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USING THE SLAC VHF AND UHF RADIO SYSTEMS*

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ABSTRACT

This note has been written to describe the use of the SLAC VHF and UHF Radio Systems and the Tunnel Antenna Systems as they are presently configured. The original radio system was built in 1968 and has grown in scope over the years. The Tunnel Antenna Systems were developed for, and first installed in, the PEP ring, and later added to other tunnels and redesigned to cover the UHF range, as well as VHF. The UHF radio system was designed and built for SLC use, and was first used in the SLC Arcs.

The three radio systems will be described and the capabilities of each system will be defined.

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Introduction

Radio communication has been a necessity at SLAC since the accelerator was built. At first, radio was used to communicate between the control rooms and people around the SLAC site. Radio communications were very soon required between the control rooms and the BSY and later to the A, B and C beam lines. That problem was solved using "Passive antennae", which consisted of two antennae, one above ground, and one below ground connected by coaxial cable. This was an adequate solution for the BSY, but did not work well in the PEP tunnels. That led to the development of the "Tunnel Antenna System", SLAC-PUB-2567 — July, 1980.

VHF Radio Systems

The purpose of these systems was to provide radio communications between control rooms and people around the SLAC site (two-way voice system) and a radio paging system for on-site and off-site one-way voice paging. Four VHF frequencies are available; operations frequency 164.35 MHz, Security/Transportation 167.875 MHz, Radio Paging 167.9 MHz and Experimenters 167.925 MHz. Remote base units have been provided on the operations frequency and on the security frequency. A remote base unit permits operation of the high power fixed transmitters and receivers from MCC and other selected locations around SLAC. (See Figure 1.) Radio paging is provided through the SLAC phone system.

Tunnel Antenna Systems

The Tunnel Antenna Systems was developed at SLAC to extend radio communications to underground tunnels. The first tunnel that had such a system was the PEP Ring. The passive antenna systems used in the BSY were not adequate, so two active "leaky feeder" systems were installed around the PEP Ring; one to carry signals into the ring, and one to carry signals out of the ring. This provided the means to communicate from one hand-held portable to another in the PEP Ring, as well as from a remote base to/from a portable radio in the PEP Ring. (See Figure 2.) All four VHF frequencies are carried by the Tunnel Antenna

See

MASTER

System simultaneously. The Tunnel Antenna System was recently modified to carry UHF signals also. This feature will be described later.

Capabilities of the VHF Radio System (See Figures 1 and 2)

1. Communications between remote bases and portables above ground or in the PEP tunnel, SLC Arcs and FF or the Accelerator Housing are possible.
2. Communications are not possible from the tunnels to a portable above ground (around the site).
3. Portable to Portable communications in the North PEP Tunnel, or the South PEP Tunnel, or the North SLC Arc or the South Arc or the Accelerator Housing, are possible.
4. Portable to portable communications are not possible from N PEP to S PEP, or from NARC to SARC (SLC), or from any of the tunnels to the Accelerator Housing on VHF.
5. Paging can be heard in any of the above tunnels.

UHF Radio System

The purpose of the UHF Radio System is to provide above-ground to below-ground radio communications, as well as site communications. Six frequencies are available as follows: Ch1 and Ch2 (on the portable radios) have repeater stations and Ch3, 4, 5, 6 do not have repeaters (See Figure 3). The repeater stations, located at Bldg. 136, rebroadcast a signal from a portable so that the portable can communicate with another portable above ground, as well as below ground (in the NARC and SARC tunnels and the Accelerator Housing). Ch1 and Ch2 have separate repeater systems, so separate conversations can be carried on each channel. In addition, Ch1 has a telephone interconnect. The telephone interconnect permits you to dial into the SLAC phone system using a UHF portable. To activate the telephone interconnect from the SLAC phone system to portables, call Ext. 3663. Figure 4 shows the connection of the UHF

radio system with the Tunnel Radio System. Figure 5 is the UHF portable operating instructions.

Capabilities of the UHF Radio System

1. Communication should be possible between portables above ground and/or below ground in the SARC and NARC tunnels and Final Focus pit, as well as the Accelerator Housing.
2. The PEP Tunnel antenna system will not carry UHF signals, only VHF signals.
3. Portable to portable communications should be possible almost anywhere on the site using the Ch1 or Ch2 repeaters, and in all of the above tunnels, except PEP.
4. Portable to portable communications using Ch3, 4, 5 or 6 should be possible if there is a line of sight between two portables. These channels do not have repeaters.
5. When MCC becomes operational on UHF, Ch2 will be the calling frequency to reach MCC. They will have capability of operating on Ch1, 3, 4, 5 and 6, also, but will listen for calls and communicate on Ch2.

If, after you have read this note, and all else fails, call Warren Struven on x3533.

WS:kf

Fig. 1

T = TRANSMITTER

DUP = DUPLEXER

R = RECEIVER

ANTENNA

Fig. 3

Fig. 4

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 W. Struven

UHF RADIO OPERATION

Channel 1 Telephone Access Repeater

2 Above/Below Repeater

3 Simplex

4 Simplex

5 Simplex

6 Simplex

Simplex Operation

Channels 3 thru 6 can be used above ground or in the Tunnels (later) for Handy Talkie (H.T.) to H.T. direct communications.

Above/Below Repeater

H.T.'s can communicate from above ground to Tunnel or vice versa, Channel 2. If both HT's are not on channel, set up communications by telephone or pagers. A party-line call can result if more than two H.T.'s are on channel 2.

To call a SLAC telephone from a H.T., select channel 1. If telephone interconnect is busy you will hear voice conversations. If not, press Transmit button and A on T.T. Pad together and release. You should hear a dial tone. Touch tone your SLAC number. You will hear it ring. If someone answers, press to talk and release to listen. When finished, press Transmit and B (on TT pad) to release telephone circuit. Anyone on SLAC site can call a H.T. by dialing the SLAC Radio number x3643. The HT must have channel 1 selected or have the Priority switch on when any other channel is selected. You will hear a beeping tone on channel 1. The HT operator must switch to CH1 and press Transmit and A to answer. When the call is completed, HT press Transmit and B to disconnect. If the H.T. doesn't want to receive phone calls, select any channel except 1 and turn Priority Search OFF. Phone calls can be placed or received from above ground or in the tunnel.

When the telephone interconnect is not required, Channel 1 can be used as a "normal repeater" i.e., just like channel 2.

fig 5

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