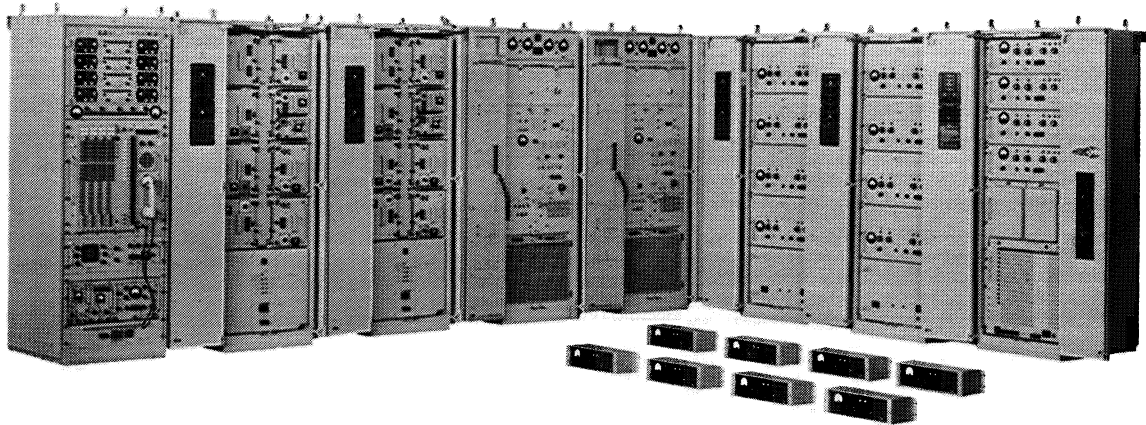


# AN/SRC-16 Shipboard HF Communication System



## Features

*Automatic Tuning*  
*Simultaneous Channels*  
*Mode Choice*  
*Data Transmission*  
*Simplified Maintenance*

## Applications

*Shipboard*  
*Fixed Station*

The AN/SRC-16 is a high capacity, long range HF communication system which provides four independent transmit and four independent receive channels. The system includes two 5 kw linear amplifiers which can be switched into any two transmit channels in lieu of the 500 watt amplifiers normally used.

Frequency coverage is in 1 kc tuning increments over the 2.0-29.999 mc range. Operating mode choice includes AM, CW, MCW, FSK, SSB, ISB and data communication on each channel. The channel frequency of each transmitter and receiver is phase locked to a primary frequency standard assuring high signal stability.

## CIRCUIT FEATURES

Linear power amplifiers, high performance filters and low distortion circuitry meet all complex data transmission and reception performance requirements. Compatible AM is transmitted using the upper sideband and a reinserted carrier. Pi network output circuitry assures efficient antenna loading. The converter for FSK-CW mode reception includes an oscilloscope to monitor test tones and to facilitate BFO adjustment on FSK reception.

## RF LEVEL CONTROL

A variable attenuator, using transistor circuitry, provides automatic control of radiated or received power levels. The RF signal between the transmitter and RF amplifier can be attenuated up to 120 db. Normally, it is automatically controlled by direct current pulses. It can be switched to the receiver input to manually attenuate the RF signal level.

## ANTENNA SWITCHING

The AN/SRC-16 employs 12 automatic antenna couplers

with terminations for three or more antennas. In a typical installation, eight couplers are associated with the 2-6 mc antenna, two couplers with the 5-15 mc antenna and two with the 10-30 mc antenna. Other arrangements are optionally available to meet individual system requirements. An RF switching matrix located in the HF coupler cabinet connects individual channel equipment to the proper antenna couplers. The couplers permit duplex operation on all channels by isolating transmit and receive circuitry, as well as maintaining the correct antenna impedance match. External equipments, such as the AN/URC-32, AN/WRT-2, AN/SRT-14 and AN/SRT-15, can also be connected to the antenna matrix through auxiliary input jacks.

## INPUT PATCHING

A communication patching switchboard permits connecting remote input audio lines to any of the radio channels. Interlocked pushbutton selectors prevent improper operation, and visual or aural signals indicate equipment status. Voice compression and noise squelching facilitate voice communications. Redundant power supplies prevent central control failure in the event of a single power supply malfunction.

## SYSTEM TEST FACILITIES

An integral multipurpose test set simplifies system maintenance tests. A two-tone signal can be applied to either transmitted sideband for distortion measurements and check of performance quality. A sidetone containing the signal is sampled at the T/R relay, coupled to the receiver input, demodulated and passed to a distortion measuring circuit which analyzes the hum level at 400 cps and 800 cps, third order distortion products and the second harmonic of the F1 tone. Frequency lock is tested by transmitting one of two tones on both LSB and USB in a closed loop throughout the system.

## UNITIZED CONSTRUCTION

The entire system is housed in eight separate equipment cabinets. Maintenance and installation are simplified through the use of modular construction. Individual units are mounted on slide cabinet drawers and all electrical connections are made through mating connectors wherever possible. Addi-

tionally, the system can be easily expanded as traffic increases by adding units and cabinets.

Completely automatic tuning allows the control cabinet to be located up to 900 feet from the other seven cabinets of the installation. It contains facilities for switching of remote input stations, system fault alarm, digital frequency selection, standby-operate control, manual variable RF level attenuation, audio level metering, RF output metering, signal monitoring, with controls and indicators for all modes.

## Specifications

**NUMBER OF CHANNELS:** 4 transmit and receive channels, each capable of independent, simultaneous operation.

**FREQUENCY RANGE:** 2.0-29.999 mc in 1 kc increments.

**FREQUENCY STABILITY:** 1 part in  $10^8$  per 30 days (with internal frequency standard).

**MODE OF OPERATION:** Radio frequency simplex or duplex.

**TYPE OF SIGNALS:** Single sideband, reduced carrier; two independent sidebands, reduced carrier; composite transmission; CW telegraphy; frequency shift telegraphy; single sideband with carrier in transmit function; double sideband with carrier in receive function.

### WEIGHT AND VOLUME:

	<i>Est. Wt. Crated</i>	<i>Est. Wt. Uncrated</i>	<i>Est. Vol. Crated</i>
Cabinet 1	1255 lbs. 569.27 kg	855 lbs. 387.83 kg	35 cu. ft. 0.99 cu. meter
Cabinets 2 & 3, each	1540 lbs. 698.54 kg	995 lbs. 451.33 kg	35 cu. ft. 0.99 cu. meter
Cabinets 4 & 5, each	1610 lbs. 730.3 kg	1110 lbs. 503.5 kg	35 cu. ft. 0.99 cu. meter
Cabinet 7	1720 lbs. 780.19 kg	1320 lbs. 598.75 kg	35 cu. ft. 0.99 cu. meter
Cabinets 6 & 8, each	1610 lbs. 730.3 kg	1056 lbs. 479.0 kg	35 cu. ft. 0.99 cu. meter
Antenna coupler control	20 lbs. 9.07 kg	12 lbs. 5.44 kg	1.2 cu. ft. 0.034 cu. meter

**DECK SPACE REQUIRED:** 38 sq. ft. (3.53 sq. meters).

**COOLING WATER REQUIRED:** 49.6 gpm at 35° C maximum.

**POWER SOURCE:** 440 v, 400 cycle, 3 phase, delta connected — 27.4 kw at 0.9 pf; 115 v, 400 cycles, 3 phase, delta connected — 11 kw.

**ANTENNAS REQUIRED:** 3 broadband, nominal 50 ohm impedance; VSWR no greater than 4:1.

**AUDIO INPUT:** 600 ohms balanced.

**AUDIO OUTPUT:** 600 ohms balanced.

### TRANSMITTER CHARACTERISTICS

**POWER OUTPUT:** Low power — 500 watts PEP with two or

## COOLING

Each cabinet is water cooled by a closed-cycle cooling system. The inlet of the centrifugal blower is attached to a water cooled heat exchanger and supplies air to a plenum located at the rear or center of the cabinet. This plenum supplies cooling air to all the units in the cabinet through openings in the rear or bottom of the units. When a unit is withdrawn from the cabinet, the plenum opening is closed by a sliding valve.

more tones; average power output of 250 watts continuous. High power (2.0-5.999 mc only with CU-1169/SRC-16 antenna coupler) — 5.0 kw PEP with two or more tones; average power output of 2.5 kw continuous.

**OUTPUT IMPEDANCE:** For antennas having frequency ranges from 2.0-5.999 mc, 6.0-14.999 mc and 10.0-29.999 mc.

**CARRIER SUPPRESSION:** 45 db below PEP output.

**HARMONIC SUPPRESSION:** 50 db below PEP output.

**SPURIOUS SUPPRESSION:** 50 db below PEP output.

**DISTORTION:** 35 db below PEP at rated power (third order distortion as measured by two-tone test).

**OPPOSITE SIDEBAND REJECTION:** 50 db below the level of a single tone.

**PHASE STABILITY:** Not more than 2.38° of phase shift in a 22 millisecond period.

**BANDWIDTH:** 300-3050 cps for each sideband (1½ db points).

**INPUT LINES:** Ten 600 ohm balanced lines; 0-60 ma teleprinter loop; key and microphone.

### RECEIVER CHARACTERISTICS

**PHASE STABILITY:** Not more than 2.38° of phase shift in a 22 millisecond period.

**BANDWIDTH:** 300-3050 cps for each sideband (1½ db points).

**NOISE FIGURE:** 17 db or better.

**DISTORTION:** Any intermodulation product or distortion 35 db or more below either tone from a two-tone test signal.

**IF AND IMAGE REJECTION:** —80 db or more below 25 mc; —65 db or more above 25 mc.

**AGC CHARACTERISTICS:** Will maintain output level within +3 db for inputs of 10 uv rms to 1 v rms. Approximately 6-12 millisecond attack time and normal decay time of 0.5-1.0 second. AGC delayed on command.

**OUTPUT LINES:** 18 600 ohm balanced lines; speaker and handset.

**SENSITIVITY:** Better than 1 uv for a 10 db S+N/N ratio.

### FREQUENCY STANDARD CHARACTERISTICS

**OUTPUT FREQUENCY:** 100 kc and 1 mc.

**OUTPUT VOLTAGE:** 1 v.

**STABILITY:** Aging rate — less than 1 part in  $10^8$  per 30 days.  
 Temperature variation — less than  $\pm 4$  parts in  $10^{11}$  per degree C (0.000004 cps at 100 kc).

**RESET ACCURACY:** Better than  $\pm 5$  parts in  $10^{11}$ .

**FREQUENCY CHANGE WITH SHOCK:** Less than 1 part in  $10^8$ .

**HARMONIC DISTORTION:** 40 db below rated output.

**SPURIOUS OUTPUTS:** 60 db below rated output.

**ANTENNA COUPLER CHARACTERISTICS**

**FREQUENCY RANGE:** CU-1169/SRC-16 — 2.0-5.999 mc. CU-1170/SRC-16 — 6.0-29.999 mc.

**INPUT IMPEDANCE:** 50 ohms nominal.

**ANTENNA VSWR (tuning range):** 4:1 (50 ohms) maximum.

**RF INPUT POWER:** CU-1169/SRC-16 — 6000 watts PEP, 3000 watts average continuous, maximum. CU-1170/SRC-16 — 1200 watts PEP, 600 watts average continuous, maximum. Both units require 100 watts average forward power for automatic antenna tuning and constant surveillance.

**EFFICIENCY:** 60% minimum.

**ISOLATION, INPUT TO OUTPUT:** 45 db minimum with channel frequencies separated 15% or more.

**ISOLATION BETWEEN INPUTS:** 45 db minimum with channel frequencies separated 15% or more.

**PRIMARY INPUT VOLTAGE:** 115 v  $\pm 10\%$ , 400 cps, 3 phase, delta or wye.

**PRIMARY INPUT POWER:** 100 watts maximum.

**TYPE OF SERVICE:** Continuous, unattended, remote.

## AN/SRC-23 Shipboard HF Communication System

The AN/SRC-23 is a single channel communication system using components of the AN/SRC-16 system. It offers exceptionally high frequency stability for long range surface-to-surface and surface-to-air communication in data, AM, FSK,

CW and SSB modes. Tuning is completely automatic on 28,000 channels in the 2.0-29.999 mc range. Detailed information on a system to specific requirements is available upon request.

*Available only on a production contract.*

## AN/TRC-115 Transportable HF Communication System

**Features**

*Automatic Tuning  
 Single Shelter  
 One-Man Operation*

**Applications**

*Transportable  
 Communication Center*

The AN/TRC-115 employs one 1 kw transmitter using single sideband techniques and one receiver with one voice channel and one teletypewriter channel capable of being transmitted and received simultaneously. The systems cover the 2.0-29.9999 mc frequency range in 280,000 channel increments with direct reading frequency control and fully automatic tuning, including the antenna circuits. Function switches permit selection of AM, upper sideband, or lower or independent sideband modes for either simplex or duplex operation. All equipment necessary to place the system in full operation is housed in one compact shelter that is transportable by fixed-wing aircraft, helicopter or truck. The AN/TRC-115 consists of components of the Collins Universal Radio Group in an S-144()/G shelter. It can be set up and operated by one man.

In duplex operation, two RF channel frequencies are required. Both an 85 cycle shift and an 850 cycle shift teletypewriter keyer-converter unit are included to provide the AN/TRC-115 with teletypewriter transmission capabilities.



The AN/TRC-115 contains the necessary units to control, switch and operate remote telephone line, remote teletypewriter, and the local operator's equipment. The unit consists of a communication control console, one radio receiver, one radio transmitter, two radio set controls, one antenna coupler and coupler control, and a telegraph terminal group.