

CLASS NOTES: HF Systems Week Seven (7-4-1)

TITLE: Introduction to the Unclassified High Frequency RFCS Communication System and the C-1004B/SG Control Unit

OBJECTIVES: Upon completion of this lesson you will be able to:

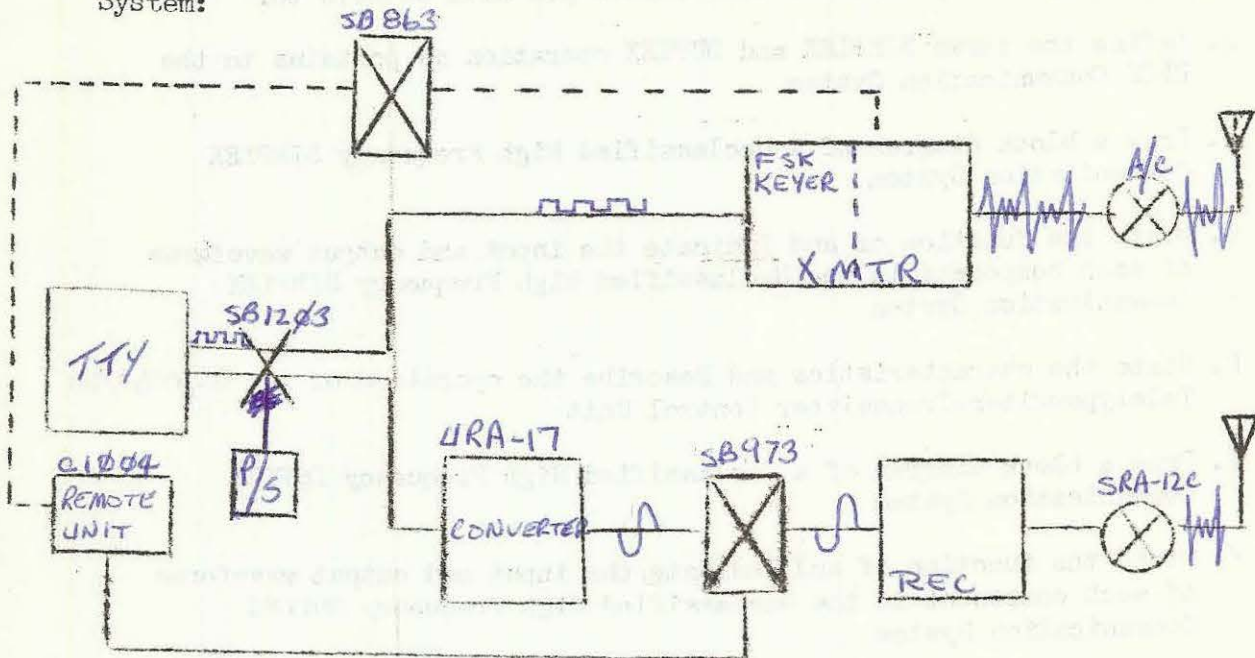
- A. Define the terms SIMPLEX and DUPLEX operation as pertains to the RFCS Communication System
- B. Draw a block diagram of a Unclassified High Frequency SIMPLEX Communication System
- C. State the function of and Indicate the input and output waveforms of each component in the Unclassified High Frequency SIMPLEX Communication System
- D. State the characteristics and Describe the operation of the C-1004B/SG Teletypewriter-Transmitter Control Unit
- E. Draw a block diagram of a Unclassified High Frequency DUPLEX Communication System
- F. State the function of and Indicate the input and output waveforms of each component in the Unclassified High Frequency DUPLEX Communication System

I. SIMPLEX and DUPLEX Operation (RFCS Communications)

- A. **SIMPLEX** - A Simplex circuit consists of a single radio channel (One Frequency) over which two or more stations may exchange information
 1. In RFCS application, Simplex circuits require only one teletypewriter
 2. Any station on the net can send and receive information on the one teletype but not SIMULTANEOUSLY
 3. Unlimited subscribers
- B. **DUPLEX** - A Duplex circuit is a circuit between two stations that permits the uninterrupted exchange of information by employing two separate radio channels (Two Frequencies)
 1. In RFCS application, Duplex circuits require two teletypewriters, one for transmitting and the other for receiving

2. Each station may transmit and receive simultaneously
3. LIMITED TO TWO (2) SUBSCRIBERS

II. Block Diagram of the Unclassified High Frequency SIMPLEX RFCS Communication System:



DOTTED LINE = CONTROL PATH

III. Component Function and Input/Output Waveforms Produced:

A. Transmit Operation (Signal Path Only)

1. Teletypewriter

- a. Function - Converts mechanical energy to electrical energy (DC Marks & Spaces)
- b. Waveforms
 - (1) Input - DC Current
 - (2) Output - Shifting DC (Marks & Spaces)

2. SB-1203/UG General Purpose Patch Panel

- a. Function - Interconnects and Transfers teletype output to transmitter
- b. Waveforms - DC Marks & Spaces (Patch Panels and/or Switchboards DO NOT change waveforms)

P/S = POWER SUPPLY
(CALLED BATTERY)

3. MF/HF Transmitter

a. FSK Unit (KEYER)

(1) Function - Converts DC Marks and Spaces to audio tones thus providing a source of excitation for the Transmitter. Tones produced have a 2KHZ reference frequency, 2.425KHZ for a mark and 1.575KHZ for a space.

(2) Waveforms

(a) Input - DC Marks & Spaces

(b) Output - AF (2.425KHZ for Mark, 1.575KHZ for Space)

b. Transmitter Unit

(1) Function - Modulation and Transmission. NOTE: When tuning a transmitter for FSK operation allowance must be made for the 2KHZ reference frequency being supplied by FSK Unit. This is done by tuning the Transmitter 2KHZ below the assigned operating frequency.

(2) Waveforms

(a) Input - AF

(b) Output - RF

4. Antenna Coupler

a. Function - MATCH ANTENNA TO XMITR.

b. Waveforms - Input and Output - RF

5. Transmit Antenna

a. Function - Radiation

b. Waveforms - Input and Output - RF

B. Receive Operation (Signal Path Only)

1. Receiving Antenna

a. Function - INTERCEPTION

b. Waveform - Input and Output - RF

854 Hz SHIFT

3406 KHz - Assigned Freq.

- 2 KHz - Keyer Freq.

3404 KHz - Window Freq.

2. Multicoupler

- a. Function - Enables multiple receiver operation while utilizing single antenna input
- b. Waveforms - Input and Output - RF

3. MF/HF Receiver

- a. Function - Frequency Selection, Amplification and Demodulation
- b. Waveforms
 - (1) Input - RF
 - (2) Output - AF

4. SB-973/SRR Receiver Transfer Switchboard

- a. Function - Interconnects and Transfers receiver output to A REMOTE STATION
- b. Waveforms - Input and Output - AF

5. Converter/Comparator Group URA-17

- a. Function CHANGE AF TO DC
- b. Waveforms
 - (1) Input - AF
 - (2) Output - DC Marks and Spaces

6. SB-1203/UG General Purpose Patch Panel

- a. Function - Interconnects and Transfers Converter/Comparator Output to Teletype
- b. Waveforms - Input and Output - DC Marks and Spaces

7. Teletypewriter

- a. Function - Converts electrical energy into mechanical energy
- b. Waveforms
 - a. Input - DC Marks and Spaces
 - b. Output - None

C. Control Path

1. C-1004B/SG Teletypewriter Transmitter Control Unit

a. Function

- (1) Enables control of a transmitter from a remote position for teletype operation
- (2) Provides monitoring capability of received incoming signal

b. Waveform - Not Applicable (Voltage Only)

2. SB-863/SRT Transmitter Transfer Switchboard

a. Function - Interconnects and Transfers remote stations output (C-1004B/SG) to transmitter

b. Waveform - AUDIO

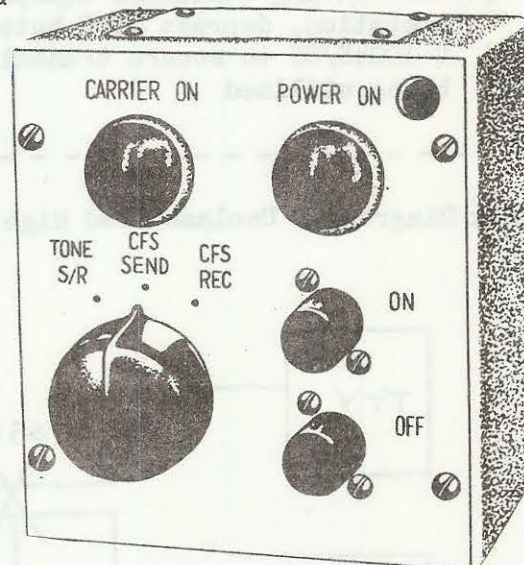
IV. C-1004B/SG Teletypewriter Transmitter Control Unit

A. Characteristics

1. Purpose - Enables control of a transmitter from a remote position for teletype operation and provides monitoring capability of received incoming signal

2. The C-1004B/SG provides the TRANSMITTER POWER ON-OFF switch, the POWER ON INDICATOR lamp, CARRIER ON INDICATOR lamp, and a THREE (3) position ROTARY SELECTOR switch. The ROTARY SELECTOR switch provides the functions described below:

- Switches a Send-Receive teletypewriter to either a Frequency Shift Keyer Circuit (CFS SEND), a Frequency Shift Converter/Comparator Circuit (CFS REC) or a Tone Terminal on a Send-Receive basis (TONE S/R (Normally AFTS System))
- Shorting of the other two unused set of terminals when the send-receive teletype is connected to the set of terminals associated with a particular switch position



C-1004B/SG Teletype
Transmitter Control Unit

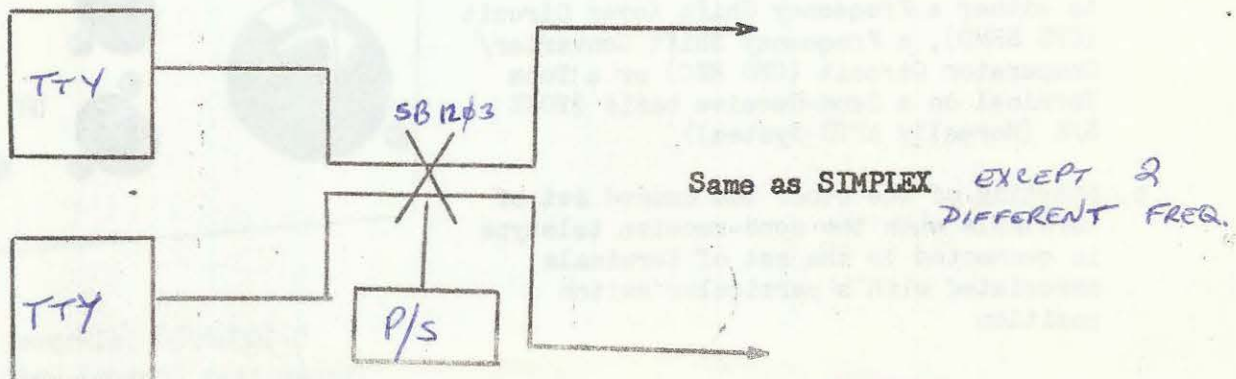
J939 - JACK ON C-1004. TO ~~CONNECT~~
~~C-1004~~ TO SB863. J939 ALLOWS
EARPHONE USE TO HEAR IF SOMEONE IS
ON LINE.

ANOTHER METHOD TO CHECK FOR SOMEONE
ELSE SENDING, LOOK ON SCOPE ON CONVERTER

B. Operation

1. Depress START button on C-1004B/SG. This will energize transmitter being utilized. POWER-ON INDICATOR lamp should illuminate indicating power to equipment
2. Place ROTARY SELECTOR switch to desired position:
 - a. When the ROTARY switch is in the TONE S/R position, the CARRIER-ON INDICATOR lamp and the transmitter carrier are OFF, the teletype is connected to the TONE TERMINAL Loop
 - b. When the ROTARY switch is in the CFS SEND position, the CARRIER-ON INDICATOR lamp is illuminated, the transmitter carrier is turned on, and the teletype is connected to the FREQUENCY SHIFT KEYER TERMINAL
 - c. When the ROTARY switch is in the CFS REC position, the CARRIER-ON INDICATOR lamp and the transmitter carrier are OFF, the teletype is connected to the FREQUENCY SHIFT CONVERTER circuit
3. Once having concluded equipment operation, depress STOP button on C-1004B/SG to secure transmitter being utilized

V. Block Diagram of Unclassified High Frequency DUPLIX RFCS Communication System



VI. Component Function and Input/Output Waveforms Produced:

- A. Transmit Operation - Same as SIMPLEX operation
- B. Receive Operation - Same as SIMPLEX operation with exception of teletype equipment. DUPLEx operation must employ two teletypewriters; one for transmitting and one for receiving. (NOTE: Frequency utilized for receive operation must be different from that used for transmitting).
- C. Control Path - Same as SIMPLEX operation