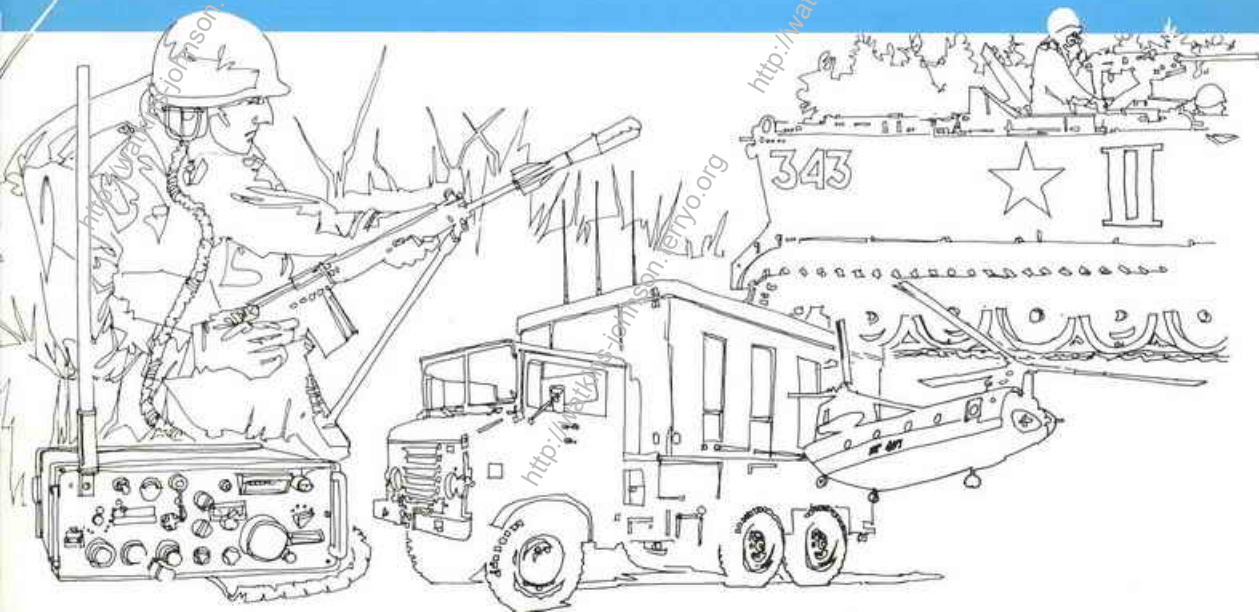


RECEIVING EQUIPMENT

Condensed Catalog





Gaithersburg Facility

Introduction

Watkins-Johnson Company was formed in December, 1957, to engage in research, development and production of advanced electron devices and electronic systems. Now employing more than 2200 people, the Company is a diversified electronics firm with manufacturing facilities in the U.S. and overseas. Corporate offices are located in Palo Alto, California. Additional facilities are located in Scotts Valley, near Santa Cruz, California; Gaithersburg, Maryland, near Washington D.C.; Windsor, England, 30 miles west of London; Munich, Germany; and Rome, Italy.

Watkins-Johnson offers the world's largest selection of receiving equipment for surveillance, direction finding, and countermeasures. The equipment produced by the Gaithersburg Facility presently covers the radio frequency spectrum from 1 KHz to 18 GHz. Through careful design, mutual compatibility has been maintained across the product line. Thus, system configurations from catalog items may be easily assembled. Practically all of the receivers, tuners, demodulators, frequency counters, and signal monitors built by W-J can be used separately or in complex system arrangements.

All Watkins-Johnson products, whether special purpose or catalog-configured, incorporate the latest concepts in system design. Computer or remote control, high sensitivity, wide dynamic range, accurate signal reproduction, and effective human engineering are all provided in W-J products. Additionally, Watkins-Johnson has an in-house systems engineering capability and full support services including training, logistics, and field engineering.

Drawing on the extensive experience of the Gaithersburg Facility, new units and systems have been developed to meet the increasing demand for precision EMI, EMC, and TEMPEST test and monitoring equipment. Additionally, many Watkins-Johnson equipments now include state-of-the-art shielding techniques which prevent W-J receiving equipment from adding to the already frequency-choked world.

For highly unusual applications, W-J will either modify existing products or design and fabricate new instruments to match the needs. Utilizing in-house capabilities to the fullest, tight deadlines can be met even on quantity production runs. Of noteworthy importance in such special projects is the Company's provision for secure areas, which allow us to undertake rigidly classified assignments of wide scope and complexity.

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The products shown in this condensed catalog represent only a cross section of our product line. Many additional products including modified versions of the equipment shown herein are available. For further information about any Watkins-Johnson product, please contact Applications Engineering in Gaithersburg, or any Watkins-Johnson Sales Office shown on the back cover of this catalog.

WJ-8888A HF Receiver



- .5 to 30 MHz
- AM, FM, CW, ISB, LSB, USB
- Synthesized LO with 10 Hz Resolution
- Built-in Memory
- Switch selectable tuning speeds
- Total Digital Control

The WJ-8888A is a highly versatile HF receiver which provides exceptional signal handling capabilities over the 0.5 to 30 MHz frequency range. The receiver has three operating modes: Local, Remote, and Memory. In the Local mode, the receiver is tuned manually by the operator. In the Remote mode, the receiver accepts and stores a digital word which controls the tuned frequency, detection mode, gain mode, IF bandwidth, RF gain level, and BFO frequency. In conjunction with the Local mode, the Memory mode enables the operator to store up to sixteen sets of receiver frequencies and control parameters which may be recalled as required.

The receiver is designed for the reception of AM, FM, CW, ISB, LSB, and USB emissions. Up to six IF bandwidths may be selected via front panel push-button switches. Four switch selectable tuning speeds are provided with resolutions of 10 Hz, 100 Hz, 1 kHz, and 10 kHz. Other features include automatic switching of sub-octave preselection filters to minimize intermodulation distortion and synthesized conversion oscillators for maximum receiver stability. The tuned frequency of the receiver is displayed on a front-panel seven-digit LED readout. Resolution of the display is 10 Hz over the entire tuning range.

The WJ-8888A is supplied with a 64-bit serial synchronous I/O interface. An optional serial asynchronous interface is available. Further digital interface information is available in Watkins-Johnson Application Note 1304-50, dated November, 1975.



In the shown configuration, the WJ-8888A is interfaced with the WJ-9188A Signal Monitor and WJ-9888 Active HF Antenna. The WJ-9188A accepts the receiver's 455 kHz signal monitor output and provides a visual display of signals around the tuned frequency.

WJ-8622 Compact Receiver



- 20-150 MHz, extendable to 500 MHz
- Small size: 4" x 5" x 8"
- Modular, stackable construction
- Built-in synthesizer with 1 kHz resolution
- Serial, digital I/O (remote control)
- Outputs: IF, video, audio, AGC



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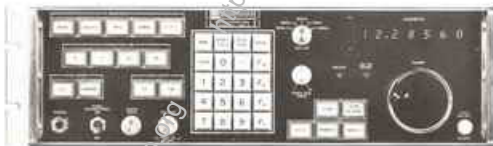
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WJ-9023A Receiver



- 50 MHz to 12.4 GHz
- AM, FM, Pulse
- Synthesized conversion oscillator
- Five IF Bandwidths
- Keyboard for selection of fixed and scan frequencies
- Manual, Semi-automatic, or Computer Control



WJ-9023A/DCU

All operator controls and displays are located on the front panel of the WJ-9023A/DCU. In the manual mode, the operator can scan the receiver between selected frequencies at selected step sizes and dwell times, tune by means of a manual tuning dial, or select fixed frequencies entered from a keyboard or recalled from memory. Six memory channels are provided for storing scan frequency limits and fixed frequencies for later selection. In both manual and remote operating modes, the DCU controls bandwidth, attenuation, and AGC selection in the IFD. A seven-digit LED readout displays the tuned frequency and/or keyboard selections. Individual LED's are included for synthesizer lock status and out of range indications.

Additional features include five IF bandwidths ranging from 10 kHz to 20 MHz, up to 45 dB of switch-selectable IF attenuation, AM or FM audio select and gain controls, and an aural enhancement switch for use during pulse reception.

WJ-9025 Receiving System



WJ-9025/DCU

- 10-1000 MHz
- AM, FM, CW, Pulse
- Built-in microprocessor for single or multiple receiver control
- Interface bus adaptable for use with WJ-8622, WJ-8888A and WJ-9023A
- Synthesized local oscillators
- Operating modes:
 - Manual
 - Scan
 - Scan/Sector
 - Cell Scan



340A VLF Receiver

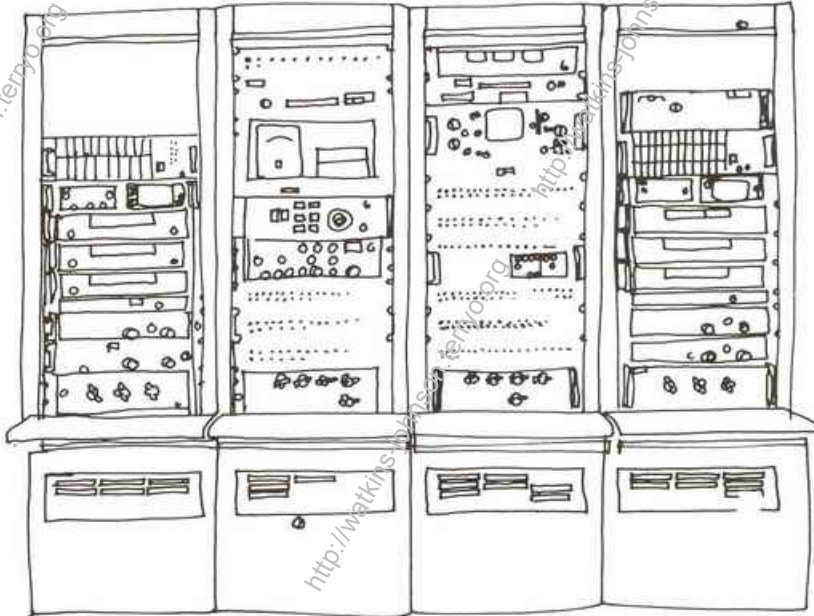


- 1 kHz to 900 kHz
- AM, FM, CW
- Voltage Tuned with Local or Remote Control
- IF Bandwidths: 1, 6, 20, and 50 kHz
- Five-digit Frequency Counter, with DAFC
- Optional Slideback for EMI Testing
- Compatible with SM-8421 Signal Monitor

521A-1 Receiver



- 20 to 80 MHz
- AM, FM, CW
- IF Bandwidths: 4, 10, 50 kHz
- Built-in Signal Monitor
- Carrier Operated Relay
- Compatible with DRO-290B Frequency Counter



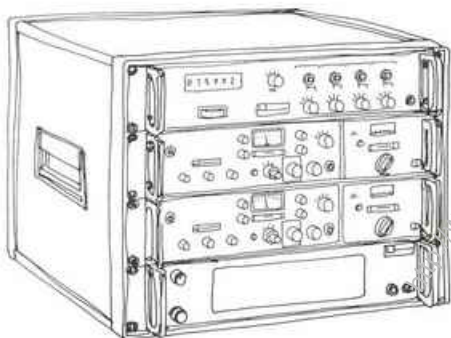
565 Receiver



- 20 to 1000 MHz
- AM, FM, CW, Pulse
- Bandwidths: 10, 50, 300 kHz, 3 MHz
Optional bandwidths available
- Built-in Signal Monitor
- DAFC when used with compatible W-J Frequency Counter
- Accepts UH-100 and VH-100 Tuning Heads
- EMC Version—WJ-8740

565A Receiver

- Modulator IF concept permits customer selection of one, two, or three IF bandwidths from 10 kHz to 3 MHz
- Uses WJ-9930-Series plug-in IF Amplifier/Demodulator modules
- Identical to 565 in other respects



UH-100 Series, VH-100 Series Tuning Heads



UH-101

- Plug into 565 and 565A Receiver
- No Alignment required when changing Tuning Heads

Tuning Head	Frequency Range
VH-101	20-90 MHz
VH-103	90-260 MHz
VH-105	200-425 MHz
UH-101	235-500 MHz
UH-102	500-1000 MHz
UH-104	490-1000 MHz

Battery Operated Receiver



BSU-101

A modified version of the 565 Receiver, the 565-13, is available for field-portable battery operation when used with the BSU-101 Battery Service Unit. The BSU-101 has a built-in battery charger and includes front-panel switches to control the following functions of the 565-13:

- Receiver Power On/Off
- Receiver Lamps On/Off
- Receiver COR On/Off
- Signal Monitor On/Off

The RBP-101 Replacement Battery Pack is available for mounting in the BSU-101. The RBP-101 contains four, 6-volt, 10 ampere hour lead-acid batteries which will accept approximately 500 recharges.

WJ-8730A Receiver Series



WJ-8730A

WJ-8731A

- 20 to 1000 MHz
- AM, FM, CW, Pulse
- Accepts WJ-9060 Series Tuning Heads
- Wide Selection of IF bandwidth options (WJ-9930 Series)
- DAFC with compatible WJ-9930 Frequency Counter
- Modular Concept to meet a wide range of requirements
- EMC Version—WJ-8730R

Receiver Configurations

WJ-8730A	{ Two tuning heads Built-in signal monitor
WJ-8731A	{ Two tuning heads Tuning Meter
WJ-8732A	{ One tuning head Built-in signal monitor
WJ-8733A	{ One tuning head Tuning Meter

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.

WJ-9060 Series Tuning Heads



WJ-9063

- Gain \times Noise Figure Product: 30 dB \pm 3 dB, all Tuning Heads
- 3rd Order Intermod Intercept Point: $>$ 10 dBm, all tuning heads
- Simple drop-in installation
- No electrical alignment required after installation
- Special versions available for use with WJ-8730R

Tuning Head	Frequency Range
WJ-9061	20-90 MHz
WJ-9062	90-300 MHz
WJ-9063	200-425 MHz
WJ-9064	250-500 MHz
WJ-9066	30-90 MHz
WJ-9068	490-1000 MHz

WJ-9930 Series IF Amplifier/Demodulator Modules

- Plug-in sets consisting of IF amplifier module and limiter/discriminator module
- Select up to three sets for use in WJ-8730A Series, WJ-8736 and 565A

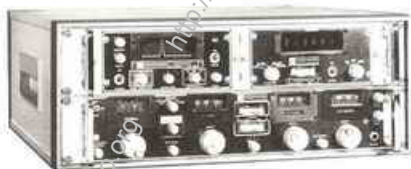
IF Amplifier/ Demodulator	Bandwidth
WJ-9930-10	10 kHz
WJ-9930-20	20 kHz
WJ-9930-50	50 kHz
WJ-9930-100	100 kHz
WJ-9930-200	200 kHz
WJ-9930-300	300 kHz
WJ-9930-500	500 kHz
WJ-9930-1M	1 MHz
WJ-9930-2M	2 MHz
WJ-9930-3M	3 MHz

WJ-8736 Receiver



- 20 to 1000 MHz
- Four-Band operation
- AM, FM, CW, Pulse
- Designed for electro-magnetic compatibility
- Uses WJ-9930 Series plug-in bandwidth modules

The WJ-8736 Receiver is an extremely compact unit covering the entire 20 to 1000 MHz range. Provisions are available for selection of one, two, or three WJ-9930 Series IF bandwidth modules (see page 6 for available IF's). Also included in the receiver are tuning and signal strength meters and a carrier-operated relay (COR).



In the shown configuration, the receiver is interfaced with an SM-9404A Signal Monitor and DRO-309A Frequency Counter, thus providing a complete 20-1000 MHz receiving system occupying only seven inches of vertical rack space.

WJ-9028 Receiving System



- 20-1000 MHz
- AM, FM, CW, Pulse
- Built-in Signal Monitor with Linear and Log Display modes
- Built-in Frequency Counter with DAFC and variable intensity
- Uses WJ-9930 Series plug-in bandwidth modules
- Compact, 5 1/4 inch rack size

RS-111-B-12B Receiving System



- 30 to 1000 MHz
- AM, FM, CW
- Selectable IF Bandwidths: 20, 75, 300 kHz
- Wideband IF Bandwidth: 2 MHz (always operating)
- Built-in Signal Monitor
- DAFC with DRO-309A or DRO-333 Frequency Counters

112, 112-1 Microwave Receivers



112

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

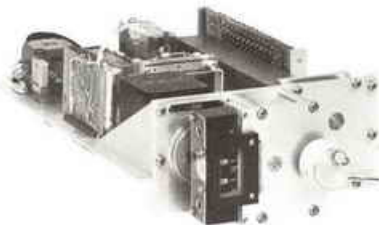
MTF-100A, MTF-101, MTF-102A Microwave Tuner Frames



MTF-100A

- MTF-100A and MTF-101 mount two TH-Series Tuning Heads
- MTF-102A mounts one TH-Series Tuning Head
- MTF-100A and MTF-102A operate independently
- MTF-101 operates with MTF-100A
- IF outputs at 160 MHz and 21.4 MHz
- Accept external AFC and AGC
- Analog tuning voltage provided

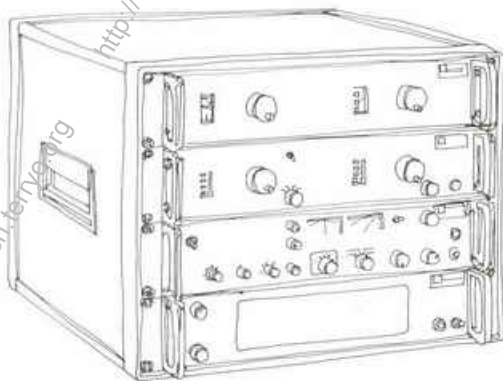
TH-Series Tuning Heads



TH-120R

- 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

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



RS-180A Receiving System



RS-180A with EF-182A Equipment Frame

20 to 1000 MHz

AM, FM

CW Option for 30 to 250 MHz Range

EMC Version—RS-168

The RS-180A Receiving System provides up to twelve independent receivers, a time-shared frequency counter with DAFC and an active multicoupler which permits operating all receivers from a single broadband antenna. An equipment frame which supplies system interface and dc operating voltage to the receivers and frequency counter is also provided. The EF-180A mounts up to six receivers and the EF-182A mounts up to 12 receivers.



483A

The 480A Series Receivers include ten plug-in units designated 481A through 490A. Each has squelch control, coarse and fine tuning controls, DAFC capability, and FM, AM/AGC and manual AM modes. A BFO pitch control is included on receivers having the CW option. A wide range of customer-selected IF bandwidths is offered with the series. In addition to the outputs required for system interface, a balanced video output and squelch logic level output is provided from each receiver. Two audio outputs and a signal monitor output from the selected receiver are provided via the frequency counter.

Receiver

- 481A
- 482A
- 483A
- 484A
- 485A
- 486A
- 487A
- 488A
- 489A
- 490A

Tuning Range

- 30-60 MHz
- 60-120 MHz
- 100-180 MHz
- 180-300 MHz
- 30-90 MHz
- 80-250 MHz
- 20-80 MHz
- 220-440 MHz
- 250-500 MHz
- 500-1000 MHz

The DRO-280A Frequency Counter is capable of controlling up to twelve receivers in the RS-180A System. Each receiver has its local oscillator frequency counted and its DAFC correction voltage updated every 15 milliseconds. A 12-position receiver selector switch on the counter is used to select the receiver whose frequency will be read out on the LED display. The display lamp on the selected receiver is illuminated so that the operator can tell at a glance which receiver's frequency is being displayed. In addition, the selector switch provides selection of the appropriate audio output so that the operator may monitor the output of the selected receiver while observing the frequency of operation. The selector switch also provides selection of the appropriate signal monitor output for external monitoring of the spectrum about the selected receiver's IF.



WJ-9310

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

440, 441 Series Receivers



440

- 30 to 300 MHz
- 440—AM
- 441—FM
- Crystal controlled for high stability
- Variety of test accessories available
- Mount in EF-506B Equipment Frame

Basic Receiver	Frequency Range		IF Bandwidth	
	First Suffix	Frequency (MHz)	Second Suffix	Bandwidth (kHz)
440-()-()	-1	30-48	-1	50
441-()-()	-2	45-72	-2	20
	-3	70-105	-3	75
	-4	100-160	-4	100
	-5	150-220		
	-6	210-260		
		255-300		

461 Series Receiver



- 300 to 550 MHz
- AM, FM
- Video Output
- Crystal Controlled
- Mount in EF-506B

Basic Receiver	Frequency Range		IF Bandwidth	
	First Suffix	Frequency (MHz)	Second Suffix	Bandwidth (kHz)
461-()-()	-1	300-450	-1	50
	-2	450-550	-2	20
			-3	75
			-4	100

EF-506B Equipment Frame



- Accommodates up to six 440, 441, 461 Series Receivers
- Built-in power supply provides operating voltage to receivers
- Occupies 5.25 inches of vertical rack space

PEC-401 Portable Equipment Case



- Mounts one 440 or 441 Receiver
- Battery operation with built-in charger
- Built-in speaker and whip antenna

WJ-8640 Manpack Receiver



- 20 to 500 MHz
- AM, FM, CW, Optional SSB
- Built-in low-power frequency counter with DAFC
- Battery or external power source operation
- Ruggedized and waterproof construction
- Compatible with WJ-9180 Manpack Signal Monitor

The WJ-8640 provides wideband frequency coverage using one of the following WJ-9120 Series Tuning Head assemblies:

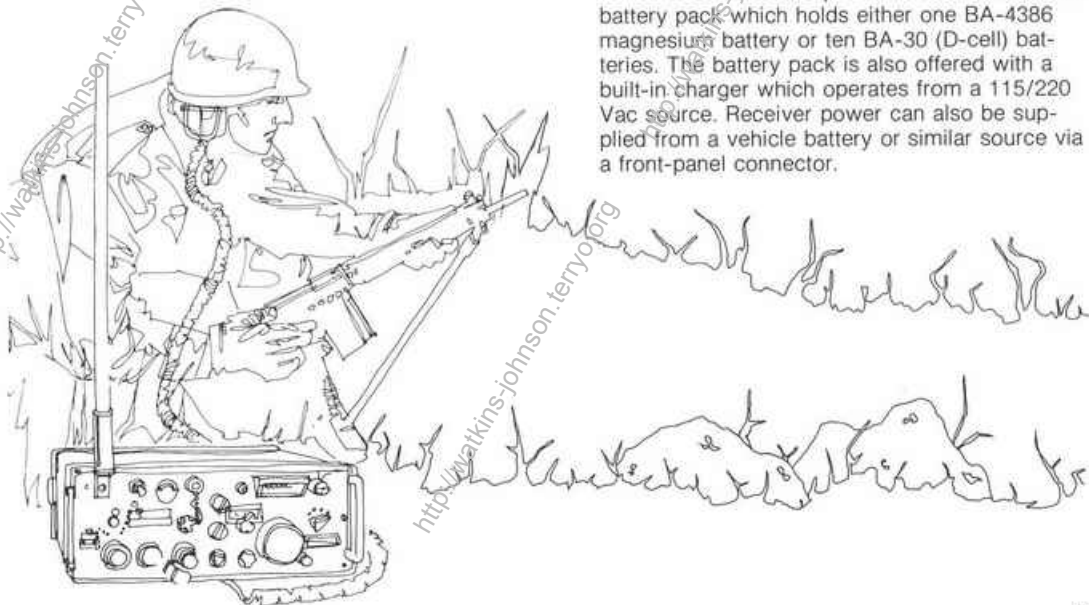
- WJ-9121 20-250 MHz (dual band)
- WJ-9122 20-80 MHz (single band)
- WJ-9123 80-250 MHz (single band)
- WJ-9124 250-500 MHz (single band)

The tuning head assemblies are modular, interchangeable units requiring only simple hand tools for installation.

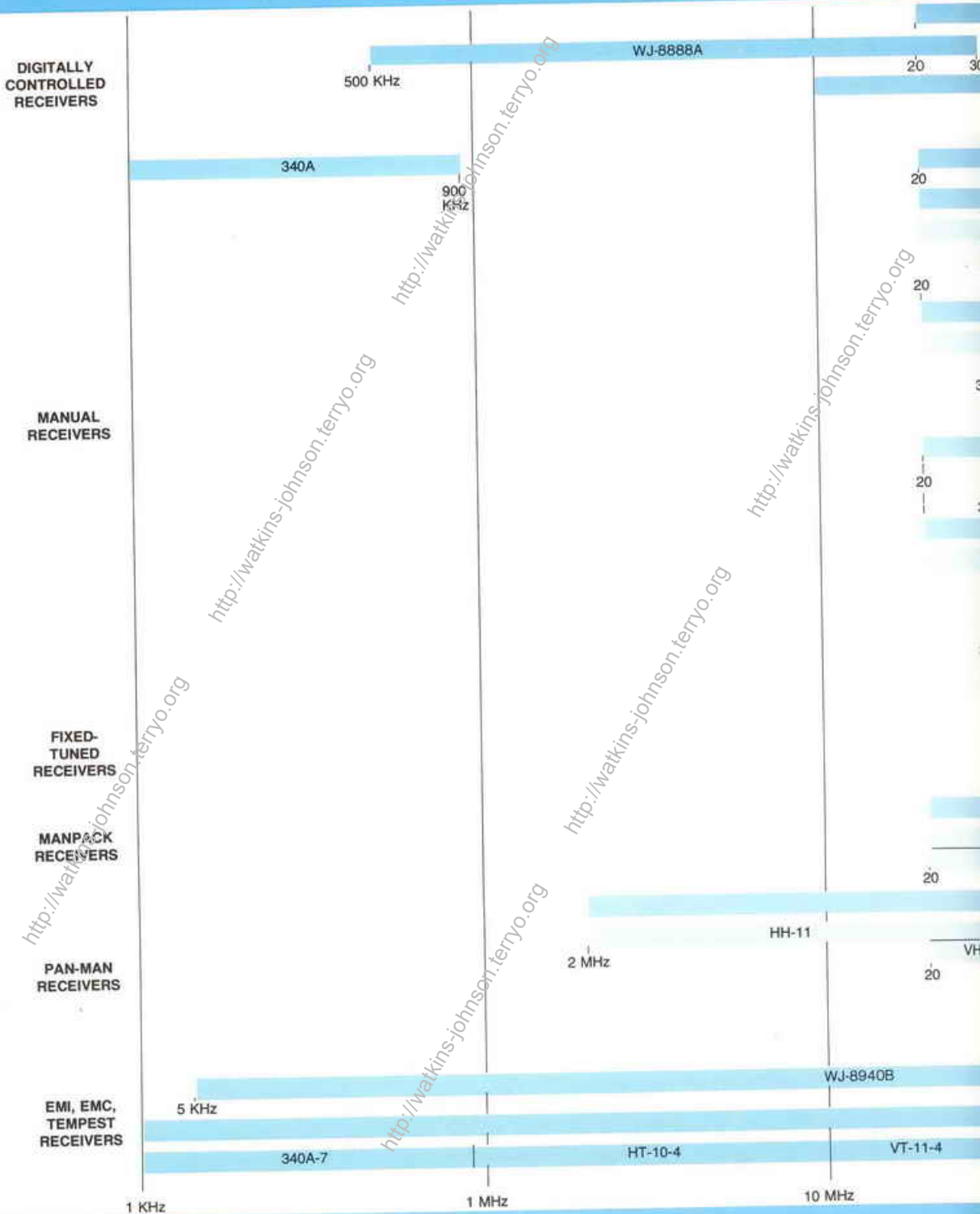
The Receiver has a built-in low power consumption frequency counter with digital automatic frequency control (DAFC) for high LO stability. To conserve battery energy, the counter and DAFC circuitry can be operated independently from the six-digit LED readout. In addition, when frequency readout is desired, a display intensity control allows the operator to set the LED brightness for adequate viewing consistent with minimum power consumption.

Three IF bandwidths of 10, 50, and 200 kHz are supplied with the receiver. Optional bandwidths of 5 and 20 kHz are available. Sideband filters are available for LSB and USB detection in the 20-80 MHz band. Outputs from the receiver include phones audio, record audio, and predetection IF. The front-panel cover supplied with the unit contains an integral power amplifier and loudspeaker for connections to the audio output.

The WJ-8640 operates from a detachable battery pack which holds either one BA-4386 magnesium battery or ten BA-30 (D-cell) batteries. The battery pack is also offered with a built-in charger which operates from a 115/220 Vac source. Receiver power can also be supplied from a vehicle battery or similar source via a front-panel connector.

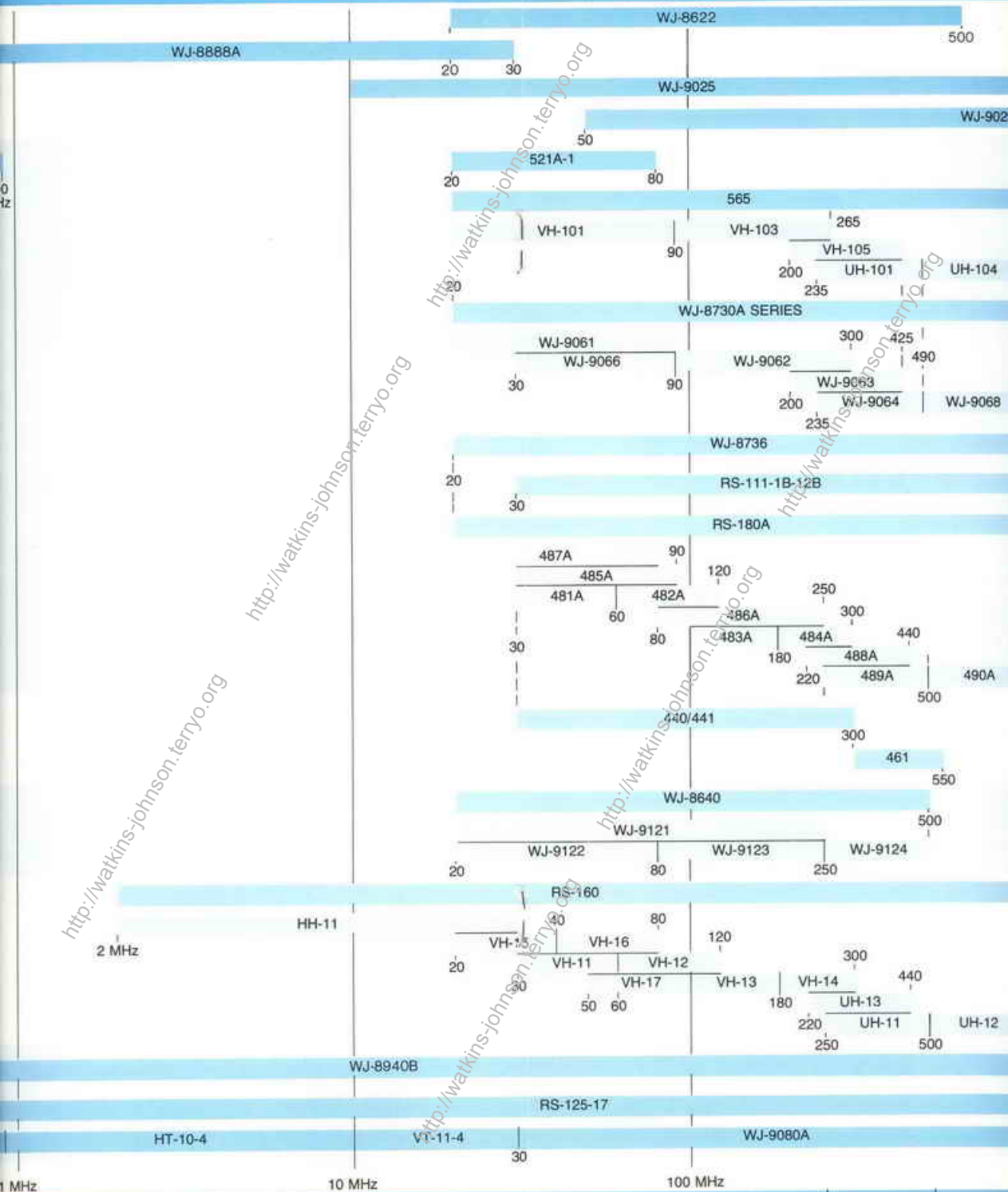


RECEIVER FREQUENCY RANGE CHART



BAND DESIGNATIONS

BAND A

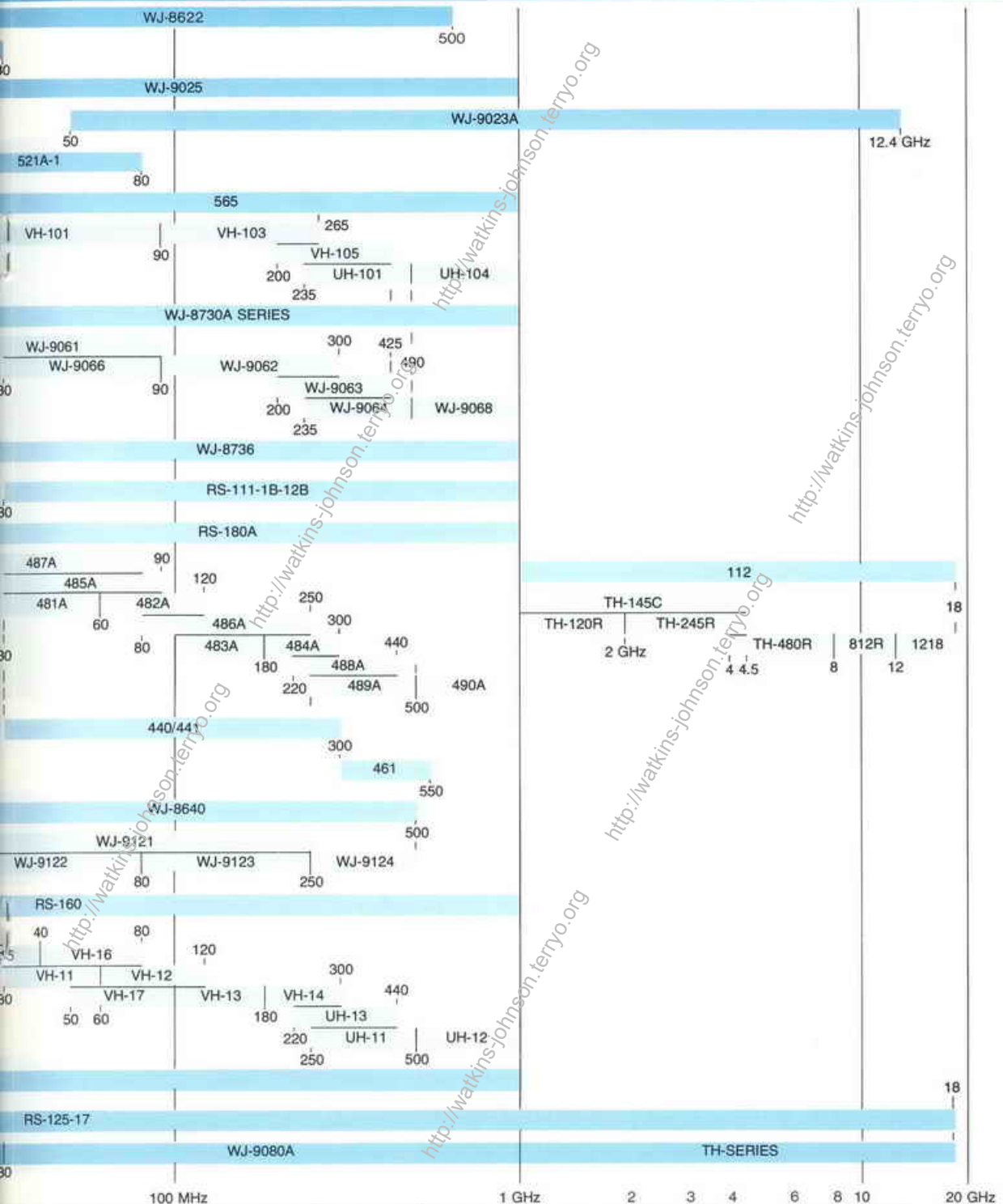


BAND A

BAND B

BAND C

RECEIVER FREQUENCY RANGE CHART



BAND B

BAND C

BAND D

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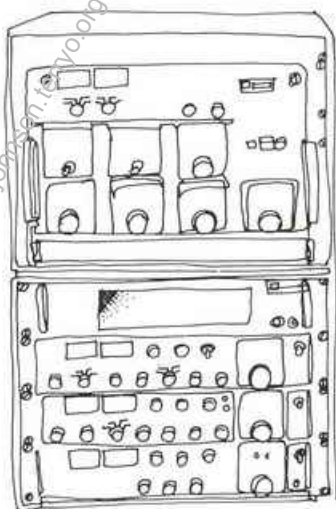
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RS-160 Receiving System



RS-160 with CSU-160 Tuner Switching Unit

- 2 to 1000 MHz
- AM, FM, Pulse
- Wide Range of Options



The RS-160 Pan-Man Receiving System consists of a family of products which can be configured to provide 2 to 1000 MHz panoramic or manual reception with either manual, remote, or computer control. The basic system consists of a 205-2 Receiver, one of the eleven available plug-in Tuning Heads, a DRO-335 Frequency Counter with DAFC, and an SM-7301A Signal Display. This system allows panoramic reception of the frequency band covered by the tuning head installed or manual reception of any frequency in the band with DAFC stability. These units and the additional system building blocks are described below.



205-2

The 205-2 Receiver is the heart of the system. This voltage-tuned unit has five operating modes: PAN, in which the entire frequency range of the installed tuning head is swept and displayed on the SM-7301A Signal Display; SECTOR, in which a selected portion of the band, from zero sweep width to full band, is swept and displayed; PAN/SEC, where the entire frequency range of the installed tuning head and a selected portion are swept and displayed; REMOTE, in which the receiver accepts a tuning voltage from a remote source; and MAN, in which the receiver operates in the conventional manner. The receiver provides AM, FM, and pulse reception with IF bandwidths of 10, 50, and 300 kHz and 1 MHz. Any one of the IF bandwidths can be selected when the receiver is in the MAN or REMOTE modes. In the PAN, SECTOR, and PAN/SEC modes the optimum IF bandwidth is automatically selected by the receiver.

The 215 Receiver has all the features of the 205-2 plus provisions for digital control via TTL compatible inputs from a digital controller. This allows remote control of receiver functions such as IF bandwidth, gain level, AGC mode, detection mode, and tuning speed. The 215 Receiver is highly suitable for employment in digitally controlled master/slave configuration for signal acquisition and handoff applications.



UH-11

The HH, VH, and UH Series Tuning Heads provide reception in the following frequency ranges.

Tuning Head	Frequency Coverage
HH-11	2-30 MHz
VH-11	30-60 MHz
VH-12	60-120 MHz
VH-13	100-180 MHz
VH-14	180-360 MHz
VH-15	20-40 MHz
VH-16	40-80 MHz
VH-17	60-100 MHz
UH-11	250-500 MHz
UH-12	500-1000 MHz
UH-13	220-440 MHz

The DRO-335 Frequency Counter greatly enhances system versatility and ease of operation. It provides a six-digit readout of the receiver's manually tuned frequency up to 1000 MHz. In the SECTOR and PAN/SEC tuning modes, the readout indicates the center of the selected sector. Thus, when the mode is switched from PAN, SECTOR, or PAN/SEC to MAN the exact center of the CRT display on the SM-7301A is the frequency display on the DRO-335. The readout display indicates the nearest 1 kHz increment in the MAN and REMOTE modes and the nearest 10 kHz increment in the PAN, SECTOR, and PAN/SEC modes. With the DRO-335 it is possible to apply digital automatic frequency control (DAFC) to the receiver when it operates in the MAN mode.



DRO-335

The SM-7301A Signal Display functions as an RF Pan Display when the receiver is in the PAN, SECTOR, or PAN/SEC mode and as an IF Pan Display

when the receiver is in the MAN or REMOTE mode. A five-inch display tube is used. (Use SM-7301A-3 with the TSU-103B and CSU-160).



SM-7301A

The VM-101 Marker Unit provides markers at the tuned frequency of up to four manual VHF receivers. The VM-101 allows the operator to instantly identify the signals being monitored by manual receivers within the display range. This identification is made through beam intensification of the SM-7301A CRT at the tuned frequency of a manual receiver.

The TSU-160 Tuner Switching Unit is an accessory device which mounts directly below the 205-2 or 215 Receiver. It connects to the receiver through the EC-160 Extender Cable which is installed in place of a tuning head. The TSU-160 can contain from one to seven of the tuning heads normally used with the 205-2 Receiver. A front-panel switch selects any installed tuner for operation. A flexible arrangement has been provided to connect antennas to the various tuning heads. With suitable antennas and seven tuning heads, coverage can be provided from 2 MHz to 1000 MHz and any band within that range can be instantly selected for operation.

The CSU-160 Tuner Switching Unit permits sequential scanning (Autostep) of up to seven tuning heads; manual selection of any one tuning head or remote selection by applying coded binary information. With the CSU-160 it is possible to view the entire 2-1000 MHz spectrum in seven RF pan traces presented on the associated SM-7301A-3 Signal Monitor.

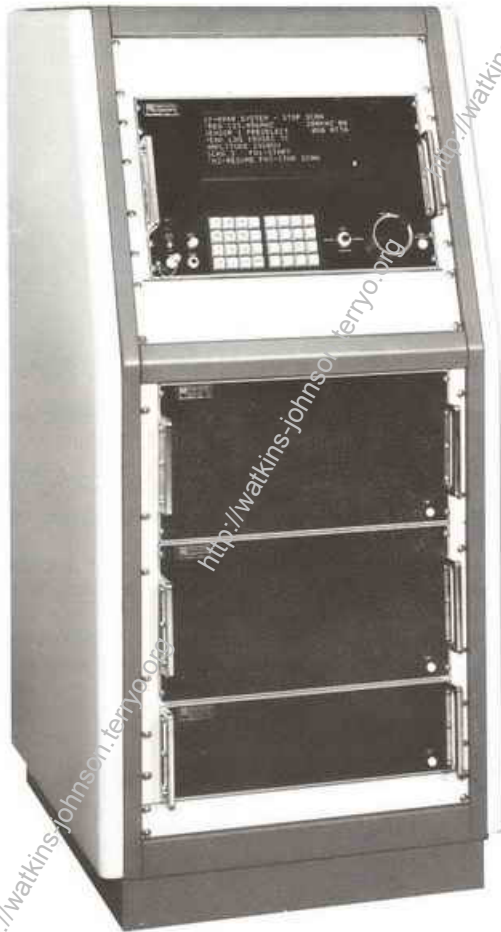
The TSU-103B is similar to the CSU-160 but has provisions for mounting only three of the HH-, VH-, or UH-Series Tuning Heads.



FS-101

The FS-101 and FS-102 Frequency Synthesizers provide digital control of the RS-160 Tuning Heads; the FS-101 covers 2-300 MHz and the FS-102 covers 2-1000 MHz. Versions are available to accept the frequency command input in either a serial or parallel format.

WJ-8940B Multi-Purpose System



RF Signal Detection and Measurement from 5 kHz to 1 GHz

Built-in Microcomputer

Exceptional Receiver Sensitivity to ensure compliance with MIL-STD-461A and NACSEM 5100

17 IF Bandwidths from 200 Hz to 500 MHz

Simplified operator control

The WJ-8940B Multi-Purpose System is a receiving system designed to meet narrowband TEMPEST measurement requirements of NACSEM 5100. The system is also well suited for RFI/EMI electromagnetic compatibility investigations and wideband coverage surveillance and analysis of communication signals. When used for RFI/EMI testing, the system meets applicable requirements of MIL-STD-461A and MIL-STD-462.

The WJ-8940B Multi-Purpose System is comprised of a Digital Control Unit (DCU), Tuner/Synthesizer (TSU), IF Demodulator (IFD), and a Power Supply Unit (PS). Each of these assemblies is modular in design which facilitates mobile or fixed installation.

The TSU provides frequency coverage from 5 kHz to 1 GHz. The local oscillators for the converter stages are synthesizer controlled from a frequency word generated by the DCU. The TSU provides both narrowband and broadband IF outputs for processing by the IFD. The RF attenuator may also be automatically controlled. The TSU also contains the system calibration signal generator and sensor selector which performs the required selection of antenna inputs. The calibration circuitry accepts digital commands from the controller and will perform a calibration scan during which no data is taken, but internal gain correction files for frequencies of interest are updated. This allows the system to take data runs without periodic interruptions to take calibration data. The system RF inputs as well as the calibration signals are passed through bandpass filters. The RF output from the filters is passed to the appropriate mixer and IF circuitry. An RF filter bypass mode is also provided.

The Digital Control Unit (DCU), contains a ROM controlled microprocessor. The DCU generates all the information and timing employed by the WJ-8940B system in making measurements. Information generated includes the frequency word transmitted to the synthesizer, the tuning information presented to the preselectors, and the IF bandwidth and mode controls.

The operator interface with the DCU consists of a 256-character alphanumeric display, a 32-key keyboard for entering information, a joystick for slewing parameters, such as frequency, and a fine-tune knob for the frequency.

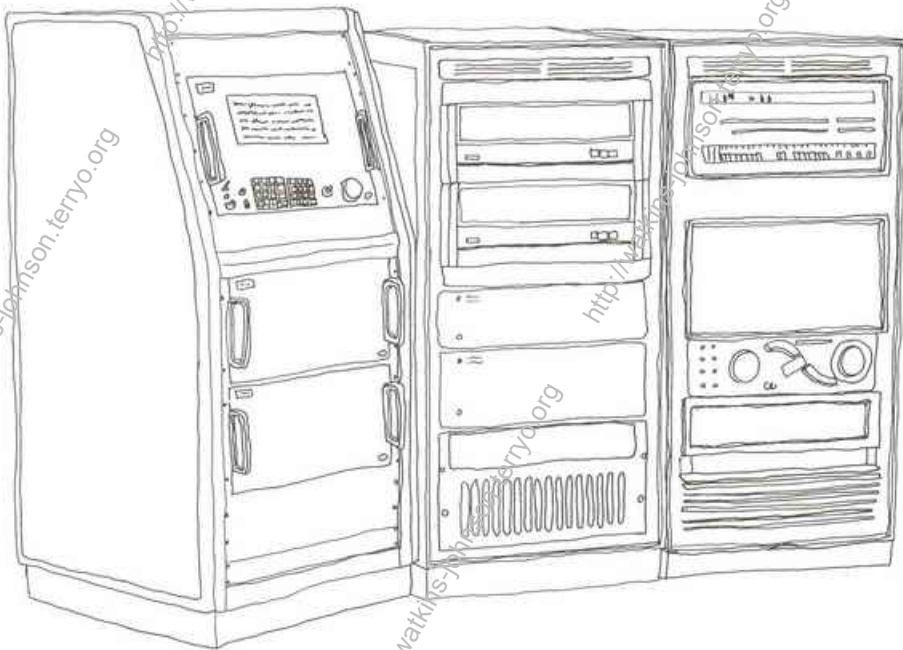
The DCU contains a non-volatile memory into which various tables may be entered. Scan data is one of the types of tables built into the system. This table allows specification of a scan to use various step sizes, IF bandwidths, sensors, and display breakpoints as a function of frequency. Since multiple scans may be stored, most commonly used setups may be retained within the machine. Sensor correction factors may also be stored within the memory, so that readout may occur in units of current or field strength as appropriate.

The DCU will drive an X-Y plotter, providing X, Y, and pen lift signals. The DCU will also drive an X-Y storage oscilloscope, providing X, Y, and Z information. Graticules may also be displayed. The scan may be linear, or expanding in step size as specified in the scan table. As each graph is drawn, significant parameters such as X and Y range are displayed on the front

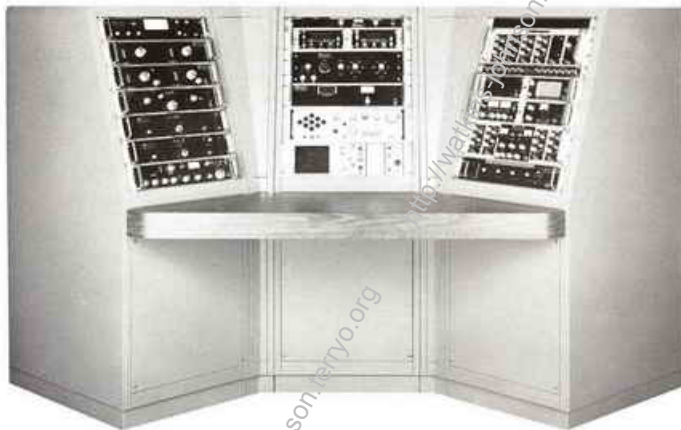
panel. In addition, a cursor mode is available, so that the front panel frequency contents may be used to precisely identify and displayed frequency and amplitude.

The DCU, when in the remote mode, takes its commands from a host processor through a parallel interface. In this mode, the DCU becomes an intelligent interface between the Macro commands given through the parallel interface, and the micro commands required by the various units of the WJ-8940B system.

The IFD provides narrowband and wideband demodulation of IF signals from the system tuner units. This unit has IF bandwidths from 200 Hz to 50 MHz and contains the circuitry required to demodulate AM, FM, and CW signals. The internal video circuits provide log, linear, and FM outputs, and also permit processing for Peak, Average, and Quasipeak detection modes.



RS-125-17 Tempest Receiving System



RS-125-17 with Optional Equipment Console

The RS-125-17 is a highly versatile arrangement of equipments designed primarily to meet the tunable TEMPEST measurement requirements of NACSEM 5100. The system is also well suited for spectrum surveillance, electromagnetic surveys, range monitoring, and analysis of electromagnetic emanations. The modular design approach permits integration of only the few components necessary for the user with limited test requirements, and allows for add-on expansion at a later time.

- 1 kHz to 1 GHz—Expandable to 18 GHz
- Meets narrowband and broadband tunable measurement requirements of NACSEM-5100.
- Meets TEMPEST Band/Bandwidth Combinations
- IF Bandwidths—400 Hz to 50 MHz
- Full Support Provided for complete Turn-Key Operation and System Integration
- Certification Testing Available

VLF Receiver and Converter

340A-7 VLF Receiver

- 1–900 kHz
- 2 MHz IF output
- Demodulator bandwidths: 0.4, 1, 2, 5, 10 kHz
- Built-in frequency counter with DAFC

WJ-9211 Dual Channel Converter

- Converts 2 MHz IF to 21.4 MHz for application to DM-4C/A
- Converts 21.4 MHz IF to 2 MHz for application to 340A-7 Demodulator section

HF, VHF, UHF, and Microwave Tuners



WJ-9080A

Tuner	Frequency Range	Overall Bandwidth	IF Outputs
HT-10-4	0.9-10 MHz	1 MHz	21.4 MHz
VT-11-4	10-30 MHz	4 MHz	21.4 MHz
WJ-9080A	30-1000 MHz	50 MHz	21.4 MHz, 160 MHz
TH-120R	1-2 GHz	20 MHz	21.4 MHz, 160 MHz
TH-245R	2-4 GHz	20 MHz	21.4 MHz, 160 MHz
TH-480R	4-8 GHz	20 MHz	21.4 MHz, 160 MHz
TH-812R	8-12 GHz	20 MHz	21.4 MHz, 160 MHz
TH-1218	12-18 GHz	50 MHz	21.4 MHz, 160 MHz

Notes: (1) MTF-Series Microwave Tuner Frames required for TH-Series mounting and interface.
(2) 50 MHz RF bandwidth for TH-Series is available.

Switching Hardware

CP-102-2 RF Control Panel

- Connects sensor to selected tuner
- 60 dB RF attenuation in 10-dB steps
- Calibrator input jack for ease of switching between sensor and calibrator

CP-105-2 Signal Distribution Panel

- Accepts all pre- and post-detection outputs from system demodulators and MP-101-5
- Makes outputs available to monitor and analysis equipments

SWP-125-2

- Provides switching between tuner IF outputs and demodulator IF inputs
- Connects frequency counter to selected tuner
- Connects tuner SM output to signal monitor
- Routes AGC voltages

Demodulators

DM-4C/A Demodulator

- 21.4 MHz Input
- AM, FM, CW, Pulse Detection
- Plug-in modules available
 - IFD-Series—Demodulators (5 kHz to 8 MHz)
 - IFD-LOG—Logarithmic Amplifier
 - AGC-BC/B—Boxcar Sample and Hold
 - AGC-PS/C—Pulse Stretcher
 - NS-101BA—Noise Silencer
- Accepts four IFD modules or three IFD modules and one AGC-() or NS-101BA
- SP-101 Storage Panel available for unused plug-ins.

DM-212A, DM-235 Demodulators

- 160 MHz Input
- AM, FM, Pulse detection
- IF Bandwidths: DM-212A—10, 20 MHz
DM-235—30, 50 MHz

Display and Monitor Hardware

SM-9804A, SM-1622 Signal Monitors

- Visual IF per display
- Input Frequency: SM-9804A—21.4 MHz
SM-1622—160 MHz
- Sweep Widths: SM-9804A—8 MHz
SM-1622—20 MHz

DRO-333-1 Frequency Counter

- Provides tuned frequency readout and DAFC for HT-10-4, VT-11-4, and WJ-9080A

MP-101-5

- 21.4 MHz Input
- Meter Scales: Peak—dB above 1 μ V
Average—0 to 10 μ V
- Video output with slideback gate

NOTE:

Further information regarding the RS-125-17 and various system configurations is available in Watkins-Johnson Application Note 1307.50, dated December, 1975.

DM-112 Demodulator



- 160 MHz Input Center Frequency
- AM, FM, Pulse
- IF Bandwidths: .1, 2, 4, 10, 20 MHz
- Built-in Signal Monitor
- Video Response: 20 Hz to 15 MHz
- Provides AGC and AFC Voltage to Associated Tuner

DM-212A, DM-235 Demodulators



DM-235

- 160 MHz Input Center Frequency
- AM, FM, Pulse
- IF Bandwidths: DM-212A—10, 20 MHz
DM-235—30, 50 MHz
- Video Response: DM-212A—20 Hz to 10 MHz
DM-235—20 Hz to 25 MHz
- Provides AGC and AFC Voltage to Associated Tuner

IFD-201-3 Demodulator



- 21.4 MHz Input Center Frequency
- AM, FM
- Companion Unit to TF-202 and TF-210 Tape-IF Converters
- Simultaneous AM and FM Video Outputs
- Mounts in EF-101 or EF-201D Equipment Frames

DMS-105A Tunable Demodulator



- 1 kHz to 1600 kHz
- AM, FM, CW, MCW, FSK, SSB
- IF Bandwidths: SSB Mode—2.5, 4, and 8 kHz
All other modes—150 Hz, 1, 5, 7, 8, and 16 kHz
- Translated IF Outputs: DMS-105A—15, 50, 100 kHz
DMS-105A-2—10, 50, 100 kHz
DMS-105R—10, 50, 100 kHz
- BFO's: 1 kHz Offset, Crystal
Zero beat, Crystal
Variable, ± 8 kHz
- EMC—use DMS-105R

DRO-290B Frequency Counter



- 20 to 90 MHz Readout Frequency Range
- DAFC Capability
- Preset for 10 MHz Receiver IF
- Six-digit Display
- Companion to 521A-1 Receiver

DRO-311 Frequency Counter



- 20 to 500 MHz Readout Frequency Range
- Time-Shared for VHF Receivers
- Provides DAFC Control and Sequential BCD Output for up to four Receivers
- Automatic Preset Selection when used with 565 or WJ-8730A Series Receivers
- Drives up to four RD-105 Remote Display Units

DRO-302B, DRO-309A DRO-315, and DRO-333 Frequency Counters



DRO-302B



DRO-333

- Half-rack and Full-rack Packages
- DAFC Capability
- Internally switched Presets of 21.4 and 60 MHz Controlled by Frequency Range Switch
- Externally switched Presets of 8, 10, 21.4, 60 MHz and one Optional Preset
- Automatic Range and Preset switching when used with compatible W-J Receiver
- Frequency Output Provided in BCD Format
- Designed to Prevent EMI/RFI Radiation

Counter	Frequency Readout Range	Mounting
DRO-302B	100 kHz to 500 MHz (3 bands)	EF-101 or EF-201D
DRO-309A	100 kHz to 1000 MHz (4 bands)	Equipment Frame
DRO-315	100 kHz to 500 MHz (3 bands)	Designed for
DRO-333	100 kHz to 1000 MHz (4 bands)	19-inch rack

SM-8421 Signal Monitor



- 2 MHz Input Center Frequency
- Sweep Widths: 3, 15, and 50 kHz
- Sweep Disable Provided
- Linear or Log Display
- Built-in Center Frequency Marker

SM-9404A, SM-9804A Signal Monitors



SM-9404A

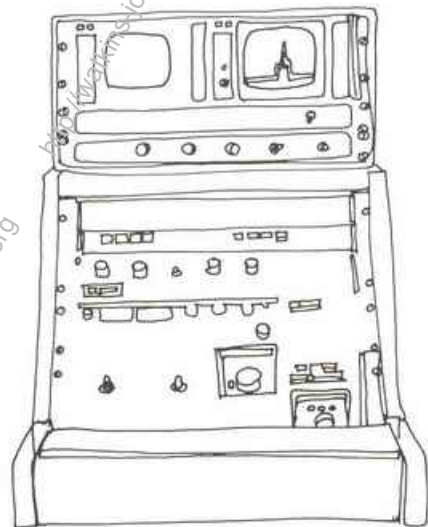
- 21.4 MHz Input Center Frequency
- Variable Sweep Width: SM-9404A—0 to 4 MHz
SM-9804A—0 to 8 MHz
- Resolution—6 dB Valley Between Signals 20 kHz Apart (100 kHz Sweep Width)
- Sweep Rate 5 to 25 Hz, Variable
- Built-in Center Frequency Marker
- Mount in EF-101 or EF-201D Equipment Frames

SM-1622, SM-1622-1 Signal Monitors



SM-1622

- 160 MHz Input Center Frequency
- Switch Width: 0 to 20 MHz
- Resolution: SM-1622—200 kHz
SM-1622-1—1 MHz
- Built-in Center Frequency Marker
- Mount in EF-101 or EF-201D Equipment Frame



FT-201A IF-Tape Converter



- 21.4 MHz Input Center Frequency
- 750 kHz Output Center Frequency
- Data Bandwidth—100 kHz to 1.3 MHz
- Crystals Available to change Output Center Frequency with corresponding reduction in Data Bandwidth
- Mount in EF-101 or EF-201D Equipment Frames

FT-210, FT-210E IF-Tape Converters



FT-210E

- 21.4 MHz Input Center Frequency
- 1.075 MHz Output Center Frequency
- Data Bandwidth—150 kHz to 2.0 MHz
- FT-210E has equalizer for minimal group delay variation
- Mount in EF-101 and EF-201D Equipment Frames
- WJ-9222 and WJ-9222E have identical specifications but in 1 3/4-inch half-rack chassis

IFC-162 Frequency Converter



- 160 MHz Input Center Frequency
- 21.4 MHz Output Center Frequency
- Overall Bandwidth—6 MHz
- Companion unit to FT-201A and FT-210(E)
- WJ-9240 has identical specifications but in a 1 3/4-inch half-rack chassis

1 3/4-inch Half-Rack Frequency Converters



WJ-9222 and WJ-9240

- Small size, compact construction
- WJ-9222(E) is electrically identical to FT-210(E)
- WJ-9240 is electrically identical to IFC-162
- WJ-9311 Rack Mount Adapter available for mounting only one unit
- Compatible Signal Monitor package to be available soon

TF-210 Tape-IF Converter



- 1,075 MHz Input Center Frequency
- Accepts Input Center Frequencies from 150 kHz to 2.0 MHz with corresponding reduction in data bandwidth
- 21.4 MHz Output Center Frequency
- Digital Front-Panel Tuning
- Internal or External Reference Source

S-9203A, S-9903E Speaker Panels



S-9903E

- Companion Units to W-J Receivers
- Accept up to Seven Audio Inputs
- 5 Watt Output
- High Input Impedance
- S-9203A mounts in EF-101 or EF-201D Equipment Frame

EF-101 Equipment Frame



- Mounts one W-J half-rack unit
- Occupies 3.5 inches vertical rack space

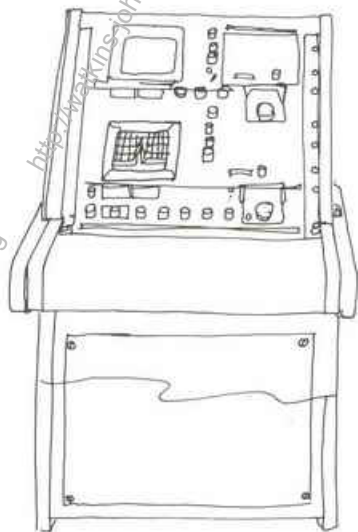
EF-201D Equipment Frame



- Mounts two W-J half-rack units
- Occupies 3.5 inches of vertical rack space



EF-201D with SM-9404A Signal Monitor
and DRO-309A Frequency Counter



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