DRAGON

manual version 1.5

Contents

DRAGON TOP PANEL

TX1:
XMIT(Green)- Lit when the associated transmitter is on.
UNLOCK(Red)- is lit if the associated transmitter has an RF problem - contact factory.

TX2:
same as TX1

CONTRAST SLIDE CONTROL:
Adjusts the contrast of the LCD display.

AUDIO SPEAKER:
Outputs tones that indicate DRAGON functions.

128 x 240 PIXEL LCD DISPLAY

KEYPAD:
1-9,0 are used for frequency and channelentry.

ENTER is used to initiate parameter entry in the main screen and to display unit information in the main menu.

ESC is used to exit entry and to enter the main menu. It is also used to exit menus to return to the main screen.

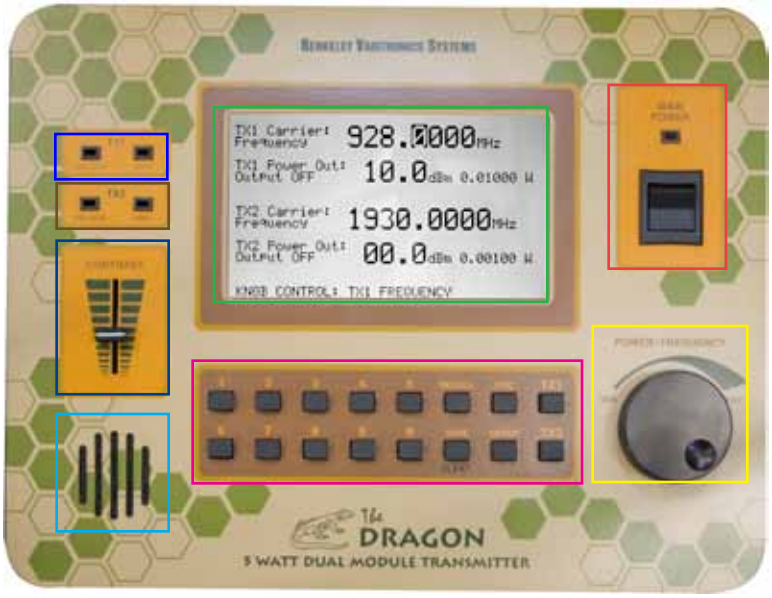
TX1 is used to turn on and off transmitter 1.

TX2 is used to turn on and off transmitter 2.

RECALL is used to enter the frequency/power recall menu.
SAVE is used to enter the frequency/power save menu.

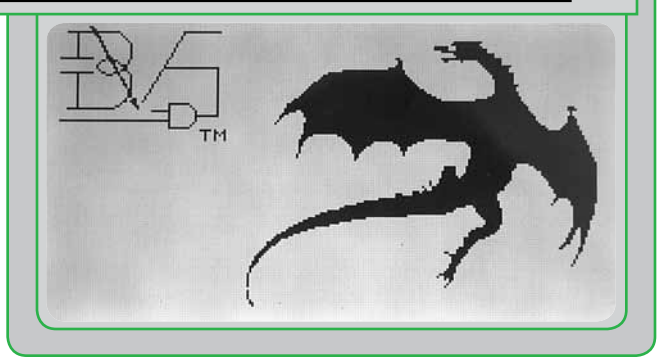
MAIN POWER ON/OFF SWITCH

POWER/FREQUENCY KNOB:
Is used to change selected transmitter parameters (frequency or power),the current parameter controlled by the knob is displayed on the last line of the main screen and selected using the main menu.

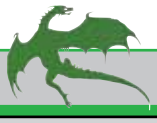


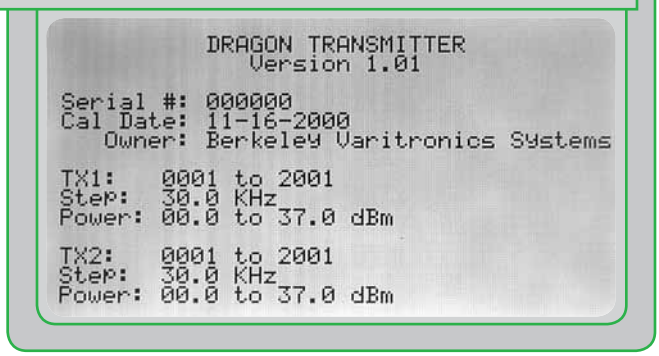
DRAGON STARTUP SCREEN

Upon powering up the DRAGON unit, the user will first see a startup screen with the BVS and DRAGON logos.The unit's serial number (not shown here) is also dispayed at the left of the screen. The following screen displays current status of unit.



DRAGON INFO SCREEN





DRAGON TRANSMITTER
Version 1.01

Serial #: 123456
Cal Date: 11-16-2000
Owner: BERKELEY VARITRONICS SYSTEMS
TX1: 0001 to 2001 (channels)
Step: 30 KHz
Power: 00.0 to 37.0 dBm

TX2: 0001 to 2001 (channels)
Step: 30 KHz
Power: 00.0 to 37.0 dBm

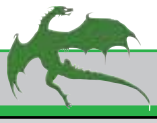
The UNIT INFORMATION SCREEN displays information pertaining to the DRAGON UNIT (Version, Serial Number, Calibration Date and Owner) and to each installed transmitter.

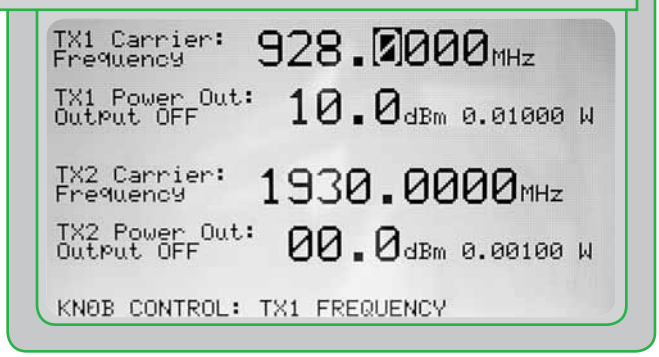
Frequency Range: displays the base to the top (maximum) frequency.

Step: is the smallest increment in KHz that the transmitter can be tuned in a single channel step. If the base channel is other than 1, it would be displayed to the left of the step. Note that this step can be selected with certain transmitters using the main menu 6 or 7 option. The currently selected step is displayed when viewing unit information.

Power: displays the minimum to the maximum output power of the transmitter. If the displayed dBm have a decimal point, the transmitter power step is .5 db. If there is not a decimal point displayed in the min/max dBm, the transmitter power step is 1 db.

DRAGON MAIN SCREEN





line #
1 TX1 Carrier: 928.0000 MHz
2 Frequency
3 TX1 Power Out: 10.0 dBm 0.01000 W
4 Output OFF
5 TX2 Carrier: 1930.0000 MHz
6 Frequency

7 TX2 Power Out: 00.0 dBm 0.00100 W
8 Output OFF
9 KNOB CONTROL: TX1 FREQUENCY

The MAIN SCREEN displays the current DRAGON status and is also used for parameter entry. The following is a discription of the information presented on each line.

Lines 1-4 indicate transmitter 1 status, lines 5-8 indicate transmitter 2 status. Lines 5-8 are only displayed if transmitter 2 is installed.

Line 9 indicates which transmitter parameter will be effected by turning the FREQUENCY/POWER knob.

Lines 1,2 and 5,6 indicate the transmitter carrier frequency (or channel number if cahnnel display is selected).

Lines 3 and 7 indicate the transmitter power output in dBm and Watts (W).

Lines 4 and 8 indicate transmitter output status (ON or OFF). When a transmitter is turned on, its status line will display "Output ON" when the output has reached the selected output power. The associated transmitter XMIT led is turned on as soon as the trqnsmitter is turned on.

TURNING ON A TRANSMITTER

To turn on a transmitter, first set the desired output frequency and power level. Press TX1 to turn on transmitter 1, TX2 to turn on transmitter 2.

While either transmitter is on, the output power is continually monitored and adjusted so that the output is held to the displayed dBm level. While a transmitter is on, NO parameter change is allowed. Pressing the following keys will cause the transmitter output to turn off:

ENTER, ESC, RECALL, SAVE, TX1, TX2

Turning the FREQUENCY/POWER knob will also cause the transmitter to shut down unless the knob has been turned off via the main menu.

NORMAL TRANSMITTER TURN OFF

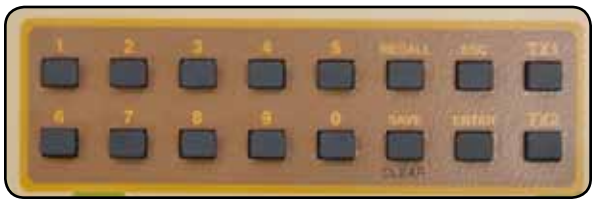
To turn off either transmitter, press TX1 or TX2.

CHANGING MAIN SCREEN PARAMETERS USING THE FREQUENCY/POWER KNOB

To change either frequency or power using the knob, the required parameter to change must first be selected using the MAIN MENU. The current parameter that the knob will change is indicated on line 9 of the display. If a parameter is selected and the knob is turned while the transmitter is on, the transmitter is first turned off. To prevent movement of the knob from turning the transmitter off, select KNOB OFF in the main menu.

CHANGING MAIN SCREEN PARAMETERS USING THE KEYPAD

To change any parameter on the MAIN SCREEN, press the ENTER key. Note that if a transmitter is on, pressing ENTER causes the transmitter to be shut off. The left most digit of TX1 frequency is highlighed. Change the highlighed digit using the digit keys or the knob. Press enter to move right 1 digit, press the CLEAR key to move back (left) 1 digit. When ENTER is pressed on the rightmost digit of a parameter, the highlight moves to the leftmost digit of the next parameter. To leave the current parameter unchanged, press the ESC key. The highlight will move to the leftmost digit of the next parameter.



DRAGON MAIN MENU SCREEN

DRAGON MAIN MENU

TX RESUME: OFF

(1) KNOB CONTROL MENU

(2) TX RESUME ON (3) TX RESUME OFF

(4) ENTER AND DISPLAY FREQUENCY
(5) ENTER AND DISPLAY CHANNEL NUMBER

(6) SELECT TX1 CHANNEL STEP
(7) SELECT TX2 CHANNEL STEP

(8) UNIT DATA (ESC) EXIT MENU

The main menu is used to select the function of the FREQUENCY\POWER KNOB, FREQUENCY-CHANNEL NUMBER display, TX RESUME, selection of transmitter channel step and to display unit information.

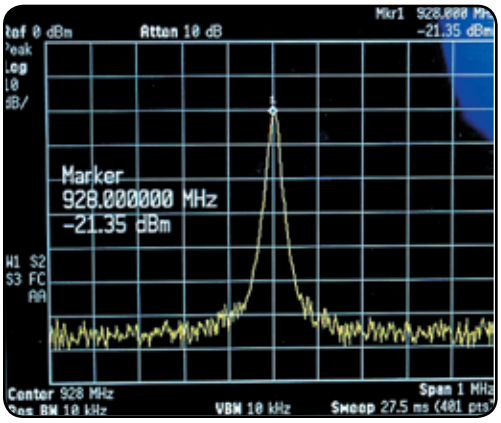
To enter the MAIN MENU from the MAIN SCREEN, press the ESC key. Note that if a transmitter is on, entry into the MAIN MENU will cause the transmitter to be turned off.

To select a MAIN MENU option, press the digit key indicated to the left of the menu option. The current setting of tx resume is displayed on the top of the MAIN MENU SCREEN.

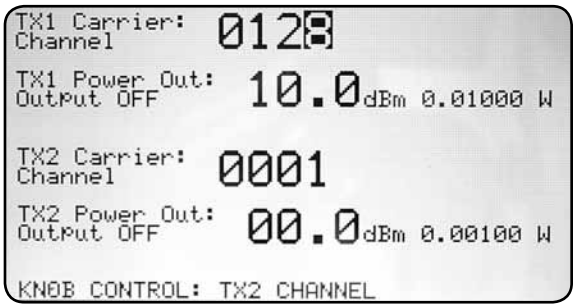
Once options have been selected, press the ESC key to return to the MAIN SCREEN. Options are saved in battery backed ram after the ESC key is pressed so that they are restored the next time the DRAGON is turned on.

Press the 8 key for the UNIT INFORMATION SCREEN. For Dual Channel step transmitters, the unit info displayed is for the channel step currently selected.

Options 4 and 5 control how the main screen carrier frequencies are displayed and entered. Use option 4 to enter and display the carrier in MHz. Use option 5 to enter and display the carrier in channel number.



Dragon output on a spectrum analyzer.



The user may search for signal strength through either channel number or frequency.

LINEAR CHANNEL NUMBER TO FREQUENCY CONVERSIONS

Use the UNIT INFORMATION SCREEN to determine the base frequency and base channel number of a transmitter (if the base channel number is not displayed to the right of the frequency step, the base channel is 1).

(FREQUENCIES IN MHZ)

CHAN NUMBER = ((F - BASE FREQUENCY)/STEP) + BASE CHANNEL

NOTE: In most cases the BASE CHANNEL is 1.

EXAMPLE: convert 933.0000 MHz to channel number

CHAN = (933.0000 - 928.0000)/.0125 + 1
CHAN = (400) + 1
CHAN = 401

EAMPS CHANNEL NUMBER TO FREQUENCY CONVERSIONS

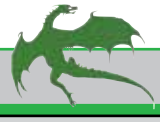
Eamps transmitters use the following channel numbering:

Channel	Frequency
990	869.01
991	869.04
.	.
1023	870.00
1	870.03
.	.
799	893.97

Each EAMPS channel is seperated by 30kHz. Eamps transmitters are not dual step capable.

Options 2 and 3 control the TX RESUME feature (2 for ON, 3 for OFF).

TX RESUME



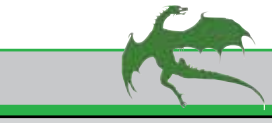
When TX RESUME is selected ON, any time the DRAGON is turned off while either transmitter is on, that same transmitter will resume transmitting the next time DRAGON is powered on. The transmitter resuming will turn back on at the same frequency and power output it was at when the DRAGON was turned off. A ten second delay and dual tone from the speaker will precede the transmitter turning on. ANY key press during this ten second period will abort the transmitter from resuming power output. Aborting TX RESUME in this way does not effect the setting of the tx resume feature or operation the next time the DRAGON is turned off while transmitting.

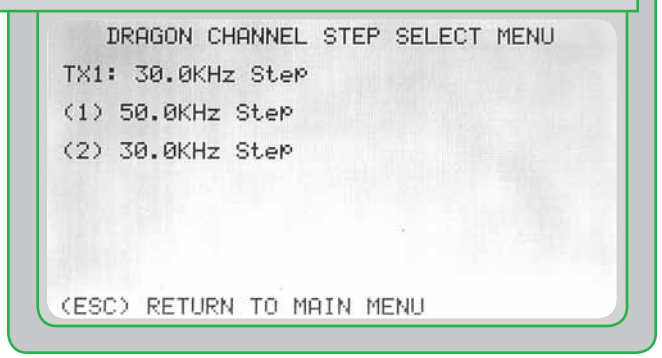
TRANSMITTER CHANNEL STEP

For DRAGON transmitters that are dual step capable, use the 6 and 7 option to select the transmitter channel step.

NOTE: Pressing the 6 or 7 key has no effect for single step transmitters.

DRAGON CHANNEL STEP SELECT MENU





TX1: 30.0KHz Step

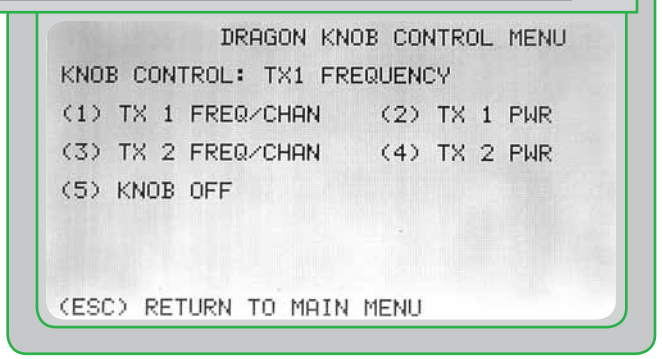
(1) 50.0KHz Step

(2) 30.0KHz Step

(ESC) RETURN TO MAIN MENU

In this example, transmitter 1 is currently set for a 30 kHz step. To change this transmitter to a 50 kHz step, press the 2 key. The currently selected step is always displayed on the second line of the screen. Pressing the ESC key returns in the main menu with the step last displayed in effect.

DRAGON KNOB CONTROL MENU



Pressing the 1 key in the main menu selects the DRAGON knob control menu.

KNOB CONTROL: TX1 FREQUENCY

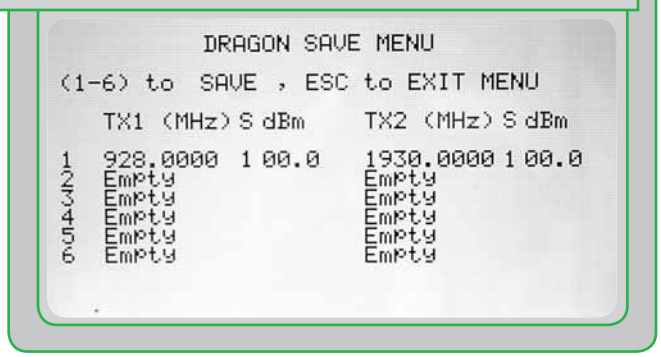
(1) TX 1 FREQ/CHAN (2) TX 1 PWR

(3) TX 2 FREQ/CHAN (4) TX 2 PWR

(5) KNOB OFF

(ESC) RETURN TO MAIN MENU

Options 1-5 are used to set which parameter is controlled by the FREQUENCY/POWER KNOB in the MAIN SCREEN. Use option 5 (KNOB OFF) to prevent un-intended knob movement from turning off a transmitter. If only one transmitter is installed in the DRAGON, options 3 and 4 are not available. Press the ESC key to return to the main menu with the last knob option selected in effect.



DRAGON SAVE MENU

(1-6) to SAVE, ESC to EXIT MENU

	TX1 (MHz)	S	dBm	TX2 (MHz)	S	dBm
1	928.0000	1	00.0	1930.0000	1	00.0
2	Empty			Empty		
3	Empty			Empty		
4	Empty			Empty		
5	Empty			Empty		
6	Empty			Empty		

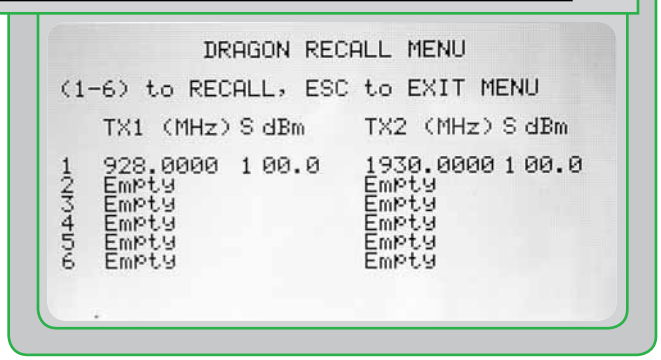
Use the SAVE MENU to save the current settings of both transmitters for later recall. Up to 6 settings can be saved. To save the current main screen settings in one of the six slots, press digit key for the number of the slot to save the settings in (1-6). Unused slots are labeled “Empty”. The Step (S) column indicates which channel step has been saved. Use the main menu 6 or 7 option to see what the transmitter step options are. Single step only transmitters always display a “1” in the S column.

When the settings have been saved, press ESC key to return to the main screen.

To make a row “Empty”, press the CLEAR key followed by the number of the row (1-6) to make empty.

NOTE: Entry into this menu will cause any RF output to be turned off. Saving settings in this menu has no effect on the TX RESUME feature.

DRAGON RECALL MENU SCREEN



DRAGON RECALL MENU

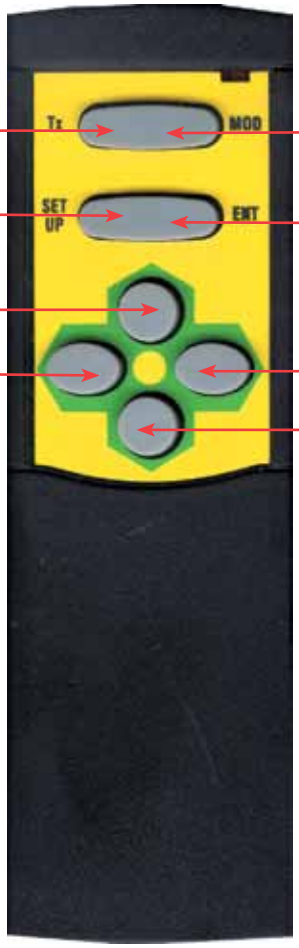
(1-6) to RECALL, ESC to EXIT MENU

	TX1 (MHz)	S	dBm	TX2 (MHz)	S	dBm
1	928.0000	1	00.0	1930.0000	1	00.0
2	Empty			Empty		
3	Empty			Empty		
4	Empty			Empty		
5	Empty			Empty		
6	Empty			Empty		

Use the RECALL MENU to restore settings of both transmitters. Up to 6 settings can be recalled. To recall a setting, press the digit key to the left of the settings (1-6). After selection, DRAGON will return to the main screen. Recalling "Empty" slots is ignored.

NOTE: Entry into this menu will cause any rf output to be turned off.

DRAGON REMOTE CONTROL



TX- same as top panel TX1 - use to turn on and off transmitter 1

MOD- same as top panel TX2 - use to turn on and off transmitter 2

SETUP- same as top panel ESC key - use to enter the main menu

ENT- same as top panel ENTER key - use to initiate the entry mode

UP- increment the currently highlighted digit when in the entry mode

LEFT- same as CLEAR key in entry mode (backspace 1 digit)

RIGHT- use to test remote sensor

DOWN- decrement currently highlighted digit when in the entry mode

When the remote is used to turn on a transmitter, a one second 2kHz tone is emitted. When used to turn off a transmitter, a one second 500Hz tone is emitted.

The remote control has a maximum range of 50 feet.

REMOTE CONTROL SENSOR

Connect the remote control sensor cable to the RJ11 jack on the rear panel of the DRAGON labled "REMOTE". Use the RIGHT arrow on the remote to test the distance and orientation of the sensor. Each time the right arrow button is pressed on the remote control the DRAGON will emit a tone.

DRAGON FIRMWARE V1.06 DUAL EAMPS ADDENDUM

Frequency Display:
All frequencies from 824.01 thru 893.97 can be tuned using the knob or by manually entering.

Channel Display:
Reverse and Forward EAMPS channel numbering is displayed. The channel band is displayed as an "R" for reverse, "F" for forward to the right of the channel number. To enter a channel number, enter the 4 digit portion of the channel number and press enter. The display will next highlight the "band" character (R or F). Press the "0" key to toggle the band, then press enter to move on to power. Use the remote "up arrow" key to select forward band, the "down arrow" key selects reverse band when the band character is highlighted.

When changing between frequency and channel display, the current frequency MUST be within either the forward or reverse EAMPS band. There is no channel display between 849.0 and 868.98 MHz.

EAMPS CHANNEL NUMBERING

CHANNEL #	REVERSE FREQUENCY	FORWARD FREQUENCY
990	824.01	869.01
.	.	.
.	.	.
1023	825.00	870.00
1	825.03	870.03
2	825.06	870.06
.	.	.
.	.	.
799	848.97	893.97

BVS Dragon Controller (v1.00)

Application Software

PC Requirements
Pentium II
500 MHz
64MB RAM
100MB free on Hard Drive
Serial Port between COM1: and COM4:

Introduction

The Dragon Controller application software is the Windows 95/98 interface that enables a user of the BVS Dragon Transmitter to control the unit for desired performance.

Certain operations such as modification of frequency and transmit power can be accomplished by using the Dragon Controller software.

The following sections outline the operation of the Dragon Controller in greater detail.

Application Overview

The Dragon Controller application mimics the display panel for the Dragon. The status is reported from the Dragon and updated on the PC display. Different commands can be sent to the Dragon from the software to control certain parameters of the transmitter.

The main menu contains three different submenus. The first submenu is FILE. The user may exit the application from this submenu.

The final submenu is HELP. In this submenu, this user manual can be brought up. The About box, displaying version information, is also available.

The main screen of the Dragon Controller can be seen in Figure 1. In addition to the status being updated in the display, the Xmit simulated LED will light up during a transmit condition for either transmitter.

The status bar of the Dragon Controller displays unit information such as the calibration date, the serial number, the owner, and firmware version. The frequency range for each transmitter and the PC system clock are also displayed.

The individual features of the application software are discussed in the following sections.

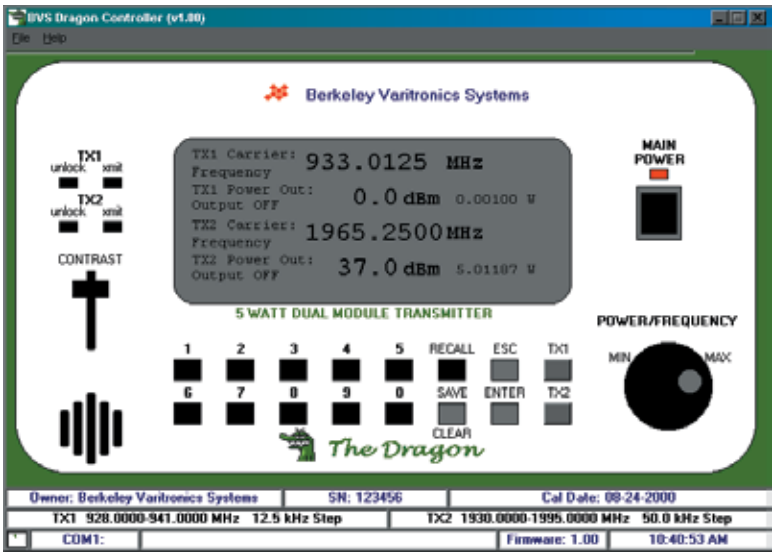


FIGURE 1 – BVS Dragon Controller

Installing the Application

The application is installed by placing the CD provided into an appropriate drive. If the CD's main program does not come up within 15-20 seconds, run AUTORUN.EXE from the root directory on the CD. From the main screen, select PC Software/Drivers. Choose the Dragon Controller button and InstallShield will prompt for further installation questions. After the installation is completed, an icon will be created in the folder specified during the installation process.

Starting the Application

Make sure that the Dragon is running and connected to a serial port on a PC using the cable packed with the unit. Clicking on the Dragon Controller icon starts the Dragon Controller application. When the PORT screen appears, choose the port to which the Dragon is connected.

When the main screen appears, check the status bar for verification that the connection was made to the Dragon. There should be a circle in the lower left-hand corner of the screen which is spinning if data is being received. You are now ready to control the Dragon.

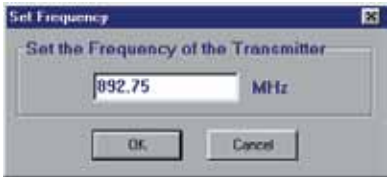


FIGURE 2 – Update Frequency Dialog

Setting the Frequency

Clicking once on the frequency in the display box may set the frequency of the Dragon. The dialog box in Figure 2 then appears. Enter a frequency in the range of the Dragon and click OK. Within a couple of seconds the status will reflect the new frequency. If the frequency selected is between channels, the Dragon will correct to the nearest channel. NOTE: If the Dragon is transmitting, the frequency will not be updated.

FIGURE 3 – Update Power Dialog

Setting the Power

Clicking once on the power in the display box may set the power of the Dragon. The dialog box shown in Figure 3 appears. Enter in a power in the range of the Dragon and click on OK. Within a couple of seconds the status will reflect the new power output setting. If the power selected is out of range, the Dragon will correct to the nearest valid power value. NOTE: If the Dragon is transmitting, the new power value will not be accepted.

Transmission

Transmission may be started or stopped by using the two buttons provided on the application main screen labeled TX1 and TX2. Dragon allows for both transmitters to work simultaneously.

Glossary of Acronyms

AC	Alternating Current
A/D	Analog to Digital converter
AGC	Automatic Gain Control
Applet	a small Application
BER	Bit Error Rate
BPSK	Binary Phase Shift Keying
BW	Band Width
CDMA	Code Division Multiple Access (spread spectrum modulation)
DC	Direct Current
D/A	Digital to Analog
dB	decibel
dBm	decibels referenced to 1 milliwatt
DOS	Digital Operating System
DSP	Digital Signal Processing
FIR	Finite Impulse Response
GHz	GigaHertz
GPS	Global Positioning System (satellite based)
GPS diff.	GPS error correction signal which enhances GPS accuracy
IF	intermediate frequency
I and Q	In phase and Quadrature
kHz	kiloHertz
LCD	Liquid Crystal Display
LO	Local Oscillator
Mbits	Megabits
MHz	MegaHertz
modem	modulator/demodulator
PC	Personal Computer
PCS	Personal Communications Service (1.8 to 2.1 GHz frequency band)
PN	Pseudo Noise
QPSK	Quaternary Phase Shift Keying, 4-level PSK
RF	Radio Frequency
RSSI	Receiver Signal Strength Indicator
UCT	Universal Coordinated Time
VAC	Volts Alternating Current
VGA	Video graphic