI-909 system has advanced features and functions supersedes the competitors.

The key components include the MI-909R ultra-compact bodypack receiver and MI-909T rack transmitter.

MI-909R Digital Stereo Bodypack Receiver

Profile

MI-909R operates in a wide 64 MHz bandwidth and it has easy to use controls and indicators with a backlit LCD screen. Advanced dual-antenna diversity design eliminates signal dropouts and enhances signal stability. Features a lightweight, exceptionally durable magnesium alloy bodypack case. Ideal for professional installations and live applications. Proprietary digital encryption provides secure audio transmission, preventing unauthorized listening in conferences, meetings and language interpretations applications.



Features

- 1. Ultra-compact, lightweight and rugged magnesium housing.
- 2. 64 MHz wide bandwidth.
- 3. Dual-antenna diversity design eliminates signal dropouts and enhances RF stability.
- 4. lightweight, exceptionally durable magnesium alloy bodypack case.
- 5. LCD screen displays audio & RF metering, battery status bar, group & channel, R/L balance.
- 6. Selectable stereo, mono or mixed output mode.
- 7. PLL-synthesized technology enables large compatible channels operation.
- 8. ACT syncs the transmitter & receiver frequency automatically.
- 9. Menu controls and indicators accessed by three buttons.
- 10. S/N ratio > 95dBA (stereo receiving).
- 11. 95dB stereo separation.
- 12. 20 Hz ~ 15 kHz Frequency Response.
- 13. 0.1% @ 1kHz distortion.
- 14. Earphone output power 120mW @ 16 Ω .
- 15. Extended operating hours with 2 AA alkaline batteries.
- 16. Dual unbreakable soft antennas.

Specifications

Frequency Response	480~824 MHz (country dependent)
Bandwidth	64 MHz
Oscillation Mode	PLL-Synthesized
Channel Grid	25 kHz
Frequency Stability	± 0.005% (-10 ~ +60°C)
Sensitivity	10 μ V input level, S/N > 90dB (Stereo)
Modulation Mode	Digital Modulation
Receiving Mode	Diversity Receiving
Spurious	< 4nW
T.H.D	0.1% @1 kHz
Max. S/N ratio	95 dBA
Frequency Response	20 ~ 15,000Hz (Stereo)
Volume Control	126 dB (1dB step)
Output Jack	3.5mm Ø stereo earphone jack
Output Power (16 Ω)	2 × 120mW
Earphone Impedance	≥ 16 Ω
Power	2 "AA" Alkaline
Current Consumption	Approx. 180mA (moderate volume)
Operating Time	Approx. 6-hour with 2 AA alkaline (moderate volume)
Dimensions (WxHxD)	63 × 82 × 23 mm (2.6 × 3.2 × 0.9 ")
Weight	Approx. 98 g (3.5 oz)
Transmitter	MI-909T
Operating Temperature	-10 ~ +60°C

Note
Refer to actual product in the event of product description discrepancy.
Frequency range and maximum deviation comply with the regulations of different countries.

Illustrations



MI-909T Digital Stereo Transmitter

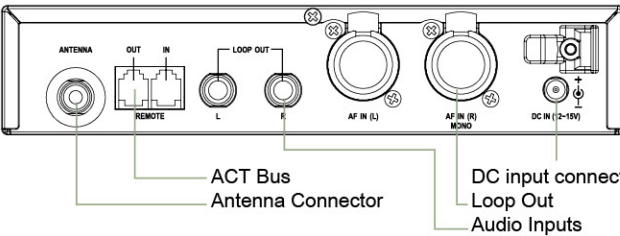
NEW

Profile

MI-909T is a rugged digitally-encrypted rack transmitter. It operates in a 64 MHz wide bandwidth and allows multiple preset compatible channels operation. Up to 100mW output power, high dynamic range stereo audio inputs and able to withstand professional audio mixers maximum output levels. Menu settings like input sensitivity, encryption, EQ DSP processors can be set-up via a rotary control knob. Built-in Scan function enables auto-scanning for an open, interference free frequency and frequency sync with the bodypack receiver with ACT button. MI-909T is ideally for live applications and professional installations like language interpretations.



Rear Panel



Features

- 1. EIA-standard half 19" metal case.
- 2. Front panel includes ACT sync button, rotary control knob for menu settings and dual audio LED indicators.
- 3. LCD screen displays group & channel, encryption status, RF output, stereo/mono mode.
- 4. Lockable front panel.
- 5. PLL-synthesized technology enables multiple preset compatible channels.
- 6. 64MHz bandwidth.
- 7. 112 dBA S/N ratio.
- 8. Balanced and unbalanced audio inputs.
- 9. Switchable Line & Microphone, adjustable sensitivity levels and up to +26 dBU maximum SPL.
- 10. Built-in 3 bands EQ settings.
- 11. Selectable encryption keys.
- 12. Scan for an open, interference-free frequency.
- 13. 6.3mm headphone monitoring jack.
- 14. RJ-11 MIPRO ACT-BUS connector.
- 15. Up to 100mW output power. selectable Hi, Low or Off setting
- 16. TNC 50 Ω RF output & input connectors.

Specifications

Frequency Range	470~664 MHz, 672~960 MHz (country dependent)
Bandwidth	64 MHz
Oscillation Mode	PLL-Synthesized
Channel Grid	25kHz
Frequency Stability	± 0.005% (-10~+50°C)
Modulation Mode	Digital Modulation
Output Power	Low <10mW High <100mW switchable (country dependent)
Spurious Rejection	<4nW
Frequency Response	20~15,000Hz (Stereo)
T.H.D.	<0.1% (Frequency Modulation 1kHz)
ADC Dynamic Range	112dBA
Stereo Audio Input	Phone 6.3mmØ × 2, XLR, 6.3mmØ Combo Jack
Max. SPL	>+26dBu, Selectable Line and Microphone level
Audio input adjustment	0~-30dB , 3dB Step
Headphone Monitor	6.3mmØ Stereo Jack with volume control
Earphone Output Impedance	≥ 16 Ω
Network Interface	RJ-11 × 2, proprietary MIPRO ACT-BUS
Antenna Connector	TNC (50 Ω impedance)
Power Supply	DC 12V~15V
Dimensions (WxHxD)	210 x 44 x 206 mm (8.3 x 1.7 x 8.1")
Weight	Approx. 1.1 kg (2.4 lbs)

Note
Refer to actual product in the event of product description discrepancy.
Frequency range and maximum deviation comply with the regulations of different countries.

High Performance Earphones

New E-8S earphones provides outstanding sound quality and excellent isolation to suppress high stage noise. An 8mm dynamic driver and can be universally fitted with three exchangeable ear sleeves for custom fit and comfort. Featuring a 20 Hz ~ 20 kHz frequency response and high isolation against ambient noise levels.

E-8S Premium Earphones

- 1. 8mm high efficient driver.
- 2. In-ear, closed-back design with S,M,L sleeves.
- 3. Beige color.
- 4. 3.5mm gold-plated stereo connector
- 5. 1.5-meter rugged cable.
- 6. 110dB SPL.
- 7. 16 Ω @1kHz Nominal impedance.
- 8. 20Hz~20kHz Frequency Response.
- 9. Excellent isolation against ambient noise levels.

E-8P Professional Earphones

- 1. Adjustable ear hook design for better fit and invisibility.
- 2. Ear canal design for easy earplug replacement.
- 3. Sub-miniature speaker design.
- 4. 1.5 meter ultra durable cable and exterior in beige.
- 5. Sensitivity >116 dB.
- 6. Superb audio bandwidth and isolation.

MI-808 Stereo IEM System

Profile

MI-808 is an IEM system designed for stage performance and broadcasting. Also, it can be served as a simultaneous language interpretation system. It is frequency-agile over a 24 MHz bandwidth with 16 selectable frequencies. Advanced dual-antenna true diversity technology eliminates signal dropouts and enhances signal stability. High S/N ratio and dynamic range ensures optimal audio quality.

MI-808R Stereo Bodypack Receiver



Features

1. UHF PLL Synthesized circuit.
2. 16 preset channels in 24 MHz band, selectable via one button.
3. Industry's only dual-antenna true diversity technology for optimal reception.
4. Dynamic expander circuitry delivers S/N ratio greater than 90 dB.
5. Mono and Stereo Operating mode.
6. Numeric LED with auto power saver.
7. POWER on/off and RF signal indicators.
8. 2 AA batteries and high efficiency circuit for long continuous use.
9. Compact and durable magnesium alloy housing.
10. Unbreakable soft antennas.
11. Multi-language interpretation system application. Simple interface for easy operation.

Specifications

Frequency Range	620~874 MHz (country dependent)
Bandwidth	24 MHz
Oscillation Mode	PLL Synthesized
Channel Grid	25 kHz
Frequency Stability	± 0.005% (-10~+60°C)
Modulation Mode	FM stereo modulation
Receiving Mode	Diversity receiving
Receiving Sensitivity	S/N > 58 dB (mono) @ 2 μV input level
Squelch Level	2~100 μV
T.H.D.	< 0.5% @ 1 kHz
Max. S/N Ratio	94 dBA
Frequency Response	80 Hz~15 kHz
Stereo Separation	≥ 45 dB @ 1 kHz
Output Jack	3.5 mm stereo earphone jack
Output Power (32 Ω)	2 × 50 mW @ 1 kHz (T.H.D. 3%)
Earphone Impedance	≥ 16 Ω
Power Supply	2 AA batteries
Current Consumption	Approx. 130 mA (under moderate volume)
Operating Time	8 hours (under moderate volume)
Antenna	Fixed 1/2 λ × 2
Matching Transmitter	MI-808T
Dimensions (W × H × D)	65 × 105 × 25.5 mm (2.6 × 4.1 × 1")
Weight	Approx. 128 g (4.5 oz)
Operating Temperature	-10~+60°C
Note	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

Illustrations



MI-808T Stereo Transmitter

Rear Panel



Features

1. Multi-function LCD panel.
2. EIA standard 1/2U rack-mountable metal chassis.
3. Balanced and unbalanced combo jack.
4. Mono and Stereo operating modes.
5. UHF PLL Synthesized circuit.
6. 16 preset channels in 24 MHz band.
7. Dynamic compander circuitry delivers S/N ratio greater than 90 dB.
8. Built-in level limiter prevents distortion at the maximum input level.
9. Monitoring headphone jack.
10. Multi-language interpretation system application. Simple interface for easy operation.

Specifications

Frequency Range	620~874 MHz (country dependent)
Bandwidth	24 MHz
Oscillation Mode	PLL Synthesized
Channel Grid	25 kHz
Frequency Stability	± 0.005% (-10~+60°C)
Modulation	FM stereo modulation
Output Power	< 10 mW (Low); < 100 mW (High) (country dependent)
Spurious Rejection	< 4 nW
Frequency Response	80 Hz~15 kHz
T.H.D.	< 1% (at 1 kHz, max. deviation)
Audio Input	line level × 2, XLR / 6.3 mm Ø phone combo socket
Audio Output	6.3 mm Ø phone jack × 2
Earphone Output	6.3 mm Ø stereo phone jack with adjustable volume
Earphone Output Impedance	≥ 16 Ω
Amplifier Gain	N/A
Antenna Connector	TNC (50 Ω impedance)
Dimensions (W × H × D)	210 × 44 × 206 mm (8.3 × 1.7 × 8.1")
Weight	Approx. 1.1 kg (2.4 lbs)
Note	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

High Performance Earphones

New E-8S earphones provides outstanding sound quality and excellent isolation to suppress high stage noise. An 8mm dynamic driver and can be universally fitted with three exchangeable ear sleeves for custom fit and comfort. Featuring a 20 Hz ~ 20 kHz frequency response and high isolation against ambient noise levels.

E-8S Premium Earphones



1. 8mm high efficient driver.
2. In-ear, closed-back design with S,M,L sleeves.
3. Beige color.
4. 3.5mm gold-plated stereo connector
5. 1.5-meter rugged cable.
6. 110dB SPL.
7. 16 Ω @1kHz Nominal impedance.
8. 20Hz~20kHz Frequency Response.
9. Excellent isolation against ambient noise levels.

E-8P Professional Earphones



1. Adjustable ear hook design for better fit and invisibility.
2. Ear canal design for easy earplug replacement.
3. Sub-miniature speaker design.
4. 1.5 meter ultra durable cable and exterior in beige.
5. Sensitivity >116 dB.
6. Superb audio bandwidth and isolation.

MR-90B Wireless ENG Receiver NEW



Detachable Antenna
LCD Display Panel

Matching Transmitters

ACT-72H Handheld Transmitter



ACT-72T Bodypack Transmitter



MT-92A Wireless Interlinking Transmitter



Accessories

MJ-90 Power Cord for SONY Camcorders



Profile

The MIPRO MR-90B is a compact wireless receiver designed for professional camcorder applications, matched with MIPRO ACT transmitters to achieve natural sound reproduction and eliminate the need for microphone cables during recording, ensuring safe and agile operation of camcorders. Furthermore, MR-90B can also be installed on an active PA speaker via ACT transmitters or MT-92 wireless interlinking transmitter of MA-909 wireless mixer to turn active speakers into a wireless system.

Features

1. Waterproof, compact, and ultra-thin rugged aluminum housing construction.
2. Various interface socket modules can be easily detached and installed to work with different camcorders, active speakers and other audio equipments.
3. Detachable battery pack accessory needs only two AA batteries to provide at least 8 continuous hours of operation, eliminating the need for external power.
4. UHF PLL synthesized circuit and dual-antenna true diversity technology for best reception quality.
5. 100 preset channels in each 24 MHz band can be easily auto-scanned for a clear, interference-free frequency.
6. Presets 16 channels specifically for wireless interlinking transmitter.
7. World's first ACT™ (Automatic Channel Targeting) provides precise and rapid frequency sync to the transmitters.
8. LCD panel shows frequency, RF and AF signal strength, function, diversity, and battery status.
9. Control panel has setup buttons for SCAN, ACT, SQUELCH, and LOCK functions, allowing easy and error-free setup.
10. High fidelity and dynamic compander circuit. Balanced, high-gain audio signal output.
11. Electronic power switch eliminates popping noise during power on/off.
12. Working voltage is 6.5~12V DC and the efficient power-saving design makes current consumption lower than 70 mA.
13. Precision SMA antenna connectors with removable soft antennas.

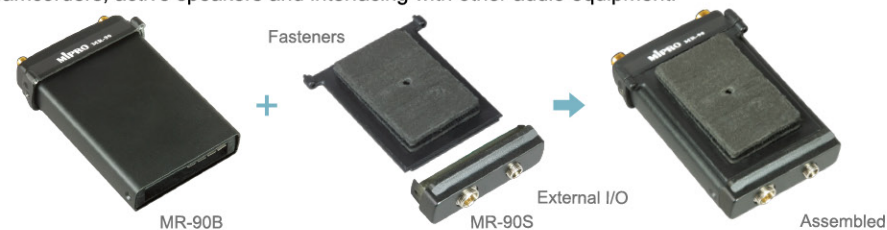
Specifications

Frequency Range	480~937.5 MHz (country dependent)	Max. S/N Ratio	107 dBA
Bandwidth	24 MHz	Max. Output Level	Balanced 2.2V rms open (T.H.D.=1%)
Oscillation Mode	PLL Synthesized. Frequency stability at ± 0.005% (-10~+60°C)	Display	LCD
Preset Channels	100 selectable channels	Power	6.5~12V DC
Channel Setup	AutoScan	Current Consumption	Approx. 70 mA
Receiving Mode	Dual antenna true diversity	Dimensions (W × H × D)	83 × 145 × 35 mm (3.3 × 5.7 × 1.4 ")
Receiving Sensitivity	S/N > 76 dB at 6 μ V input	Weight	Approx. 220 g (7.7 oz)
Frequency Response	80 Hz~18 kHz (low frequency filter characteristics)	Matching Transmitters	ACT-72H, ACT-52H, ACT-32H, ACT-72T, ACT-52T, ACT-32T
Spurious Rejection	> 80 dB	Operating Temperature	-10~+60°C
T.H.D.	< 0.15% (at 1 kHz, deviation at 15 kHz)	Note	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.
Squelch Level	Adjustable range: 6 dBuV to 40 dBuV at 5 dB steps		

Key Accessories and Functions

1. MR-90S Standard Package (Included with MR-90B)

Includes Velcro fasteners, external I/O module, signal output cable and power cable. Ideal for other camcorders, active speakers and interfacing with other audio equipment.



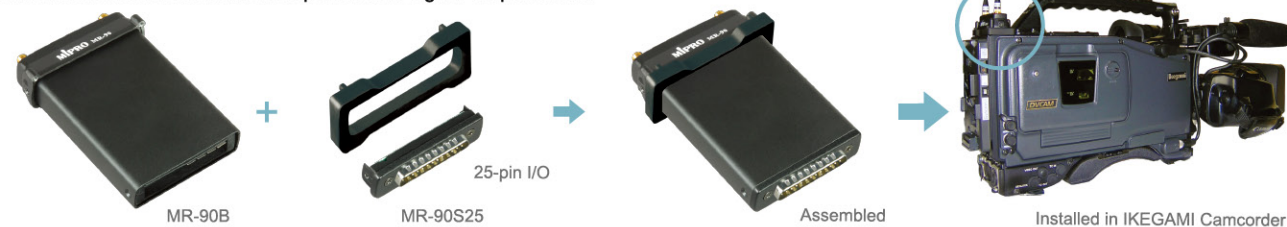
2. MR-90S15 Exclusive Socket Interface

For SONY Betacam camcorders with 15-pin I/O sockets. Installs directly into the reserved slot on the camcorder. No need for external power and signal output cable.



3. MR-90S25 Exclusive Socket Interface

For Ikegami camcorders with 25-pin I/O sockets. Installs directly into the reserved slot on the camcorder. No need for external power and signal output cable.



4. MR-90SB Built-in Battery Pack

Ideal for other camcorders, active speakers and interfacing with other audio equipment. MR-90SB requires two AA-sized batteries, eliminating the need for an external power source.



5. MR-90SC Mounting Fasteners

No need for Velcro fasteners. Connects directly to the accessory shoe of many miniature camcorders.



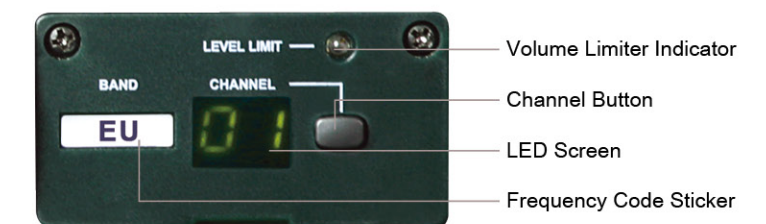
MTS-100 Digital Stationary Transmitter



Features

1. Modular design for easy set-up, operation and maintenance.
2. Preset with 16 selectable channels.
3. Bright LED channel display.
4. Direct output for low level or switch to wideband amplifier for high level output.
5. Selectable input audio signal level for optimal modulation index.
6. Audio input and RF output LED indicators.
7. 48V phantom power for condenser microphones.

Wireless Transmitter Module Controls and Indicators



Specifications

Frequency Range	794~928 MHz (country dependent)
Oscillation Mode	PLL Synthesized
Switching Bandwidth	16
Preset Frequencies	± 0.005% (-10~+60°C)
Modulation	2FSK
Stability	2 MHz
Channel Grid	125 kHz
RF Output Power	< 10 mW (Low), < 50 mW (High) (country dependent)
Antenna	TNC × 1, 50 Ω
Spurious	<250nW @>1GHz
Transmission Range	> 100 meters (High setting)
Frequency Response	50Hz~10kHz
Max. AF Input Level	<15V rms (Line In)
Microphone Input	XLR & 6.3 mm Ø (Combo)
Input Level Switch	Mic or Line Level
Input Level Adjustment	Adjustable VR
Phantom Power Switch	ON / OFF
Panel Display	AF Meter, AF Limit, RF Hi/Low Power indicators, numeric channel.
Power Supply	12~15V DC
Dimensions (W × H × D)	210 × 44 × 206 mm (8.3 × 1.7 × 8.1")
Weight	Approx. 1.1kg (2.4lbs)
Notes	Refer to actual product in the event of product description discrepancy. Frequency range and maximum deviation comply with the regulations of different countries.

Optional Accessories



MT-92A Wireless Interlinking Transmitter **NEW**



Features

- 1. Modular design for easy installation and maintenance.
- 2. 16 selectable channels available by push of a button.
- 3. Numeric LED clearly indicates working channel.
- 4. High/Low power output selectable.
- 5. LED indicators for RF and audio signal strength.
- 6. Supplies +48V phantom power for true condenser microphone.
- 7. Compatible with ACT-717B, ACT-727B, ACT-747B & MR-90B receivers.

Specifications

Frequency Range	620~934 MHz	Audio Input	XLR / 6.3mm Ø Combo Jack
Bandwidth	24 MHz	Input Sensitivity	Mic or Line level
Oscillation Mode	PLL Synthesized	Input Sensitivity Control	Adjustable control for Input Gain
Channel Grid	25 kHz	Phantom Power Switch	ON / OFF
Frequency Stability	± 0.005% (-10~+60°C)	Panel Display	AF Meter, AF Limit, RF Hi/ Low Power indicators, numeric channel.
Modulation	FM	Antenna Connector	TNC × 1 (50 Ω impedance)
Output Power	< 100 mW (low), < 500 mW (high) (country dependent)	Dimensions (W × H × D)	210 × 44 × 206 mm (8.3 × 1.7 × 8.1 ")
Spurious	< 4 nW	Weight	Approx. 1.1 kg (2.4 lbs)
Frequency Response	80 Hz~15,000 Hz	Note	Refer to actual product in the event of product description discrepancy.
T.H.D.	< 0.5% (at 1 kHz, max. deviation)		

PC-11 Frequency Programmer



How to modify frequency:

- 1. After power is on, use ▲▼ function keys and switch to OLD mode.
- 2. Use keypad to dial 6 digits (omit decimal point). For example, for frequency of 810.000 MHz, dial 810000 and push ENT button when numbers are entered.

Antenna Systems

Antennas	89
Antenna Divider / Booster	97
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Antenna Combiner	100
Applications	101



Profile

MIPRO complete antenna systems include antennas, antenna dividers, antenna combiners, antenna boosters, booster relay power supply and front mount antenna bracket.

Antennas: Fits MIPRO wireless receivers.

Antenna Divider: Allows up to 4 UHF receivers to operate from a single pair of antennas or allows a single transmitter to operate via multiple antennas which greatly reduce intermodulation distortion and increase antenna efficiency and reception range.

Antenna Combiner: Allows up to 4 wireless transmitters to operate via 1 single antenna to eliminate spurious interference and simplify antenna installation. Ideal for professional stage applications.

Antenna Booster: Amplifies the antenna signal to increase signal strength and transmission range and improved S/N ratio signal and stability.

AT-10 Whip Antenna

AT-10 is a 1/4 wave single rod antenna featuring wider band, omni-directional, and 50 Ω impedance. Directly mounted on the antenna connectors of a receiver to become monopole antenna for adequate sensitivity and operating range.



AT-20 Coaxial Antenna

AT-20 is a 1/2 wave coaxial antenna that functions like a dipole antenna, featuring 2.15 dBi gain, 50 Ω impedance, and omni-directional. Directly mounted on the antenna connectors of a receiver for adequate sensitivity and operating range.



AT-70 Ground Plane Antenna

AT-70 is a UHF antenna that stabilizes signal receiving and prevents impedance interference from nearby objects because of its vertical 1/4 wave antenna is surround by horizontal antennas at a 45 ° degree, causing a 1/2 wave dipole antenna effect. Thus AT-70 has higher positive gain than a 1/4 wave single rod antenna and smoother impedance within 620~960 MHz band. Therefore, the length of the antenna does not need to be adjusted while receiving. The antenna is able to reduce interference by filtering signals outside the range. 50 Ω impedance for matching with regular 50 Ω impedance antenna cables. It is suggested to be installed at the central location of a hall, on the wall, inverted on a ceiling, or mounted on a tripod (MS-30).



Specifications

Frequency Range	620~960 MHz
Impedence	50 Ω
Connector	TNC Male
Dimensions (L × Ø)	165 × 150 mm (6.5 × 5.9 ")
Weight	Approx. 142 g (5 oz)
Note	Refer to actual product in the event of product description discrepancy.

AT-100 Wideband Circularly Polarized Antenna



Patents :
Taiwan Design D150421
China Design ZL201230113513.5

Profile

1. Patented in multiple countries. Distinguished Appearance

Optimized solution for both transmitting and receiving RF signals throughout the UHF bandwidth. AT-100 has a distinguished appearance is patented in multiple countries.
2. Main Features

Front area is the main focus of antenna direction for either vertical or horizontal polarization.

Circularly polarized antenna can effectively reduce the polarization loss of the antenna to improve signals strength. Optimum solution for 470-1,000 MHz bandwidth with 6~8 dBi antenna gain and certified to latest CE/FCC newly telecom regulations.
3. Results

AT-100 is an ideal antenna system for utmost signal stability. Antenna features affect transmission range, stability and anti-interference performance. Therefore, antenna is a vital component in any system installations especially for complicated and demanding RF environment wireless microphones and wireless monitors systems. It greatly improves signal stability and reduces interferences, signal drop-outs caused by polarization problems.
4. Built-in Connectors

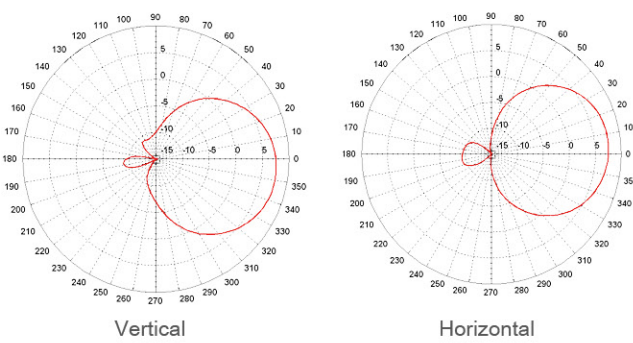
AT-100 has two built-in connectors: One "TX/RX" signal connectors for either transmitter or receiver. Another "RX Only" receiver only connector (cannot connect to transmitter) has a built-in 12 dB antenna gain booster provides extended reception range and compensates for coaxial cable signal loss caused to improve reception range and signal quality. Booster power can be provided by a MIPRO AD-707a or any ACT series receivers.
5. Waterproof

Waterproof and weather resistant. Ideal for both outdoor and indoor applications.

Specifications

Frequency Range	470~1,000 MHz
Antenna Gain	6~8 dBi
Polarization	Circular polarization
3-dB Beam Width	72°
Booster Gain	RX Connector : 12 ± 1 dB ; TX/RX Connector : 0 dB
VSWR	< 2:1
Power Consumption	RX Connector : 1120 mW(8V DC; New Version : 8~15V DC) TX/RX Connector : 0 mW
Impedance	50 Ω
Connector	TNC Female x 2
Dimensions (W x H x D)	350 × 350 × 225 mm (13.8 x 13.8 x 8.8")
Weight	Approx. 1.5 kg (3.3 lbs)
Note	Refer to actual product in case of product description discrepancy

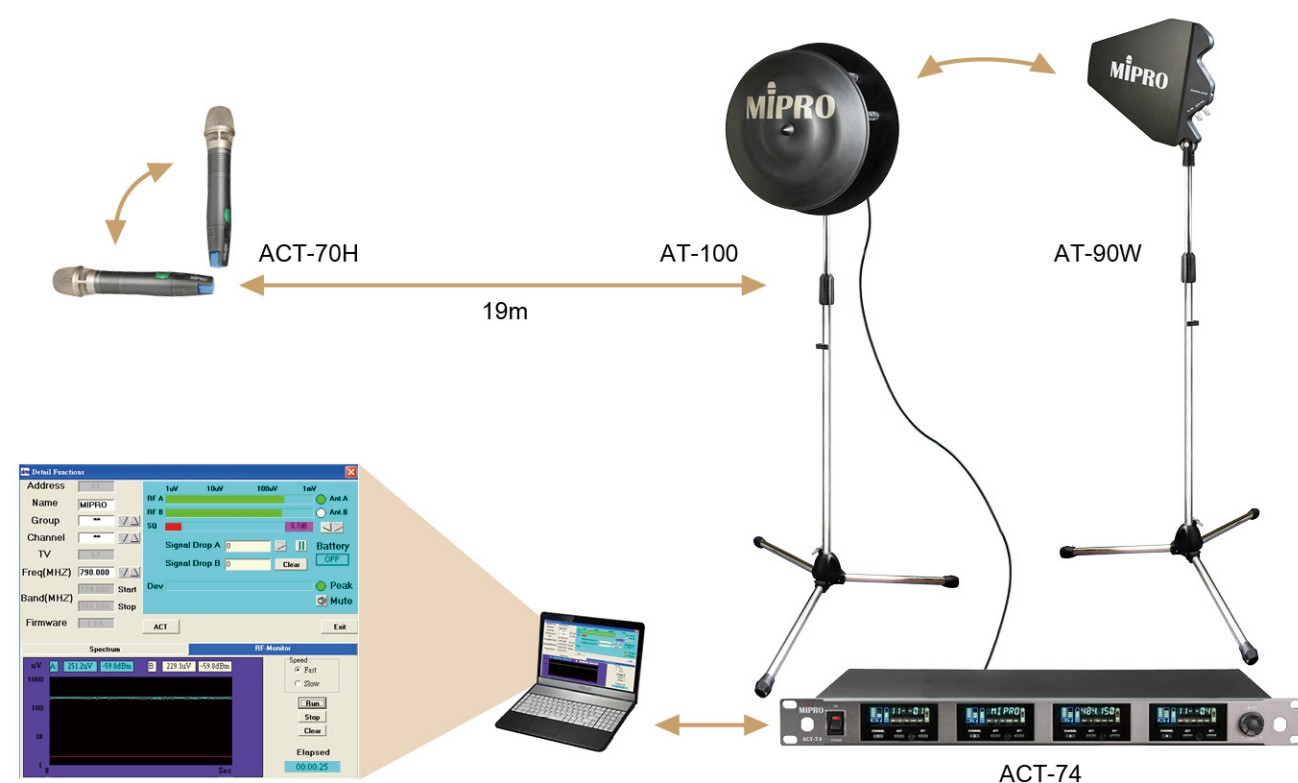
Antenna Pattern



AT-100 and AT-90W (or other directional antenna) Comparison Chart

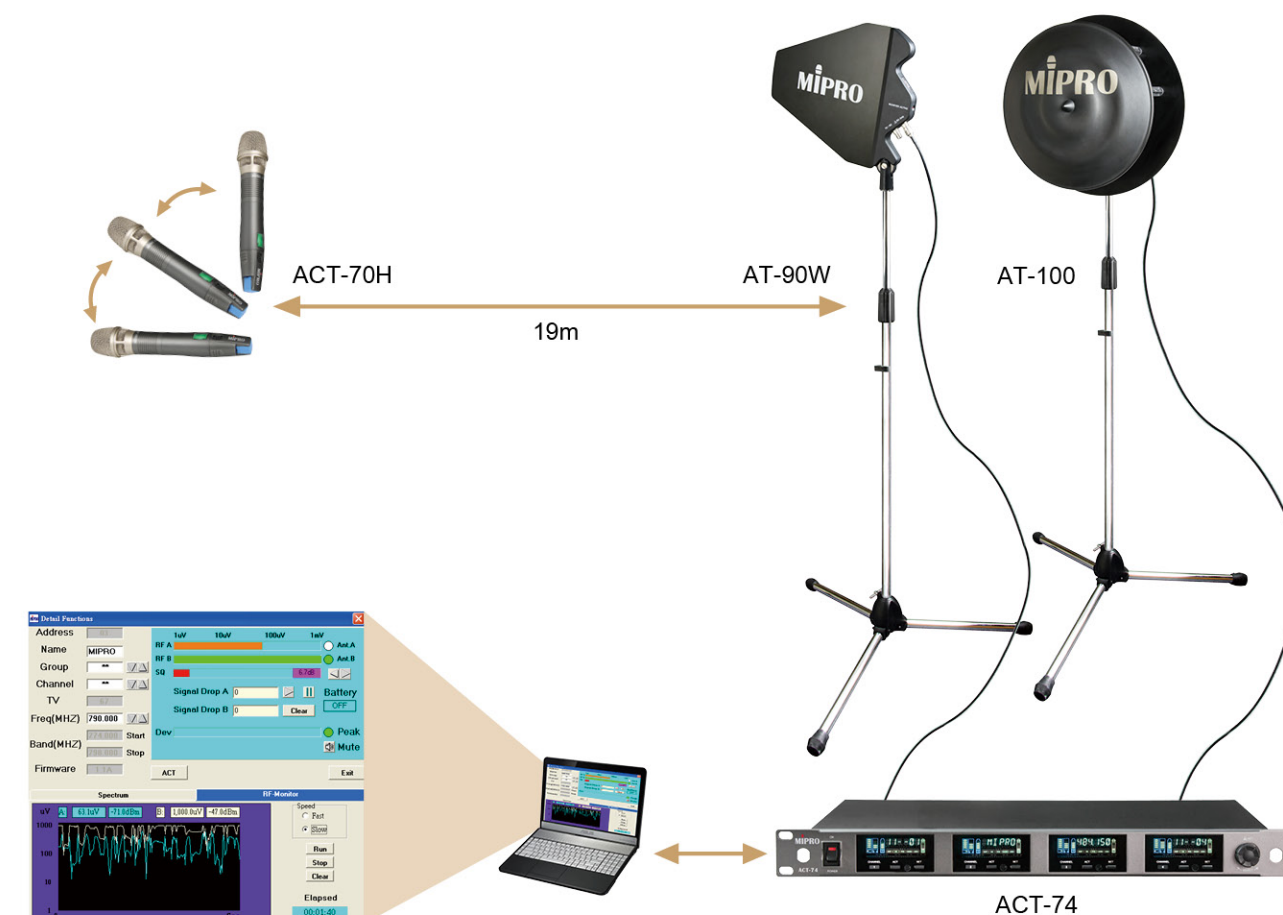
1. Static Measurement of Antenna Polarization Loss:

Antenna observation statistics of MIPRO RCS2.Net 2.6 monitoring software connected to ACT-74 receiver and signal transmitted by ACT-70H handheld transmitter. AT-100 and AT-90W directional antenna is connected to the same antenna input port at the receiver and measuring differences to antenna polarization characteristics as show below:



2. Antenna Dynamic Measurements with Polarization Loss Experiments

Antenna observation statistics of MIPRO RCS2.Net 2.6 monitoring software connected to ACT-74 receiver with signal transmitted by ACT-70H handheld transmitter. The AT-100 and AT-90W are connected to ACT-74 receiver input "B" and "A" terminals, respectively. The measuring differences to antenna polarization characteristics as show below:



Test Result

Below diagram clearly indicated that AT-100 circularly polarized antenna has improved performance than AT-90W in terms of received signal strengths and signal stability.

AT-100 Measurement Result



Vertical Positio

Horizontal Position

AT-90W Measurement Result



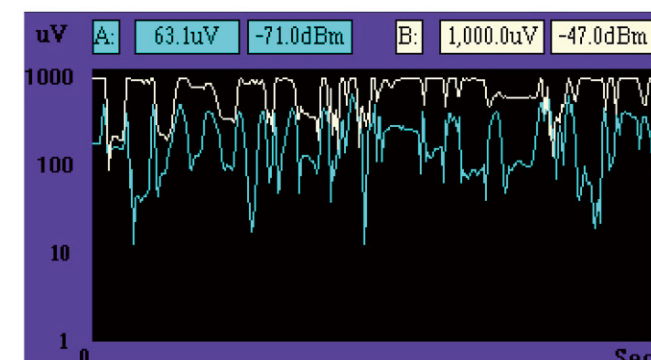
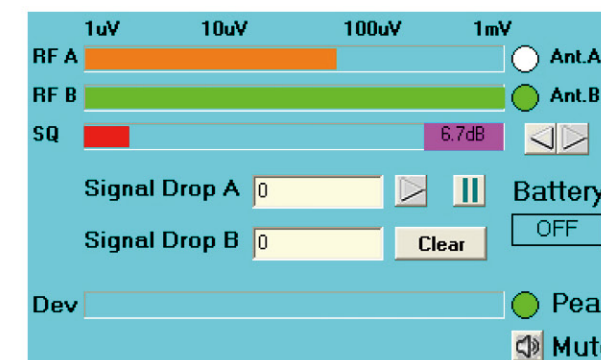
Vertical Positio

Horizontal Position

Measurement Result Clearly Indicated

Model	RF Received Signal Strength (dBm)	
	Vertical Position of Microphone	Horizontal Position of Microphone
AT-100	-51.8	-51.8
AT-90W	-53.0	-72.6

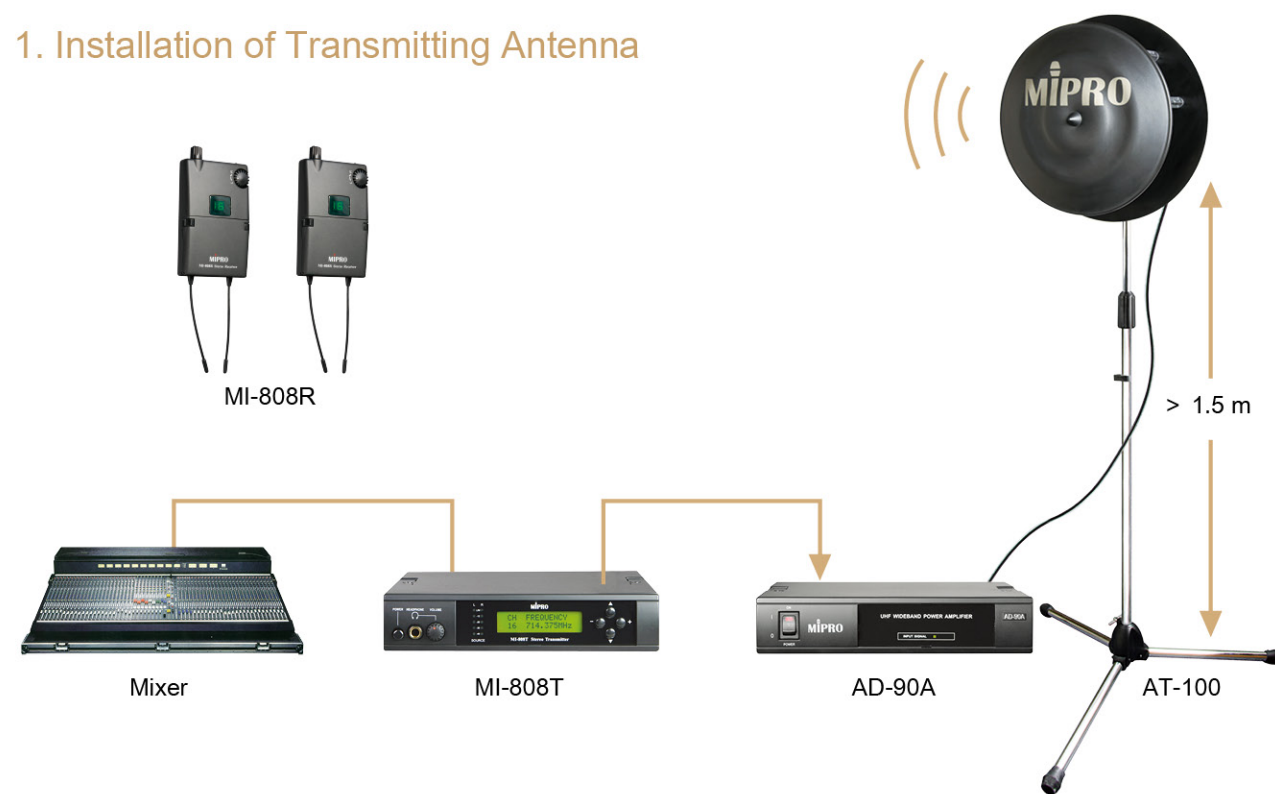
Due to the low polarization loss of circularly-polarized antenna AT-100, the received signal strengths are almost the same and stable when transmitting microphone is in both vertical and horizontal positions. On the contrary, due to the large polarization loss of linearly-polarized antenna AT-90W, the received signal strengths indicate a difference of 19.6 dB when transmitting microphone is in vertical and horizontal positions.



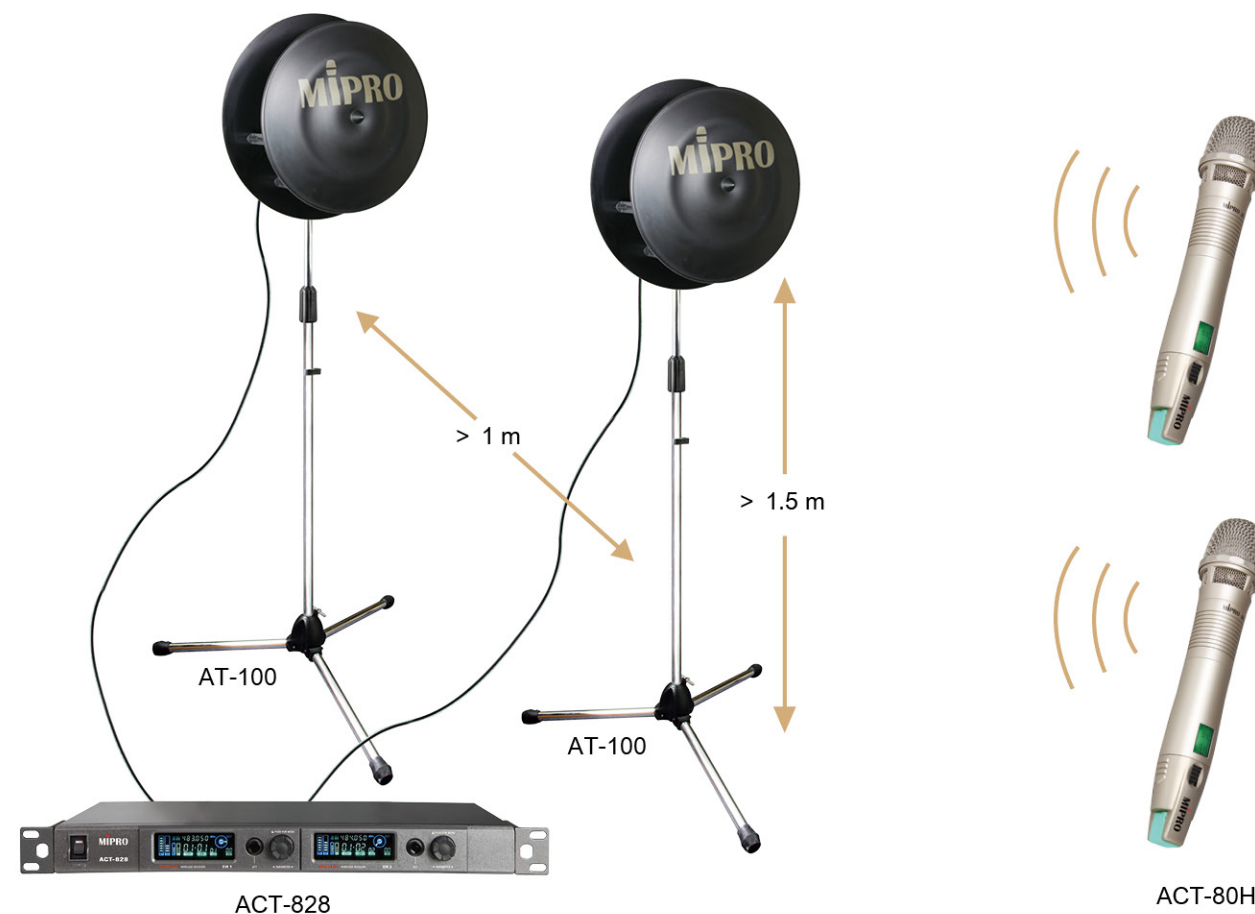
Computer Monitoring Graphs

Correct Antenna Installations

1. Installation of Transmitting Antenna



2. Installation of Receiving Antenna for Directional Stage Performances



Installed Venues and Mounting Methods

Stages



Convenient MS-30 mic stand.

Ceiling Mounting-vertical Position



Convenient MS-90 ceiling rack-mount.

Wall Mounting-horizontal Position



Convenient MS-90 wall rack-mount.

Outdoor Installation



Convenient MS-90 rack-mount.

Built-in booster Usage

1. Optimal signal quality through proper booster usage

Coaxial cable loss reduces signal received distance and stability. It must be connected to booster to improve antenna gain to compensate for signal loss. However, too much antenna gain in the booster causes unnecessary interference from intermodulation distortion resulting in received signal quality deterioration.

ACT-100 has two connectors, one is for RX (receiver only) with built-in 12 dB antenna gain, and can be used effectively to compensate the signal loss from extended cable transmission.

2. Calculation in selection of appropriate cable size and length to match the booster

Please refer to the catalog Technical Knowledge "How to Design Transmission Cable and Booster for Antenna System"

AT-90W Wideband Transmitting and Receiving Log Antenna



Profile

AT-90W is a bi-functional log antenna for professional receiving and transmitting applications. Optimized for 470~1000 MHz, which is compatible with US and EU new telecom regulations. It has a 4~6 dBi gain which is ideal for any installation required specific directions. The wideband ACT-90W can be easily distinguished from its predecessor, AT-90, by its new "W-Shaped" design.

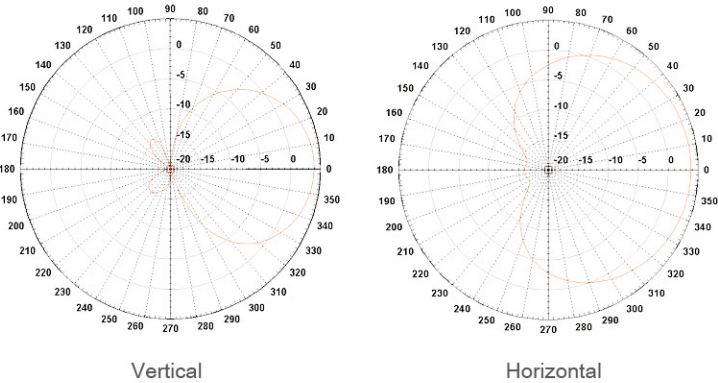
AT-90W has two input connectors, "TX/RX" which can be connected to transmitter or receiver directly. The "RX only" connector has a built-in 12 dB high gain booster provides increased reception range for ACT receiver.

AT-90W offers users the options of transmitting or receiving based on actual application. Built-in booster power can be provided from a MIPRO AD-707a or ACT Series receivers through the coaxial cables. AT-90W is waterproof and ideal for both indoor and outdoor applications.

Specifications

Frequency Range	470~1000 MHz
Antenna Gain	4~6 dBi
Booster Gain	RX Connector: 12 ± 1 dB ; TX/RX Connector: 0 dB
VSWR	≤ 2:1
3-dB Beam-width	75° Vertical; 130° Horizontal
Power Consumption	RX Connector : 1120 mW (8V DC ; New Version: 8~15V DC) ; TX/RX Connector: 0 mW
Impedance	50 Ω
Connector	TNC Female × 2
Dimensions (W × H × D)	319 × 270 × 25 mm (12.5 × 10.6 × 1 ")
Weight	Approx. 430 g (15.2 oz)
Note	Refer to actual product in the event of product description discrepancy.

Antenna Pattern



MS-90 Wall-mounting Rack

Wall-mounting rack for AT-70W, AT-90W, AT-100.



AT-70W Wideband Transmitting and Receiving Omni-directional Antenna



Profile

AT-70W is a bi-functional omni-directional antenna for professional receiving and transmitting applications. Optimized for 470~1000 MHz, which is fully compatible with US and EU new telecom regulations. It has a 2~4 dBi gain which is ideal for any specific installation required with full directions. It can be easily distinguished by its new "W-Shape" appearance.

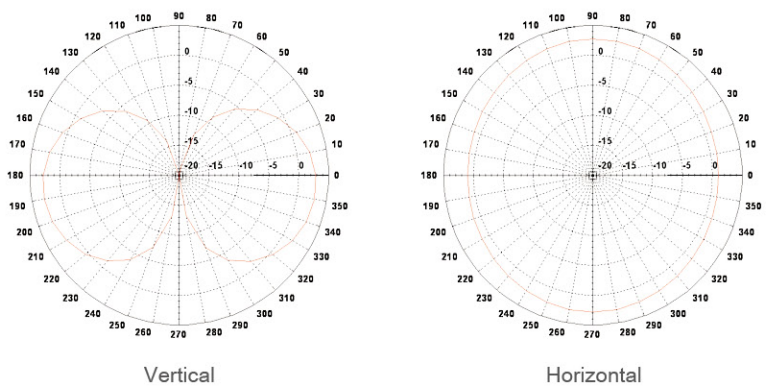
AT-70W has two input connectors, "TX/RX" which can be connected to transmitter or receiver directly. The "RX Only" connector has a built-in 12 dB high gain booster provides increased reception range for ACT receiver.

AT-70W offers users the options of transmitting or receiving based on actual application. Built-in booster power can be provided from a MIPRO AD-707a or ACT Series receivers through the coaxial cables. AT-70W is waterproof and ideal for both indoor and outdoor applications.

Specifications

Frequency Range	470~1000 MHz
Antenna Gain	2~4 dBi
Booster Gain	RX Connector : 12 ± 1 dB ; TX/RX Connector: 0 dB
VSWR	≤ 2:1
Power Consumption	RX Connector : 1120 mW (8V DC ; New Version : 8~15V DC) TX/RX Connector: 0 mW
Impedance	50 Ω
Connector	TNC Female × 2
Dimensions (W × H × D)	120 × 261 × 32 mm (4.7 × 10.3 × 1.3 ")
Weight	Approx. 200 g (7 oz)
Note	Refer to actual product in the event of product description discrepancy.

Antenna Pattern



FB-70 Front Mount Antenna Bracket



Ideal for installation into an EIA-standard 19" rack case

AD-708 Wideband 4-channel Auto Gain-Control Antenna Divider



Profile

AD-708 is MIPRO's innovative antenna divider working with MPB-30 auto gain controlled antenna booster and can detect the signal-loss of the cables between divider and booster to control the gain level of MPB-30 booster automatically. AD-708 can compensate the signal-loss precisely and solve antenna systems installation issues to achieve optimal receiving performance. (See technical knowledge number 9)

Features

1. Equipped with auto-detect divider to work with MPB-30 auto gain controlled antenna booster to control and compensate the signal-loss of antenna cables precisely automatically in order to avoid the intermodulation caused by the higher gain supply from booster.
2. Same features with AD-707a wideband antenna divider and compatible with MPB-20 or any MIPRO log antennas (RX connector) to compensate the signal-loss of cables but can not change the gain of the boosters themselves.
3. EIA-Standard 1U metal case with bright LED indicator to identify the communication of antenna cables and the result of detection.
4. Make it fast and easy to install antenna systems without worrying about the calculations of signal-loss of antennas, cables, and the specifications of boosters.

Specifications

Antenna Splitter	2 sets of 1-to-4 active divider output, 2 sets of 1-to-1 active output
Frequency Range	470~850MHz
IIP3	+32dBm
Detection of Signal-Loss from Cable	Detect the signal-loss of cables automatically to control the gain of MPB-30
RF Output Gain	+1.0dB \pm 1dB
Input/Output Gain	+1.0dB \pm 1dB
Output Port Isolation	>18dB at 400~1000MHz
Filter Selection	Low sideband \geq 35dB, High sideband \geq 30dB
Impedance	50 Ω
Connector	TNC Female
Antenna Input Power Supply	Antenna A/B input port supplies bias 8.3 V DC , 230 mA max. to booster
Power Supply Current	12~15V DC
Consumption	Approx. 242mA/12V DC Input
Dimension (W x H x D)	420 x 44 x 180 mm (16.5 x 1.7 x 7.1")
Weight	Approx. 1.5 kg (3.3 lbs)
Note	Refer to actual product in the event of product description discrepancy

AD-707a UHF Wideband 4-channel Antenna Divider



Features

1. Optimized for 470~850 MHz carrier frequency range. Fully compatible with US and EU telecom regulations.
2. Provides 2~4 sets UHF diversity receivers to operate from a pair of antennas. Greatly simplifies antenna installation and increases reception range and efficiency.
3. Adopts the latest high dynamic range components and wideband microstrip circuit design, featuring ultra low intermodulation distortion, and eliminates spurious interference in multiple systems usage. System output gain approximately equals to 1.
4. Output connectors provide bias for a ground plane antenna with antenna booster and a wideband receiving log antenna with built-in booster.
5. 2 sets of 4-channel antenna output connectors for direct connect to 4 sets of diversity receivers.
6. 2 sets of antenna input and output connectors.
7. Output connector can be linked to input connector of another antenna divider.
8. Booster power indicators assist with identifying the booster linkage.

Specifications

Antenna Splitter	2 sets of 1-to-4 active divider output, 2 sets of 1-to-1 active divider output.
Frequency Range	470~850 MHz
IIP3	+32 dBm
RF Output Gain	+1.0 dB \pm 1 dB
Input/Output Gain	+1.0 dB \pm 1 dB
Output Port Isolation	> 18 dB at 400~1000 MHz
Filter Selection	Low sideband \geq 35 dB, high sideband \geq 30 dB
Impedance	50 Ω
Connector	TNC Female
Antenna Input Power Supply	Antenna A/B input port supplies bias 8.3V DC, 230 mA max. to booster.
Power Supply	12~15V DC
Current Consumption	Approx. 190 mA at 12V DC
Dimensions (W x H x D)	482 x 44 x 190 mm (19 x 1.7 x 7.5 ")
Weight	Approx. 1.5 kg (3.3 lbs)
Note	Refer to actual product in the event of product description discrepancy.

MPB-30 Auto Gain Controlled Antenna Booster



Profile

MPB-30 antenna booster is equipped with variable gains to work with AD-708 antenna divider to detect and compensate the signal-loss of antenna cables automatically to obtain optimal signal outputs.

Features

1. Optimized in 470~960 MHz frequency range and work with AD-708 antenna divider to detect and compensate the signal-loss of cables automatically by controlling the built-in variable 0~13dB \pm 1dB gain.
2. With external power supply, MPB-30 provides power independently to internal antenna booster. This allows complicated external antenna dividing systems to work efficiently and independently so that longer antenna cable can be connected with more boosters.

3. Without external power supply, MPB-30 works by the 8V DC power provided from MIPRO ACT-series receivers to ensure normal operation.
4. Aluminum casing provide superb heat dissipation characteristics and constant output voltage at 8V DC.

Specifications

Frequency Range	470~960 MHz
Gain	Variable 0~14dB \pm 1dB (work with AD-708)
Noise Figure	< 2.5 dB (center band)
IIP3	+18 dBm (center band)
Impedance	50 Ω
Input Power	12~24V DC / min. 350mA
Regulated Output Power	8V DC / max. 250mA
Current Consumption	Approx. 77mA/12V DC Input
Connectors	TNC x 2, 2.0 mm DC Jack x 1
Dimensions (W x H x D)	90 x 25 x 55 mm (3.5 x 1 x 2.2 ")
Weight	Approx. 100 g (3.5 oz)
Note	Refer to actual product in the event of product description discrepancy

MPB-20 Antenna Booster with Built-in Power Supply



Features

1. Optimized in 470~960 MHz frequency range and offers 13 dB gain to compensate for signal loss due to long antenna cable, so as to enhance signal stability and increased reception range.
2. With external power supply, MPB-20 provides power independently to internal antenna booster. This allows complicated external antenna dividing systems to work efficiently and independently so that longer antenna cable can be connected with more boosters.
3. Without external power supply, MPB-20 can work properly by the 8V DC power provided from MIPRO ACT receivers to offer stable 13 dB gain.
4. Aluminum casing provides superb heat dissipation characteristics and constant output voltage at 8V DC.

Specifications

Frequency Range	470~960 MHz
Gain	13 \pm 1 dB
Noise Figure	< 2.5 dB (center band)
IIP3	+18 dBm (center band)
Impedance	50 Ω
Input Power	12~24V DC (min. 350 mA)
Regulated Output Power	8V DC (max. 250 mA)
Current Consumption	Approx. 32 mA at 12V DC
Connectors	TNC x 2, 2.0 mm DC Jack x 1
Dimensions (W x H x D)	90 x 25 x 55 mm (3.5 x 1 x 2.2 ")
Weight	Approx. 100 g (3.5 oz)
Note	Refer to actual product in the event of product description discrepancy.

AD-90S UHF 4-channel Wideband Power Splitter



Features

- AD-90S is a UHF 4-channel power antenna splitter with a maximum output level of +26 dBm (0.4 W), assisting with one transmitter connecting to 4 transmitting antennas.
- Primarily operates with 4 MI-909T/MI-808T in-ear monitoring transmitters or 4 MT-92A wireless interlinking transmitters to send signals through 4 channels with reliable signal transmission and larger signal coverage in multiple directions. Note that AD-90S is not designed for receivers.
- Each channel of AD-90S can be connected to an AD-90A UHF wideband power amplifier to increase signal output power and transmission range when the antenna is installed in complex terrain or a large building with many partitions.

Specifications

Bandwidth	UHF 470~960 MHz
Full System Gain	0~2 dB
VSWR Input / Output	≤ 1.5:1
Max. Output Connectors	4
Input Signal Indicator Threshold	+3 dBm
Max. RF Input Power	+26 dBm
Power Supply	12~15V DC
Current Consumption	Approx. 760 mA
Input / Output Connectors	TNC Female (1 input, 4 output)
Dimension (W × H × D)	210 × 44 × 206 mm (8.3 × 1.7 × 8.1 ")
Weight	Approx. 1.1 kg (2.4 lbs)
Operating Temperature	-10~+60°C
Note	Refer to actual product in the event of product description discrepancy.

AD-90A UHF Wideband High Power Amplifier



Features

- AD-90A is a professional UHF 470~960 MHz wideband power amplifier with maximum output power of +30 dBm (1 W).
- AD-90A is designed to operate with a MIPRO MI-909T/MI-808T stereo transmitter, a MT-92A wireless linking transmitter, and an AD-90S UHF wideband power splitter as an end-amplifier to boost signal strength for longer signal transmission distance and reducing signal dropout in extremely complicated environments.
- Ideally suited for large outdoor installation sites requiring wireless transmission to remote powered active speakers.
- AD-90A's output can be connected to AT-90W UHF wideband antenna to complete a high efficient and long distance transmission.

Specifications

Bandwidth	UHF 470~960 MHz
Full System Gain	8 ± 1 dB
VSWR Input/Output	≤ 2:1
Input Signal Indicator Threshold	+6 dBm
Max. RF Output Power	1 W
Power Supply	12~15V DC
Current Consumption	Approx. 370 mA
Connectors	TNC Female (1 input, 1 output)
Dimension (W × H × D)	210 × 44 × 206 mm (8.3 × 1.7 × 8.1 ")
Weight	Approx. 1.1 kg (2.4 lbs)
Operating Temperature	-10~+60°C
Note	Refer to actual product in the event of product description discrepancy.

AD-808 UHF 4-channel Active Antenna Combiner



Features

- Wideband frequency ranges from 470~960 MHz.
- Operates with up to 4 transmitters.
- Input signal indicator (threshold above +6 dBm).
- Maximum RF input power +20 dBm (100 mW).
- Ideal intermodulation characteristics (3rd order IM<-57 dBc under full band performance +15 dBm two-tone test).

Specifications

Frequency Range	470~960 MHz
Full System Gain	0 ± 2 dB
VSWR Input / Output	≤ 1.5:1
Max. RF Input Power	+20 dBm
Input Signal Indicator Threshold	+6 dBm
Power Consumption	9.12 W (12V, 760 mA)
Input / Output Connectors	TNC Female (4 input, 1 output)
Dimension (W × H × D)	210 × 44 × 206 mm (8.3 × 1.7 × 8.1 ")
Weight	Approx. 1.1 kg (2.4 lbs)
Note	Refer to actual product in the event of product description discrepancy.

AD-12 Passive Antenna Divider & Combiner



Features

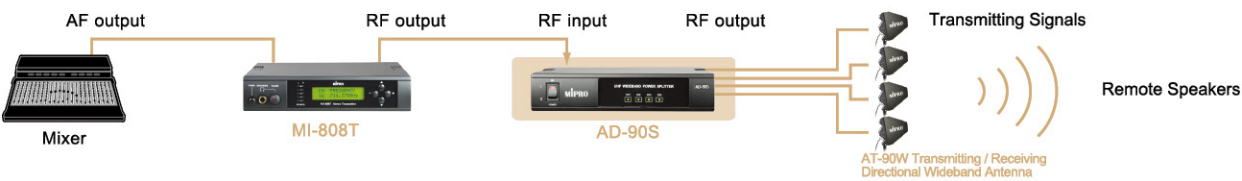
- The AD-12 can either divide a RF signal into 2 signal outputs or combine 2 signals into 1 signal output. Simultaneously, it transmits bias voltage to afterward boosters. This is an ideal accessory to set up antenna systems.
- The AD-12 adopts an isolated grounding design to avoid power noise from multi-receiver operation.

Specifications

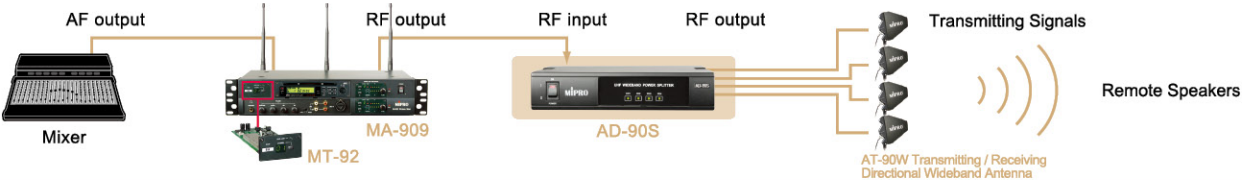
Frequency Range	470~1000 MHz
Attenuation	3.5 dB (typ.)
Isolation	20 dB (typ.)
Impedance	50 Ω
Max. Volt / Current	50V DC / 1.5A
Connector	TNC × 3
Dimension (W × H × D)	90.3 × 25 × 55.4 mm (3.5 × 1 × 2.2 ")
Weight	Approx. 105 g (3.7 oz)
Note	Refer to actual product in the event of product description discrepancy.

AD-90S Application

Application of AD-90S with MI-808T Stereo Transmitter & AT-90W Passive Directional Antenna

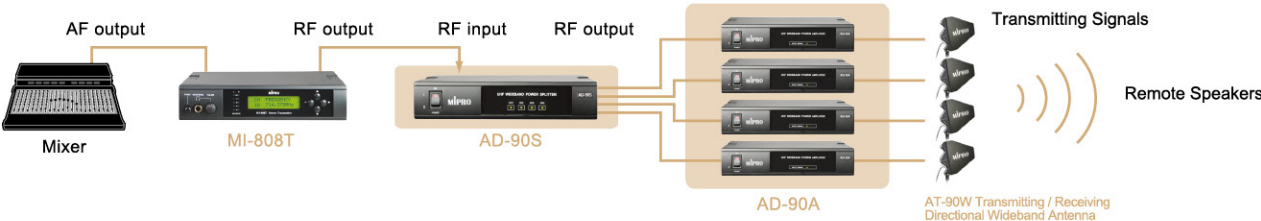


Application of AD-90S with MT-92 Wireless Interlinking Transmitter & AT-90W Passive Directional Antenna

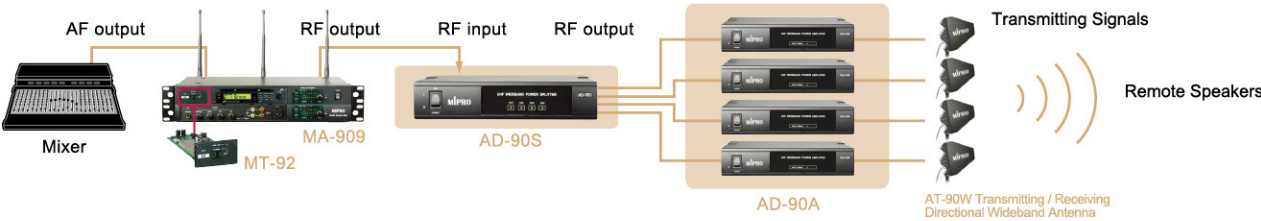


Transmission Enhancement Application

Application of AD-90S with MI-808T Stereo Transmitter & AD-90A Wideband High Power Amplifier

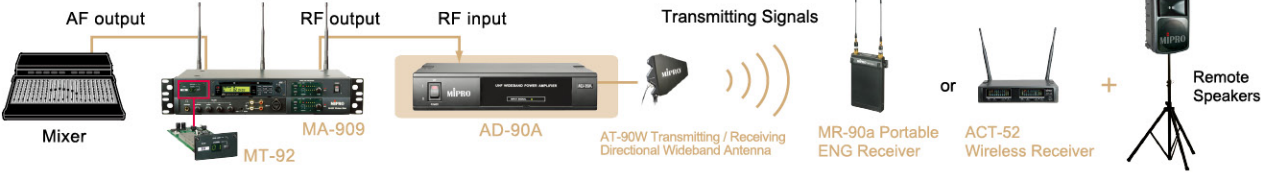


Application of AD-90S with MT-92 Wireless Interlinking Transmitter & AD-90A Wideband High Power Amplifier



AD-90A Application

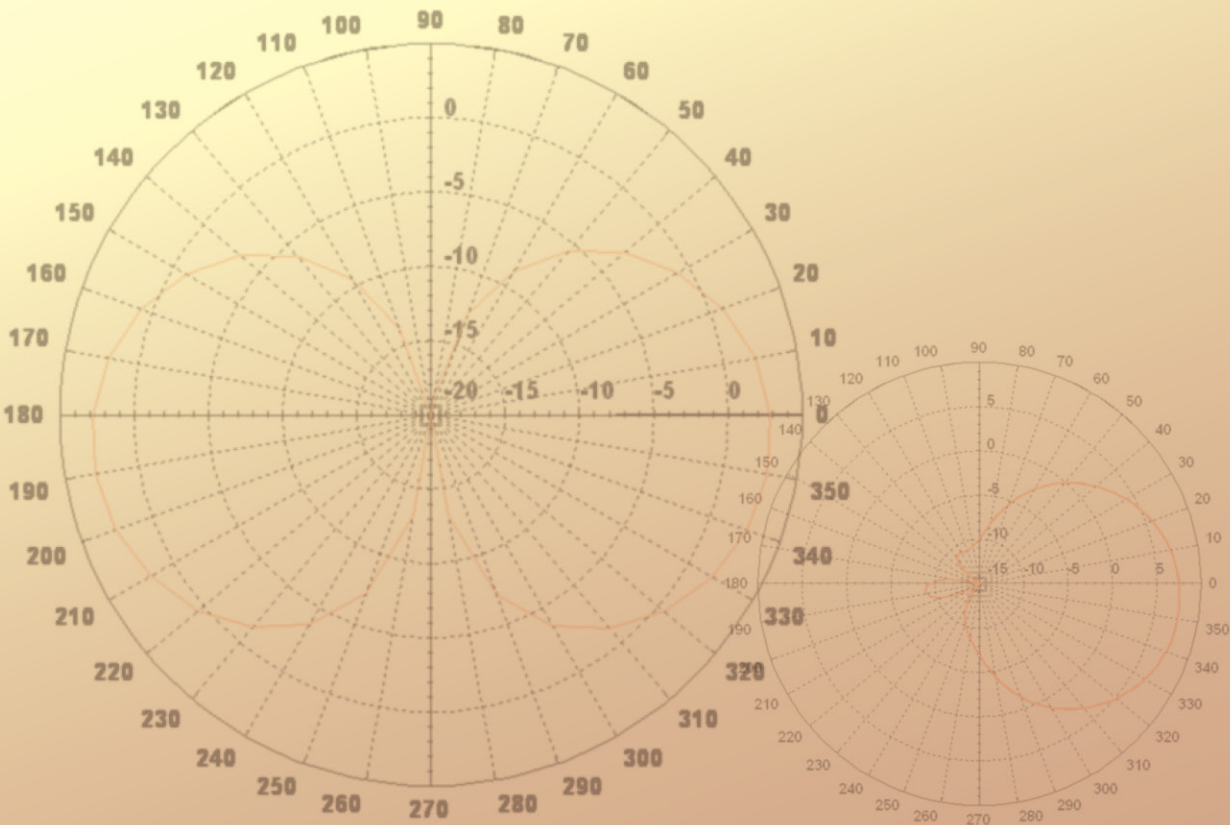
Application of AD-90A with MT-92 Wireless Interlinking Transmitter & AT-90W Transmitting / Receiving Directional Wideband Antenna



Application of AD-90S with MI-808T Stereo Transmitter & AT-90W Transmitting / Receiving Directional Wideband Antenna



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1. Why True Diversity Receiver is Required for Professional Performance?

Before choosing the professional wireless receivers for live performances, please study the following issues:

• Why the signal drop-out and noise occurs during the usage of wireless microphone systems:

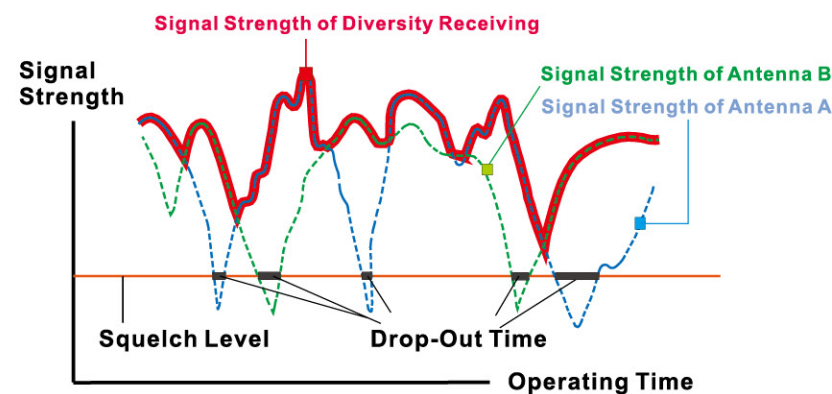
When the antenna of receiver receives the direct signal from the transmitter, it also receives the indirect signal reflected by the surrounding environment at the same time. As these two signals are out-of-phase, the signal strength will be canceled out; while the signal strength is lower than the receiver's muting threshold, then the output of the receiver will produce the signal drop-out and noise caused by the "dead point". The weaker the signal, the greater the noise.

• How to prevent wireless microphone systems from the signal drop-out and noise problems?

1. Using Switching Diversity Receiving mode to resolve the reception problems:

In order to overcome the defect of the single antenna receiving occurring signal drop-out and noise, the "Automatic Switching Diversity Receiving" design has been developed to solve these problems. The design employs two antennas setting at different locations to receive the signal from one wireless microphone transmitter, and then automatically switches to the one which is receiving stronger signal.

With this reception mode, when receiving weak signals, the improvement probability of signal drop-out is about five times higher than single antenna; while the signal intensity increased about three times (10dB), the probability can be improved to about 45 times; there's almost no signal drop-out in short operating distance. The higher the sensitivity of the receiver, the longer the reception distance and the less signal dropout, and the noise will be lower when the signal is weakened close to the receiver's muting threshold.



2. Switching Diversity Receiving category:

Using single antenna to directly connect to the tuner is known as "Non-Diversity Receiving", as shown in Figure 1. The Automatic Switching Diversity Receiving has two modes: "Dual Antenna Diversity Receiving" (Ant-Diversity) and "True Diversity Receiving" (True-Diversity).

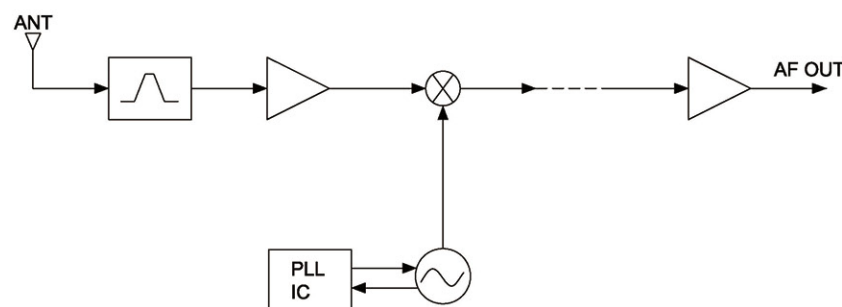


Figure 1 : Non-Diversity Receiving

Dual antenna diversity reception or called "Predictive diversity reception" employs two antennas in different locations. A specially designed CPU control circuit automatically switches to one antenna which is receiving a stronger signal and connects its signal to the tuner. The output signal of the demodulator provides a control voltage to the CPU control unit for quickly determine whether to switch to the another antenna or not, in order to achieve the antenna connection to always keep on the antenna which has stronger signal, and then the signal drop-out and instability caused by the "dead point" can be eliminated. As shown in Figure 2.

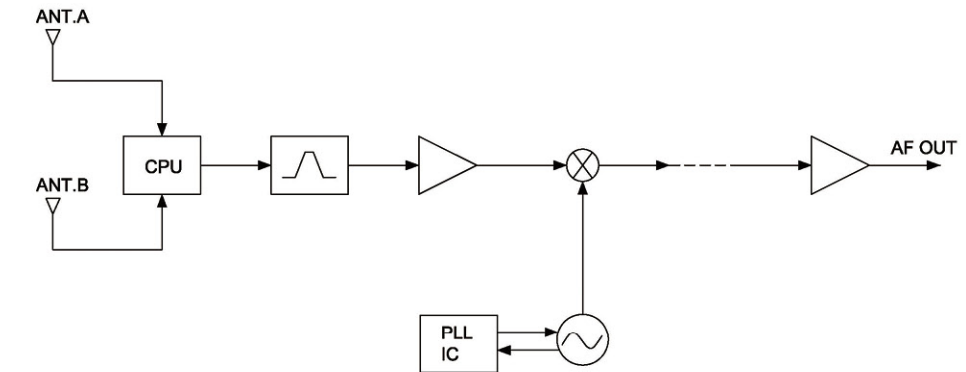


Figure 2 : Dual antenna diversity or called Predictive-Diversity Receiving

True-Diversity also employs two antennas in different locations and connecting respectively to dual tuners which have the same characteristics. The output signals are demodulated from tuner and connected to the comparator and switching circuit for fast switching to the stronger audio signal output. This receiving mode perfectly prevents signal drop-out and instability caused by receiving "dead point". As shown in Figure 3.

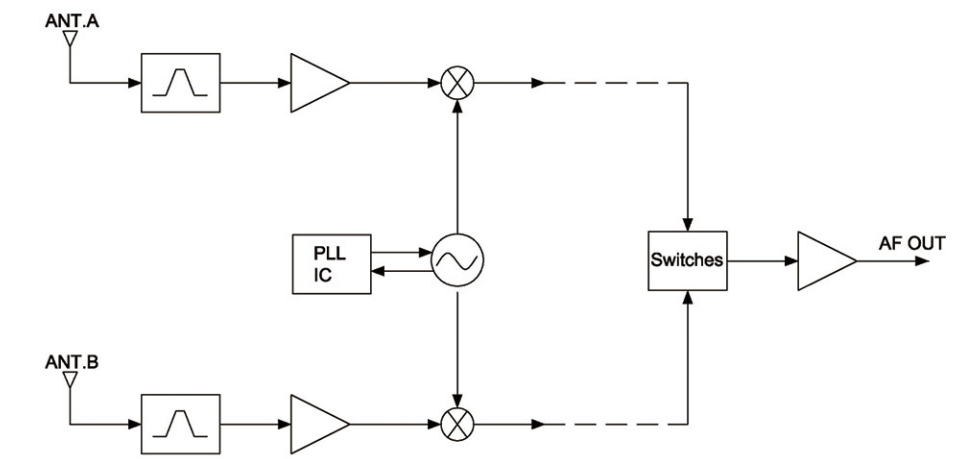


Figure 3 : True-Diversity Receiving

3. The advantages and disadvantages of Antenna Diversity and True-Diversity:

To lower cost, many wireless microphone manufacturers employ dual-antenna diversity receiving design. Though two antennas are applied to prevent signal drop-out, the result is not ideal because only one tuner is used. Therefore, it will not perfectly resolve the signal drop-out and signal instability especially under complex reception environments and longer distance operation is required.

True-Diversity receiving design utilizes two antennas connecting to two tuners respectively. The output signals from demodulator are connected to the comparator, and its output signal is always switched immediately to the better quality. Although the cost of this true diversity receiving mode is more expensive, it improves the quality of signal reception free from the signal dropout and noise interference.

4. Select "True Diversity" receivers to ensure wireless microphone perfect sound quality!

The true diversity wireless receiver eliminates signal dropout and signal shift during performance. Choice of the "True Diversity" receiver meets the requirements of professional audio quality. Although it is more expensive, it is the only choice for professional stages and live performances to ensure perfect sound quality!

Writer Profile: Andy Yeh, over 30 years in R&D of wireless microphone system. Currently R&D Engineer of MIPRO, primarily responsible for wireless receivers development.

2. Is It Better to Have More Switchable Channels in a PLL Receiver?

• Difference between the “switchable channels” and the “switchable interference-free channels”

A quartz-controlled receiver can receive only a single fixed channel signal, while a PLL receiver adopts a frequency synthesizer circuit design that can receive a frequency band and can freely switch to any desired working channel within that frequency band.

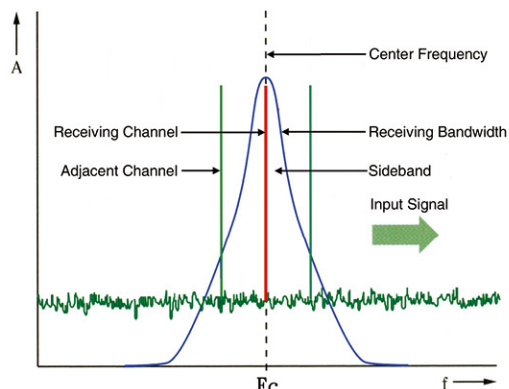


Figure 1: A Quartz Control Receiver receives a fixed frequency signal only.

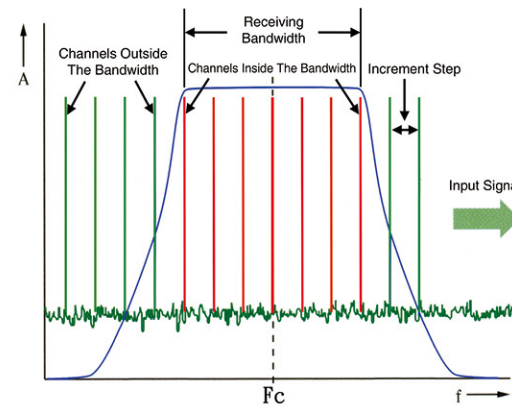


Figure 2: A PLL Receiver is able to switch channels within a receiving frequency band.

The numbers of switchable channels in a PLL receiver depends on the receiving frequency bandwidth and the switchable channel's interval step. The wider the bandwidth, the smaller the interval step is, and the more switchable channels will be available. For example, for a PLL receiver with a 25MHz bandwidth where each channel switches by 1MHz interval steps, then only 26 (25+1) channels will be available. If the interval step changes to 125kHz, then the switchable channels will increase to a total of 201 (25 ÷ 0.125 + 1). Similarly, if the interval step is changed to 25kHz, then 1001 channels are generated. For the same reason, the smaller the interval step is, the more switchable channels there will be, but is it really better to have more switchable channels available in a PLL receiver?

• Is it better to have more switchable channels in a PLL receiver?

Since the receiving channel of a PLL receiver has a fixed bandwidth, if the interval step of switchable channels is smaller than the receiving bandwidth, its center frequency will still cover within the sidebands of the receiving bandwidth and cause interference. For example, if a receiver has a 250kHz receiving bandwidth and switches channel by incremental steps of 25kHz, then 11 switchable incremental channels are available, but since all are included within the receiving bandwidth, sideband interference will occur. Consequently, it will be practical only if the interval step of adjacent switchable channels is wider than the receiving bandwidth. In other words, it is redundant to switch an incremental channel of interval step smaller than receiving bandwidth.

• How to choose an advanced PLL receiver?

When multiple channels are used simultaneously, it's not easy to select the non-interference ones. Not only does each channel's own multi-harmonic waves interfere with each other, but the receiver's selectivity and sensitivity, squelch threshold are factors that can also affect potential interference. As a result, for a more advanced PLL receiver, it is not desirable to have as too many switchable channels as possible, but rather to design a selected group of preset non-interference channels chosen from the switchable ones available within a certain bandwidth. This helps users rapidly switch to another “interference-free working channel” by choosing only from these pre-selected channels.

All of the preset channels for MIPRO's ACT series receivers are precisely selected, so that, with the unique ACT function, just one press of a button will make the receiver automatically and rapidly scan and lock on an interference-free channel within a set of preset channels. Additionally, it will skip any channels having interference and then lock on an interference-free channel, thus solving the biggest problem for users when setting up multi-channel systems. Therefore, the best design for PLL receivers should not be determined by the numbers of switchable channels available, but by the numbers of switchable interference-free channels that can be utilized.

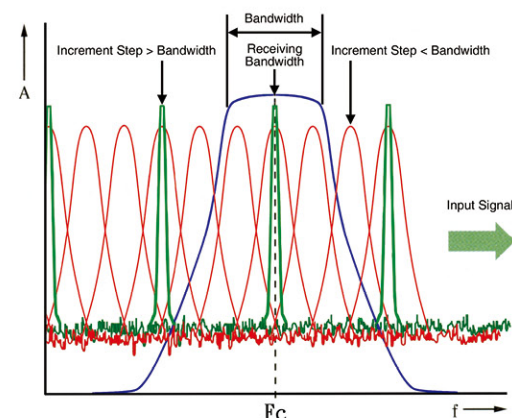
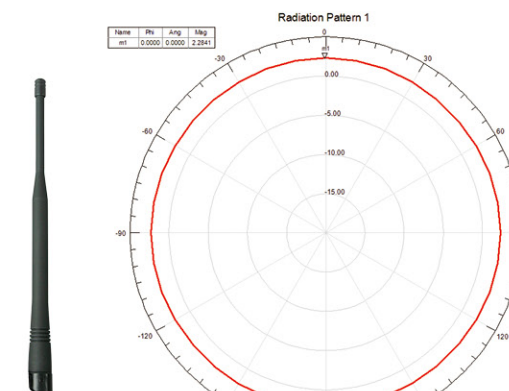


Figure 3: If the increment step of switchable channel for a PLL receiver is smaller than the signal of bandwidth, the sideband interference occurs.

3. The Proximity Effect of Multi-Antenna

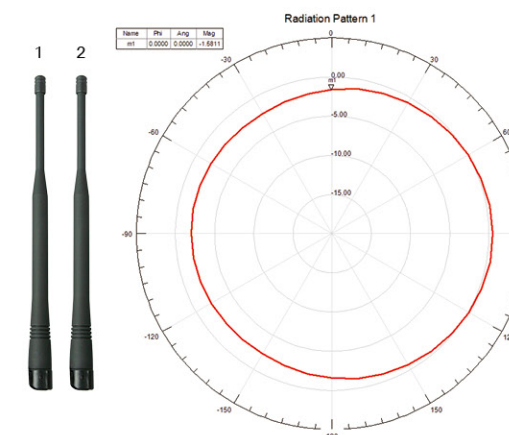
During multi-channel operation, receivers are usually stacked up where antennas of each receiver are very close to each other. However, many people always neglect the problem of such arrangements will greatly affect antenna efficiency. In fact, reduction of antenna efficiency greatly affected efficiency and stability of receiving and operating distance. Hence, the calculation of cable loss, antenna angles and the distance of each antenna are critical conditions to be taken into consideration. MIPRO provides data of some measurements for your reference. The following provides a variety of antenna installation examples, and their advantages and disadvantages:

• Case 1: Single Dipole Antenna : Antenna Pattern (Top View)



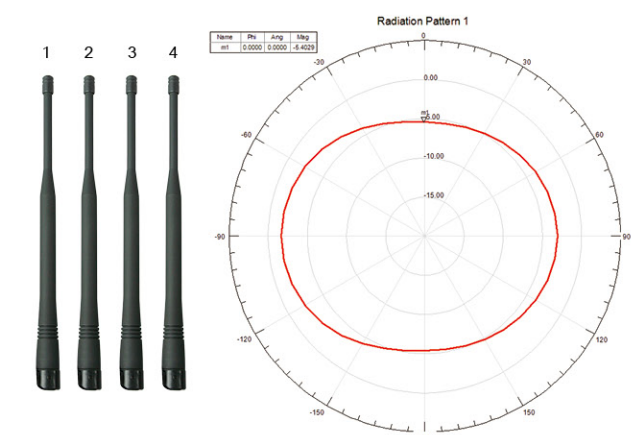
1. Antenna Gain: 2.3 dBi @ 0 degree
2. Antenna Efficiency: ~ 100%
3. Impedance Matching Loss: 0.16 dB
4. Total Antenna Gain (Antenna Gain - Impedance Matching Loss): 2.14 dBi @ 0 degree

• Case 2: Dual Dipole Antennas (Distance between Antennas: 20 mm) Antenna Pattern (z-axis)



1. Antenna Gain: -1.6 dBi @ 0 degree
2. Antenna Efficiency: 46%
3. Impedance Matching Loss: 0.29 dB
4. Total Antenna Gain (Antenna Gain - Impedance Matching Loss): -1.89 dBi @ 0 degree

• Case 3: Four Dipole Antennas (Distance between Antennas: 20 mm) Antenna Pattern (z-axis)



1. Antenna Gain: -5.4 dBi @ 0 degree
2. Antenna Efficiency: 25 %
3. Impedance Matching Loss: 1.25 dB
4. Total Antenna Gain (Antenna Gain - Impedance Matching Loss): -6.65 dBi @ 0 degree

Measurements Data of The Proximity Effect of Multi-Antenna Installation (Distance: 1/20λ)

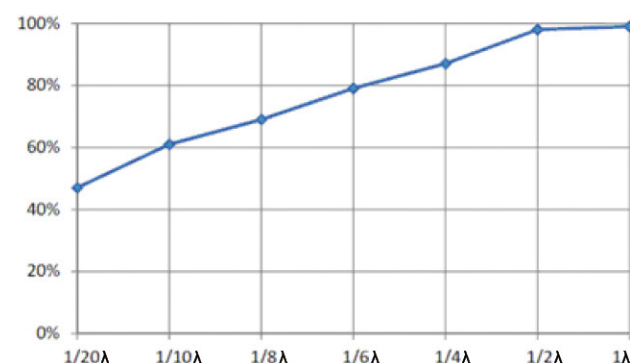
Antenna	Numbers of Antenna Used	1 pc	2 pcs	3 pcs		4 pcs	
	Antenna No.	1	1、2	1、3	2	1、4	2、3
Antenna Efficiency		100 %	46 %	41 %	29 %	42 %	25 %
Total Receiving Efficiency (incl. Impedance Matching Loss)		96 %	43 %	36 %	23 %	38 %	19 %
Antenna Gain Loss Compare to Single Antenna		0 dB	-3.53 dB	-4.27 dB	6.2 dB 1	-4.03 dB	-7.04 dB
Antenna Pattern		Very Evenly Radiated	Close to Evenly Radiated	Unevenly Radiated	Close to Evenly Radiated	Extremely Unevenly Radiated	Unevenly Radiated

Discussions about the proximity effect of multi-antenna

From above chart, we can see antenna efficiency drops from 100% to 19% when total antenna increases from 1 antenna to 4 antennas and additional 7 dB in gain loss. 6 dB gain loss means operating distance shorten by half and 7 dB loss means that the operating distance is shorten from 100 meters to 45 meters because additional installation of antenna. Hence, the proximity effect of multi-antenna greatly affects the receiving efficiency that should not be neglected.

How to keep an ideal interval between Antennas

The chart of interval and gain loss between 2 antennas



From above chart, if the interval between antennas is more than 1/4 λ , efficiency can reach more than 80%, and the interacting effect can be neglected. However, if the interval can be extended to 1/2 λ , the efficiency can reach 90%.

1/4λ Interval of Each Frequency Band

When installing antennas, minimum interval between antennas varies. Please refer to the recommending chart below for minimum interval between antennas under each frequency band. However, if an installation requires mixture of various frequency bands, always refers to the minimum interval between antennas of the lowest frequency band.

Frequency (MHz)	500 MHz	600 MHz	700 MHz	800 MHz	900 MHz
1/4 λ Distance (cm)	About 15 cm	About 12.5 cm	About 10 cm	About 9.4 cm	About 8.3 cm

Writer Profile: Michael Tsai, VP R&D of MIPRO. Over 30 years in research and development of wireless microphone systems.

The Best Solution for Multi-Channel Receiving Antenna Installation

Antenna installation is the most important factor for the transmission distance and signal quality of wireless microphone systems. Therefore, for multi-channel wireless microphone systems, it is necessary to know how to effectively simplify the large number of antennas to obtain efficient and stable reception quality as well as save the installation cost.

The following provides a variety of antenna installation examples, and their advantages and disadvantages:

Antenna mounted directly on each receiver :

If you want to setup a 8-channel wireless microphone system, you can choose four dual-channel receivers (eg. MIPRO ACT-72) or two quad-channel receivers (eg. MIPRO ACT-74), then directly mount each antenna on the receiver shown in Figure 1. This installation is simple and economical, but each antenna is so close that it inevitably will produce “The proximity effect of multi-antenna” and worsen the reception quality. (See 5. The Proximity Effect of Multi-Antenna, Technical Knowledge)



Figure 1A: Antenna installation with four dual-channel receivers



Figure 1B: Antenna installation with two quad-channel receivers

From Figure 2, we can see the variation of antenna receiving pattern and efficiency. The horizontal radiation pattern of antenna 1 presents a very uneven distribution, and the overall antenna efficiency decreases greatly to 42%! This setup method may result in different receiving signal strength for each channel, and affect the signal stability. This method would be the most simple and economical installation for short-distance reception and not demanding efficiency.

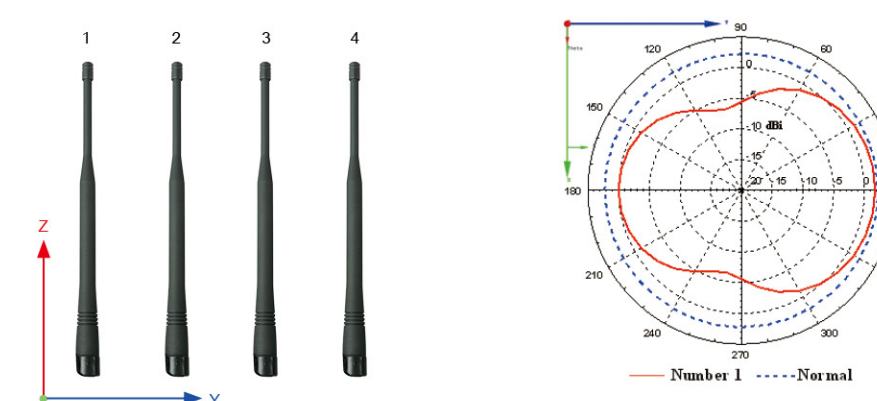


Figure 2: Horizontal radiation pattern of Antenna 1

• Daisy chain antenna divider

To avoid "The proximity effect of multi-antenna" caused by the antennas directly installing to the stacked up receivers, you can use an external or built-in daisy-chain antenna divider to share one pair of antennas, and simplify the system installation.

As shown in Figure 3, the input signal of antenna connected to the MIPRO AD-12 is divided into two signal outputs and these two outputs directly connect to the receiver's antenna inputs. This setup method is used for two receivers being stacked up.

However, although the 1-to-2 passive antenna divider simplifies the installation of antennas and avoids the "The proximity effect of multi-antenna", the cascaded divider would weaken the receiving signal strength, increase additional noise figure and decrease the sensitivity. Thus, the number of cascaded dividers must be as less as possible.



Figure 3: MIPRO AD-12 passive antenna divider

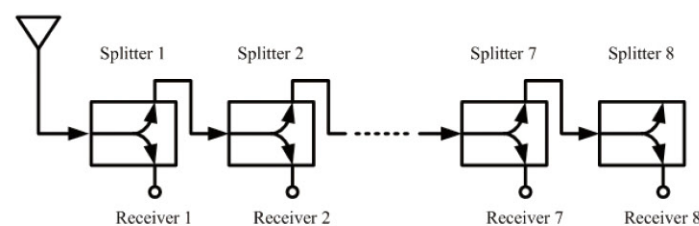


Figure 4: 1-to-8 active daisy-chain antenna divider

In order to solve the problem about the signal attenuation caused by the cascaded passive antenna dividers, the divider must be added a booster to become an active divider, so as to compensate for the signal attenuation.

Figure 4 shows a 1-to-8 active "daisy-chain" antenna divider. Ideally, the active daisy-chain antenna divider with a booster can compensate for signal attenuation. However, in a cascade of multiple receiver antenna systems, this noise figure of divider will cause the deterioration of the sensitivity.

As shown in Figure 5, assuming the noise figure of an active daisy-chain antenna divider is 5dB, the gain is 0dB, and the noise figure of receiver is 7dB. If there are eight dividers cascaded, the system noise figure of the eighth receiver will become 13dB, that is, the noise figure is worsened 6dB than the first one.

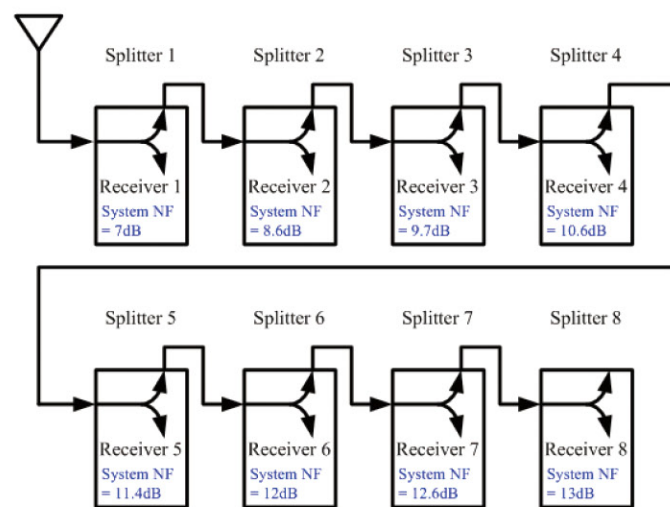


Figure 5: The noise figure of a 1-to-8 active daisy-chain antenna divider

• Parallel antenna divider

To avoid the disadvantages of the daisy-chain antenna divider, and to simplify the antennas installation by sharing a pair of antennas, the best method is to use the "parallel" antenna divider.

As shown in Figure 6, MIPRO AD-707a is an active parallel antenna divider. It has 1-to-4 outputs with a booster circuit to compensate for the signal loss, also an active output for connecting to another divider input port, so as to meet the needs of more than four receivers.

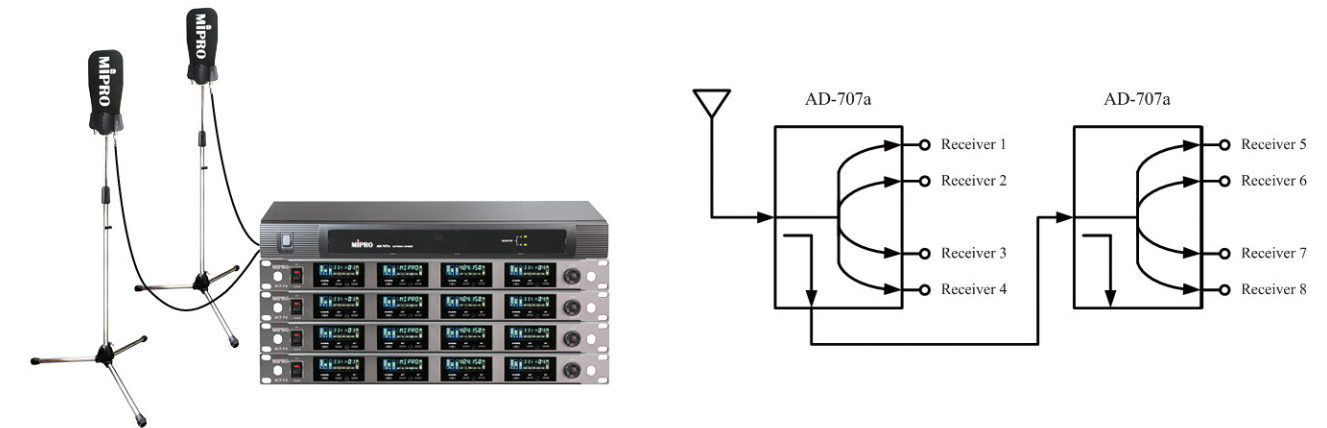


Figure 6: One AD-707a active parallel divider connected to four receivers, and can be cascaded to another divider.

For installing with eight receivers, assuming the noise figure of an active parallel antenna divider is 5dB, the gain is 0dB, and the noise figure of receiver is 7dB. The noise figure is estimated as shown in Figure 7A, the noise figure of system were 8.6dB (Receiver 1-4) and 9.7dB (Receiver 5-8). Compared to the noise figure of the original receiver, the differential can be controlled within 3dB. Under the same condition, the active daisy-chain antenna divider can connect only up to three receivers, as shown in Figure 7B.

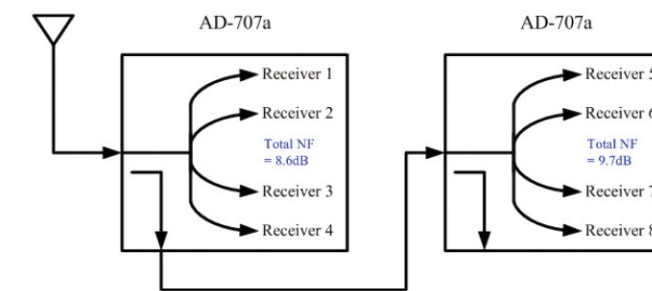


Figure 7A: The noise figure of two 1-to-8 MIPRO AD-707a wideband antenna dividers

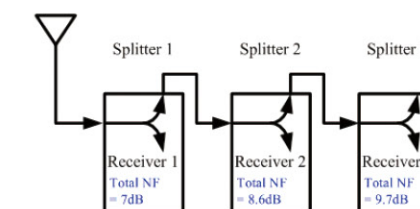


Figure 7B: For the same noise figure in active daisy-chain antenna divider system, only three receivers can be cascaded.

• MIPRO's multi-channel receiver antenna system is the most excellent products :

Some brands design their receivers with built-in active daisy-chain antenna divider to simplify the antennas installation. In fact, the sensitivity of the receiver would decrease as the number of cascade added. The MIPRO receiver with a built-in or external active "parallel" divider is designed to completely solve the above disadvantages. Studying the following cases will help you understand further.

1. 4-channel wireless microphone system :

If you choose other brands, you must stack up two of dual-channel receivers, and the sensitivity will decrease more than 1.6dB, as shown in Figure 8A.

If you choose MIPRO ACT-74 or ACT-747 quad-channel receiver, as both of them have built-in expensive active parallel divider with ultra-low noise figure and high dynamic input characteristics, only one pair of antennas is required. Without any cascade, the quad-channel receiver owns maximum sensitivity. This is the simplest, effective and cost-saving professional multi-channel system, as shown in Figure 8B.

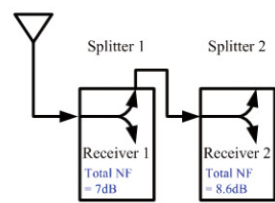


Figure 8A: Two dual-channel receivers with built-in active daisy-chain divider



Figure 8B: MIPRO ACT-74 quad-channel receiver, with built-in active divider, shows the highest sensitivity

2. 8-channel wireless microphone system :

If you choose other brands, you must stack up four dual-channel receivers and connect the antenna input and output of each receiver in order to share one pair of antennas. The result is the sensitivity will decrease more than 3.6dB, as shown in Figure 9A.

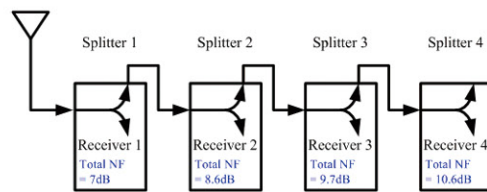


Figure 9A: Four dual-channel receivers with built-in active daisy-chain divider

If you choose four MIPRO ACT-72 or ACT-727 dual-channel receivers, as shown in Figure 9B, or two MIPRO ACT-74 or ACT-747 quad-channel receivers, as shown in Figure 9C. Both of them require only one AD-707a wideband antenna divider to share a pair of antennas. Due to low noise figure of the divider, the receiving sensitivity almost has no attenuation.



Figure 9B: Four MIPRO ACT-72 dual-channel receivers installed with an AD-707a wideband antenna divider



Figure 9C: Two MIPRO ACT-74 quad-channel receivers installed with an AD-707a wideband antenna divider

3. 16-channel wireless microphone system :

If you choose other brands, you must stack up eight dual-channel receivers and connect the antenna input and output of each receiver in order to share one pair of antennas. The result is the sensitivity will decrease more than 6dB (cable loss is not included), as shown in Figure 10A.

If you choose four MIPRO ACT-74 or ACT-747 quad-channel receivers, only one AD-707a wideband antenna divider is required to share a pair of antennas. As shown in Figure 10B.

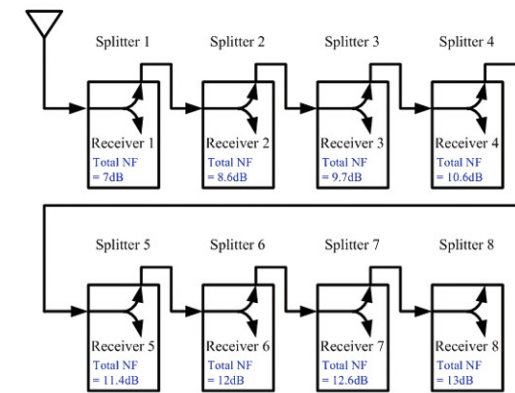


Figure 10A: Eight dual-channel receivers with built-in active daisy-chain divider



Figure 10B: Four MIPRO ACT-74 quad-channel receivers installed with an AD-707a wideband antenna divider

4. 32-channel wireless microphone system :

It is not recommended to choose dual-channel receiver with built-in active daisy-chain divider of other brands.

Use eight MIPRO ACT-74 or ACT-747 quad-channel receivers and two AD-707a wideband antenna dividers (one AD-707 for four receivers) to share a pair of antennas, as shown in Figure 11. The result is the sensitivity of each receiver is average and attenuation is limited within 3dB.



Figure 11: Two AD-707a wideband antenna dividers with eight quad-channel receivers to form a 32-channels system

5. Conclusion :

Using the antenna divider in the antenna installation for multi-channel receivers not only reduce the number of receiving antennas but also simplify the installation operations. Most important of all, the antenna short-distance coupling effects can be avoided, maintaining the original antenna radiation pattern and reception efficiency. From the description of this article we know that regardless of internal or external daisy-chain antenna divider, in fact, the number of cascade should be as less as possible to avoid the sensitivity attenuation. By using the parallel antenna divider to avoid the shortcomings of the daisy-chain divider is the best solution for the multi-channel receiver antenna installation.

MIPRO AD-707a wideband antenna divider adopts ultra-high dynamic, low noise active components and wideband microstrip circuit design, featuring ultra-low intermodulation distortion and loss. In parallel mode it provides four antenna diversity receivers to share a pair of antennas, which can eliminate spurious interference, and its output gain equals to 1. Without any external booster, it can keep the sensitivity of each receiver, and its daisy-chain output port allows more channels to be operated. Moreover, the output connectors provide bias for external booster, for easy to connect a variety of MIPRO antenna systems for long-distance transmission. Each divider output port has individual characteristic and does not affect with each other. To sum up, choosing AD-707a for the multiple system antenna installation is the best solution.

Writer Profile: Harry Hsiao, received his M.S.E.E. degree from National Chung Cheng University. His research topics focus on RF electric circuit and IC design. Currently R&D Engineer of MIPRO. Primarily responsible for research and development of antenna system products.

5. How to Improve the Transmission Distance and Signal Quality in a Wireless Microphone System?

• Antenna determines the actual reception distance and the quality of the receiving

Wireless transmission distance is mainly determined by the sensitivity of the receiver and the power of the transmitter. It can be improved by directly increase the transmitting power or receiving sensitivity. However, the two characteristics are provided by the manufacturer, and can't be changed arbitrarily by the users. In particular, the way to increase the transmitters' power is not only limited by the telecom regulations, the multi-channel signals interference will be more serious. Furthermore, the power consumption will increase, so that the battery life is considerably reduced.

The other way is to increase the sensitivity of the receiver, in theory, sensitivity being increased 6dB will increase twice the receiving distance, but in fact, it is not easy for user to change the sensitivity. In practice operating, the signal is received via the receiver's antenna, so the best way to improve the transmission efficiency of the overall system is through improving the characteristic of antenna and the antenna installations.

• The characteristics of antenna

In a wireless microphone system, the signal is transmitted via the transmitting antenna of the transmitter, and is received via the receiving antenna of the receiver. Therefore, the antenna is the passageway for transmitting and receiving the wireless signals, and its function is directly affected the signal transmission range and stability.

The detachable antenna design of MIPRO receivers allows users to choose different types of antenna to install for optimal reception.

The main characteristics of the antenna below are as follows:

1. Frequency :

To choose the antenna to be installed on a wireless microphone receiver, we must identify its frequency range at first. The antenna usually has the frequency range code on it. To select an antenna, we should make sure the frequency range is within the frequency range of the receiver, so that the signals received by the antenna can be delivered effectively to the receiver. Frequency is inversely proportional to the length of the antenna, thus the antenna of VHF system is significantly longer than the UHF system.

2. Impedance :

In general, the antenna impedance has two categories: 50 Ω and 75 Ω . MIPRO receiver antenna input impedance is designed with 50 Ω , so you must select the antenna with 50 Ω impedance to match perfectly to the receiver. Its specification is generally labeled with input reflection coefficient or Voltage Standing Wave Ratio (VSWR). A good antenna generally has the input reflection coefficient less than -10dB or VSWR less than 2:1.

3. Antenna Gain :

Antenna gain indicates the signal transmitting or receiving ability. The gain value is relative to an isotropic radiator, shown in units dBi, which "i" represents the isotropic radiator, a virtual sphere can transmit or receive signals towards all directions. As shown in Figure 1, the theoretical maximum gain value of a dipole antenna is about 2.15dBi. As the gain is usually designed to be concentrated to some degree, thus obtains the value > 0dBi. If the gain is designed to be concentrated toward one direction, the antenna will be called "Directional Antenna." The narrower the angle is, the higher the gain value. Meanwhile the gain of other directions will decline. Therefore when users are installing antennas, the directionality should be paid attention.

4. Antenna Polarization :

In actual use, the antenna polarization is an easily neglected character. Depending on the ratio of the electric field distribution, polarization can be divided into "linear polarization" and "circularly polarization." According to different placement, the linear polarization can be divided into horizontal or vertical polarization, while the circularly polarization can be divided into clockwise or anti-clockwise circularly polarization, depending on the rotation direction of the electric field. Most of the antennas are belong to the linear polarization, such as single-pole antenna, coaxial antenna, AT-70, AT-70W and AT-90W. Circularly polarized antenna, in fact, is more like "Elliptical polarization" characteristics. MIPRO AT-100 is the representative of this kind.

Polarized relations between the receiving and transmitting antennas will directly affect the quality of the signal. As shown in Figure 2 and Figure 3, if the wireless microphone receiver antenna is fixed to vertical polarization, and users swing the transmitter to the horizontal position, the signal will decline greatly and result in unstable reception quality. Especially in far and wide environment, the decline will be larger and cause an instant of signal drop-out. In this case, if the circularly polarized antenna is used, the vertical or horizontal polarization signals can maintain stable reception, so the signal will not significantly decline in an instant.

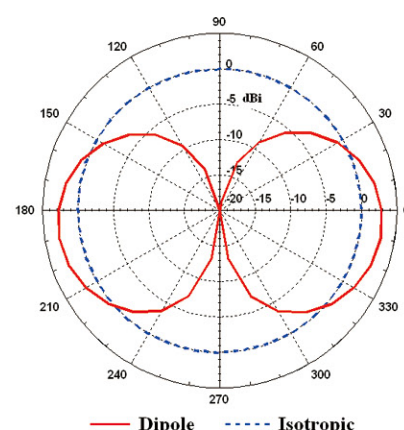


Figure 1: The vertical radiation pattern of a dipole antenna



Figure 2: How the signal quality present between the linearly polarized antennas



Figure 3: How the signal quality present between the linear and the circular polarization antennas

5. Antenna Radiation Pattern :

In a complete specification of an antenna, the antenna radiation pattern is indispensable. It helps users to recognize the antenna gain at the Null and the angle & direction of the Main Beam. As shown in Figure 4 and 5, antenna pattern diagrams include vertical pattern and horizontal patterns, providing important reference for antenna installation.

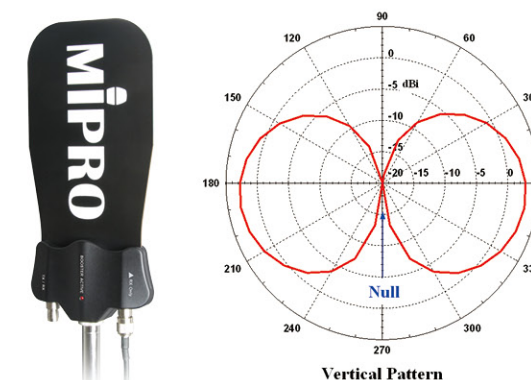


Figure 4: Vertical pattern for AT-70W antenna

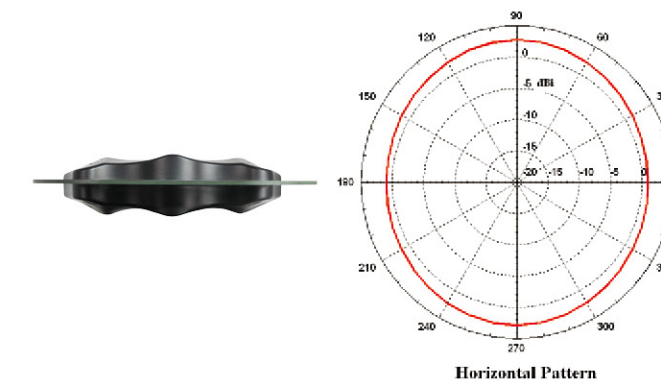


Figure 5: Horizontal pattern for AT-70W antenna

From the radiation pattern diagrams we can perceive the difference between the omni-directional and directional antenna. The omni-directional antenna has 360 degrees of reception angle and doesn't require adjusting the angle of the antenna, as shown in Figure 6. The directional antenna with 3dB beamwidth, that is, the antenna gain of angles range and the directionality attenuates from the maximum to 3dB, as shown in Figure 7. Users can select the proper antenna according to the environments. For example, when there's no particular direction between the microphone and the receiver, and in short distance, MIPRO omni-directional antenna is recommended. For live stages which need long-distance and particular direction, MIPRO directional antenna is usually selected to get better signal quality and prevents interfering signals from other directions.

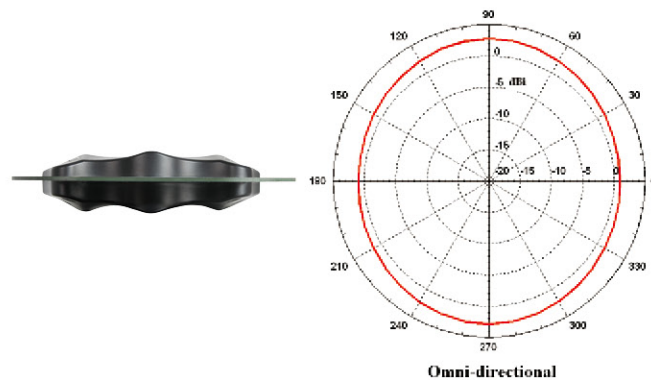


Figure 6: Horizontal pattern for AT-70W antenna

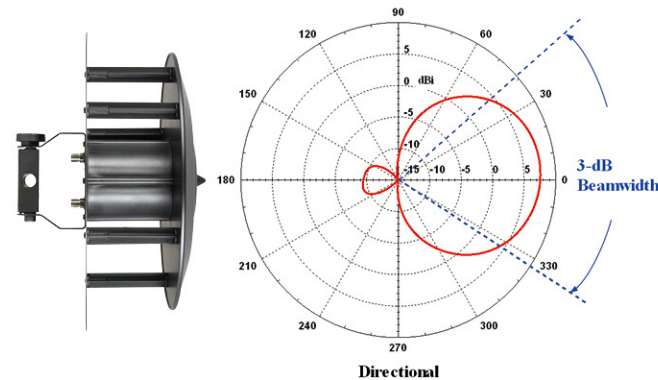


Figure 7: Horizontal pattern for AT-100 antenna

• Select different types of MIPRO receiving antennas to get the optimal reception quality :

MIPRO antenna systems have the most complete product line, and provide multi-channel wireless microphone systems for long-distance transmission, improved signal quality and simplifying the antenna installation.

MIPRO has the following types of the receiving antennas :

1. AT-10 Whip Antenna :

AT-10 is a 1/4 wave single rod antenna featuring wider band, omni-directional, and 50 Ω impedance. Directly mounted on the antenna connectors of a receiver to become monopole antenna for adequate sensitivity and operating range.

2. AT-20 Coaxial Antenna :

AT-20 is a 1/2 wave coaxial antenna that functions like a dipole antenna, featuring 2.15 dBi gain, 50 Ω impedance, and omni-directional. Directly mounted on the antenna connectors of a receiver for adequate sensitivity and operating range.

3. AT-70 UHF Ground Plane Antenna :

AT-70 is an UHF antenna that stabilizes signal receiving and prevents impedance interference from nearby objects because of its vertical 1/4 wave antenna is surround by horizontal antennas at a 45° degree, causing a 1/2 wave dipole antenna effect. Thus AT-70 has higher positive gain than a 1/4 wave single rod antenna and smoother impedance within 620~960 MHz band. Therefore, the length of the antenna does not need to be adjusted while receiving. The antenna is able to reduce interference by filtering signals outside the range. It is suggested to be installed at the central location of a hall, on the wall, inverted on a ceiling, or mounted on a tripod (MS-30).

4. AT-70W Wideband Transmitting and Receiving Omni-directional Antenna :

AT-70W is a bi-functional omni-directional antenna for professional receiving and transmitting within UHF range. Optimized for 470~1000 MHz, which is fully compatible with US and EU new telecom regulations. It has a 2~4 dBi gain which is ideal for any specific installation required with full directions. It can be easily distinguished by its new "W-Shape" appearance.

AT-70W has 2 input connectors, "TX" and "RX", which can be connected to transmitters and receivers directly. The "RX" connector is built with a 12 dB high gain booster specifically enabling receivers for a long distance reception.



Figure 1



Figure 2



Figure 3



Figure 4

5. AT-90W Wideband Transmitting and Receiving Log Antenna :

AT-90W is a bi-functional log antenna for professional receiving and transmitting within UHF range. Optimized for 470~1000 MHz, which is fully compatible with US and EU new telecom regulations. It has a 4~6 dBi gain which is ideal for any specific installation required. It can be easily distinguished from AT-90 by its new "W-Shape" appearance.

AT-90W has 2 input connectors, "TX" and "RX", which can be connected to transmitters and receivers directly. The "RX" connector has a built-in 12 dB high gain booster specifically enabling receivers for a long distance reception.

6. AT-100 Wideband Circularly Polarized Antenna :

AT-100 is a bi-functional log antenna for professional receiving and transmitting within UHF range. Optimized for 470~1000 MHz, which is fully compatible with US and EU new telecom regulations. It has a 6~8 dBi gain which is ideal for any specific installation required.

AT-100 has two built-in connectors: One "TX/RX" signal connectors for either transmitter or receiver. Another "RX Only" receiver only connector (cannot connect to transmitter) has a built-in 12 dB antenna gain booster provides extended reception range and compensates for coaxial cable signal loss caused to improve reception range and signal quality.

• The receiver must be equipped with right antenna system to get the optimal reception quality :

1. The receiver is operated at indoor / outdoor or short-distance receiving :

For the karaoke, small conference room, small concerts or other small-scaled environments, just mount a pair of single pole antenna or standard coaxial antenna directly install on the antenna input connector of the receiver and then screw-locked tightly. Even for short distance, the receiver still must keep stable receiving and free from the interference. When using single-pole antenna, due to the metal chassis is a part of ground element of the antenna, you should keep the antenna vertically to the receiver chassis. Receiving antenna should be far away from metal obstructions and noise interference sources, in order to get the optimal reception.

2. The receiver is operated at indoor / outdoor or long-distance receiving :

In live stages or long-distance reception, the professional true diversity receiver is required. In addition, the installation of the antenna system is more important.

Mount the AT-70 or AT-70W omni-directional antenna on the stand or upside down on the ceiling, then connect directly to the antenna input port of the receiver with the coaxial cable, making the receiver increase the reception range and quality. However, since the antenna is installed at high and far position from the receiver, connecting with long coaxial cable, and that will cause signal loss. You have to choose the cable with lower loss according to the distance, or to add with AT-70B or MPB-20 antenna booster to compensate for the cable loss.

For long-distance reception under more signal interference environment, the better way is to use AT-90W wideband log antenna. Set it on the stand vertically and adjusts the polarity direction toward the wireless microphones operating position. Since the log antenna has directivity and higher gain, it gets better reception quality. For the same operating environment above, the best way is to use AT-100 wideband circularly polarized antenna to eliminate the signal instant dropout and get more stable reception quality. (Refer to the AT-100 catalogue).

3. Use the antenna divider for two or more receivers to simplify the antenna installation :

When two receivers need an external antenna to increase reception distance, you can use the AD-12 Passive Antenna Divider/Combiner to simplify installation works.

When three or more receivers need an external antenna to increase reception distance, you can use the AD-707a UHF 4-channel antenna divider to simplify and improve reception quality. For five or more receiving systems, you can use two or more AD-707a.

4. Antenna system for extremely long distance :

In some large-scale professional stages require long-distance receiving operation, and the antenna system requires long cable connection, you must install with AT-70B or MPB-20 booster, or AT-90W, AT-100 directional antenna with built-in booster to compensate the cable loss and get optimal reception.

5. An example of 16-channel wireless system antenna installation for long-distance reception:

In the professional live stage, the auditorium and the long-distance reception application venues required up to 16 channels to be operated simultaneously, use 4 sets of ACT-74 quad-channel true diversity receiver and one AD-707 wideband antenna divider, connecting with a pair of AT-100 UHF circularly polarized wideband directional antenna. This package is the most economical combination with optimal performance, easy operating, and requires minimal installation space.

Writer Profile: Harry Hsiao, received his M.S.E.E. degree from National Chung Cheng University. His research topics focus on RF electric circuit and IC design. Currently R&D Engineer of MIPRO. Primarily responsible for research and development of antenna system products.

Reference: J. D. Kraus and R. J. Marhefka, Antennas: for All Applications, 3rd Edition, McGraw-Hill, 2003.



Figure 5



Figure 6

6. How to Design Transmission Cable and Booster for Antenna System?

1. First, estimate the distance between the antenna and the receiver as well as the frequency of transmitting signals. Then, find a suitable cable specification according to the tolerance of the receiving system.
2. 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
3. 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.
4. 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-90W	Use 5D-2V cable with booster	Use 5D-SFA cable with booster
<-2dB	Use 3D-2V cable with AT-90W	Use 3D-2V cable with booster	Use 5D-2V cable with AT-90W	Use 5D-SFA cable with AT-90W

5. 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, MPB-20 booster, and 50 meters of 5D-2V coaxial cable.

- From Chart A, gain of 1/2 wavelength antenna and MPB-20 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 A, C into 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-90W antenna	MPB-20 booster
Gain	2dBi	5dBi	12dB

Chart B: General specifications of 50 Ω 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/V	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.

7. How to Correctly Use the Auto Gain-Controller Antenna Divider?

In the wireless microphone system installation, the correctness of the antenna system installation greatly affects the quality of the receiving signal. Especially in long-distance receiving, the specifications of antenna, coaxial cable and booster must be considered carefully. In order to get the best reception, it is required to properly calculate the gain of antenna system. If the gain of the system is insufficient, it will reduce the receiving distance and stability; if the gain is too high, it will cause the inter-modulation interference in receiver and result in poor reception quality.

In order to solve this problem, MIPRO developed AD-708 UHF Auto Gain-Controller Antenna Divider and MPB-30 UHF Variable-Gain-Controlled Antenna Booster with built-in power supply. These two units can detect the cable loss between the divider and the booster, automatically adjust the proper gain of the booster to compensate the cable loss, and provide the receiver to have sufficient strength and stable receiving signal.

The application of AD-708 and MB-30 antenna systems in the long distance receiving, the installation method, the operating instructions and how to choose the coaxial cable are as follows:

• Installation Instructions:

1.The coaxial cable length does not exceed the length of maximum adequate limit in table A:

As shown in Figure 1, the cable loss between AD-708 and MPB-30 is able to obtain the correct compensation by Auto Gain-Controller function of the system. So, this system can be used with MIPRO all antenna products to obtain sufficient and stable signal strength. If any antenna has built-in booster, the cable must be connected to the TX/RX connector on the antenna (Non-booster input).



Figure 1: The system cable length does not exceed the maximum length of adequate limit. (Connected to TX/RX connector of the antenna)

2.The coaxial cable length exceeds the maximum length of adequate limit in table A:

It is necessary to use two cables to connect the system. One cable is connected between the AD-708 and MPB-30. The cable length must not exceed the maximum length limit, and then the cable loss can be compensated by the Auto Gain-Controller of the system. The other cable is connected between the MPB-30 and the antenna to get the proper noise figure and inter-modulation interference of the system.

As shown in Figure 2A, when the other cable length is less than one-third of the maximum adequate limit length, you can directly connect the cable to the connector of MIPRO's antenna which is without built-in booster. If the antenna has built-in booster, the cable must be connected to the TX/RX connector. The cable loss of receiving system will be controlled within an acceptable range.

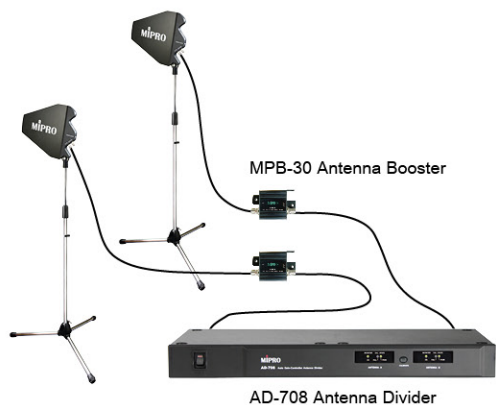


Figure 2A: The system cable length exceeds the maximum length of adequate limit. (Connected to TX/RX connector of the antenna)

When the other cable is longer than one-third of the maximum length of adequate limit, you can use MIPRO's antenna with built-in booster, and connect the cable to the RX Only connector on the antenna. The cable loss of receiving system will be controlled within an acceptable range. At the same time, the system can obtain sufficient and stable signal strength.

Notice! The booster must use an external power supply. As shown in Figure 2B.

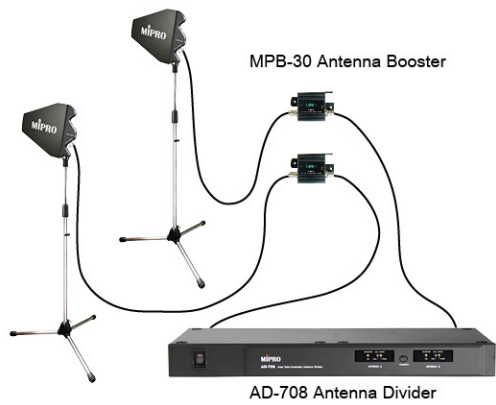


Figure 2B: The system cable length exceeds the maximum length of adequate limit. (Connected to RX Only connector)

2. AD-708 can be directly connected to MIPRO's antennas or MPB-20:

AD-708 can also be connected directly to all the MIPRO's antenna except for MPB-30. It provides four channel signals for four receivers and supplies the booster bias. At the status of AD-708 supplying the booster bias, the front panel "BOOSTER ON" indicator lights on and the other indicators remain off. AD-708 may be connected to MPB-20 or the built-in booster of antenna, and provides fixed gain to the signal, but there is no automatic variable gain controlled function.

• Operating Instructions:

After the antenna system is installed, turn on the AD-708. As shown in Figure 3, at first, AD-708 divider will identify whether the antenna input port A and B are connected to the MPB-30 booster. If the front panel "BOOSTER ON" LED lights, the booster is already working properly. Otherwise, the cable should be checked whether the disconnection or lack of bias. If so, you must add an external power supply to the booster.

Next, press the "CALIBRATE" button, the divider will automatically detect the cable loss of antenna port A and B, and adjust the gain of the system. Then, if the front panel "PASS" LED lights on, it indicates the gain adjustment have been completed, and the system can be started to use normally. If "FAIL" LED lights on, it indicates the cable loss exceeds the range which the booster is able to compensate, and you must check whether the cable is too long or the connector has not been perfectly locked, causing the RF signal loss. After check and adjustment, press the "CALIBRATE" button again, the divider will once quickly detect the cable loss and gain adjustment. Notice! When the "BOOSTER ON" LED does not light on, the cable loss detection and gain adjustment functions will not be activated, "PASS" and "FAIL" LEDs will remain off.



Figure 3A: Booster is working



Figure 3B: Calibration is completed



Figure 3C: Cable loss is overload

• The coaxial cable list for reference:

According to the variable gain range of MPB-30, Table A lists several available cable specifications. Cable length can be used normally within the maximum adequate limit length, and the maximum acceptable loss of the receiving system is controlled less than 3dB.

Table A: General 50Ω coaxial cable specifications

Models	Attenuation (dB/10m)		Maximum length limit (m)
	200MHz	1.0GHz	
RG-58A/V	2.3	5.8	30
3D-2V	2.1	5.2	33
5D-2V	1.5	3.8	45
8D-2V	0.9	2.2	80
5D-SFA		1.8	95
8D-SFA		1.2	140

Writer Profile: Harry Hsiao, received his M.S.E.E. degree from National Chung Cheng University. His research topics focus on RF electric circuit and IC design. Currently R&D Engineer of MIPRO. Primarily responsible for research and development of antenna system products.

8. The Discussion on 2.4GHz Wireless Microphone System

• Introduction:

The technology and reliability of 2.4GHz wireless transmission are improved in the recent years, and on the other hand, the wireless regulations of each country on the UHF (below 1GHz) band is becoming more and more strict. Hence, the development of wireless microphone systems at 2.4GHz band belonged in ISM (Industrial Scientific Medical) band has been gradually paid attention by the wireless microphone industry. However, the efficiency of 2.4GHz system is limited due to its physical characteristics and can not be better than the UHF systems. In this topic we describe the characteristics of 2.4GHz wireless microphone system and analyze the advantages and disadvantages. Beside, the comparison with UHF system is also mentioned.

• The characteristics of the 2.4GHz band

The 2.4GHz band is one of the ISM bands which are special bands reserved internationally for used in industrial, scientific and medical purposes. The carrier ranges from 2,400 MHz to 2,483 MHz, which has a bandwidth of 83MHz. While the definition of each country on the ISM band is not the same, 2.4GHz band is internationally accepted.

Depending on the difference of modulation schemes such as ASK, FSK, QAM, the modulation bandwidth of 2.4GHz band can be from 250kHz to 44MHz, which is wider than that of UHF under the wireless regulations.

As 2.4GHz band is in the ISM band, various number of transmission protocol standards have been developed. On the other hand, there are huge number of users coexisted in the bandwidth of 83MHz on 2.4G band, the interference is particularly serious. To solve this problem, the frequency hopping scheme is usually an approach to reduce the interference.

Since the wavelength of 2.4G band is about 1/3 (or less) of UHF (below 1GHz) band, the reflection effect is noticeable and the penetrating of signal is poor. Due to the above mentioned, the signal of 2.4GHz band in the place with many obstacles is easily missing and drop-out, more technical design such as signal re-transmission or multi-transmission technology is need to overcome this problem.

• Transmission distance:

Compared with 2.4GHz band, the signal of UHF band has better rate of penetrating through the obstacles, the transmission distance will not decay so much in outside or indoor. However, the transmission distance will be substantially attenuated under the same condition while using 2.4GHz system. Recently, the transmission distance and reliability of 2.4G wireless microphone systems has significantly improved by the research of fading compensation, frequency hopping, re-transmission and other aspects of technology.

• Audio latency:

Under the 2.4GHz system, the audio signal is maintained un-interruption by using re-transmission scheme while the transmission signal is loss. However, the re-transmission scheme is compromised by signal delay in which the audio latency of 2.4GHz system is larger then that of UHF system. While numbers of 2.4GHz systems are used at the same space, the error and missing rate of signal are increased due to the large number of interference, more signal latency is required for re-transmission scheme to provide the high audio quality and reliability.

• Number of Channel compatible:

Theoretically, the 2.4GHz system with a bandwidth of 83MHz can provide a large number of channel compatible, however due to huge number of the users, the interference of 2.4GHz system with the frequency hopping technique is still worse than that in UHF band. A system provided 12 compatible channels have developed in recent years, but is still much less then that in UHF system in the same bandwidth.

• The advantages and disadvantages of wireless microphone system based on 2.4G wireless standard protocol:

Since many standard wireless transmission protocols in 2.4G band have been developed, there are many resources corresponding with hardware and software to easy to develop the 2.4GHz system. As a result, some wireless microphone system using these protocols have been developed. However the wireless microphone system must have a sound quality with low latency and un-interruption. The systems based on the standard 2.4GHz transmission protocol are unable to overcome the long latency and signal missing. Beside, some systems only provide the speech of sound quality. As a result, there are not yet to meet the quality of stage performance requirements.

The 2.4GHz wireless microphone systems based on the hardware and software resource of the standard protocols are not suitable for the requirement of stage performance, so many chip manufacturers have developed the single-chip specifically for home entertainments. However, at present, there is no single-chip completely meets the professional applications.

• The development status of industry

Generally, the consumer 2.4GHz wireless microphone system is usually developed by the integrated chip (RF + base-band) with MCU, the latency, signal drop-out and more compatible channels are still need to improve.

The professional system is developed by some commercial single-chips or customer defined base-band processing chip, although the performance of using distance and signal drop-out are improved to close to the performance of UHF system, but the channel compatible is not yet breaking through.

• Summary:

Recently, the 2.4GHz wireless microphone system with reliable performance in the current market is expensive then the UHF system. However, the UHF band is currently increasingly crowded since it is limited by the wireless regulations; as a result, the 2.4G wireless microphone systems still have the potential for development.

The comparison of 2.4G and UHF wireless microphone system

Band	2.4G wireless microphone system	UHF wireless microphone system
Frequency range	2,400MHz~2,483MHz	300MHz~1,000MHz
Diffraction characteristics	Seriously multi-path effect, easily short-distance signal interruption	Un-notable short-distance signal interruption
hardware integrating	RF+ base-band chip+ packet processing chip.	Discrete element.
Modulation bandwidth	Depending on standard, maximum 44MHz.	<200kHz
Distance under same power (without any signal processing)	1/3	1
Audio quality	Digital CD quality	Analog or Digital CD quality
Audio latency	>5ms	Depending on modulation and hardware
Application	Home entertainment, KTV	Unlimited
Congestion and interference	Bluetooth, Wi-Fi and various wireless standards protocols use the same frequency band, vulnerable to interference.	Each country has started planning the wireless microphone band.
Using status in industry	Susceptible to interference, so that it can not be safe to use in professional stage, and is currently used for family KTV or small music performances.	Unlimited, usually used in the professional stage.
Number of channel compatible	less	many

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9. Color VFD is MIPRO Professional Receiver's Discrimination

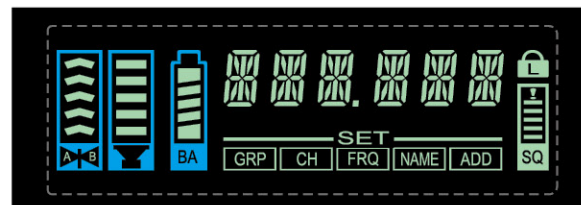
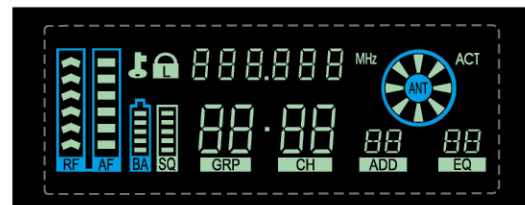
Electronic products display has evolved from black & white to colors due to pursuit of visual realism. In the past, monochrome black & white in high-end automobiles or audio equipment are considered professional. However, currently, professional designers have deviated from the monochrome black & white into gray and gray to full colors to fulfill goal of the modern human color vision.

MIPRO CEO graduated with a Fine Art degree and has incorporated colors into product visualization. Deviate from monochrome black & white into full color style to conform with the evolution trend.

MIPRO receiver panel display has changed from LED in the beginning to back-lit LCD to color LCD and now, color VFD, so all pertinent parameters are displayed clearly at the same screen for easy viewing.

The increased display parameter in professional receivers has resulted in viewing in multiple pages due to limited space and complex setting procedures. To combat these problems, MIPRO has utilized a single display using multiple colors to identify parameter sections.

For over a decade, MIPRO has sold the professional color VFD receivers to AV system integrators, contractors, audio engineers, rental & production companies in Europe, North America and Asia, including Taiwan. Our advanced designs have been widely accepted by the audio professionals and color VFD receivers have become the discrimination for professional models of MIPRO.



Writer Profile: K.C. Chang, MIPRO CEO, 50 years in R&D of wireless microphone systems.

A	
ACT-101	45
ACT-22T	60
ACT-100B	37
ACT-300B	35
ACT-311B	34
ACT-312B	34
ACT-312BT	33
ACT-32H	39
ACT-32HR	39
ACT-32HC	41
ACT-32T	43
ACT-32TC	44
ACT-51B	29
ACT-515B	27
ACT-52B	29
ACT-52H	31
ACT-52T	32
ACT-525B	27
ACT-70H	21
ACT-70HC	23
ACT-70T	25
ACT-70TC	26
ACT-707SD	59
ACT-71	17
ACT-717B	19
ACT-72	16
ACT-727B	19
ACT-72H	21
ACT-72HC	23
ACT-72T	25
ACT-72TC	26
ACT-74	15
ACT-747B	19
ACT-80H	11
ACT-80HC	12
ACT-80T	13
ACT-80TC	13
ACT-818	8
ACT-828	7
ACT-8D	59
AD-12	100
AD-707a	98
AD-708	97
AD-808	100
AD-90A	99
AD-90S	99
ASP-10	66
ASP-30	66
AT-10	89
AT-100	90
AT-20	89
AT-70	89
AT-70W	96
AT-90W	95
B	
BC-100	67

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