COMMUNICATION ELECTRONICS TECHNOLOGY DIVISION

WATKINS-JOHNSON COMPANY

CET CONDENSED CATALOG

Table of Contents

ELECTRONIC EQUIPMENT GROUP

The Electronic Equipment Group (EEG) was established on January 1, 1989 and consists of two operating divisions and a manufacturing facility in Wake County, North Carolina. The two operating divisions, CET (Communication Electronics Technology) and RET (Reconnaissance Electronics Technology) are both engaged in the design, development and production of SIGINT equipment. The Group has a comprehensive collection of receiving equipments and peripheral boxes which cover the entire radio frequency spectrum. The units described in this short form catalog are available as standard catalog items. These products can be used as stand-alone units or they may be integrated into more complex systems or subsystems.

Watkins-Johnson Company prides itself on greater than three decades of producing equipment which has kept pace with a rapidly changing electromagnetic environment. W-J has a well deserved reputation as a leading supplier of innovative, state-of-the-art, high-quality, reliable products serving the United States government, commercial customers, and friendly countries worldwide.

CORPORATE HEADQUARTERS
Palo Alto, CA

CET DIVISION
Gaithersburg, MD

Communication Electronics Technology Division

The Communication Electronics Technology (CET) Division of Watkins-Johnson Company was established on January 12, 1988. The CET Division manufactures a diverse array of communications equipment, such as surveillance receivers, direction finders, demodulators, signal processors, jammers, EMC/TEMPEST test systems, and accessory equipment. These products cover the frequency spectrum from 1 Hz to greater than 18 GHz. Many are stand-alone units that can be interfaced with other equipment to develop complex subsystem and/or system configurations.

CET engineers continue to design and develop general-purpose and specialized receiving equipment integrating analog, digital, and RF technologies. Their efforts are being focused on meeting the ever-increasing demands in the strategic and tactical communications environments. In addition, training courses on production equipment are provided.

The following pages show a cross section of the CET Division product line. For more detailed information on these products and/or other available equipment, including modified versions of various units, please contact Applications Engineering at the CET Division in Gaithersburg, Maryland, or one of the Watkins-Johnson Field Offices listed on the back cover of this catalog.

RET DIVISION

The RET Division (Reconnaissance Electronics Technology), located at the San Jose Plant, designs and produces microwave receivers, tuners, demodulators, and synthesizers for the U.S. Military, prime contractors, and international markets. These products are wideband, narrowband, manually controlled, and digitally controlled, commercial grade and Mil-Spec and produced using the latest packaging and manufacturing techniques. The RET Division focuses its products in the microwave and millimeter frequency ranges.

The W-J special purpose and military frequency synthesizers are an important product line in the RET Division. W-J synthesizers have been an industry leader for fifteen years. Products from this product line and other W-J equipment form the nucleus of our specialized EW and Radar Simulator systems.

WAKE COUNTY FACILITY

Located in the vicinity of North Carolina's Research Triangle is a support services facility of Watkins-Johnson Company. This facility presently provides precision fabrication, test, and assembly of various W-J products, and has the capabilities to undertake most Build-To-Print manufacturing.

Watkins-Johnson has incorporated over 80 years of combined management experience with the latest in automated machinery to smoothly and efficiently produce quality products. We stress our ability to perform tasks in a timely and cost-effective manner. Computerized materials inventory and computer-aided design techniques are employed for tracking the large quantities of raw materials kept on hand enabling rapid response times to customer needs.

Our plant, located in Fuquay-Varina, has been organized to effectively use the 50,000 square feet of floor space available and to operate in the most cost-effective manner possible. Furthering these goals are the utilization of local resources and the employment of many local residents. The company holds specialized training on our state-of-the-art manufacturing equipment for new employees, and also encourages advanced courses for interested individuals.

The Manufacturing process begins with the development of drawings, and flows smoothly through the production cycle which is fabrication, inspection, assembly, and test. Fabrication of raw materials is accomplished using programmable punch presses for duplication of specific patterns. The fabrication operation consists of shearing, punching, grinding, and sanding on semi-automatic and precision equipment, passes through a marking station using silk screening and stencil machines, and into sheet metal assembly. As each operation is completed, the product must pass inspection before moving on to the next step. The process ends with final inspection.

Since protection of the environment is of vital importance, Watkins-Johnson has installed a waste treatment system for separation of chemicals from the waste water and uses a chemical treatment process for resistance to corrosion and deterioration. The water leaving this process is chemical free, while all harmful chemicals are collected in a solid block for proper disposal.

High quality, safety, and cost-effective operation make the manufacturing plant in Fuquay-Varina, North Carolina, a viable alternative for many small and large fabrication and assembly requirements.

RET DIVISION
San Jose, CA

WAKE COUNTY FACILITY
Fuquay-Varina, NC

Integrated Logistics Support (ILS)

TRAINING

Experienced Watkins-Johnson training specialists teach courses in the operation and maintenance of all equipment manufactured by the Electronic Equipment Group. Classes can be conducted in a formal classroom or informal setting. Training is geared to typical applications of Watkins-Johnson equipment, but can be tailored to the specific mission of the customer. Training, consisting of lectures and laboratories, emphasizes hands-on experience in operating, troubleshooting, and repairing equipment.

Typical training sessions accommodate up to ten students knowledgeable in digital and analog electronics. An operation and service manual is the basic text for the course with supplementary handouts provided as required. Training can be provided at Watkins-Johnson's facilities or at a customer site.

Special lesson plans and training materials have also been developed to provide the customer with an in-house training program for all Watkins-Johnson equipment.

VIDEOS

Watkins-Johnson can provide everything from simple audio-visual tapes to professional videos for training or other purposes.

The training packages, consisting of student workbooks and audio visual tapes or videos, can offer the customer a cost-effective means to develop an in-house training program related to Watkins-Johnson equipment. Video cassettes are produced for compatibility with VHS, Beta, and Umatic formats and NTCS or PAL television systems.

OTHER INTEGRATED LOGISTICS SUPPORT

Training courses, lesson plans, training tapes, and videos are several ILS services. Others include:

- Production of all levels of MIL-Spec technical manuals;
- Production of all levels of Repair Parts and Special Tools Lists (RPSTLs);
- Preparation of both Short-Form and Long-Form Provisioning Parts Lists (SFPPLs and LFPPLs);
- Logistics Support Analysis (LSA) and preparation and maintenance of Logistics Support Analysis Records (LSAR) on in-house computers;
- Level of Repair Analysis;
- Interim Support Items Lists (ISIL) and Recommended Spares Listings; and
- Preparation of Ground Support Equipment Selection Data (GSESD).

W-J/CET Thick Film Hybrid Facility

- Thick Film Chip-and-Wire With SMT
- Commercial to Paramilitary Quality-Tested to MIL-STD-883
- Quick Reaction Time
- Secure Facility
- Custom or Build-To-Print Hybrids

The communications equipment marketplace continues to respond favorably to *smaller*, more capable equipment. In response, Watkins-Johnson's CET Division is rapidly developing new electronic circuit design, packaging, and manufacturing methods. At CET, Surface Mount Technology (SMT) is becoming a dominant manufacturing and interconnect design media. In addition, an in-house Thick Film Microelectronics facility has been developed for both internal Corporate and external customer needs. The CET thick film facility can apply a practical and cost-effective microelectronic solution to high-density electronic packaging requirements.

ENGINEERING RESOURCES AND CAPABILITIES

Supporting the CET Thick Film Hybrid Facility is a staff of over 50 skilled electrical, mechanical, and manufacturing process engineers and specialists. This staff represents twenty-five years of applicable RF, analog, and digital circuitry design experience. Specific engineering design expertise is in the following areas:

- RF Circuitry From VLF to Microwave Including Filters, Amplifiers, and Converters
- IF Circuitry Including Demodulators, Filters and AGC Circuits, Etc.
- High Speed Digital Signal Processing and Control Circuitry

CET engineers can develop customer-provided specifications or schematics into commercial-to-paramilitary quality, custom thick film hybrids. The Lab is well suited for quick reaction requirements and was specifically designed to comply with stringent government security regulations. The facility is located in a static-protected, clean room environment. Work in progress is protected and organized in dry nitrogen cabinets located throughout the facility.

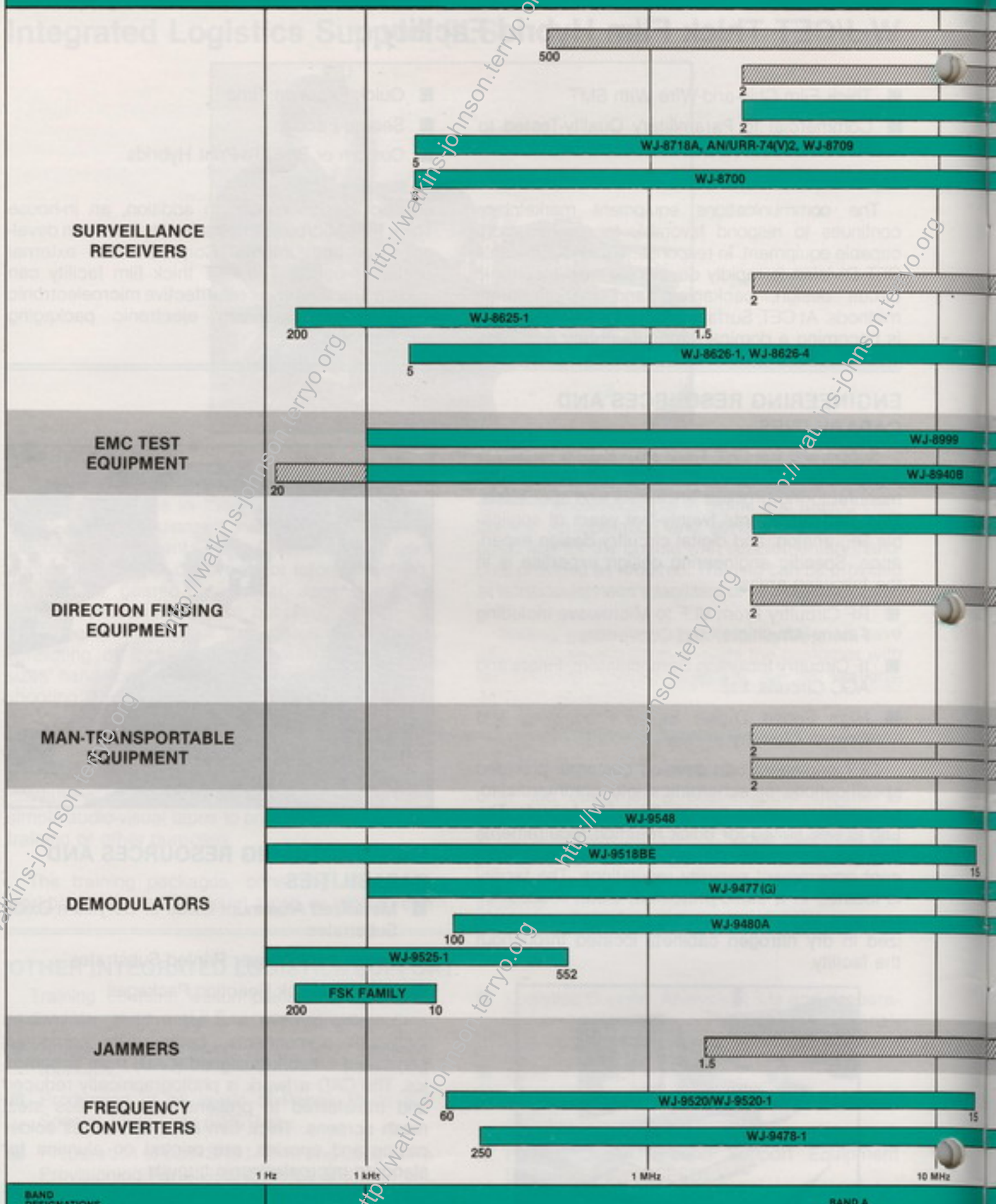
MANUFACTURING RESOURCES AND CAPABILITIES

- Metallized Aluminum Oxide or Beryllium Oxide Substrates
- Single or Multilayer Printed Substrates
- Custom Quick Reaction Packages

Complex devices and assemblies, as well as individual components, begin with computer-generated artwork designed (CAD) from schematics. The CAD artwork is photographically reduced and transferred to presensitized stainless steel mesh screens. Thick film inks, as well as solder pastes and epoxies, are printed on alumina for standard microelectronic circuits.

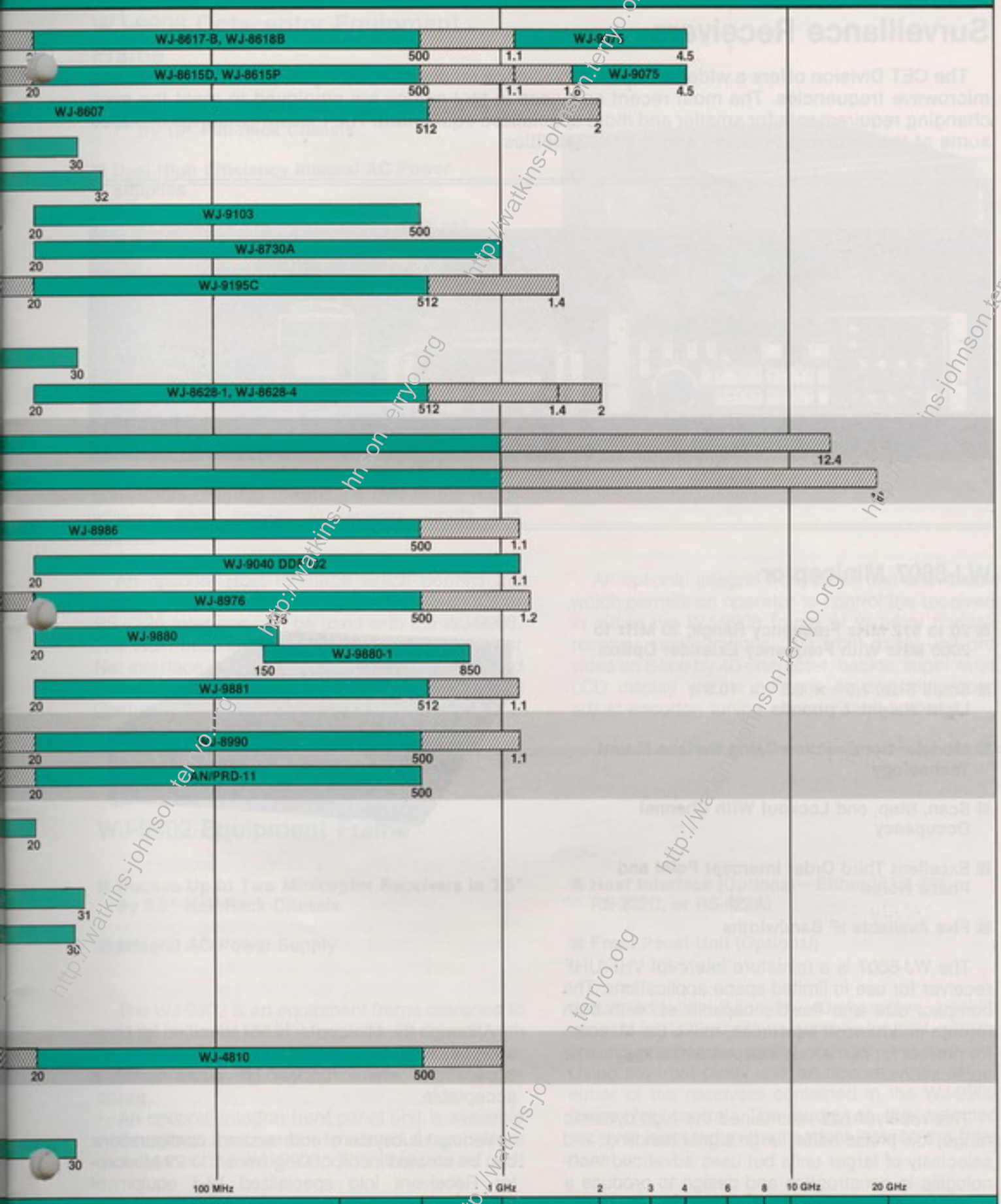
FREQUENCY RANGE CHART

WATKINS-JOHNSON COMPANY • Communication Electronics Tech



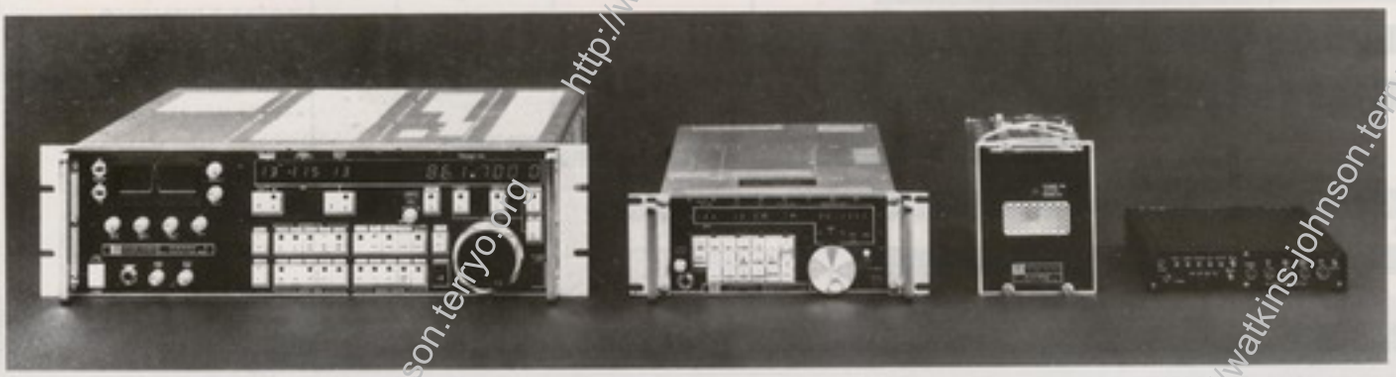
Indicates Extended Range

FREQUENCY RANGE CHART



Surveillance Receivers

The CET Division offers a wide variety of surveillance receivers covering HF, VLF, VHF/UHF, and microwave frequencies. The most recent advances in technology are employed to meet the ever-changing requirements for smaller and more specialized equipment. The following listings describe some of the receivers available and their capabilities.



WJ-8607 Miniceptor

- **20 to 512 MHz Frequency Range; 20 MHz to 2000 MHz With Frequency Extender Option**
- **Small Size: 1.5" × 6.5" × 10.5"; Light Weight: 5 pounds**
- **Modular Construction Using Surface Mount Technology**
- **Scan, Step, and Lockout With Channel Occupancy**
- **Excellent Third Order Intercept Point and Phase Noise**
- **Five Available IF Bandwidths**

The WJ-8607 is a miniature intercept VHF/UHF receiver for use in limited space applications. The compact size and flexible capabilities, with both remote and handoff interfaces, make the Miniceptor perfect for numerous independent and systems applications.

This receiver has maintained the high dynamic range, low phase noise, large signal handling, and selectivity of larger units but uses advanced technologies in construction and design to produce a very cost-effective miniature receiver.

Although the Miniceptor is not specified for operation below 20 MHz, tuning to 2 MHz is possible for applications where modest HF performance is acceptable.

Various subsystem and system configurations can be created incorporating from 1 to 29 Miniceptor Receivers into specialized W-J equipment frames or into customer-specified equipment racks.

WJ-9908 Octaceptor Equipment Frame

- **Houses Up to Eight Miniceptor Receivers in 7″ By 19″ Full-Rack Chassis**
- **Dual High Efficiency Integral AC Power Supplies**
- **Host Interface (Optional—Either IEEE-488, RS-232C, or RS-422A)**
- **Two Input, Eight Output RF Multicoupler (Optional)**
- **Front Panel (Optional)**

The WJ-9908 is an equipment frame designed to hold up to eight WJ-8607 Miniceptor Receivers, either with or without frequency extenders, in a full-rack package occupying only 7.0 inches of vertical rack space. The receivers are mounted with the connectors oriented toward the rear of the frame allowing easy access to receiver inputs and outputs.

An optional Host interface which permits the user to choose either an IEEE-488, RS-232C, or RS-422A interface can be used with the WJ-9908. The Host interface also includes a W-J Receiver Net interface which allows the receivers contained in the frame to be accessed by W-J Receiver Net Controllers.

An optional integral front panel unit is available which permits an operator to control the receivers in either the WJ-9908 frame or in other multiple receiver configurations. The front panel unit provides an 8-line by 40-character, backlit, super twist, LCD display with a numeric keypad, parameter adjust encoder, tuning encoder, and softkeys.

WJ-9902 Equipment Frame

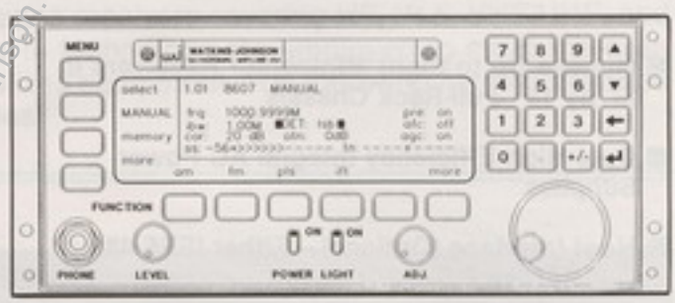
- **Houses Up to Two Miniceptor Receivers in 3.5″ By 8.5″ Half-Rack Chassis**
- **Integral AC Power Supply**
- **Host Interface (Optional—Either IEEE-488, RS-232C, or RS-422A)**
- **Front Panel Unit (Optional)**

The WJ-9902 is an equipment frame designed to hold up to two WJ-8607 Miniceptor Receivers, with or without frequency extenders, in a half-rack package occupying only 3.5 inches of vertical rack space.

An optional integral front panel unit is available which allows the operator to control the receivers mounted in the WJ-9902. This front panel unit option adds an 8-line by 40-character, backlit, super twist, LCD display, a numeric keypad, parameter adjust encoder, tuning encoder, and softkeys. Using the front panel unit, an operator may select either of the receivers contained in the WJ-9902 frame for control. The audio of the selected receiver is routed to the headset jack on the front panel unit.

WJ-9607 Multi-Receiver Front Panel

The WJ-9607 Multi-Receiver Front Panel (MRFP) is a self-contained, detached unit used directly with WJ-8607 Miniceptor Receivers or with units, such as the WJ-8700 Dual VLF/HF Receiver or WJ-9902 Equipment Frame, via a W-J Receiver Net. The MRFP is housed in an 8.3" wide, 3.5" high, 3.2" deep enclosure and powered by an external 12 VDC user-supplied source.



WJ-9605 Front Panel Unit

The WJ-9605 Front Panel Unit is a detached front panel for up to two WJ-8607s, a WJ-8700, or a W-J Receiver Net Controller. The WJ-9605 is housed in a 8.3" wide, 3.5" high, 2.4" deep enclosure and powered by an external 12 VDC user-supplied source. This front panel unit can serve as an additional "controller" on the W-J Receiver Net. It may be connected to a net of WJ-8700 Receivers or WJ-8607 Miniceptors installed in host interface-equipped frames. The WJ-9605 may also be used as a remote front panel unit for the WJ-8700 when this receiver is used without a front panel of its own. It can also be used as a remote front panel for the WJ-9902 with or without host interface or with the WJ-9908 with a host interface.

WJ-8615P Compact VHF/UHF Receiver

- **Frequency Range of 20 to 500 MHz, Standard; 2 MHz to 1600 MHz Frequency Extender Options Available**
- **Compact Size**
- **Expanded Front Panel Capabilities**
- **Microprocessor Controlled — Alphanumeric Display with Menu**

The WJ-8615P VHF/UHF Compact Receiver is a microprocessor-controlled receiver intended to monitor or search the 20 to 500 MHz frequency range (expandable to 2 to 1600 MHz). Its compact size (3.5 × 8.25 × 20 inches) and flexible capabilities provide a multitude of independent and system applications. These operations are enhanced by the availability of Step, Scan, Lockout operation either from the illuminated front panel keypad or by remote control.

Three standard IF bandwidths (from 3.2 kHz to 8 MHz) are included in the WJ-8615P with two optional bandwidths readily accepted. AM, FM, CW, and Pulse detection modes are provided with the standard receiver, and independent sideband is available as an option. Other options include a tracking preselector, selected audio output, and wideband output.

Many features of the older WJ-8615D VHF/UHF Receiver have been included and enhanced in the WJ-8615P Receiver making it an important part of small or large systems and an excellent stand-alone receiver.

WJ-8615D Compact VHF/UHF Receiver

- **20 to 500 MHz Frequency Range (Expandable to 2 to 1600 MHz)**
- **Compact Size**
- **Modular Construction**
- **Three Standard Bandwidths (Two Additional Optional)**
- **High Dynamic Range**
- **Low Phase Noise**

The flexible capabilities and IEEE-488 remote interface of the WJ-8615D Compact VHF/UHF Receiver provide a multitude of independent and system applications. Fully synthesized local oscillators provide fast, accurate tuning throughout the 20 to 500 MHz tuning range with a 100 Hz tuning resolution. Three IF bandwidths, ranging from 6.4 kHz to 4 MHz, are provided with the unit. Two additional bandwidths can be readily accepted, providing a capability of five selectable IF bandwidths. AM, FM, Pulse, and CW detection modes are provided with the standard receiver.

A full range of options permit easy expansion of receiver capabilities. Software and hardware options are also available that readily install into or interface directly with the receiver.

WJ-9075 Frequency Extender

- **Increases Frequency Range of WJ-861X Receivers to 4.5 GHz With 100 Hz Resolution**
- **Frequency Controlled From Asynchronous Serial Data — Coax or Fiber Optics Option**
- **Mounted With Receivers Or At a Remote Location**

The WJ-9075 Frequency Extender is used in conjunction with WJ-861X Receivers to increase the frequency range to 4.5 GHz. The WJ-9075 may be supported by all options of the WJ-861X Receivers and may be mounted with a receiver or remoted up to 500 feet away.

This extender uses a down converter technique with a two-stage tracking YIG preselector for low spurious responses and low LO radiation. An internal preamplifier provides low noise figure performance across the 1.0 to 4.5 GHz operating range of the extender. An additional 20 to 1100 MHz antenna input allows VHF/UHF signals to bypass the down converter and to be routed directly to the receiver.

WJ-8617B VHF/UHF Receiver

- **Fully Synthesized 20 to 500 MHz Tuning (Expandable to 0.5 to 1100 MHz; Down to 10 kHz on Special Request)**
- **Five or Ten Selectable IF Bandwidths (Optional)**
- **96 Channel Programmable Memory**
- **Optional Built-In LOG/LIN Signal Monitor**
- **Microprocessor-Based Control**
- **High Dynamic Range**
- **Scan Lockout Capability**

The WJ-8617B VHF/UHF Receiver is a full sized, microprocessor-controlled receiver designed to operate over a 20 to 500 MHz frequency range, with capabilities for expansion of coverage to 0.5 to 1100 MHz. This receiver contains two RF inputs that permit two signal sources, such as antennas of different frequency capabilities. It provides AM, FM, CW and Pulse detection modes. Log Video, SSB, and Variable BFO are available as options. Up to five selectable IF bandwidths may be installed to permit bandwidth selections ranging from 3.2 kHz to 8 MHz. Ten IF bandwidths are optional.

A wide range of operating capabilities are provided by the WJ-8617B Receiver. It can be used as a manually controlled receiver utilizing the flexible front panel controls, or automatic operating modes, such as frequency stepping or scanning, can be implemented utilizing preprogrammed parameters stored in the standard 16-channel memory. With the IEEE-488 Remote Interface option, the receiver can accept and provide signal information from an external controller or provide handoff signals to other receivers.

WJ-8628A-4 VHF/UHF Master Acquisition Receiver

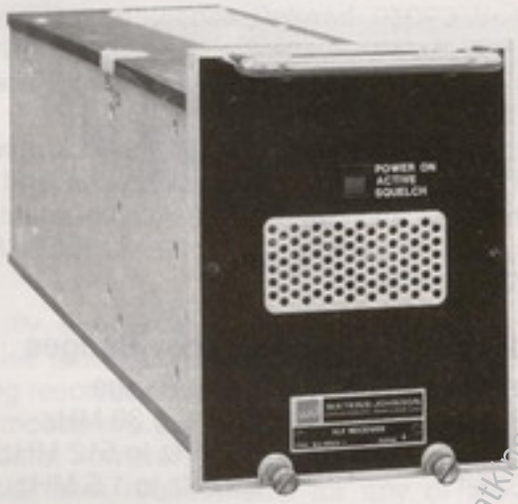
- **Operates As a Receiver/Controller Module in the WJ-9040 Receiving System**
- **Covers 20 to 512 MHz Frequency Range With Optional 20 to 2000 MHz Frequency Extenders**
- **100 Hz Tuning Resolution, Fully Synthesized**
- **Digitally Refreshed Display Option (X, Y, Z Outputs To External Display)**
- **Master Handoff/Monitor/Control Functions With Up to 34 WJ-9040 VLF HF/VHF/UHF Handoff Receivers**

The WJ-8628A Receiver is a fully synthesized, microprocessor-controlled receiver capable of local or remote control. It tunes the 20 to 512 MHz frequency spectrum with a variable tuning resolution to 100 Hz. Frequency extender options expand spectrum coverage to 2000 MHz. Detection modes include AM, FM, CW, Pulse and SSB. Five IF bandwidths may be selected ranging from 2.85 kHz to 8 MHz. The WJ-8628A-4 inherits its RF performance from the WJ-8628A-1 One-Quarter Rack Receiver which, in its entirety, is packaged inside the WJ-8628A-4 Receiver unit.

WJ-8625-1 VLF Receiver

- **200 Hz to 1.5 MHz Frequency Coverage**
- **Fully Synthesized With 1 Hz Tuning Resolution**
- **Low Phase Noise**
- **Five Selectable IF Bandwidth Filters**
- **AM, FM, CW, and SSB Detection Modes**

The WJ-8625-1 VLF Receiver is a one-quarter rack WJ-9040 System compatible unit that can be plugged into a suitably equipped WJ-9040 EFR100 Equipment Frame. Remote control can be accomplished either via IEEE-488 or RS-232C interfaces. Control can also be achieved through a WJ-8628A-4 VHF/UHF Receiver or a WJ-8626A-4 Half-Rack HF Receiver, providing a multitude of frequency coverages.



WJ-8626A-4 HF Receiver/Receiver Controller

- **Local or Remote Control in the 5 kHz to 30 MHz Frequency Range**
- **Indicating Microprocessor Front Panel With 48-Character Alphanumeric Display**
- **Master Handoff/Monitor/Control Functions With Up to 32 WJ-9040 VLF HF/VHF/UHF Handoff Receivers**
- **Operates As a Receiver/Controller Module in the WJ-9040 Receiving System**

The WJ-8626A Receiver is a fully synthesized, microprocessor-controlled, half-rack receiver capable of local or remote control for surveillance applications in the 5 kHz to 30 MHz frequency range. Each unit is a fully synthesized, high dynamic range HF receiver with five selectable IF bandwidths ranging from 200 Hz to 16 kHz and AM, FM, CW, USB and LSB detection modes. The WJ-8626A Receiver features variable tuning resolution to 10 Hz, fully synthesized BFO and 15 msec tuning speed. Options include suboctave preselection and demodulation of binary FSK signals.

WJ-9040 Quarter-Rack Handoff Receivers

The WJ-9040 handoff receivers include the WJ-8626A-1 HF Receiver, the WJ-8625-1 VLF Receiver, and the WJ-8628A-1 VHF/UHF Receiver.

All handoff receivers are quarter-rack modules which feature low power consumption and high performance, and can be controlled via an internal bus system or remote computer via IEEE-488 or RS-232C interface.

Handoff Receiver Frequency Ranges

Model No.	Freq. Range
WJ-8626A-1	5 kHz to 30 MHz
WJ-8628A-1	20 MHz to 512 MHz
WJ-8625-1	200 Hz to 1.5 MHz (Tunable to 0 Hz)

WJ-9103 Multichannel Digital Tuner

- **Up to Eight Channels, Tunable In Parallel From 20 MHz to 500 MHz**
- **2 MHz Instantaneous Bandwidth**
- **Digital IF Outputs From Each Channel At 12 Bits of Precision**
- **Internal Equalization Source**

The WJ-9103 Multichannel Digital Tuner is a digital receiver suitable for a number of applications, including precision direction finding, signal analysis, and antenna beamforming. Amplitude and phase distortion within each channel is minimized, as is amplitude and phase mismatch between channels. Operation and control of the WJ-9103 is performed remotely through an IEEE-488 interface.

WJ-8700 Dual VLF/HF Receiver

- 5 kHz to 32 MHz Frequency Range
- Two Receivers Contained In 3.5" High By 8.5" Wide Space
- Microprocessor Controlled With Alphanumeric Display and Menu
- Five Standard IF Bandwidths
- Scan, Step, Lockout With 100 Memory Channels

The WJ-8700 is a compact microprocessor-controlled receiver intended to monitor or search the 5 kHz to 32 MHz HF spectrum. The half-rack size of this dual receiver permits mounting of four receivers in the 3.5-inch height of a standard 19-inch rack cabinet. Front panel functions are menu driven, with softkey access to different menu levels so that the power available in scan, step, lockout, etc., are easily programmed. Either of the two receivers housed within the enclosure may be accessed from the front panel.

Fully synthesized local oscillators provide precise tuning from 5 kHz to 32 MHz with 10 Hz tuning resolution. AM, FM, CW, and SSB demodulation modes are available. Five IF bandwidths are standard; however, there is room for a total of six. Special filter requirements for any of the six IF bandwidth slots can be specified by the customer.

Numerous options are available, including: 21.4 MHz signal monitor output, special data buses, FSK demodulator, independent sideband, baseband converter output, and control net.

WJ-8709 HF Receiver

- Half-Rack Version of the WJ-8718A HF Receiver
- Frequency Coverage From 5 kHz to 30 MHz in One Band
- Five IF Bandwidths Up to 16 kHz
- AM, FM, and CW Detection Modes Standard, USB and LSB Optional
- Uses Proven WJ-8718 RF, IF and Synthesizer Modules
- IEEE-488 and RS-232C/MIL-188C Remote Control Options

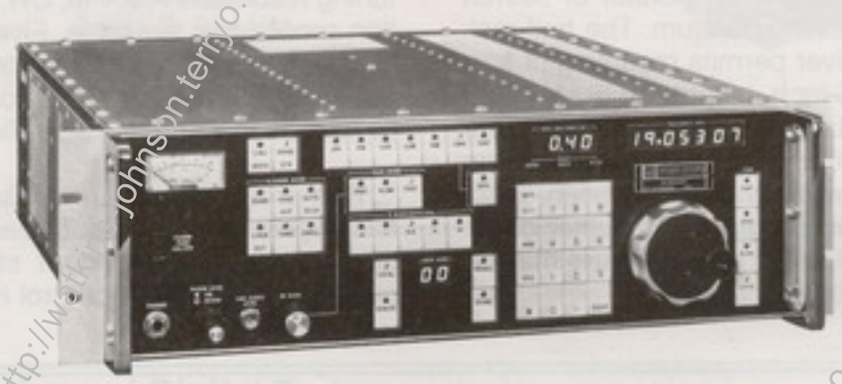
The WJ-8709 is a general purpose, half-rack HF receiver for surveillance and monitoring of RF communications in the 5 kHz to 30 MHz frequency range. Operator-designed controls provide frequency tuning, IF bandwidth, BFO (+8 kHz), analog meter input, manual or AGC gain with slow decay times, detection mode, and line audio level selections.

WJ-8718A/MFP HF Receiver

- **Frequency Coverage From 5 kHz to 30 MHz in One Band**
- **Five IF Bandwidths Up to 16 KHz**
- **AM, FM, CW, ISB, USB and LSB Detection Modes**
- **Meets MIL-E-16400 and MIL-S-901C Requirements**
- **Programmable Memory/Front Panel**

The WJ-8718A/MFP General Purpose HF Receiver is designed to be used in either a manual or remote digitally controlled mode. In addition to the front panel controls offered in the standard version (WJ-8718A), the WJ-8718A/MFP provides a keypad for fast entry of tuned frequency or programmable memory and the ability for the receiver to step through the memory channels automatically and do specified spectrum scans.

This receiver is also available in a special Navy environmental configuration nomenclatured the AN/URR-74(V)2.



AN/URR-74(V)2 Multi-Purpose HF Receiver

The AN/URR-74(V)2 Multi-Purpose HF Receiver is designed to be used in either a manual or remote digitally controlled mode. With available options, this highly stable, solid state receiver provides excellent performance for almost any user requirement. Plug-in modular construction allows most options to be field installed should operational requirements change.

The AN/URR-74(V)2 pictured is a standard WJ-8718A Receiver equipped with Manual Control Module (MCM), Independent Sideband (ISB) and Navy Environmental (NAV) options. (The NAV option consists of: MS power connector, 13-pin MS audio connector, conformal coated printed circuit boards, Type "N" RF input connector, double-fused AC power circuit, DPST power switch, nickel-plated side panels, and MIL-STD elapsed time and RF/Audio meters.)

Systems/Subsystems

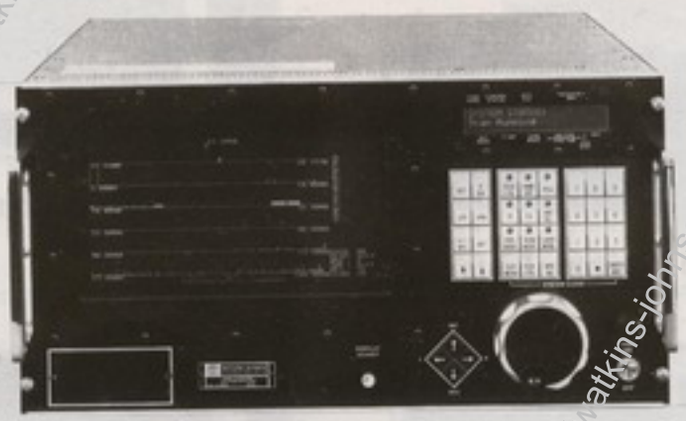
With the continuing advances in technology and the ever-changing requirements of the communications environment, the CET Division has packaged a number of systems and subsystems.

These applications range from simple subsystems using a controller, signal monitor, and several receivers, to applications which incorporate our products into programs to expand the capabilities and enhance the performance.

The following pages show several applications using CET equipment. Many units are stand-alone products whose versatility is shown when they are incorporated into systems.

WJ-9195C Rapid Acquisition Spectrum Processor (RASP)

- **Fast Scan Rate — 1 GHz/Second**
- **Broad Frequency Range: 20 to 512 MHz, Expandable to 2 to 1400 MHz**
- **High Dynamic Range — 60 dB (Typical)**
- **Interactive RF Spectrum Display**
- **Control and Handoff of Up to 15 External Receivers**
- **High Resolution — 5 kHz or 25 kHz**



The WJ-9195C Rapid Acquisition Spectrum Processor—"RASP" is a broadband receiver and spectrum display unit, offering exceptional scanning speed and dynamic range. With available frequency extenders installed, it will cover a frequency range of 2 to 1400 MHz, and houses the requisite functions of receiver, digital IF processor and display in a single 8.75" high, 19" wide, 17" deep, rack-mount enclosure.

The WJ-9195C will scan user-specified segments of the RF spectrum at a rate of 1 GHz per second, resolving the band into 25 kHz cells. For greater resolution, a 5 kHz mode is selectable. Resultant signal data are presented on six programmable traces which may be set up to provide a full view of the entire spectrum, or a detailed view of a specific area of interest.

Extensive receiver control functions have been incorporated into the WJ-9195C to facilitate its use as a system controller. Up to 15 external receivers may be controlled, using the WJ-9195C as a single point of control. Complete receiver control, handoff and status monitoring functions are available. With a maximum of two keystrokes, the operator can handoff, control, or monitor the status of any external receiver in the system. The status of all receivers is continually displayed, keeping the operator aware of both signal activity and the availability of receiver resources.

WJ-9040 System Modular Components

WJ-9040 DLP100 Data Logger and Printer

- Microprocessor Controlled Thermal Printer
- 96 ASCII Characters
- Two Switch Selectable Printing Directions
- Out-of-Paper Indicator
- Self-Test Capability

WJ-9040 SPN108 and SPN128 Speaker Panels

- WJ-9040 System Compatible
- Compact Size, 1/4 Rack Enclosure
- Eight Selectable Inputs
- Headphone and Speaker Outputs

WJ-9040 MVU104 VHF/UHF Multicoupler

- 20 to 1400 MHz Frequency Range
- 7 dB Noise Figure
- Low Power, Compact Size
- Optimum Coupling of Up to Four Receivers

WJ-9040 ASU226A Audio Select Unit

- 2 × 6 Audio Switch Matrix
- VOR Capability
- Compact, Eighth-Rack Size
- Fully Remote Controllable

WJ-9040 SSU226, SSU226-1 Signal Select Unit

- 2 × 6 Signal Switch Matrix
- Compact Eighth-Rack Size
- Fully Remote Controllable

WJ-8610A/WJ-8610A-1 Controllers

- **Dedicated Controller for WJ-861X Family Receivers**
- **Functions As Central Controller or Command Distribution Point**
- **Simultaneous Status Display for Up to Fourteen Receivers**
- **99 Channel Memory for Storage of Complete Receiver Setups**
- **Microprocessor Based Control Circuitry**
- **IEEE-488 Interface for Receivers and External Computer**

The WJ-8610A Controller is the center for multiple receiver systems utilizing WJ-861X Receivers. Its front panel provides local control of each receiver in the system and has the capability of interfacing with an external system computer for remote computer-controlled operation. The front panel has all of the controls and indicators necessary for total control of each receiver in the system. It displays a continuous status of up to 14 receivers simultaneously and permits control to be exercised over any receiver as required. A 99-channel non-volatile memory, contained in the controller, is capable of storing complete receiver setups. This memory capability can be utilized as a scratch pad memory to store up to 99 frequently used receiver settings or as a convenient method of transferring data from receiver to receiver.

When operated in the remote mode using a system computer, the WJ-8610A Controller functions as an interface bus extender and command distribution point. It receives commands from the computer and directs control to the appropriate receiver in the system. The status of each of the receivers is then maintained by the controller, permitting the computer to gain access to or change the status of any receivers on command. This configuration minimizes computer housekeeping time, freeing the computer for other tasks.

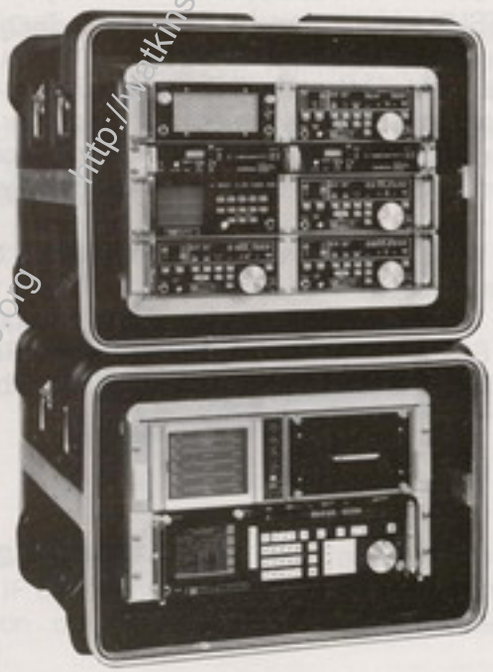
This controller can be modified for more complex systems' requirements or used to control demodulators.

Responsive Surveillance Subsystem

One example of the expanded capabilities of a WJ-8610A Controller would be a subsystem using the WJ-8610A-1 as the central control point for a program that employs numerous receivers and ancillary equipment, such as signal monitors, multicouplers, tape recorders, and printers.

One WJ-8610A-1 Controller can handle up to 14 receivers on its IEEE-488 bus. Versatility and flexibility are shown when the equipment is used to complete a computer-controlled subsystem or in an operator-controlled system with a building-block approach.

The requirements of the customer are the main considerations; our engineering technology enables us to adapt or design equipment that will meet these needs.



EMC/TEMPEST Test Equipment

To meet the special requirements of electromagnetic compatibility investigations, the CET Division has designed the WJ-8940B Receiving System and, more recently, the portable WJ-8999 EMC/TEMPEST Test Receiver.

WJ-8999 Portable EMC/TEMPEST Test Receiver

- **1 kHz to 1 GHz Frequency Coverage (1 GHz to 12.4 GHz Optional)**
- **Receiver Sensitivity and Dynamic Range Designed for Optimized EMC Testing**
- **Semiautomatic Operating Modes**
- **Eighteen Standard IF Bandwidths From 100 Hz to 50 MHz (Two Optional Bandwidths of 100 MHz and 200 MHz)**

The WJ-8999 is a multipurpose system designed to meet the requirements for electromagnetic compatibility (EMC) investigations, wideband RF ambient signal surveys, and analysis of narrowband and broadband signals. It is comprised of a Digital Control Unit (DCU) and a Tuner/Synthesizer Unit (TSU) which may be housed in two small cases. Signal detection modes include AM, AM/AGC, FM, CW and LOG. Signal data is available from audio and video outputs, a printer interface, optional X-Y-Z outputs for oscilloscope displays, and optional signal monitor display.

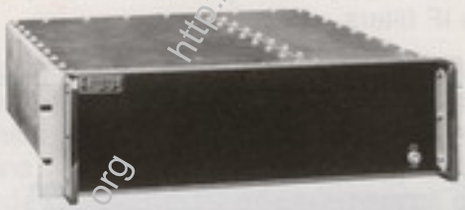
The WJ-8999/TSU is remotely controlled by the microprocessor-based Digital Control Unit which allows four operating modes: Fixed Frequency, Sector Scan/Plot, Sector Scan/Monitor, and Remote Control. A unique degree of operational flexibility is available using the internal operating software with the digitally-controlled receiver design.

The WJ-8999/DCU contains three major sections: the IF demodulators for the 160 MHz, 21.4 MHz and 10 kHz IF shelves, the digital control hardware for the entire WJ-8999 Receiving System, and system power supply providing +8 volts DC and ±18 volts DC for both the DCU and the TSU.

WJ-8940B Receiving System

- **Calibrated RF Signal Measurement and Analysis Over a 1 kHz to 1 GHz Frequency Range (20 Hz to 18 GHz Optional)**
- **Exceptional Receiver Sensitivity for EMI/EMC and TEMPEST Testing Requirements**
- **AM, AM/AGC, FM, CW and LOG Detection Modes**
- **17 IF Bandwidths From 200 Hz to 50 MHz for Analysis of Narrowband and Broadband Signals (5 Hz, 10 Hz, 20 Hz, 50 Hz, and 100 Hz Added With NBIF Option Installed; 100 MHz, 200 MHz, and 500 MHz Added With WBD Option Installed)**
- **Audio, Video and IF Outputs for Signal Analysis and Digital Outputs for Displays**

WJ-8940B System Options



WJ-8940B/LFT—Extends the low frequency limit of the system down to 20 Hz. It is designed to be installed remotely and interconnects with the system via the WJ-8940B/NBIF. The LFT and NBIF together comprise the ELF option.

WJ-8940B/WBD—Adds three additional IF bandwidths and provides AM, AM/AGC, and FM detection of input signals centered at 2175 MHz. Also provides peak detected measurements through the main system. It is usable with the WJ-8940B and WJ-8940B/MX.

WJ-8940B/MX—Extends the upper frequency limit to 18 GHz. It mounts into the system rack enclosure and interconnects directly with the system.

WJ-8940B/NBIF—Adds five additional narrowband IF bandwidths to the system and permits the addition of the WJ-8940B/LFT Low Frequency Tuner.

Direction Finding Equipment

The CET Division's direction finding equipment is designed for use in large surveillance receiver systems and in smaller tactical systems. These direction finders cover a wide range of frequencies and requirements. In addition, standard antennas can be adapted to meet the special needs of users.

Watkins-Johnson Company's broad experience in digitally-controlled, high performance receivers, coupled with our strong background in the design and production of small, lightweight, ruggedized equipment, has also resulted in a family of manpack receiving and direction finding equipment for tactical users.

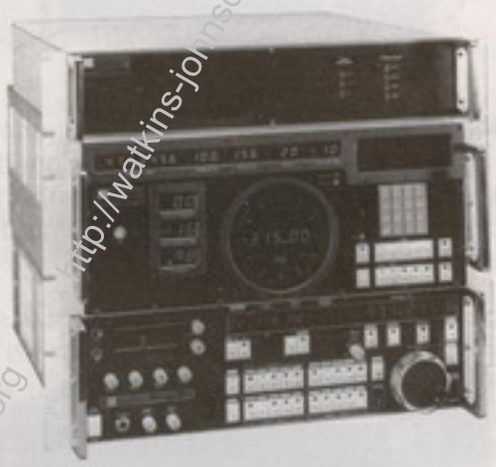
WJ-9040 DDF102 Direction Finding System

The WJ-9040 DDF102 Direction Finder provides the WJ-9040 System with a low-cost direction finding capability. When combined with the WJ-8628-4 VHF/UHF Receiver and WJ-98XX Series DF Antenna, the DDF102 forms a direction finding system, with frequency coverage from 20 to 1000 MHz.

In addition to DF processing, the DDF102 serves as the DF system controller. The DDF102 has its own internal IF demodulator with four selectable IF bandwidth filters. Four standard IF filters are installed; however, the user may specify alternate IF filters.

WJ-8976 Three Channel Direction Finding System

- **20 to 500 MHz Frequency Coverage (Expandable to 2 to 1200 MHz)**
- **Digital Display of Signal Parameters**
- **2 Degree Accuracy**
- **Accuracy Not Affected By Modulation Type**
- **Microprocessor-Based Control**



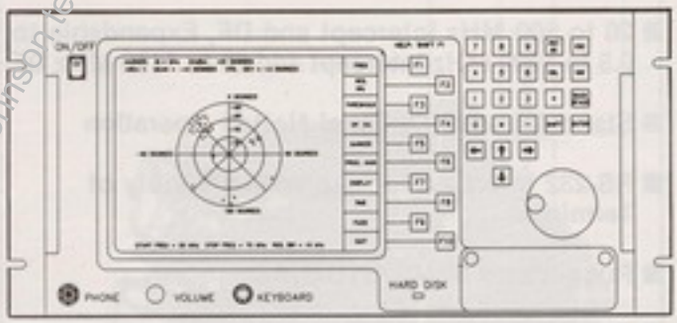
The WJ-8976 Three Channel Direction Finding System provides accurate azimuth and elevation bearing information for a variety of signal types within a 20 to 500 MHz frequency range. Other configurations of the WJ-8976 System are available which expand coverage from 2 MHz to 1200 MHz. The System is relatively immune to the type of signal modulation, permitting effective operation on noise-like signals such as spread spectrum as well as the more conventional AM, FM, SSB, CW and Pulse type signals. Utilization of a Discrete Fourier Transform algorithm provides signal amplitude and phase data, which is used with signal frequency and antenna geometry to accurately compute a line of bearing.

The basic system consists of a triple baseline antenna unit, WJ-8976/AU-6, a three channel slave receiver, a WJ-8617-21 Receiver used as a master tuner and a high speed digital processor. Each WJ-8976 System can be unique, depending on customer specifications.

WJ-8986 N-Channel DF System

- **Three to Five Channel Simultaneous Signal Processing**
- **200 MHz/Second Scan Rate**
- **DFs on 10 Microsecond Pulses**
- **Single Rack Mountable Box**
- **Full Remote Control**

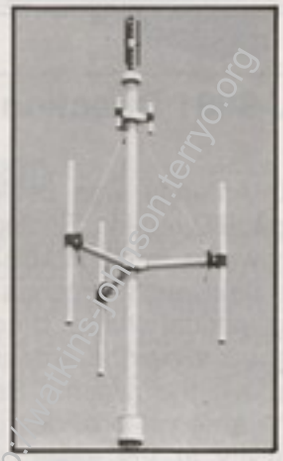
The WJ-8986 represents the leading edge in low-cost, compact direction finding systems. It combines advanced digital processing with state-of-the-art hardware to achieve outstanding, across-the-board performance. High probability of intercept and accurate lines of bearing for short duration signals are attained by using new synthesizer and digital signal processing techniques. In addition, graphical data processing options provide the user with a powerful tool in applications such as resolving co-channel signals and direction finding of low power and short duration signals.



The system consists of an 8.75-inch high rack mountable chassis. The front panel of the DF contains a keypad and EL display as well as jacks for an optional keyboard and headset. The only additional hardware needed is a DF antenna with accompanying cables. System power is less than 200 watts making the WJ-8986 ideal for vehicular applications.

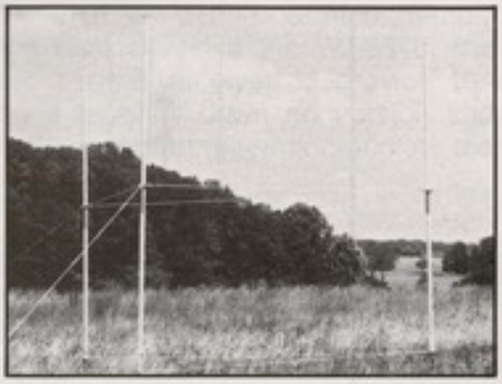
WJ-8976/AU-5 Triple Baseline DF Antenna

This antenna features a triple baseline interferometer with three separate bays. The WJ-8976/AU-5 is similar to the 20 to 500 MHz WJ-8976/AU-6 Antenna, except that the frequency coverage is expanded to 1100 MHz by the addition of a slave receiver converter and frequency extender. Further frequency expansion to 1200 MHz is provided by changing the slave receiver converter and frequency extender.



WJ-8976/AU-3 Triple Baseline HF DF Antenna

The WJ-8976/AU-3 is a lightweight DF antenna designed to meet requirements over a 2 to 30 MHz frequency range. It consists of three vertical dipoles and a switch assembly and mounts directly on the ground for easy deployment.



NOTE: The WJ-8976/AU-3, WJ-8976/AU-5, and WJ-8976/AU-6 antennas can be used with either the WJ-8976 DF System or the WJ-8986 N-Channel DF System.

WJ-8990 Manpack Tactical Intelligence System (MANTIS)

- **20 to 500 MHz Intercept and DF, Expandable to 0.5 to 1100 MHz Intercept and 20 to 1100 MHz DF**
- **Stand-Alone or Optional Netted Operation**
- **RS-232 Interface for Use With a Variety of Terminals**
- **Ruggedized to MIL-STD-810C**
- **Built-In Test**
- **Modular, Lightweight Design for Ease of Maintenance and System Upgrade**

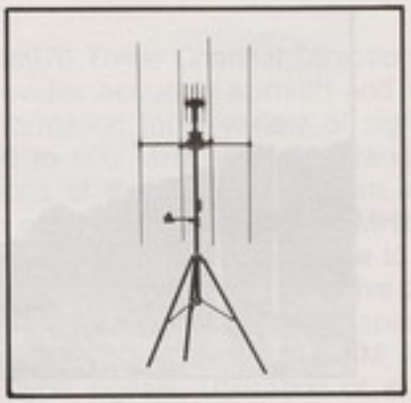
The WJ-8990 MANTIS communications intercept and direction finding system is designed specifically for fast-moving operations where weight, size and capability are essential to both mission success and team survivability.

An extremely lightweight system, weighing less than sixty pounds including the DF antenna, MANTIS provides HF, VHF, and UHF intercept and direction finding in a two-man load, including both stand-alone and netted direction finding operations.

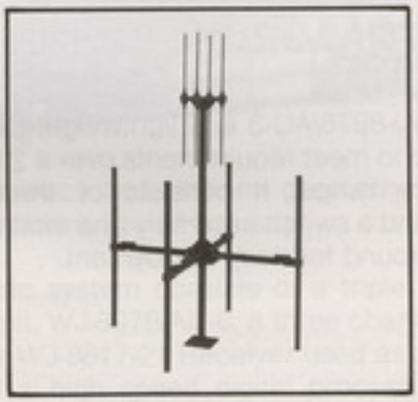
WJ-9880/WJ-9881 Direction Finding Antennas

The WJ-9880 Antenna was designed for the WJ-8975A Manpack Direction Finding System, but will work equally well with the WJ-8971A Direction Finder. This is a lightweight antenna that folds up into a 3′ × 8″ cylindrical shape. It comes with its own tripod that will allow the antenna to be elevated to 76″ above the ground. Because of its working size, the antenna provides greater accuracy and sensitivity in the lower, 20 MHz, frequency range.

The WJ-9881 Direction Finding Antenna is designed for use with the WJ-9040 DDF102 DF System and with the WJ-8990 Manpack Tactical Intelligence System (MANTIS). The WJ-9881 incorporates two bays which provide the complete 20 to 512 MHz frequency coverage. The WJ-9881 is designed for quick erection and ease of transportability. The entire assembly is ruggedized to withstand harsh environmental conditions.



WJ-9880



WJ-9881

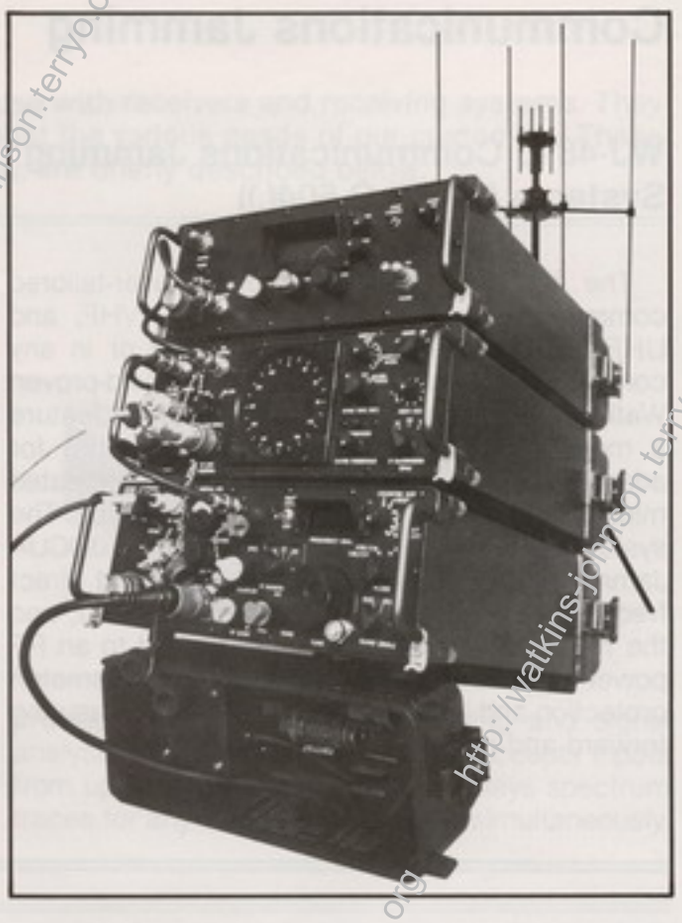
AN/PRD-11 System

- **Combat Proven**
- **User-Verified Accuracy**
- **Lightweight, Versatile, User Friendly**
- **Full Support Package Available**
- **Dependable, High MTBF**

The dependable AN/PRD-11 provides accurate line of bearing for signals received in the 20 to 500 MHz* frequency range. Because the AN/PRD-11 is lightweight and ruggedized, it is suitable for virtually all types of environmental conditions requiring tactical direction finding with a man-portable system.

The AN/PRD-11 utilizes the WJ-8640-1 Manpack Receiver, the WJ-9180-1 Signal Monitor, and the WJ-8975A Manpack DF Processor with the WJ-9880A DF Antenna.

*Interchangeable tuning heads: 20 to 250 MHz and 250 to 500 MHz.



WJ-8640-1, WJ-9180-1, WJ-8975A, WJ-9880A, WJ-9230

The **WJ-8640-1 Manpack Receiver** is a portable, ruggedized unit designed to operate under extreme environmental conditions. The receiver features frequency coverage from 0.5 to 500 MHz using various WJ-9120 Series Tuning Heads.

The tuning heads are interchangeable, drop-in units requiring only simple hand tools for installation. No electrical realignment is necessary when changing tuning heads.

The **WJ-9180-1 Signal Monitor** is ruggedized and operates with the WJ-8640 Series of Manpack Receivers. It receives a 10-MHz signal from the WJ-8640-1 SM output and provides a visual spectrum display of signal activity around the tuned frequency. The sweep width of the signal monitor is continuously adjustable from 0 to 1 MHz.

The **WJ-8975A Direction Finder** functions as the controlling unit in the AN/PRD-11 DF System. It controls the element switching at the antenna and processes signal information obtained via the receiver signal monitor output. Since the WJ-8975A utilizes the signal monitor output of the receiver and thus sees a fixed frequency output, it is not frequency limited. Derived bearing data is displayed by a three-digit LED display, and supplementally with a circular array of LEDs.

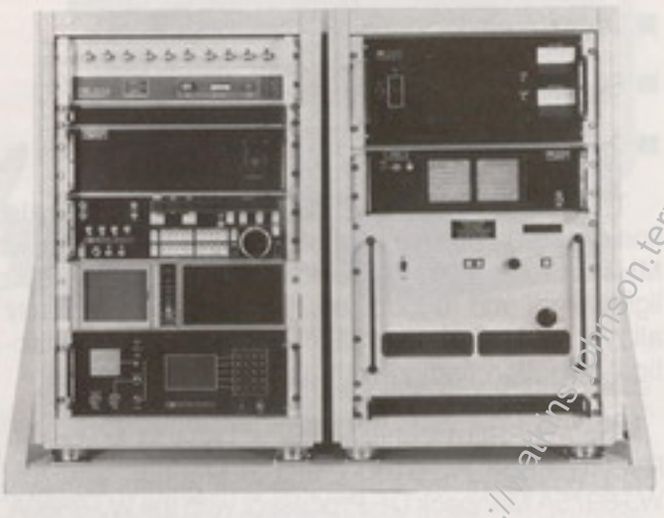
The **WJ-9230 HF Upconverter** adds HF intercept to a WJ-8640 Series Receiver which has been configured for VHF or UHF operation. Simply installed in the dust cover of the WJ-8640, the WJ-9230 relies on the receiver to provide frequency tuning, frequency down conversion and power. Four cables and an antenna complete the configuration.

The **WJ-9880A Antenna** was designed for the WJ-8975A Manpack Direction Finder. This is a lightweight antenna that folds up into a 3′ × 8″ cylindrical shape. It comes with its own tripod that will allow the antenna to be elevated to 76″ above the ground.

Communications Jamming

WJ-4810 Communications Jamming Systems (AN/TLQ-504(.))

The WJ-4810 systems provide user-tailored communications jamming in the HF, VHF, and UHF bands either in one band alone or in any combination. Designed for use with field-proven Watkins-Johnson receivers, these jammers feature a modular design with flexible architecture for adaptation to future requirements and integrated microprocessor control for ease of operation. The systems are built around the WJ-4810/JCUA Jammer Control Unit which controls a fast direct frequency synthesizer, an RF switching unit, and the receiver. The jamming output is fed to an RF power amplifier which features output mismatch protection and a built-in digital meter for measuring forward and reverse power.



WJ-4810/JCUA Jammer Control Unit (C-5486/TLQ-504)

- **AM, FM & CW Modulation With Variable Jamming Bandwidth**
- **Noise, Fixed-Tone, Two-Tone and Swept-Tone Modulation Sources**
- **Provision for External Microphone or Recorder Input**
- **Pseudo-Simultaneous Jamming of Up to Six Targets**
- **Programmable "Softkey," Menu Driven Control**
- **100 Non-Volatile Memory Channels With Priority and Lockout**
- **Selectable Lookthrough Capability, Fixed or Pseudo-Random**
- **Built-In Speaker for Monitoring Receiver or Jammer Audio**

The WJ-4810/JCUA provides complete system control and signal operation for jamming systems in the 20 to 500 MHz range, with optional extension down to 1.5 MHz and up to 1 GHz. The unit includes front panel keyboard and display, speaker or headphone audio connections, microphone or recorder input, two RS-232 ports and an IEEE-488 port. In conjunction with a WJ-861X receiver, the WJ-4810/JCUA serves as the nucleus of the WJ-4810 Communications Jamming Systems family.

Spectrum Displays

A variety of spectrum displays are available for use with receivers and receiving systems. They include a number of signal monitors designed to meet the various needs of our customers. These signal monitors, as well as the WJ-9201 XYZ Display, are briefly described below.

WJ-9205 Signal Monitor

- **Wide On-Screen Dynamic Range**
- **Accepts Inputs From Up to Three Receivers**
- **Displays Up to Three Spectrum Traces Simultaneously on a 4-Inch CRT**
- **Digitally Refreshed Display**
- **Automatic Sweep Rate and Centering Adjustments**

The WJ-9205 is designed as a companion unit for the WJ-8615D and WJ-8615P VHF/UHF Receivers, and also may be used with other receivers having a 21.4 MHz IF output. This signal monitor utilizes the latest state-of-the-art technology to provide a wide range of monitoring and signal analysis capabilities. The WJ-9205 accepts inputs from up to three receivers and displays spectrum traces for any or all of these inputs simultaneously.

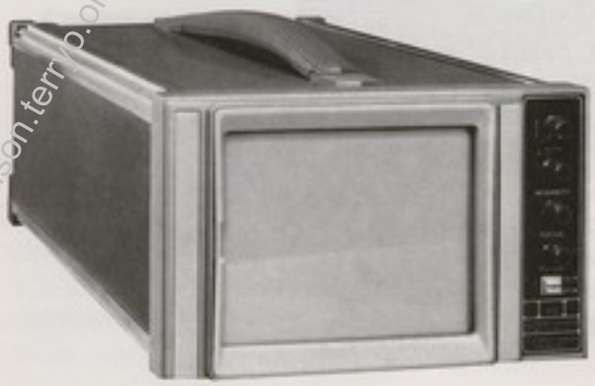
WJ-9206 Signal Monitor

- **4-Inch CRT**
- **70 dB Calibrated Logarithmic Range**
- **Selectable Input Attenuator**
- **5-2-1 Sequence Calibrated Sweep Widths**

The WJ-9206 is designed to complement the WJ-8615 Receivers, but may be used with any 21.4 MHz input. It provides visual indication of signals within 2.5 MHz of the receiver's tuned frequency.

WJ-9201 XYZ Display

- **Three Inputs: Vertical, Horizontal, and Z-Axis**
- **Operates With WJ-8617B and WJ-8618B Receivers, and With WJ-8610A Controllers**
- **Display Area of 3.9 × 4.7 Inches**



SM-9X04A Signal Monitors

The SM-9X04A Signal Monitor family consists of the SM-9304A, SM-9404A, and SM-9804A Signal Monitors.

The **SM-9404A** operates from a receiver's 21.4 MHz mixer output to provide a visual display of signals in a band around the tuned frequency. The sweep width is continuously adjustable from 0 to 4 MHz. The SM-904A has a flat response.

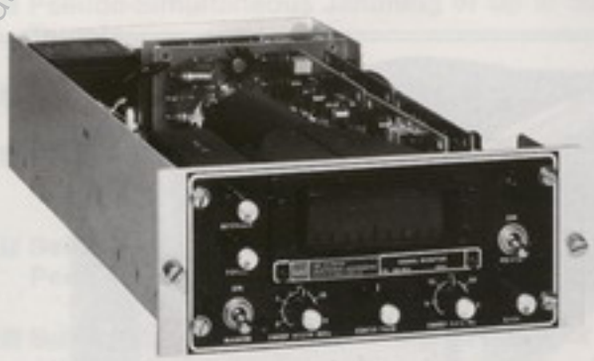
The **SM-9304A** operates from a receiver's 21.4 MHz mixer output to provide a visual display of signals in a band around the tuned frequency. The sweep width of the signal monitor is continuously adjustable from 0 to 3 MHz. The SM-9304A has a "compensated" input response.

The **SM-9804A** is designed for use with VHF/UHF tuners. It operates from the unit's 21.4 MHz mixer output to provide a visual spectrum display of in-band signals around the received signal. The unit has a bandwidth of 8 MHz.

SM-9404

WJ-9188A-18 Signal Monitor

The WJ-9188A-18 Signal Monitor is an IF signal display unit designed for use with the WJ-8718A HF Receiver with SMO option. The WJ-9188A-18 accepts a 455 kHz IF input signal and provides selectable sweep widths of 5 kHz, 15 kHz, or 30 kHz. The gain control adds 60 dB of range to the 40 dB logarithmic display. All active elements in the signal monitor are solid state except for the cathode ray tube. The unit, therefore, offers high reliability and low power requirements.



SM-1622 and SM-1622-1 Signal Monitors

- **160 MHz IF Output**
- **Maximum Sweep Width of 20 MHz**
- **SM-1622: Minimum Resolution of 250 kHz SM-1622-1: 1 MHz Resolution. Recommended for Use When Prime Interest Is Pulse Reception**

Demodulators

Watkins-Johnson has been manufacturing demodulators for many years, and some of these units, such as the DM-112, DMS-105, DMS-107, WJ-9525, WJ-9470, WJ-9471, and WJ-9472 Demodulators, are still in use today. More recently, we have improved and expanded our demodulators to include the WJ-9477(G) Precision Tunable Demodulator and the WJ-9518BE FDM Demodulator. The latest addition to the demodulator line is the WJ-9548 Digital FDM Demultiplexer which incorporates the latest technologies into a proven line of equipment. A brief description of some of these units follows, and information on other demodulators, or special demodulator requirements, is available on request.

WJ-9548 Digital FDM Demultiplexer

- **Up to 24 Independently-Tunable FDM Channel Demodulators In a Single Half-Rack Unit**
- **Analog Input Tunable From 0 to 20 MHz In 1-Hz Steps**
- **Very Low Differential Group Delay and Flat Amplitude Response**
- **Four Analog Baseband Inputs Connected In a Nonblocking Fashion To Any of the Individual Channel Demodulators**
- **Independent Channel Control of Gain, Upright/Invert Detection and Output Routing**
- **Built-In Test Capability Detects Circuit Faults to the Module Level**

The WJ-9548 is a Multichannel Tunable FDM Demultiplexer that incorporates the accuracy and efficiency of a Digital Signal Processing (DSP) approach. Because of its modular design, the WJ-9548 can be easily configured as a 6, 12, 18, or 24 channel unit. It accepts up to four 20 MHz analog FDM basebands and connects them in a nonblocking fashion to any of the independently-tunable channel demodulators. A buffered version of each baseband input is also provided as an output allowing multiple units to access the same basebands.

This demultiplexer combines analog and digital processing techniques in a scheme that significantly enhances the performance relative to demultiplexer implementations that are purely analog or digital. The result is a compact, cost-effective solution to FDM demodulation characterized by high performance, flexibility, and reliability.

Control of the WJ-9548 can be performed either locally, via the front panel LCD display and keypad controls, or remotely, via the standard IEEE-488 interface. A variety of other remote control interfaces are available as drop-in, alternative options.

Other options which are available for the WJ-9548 include a high fidelity analog output, a CEPT format digital output, a T1 format digital output, and an activity monitor. The activity monitor identifies each tuned channel as being either voice, data, signaling tones, or inactive.

WJ-9518BE FDM Demodulator

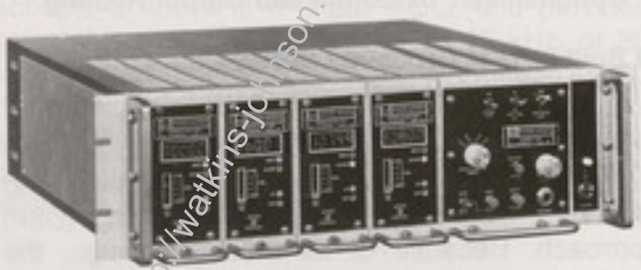
- **0 to 15 MHz Tuning Range**
- **Contains Six Independent SSB Demodulators With Provisions for Bridging Between Demodulators**
- **CCITT Tuning for 960 or 2700 Channel Basebands**
- **Buffer Baseband Output for Multiple Unit Operation**
- **IEEE-488 Bus Compatible**
- **Frequency Scanning Capability**

The WJ-9518BE FDM Demodulator contains six delay equalized SSB demodulators, each capable of processing signals in a 0 to 15 MHz frequency range. Each demodulator is independently controlled from a common front panel keypad, permitting simultaneous processing and monitoring of up to six individual signals. The front panel contains separate displays for each demodulator providing the tuned frequency and sideband selection of each and an indication of which demodulator is under active control.

In addition to discrete frequency tuning, the WJ-9518BE FDM Demodulator provides frequency scanning in increments ranging from 1 kHz to 1 MHz. It mounts in a standard 19-inch equipment frame and occupies 3.5 inches of vertical rack space.

WJ-9525-1 FDM Demodulator

- **0 to 552 kHz Tuning**
- **Selection of IF Group Delay Characteristics Available**
- **Four Independent Demodulation Channels**
- **Independent Parameter Displays for Each Channel**
- **Fully Synthesized Local Oscillators**
- **IEEE-488 or RS-232 Compatible Remote Interface**



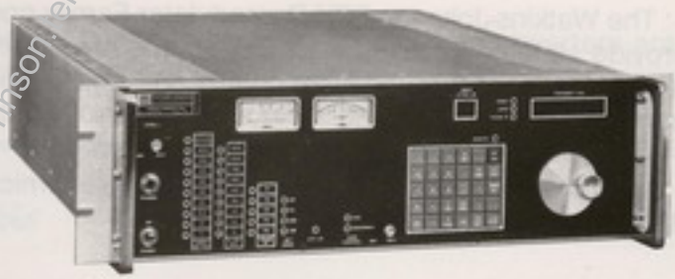
The WJ-9525-1 FDM Demodulator is comprised of the WJ-9525/CRF Control Rack Frame, housing the WJ-9525/CU Control Unit, and four plug-in WJ-9525/DU Demodulator Units. Each Demodulator Unit is an independent SSB demodulator capable of processing signals in the 0 to 552 kHz frequency range. It tunes this range in 10 Hz increments and is intended for use with baseband signals having a 4 kHz carrier spacing in either ERECT or INVERTED modes. Both modes refer to the same 4 kHz spectral segment.

The standard WJ-9525/DU Demodulator Unit is supplied with IF filters having a total differential delay of less than 300 microseconds from 200 to 3200 Hz. Filters with different group delay characteristics and different carrier spacings are also available.

The WJ-9525/CU Control Unit provides a full set of operator controls which are common to each of the Demodulator Units. A Demodulator Select Switch on this unit directs control to the desired demodulator.

WJ-9477(G) Tunable Demodulator

- **0 Hz to 31 MHz Tuning Range**
- **AM and FM Demodulation (Optional SSB)**
- **Up to Nine Selectable IF Bandwidths From 3.2 kHz to 6 MHz**
- **Microprocessor-Based Control Circuitry**
- **IEEE-488 Bus Compatible**



The WJ-9477(G) is a basic configuration for the WJ-9477 Precision Tunable Demodulator. It is designed to accommodate all selectable options available in the WJ-9477. This demodulator provides precision demodulation of AM, FM, and optional SSB signals. It utilizes frequency synthesized local oscillators which provide fast and accurate tuning over a 0 Hz to 31 MHz range, with a 10 Hz tuning resolution. Up to nine selectable IF bandwidths, between 3.2 kHz to 6 MHz, may be installed in the unit to provide optimum demodulation of both wideband and narrowband signals. Additional flexibility is afforded by rear panel IF and video jumpers, permitting these signals to be directed to external equipment for further processing.

The demodulator design provides a wide variety of system configurations. In addition, an optional IF converter, single or independent sideband, video output attenuator, and video filters are available which enhance the performance of the WJ-9477(G) Demodulator.

WJ-9480A Tunable Demodulator Subsystem

- **100 kHz to 30 MHz Tuning Range**
- **IF Bandwidths From 3 kHz to 20 MHz**
- **AM, FM, and Phase Detectors**
- **Built-In Up and Down Converters**

The WJ-9480A Subsystem consists of the WJ-9480A/TU Tuner/IF Amplifier and the WJ-9480/DU Demodulator Unit. For systems requiring multiple WJ-9480A/TUs, a controller (the WJ-8610A-6) is available.

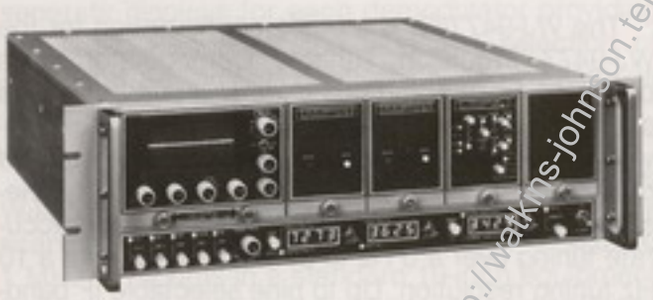
This system is designed to process signals in the range of 100 kHz to 30 MHz. The WJ-9480A/TU provides AM, FM, and Pulse detection. Front panel LED displays indicate all tuning and operating modes for both the Tuner/IF Amplifier and for the Demodulator Unit.

FSK Demodulator Family

The Watkins-Johnson FSK Demodulator Family consists of a group of demodulator systems designed to provide state-of-the-art FSK or OOK demodulator performance. The control rack frames comprising this family provide microprocessor control and signal interconnection for a variety of compact plug-in modules, permitting maximum flexibility in a minimum of space.

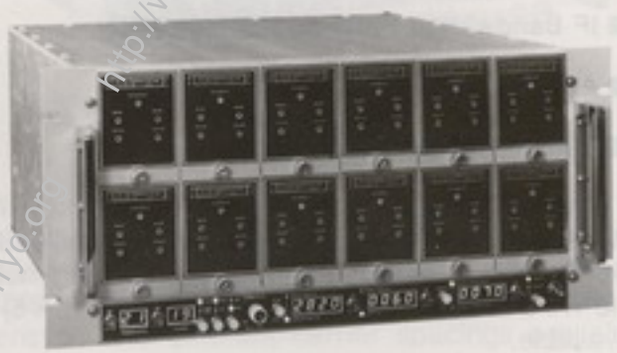
All Watkins-Johnson Demodulator Systems are microprocessor controlled and remotely controllable with RS-232 and IEEE-488 optional interfaces.

The WJ-9472 FSK/OOK Demodulator System provides two-channel baud rate matched filter type demodulation, with optional Double Frequency Shift Keying (DFSK) and Frequency Diversity demodulation capability. The WJ-9472/SMU Signal Monitor Unit is ideally suited for analysis of signals of unknown parameters.



The WJ-9470 FSK/OOK Demodulator System utilizes the same demodulation techniques as used in the WJ-9472. In addition, it provides up to twenty-four channel demodulation.

The WJ-9471 "VFT" FSK Demodulator System employs phase-locked-loop (PLL) demodulation which is optimized to demodulate narrow shift FSK signals such as the Voice Frequency Telegraph (VFT) signal used in many FDM plans. The tuning parameter preset feature, multi-channel capability and built-in diversity function ensure a very versatile system.



Frequency Converters and Translators

Information on Watkins-Johnson IF-Tape Converters, Tape-IF Converters, and other converters are available from the CET Division. Described below are two of our newer converters.

WJ-9520/WJ-9520-1 Supergroup Converter

Features

- **Tuning Range of 60 kHz to 15 MHz**
- **Six Independent Supergroup Converters**
- **IEEE-488 Bus Compatible**
- **100 Memory Presets, Plus 960 and 2700 Channel Presets**

The WJ-9520 and WJ-9520-1 Supergroup Converters are designed to process FDM signals with input range extending from 60 kHz to 15 MHz. WJ-9520 output frequency is from 60 to 300 kHz, and output for the WJ-9520-1 is from 312 to 552 kHz. Each unit contains six completely independent converters, each with its own display and gain control.

WJ-9478-1 Tunable Frequency Converter

Features

- **250 kHz to 30 MHz Tuning Range**
- **IEEE-488 Remote Control**
- **Excellent Phase Linearity**

The WJ-9478-1 provides frequency conversion of signals from 250 kHz to 30 MHz to one of five output frequencies ranging from 125 to 1600 kHz. It is ideal for IF-to-tape conversions or as a front end for digital signal processing. Any of five bandwidths may be selected from either the front panel or over the IEEE-488 remote control bus. The output center frequency depends on the bandwidth selected and provides the lowest practical center frequency consistent with the bandwidth selected. All front panel functions are accessible via remote control.

Accessory Equipment

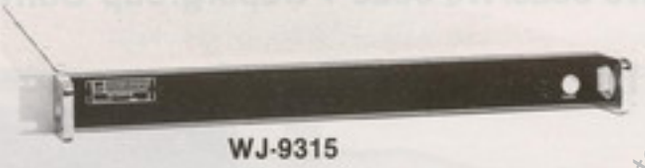
The CET Division manufactures many accessories for their product lines. Among them are frequency counters, equipment frames, speaker panels, multicouplers and interface units. Examples of these accessories follow.

WJ-931X Multicouplers

A variety of multicouplers have been designed over the years by Watkins-Johnson. Presently available are four multicouplers which are designed for standard rack mounting in only 1.75 inches of space.

WJ-9310 provides optimum coupling between a single antenna and as many as twelve receivers operating in the 20 to 1000 MHz range.

WJ-9311 operates in the 0.5 to 30 MHz frequency range and provides a gain of 2 dB nominal.



WJ-9315

WJ-9314 provides optimum coupling between a single antenna and up to four receivers operating in the 20 to 1100 MHz range.

WJ-9315 is well suited for applications using a number of receivers and either a single or multiple antennas. Up to twelve receivers operating over a 20 to 1100 MHz range may be employed.

S-9203A and S-9903E Speaker Panels

S-9203A

- **Companion Units to W-J Receivers**
- **Both Accept Up to Seven Audio Inputs**
- **High Input Impedance**
- **5 Watts Output**
- **S-9203A Mounts in EF-101 or EF-201D Equipment Frame**
- **S-9903E Fits In Standard 19-Inch Rack Space**

WJ-9948 Blower Module

- **1-3/4 Inch Rack Unit**
- **Three, Six or Nine Blowers**
- **Adjustable Positions**
- **19-inch Panel**

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