326-G DIGITAL VFO

Congratulations, you have just purchased a very unique and precision instrument. This unit contains a VFO, Digital Computer, Frequency Counter, and a 5 digit LED display. Its function is to generate a stable variable frequency, compute and display the resultant transmit or receive frequency.

By understanding what it does and how to use it will result in maximum satisfaction. Carefully read the instructions and you will have little difficulty in getting your new VFO operating.

TECHNICAL SPECIFICATIONS

VFO Frequency Range-----7 to 25 MHZ on fundamentals, 14 to 50 MHZ on 2nd harmonic.

Tuning Ratio----------10 : 1 vernier on Coarse, and Fine controls. 500 KHZ may be tuned on any band.

High/Low Switch---------Shifts any selected frequency up 400 KHZ, allowing coverage of any band of 900 KHZ.

Display----------MC or KC gives a choice of either 1KHZ, or .1KHZ resolution on display.

Accuracy----------1KHZ in MC position, .1KHZ in KC position.

Counter Range----------5KHZ to 50MHZ, fully programable on 5 digits. X1 or X2 multiplier for harmonics.

Power, Base model-------117 Volts AC@ .1 Amps @ 60 HZ

Power, Mobile model-----10 to 20 Volts DC negative or positive gnd. Either lead may be reversed with out regard to polarity.

Return warranty card with your name and address for warranty coverage. In the event of any new changes or applications, you will be notified.

In the event of any un-usual problems,re-view your work carefully, then contact your nearest serviceman. If none is available, return the unit by Pre-Paid Post with a complete description of the nature of your problem, to Glen Mfg.

NOTE: Novice band, business band, or citizen band is not permitted the use of a VFO to transmit with. Only crystal controlled transmissions are authorized by the FCC on these bands.

If the purpose of the VFO is to monitor the various bands previously mentioned, and a transceiver is used, then the transmitter should be dis-abled or the microphone removed to prevent the possibility of transmitting.

INTRODUCTION

Due to the versatillity of the 326-G, it may be used on almost any type of communication receiver, transmitter, or transceiver.

The frequency counter and display section of this unit can also be programmed to display the actual receive or transmit frequency of almost any receiver, transmitter, or transceiver, or other VFO with out using the VFO section in the 326-G. Note that some types of crystal controlled equipment may not be permitted to have any device connected to the equipment other than the manufacturer installed. If in doubt, check with your FCC field office.

When used as a straight frequency counter, the 326-G will accurately measure the output of a transmitter or signal generator up to 50 MHZ to an accuracy of + or - 100 HZ.

The secret of the 326-G having such a wide range of versatillity is in the programmable frequency counter section. Not only will it measure frequency, it also performs mathematical operations on the frequency such as addition, multiplication, division. Over 20 space age integrated circuits are combined to perform the clocking, gating, strobe,latch, and load functions necessary to generate this kind of sophisticated logic. This is the first time that a consumer oriented product of this nature has ever been introduced.

APPLICATIONS

The 326-G may be connected to a standard broadcast radio, short wave set, police band monitor, WWV receiver, Sonar systems, Loran,or Radio direction finding systems to accurately measure, display, or tune the various frequenceis in. Due to the sophisticated strobe circuitry, and high frequency clock circuits used, no parasitics will be introduced that could upset the most delicately balanced system.

As a service aid, the 326-G has the ability to substitute an accurate high level signal for driving frequency synthesizers, mixers, buffers, and dead RF front ends for those troublesome dogs that come along occasionaly in the repair of 2 way radios.

For the CB radio shops, the 326-G provides an excellent means of monitoring your customers equipment to determine if they are on frequency within the specified tolerance set by the FCC, over the air with out having to bring them in to the shop!!

For the advanced Amateur, an in-expensive CB radio can be converted to an excellent 10 meter transceiver by removing one crystal, and pluging in a 326-G. With a little more effort, it will also make a good 15, or 20 meter rig.

In pruning an antenna to a specific frequency, a 326-G makes an ideal signal source for determining lobes, bandwidth, front to back ratio, and side rejection.

As an aid in the design of various types of transmitters, receivers, and amplifiers. The broadband, high level output with its own built in frequency meter makes it a natural for breadboarding or proto typing a piece of equipment.

FIRST TIME OPERATION

HOOKING UP POWER LEADS

With a mobile unit, connect the 2 leads to 12 Volts DC. Either lead may be positive or negative since the leads are not polarity conscious. For the AC unit, just plug it in to a 117 Volt outlet.

CHECKING OUT UNIT

Turn power switch on. Turn standby switch on, note the display frequency of 5 digits. If unit hasn't been programmed yet, display should be all zero's with standby switch off.

With the standby switch on, and display switch on MC display should show 2 digits with a decimal followed by 3 more digits. Example: 13.718

Put display switch to KC and note display shows 4 digits with a decimal followed by 1 more digit. Example: 3718.0

Switch multiplier switch from X1 to X2. Display should almost double.

When Hi/Lo switch is switched from Lo to Hi, display should increase approximately 400 KHZ.

Turn coarse control from extreme counter clockwise position to extreme clockwise position (10 revolutions). Frequency should increase at least 500 KHZ. Similarly turn fine frequency control and note a frequency change of at least 5KHZ.

Rotate band switch from position #1 thru position #6, frequency should increase several MHZ on each position.

SETTING VFO OUTPUT FREQUENCY

The frequency leaving the VFO is independant of the counter, and program functions. But to make sure the VFO frequency is measured correctly, all PRESET switches must be set so display reads zero when standby switch is off. Also, multiplier switch must be in X1 position, and display switch in MC position. In summary, put multiplier in X1, display to MC, and PRESETs to "0" to measure and set VFO frequency. Turn standby switch to on, and set VFO frequency.

To set VFO frequency, turn BAND switch to the nearest desired frequency, then adjust FREQ SET to bring it in to the desired frequency. If the FREQ SET doesn't have enough range, it may be necessary to turn the BAND switch to the next position.

EXAMPLE: Desired VFO frequency is 12.365 MHZ. Set MULTIPLIER to X1, DISPLAY to KC, all PRESETs to "0", standby switch on.

Set BAND switch to frequency nearest 12.365 MHZ on display, then adjust FREQ SET to bring frequency in to desired setting.

In setting the VFO frequency, it is not necessary to set it precisely. After unit has been programmed, it may be necessary to re-adjust the FREQ SET to obtain the desired operating range. In the previous example, anything from 12.300 to 12.400 would be close enough.

PROGRAMMING DISPLAY

In programming the display, we are simply adding human intelligence to what is feeding the display. To get this intelligence into the display, we use 4 switches for each digit in the display.

Remove the top cover and notice that there are 5 blocks of switches, each containing 4 minature switches on them. Each of these switch blocks controls the displayed digit directly in front of it.

The 4 minature slide or rocker switches are set to add any number from 0 to 9 to the digit in front of it. The switch combinations for each number is listed below under DIGITAL SETTINGS. To set these switches, the standby switch should be off killing the VFO so it does not interfere with the display.

DIGITAL SETTINGS

To add a number from 0 to 0 to a displayed digit, first set all 4 minature slide or rocker switches to on, then

For a	1 - Set 4 off	For a	6 - Set 2,3 off
"	2 - " 2 off	"	7 - " 2,3,4 off
"	3 - " 2,4 off	"	8 - " 1 off
"	4 - " 3 off	"	9 - " 1,4 off
"	5 - " 3,4 off	"	0 - " 1,2,3,4 "ON"

NOTE: Standby switch must be off when setting these switches.

In addition to the previous digit settings, the display can show letters also:

For	E - Set 1,2,4 off	For	P - Set 1,2,3 off
"	H - " 1,3 off	"	L - " 1,3,4 off
"	I - " 4 off	"	- " 1,2 off

If all switches are off, the digit will be dark. Simple words like "HELLO", "HELP", "LOOP", etc., can be displayed.

PRESETS

This term refers to the 5 digits that will be added to the display using the 5 blocks of minature 4 gang switches.

EXAMPLE: Suppose that we wanted to set up a PRESET of 35.976. Place the standby switch off then:

Set	extreme	left	switch	block	for	a	3,	by	turning 2,4 off
"	2nd	switch	block	from	left	for	a 5,	"	" 3,4 "
"	3rd	"	"	"	"	"	9,	"	" 1,4 "
"	4th	"	"	"	"	"	7,	"	" 2,3,4 off
"	5th	"	"	"	"	"	6,	"	" 2,3 off

The display should now show 35.976, which is the preset number that will be added to the VFO frequency when the standby switch is turned on. If the VFO frequency was 12.365 before we programmed the PRESETS, the display would show 48.341 (35.976+12.365) .

PROGRAMMING THE 326-G FOR A SPECIFIC RADIO

To program for a specific radio, first we set the VFO frequency, then program the display.

In order to do this we must determine what the VFO frequency is to be, and what the presets are to program the display.

Let's take the VFO frequency first. Assume that we have a crystal controlled Citizens Band radio. Select a crystal that controls more than one channel on both AM, and SSB. Normaly they run in groups of 4, like 1 to 4, 5 to 8, etc. Lets assume that this crystal we select controls channels 1 to 4 and has a frequency of 11.705 MHZ.

The VFO frequency would then be 11.705 MHZ. If we desire to run the VFO on Channel # 1 whose frequency is 26.965 MHZ, then the PRESETs would be 15.260 (26.965 - 11.705 = 15.260). If we wanted to run the VFO on Channel # 4 whose frequency is 27.005 MHZ, the PRESETs would then be 15.300 (27.005 - 11.705). Just as easily, we could run the VFO on Channel # 23 by determining the crystal for that channel and then computing the PRESETs.

Once the PRESETs are set, the display will accurately show the received frequency , even though the receive frequency is tuned to 29.000 MHZ or any other frequency, by the VFO. If used as a transceiver, this would also be the transmit frequency. Note; Only a properly licensed operator, and station may transmit at these frequenceis.

To set the VFO refer to the section "SETTING VFO OUTPUT FREQUENCY". For calibration of the display PRESETs refer to the section "PROGRAMMING DISPLAY".

TO DISPLAY KC INSTEAD OF MC

All previous instructions have refered to setting the display switch to MC which is a display of MHZ. For increased accuracy of the display, the display switch can be put in the KC position. As an example in the MC position we may have a display of 28.965 MHZ, but in the KC position the display would be 8965.0 . Notice that all the digits have been shifted to the left one position and we have lost the 2 since there are only 5 display's, but an extra digit of tenths has been picked up on the extreme right.

If PRESETs have been set for MC, they will have to be reset for KC.Like the display, they will have to be shifted to the left one position and a "0" added to the right side. Example; If presets had been 12.345 in the MC position, they would be 2345.0 in the KC position.

MULTIPLIER

If the desired VFO frequency is larger than 25 MHZ, or if the Radio doubles or triples the frequency, the MULTIPLIER must be set to X2.

EXAMPLE # 1: If receive frequency is 28.965 MHZ, and crystal frequency is 38.868 MHZ. Then VFO must be set to ½ of 38.868 MHZ or 19.434 MHZ, and MULTIPLIER to X2.

EXAMPLE # 2: If receive frequency is 28.965 MHZ, and crystal frequency is 19.434 MHZ but doubled to 38.868 MHZ. Then VFO must be set to 19.434 MHZ, and MULTIPLIER to X2.

EXAMPLE # 3: If receive frequency is 28.965 MHZ, and crystal frequency is 12.946 but tripled to 38.868 MHZ. Then VFO must be set to ½ of 38.868 or 19.434 MHZ, and MULTIPLIER to X2.

In all 3 of the previous examples, the PRESETs would be 90.097. (128.965 - 38.868 = 90.097) Notice that 38.868 can not be subtracted from 28.965, and a "1" was added to the 28.965 making it 128.965.

MULTIPLIER actualy multiplies the incoming frequency by 1 or 2 before it gets to the frequency counter. Also it cuts the range of the coarse control making it easier to tune when in the X2 position.

326-G AS A FREQUENCY COUNTER ONLY

To use as a frequency counter, a slight modification has to be made. Remove top cover and observe the green wire coming thru a grommet from the bottom of the chassis and soldered to the right hand side of the rear of the circuit board (as viewed from the front).

Cut this wire about an inch back from the circuit board, and solder the wire just cut that connects to the circuit board to the center post of the VFO output jack. This wire is the input to the frequency counter and connects to the circuit board at a solder tab marked RF which has one end of a small 68 ohm resistor connected to it.

This modification will not affect the operation of the VFO or the frequency counter.

To use the frequency counter section with out the VFO feature, place the standby switch off which kills the VFO.

When using as a programmable frequency counter connected to an external VFO, or other equipment, program the display the same as you would using the internal VFO except it will not be necessary to set the internal VFO section.

EXAMPLE: Suppose we have a transceiver operating at a receive frequency of 28.965 MHZ, controlled by an internal VFO operating at a frequency of 18.265 MHZ. The presets would be (28.965 - 18.265) set to 10.700. The display would show 28.965 which would be the transmit and receive frequency.

If we wanted to use the 326-G as a straight frequency counter, the PRESETs would be set to zero, standby switch off, and MULTIPLIER to X1. Then simply connect in any frequency source to the VFO output jack such as a signal generator, loosely coupled transmitter, etc,.

Minimum drive to counter section should be not less than .2 volts or more than 5 volts.

For measuring transmitter output frequencies, a special cable may be made up so the counter can be put in line with the antenna coax.

This cable should be as short as possible and made up using a type of sheilded coax cable. Take a PL-259 connector and place a resistor of 1800 ohms rated at 2 watts inside of the connector. Solder one end of the resistor to the center pin of the connector. Solder the center conductor of the coax to the other end of the resistor, and the outer braid of the coax to the outside metal body of the connector.

Put a TEE in line with the antenna coax, and screw the special connector to the TEE and plug the other end in to the VFO output jack.

Essentialy we have placed a limiting resistor in series with the coax center conductor to sample a small portion of the transmitter power (less than .05 watts). This resistor is ample for power levels up to 15 watts. It should be increased to 10,000 ohms at 2 watts for power levels of 100 watts. See Fig. #1,and Fig. # 7.

CONNECTIONS TO EQUIPMENT

Included with the 326-G is a small 75 ohm coax cable with an RCA plug on one end, and a BALUN matching transformer. This is to connect the 326-G to the equipment. The coax should be kept as short as possible, if it is longer than 30 inches a slight loss in receive or transmit may be noted.

The braid should be stripped back 1 ½ inches and soldered to the metal case of the equipment. This is the ground connection to the 326-G and should be a good clean solid connection. It may require a 150 watt solder iron , so be careful that the center conductor of the coax does not get soft and short to the braid with the heat.This ground connection must be not more than 4 inches from where the BALUN connects in.

The BALUN transformer has 2 enamel coated wires coming out of one end. These wires should be cut not more than 2 inches long. Scrape the last ½ inch of the enamel coated copper wires untill the enamel is off and the ends are clean and shiny. Solder one of the copper wires to the ground where the braid was connected. Solder the other copper wire to the center conductor of the coax. These copper wires must not touch or short out to each other where they have been scraped or soldered.

The other 2 wires coming out the other end of the BALUN is to be connected to the equipment. The yellow wire should be connected to chassis ground. This is the metal chassis on a tube type set. On a transistor type set, this would be the printed circuit board ground. The little square metal cans on a printed circuit board are always grounded to the printed circuit board ground.

Caution, do not confuse the "CASE" ground with the printed circuit board ground. On a transistor set they are totaly different.

If a crystal is to be removed and replaced with the 326-G VFO, then the red wire will connect to the hot side of one of the crystals where the crystal was removed from, see Fig. # 2. It will be noticed that one of the methods of hook up uses a toggle switch, one of the minature types with a double pole double throw is suitable. If the switch is used, it should be mounted as close as possible to the crystal deck.

Generaly,for most types of equipment, the two wires from the balun may be connected directly to the two points where the crystal was removed from.

In the event, that a warbling sound is received, or the voice is not clear and sounds gravely then the connection in Fig. # 3 will be necessary. This warbling or gravely pitch is caused by the oscillator still trying to oscillate even though the crystal is removed. To eliminate this problem, it is necessary to lift one leg of the feedback condensor that causes these oscillations. However, the circuit will not oscillate when the crystal is switched back in unless the condensor is put back. The circuit in Fig. # 4 will allow you to switch the VFO in or out, and still let the circuit work normaly on all the crystals.

It will be necessary to consult a schematic of your specific radio in order to determine where the feedback condensor is.

If the equipment has a phase lock loop instead of the conventional crystal oscillator, then the circuit in Fig. # 5 should be used.

INSTALLATION HINTS, AND NOTES

Make sure all connections are mechanicaly solid, and soldered with rosin core solder. Acid core solder will cause a green colored corrosion to occur over a period of time that will eat a wire in to.

Use a small 25 watt solder iron around circuit boards and small insulated wires. This will prevent melting the insulation on the wires or softing of the glue that holds the copper foil to the circuit board.

Use a large 150 watt solder iron to solder to the case of the equipment, as the metal will pull the heat away from the iron, and the solder will not melt and flow properly. Always scrape the metal clean with the tip of a screwdriver to remove lacquer coating, or oxide plating where you intend to solder.

It is good practice to clean the tip of your iron off with a damp cloth or sponge, and re-tin the tip of the iron each time you solder. This will prevent burnt rosin or burnt solder from building up and will give you a better solder joint with less heat.

Route the coax cable to the 326-G the shortest distance possible and cut off the excess length. In routing the cable, keep it away from the finals , or other high power RF fields such as a linear amplifier. Most amplifiers are not adequately sheilded and the RF radiation from them can be carried back inside the equipment causing frequency changes.

If the coax cable is to short, it can be lengthened with an additional piece of 75 ohm cable. If the cable is increased by 36 inches, it is possible to lose a little transmit power. This loss will normaly run between 3 to 5 % per foot. The least amount of loss will occur with 75 ohm coax. Do not use audio type cable, as it has the highest amount of loss per foot (20 to 30 %).

Do not locate the 326-G where air conditioners,heaters, or other drastic thermal changes will occur. Un-like crystals, a good VFO will drift as much as 5 to 10 KC with drastic temperature changes. This is most notable in an automobile on a hot day where the windows have been rolled up.However, the unique digital display lets you know instantly exactly where you are at all times. All other types of VFO,s use a pre-calibrated dial, and you can never be sure exactly of your frequency.
Also, the 326-G will never require re-calibration, due to it,s digital processing .

If the VFO is connected to an oscillator that has a tuned circuit, it may be necessary to slightly re-peak the tuned circuit to maintain the same transmit level, that it had.

A VFO has the abillity to extend the range that a radio operates at. If a decrease in performance is encountered below or above the normal operating band, then the equipment may have to be slightly re-tuned to this new band edge.

If distortion is encountered on single sideband, it may be necessary to wire the hook up as in Fig. # 3 or # 4.

Do not hook up the D.C. leads on the mobile unit to the same point that an other device is connected to that draws more than 3 amps.
If the voltage on the mobile unit drops to less than 10½ volts, instabillity may result.

In the event that the 326-G appears to be functioning, but the equipment is not behaving properly. Check the VFO output frequency to make sure it is the actual frequency into the equipment that is needed. Next check the VFO cable to make sure it is plugged in tight.

Then check the cable for continuity or shorts. Occasionaly to much heat is used when the sheild on the coax is soldered to the case, and it melts the insulation on the center conductor shorting it to the sheild. The input copper leads to the BALUN COIL should have continuity, but the red and yellow leads should not. The red lead has a condensor in it that prevents shorting out the circuit it is connected to.

The sheilded braid on the coax cable should only be connected to the actual metal case of the radio, and after it is connected,give it a sturdy tug to make sure it is properly bonded.The yellow lead should only be connected to the actual circuit ground. On tube type sets,circuit ground is also the metal chassis. On transistor type sets, this is the ground foil on the circuit board , the small metal cans on the board is always connected to the ground foil.

ACESSORIES

326-1	Converter unit.	This is required to prevent throwing a carrier on the receiver on 2 piece radios that are not synthesized together. It can also be used to convert a lower frequency to a higher one or conversely. Two of these units can be used to lock a seperate receiver and transmitter together as a single unit controlled by the VFO.
326-1A	Converter unit.	Same as above(326-1)except this is a matched pair with interconnecting cables and displaced in frequency by 455 KC to mate a seperate receiver and transmitter togeteher.
326-2	Amplifier unit.	An amplifier to boost the output of the VFO in the event more drive is required. It can also be used to increase a weaker signal to a level where the frequency counter can measure it.
326-3	Cable,& BALUN.	Extra cable and BALUN COIL for additional equipment.

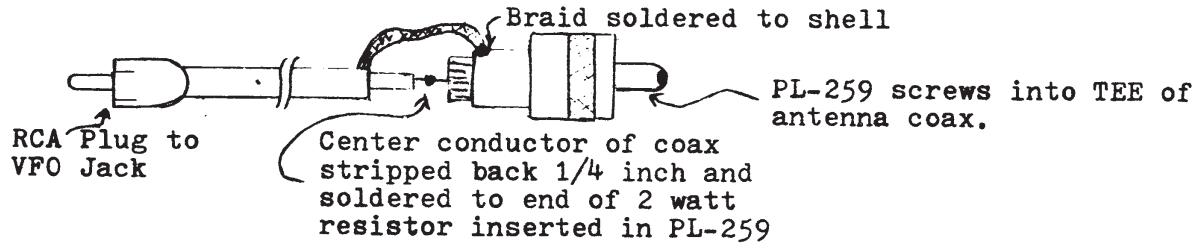
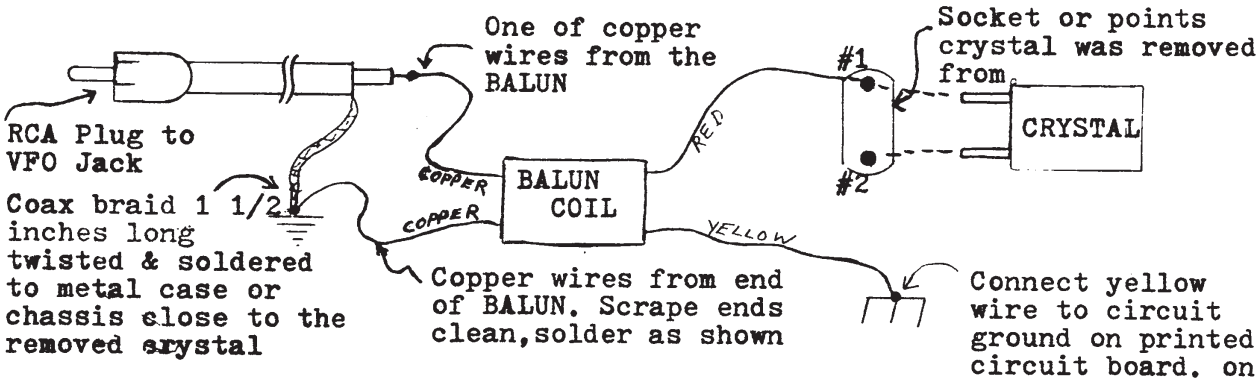
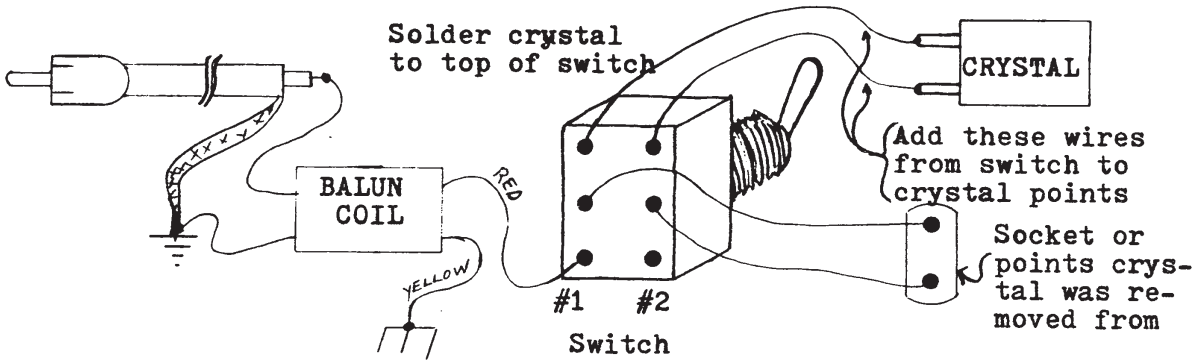


Fig. # 1 Special cable for measuring transmit frequency



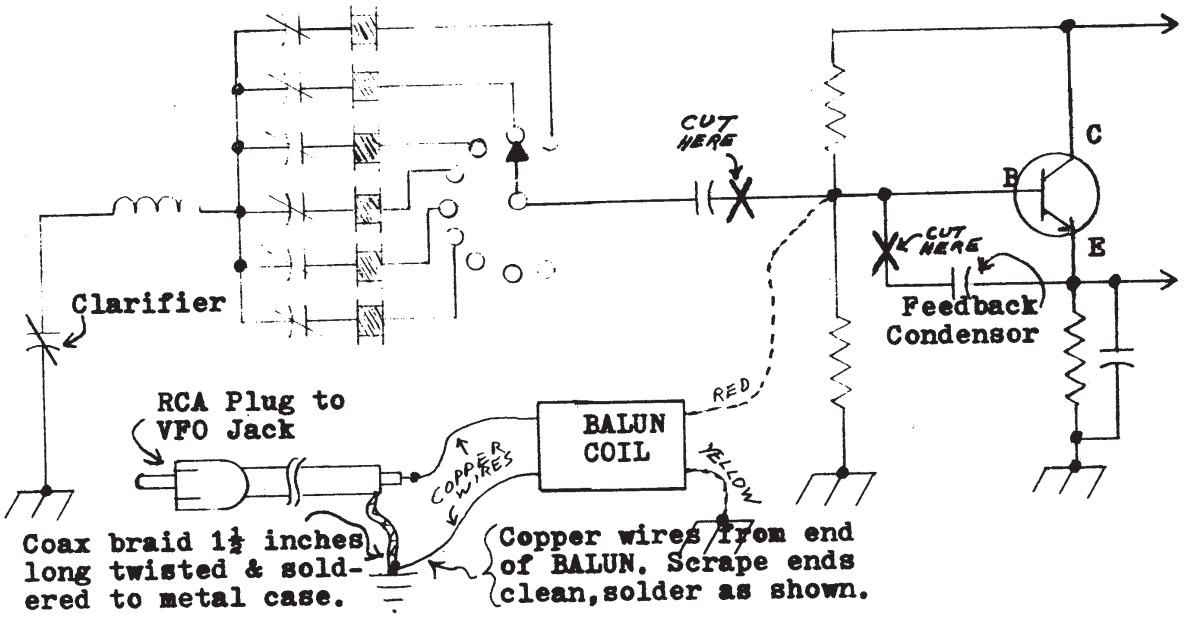
Remove crystal & solder the red wire from the BALUN to either point # 1 or # 2, the one that receives the loudest is the right point to connect to.



Shown above are 2 methods of replacing a crystal with a VFO. Both are identical except the lower circuit uses a switch, when the switch is down, the crystal is switched in and no channels are lost. When the switch is up, the VFO is on and the crystal is swiched out. The circuit with the switch is the preferred method of installation as it assures that the VFO will not affect any of the other channels, or change their frequency.

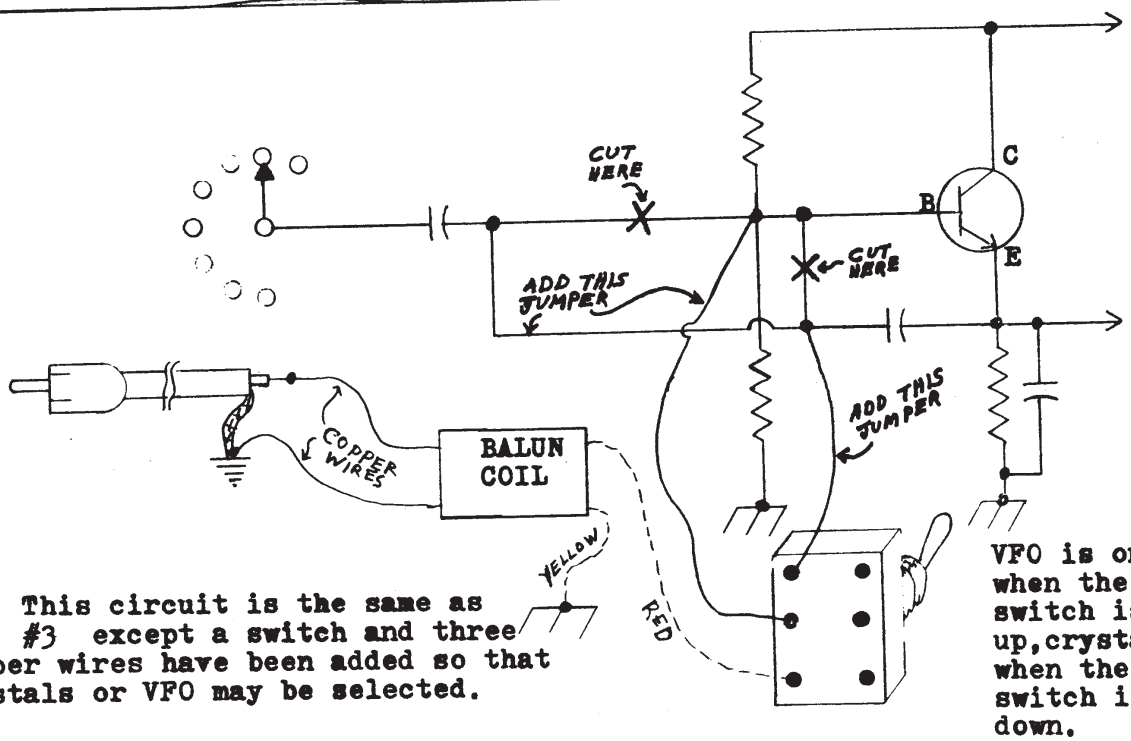
The wires to the crystal points from the switch should be as short as possible, if they are longer than 4 inches they may affect the frequency of the removed crystal.

Fig. # 2 A simple method of replacing a crystal with a VFO.



This circuit is typical of most transistor oscillators used in most transistor radios, there may be a few variations, but the schematic of your radio will point these out. The purpose is to cut one leg of the feedback condensor, to eliminate free running oscillations, and cut the crystals out to eliminate the loading of the balun.

Fig. # 3 Typical hookup to eliminate voice distortion or warble.

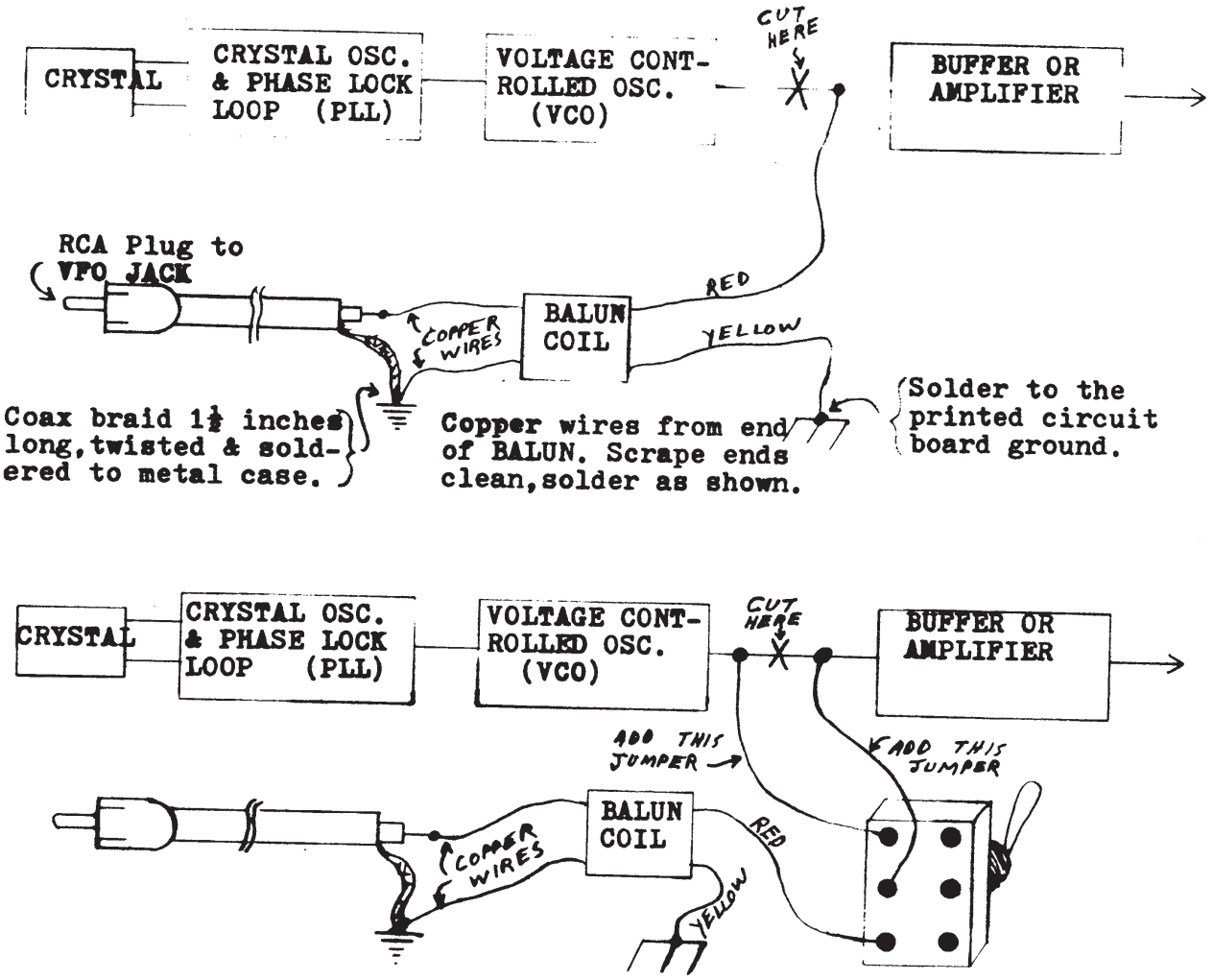


This circuit is the same as Fig. #3 except a switch and three jumper wires have been added so that crystals or VFO may be selected.

VFO is on when the switch is up, crystals when the switch is down.

NOTE: Neither Fig. # 3 or # 4 is necessary unless distortion is encountered. Normaly this is only required on some SSB equipment.

Fig. # 4 Hook up to select VFO or crystals, & eliminate distortion.

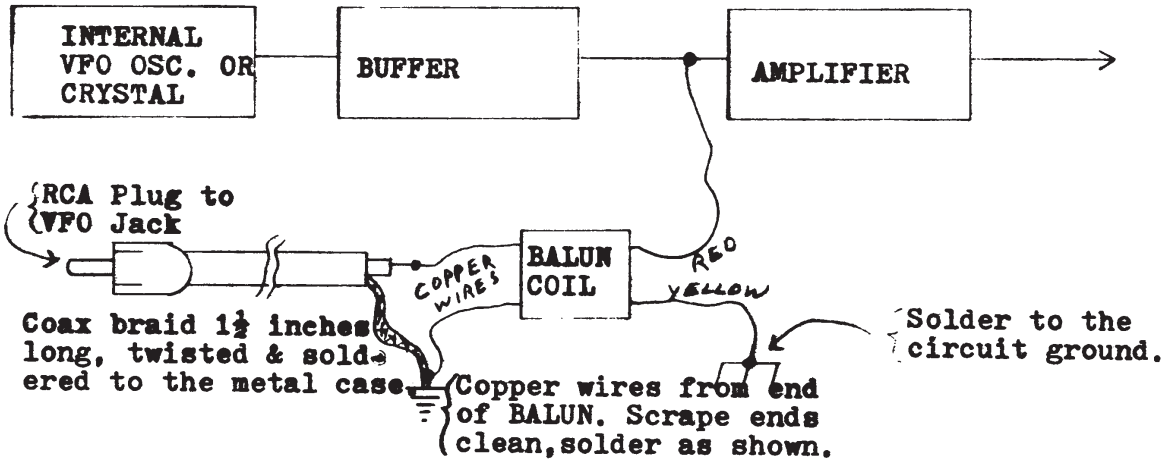


Both of these circuits will work on a phase lock loop system. The lower diagram will allow you to use either the VFO, or the internal crystal controlled channels. When the switch is up the VFO will be on, when the switch is down the normal crystal controlled channels are in.

Basicaly this type of circuit is refered to as a PLL. It's function is relatively simple. A single crystal is used as a reference to compare the phase of the voltage controlled oscillator and set the output frequency of the VCO.

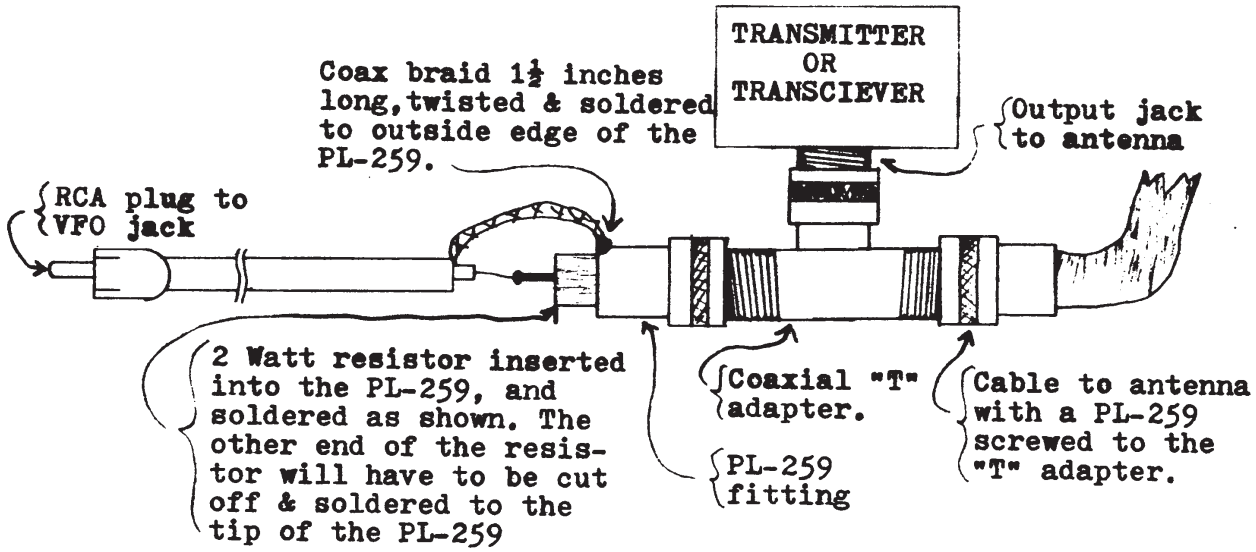
The VFO frequency should be set to the same frequency as the VCO is putting out. The display should be programmed to the difference of the VFO frequency, and the received or transmit frequency. See section on programming, and setting VFO.

Fig. # 5 Typical hook up to Phase Lock Loop system.



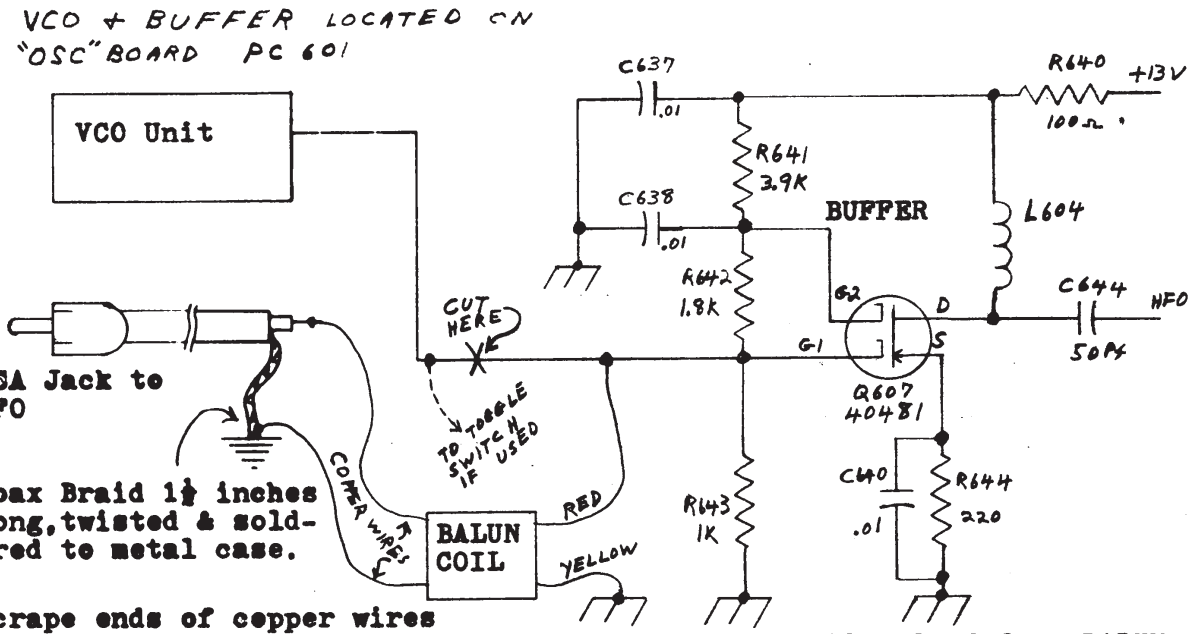
This hook up will let you read the transmit or receive frequency in other equipment with out using the VFO in the 326-G. See section on using as a FREQUENCY COUNTER. Display program is the difference between the VFO frequency and the received or transmited frequency. If the BALUN is connected to a tuned circuit, then a slight readjustment may be required.

Fig. # 6 Connecting the 326-G to monitor a VFO in other equipment.



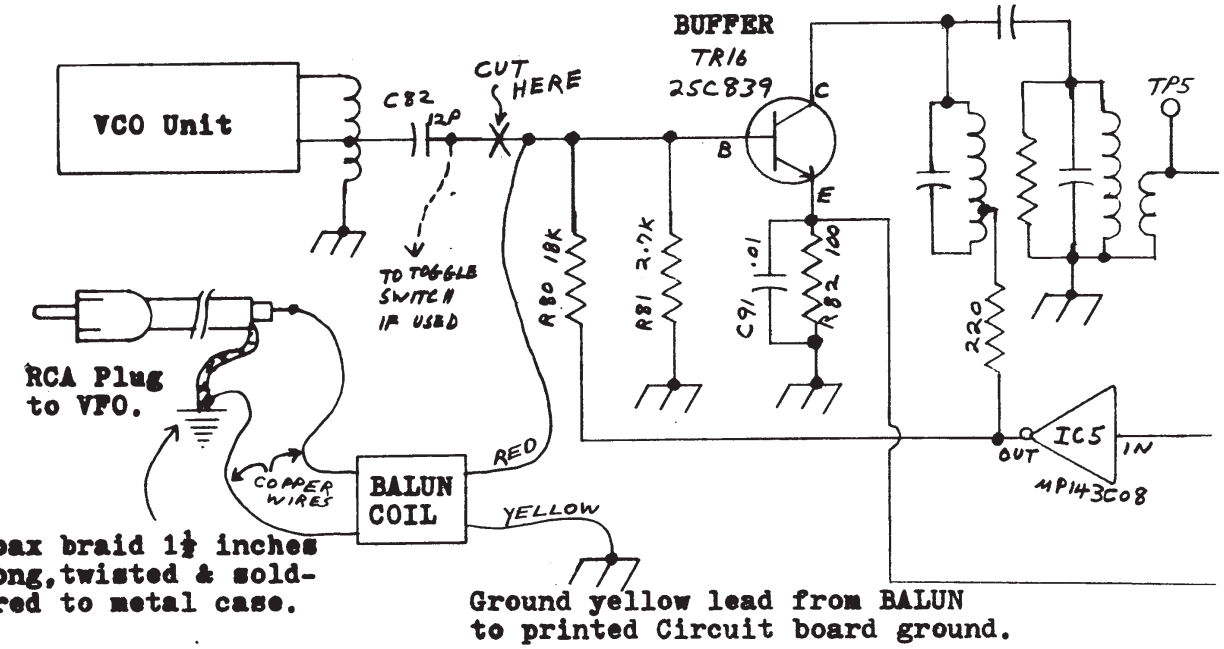
The resistor is to limit the voltage from the transmitter to protect the 326-G frequency counter. The size of this resistor depends upon the wattage of the transmitter. 1800 ohms is ample to levels of 5 watts, 4700 ohms for 50 watts and 10,000 ohms for 100 watts. If the resistor is to high in value for the wattage, the counter will not count, or the count will be somewhat erratic. See section FREQUENCY COUNTER.

Fig. # 7 Hook up to a transmitter as a counter only.



Refer to Fig. # 5 for explanations and switch detail.

Fig. # 8 Hook up for a HY-GAIN 623 SSB (Replaces PLL w/external VFO)



Refer to Fig. # 5 for explanations and switch detail.

Fig. # 9 Hook up for a REALISTIC TRC-57 (Replaces PLL w/external VFO)

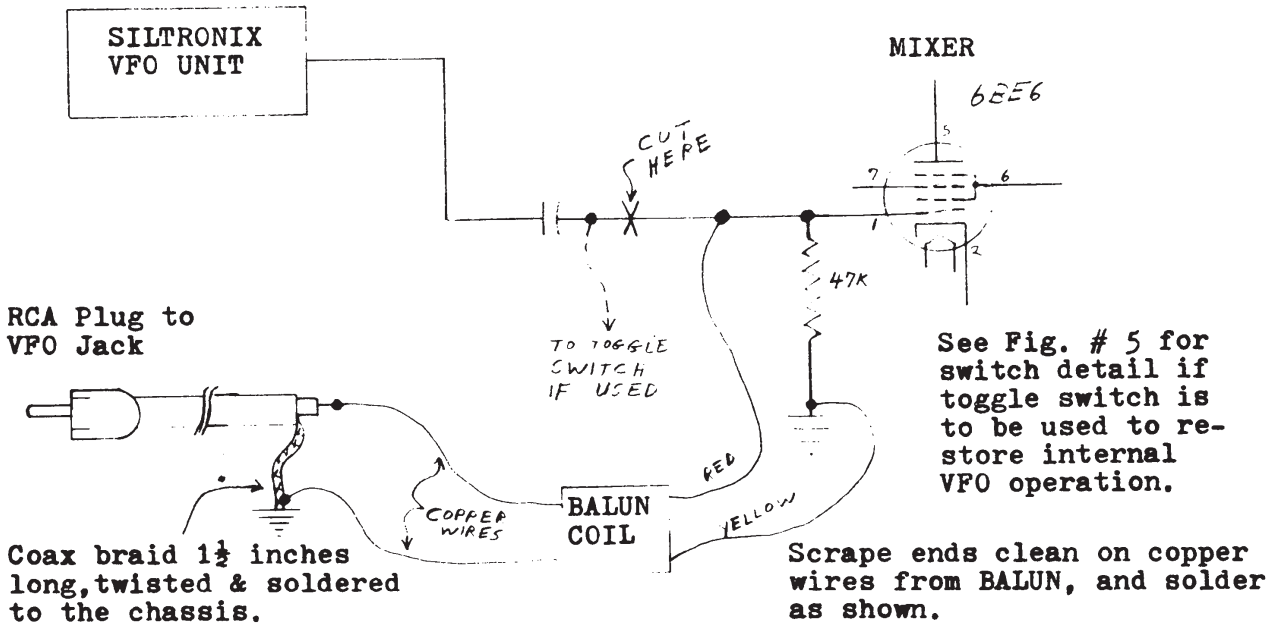


Fig. # 10 Hook up for SILTRONIX 1011B (Internal VFO replaced w/ext. VFO)

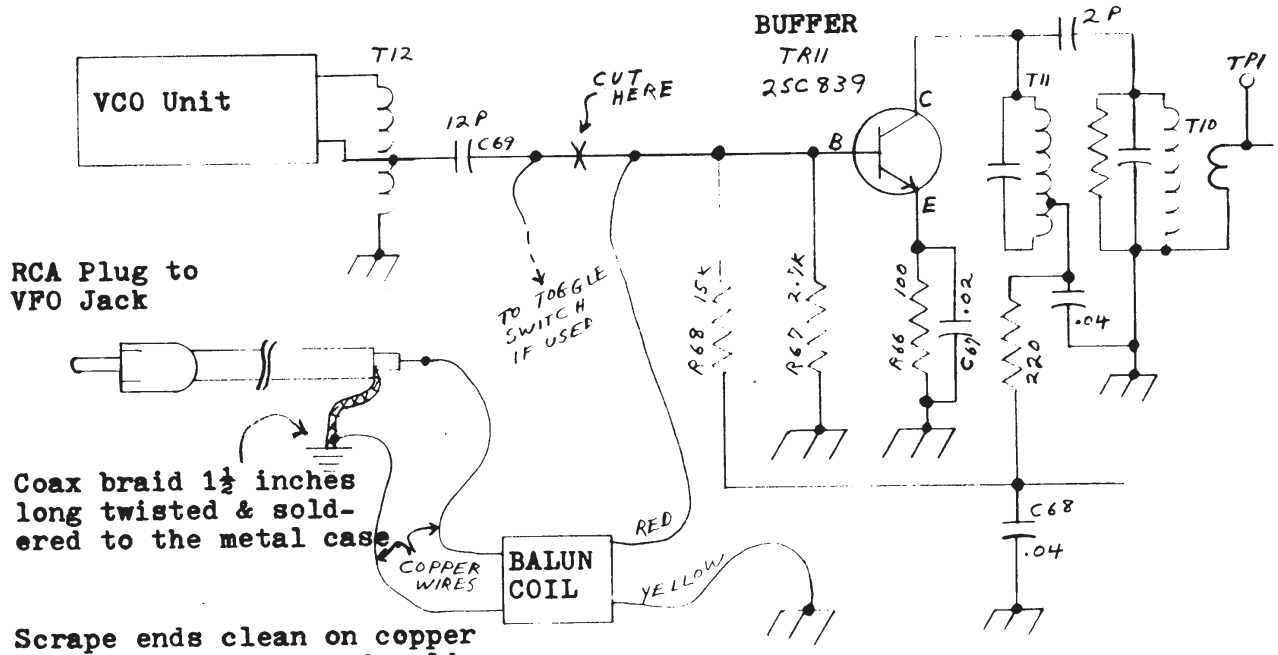


Fig. # 11 Hook up for TEABERRY STALKER TWO (Replaces PLL w/external VFO)

FREQUENCY LISTINGS (Megahertz)

AMATEUR BANDS

1.8	to	2.0	28.0	to	29.7	1215	to	1300
3.5	to	4.0	50.0	to	54.0	2300	to	2450
7.0	to	7.3	144	to	148	3300	to	5925
14.0	to	14.35	220	to	225	10000	to	1050
21.0	to	21.45	420	to	450	21000	to	22000

RADIO CONTROL

26.995	27.045	27.095	27.145	27.195

CIVIL AIR PATROL

26.620

CITIZEN BAND

CHANNEL	FREQUENCY
1	26.965
2	26.975
3	26.985
4	27.005
5	27.015
6	27.025
7	27.035
8	27.055
9	27.065
10	27.075
11	27.085
12	27.105
13	27.115
14	27.125
15	27.135
16	27.155
17	27.165
18	27.175
19	27.195
20	27.205
21	27.215
22	27.225
23	27.255

The listings on the following pages are a broad cross section of Citizen Band radios. If your equipment does not appear on the list,use a similar radio that matches the frequency of the crystal in your equipment.

In the event of difficulty,consult your local communications service shop.

To use the listings, find the crystal in your radio that controls channels 1 to 4 , or chan # 1.

Put the DISPLAY switch in MC, MULTIPLIER switch to X1,and all the PRESETS to display "00.000" with the standby switch off.

With the BAND switch and FREQ. SET, adjust the display close to the frequency listed underSET VFO FREQ. TO,while the standby switch is on.

Turn standby switch off,set PRESETS to display the frequency setting under PRESET SET TO . Put MULTIPLIER to X1 or X2 as shown and turn the standby switch on.

The 326-G is now programed to be used in channel # 1 position of the radio. Once the 326-G is programed to the radio, the frequency can then be shifted to any of the Amateur bands simply by setting the Band switch, and the Freq. set.

Under the heading HOOK UP FIG. # shows the recommended method of connecting the 326-G to the radio, including the newer Phase Lock Loop systems (PLL) . If the frequency of the VCO in a PLL is not known, then subtract the frequency of the crystal filter from the received or transmit frequency, and the difference will normaly be the VCO frequency.

The best method of determining the VCO frequency is to connect the 326-G up as a frequency counter and measure it.

NOTICE

Novice band, business band, or citizen band is not permitted the use of a VFO to transmit with.

Only crystal controlled transmissions are authorized by the FCC on these bands.

If the purpose of the VFO is to monitor the various bands previously mentioned, and a transceiver is used, then the transmitter should be dis-abled or the microphone removed to prevent the possibility of transmitting.

EQUIPMENT & MODEL #	CRYSTAL FREQ.	SET VFO FREQ.TO	PRESET SET TO	MULTI-PLIER	HOOK UP FIG. #	
Aircastle						
JE321, 23-02	37.600	18.800	89.365	X2	2	TUBE
Allied						
A-2569	37.600	18.800	89.365	X2	2	
A-2533	33.165	16.582	93.800	X2	2	
A-2561,2564,2568	16.965	16.965	10.000	X1	2	
A-2567	10.850	10.850	16.115	X1	2	TUBE
Allstate	*SCANNED BY NU0C*					
6562,6563	32.845	16.422	94.120	X2	2	
7531,7535	32.700	16.350	94.265	X2	2	
6554	10.850	10.850	16.115	X1	2	
Amphenol						
777,779	37.600	18.800	89.365	X2	2	
Browning						
'Y' series Eaglette	34.971	17.485	91.994	X2	2	
'X'series Eaglette	18.513	18.513	08.452	X1	2	
SST	16.965	16.965	10.000	X1	2	
LTD	15.965	15.965	11.000	X1	2,3,4	SSB
MARK III,SSB-15	16.270	16.270	10.695	X1	2	TUBE
BROWNIE	11.705	11.705	15.260	X1	2	
MARK II,69T,S23 Golden Eagle	26.965	Use 326-1 Converter unit				TUBE
Buddy						
Base	26.965	Use 326-1 Converter unit				TUBE
Citi-Fone						
SS	22.980	22.980	03.985	X1	2	TUBE
Claricon						
14-523	37.600	18.800	89.365	X2	2	
Cobra (B&K)						
23,27	33.165	16.582	93.800	X2	2	
19,21,29,129, CAM 89	23.290	23.290	03.675	X1	2	
20,24,25,28A,880	16.965	16.965	10.000	X1	2	
132/A,135 (late)	15.965	15.965	11.000	X1	2,3,4	SSB
85	11.805	11.805	15.160	X1	2	
132, 135 (early) 130, 131	11.705	11.705	15.260	X1	2,3,4	SSB
CAM 88,CAM 98	10.850	10.850	16.115	X1	2	TUBE
138/A, 139	8.159	8.159	18.806	X1	2,3,4	SSB
Contact						
CB-23H	37.600	18.800	89.365	X2	2	
Courier (ECI)						
Comet 23,Chief 23 Redball,CCT-4,TR-23 TR-23/B/S,Clipper Classic I,II Traveler I,II Citation	37.600	18.800	89.365	X2	2	

EQUIPMENT & MODEL #	CRYSTAL FREQ.	SET VFO FREQ.TO	PRESET SET TO	MULTI-PLIER	HOOK UP FIG. #
Courier (ECI)					
23,Royale Ranger 23	37.600	18.800	89.365	X2	2 TUBE
Cadet 23,Rebel 23 +	23.290	23.290	03.675	X1	2
Caravelle, II					
Conqueror, II					
Classic III					
Gladiator,Centurion	11.000	11.000	15.965	X1	2,3,4 SSB
Demco					
Satelite Deluxe	37.600	18.800	89.365	X2	2 TUBE
Ravelle 23					
ECHO					
23	37.600	18.800	89.365	X2	2 TUBE
Eico					
Sentinel Pro	37.600	18.800	89.365	X2	2 TUBE
779A	37.600	18.800	89.365	X2	2
Nova 23	15.185	15.185	11.780	X1	2
Fannon					
SFT-700,400,500, 800/A, 900	37.600	18.800	89.365	X2	2
Fanfare 100,880	23.290	23.290	03.675	X1	2
Fieldmaster					
MF-1001	45.8515	22.926	81.114	X2	2
TR-19, 19M,18M	37.600	18.800	89.365	X2	2
Micro Mini 23					
Gemtronics					
GTX-2325	11.705	11.705	15.260	X1	2,3,4 SSB
General Radio					
MC-7,8,9,11	23.509	23.509	03.456	X1	2 TUBE
Super MC-11A	11.7545	11.754	03.456	X2	2 TUBE
Gonset					
23 Channel Deluxe	32.700	16.350	94.265	X2	2 TUBE
Hy-Gain					
Hy-Range I,II,III, IV,672,673	23.290	23.290	03.675	X1	2
Hy-Range V,673	23.330	23.330	03.635	X1	2,3,4 SSB
623 SSB	(PLL)	19.141	07.824	X1	8 SSB
Hallicrafter					
CB-24	37.600	18.800	89.365	X2	2
CB14	10.850	10.850	16.115	X1	2
Hammarlund					
CB-23	25.315	12.657	01.650	X2	2 TUBE
Johnson					
Msgr.124/M,320, 323/M	32.845	16.422	94.120	X2	2

EQUIPMENT & MODEL #	CRYSTAL FREQ.	SET VFO FREQ.TO	PRESET SET TO	MULTI-PLIER	HOOK UP FIG. #	
Johnson						
122,123/A,130 132,223	32.700	16.350	94.265	X2	2	
350	11.905	17.857	91.250	X2	2,3,4	SSB
351	11.700	11.700	15.265	X1	2,3,4	SSB
Kaar						
Skyhawk II,TR-337	31.975	15.987	94.990	X2	2	
Skyhawk I, TR-335	21.955	21.955	05.010	X1	2	
Knight						
KN-2569	37.600	18.800	89.365	X2	2	
KN-2533	33.165	16.582	93.800	X2	2	
KN-2561,2564,2568	16.965	16.965	10.000	X1	2	
Safari I	16.200	16.200	10.765	X1	2	TUBE
KN-2560,2565/B,2567	10.850	10.850	16.115	X1	2	TUBE
Kris						
Valiant	37.600	18.800	89.365	X2	2	
Victor II	34.971	17.486	91.994	X2	2	
23 Plus	23.290	23.290	03.675	X1	2	TUBE
99er,T-23,Vega	23.290	23.290	03.675	X1	2	
Lafayette						
Comstat 23/25, HB-444	40.900	20.450	86.065	X2	2	TUBE
HB-23/A,502A, Micro 23,Dyna-com 23 Telstat 50,150,924	38.275	19.137	86.690	X2	2	
HB-333	37.600	18.800	89.365	X2	2	TUBE
Micro 723,HB-700 Telstat 925,1023	37.600	18.800	89.365	X2	2	
Micro 923	33.000	16.500	93.965	X2	2	
HB-222	25.315	12.657	01.650	X1	2	
Comstat 25/A/B HB-525/A/B/C/D/E/F HB-625/A,Telstat 23 Com-Phone 23	23.290	23.290	03.675	X1	2	
Comstat 35	23.290	23.290	03.675	X1	2	TUBE
Comstat 23, Mark V Comstat 23, Mark VI	16.965	16.965	10.000	X1	2	TUBE
HB-400	16.600	16.600	10.365	X1	2	TUBE
Telstat SSB 50/A SSB 25/A	7.7766	23.330	03.635	X1	2,3,4	SSB
Mark						
Invader 23	37.600	18.800	89.365	X2	2	
Lancer 23	16.965	16.965	10.000	X1	2	
Midland						
13-862B/863/864/865 13-867/869/870/870C 13-872/877/879/887 13-790/862/897B	37.600	18.800	89.365	X2	2	

EQUIPMENT & MODEL #	CRYSTAL FREQ.	SET VFO FREQ.TO	PRESET SET TO	MULTI-PLIER	HOOK UP FIG. #
Midland					
13-795	33.000	16.500	93.965	X2	2
13-765/882/883 13-886/890	23.290	23.290	03.675	X1	2
13-881/B	16.965	16.965	10.000	X1	2
13-873/878/880 13-880B/885	11.705	11.705	15.260	X1	2,3,4 SSB
13-778/845	11.5878	17.382	92.202	X2	2,3,4 SSB
13-893/895	8.159	8.159	18.806	X1	2,3,4 SSB
13-894/896 13-898/B	7.7766	23.330	03.635	X1	2,3,4 SSB
Olson					
CB-88	37.600	18.800	89.365	X2	2
Sidebander II, RA-590	10.850	10.850	16.115	X1	2 TUBE
Pace					
123/A,C123A,130,133	37.600	18.800	89.365	X2	2
Base station,223 TA-2300B,Plus 23 2376/A 'Y' Series 2300	34.971	17.485	91.994	X2	2
'X'Series 2300 Plus 23	18.513	18.513	08.452	X1	2
Sidetalk CB-1023/B	11.700	11.700	15.265	X1	2,3,4 SSB
CBST-23	11.705	11.705	15.260	X1	2,3,4 SSB
Sidetalk 1000M	11.740	11.740	15.225	X1	2,3,4 SSB
Palomar					
skipper 71B	16.265	16.265	10.700	X1	2 TUBE
skipper 73	8.135	8.135	10.700	X2	2 TUBE
Pearce Simpson					
Tiger 23 (early)	38.275	19.137	88.690	X2	2
Tiger 23 (late) Bearcat 23/C,Lynx 23 Bobcat 23/B/C Tiger 23/B/C,Puma 23/B Super Lynx,Pussycat 23 Cougar 23/B	37.600	18.800	89.365	X2	2
Gaurdian 23/B	33.000	16.500	93.965	X2	2 TUBE
Director,CB-23	33.000	16.500	93.965	X2	2
Escort II	32.960	16.480	94.005	X2	2
Cougar 23 (early) Tomcat 23	23.290	23.290	03.675	X1	2
Bengal SSB Panther SSB	11.805	11.805	15.160	X1	2,3,4 SSB
Cheetah SSB Simba SSB	11.000	11.000	15.965	X1	2,3,4 SSB
Penny,J.C.					
Pinto 23/B Golden Pinto	37.600	18.800	89.365	X2	2

EQUIPMENT & MODEL #	CRYSTAL FREQ.	SET VFO FREQ.TO	PRESET SET TO	MULTI-PLIER	HOOK UP FIG. #
Penny, J.C.					
981-6213	23.290	23.290	03.675	X1	2
981-6240	7.7766	23.330	03.635	X1	2,3,4 SSB
Ray Jefferson					
CB-705	37.600	18.800	89.365	X2	2
Raytheon					
Raycom III	16.965	16.965	10.000	X1	2
Raycom IV	11.705	11.705	15.260	X1	2,3,4 SSB
Realistic					
TRX-23A, Americana 23 +	37.600	18.800	89.365	X2	2 TUBE
TRC-23/24/25/40 TRC-23B/49/50/50B	37.600	18.800	89.365	X2	2
TRC-18/29	33.165	16.582	93.800	X2	2
TRC-55/101B	33.050	16.525	93.915	X2	2
TRC-101	33.000	16.500	93.965	X2	2
TRC-24/B/C/30A	23.290	23.290	03.675	X1	2
TRC-47	23.330	23.330	03.635	X1	2,3,4 SSB
TRC-46	7.7766	23.330	03.635	X1	2,3,4 SSB
TRC-57	(PLL)	19.167	07.798	X1	9 SSB
Regency					
CR-142/185/186 Sprint 23	37.600	18.800	89.365	X2	2
Formula 23	23.290	23.290	03.675	X1	2
GT 523	19.005	19.005	07.960	X1	2
CR-123/B	11.805	11.805	15.160	X1	2
Range Gain I,II Imperial I,II	10.850	10.850	16.115	X1	2 TUBE
Robyn					
T-23,J-123,BB-123 TR-123/B/C,WV-23 LB-23,XL-TWO SX-101, GT-VIIB	37.600	18.800	89.365	X2	2
SS-747B	11.705	11.705	15.260	X1	2,3,4 SSB
Royce					
1-600B/602A/606 1-620	37.600	18.800	89.365	X1	2
1-631/635/640	7.7791	23.337	03.628	X1	2,3,4 SSB
SBE					
9CB,11CB,22CB	37.600	18.800	89.365	X2	2
7CB	23.290	23.290	03.675	X1	2
1CB,10CB,21CB Coronado	16.965	16.965	10.000	X1	2
12CB,16CB,18CB	11.700	11.700	15.265	X1	2,3,4 SSB
6CB,8CB,14CB	11.705	11.705	15.260	X1	2,3,4 SSB
Sears					
7531,7535	32.700	16.350	94.265	X2	2
6554	10.850	10.850	16.115	X1	2

EQUIPMENT & MODEL #	CRYSTAL FREQ.	SET VFO FREQ.TO	PRESET SET TO	MULTI-PLIER	HOOK UP FIG. #	
Siltronix						
SSB-23	11.705	11.705	15.260	X1	2	
1011B	VFO	21.465	05.500	X1	10	SSB
Sharp						
CBT-58	23.290	23.290	03.675	X1	2	
Sonar						
J-23	37.665	18.832	89.300	X2	2	
FS-23	16.200	16.200	10.675	X1	2	TUBE
Squires Sanders						
Skipper	37.600	18.800	89.365	X2	2	
Flagship, 23er	22.005	22.005	04.960	X1	2	
Admiral						
Teaberry						
Five X Five,Big T	37.600	18.800	89.365	X2	2	
"T"	23.290	23.290	03.675	X1	2	TUBE
"T" Charlie one	23.290	23.290	03.675	X1	2	
Mighty "T"						
Stalker Two	(PLL)	19.167	07.798	X1	11	SSB
Twin "T"	8.450	08.450	18.515	X1	2	
Tram						
Titan	26.965	Use 326-1 Converter unit				TUBE
Titan II,IIA	13.4825	" " " "				TUBE
Titan III,IV	20.710	20.710	06.225	X1	2,3,4	SSB
Corsair 464						
Diamond 40	16.965	16.965	10.000	X1	2	
XL-100	16.310	16.310	10.655	X1	2	
D201	16.3085	16.310	10.655	X1	2,3,4	SSB
Diamond 60	15.965	15.965	11.000	X1	2,3,4	SSB
Truetone						
MCC4532A-47/-57	37.600	18.800	89.365	X2	2	
MCC4370A-57						
MCC4635A-67	23.290	23.290	03.675	X1	2	
USL						
Contact 23	25.315	12.657	01.650	X2	2	TUBE
Utac						
TR-18M	37.600	18.800	89.365	X2	2	