# COMMUNICATION ELECTRONICS TECHNOLOGY DIVISION

## WATKINS-JOHNSON COMPANY

# CET CONDENSED CATALOG


Gaithersburg, Maryland Plant

Wake County, North Carolina Plant

# Communication Electronics Technology Division
# Systems Group
# Watkins-Johnson Company

The Communication Electronics Technology (CET) Division of Watkins-Johnson Company was established on January 12, 1988, in an effort to consolidate the efforts of the CEI and Special Projects Divisions located in Gaithersburg, Maryland, and, ultimately, to better serve our customers. The talent and expertise of the two divisions are now being employed to improve and expand our capabilities.

The CET Division will continue to manufacture a diversified array of communications equipment, such as surveillance receivers, EMC/TEMPEST test systems, direction finders, demodulators, signal processors, jammers, 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.

Our 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 is provided.

Operating under the auspices of the Gaithersburg facility is the Watkins-Johnson plant located in Fuquay-Varina, Wake County, North Carolina. Presently, this plant is functioning as an extension of the CET Division production facility. However, their activities will be expanded as the need arises.

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 Requirements Offices listed on the back cover of this catalog.

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# Integrated Logistics Support (ILS)

## TRAINING

Experienced Watkins-Johnson training specialists teach courses in the operation and maintenance of all equipment manufactured by the CET Division. 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. The operation and service manual is the basic text for the course with supplementary hand-outs provided as required. Training can be provided at Watkins-Johnson's Gaithersburg facility 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 (−10 through −34);
- 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 Processing and Control Circuitry

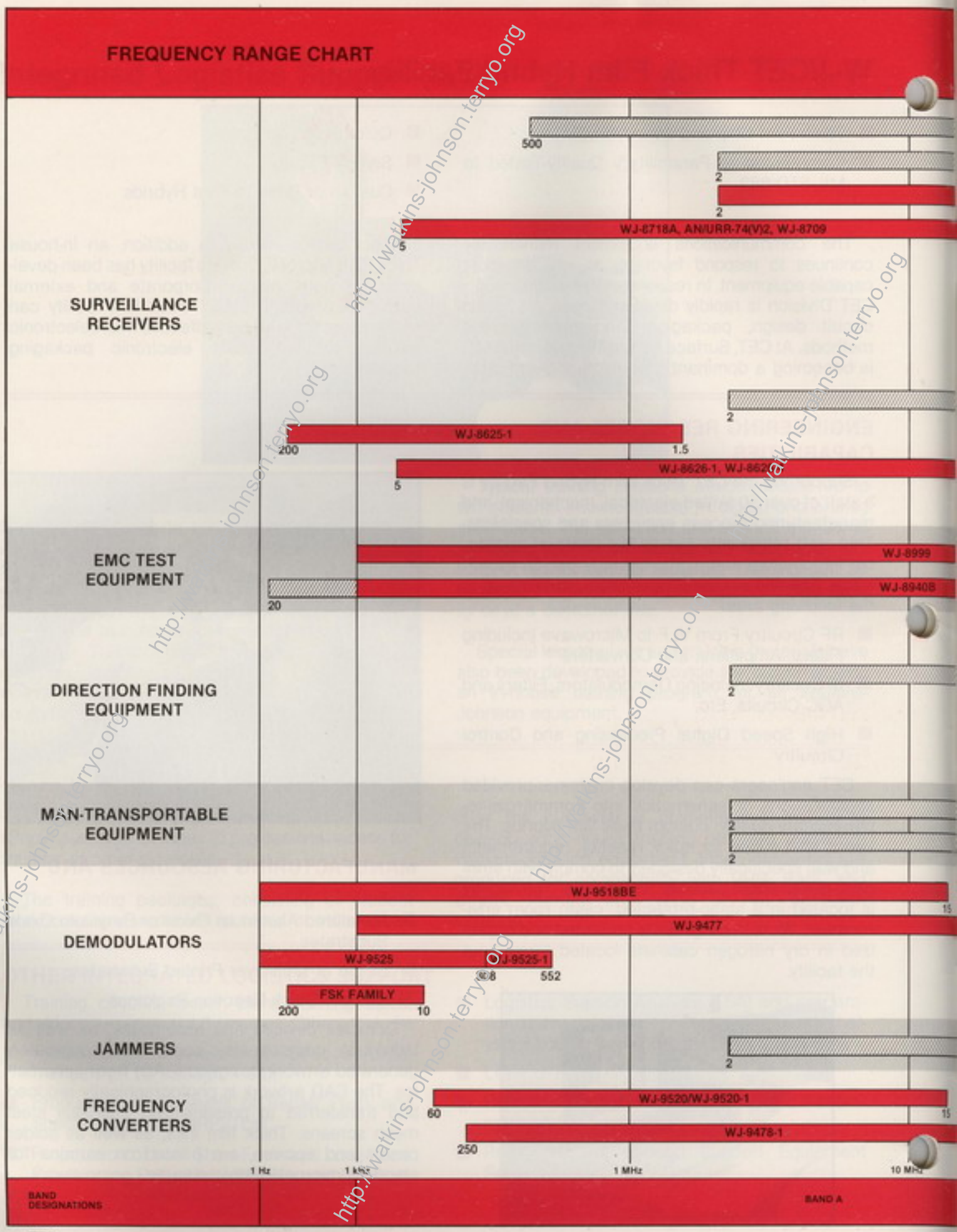
CET engineers can develop customer-provided specifications or schematics into commercial-to-paramilitary quality, custom thick film hybrids. The Lab is well suited for quick reaction requirements and was specifically designed to comply with stringent government security regulations. The facility is located 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.

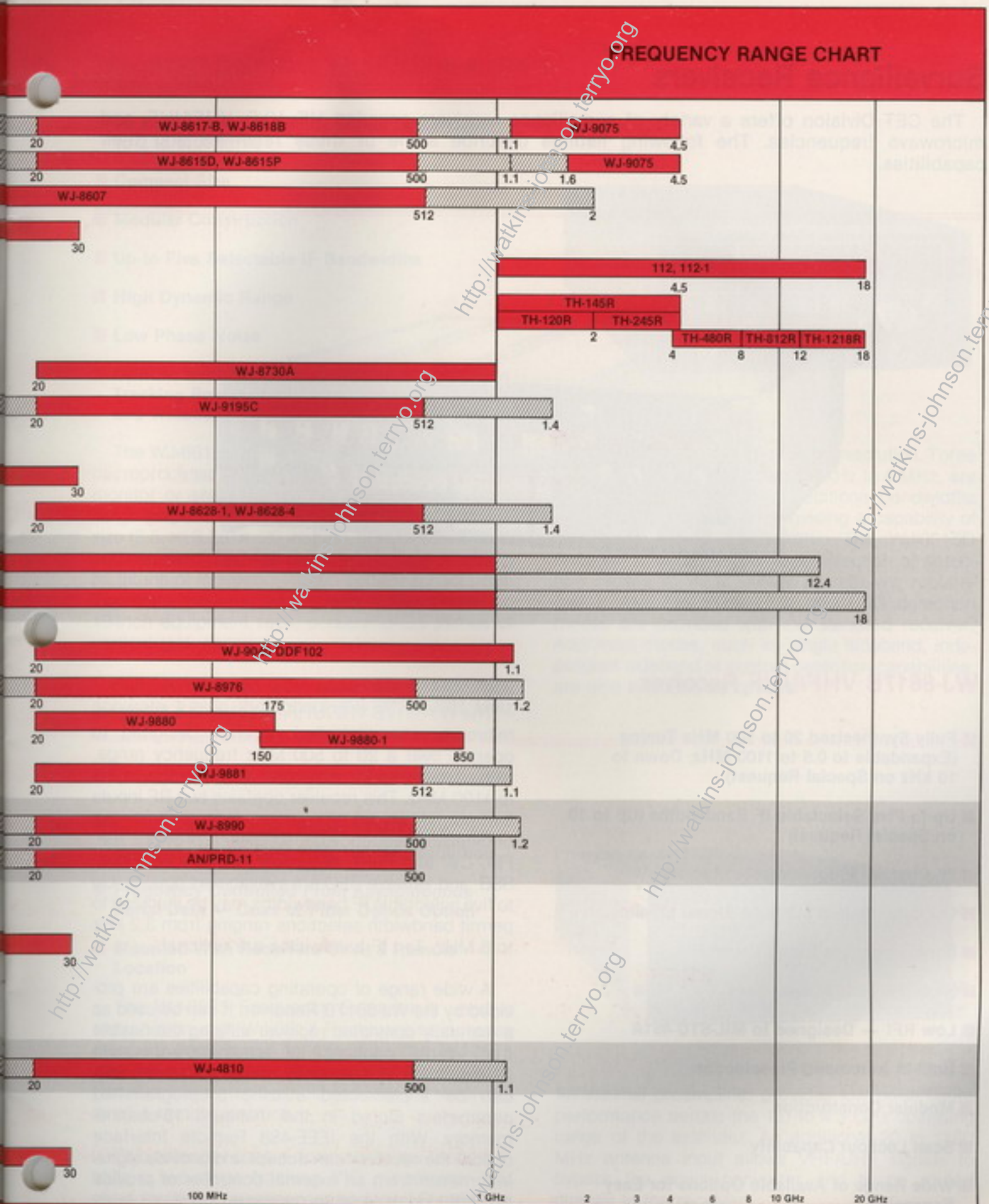
# FREQUENCY RANGE CHART




Indicates Extended Range

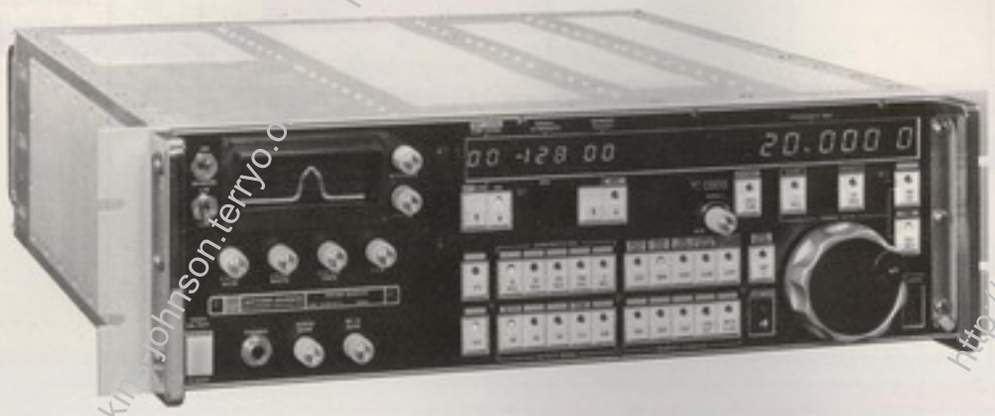

WJ-8617-B, WJ-8618B
WJ-8615D, WJ-8615P
WJ-8607
WJ-8718A, AN/URR-74(V)2, WJ-8709
WJ-8730A
WJ-9195C
WJ-8625-1
WJ-8628-1, WJ-8628-4
WJ-8999
WJ-8940B
WJ-9040 DDF102
WJ-9880
WJ-9880-1
WJ-9881
WJ-8990
AN/PRD-11
WJ-9518BE
WJ-9477
WJ-9525-1
WJ-4810
WJ-9520/WJ-9520-1
WJ-9478-1
1 MHz
100 MHz
1 GHz
BAND A
BAND B
BAND C

# FREQUENCY RANGE CHART



# Surveillance Receivers

The CET Division offers a variety of surveillance receivers covering HF, VLF, VHF/UHF, and microwave frequencies. The following listings describe some of these receivers and their capabilities.




## 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)**
- **Up to Five Selectable IF Bandwidths (Up to 10 on Special Request)**
- **99 Channel Programmable Memory**
- **Optional Built-In LOG/LIN Signal Monitor**
- **Microprocessor Based Control**
- **High Dynamic Range**
- **Low RFI — Designed to MIL-STD-461A**
- **Built-In Automatic Preselection**
- **Modular Construction**
- **Scan Lockout Capability**
- **Wide Range of Available Options for Easy Expansion**

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-8615D Compact VHF/UHF Receiver

- **20 to 500 MHz Frequency Range (Expandable to 2 to 1100 MHz)**
- **Compact Size**
- **Modular Construction**
- **Up to Five Selectable IF Bandwidths**
- **High Dynamic Range**
- **Low Phase Noise**
- **Options Include: Step/Scan/Lockout Capability; Tracking Preselector; Selected Audio Output; and Wideband Output**

The WJ-8615D 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 1100 MHz). Its compact size (3.5 × 8.25 × 20 inches), flexible capabilities and standard IEEE-488 Remote Interface provide a multitude of independent and system applications. Two units, mounted side by side, fit into a standard 19-inch equipment rack, occupying 3.5 inches of vertical rack space.

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. The WJ-8615D Receiver is capable of a wide selection of detection modes to fill a variety of receiver requirements. AM, FM, Pulse, CW and LOG detection modes are provided with the standard receiver. Additional modes, such as single sideband, independent sideband or custom detection capabilities, are also available as options.

## 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 the receivers or at a remote location.

This extender uses a down converter technique with a two-stage tracking YIG preselector that gives 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-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**
- **Includes Many Standard Features of the WJ-8615D Receiver**

When more complex operations must be performed, the enhanced front panel of the WJ-8615P Receiver enables users to access functions previously requiring a controller. For example, Step, Scan, and Lockout (SSL) are now available from the front panel.

The WJ-8615P has three standard and two optional IF bandwidths (from 6.4 kHz to 4 MHz). It features a wide selection of detection modes, including: AM, FM, CW, and Pulse.

This receiver may be utilized as a stand-alone receiver or incorporated into small or large systems.

## WJ-8607 Miniceptor

- **2 to 512 MHz Frequency Range; 2 MHz to 2000 MHz With Frequency Extender Option**
- **Small Size: 1.65" × 6.50" × 10.50"**
- **Modular Construction Using Surface Mount Technology**
- **Light Weight: 4 Pounds**
- **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.

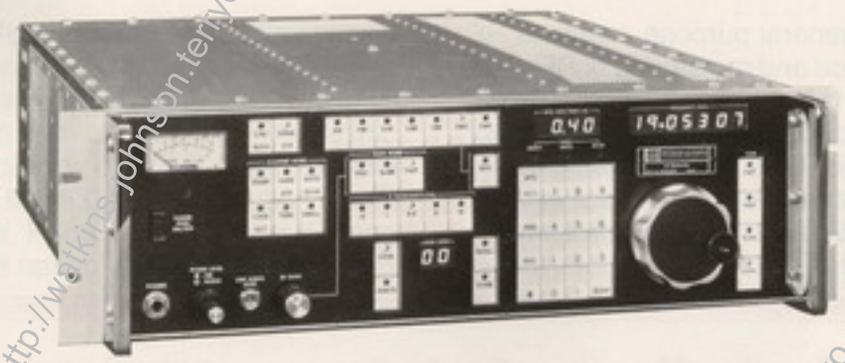
This receiver has maintained the high dynamic range, low phase noise, large signal handling, and selectivity of larger units but uses advanced technologies in construction and design to produce a very cost-effective miniature receiver.

## 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.)

## 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-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 34 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 sub-octave preselection and demodulation of binary FSK signals.

## 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 1400 MHz Frequency Extender**
- **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. A frequency extender option expands spectrum coverage to 1400 MHz. Detection modes include AM, FM, CW, Pulse and SSB. Four IF bandwidths (five with HPI option) may be selected ranging from 10 kHz to 8 MHz. The WJ-8628 features a fully synthesized BFO, 10 msec tuning speed and voltage tuned preselection to 512 MHz with sub-octave preselection to 1400 MHz. Options include a digitally refreshed display output.

## WJ-8730A Receiver Series

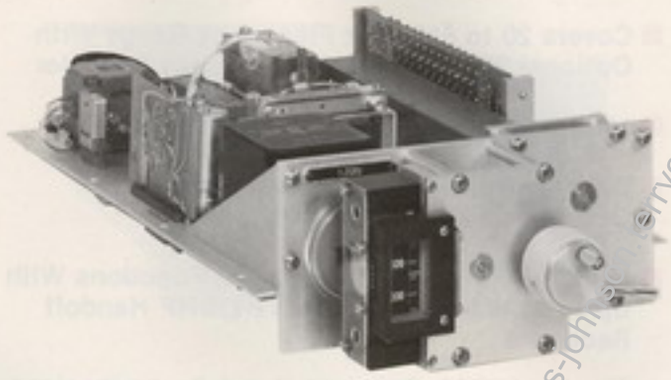
- **20 to 1000 MHz**
- **AM, FM, CW, Pulse**
- **Accepts WJ-9060 Series Tuning Heads**
- **Wide Selection of IF Bandwidth Options (WJ-8930 Series)**
- **DAFC With Compatible W-J Frequency Counter**
- **Modular Concept To Meet a Wide Range of Requirements**
- **EMC Version—WJ-8730R**

The WJ-8730A Series of Modular Receivers offers a wide selection of receiver configurations. Main frames are available with provisions for one or two WJ-9060 Series drop-in Tuning Heads and a signal monitor or tuning meter. Additionally, IF bandwidth options ranging from 10 kHz to 3 MHz are available. Each receiver in the series has provisions for three IF bandwidths; however, the modular concept allows selection of only one or two IF bandwidths if desired.

## TH-Series Tuning Heads

- 1 to 18 GHz
- Four-Stage YIG Preselector
- Solid-State Local Oscillator
- TH-5 Series Available With 50 MHz Bandwidth
- EMC-Qualified When Used With 112R Receiver

| Tuning Head | Frequency Coverage |
|---|---|
| TH-120R | 1 to 2 GHz |
| TH-145R | 1 to 4.5 GHz |
| TH-245R | 2 to 4.5 GHz |
| TH-480R | 4 to 8 GHz |
| TH-812R | 8 to 12 GHz |
| TH-1218 | 12 to 18 GHz |



## 112, 112-1 Microwave Receivers

- 1 to 18 GHz
- AM, FM, Pulse
- Modular Tuning Heads (TH-Series)
- IF Bandwidths:
  112: 0.1, 2, 4, 10, 20 MHz
  112-1:P 0.1, 0.5, 1, 10, 20 MHz

The 112 and 112-1 Microwave Receivers are compact units designed for the reception of AM, FM, and Pulse signals in the 1 to 18 GHz frequency range. This range is covered by the TH-Series Tuning Heads, one of which may be mounted in the receiver at a time. The receivers use double conversion with a first IF of 160 MHz and a second IF of 21.4 MHz. Predetection outputs are available from both IF amplifiers.

# Systems/Subsystems

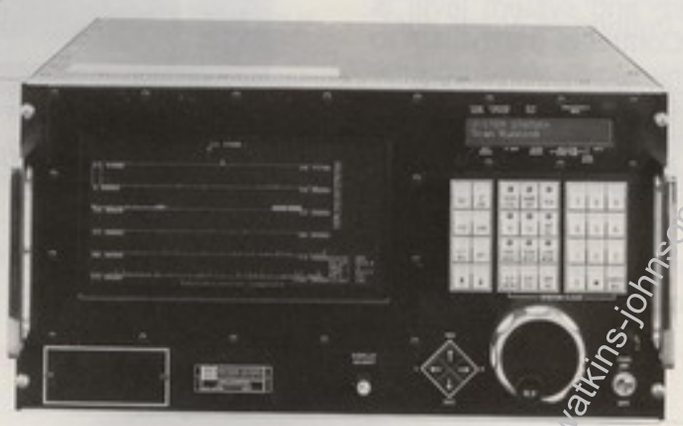
With the continuing advances in technology and the ever-changing requirements of the communications environment, the CET Division has packaged a number of systems and subsystems.

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.

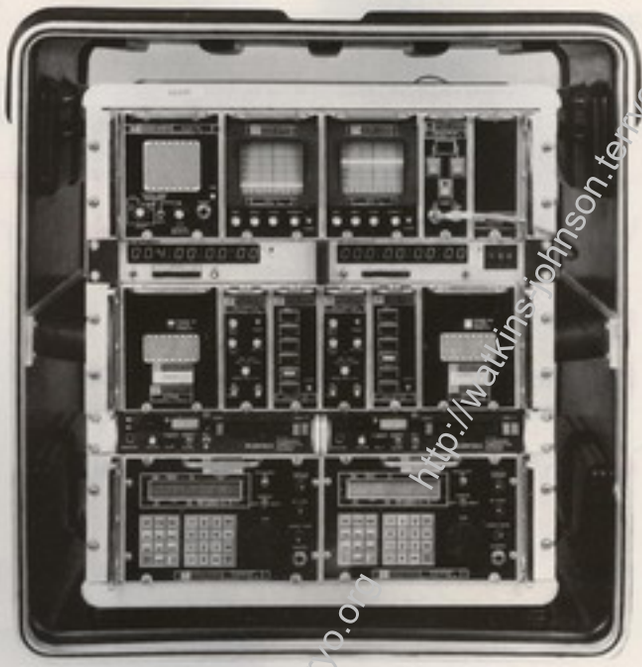
## WJ-9040 Modular Receiving System

The WJ-9040 Modular Receiving System was developed to provide a simple, yet flexible system concept with high performance, small size versus capability, and low power consumption. The resulting design is a unique system which can be quickly configured to meet either general purpose or special VLF/HF/VHF/UHF/ Microwave signal acquisition, monitoring and analysis requirements.

The system design was conceived to provide a compatible family of functional modules which may be configured into a variety of specific system designs. These modules are all designed to be compatible in size, power and digital control, thus resulting in a totally interchangeable and expandable system.

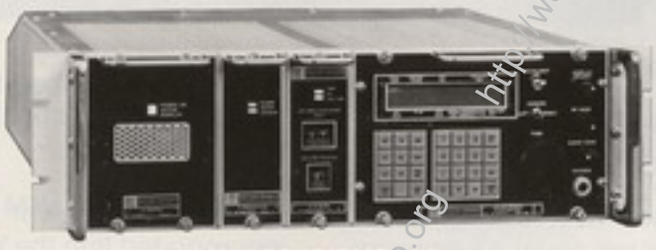
The basic building block of the system concept is the standard 19" equipment frame containing eight module slots, which provide plug-in power and digital interface. Modules are available in 1/8, 1/4, 1/2 and full size rack widths.

System software control is partitioned to the module, frame, zone and system levels. A zone is defined as multiple frames, and system level is defined as multiple zones. Control of the system to the module level can be achieved by frame controllers such as the WJ-8626A-4, WJ-8628A-4 Receiver/ Controller, or external computers connected via IEEE-488 or RS-232 interfaces or a combination of the above.



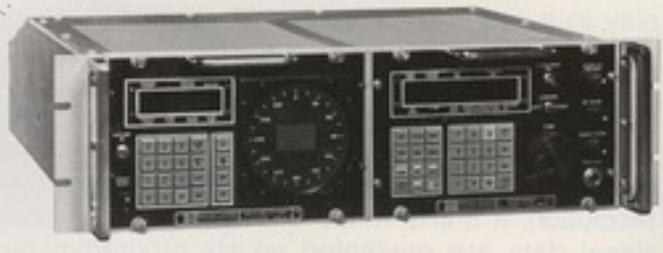
WJ-9040/SYS013

The family of modules described herein is intended to satisfy a broad range of receiver, display, direction finding, signal processing and control functions for communications systems applications.



WJ-9040/SYS003

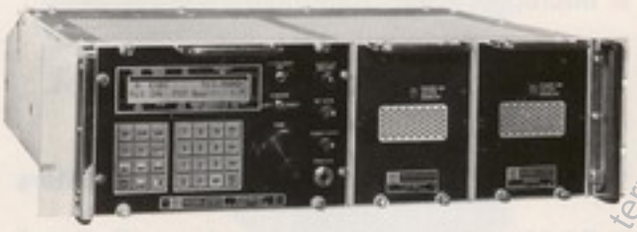
WJ-8628A-4 w/SDU100



WJ-9040/SYS008

## WJ-9040 Modular Receiving Subsystem

- **Half-Rack Receiver Controller**
- **Full Local and Remote Control**
- **Low Power**
- **Extensive Uncommitted ROM and RAM for User-Defined Applications**
- **Master Handoff/Monitor/Control With Up to 34 WJ-9040 VLF/HF/VHF/UHF Handoff Receivers**



WJ-8626A-4
WJ-8626A-1
HF Subsystem
5 kHz to 30 MHz

WJ-8628A-4
WJ-8628-1
VHF/UHF Subsystem
20 to 512 MHz

WJ-8628A-4
WJ-8626A-1
HF/VHF/UHF Subsystem
5 kHz to 1400 MHz

Complete 200 kHz to 1400 MHz frequency coverage can be achieved in low cost subsystems as small as one rack-mounted equipment frame and later upgraded to include as many as 34 HF/VHF/UHF handoff receivers. Each subsystem enables a user to perform manual or automatic signal collection while executing comprehensive scan and signal dwell routines. Control is achieved using a unique WJ-9040 serial asynchronous bus for real time master handoff/monitor/control of quarter-rack receivers. Full IEEE-488 or RS-232 backup is available for optional remote control. Due to their small size and low power consumption, subsystems may be configured without taxing system rack space or primary power.

WJ-9040 VLF/HF/VHF/UHF Receiving Subsystems, incorporate the full complement of WJ-9040 quarter and half-rack receivers into versatile, compact acquisition and/or monitoring stations.

## 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-8628-1 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-8628-1 | 20 MHz to 512 MHz |
| WJ-8625-1 | 200 Hz to 1.5 MHz (Tunable to 0 Hz) |

# WJ-9040 System Modular Components

## WJ-9040 DDF102 Direction Finder

- **Microprocessor Controlled**
- **Full Local and Remote Control**
- **Built-In Test (BITE)**
- **Internal IF Demodulator With Four IF Filters**
- **RS-232, IEEE-488 Direct Interfaces (Optional)**
- **One-Half Rack, Modular Construction**
- **Low Power Consumption**
- **Ability to DF on Pulse Signals ( 150 msec)**

The WJ-9040 DDF102 Direction Finder provides the WJ-9040 System with a direction finding capability. The DDF102, when used with a WJ-86XX VHF/UHF Receiver and a WJ-98XX Series DF Antenna, forms a DF system. Frequency coverage from 20 to 1000 MHz is possible with the proper selection of receiver and DF antenna.

## WJ-9040 SDU100 Spectrum Display Unit

- **21.4 MHz Input (455 kHz Optional)**
- **Switch Selectable/Continuously Variable Sweep Width**
- **2 Hz to 40 Hz Sweep Rate**
- **External X-Y-Z Input Capability**
- **X-Y-Z Outputs to Ancillary Display**

The WJ-9040 SDU100 is a general purpose Spectrum Display Unit designed to present either VLF, HF or VHF/UHF signal activity on a large 5-inch diagonal Cathode Ray Tube (CRT). This unit is a one-half rack WJ-9040-compatible unit with many standard and optional features available to enhance its versatility. The SDU100 is fully compatible with any WJ-86XX HF/VLF/VHF/UHF series receivers, along with other receivers which develop 21.4 MHz or 455 kHz Signal Monitor (SM) outputs.

## WJ-9040 System Modular Components

### WJ-9040 IFD121-1 IF Demodulator (21.4 MHz)

The WJ-9040 IFD121-1 IF Demodulator is used to provide additional demodulation capability for any receiver or RF tuner which has a 21.4 MHz low level IF or SM output. This eighth-rack module provides FM, AM, CW and Pulse demodulation of the input signal. Up to four bandwidths in the 10 kHz to 4 MHz range may be selected.

### WJ-9040 SMU120 Signal Monitor

The WJ-9040 SMU120 IF signal display unit is designed for use with WJ-9040 VHF/UHF receivers. The SMU120 accepts signals at 21.4 MHz and has a variable sweep width up to 4 MHz. The signal monitor is an eighth-rack unit powered by an EFR100 Equipment Frame and outputs X, Y, and Z DC voltages capable of driving a CRT display, such as the WJ-9040 DXY100.

### WJ-9040 PHF101, PHF102, and PHF103 HF Preselectors

The WJ-9040 PHF101, PHF102, and PHF103 series of HF Preselectors consist of one quarter-rack modules, containing up to three independent HF Preselectors. Each preselector covers the 5 kHz through 30 MHz frequency range in ten switched suboctave bands. The unit is specifically designed to be used with the WJ-8626A-1 HF Handoff Receiver. Automatic band switching is accomplished with four TTL lines using a BCD format, and is transparent to the user.

# 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 MVU108 VHF/UHF Multicoupler

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

## WJ-9040 ASU226-1/-2 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.

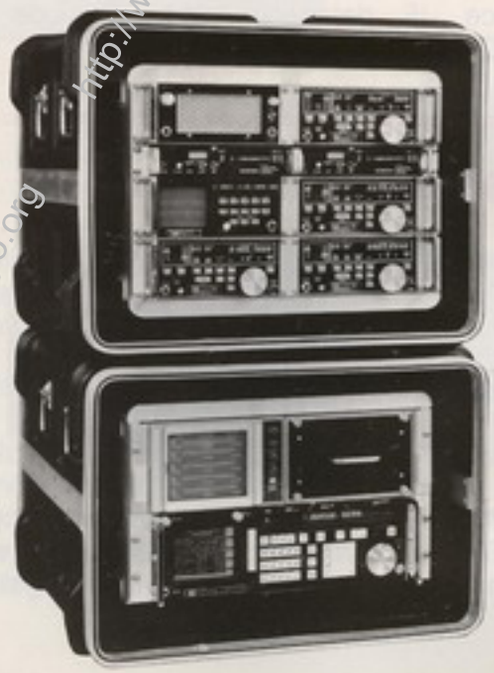
This controller can be modified for more complex systems' requirements or used to control demodulators.

## 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-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**

The WJ-8940B Receiving System is a multi-purpose system designed for EMC and TEMPEST investigations, wideband RF ambient signal surveys, and visual analysis of narrowband and broadband signals. In its standard configuration, this system tunes from 1 kHz to 999.999999 MHz, with a 1 Hz resolution and provides 17 selectable IF bandwidths ranging from 200 Hz to 50 MHz in a 1-2-5 sequence. IF detection modes include AM, AM/AGC, FM, CW and LOG.

The standard WJ-8940B System consists of a Digital Control Unit (DCU), Tuner/Synthesizer Unit (TSU), Auxiliary Synthesizer (AS), IF Demodulator (IFD), Power Supply (PS), and Circuit Breaker Panel (CB) integrated into a rack enclosure. It provides three local (Fixed Frequency, Sector Scan, and Repetitive Sector Scan) modes and one remote mode, offering a high degree of operating flexibility.

## WJ-8940B System Options

**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.

## 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-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.

# Tactical Equipment

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 resulted in a family of manpack receiving and direction finding equipment for tactical users.

CET Division's advanced development of Hybrid technology is the mechanism by which these products can pack more features into smaller and lighter weight designs. This equipment is especially suited for special missions in a highly mobile and intense combat environment. They perform equally well for airborne or special forces teams, and may be vehicular mounted for heavier units such as an armored division.

Rugged, supportable, state-of-the-art design, and operator-friendly systems, provide accurate, reliable data for use on the battlefield.

## WJ-8990 Manpack Tactical Intelligence System (MANTIS)

- **20 to 500 MHz Intercept and DF, Expandable to 0.5 to 1200 MHz Intercept and 2 to 1200 MHz DF**
- **Stand-Alone or 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.

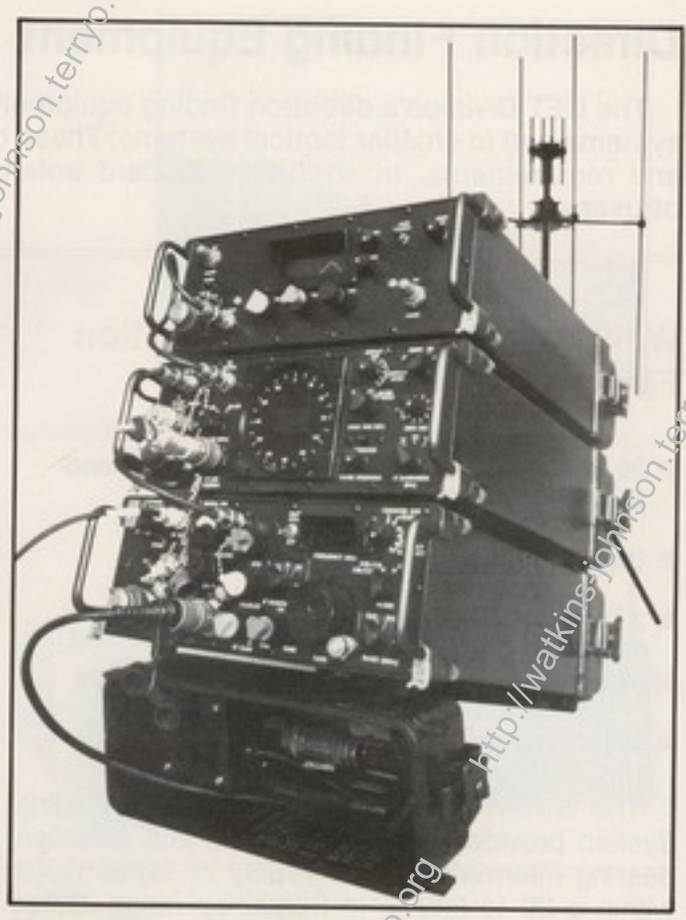
## AN/PRD-11 System

- **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.

# 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.

## WJ-8976 Three Channel Direction Finding System

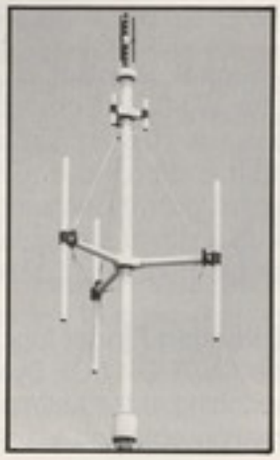
- **20 to 500 MHz Frequency Coverage (Expandable to 2 to 1200 MHz)**
- **Digital Display of Signal Parameters**
- **2 Degree Accuracy**
- **Accuracy Not Affected By Modulation Type**
- **Microprocessor-Based Control**

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. It is equipped with an IEEE-488 Remote Interface to permit full system control utilizing an external computer or other compatible controlling device. Additional interfacing may be implemented to accommodate an external keyboard and color monitor to enhance control and monitoring capabilities. Each WJ-8976 System can be unique, depending on customer specifications.

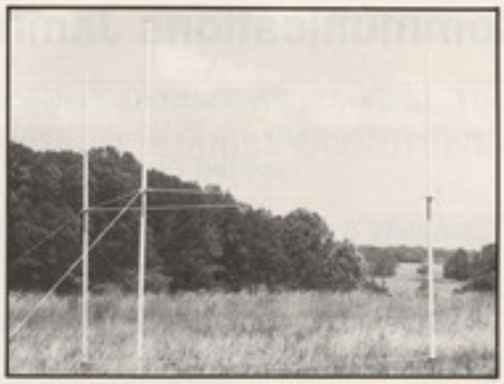
## WJ-8976/AU-5 Triple Baseline DF Antenna

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 frequently 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.



## WJ-9040 DDF102 Direction Finder (SYS008)

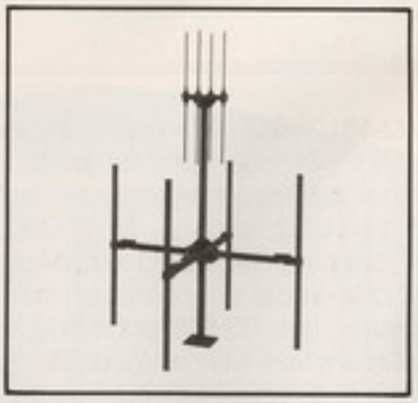
The WJ-9040 DDF102 Direction Finder provides the WJ-9040 System with a low-cost direction finding capability. When combined with the WJ-8628-4 VHF/UHF Receiver and WJ-98XX Series DF Antenna, the DDF102 forms a DF system, "WJ-9040/SYS008," with frequency coverage from 20 to 1000 MHz.

## 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 Processor and with the WJ-8990 Manpack Tactical Intelligence System (MANTIS). The WJ-9881 incorporates two bays which provide the complete 20 to 500 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

# Communications Jamming

## WJ-4810/JCU Jammer Control Unit

- **Complete System Control for HF, VHF or UHF Communications Jamming**
- **AM, FM or 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**
- **Standard IEEE-488 or RS-232 Ports for System Flexibility**
- **Selectable Lookthrough Capability, Fixed or Pseudo-Random**
- **Built-In Speaker for Monitoring Receiver or Jammer Audio**

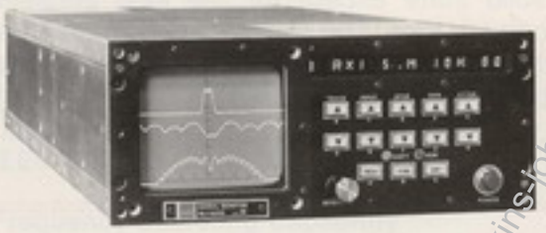
The WJ-4810/JCU provides complete system control and signal operation for jamming systems in the 20 to 500 MHz range, with optional extension down to 1.5 MHz and up to 1 GHz. The unit includes front panel keyboard and display, speaker or headphone audio connections, microphone or recorder input, two RS-232 ports and an IEEE-488 port. In conjunction with a WJ-862X receiver, the WJ-4810/JCU serves as the nucleus of the WJ-4810 Communications Jamming Systems family. The JCU provides receiver control via RS-232 or IEEE-488, parallel interface to a direct frequency synthesizer, control signals for external T/R switches and harmonic suppression filters, and a CW or modulated RF output of up to 3 watts. Both AM and FM modulations are available in selectable bandwidths using a combination of noise, single tone, dual tone, variable tone and external modulating signals.

# 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.

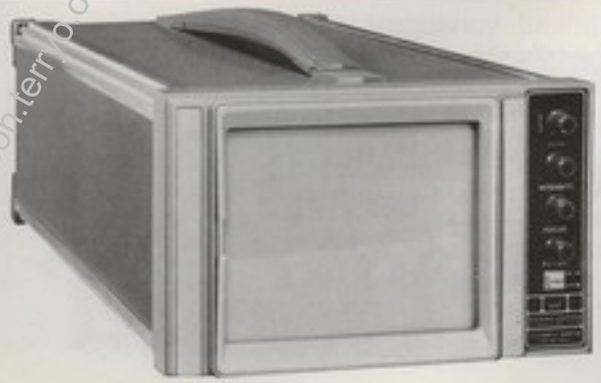
## WJ-9206 Signal Monitor

- **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.

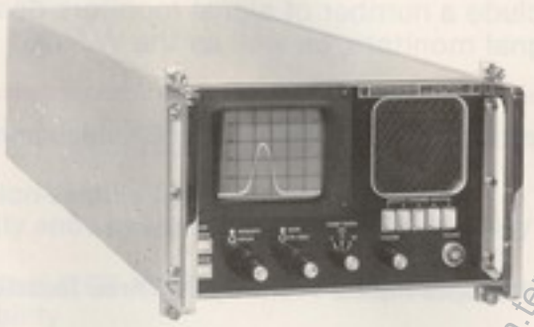
## WJ-9201 XYZ Display

- **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**



## WJ-9209 Signal Display With Integral Speaker Unit

The WJ-9209 is an IF Signal Display with Integral Speaker Unit designed for use with the WJ-8709 HF Receiver. The WJ-9209 accepts a 455 kHz input signal and provides selectable sweep widths of 5 kHz, 15 kHz, or 30 kHz. The audio section has five 600-ohm switchable inputs. The gain control adds 60 dB of range to the 40 dB logarithmic display mode. All active elements in the signal monitor are solid state except for the long persistence cathode ray tube. The speaker contains an integral 1-watt output solid state amplifier. It also has an additional feature that allows up to five audio channels from other sources to be monitored, via the front panel selector switch.

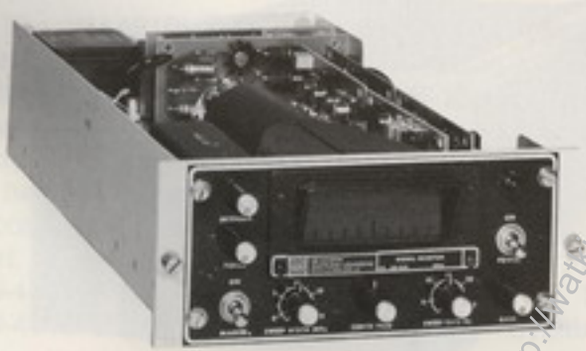


## WJ-9188A-18 Signal Monitor

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-9404A Signal Monitor

- **21.4 MHz Input Center Frequency**
- **Variable Sweep Width: 0 to 4 MHz**
- **Resolution — 6 dB Valley Between Signals 20 kHz Apart (100 kHz Sweep Width)**
- **Sweep Rate 5 to 25 Hz, Variable**



## 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 Precision Tunable Demodulator and the WJ-9518BE FDM Demodulator. A brief description of some of these units follows, and information on our other demodulators, or special demodulator requirements, is available on request.

## 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-9477 Tunable Demodulator

- 1 kHz to 30 MHz Tuning Range
- AM and FM Demodulation (Optional SSB)
- Up to Nine IF Bandwidths From 3.2 kHz to 5 MHz
- 1.8 to 1 Shape Factor Filters Available
- Microprocessor-Based Control Circuitry
- IEEE-488 Bus Compatible

The WJ-9477 Precision Tunable 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 1 kHz to 30 MHz frequency range, with a 10 Hz tuning resolution. Up to nine IF bandwidths, chosen from a selection ranging from 3.2 kHz to 5 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 Demodulator.

## WJ-9525/WJ-9525-1 FDM Demodulators

- 0 to 308 kHz or 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 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 308 kHz (WJ-9525) or 0 to 552 kHz (WJ-9525-1) 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.

## FSK Demodulator Family

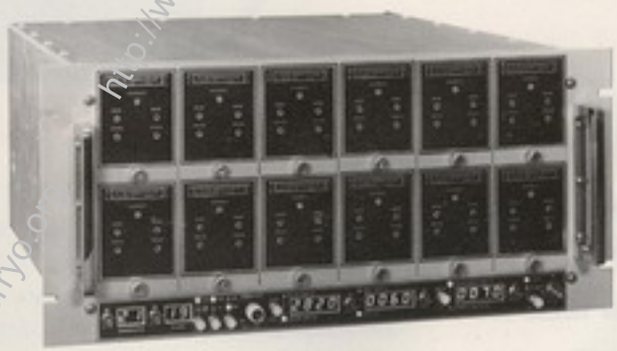
The Watkins-Johnson FSK Demodulator Family consists of a group of demodulator systems designed to provide state-of-the-art FSK or OOK demodulator performance. The control rack frames comprising this family provide microprocessor control and signal interconnection for a variety of compact plug-in modules,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

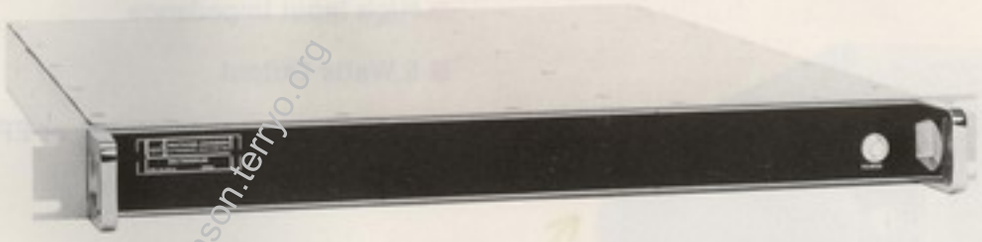
### Features

- **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.

# Multicouplers

The CET Division Multicouplers are designed for standard rack mounting and occupy only 1.75 inches of rack space. A brief description of our multicouplers follows.



## WJ-9310 Multicoupler

The WJ-9310 Multicoupler provides optimum coupling between a single antenna and as many as 12 receivers operating in the 20 to 1000 MHz frequency range. The multicoupler provides a nominal gain of 2 dB and has a noise figure of 6.5 dB from 20 to 300 MHz and 8.5 dB from 300 to 1000 MHz.

## WJ-9311 HF Multicoupler

The WJ-9311 Multicoupler operates in the 0.5 to 30 MHz frequency range and provides a gain of 2 dB nominal. The input/output impedance is 50 ohms with a noise figure of 7 dB maximum.

## WJ-9314 Multicoupler

The WJ-9314 Multicoupler provides optimum coupling between a single antenna and up to four receivers operating in the 20 to 1100 MHz frequency range. Attention has been focused on minimizing intermodulation and achieving high isolation between outputs. Four auxiliary outputs are provided on the rear panel.

## WJ-9315 Multicoupler

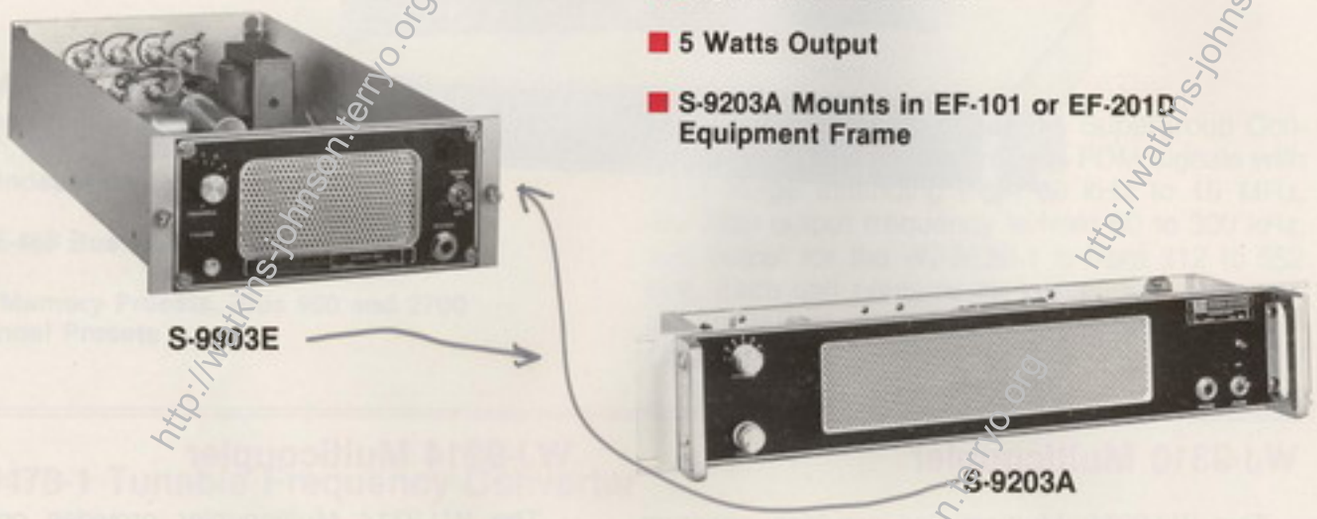
The WJ-9315 Multicoupler is well suited for applications using a number of receivers and either a single or multiple antennas. As many as 12 receivers operating over a 20 to 1100 MHz frequency range may be employed.

# Accessory Equipment

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

## S-9203A and S-9903E Speaker Panels

- 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




## WJ-9948 Blower Module

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

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