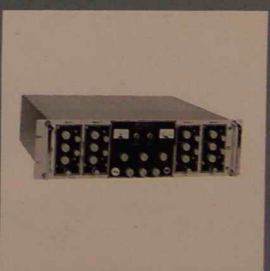
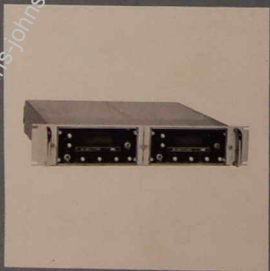
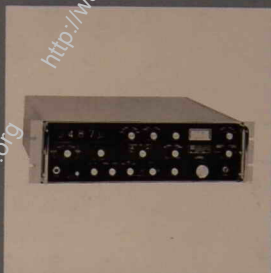


CONDENSED CATALOG

RECEIVING EQUIPMENT

MAY 1970



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For further information on any item listed in this Catalog—or for special assistance on any receiver problem—write Watkins-Johnson Company, CEI Division, 6006 Executive Boulevard, Rockville, Maryland 20852, or Telephone Area Code 301, 881-3300. Complete specification sheets on any equipment listed in this Catalog will be sent upon receipt of one of the enclosed business reply cards.

CEI is a Division of the Watkins-Johnson Company of Palo Alto, California. W-J is an established leader in research, development and manufacturing of microwave devices, both tube and solid state, receiving and transmitting equipment and systems.

The CEI Division offers the world's largest selection of receiving equipment for surveillance, direction finding and countermeasures. This array of precision products includes CEI Division-designed receivers and receiving systems covering the frequencies from 1 kHz to 12 GHz, including units with built-in signal monitors and counters. Separate signal monitors, demodulators, frequency extenders, converters, preamplifiers, multicouplers, digital readouts and other accessories such as speaker units, meter panels and mounting frames also are offered.

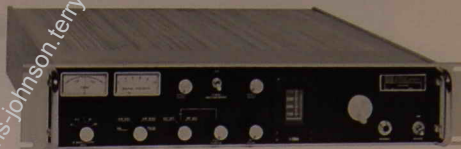
All CEI Division products incorporate the latest advances in electronic components and circuit techniques. To assure the highest reliability in all of its products, CEI Division has adopted a policy of performing in-house all possible manufacturing operations—from design to delivery. The Division thus is one of the nation's most self-sufficient electronics manufacturing facilities.

The products shown in this catalog represent only a small cross-section of the entire proprietary line. In addition, we have produced many modified and special equipments which are not described herein. One of these items could well serve your needs. For these reasons, please contact our Sales Department or any Watkins-Johnson representative whenever you cannot satisfy your requirements with equipments listed in this catalog.



For reception of AM, FM, and pulse signals in the 1 to 12 GHz range. Four modular tuning heads are available, any one of which can be mounted in the receiver at a time. TH-120 tuning head covers 1-2 GHz; TH-240, 2-4 GHz; TH-480, 4-8 GHz; TH-812, 8-12 GHz. Five IF bandwidths: 100 kHz and 2, 4, 10, and 20 MHz. For other equipment covering this frequency range, see the MT-112 Tuner and DM-112 Demodulator shown in a subsequent section. The MT-112 includes all four tuning heads; DM-112 has IF bandwidths listed above plus a built-in signal monitor.

MT-112 MICROWAVE RECEIVER



357 RECEIVER

Covers the 1 kHz to 600 kHz frequency range on a single band. Four IF bandwidths: 150 Hz, 1 kHz, 3 kHz, 6 kHz. Four-digit Nixie displays frequency to which receiver is tuned. Digital automatic frequency control (DAFC) circuit stabilizes receiver's local oscillator to ± 10 Hz of the desired frequency.



371A HF RECEIVER

HF Receiver featuring wide bandwidth covers 500 kHz to 10 MHz in one band. Designed for FM, AM, or CW reception over entire range. Particularly suitable for RFI detection and predetection recording. Includes IF bandwidths of 6, 20, 100, and 400 kHz.



373A-2 HF RECEIVER

Similar to 371A except a second tuning range of 10 MHz to 30 MHz is added. Also includes X-Y outputs for recording signal strength versus frequency.



377A HF RECEIVER

Similar to 371A Receiver except the mechanical dial has been replaced by a digital counter. Six-digit Nixie display of frequency. Digital automatic frequency control (DAFC) circuit stabilizes receiver's oscillator to ± 100 Hz of desired frequency.





415 Shown

415, 416 RECEIVERS

Single-channel, crystal controlled receivers available to cover the following frequency ranges: 60-90 MHz, 75-110 MHz, 90-130 MHz, and 110-150 MHz. Any one of four frequencies within a range may be selected by a front-panel switch. Type 415 for AM reception has IF bandwidth of 50-kHz (standard) or 100 kHz (optional). Type 416 designed for pulse reception has IF bandwidth of 2 MHz. Units mount in EF-401 through EF-404 Equipment Frames.



440 Shown

440, 441 RECEIVERS

Single-channel, crystal-controlled receivers are available to cover the following ranges: 30-48 MHz, 45-72 MHz, 70-105 MHz, 100-160 MHz, 150-220 MHz, and 210-260 MHz. Specify 440 for AM reception; 441 for FM reception. IF bandwidth available as either 20 kHz or 50 kHz. Up to six receivers plug into EF-506 Equipment Frame for rack operation or single receiver into PEC-401 Portable Equipment Case for battery operation.



501A-1 Shown

501A-1, 504A VHF RECEIVERS

General purpose receivers provide AM, FM, and CW reception from 54 MHz to 260 MHz in single band. Two IF bandwidths; 10 kHz and 300 kHz. 501A-1 includes AFC; 504A includes crystal marker oscillator.



521A-1 RECEIVER

AM, FM, and CW reception from 20 MHz to 80 MHz. With the 555 and 595 Receivers, designed for reception of narrowband communication signals. Three IF bandwidths: 4 kHz, 10 kHz, and 50 kHz. Built-in signal monitor has maximum sweep width of 300 kHz and maximum resolution of 2.5 kHz. DAFC compatible. Includes COR and variable BFO.



555-1 Shown

555, 555-1 RECEIVERS

Type 555 similar to 521A-1 except tuning range is 90 to 180 MHz and IF bandwidths are 10 kHz, 20 kHz, and 50 kHz. Type 555-1 has 90-180 MHz tuning range and IF bandwidths of 4 kHz, 10 kHz, and 50 kHz.

595 RECEIVER

Similar to 521A-1 except frequency range is 220 to 440 MHz, and IF bandwidths are 10, 20, and 50 kHz.



775-3 UHF RECEIVER

Multi-purpose receiver. For AM, FM, CW and pulse signals in UHF range of 235 to 1000 MHz. Carrier operated relay (COR) circuit. IF bandwidths: 100 kHz, 500 kHz, 4 MHz.



901B, 904A, 905A, 906A VHF RECEIVERS

General purpose VHF receivers covering 30 MHz to 300 MHz in two bands. 904A and 906A include crystal marker oscillators providing marker pips at 1 MHz and 5 MHz. 905A and 906A contain carrier operated relay. All have IF bandwidths of 20 kHz and 300 kHz.



904A Shown

For reception of AM, FM, CW, and pulse signals in VHF frequency range of 30 to 300 MHz. All solid state, with dual gate MOS field-effect transistors for wide dynamic range. Three IF bandwidths: 60 kHz, 300 kHz, and 3 MHz. Pulse AGC circuit permits operation on pulse widths as narrow as 1 microsecond with pulse repetition rates as low as 50 pps. Ideal when wide bandwidth and pulse reception is required. Can be used with DRO-300A or DRO-302A-2 for digital readout and digital automatic frequency control.

977 VHF RECEIVER



RS-111-1B-12 VHF-UHF RECEIVING SYSTEM

For complete coverage of the frequency range from 30 to 1000 MHz in four bands: AM, FM, CW operation. Displays RF signals with built-in signal monitor which has center frequency crystal marker to aid tuning. Front panel signal strength meter. Four IF bandwidths: 20 kHz, 75 kHz, 300 kHz, and 2 MHz. The 2 MHz bandwidth IF provides separate AM and FM outputs and operates continuously; others are selectable.



RS-160 PAN-MAN



The RS-160 Pan-Man Receiving System consists of a family of related products which can be configured in a variety of ways. A basic system could include a 205 Receiver, a DRO-308 Counter, and an SM-7301 Signal Display. There are six tuning heads (VH-series and UH-series) available which provide coverage from 30 to 1000 MHz; a seventh tuning head will soon be available to provide coverage from 2 to 30 MHz. A DRX-308 Extender is available to extend the range of the basic counter from 300 MHz to 1000 MHz. The TSU-160 Tuner Switching Unit allows up to seven tuning heads to be installed at one time and switched on and off by a front panel control. There are three marker units available: the VM-101, UM-101, and UM-160. The three types are for manual receivers with 21.4 MHz, 60 MHz, and 160 MHz intermedi-

ate frequencies. Each marker unit can operate with up to four receivers.

THE TYPE 205 RECEIVER is the heart of the system. This voltage-tuned unit has manual, panoramic, and sector tuning modes and provides AM, FM, pulse reception. In the PAN mode, the entire range of the installed tuning head is swept. The sweep rate can be varied by a front panel control. In the SECTOR mode, any segment of the tuner's frequency range can be swept based on the manual tuned frequency and the setting of the sector width control. In the MAN mode, the entire range of the tuning head can be manually tuned. IF bandwidths of 10 kHz, 50 kHz, 300 kHz, and 1 MHz are provided. Any one of the four IF bandwidths can be selected when the receiver is in the MAN mode. In the PAN and

SECTOR modes, the optimum IF bandwidth is automatically selected by the receiver.

THE TYPE SM-7301 SIGNAL DISPLAY functions as an RF Pan Display when the 205 Receiver is in the PAN or SECTOR mode and as an IF Pan Display when the receiver is in the MAN mode. A five-inch display tube is used.

When the receiver is in the PAN mode, the entire frequency range of the installed tuner is displayed. A portion of the beam will be intensified. The intensified portion is displayed when the receiver is switched to the SECTOR mode.

If the receiver is placed in the MAN tuning mode, the SM-7301 operates as an IF Pan Display with four calibrated sweep widths available for selection: 30, 100, and 500 kHz, and 3 MHz. Under these conditions either a linear or loga-

RECEIVING SYSTEM

hythmic vertical display may be selected.

THE TYPE DRO-308 COUNTER greatly enhances system versatility and ease of operation. It provides a six-digit readout of the receiver's manually tuned frequency up to 300 MHz. In the PAN and SECTOR tuning modes, the readout indicates the center of the selected sector. Thus when the mode is switched from PAN to SECTOR, the exact center of the CRT display on the SM-7301 is the frequency display on the DRO-308. The display indicates the nearest 1-kHz increments in the MANUAL mode, and the nearest 10-kHz increment in the PAN and SECTOR modes.

With the DRO-308 it is possible to apply digital automatic frequency control (DAFC) to the 205 Receiver when operated in the MAN mode. With DAFC the receiver can be locked in 1-kHz increments to any frequency within its tuning range with long-term stability approaching that of the counter's internal reference source.

THE TYPE DRX-308 DIGITAL READOUT EXTENDER is a companion unit to the DRO-308 Counter. It extends the readout range and DAFC capability of the basic counter to 1000 MHz for operation with the UH-series Tuning Heads.

THE TYPE TSU-160 TUNER SWITCHING UNIT is an accessory device which mounts directly below the 205 Receiver. It connects to the 205 through the opening normally used to install a tuning head. The TSU-160 can contain from one to seven of the tuning heads normally used with the 205 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 TYPES VM-101, UM-101, and UM-160 MARKERS provide a visual indication of the tuned frequency set up to four manual receivers each. The VM-101 is for use with manual receivers which have a 21.4-MHz IF. Similarly, the UM-101 is used with 60-MHz IF receivers and the UM-160 with 160-MHz IF receivers. They allow the receiving system operator to instantly identify the signals being monitored by all manual receivers within the display range. This identification is made through beam intensification of the SM-7301 CRT at the tuned frequency of a manual receiver.

The RS-160 operates from a primary power source of 115/230 Vac, 50-60 Hz. Systems to operate from 400 Hz are available on special order. The components are designed for standard 19-inch rack mounting with the exception of the tuning heads which mount in the 205 Receiver and the DRO-308 counter which mounts in the frame of the SM-7301. The system can be supplied in an EF-160 series Equipment Cabinet similar to the one shown in the photograph. Several different cabinets are available to provide the vertical space needed by the various system configurations.

SPECIFICATIONS

SM-7301 SIGNAL DISPLAY

Display Modes: RF Pan Display for Pan and Sector modes; IF Pan Display for Man mode
Sweep Widths: 30, 100, 500 kHz, and 3 MHz
IF Pan Resolution: 30 and 100 kHz sweep widths, 2 kHz; 500 kHz and 3 MHz sweep width, 20 kHz

DRX-308 READOUT EXTENDER

Frequency Range: For use with tuning heads covering 300 MHz to 1000 MHz

MARKER UNITS

Inputs: Four
Type: Marker Range Offset
VM-101 30-300 MHz 21.4 MHz
UM-101 235-1000 MHz 60 MHz
UM-160 235-1000 MHz 160 MHz

TSU-160 TUNER SWITCHING UNIT

Plug-in Tuning Heads: Seven, maximum
Selection of Tuning Head: By front panel switch

205 RECEIVER

Types of Reception: AM, FM, pulse
Frequency Range: 30-1000 MHz in 6 bands
IF Bandwidths: 10, 50, 300 kHz and 3 MHz
Tuning Modes: Panoramic, Sector for Manual
Sweep Rate: 0.1 to 25 Hz

TUNING HEADS

Ranges: VH-11, 30-60 MHz;
VH-12, 60-120 MHz; VH-13, 100-180 MHz; VH-14, 180-300 MHz; UH-11, 250-300 MHz;
UH-12, 500-1000 MHz

DRO-308 READOUT

Display: 6-digit readout to nearest 1 kHz in Man mode and to nearest 10 kHz in Pan and Sector modes.
Accuracy: Man mode, +1, -0.0 kHz (one count); Pan or Sector modes, +10, -0 kHz
DAFC (Man mode): Single-digit control with 500 Hz increments held to zero
Range: For use with tuning heads covering 2 MHz to 300 MHz

TYPE RS-158 RECEIVING SYSTEM

The system consists of 12 independent, single-channel type 410 Receivers and a time-shared type DRO-270 Counter in a type EF-158 Modular Equipment Frame.

The 410 Receivers are continuously tunable and designed for narrow-band AM and FM reception in the 20 MHz to 80 MHz frequency range. An IF bandwidth of 10 kHz is provided using a crystal filter. IF bandwidth of 20 kHz (410-2) or 50 kHz (410-3) are also available.

The system utilizes the latest solid-state design techniques such as dual gate MOS field-effect transistors in critical RF amplifier stages and integrated circuit amplifiers in both the IF amplifier and signal processing circuits. A unique AOR (activity operated relay) circuit provides audio squelch only when both a carrier and modulation are present. Mounted on the front panel of the receivers are a DAFC switch, frequency set, and AOR threshold controls, a phones jack with a level control, and a local oscillator output connector which is used with a built-in test signal generator, and an AM-FM mode switch.

Continuous frequency stabilization of all twelve receivers is by means of DAFC (digital automatic frequency control) circuit. The DAFC circuit functions in conjunction with a five-digit DRO-270 Counter to lock the local oscillator of each receiver to a preset frequency. The DAFC circuit stabilizes the local oscillator and acts as a frequency synthesizer to provide 6000 channels spaced 10 kHz apart in the 20 to 80 MHz band. Thus, each receiver can be locked to any of the 6000 channels with crystal-controlled stability without the necessity of providing 6000 crystals to cover all of the channels. The preset frequency of the receivers is held to within ± 1 kHz for an indefinite period.

An RF test signal generator built in the EF-158 Equipment Frame permits a simple "go-no-go" test of each receiver in the system. The EF-158 Equipment Frame also contains a 12-channel active multicoupler to allow all receivers to operate from a single antenna input.



SPECIFICATIONS

MULTICOUPLER

Number of Output Channels	12
Noise Figure	5 dB, maximum
Gain	6 dB, nominal
Isolation Between Outputs	38 dB, minimum
Input Impedance	50 ohms, unbalanced
Input VSWR	2:1, maximum

410 RECEIVER

Frequency Range	20 to 80 MHz
Noise Figure	6 dB, maximum
Image Rejection	60 dB, minimum
IF Rejection	60 dB, minimum
Intermediate Frequency	10 MHz
IF Bandwidth	10 kHz, standard. For 20 kHz, or 50 kHz specify types 410-2 or 410-3 Receivers, respectively.
LO Radiation at Antenna Input	-95 dBm, maximum
Activity Operated Relay	Threshold adjustable from input signal level of $1\mu\text{V}$ to over $100\mu\text{V}$

DRO-270 COUNTER

Display	Five-digit readout for any one of twelve receivers
Accuracy	± 1 kHz
DAFC Stability	± 1 kHz for indefinite period
Setability	10 kHz increments

TYPE RS-125 RECEIVING SYSTEM



The RS-125 Receiving System is a versatile arrangement of equipment which provide AM, FM, CW, and pulse reception over a frequency range as wide as 500 kHz to 12 GHz. Because of this wide frequency range and the variety of bandwidths available, it is frequently used for RFI monitoring and EMI control. The modular construction of the RS-125 makes it possible for the user to purchase only those components required for the job at hand. It can be easily expanded to meet additional requirements in the future. The frequency coverage is provided in ten bands using seven tuners. By the addition of a 300-series receiver, such as the 357, the frequency coverage can be extended down to 1 kHz. Over the 500-kHz to 12 GHz range the received signals are processed by a demodulator which uses plug-in modules to determine the IF bandwidth, as well as special plug-ins such as a logarithmic IF amplifier, pulse-stretching AGC, box car AGC, and noise limiter. A total of ten standard IF bandwidths are available from 5 kHz to 8 MHz.

The system shown above is typical of many the CEI Division has supplied. It provides continuous coverage from 1 kHz to 12 GHz.

A counter-frequency extender combination gives a direct six-digit readout of the tuned frequency from 500 kHz to 1000 MHz. In addition, it provides digital automatic frequency control over this same range so that the tuners covering these frequencies can be locked in 1-kHz increments. The VLF receiver has a built-in counter with DAFC capability covering the 1-kHz to 600-kHz frequency range. Switching panels are provided to connect the antenna to the desired tuner and to connect the demodulator, signal monitor, and frequency counter to the proper tuner.

Tuners can be supplied with internal motor drives for automatic scanning. Three letter models starting with "S" indicate motor drive. The motor-drive units feature sector scan whereby the operator can adjust the upper and lower frequency limits of the sector of interest.

The units listed below have been specially designed for use in an RS-125 Receiving System. Specifications will be found in the sections in this catalog in which these equipments are listed by type. Detailed specifications will be sent upon receipt of the enclosed business reply inquiry cards.

EQUIPMENTS

TUNERS

Model	Range
HT-10, SVT-10	500 kHz-10 MHz
VT-11, SVT-11	10-30 MHz
VT-10, SVT-10	10-90 MHz
VT-34, SVT-30	30-260 MHz
UT-600, SUT-1000	235-1000 MHz
LT-920, SLT-1020	0.95-2.05 GHz
ST-1045, SST-2045	1.95-4.5 GHz
ST-1045, SST-1045	0.95-4.5 GHz
CT-4080, SCT-4080	4-8 GHz
XT-8012, SXT-8012	8-12 GHz

DEMODULATOR

DM-4CA accepts up to four IF Demodulator plug-ins or three IF Demodulators and one special plug-in.

IF DEMODULATOR PLUG-INS

Model	Bandwidth
IFD-5C	5 kHz
IFD-15C	15 kHz
IFD-50C	50 kHz
IFD-100C	100 kHz
IFD-200C	200 kHz
IFD-500C	500 kHz
IFD-1000C	1 MHz
IFD-2000C	2 MHz
IFD-4000C	4 MHz
IFD-8000C	8 MHz

SPECIAL DEMODULATOR PLUG-INS

Model	Function
NS-101BA	Noise Silencer
IFD-LOG	Logarithmic IF Amplifier
AGC-BC/C	Box Car AGC
AGC-PS/C	Pulse Stretching AGC

SIGNAL MONITORS

Model	Sweep Width
SM-9404A	4 MHz, maximum
SM-9804A	8 MHz, maximum

DIGITAL READOUT

DR0-300A (full rack) or DR0-302A (half rack) readouts to 300 MHz. DRX-1000 extends readout range to 1000 MHz.



ST-1045A Shown

Tuners are available to cover the frequency range of 500 kHz to 12 GHz. These tuners convert input signals to an IF of 21.4 MHz or 160 MHz which can be amplified and demodulated with the DM-4CA (21.4 MHz) or DM-112 (160 MHz) demodulators.

The tuners listed with S as the first letter of a three-letter prefix feature built-in motor drive. This automatic tuning feature allows the operator to select either manual or motor drive tuning. Sector scan controls are provided for use in the automatic mode whereby the operator can set the upper and lower frequency limits of the sector being scanned.

The units that cover frequency ranges above 1 GHz include a four-section YIG preselector for each band to provide high image rejection and low oscillator radiation. These units are electronically tracked and thus avoid the complex mechanical drives often used in this frequency range.

TUNER SPECIFICATIONS

Model	Bands	Range	Maximum Noise Figure	IF Output	Minimum Bandwidth
HT-10, SHT-10	1	500 kHz-10 MHz	7dB	21.4 MHz	400 kHz
VT-11, SVT-11	1	10-30 MHz	6dB	21.4 MHz	2 MHz
VT-10, SVT-10	2	10-30 MHz	7dB	21.4 MHz	2 MHz
		30-90 MHz	7dB	21.4 MHz	2 MHz
VT-30, SVT-30	2	30-60 MHz	6.5dB	21.4 MHz	3 MHz
		54-260 MHz	6.5dB	21.4 MHz	3 MHz
UT-1000, SUT-1000	2	235-500 MHz	11dB	21.4 MHz	6 MHz
		490-1000 MHz	14dB	21.4 MHz	8 MHz
LT-1020, SLT-1020	1	0.95-2.05 GHz	18dB	21.4 MHz	8 MHz
ST-2045, SST-2045	1	1.95-4.5 GHz	18dB	21.4 MHz	8 MHz
ST-1045, SST-1045	2	0.95-2.05 GHz	18dB	21.4 MHz	8 MHz
		1.95-4.5 GHz	18dB	21.4 MHz	8 MHz
CT-4080, SCT-4080	1	4-8 GHz	18dB	21.4 MHz	8 MHz
XT-8012, SXT-8012	1	8-12 GHz	18dB	21.4 MHz	8 MHz
MT-112	4	1-2 GHz	10dB	160 MHz	20 MHz
		2-4 GHz	18dB	160 MHz	20 MHz
		4-8 GHz	18dB	160 MHz	20 MHz
		8-12 GHz	18dB	160 MHz	20 MHz



FREQUENCY RANGE BY MODEL NUMBER

VLF 3kHz-30kHz	LF 30kHz-300kHz	MF 300kHz-3MHz	HF 3MHz-30MHz	VHF 30MHz-300MHz	UHF 300MHz-3GHz	SHF 3GHz-30GHz
	357					
RECEIVERS						
		371A, 377A 373A-2		415, 416 440, 441 501A-1, 504A 527A 555 555-1 595 775-3		112
				908B, 904A, 905A, 906A 95-111B-12		
TUNERS						
		HC-10, SH-10		VT-30, SVT-30	UT-1000 SUR-1000	
			VH-11, SVH-11		ST-2045 SST-2045	
			VT-10, SVH-10		ST-1045 SST-1045	XT-80 SST-802
						CT-4000 SCT-4000
FREQUENCY EXTENDERS						
			FE-103		FE-25-1 FE-26	FE-8-22
					FE-2-43	
					FE-1-28	FE-4-8
					FE-1-45	



MT-112



DM-112

MICROWAVE TUNER AND DEMODULATOR

The MT-112 Microwave Tuner and DM-112 Demodulator operate together to provide AM, FM, and pulse reception in the 1 GHz to 12 GHz frequency range. The MT-112 uses four tuning heads and converts signals in this frequency range to a 160-MHz IF output. The frequency ranges are: 1 to 2 GHz, 2 to 4 GHz, 4 to 8 GHz, and 8 to 12 GHz. All four tuning heads are installed in the MT-112 and any one can be selected for operation by a front-panel switch. The 160-MHz output from the selected tuner is available at a common output jack.

The common 160-MHz IF output from the MT-112 is normally used as the input to the DM-112 Demodulator. This unit has five IF bandwidths: 100 kHz, 2 MHz, 4 MHz, 10 MHz, and 20 MHz. The DM-112 includes a built-in signal monitor operating from the 160-MHz IF input. The signal monitor has a maximum sweepwidth of 20 MHz; its sweep rate is continuously variable from 5 Hz to 25 Hz. Predetection outputs are provided at 160 MHz and at the second IF of 21.4 MHz. Additional outputs include video, audio, tuner AGC, tuner ALC, and 21.4 MHz signal monitor.

For other equipment in this range, please refer to the earlier description on the 112 Receiver.



FE-26 Shown

FREQUENCY EXTENDERS

The frequency coverage of VHF receivers such as the 501A, 901B or 977 may be extended to include HF, UHF and SHF regions through the use of frequency extenders. Types FE-1-2B, FE-2-4.5A, FE-1-4.5A, FE-8-12 have a tunable four-section YIG prescaler for each band. FE-26 has built-in Signal Monitor which provides a visual display of signals in a band 30 MHz around the received signal.

FREQUENCY EXTENDER SPECIFICATIONS

Model	Bands	Range	Maximum Noise Figure	IF Output
FE-103	1	10-30 MHz	6 dB	60 MHz
FE-25-1	2	235-506 MHz	10 dB	60 MHz
FE-26	2	490-1000 MHz	12 dB	60 MHz
		235-500 MHz	10 dB	
FE-1-2B	1	490-2000 MHz	12 dB	60 MHz
FE-2-4.5A	1	1-2 GHz	18 dB	160 MHz
FE-1-4.5A	2	1.05-4.5 GHz	18 dB	160 MHz
		1.95-2.05 GHz	18 dB	160 MHz
FE-4-8	1	4-8 GHz	18 dB	160 MHz
FE-8-12	1	4-8 GHz	18 dB	160 MHz
		8-12 GHz	18 dB	160 MHz

DRO-290A DIGITAL READOUT

Companion unit for 521A Receiver. Provides 6-digit display of received frequency. Provides a readout range of 20 MHz to 90 MHz with a 10 MHz offset. Features dual DAFC (digital automatic frequency control) when used with 521A receiver. Has a ± 100 Hz resolution. Compact unit occupies only 1.75 inches of vertical space.



DRO-300A DIGITAL READOUT

Advanced design provides a six-digit display in 1.75 inches of vertical space. For operation over the range of 30-300 MHz with receivers having a 21.4-MHz IF. Resolution is ± 100 Hz from 10 kHz to 30 MHz and ± 1 kHz from 30 MHz to 300 MHz. With DRX-3000 Readout Extender, can indicate frequencies up to 3000 MHz. Includes DAFC to lock VHF receivers to desired frequencies in 1-kHz increments.



DRO-302A-2 DIGITAL READOUT

Indicate tuned frequency of receivers having a 21.4 MHz IF over the frequency range of 30 MHz to 300 MHz. 6-digit display. Provisions for changing internal preset so that tuned frequency of HF receivers can be indicated down to 10 kHz. Resolution of ± 100 Hz in 10 kHz to 30 MHz range; ± 1 kHz, 30-300 MHz range. Features digital automatic frequency control (DAFC) and BCD output. Half-rack size mounts in EF-101 or EF-201C frame.



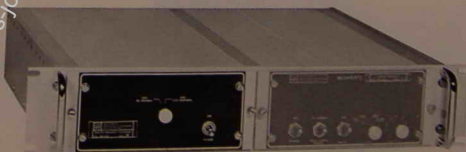
DRO-307 DIGITAL READOUT

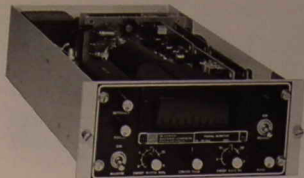
Time-shared counter for readout of up to 4 VHF receivers. Readout range from 30 to 300 MHz with 21.4-MHz offset. Resolution is ± 1 kHz. DAFC voltages from last two digits available for all receivers. Continuously updated BCD output of tuned frequency of each receiver available on command.



DRX-1000 READOUT EXTENDER

Extends range of DRO-300A or DRO-302A digital readout to 1000 MHz when used with CEI Division UHF receivers. Also extends DAFC capability. Half-rack size, $3\frac{1}{2}$ " high by 7.9" wide. DRO-302A and DRX-1000 can be used together in equipment frame EF-201C for standard 19-inch rack mounting.





SM-1622 SIGNAL MONITOR

Companion unit for 112 Microwave Receiver and other receivers or tuners with 160-MHz IF. The sweep width is continuously variable to 20 MHz. The sweep rate is variable from 5 Hz to 25 Hz. Mounts in EF-101 or EF-201C Equipment Frame.



SM-4301B SIGNAL MONITOR

Compact unit operates from 21.4-MHz IF output from receiver. Normally used with 415 or 416 Receivers. Has sweep width of 0-3 MHz, continuously variable with a 25 Hz sweep rate. All active elements are solid state except for CRT. Mounts in EF-401 through EF-404 Equipment Frames.



SM-8421 SIGNAL MONITOR

Operates from a 2-MHz IF output to provide visual display of signals in a band around the received signal. Sweep widths: 3 kHz, 10 kHz, 50 kHz. Operating accessory for VLF receivers such as the 357.



SM-8511 SIGNAL MONITOR

For use with HF receivers having a 500-kHz IF center frequency such as Collins 51S-1. Provides visual display of signals in a band around the received frequency. Sweep widths: 5, 20, 50, 200 kHz.

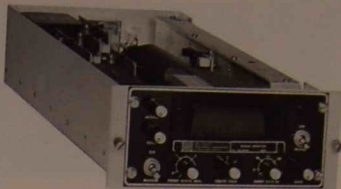


SM-8512 SIGNAL MONITOR

For use with HF receivers having a 455-kHz IF center frequency such as the R-390. Provides visual display of signals in a band around the received frequency. Sweep widths: 5, 20, 50 kHz, switch selectable.

SM-9304A SIGNAL MONITOR

Designed for use with CEI Division VHF and UHF receivers. Input response matches receiver 21.4-MHz mixer output response. Result provides a flat sweep width of 3 MHz. Variable sweep rate control is provided to obtain optimum resolution at the sweep width being used. Half-rack unit mounts in EF-101 or EF-201C frame.



SM-9404A SIGNAL MONITOR

Operates from 21.4-MHz input. For use primarily with tuners having flat response at signal monitor output. Maximum sweep width is 4 MHz. Sweep rate continuously variable from 5 Hz to 25 Hz. Advanced design is all-solid-state except for the CRT. Mounts in EF-101 or EF-201C.



SM-9804A SIGNAL MONITOR

For use with wide bandwidth tuners (UT, LT, ST, CT, XT Series) installed in a receiving system such as the RS-125. Provides a visual display of signals in a band around the received signal. Operates from a 21.4-MHz input; response is flat to 8 MHz. Features solid state design, variable sweep width and sweep rate, and simplified maintenance. Requires EF-101 or EF-201C for mounting.



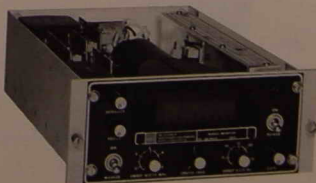
SM-9805A SIGNAL MONITOR

Input frequency is 21.4 MHz; input response is flat. Provides sweep width from 0 to 8 MHz. Sweep rate continuously variable from 5 to 20 Hz. This unit features a large CRT display with a choice of P1 or P7 persistence. The CRT is 2 3/4 inches high and 4 3/4 inches wide; overall panel height has been maintained at 3 1/2 inches.



SM-9832A SIGNAL MONITOR

Operates from a 30-MHz IF output from a receiver and provides a visual display of signals in a band around the received signal. Has a built-in marker at 30 MHz which is actuated by a front-panel switch. Employs the latest solid-state design, offers high reliability, and low power consumption. Mounts in EF-101 or EF-201C frame.





DM-4CA DEMODULATOR

Accepts plug-in modules to provide AM, FM, CW, and pulse demodulation from a tuner providing a 21.4-MHz IF input signal (such as HT, VT, UT, LT, ST, CT, and XT series). Accepts 4 IFD modules or 3 IFD modules and 1 special-purpose module.



IF DEMODULATOR MODULES

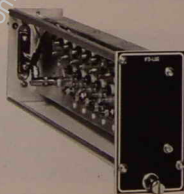
Provide AM, FM, and CW demodulation from an incoming 21.4-MHz IF signal. Units with bandwidths narrower than 100 kHz employ crystal filters and discriminators. Ten models available with bandwidths as follows: IFD-5C, 5 kHz; IFD-15C, 15 kHz; IFD-50C, 50 kHz; IFD-500C, 500 kHz; IFD-1000C, 1 MHz; IFD-2000C, 2 MHz; IFD-4000C, 4 MHz; IFD-8000C, 8 MHz.

IFD-1000C Shown



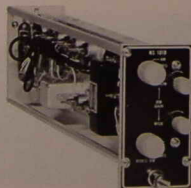
AGC-BC/C, AGC-PS/C AGC MODULES

Special AGC modules operate from demodulated output of an IFD module. AGC-BC/C box car unit provides sample-and-hold, peak-type AGC voltage from an incoming pulse video signal, or averaged-type AGC from incoming AM or CW signal. AGC-PS/C pulse stretching unit provides peak-type AGC voltage from an incoming pulse video signal, or averaged-type AGC from CW signals.



IFD-LOG LOGARITHMIC AMPLIFIER

Special plug-in module designed for the reception of pulse-type signals. Gain adjusts instantaneously to prevent overload. Has wide dynamic range to accurately relate output pulse amplitude to signal level. Has wide bandwidth for use with fast-rise-time pulses.



NS-101A NOISE SILENCER

Special plug-in module provides AM and CW demodulation from a 21.4-MHz center frequency input. Reduces pulse-type noise by using wideband limiting techniques prior to filtering.

DMS-105 TUNABLE DEMODULATOR

Designed to demodulate AM, FM, SSB, CW, MCW, and FSK signals in the 1 kHz to 1600 kHz frequency range. Four IF bandwidths for SSB signals: 2.5, 3.5, 4, and 8 kHz. Six IF bandwidths for the remaining modes: 150 Hz, 1, 5, 7, 8, and 16 kHz. Built-in counter features 10 Hz resolution and DAFC which will lock the local oscillator to any 10 Hz increment in the tuning range.



DMS-107 TUNABLE DEMODULATOR

Provides AM, FM, CW, and pulse reception in the 100 kHz to 10 MHz frequency range. Used to perform spectrum analysis of complex signals from the outputs of wide-band tape recorders. Digital automatic frequency control (DAFC) from a DRO-302A-2 or DRO-326 counter can be used to lock the DMS-107 to any 100 Hz increment in the tuning range. Eight IF bandwidths provided: 20, 50, 100, 300, 500 kHz, and 1, 2, and 3 MHz.



DMS-109 TUNABLE DEMODULATOR

Provides SSB demodulation over frequency range of 5 kHz to 1 MHz. Either upper or lower sideband can be selected by front-panel switch. IF bandwidth is 2.8 kHz. Unit includes a built-in counter with five-digit display and digital automatic frequency control (DAFC). Using DAFC, the demodulator local oscillator can be locked to any desired 10 Hz increment in the tuning range.



OTHER DEMODULATORS

A variety of demodulators, both fixed and tunable, are available in addition to those already described. Some representative models are tabulated below.

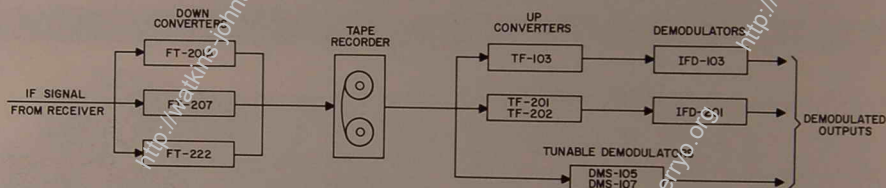
Model	Center Frequency/ Tuning Range	Capability	IF Bandwidths
DM-22A	21.4 MHz	AM	1.5 MHz
DM-160	160 MHz	AM, FM, pulse	350 kHz, 1.5 MHz, 4 MHz
DM-161	160 MHz	AM, FM, pulse	1, 5, 10, 20 MHz
DM-212	160 MHz	AM, FM, pulse	10, 20 MHz
DMS-201	0.5-10 MHz	CW, FSK	1, 3 kHz

Predetection Recording Systems

Predetection recording is a technique for recording an RF carrier and its associated sidebands in which the RF signal is heterodyned to lie within the frequency capabilities of a tape recorder. When playing back the recorded information, the system heterodynes the tape recorder output up to the input center frequency of a demodulator. As shown in the illustration below, there are four essential units in a typical predetection record/playback system: a down converter, a tape recorder, an up converter, and a demodulator. The down (IF-to-tape) converter accepts the IF center frequency from a receiver and produces an output center frequency compatible with the tape recorder being used. The up (tape-to-IF) converter receives the output of the tape recorder and heterodynes it to the input center frequency of the associated demodulator. The demodulator provides the desired bandwidth selection and detection capabilities.

Predetection recording offers advantages over other methods. First, incoming signals can be stored without prior knowledge of the type of modulation employed (AM, FM, CW, pulse) or the nature of the modulating signal. Second, the ability to record modulation components extending to very low frequencies is inherent in predetection recording and very difficult to obtain otherwise. Third, the gain stability and amplitude linearity of the tape recorder are less important than in post detection recording.

The diagram below shows several typical components available for use with tape recorders of three different bandwidths.

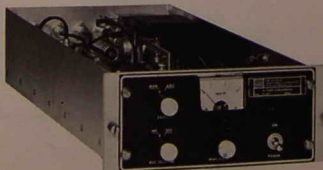


Block Diagram, Predetection Recording and Playback System



FT-201A IF-TAPE CONVERTER

Accepts 21.4-MHz IF output from receivers and translates this signal to one which can be recorded. For use with tape recorders with a frequency cutoff of 1.5 MHz. Data bandwidth: 100 kHz to 1.4 MHz. Output center frequency is 750 kHz. The FT-201A is a half-rack size which mounts in an EF-101 or EF-201C frame.



FT-207 IF-TAPE CONVERTER

Wideband down converter accepts input spectrum centered at 21.4 MHz and translates it to one centered at 2.15 MHz for recording on a tape recorder which has a 4-MHz bandwidth. Either manual or automatic gain control may be selected. Output data bandwidth from 300 kHz to 4 MHz. Half rack size.

FT-222 IF-TAPE CONVERTER

Narrowband predetection converter provides output center frequency between 20 kHz and 200 kHz from an input signal at 21.4 MHz. For use with tape recorders having a bandwidth of less than 500 kHz. Output center frequency is customer selected by changing a crystal. Data bandwidth is equal to center frequency. Mounts in EF-101 or EF-201C frame.



TF-103 TAPE-IF CONVERTER

Provides a 21.4-MHz center frequency IF output from input video signals in the 40 kHz to 4 MHz frequency range. Input range covered in three bands: 40-200 kHz, 150 kHz-1.5 MHz, and 400 kHz-4 MHz. Tuning provided to convert any frequency within a band to the 21.4-MHz center frequency. Manual gain control and output level meter provided. Four use with wideband tape recorders. Companion demodulator is the IFD-103.



TF-201, TF-202 PREDETECTION CONVERTER

Translate output signal from a tape recorder having a 1.5 MHz bandwidth up to 21.4 MHz for demodulation. Data bandwidth is 1.3 MHz when input center frequency is 750 kHz. Units are half-rack size for mounting in an EF-101 or EF-201C equipment frame. The TF-202 includes tuning controls to maintain output frequency at 21.4 MHz for an input center frequency between 100 kHz and 1.4 MHz. This permits separation of a narrow-band signal from the complete band.



TF-202 Shown

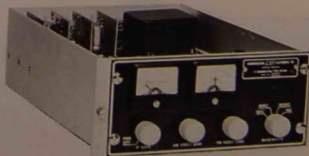
IFD-103 IF DEMODULATOR

Accepts the 21.4-MHz output from an up converter. Provides bandwidth selection and AM and FM demodulation. Has IF bandwidths of 10, 50, 100, and 300 kHz, 1 and 3 MHz. Provides a predetection IF output in addition to AM and FM video outputs.



IFD-201 IF DEMODULATOR

Accepts the 21.4-MHz output from an up converter. Provides bandwidth selection and AM and FM demodulation. Has IF bandwidths of 10, 50, 300, and 1000 kHz. Provides separate AM and FM video outputs.





DA-1 VIDEO DISTRIBUTION AMPLIFIER

Provides nine separate outputs from a common video input. Six data outputs are identical. They will deliver 1.5V rms into a 91-ohm load with a frequency response of 30 Hz to 2 MHz. The seventh output is for oscilloscope display and is similar to the six data outputs except gain is unity with respect to input. The eight and ninth outputs provide 600-ohm loudspeaker and 1000-ohm headset audio over a frequency range of 200 Hz to 15 kHz at levels of 100 mW and 10 mW, respectively.



DA-5 AUDIO DISTRIBUTION AMPLIFIER

Provides five isolated audio outputs from a common input. Each output will deliver 100 mW into a 600-ohm or 150-ohm load with a frequency response of 150 Hz to 10 kHz. Internally adjusted gain controls set amplitude of each output signal.



EF-201C



EF-402

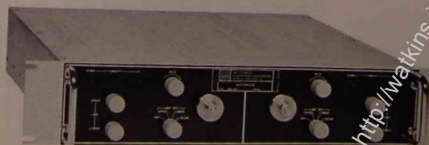


EF-506

EQUIPMENT FRAMES

Model	Openings	Dimensions
EF-101	1	3¼" x 8"
EF-201C	2	3¼" x 8"
EF-401	1	6¾" x 3¾"
EF-402	2	6¾" x 3¾"
EF-403	3	6¾" x 3¾"
EF-404	4	6¾" x 3¾"
EF-506	6	2½" x 4½"

Various equipment frames are available. Some representative types are listed to the left. The EF-101 and EF-201C are used to mount half-rack units such as the S-9203 shown on the next page. The EF-401 through EF-404 are used to mount 415 or 416 receivers or an SM-4301B signal monitor. The EF-506 is used to mount 440 or 441 receivers which could also be mounted in the PEC-401 portable equipment case.

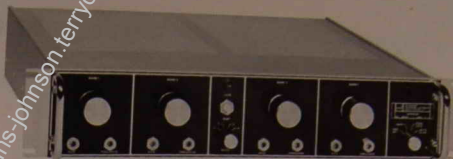


MD-50, MD-100 AUTOSCAN

Motor drive units used to adapt manual receivers for mechanical scanning. The MD-50 is single channel for use with receivers having a single tuning knob. The MD-100 has two channels for use with receivers having two tuning knobs. We invite inquiries concerning the use of these devices.

MD-104 AUTOSCAN

For operation with RS-111-1B-17 Receiving System. Scans signals without an operator. Externally drives tuning knobs on the receiver and provides electrical "command" to auxiliary equipment such as printer, recorder, etc. Four channels, each channel controlling one drive pulley. Variable scan speed and variable threshold level adjustments; manual, auto-scan and scan-lock operation. Standard rack mount, 3.5 inches high.



MP-101, MP-102 METER PANELS

Operate from the 21.4-MHz IF output from a receiver. The MP-101 converts a tunable receiver to a selective comparison voltmeter. Either peak or average response can be selected. Variable slide-back-gate included. The MP-102 converts a tunable receiver into a frequency deviation meter. Provides FM deviation ranges from 3 kHz to 300 kHz in three bands. Accurate indications provided of the peak deviation of sine-wave modulation.



MP-101 Shown

S-9902A SPEAKER PANEL

Selects one of six inputs for monitoring. Input transformer matches speaker to 600-ohm line. Unselected inputs are terminated in 600-ohm resistors. Will accept up to a 4 watt input for high-level monitoring.



S-9203, S-9903D SPEAKER PANELS

Integral solid-state amplifier and power supply. Provide high-level audio monitoring through front-panel speakers from five-watt amplifiers. Have seven selectable inputs. Input impedance is 10,000 ohms for bridging audio lines. The S-9203 is half-rack size for mounting in EF-201C equipment frame. The S-9903D mounts in a standard 19-inch rack.



SOR-1A SIGNAL OPERATED RELAY

Solid-state device operates a relay when activated by any one of three selectable inputs: voice frequency, positive-going dc, or negative-going dc. Designed to activate tape recorders or other remote devices in response to audio or AGC signals from a receiver.





TDS-100 Carrier Demultiplexing System

The TDS-100 Carrier Demultiplexing System is designed to monitor and evaluate the electromagnetic integrity of microwave telephone signals in the 3.7 to 4.2 GHz frequency band. Recommendations of the CCITT have been followed for frequency allocations, so the equipment can be used world wide. The actual frequency allocations can be found in the "Reference Data for Radio Engineers", MIL-STD-188B, and numerous other publications. A building block scheme has been used for system development which permits the user to assemble a system to meet his particular requirement at minimum cost. Units presently available will simultaneously demodulate all 960 channels of CCITT supergroups 1 through 16. Push-button switches on the system's frequency converters and demodulators make it possible to apply any desired channel to a monitor speaker or headphones. For the user who is interested in only selected channels, or can accommodate only a small number of channels simultaneously, the flexibility offered by the push-button approach plus the building block approach makes tailoring a system to do the job a simple matter, requiring a minimum of hardware.

Complete systems from antenna to speaker can be assembled from the following equipments:

- Type FE-3442 Tuner
- Type IFD-210 IF Demodulator
- Type SM-1622 Signal Monitor
- Type TFC-101 Supergroup Converter (Supergroups 1 through 10)
- Type TFC-105 Supergroup Converter (Supergroups 11 through 16)
- Type TFC-212 Basic Supergroup Converter
- Type TDM-101 Basic Group Demodulator
- Type TDM-110 Basic Group Demodulator (Ten inputs)
- Type PR-101 Low Noise Preamplifier
- Type ANT-101 Antenna
- Type APR-101 Antenna-Preamplifier

With the exception of a ceramic triode local oscillator in the RF tuner and the CRT display in the signal monitor, all active elements are solid state. The resulting low power consumption and light weight make TDS-100 systems ideally suited for mobile applications or for applications in which the system must be transported frequently.

The basic CCITT multiplexing scheme consists of allotting 4 kHz to each voice channel. Twelve such channels are multiplexed in the 48 to 108 kHz band. Each channel is single sideband with suppressed carrier. This constitutes the basic group 12-channel building block. The TDM-101 accepts the 60-108 kHz input and simultaneously demodulates the twelve voice channels. Each of the twelve outputs from the demodulator are suitable for driving audio power amplifiers, tape recorders, or other devices.

Another demodulator option available in the TDS-100 system is the TDM-110. This unit contains ten independent basic group demodulators, each of which can select one of the twelve channels by means of front-panel thumb-wheel switches. Thus, the TDM-110 can provide ten outputs; one selected voice channel from each of ten 12-channel basic group inputs.

Demultiplexing of video signals down to the 12-channel basic group level is accomplished by the TFC-101 and TFC-105 Supergroup Converters and the TFC-212 Basic Supergroup Converter. The TFC-101 accepts CCITT supergroups 1 through 10 containing up to 600 voice channels and converts each supergroup to a standard 60-channel basic supergroup covering the frequency range of 312 to 552 kHz. For a 960-channel system the TFC-105 is required for converting supergroups 11 through 16 to the 312 to 552 kHz range. Once the signals are available in the 60-channel basic supergroup format, the TFC-212 then further demultiplexes each basic supergroup into five 12-channel basic groups which are then ready for demodulation by the TDM-101 or TDM-110.

For the simultaneous demodulation of all channels of a 600-channel system, a TFC-101, ten TFC-212's, and fifty TDM-101's would be required. For a 960-channel system, the TFC-105, six additional TFC-212's and thirty additional TDM-101's are required. To select any basic group out of a 600-channel system requires only a single TFC-101, TFC-212, and TDM-101. By use of the push-button switches on the units any one channel of the 600 can be routed to a monitor speaker or recorder. With the TFC-105

added, any one of 960 channels can be selected. In many applications system flexibility can be increased by using the TDM-110 rather than the TDM-101. For example, five TDM-110's can replace fifty TDM-101's in a 600-channel system, making it possible to simultaneously monitor any fifty selected channels. A single TDM-110 fed by two TFC-212's permits monitoring ten channels out of two selected supergroups provided by a TFC-101 or a TFC-105.

The FE-3442 provides continuous tuning of the 3.4 to 4.2 GHz frequency band allocated to telephone signal transmission. Its output center frequency is 160 MHz with an overall bandwidth of 20 MHz. A visual display of signal activity about the tuned frequency is provided by a SM-1622 Signal Monitor. The 160-MHz output from the FE-3442 tuner is fed to the IFD-210 which provides FM demodulation of the input signal. Two IF bandwidths are provided in the IFD-210, 10 MHz and 22 MHz. Its video bandwidth extends to 8.5 MHz, making the IFD-210 suitable for use in demultiplexing systems of up to 1800 channels. An AGC voltage is generated in the IFD-210 to control the gain of its own IF amplifier stages, as well as provide gain control of the FE-3442.

A number of antenna and preamplifier options are available in the TDS-100. For installations where the RF signal level is relatively high and the antenna lead-in relatively short, the FE-3442 can be connected directly to an ANT-101 Antenna. The ANT-101 is a linear microwave horn with a minimum power gain of 12 dB and a beamwidth of 25°. It is designed for tripod mounting, but the tripod is not included with the ANT-101.

Where weak signals are encountered or appreciable cable runs are required, the APR-101 is recommended. This unit consists of an ANT-101 with a tunnel diode preamplifier built on to the antenna. The amplifier provides a minimum gain of 22 dB over the 3.7 to 4.2 GHz frequency range and has a noise figure of 4.5 dB. Like the ANT-101, the APR-101 is also designed for tripod mounting, but the tripod is not supplied.

For installations in which the cable losses exceed approximately 18 dB from the APR-101 to the tuner, the PR-101 Preamplifier is available to provide the necessary gain to preserve the system noise figure. The PR-101 incorporates the same tunnel diode amplifier used in the APR-101, but is packaged in a standard 19-inch rack mounting housing which occupies 3.5 inches of vertical rack space.

Although not a part of the TDS-100 system, the CEI Division has in production the TDM-102 Demodulator for the CCITT Base Group "A". This base group consists of twelve voice channels covering the frequency range of 12 to 60 kHz. The TDM-102 functions identically to the TDM-101; it differs only in the frequency of the input band.

The SM-6108 Signal Monitor is also available to display the entire 60-108 kHz base group band and provide an indication of activity in any of the twelve channels.

Detailed specification sheets are available for all the units discussed; contact the Sales Department of the CEI Division or your CEI representative. Technical assistance is also available to advise on telephone system demultiplexing problems.

SPECIFICATIONS

ANT-101 ANTENNA
Power Gain 12 dB, minimum
3dB Beamwidth 25° approximately

APR-101 ANTENNA/PREAMPLIFIER
Antenna Power Gain 12 dB, minimum
Antenna 3-dB Beamwidth 25° approximately
Preamplifier Gain 23 dB, nominal
Noise Figure 4.5 dB, maximum
Bandwidth 300 MHz
Center Frequency 3.95 GHz

PR-101 PREAMPLIFIER
Center Frequency 3.95 GHz
Bandwidth 500 MHz
Noise Figure 4.5 dB, maximum
Gain 23 dB, nominal

FE-3442 TUNER
Tuning Range 3.4 to 4.2 GHz
Noise Figure 15 dB, typical
RF Bandwidth 20 MHz
Output Frequency 160 MHz
Gain 20 dB, nominal

SM-1622 SIGNAL MONITOR
Input Center Frequency 160 MHz
Sweepwidth 20 MHz, maximum
Sweep Rate 5 Hz to 25 kHz
Resolution 200 kHz, maximum

IFD-210 IF DEMODULATOR
Input Center Frequency 160 MHz
Type of Demodulation FM
IF Bandwidths 10 MHz and 22 MHz
Video Bandwidth 8.5 MHz

TFC-101 CONVERTER
Input Frequency Range 60 kHz to 4 MHz
Number of Outputs Twelve for supergroups 1 through 10 and 2 optional supergroups
Output Frequency Range 312 to 552 kHz
Monitor Output Any one of twelve outputs can be selected for monitoring by front-panel switch

TFC-105 CONVERTER
Input Frequency Range 2548 to 4028 kHz
Number of Outputs Six: for supergroups 11 through 16
Output Frequency Range 312 to 552 kHz
Monitor Output Any one of six outputs can be selected for monitoring by front-panel switch

TFC-212 CONVERTER
Input Frequency Range 312 to 552 kHz
Output Frequency Range 60 to 108 kHz
Number of Outputs Five
Monitor Output Any one of five outputs can be selected for monitoring by front-panel switch

TDM-101 DEMODULATOR
Input Frequency Range 60 to 108 kHz
Type of Demodulation SSB
Number of Outputs Twelve
Output Frequency Range 300 Hz to 3.5 kHz
Monitor Output Any one of twelve outputs can be selected for monitoring by front-panel switch

TDM-110 DEMODULATOR
Number of Inputs Ten
Input Frequency Range 60 to 108 kHz
Type of Demodulation SSB
Number of Outputs Ten
Output Frequency Range 300 Hz to 3.5 kHz
Output Channel Selection Any one of twelve channels on all ten outputs may be selected by front-panel switches

TDM-102 DEMODULATOR
Input Frequency Range 12 to 60 kHz
Type of Demodulation SSB
Number of Outputs Twelve
Output Frequency Range 300 Hz to 3.5 kHz
Monitor Output Any one of twelve outputs can be selected for monitoring by front-panel switch

SALES REPRESENTATIVES

DOMESTIC

ALABAMA

Gentry Associates, Inc.
Rm. 422, 2109 W. Clinton Ave.
Huntsville 35805
Phone: (205) 534-9771

CONNECTICUT

See Massachusetts

DELAWARE

See Pennsylvania

FLORIDA

Gentry Associates, Inc.
550 N. Bumby Ave.
Orlando 32803
Phone: (305) 841-7740

GEORGIA

Gentry Associates, Inc.
P.O. Box 13513, Sta. K
Atlanta 30324
Phone: (404) 874-4661

LOUISIANA

See Alabama

MAINE

See Massachusetts

MASSACHUSETTS

Lancer Associates
16 Adams St.
Burlington 01803
Phone: (617) 272-6445

MISSISSIPPI

See Alabama

NEW HAMPSHIRE

See Massachusetts

NEW JERSEY (North of Trenton)

Bonn Associates, Inc.
266 Lake Avenue
Metuchen 08721
Phone: (201) 249-9573

NEW MEXICO

See Texas

NEW YORK (Greater NYC Area)

See New Jersey

NEW YORK (Syracuse, Schenectady, Utica, Albany)

Ossmann Instruments, Inc.
6666 Collandar Rd.
East Syracuse, N.Y. 13057

NEW YORK (Rochester, Buffalo Area, City of Niagara Falls)

Ossmann Instruments, Inc.
3100 Monroe Ave.
Rochester 14618
Phone: (716) 586-0380

NEW YORK (Ithaca, Endicott, Oswego, Corning, Binghamton)

Ossmann Instruments, Inc.
Vestal Parkway East
Vestal 13850
Phone: (607) 785-9947

NEW YORK (Wappinger Falls, Poughkeepsie, Troy)

Ossmann Instruments, Inc.
P.O. Box 207
Wappinger Falls 12590
Phone: (914) 237-7777

NEW YORK (Long Island, Brooklyn, Staten Island)

Bonn Associates, Inc.
1 Ann Court
King Park, L.I. New York 11754
Phone: (516) 427-4328

NORTH CAROLINA

Gentry Associates, Inc.
116 E. O'Neal Avenue
Durlington 27215
Phone: (919) 227-2581

OKLAHOMA

See Texas

PENNSYLVANIA (Eastern + N.J. south of Trenton)

Bonn Associates, Inc.
1010 Abington Terrace
Cherry Hill, N.J. 08034
Phone: (609) 795-0600

RHODE ISLAND

See Massachusetts

SOUTH CAROLINA

See North Carolina

TENNESSEE

See Alabama

TEXAS (Except Dallas Area)

John W. Casey, III
Route 10, Box 189
San Antonio 78216
Phone: (512) 694-2911

VERMONT

See Massachusetts

EXPORT

Belgium

Indulus N.V.
Rue Stanley, 38
Brussels 18, Belgium
Telephone: 44.48.26/27
Telegram: INKOHIA
Telex: 22760

Electromechanical Products

Markham Road
Agincourt, Ontario, Canada
Telephone: AXminister 3-7011

Danavia A/S

4B, Strandgade
DK-1401 Copenhagen K
Denmark
Telephone: ASTA *7071
Telegram: AIRTRADE COPENHAGEN
Telex: 5749

Watkins-Johnson International

United Kingdom Branch
Shirley Avenue & Vale Road
Windsor, Berkshire, England
Telephone: 69241
Telex: 831-84578

Oy Hedengren AB

Lauttasaarentie 50
Helsinki 20, Finland
Telephone: 670 211
Telegram: HEDDY-Helsinki
Telex: 12-1110

Bureau de Liaison

113, rue de l'Universite
7e, France
Telephone: 551.99.20
Cable: Budliaison-Paris-007
Telex: Bulison-Pais 26-725

Watkins-Johnson International

8 Munchen 2
Maximiliansplatz 12A
Germany
Telephone: (0811) 29 33 30
Cable: WJDBM

Ingenieursbureau

KÖNING EN HARTMEN N.V.
Koperwerf 30, The Hague
Holland
Telephone: 67 83 80
Cable: INKOHIA
Telex: 31528

Parco

16-B Connaught Place
New Delhi-1, India
Telephone: 44557
Telegram: OCRAP

STG International Ltd.

P.O. Box 127
52 Nachlat Shimon Street
Tel-Aviv, Israel
Telephone: 53459
Telex: 05-229

Vianello S.p.A.

Via Crivelli, 12
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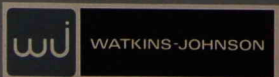
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