

W6LVP Amplified Receive-Only Magnetic Loop Antenna
Setup and Operation Guide

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Operation and Instructions

The first step to setup the loop antenna is selection of the location and type of mounting. If the antenna is going to be used in a fixed location, it should be mounted as far from your house and other noise generating sources as possible. In addition, a light-weight rotator is highly recommended to orient the antenna for minimum noise pickup.

For portable operation, I use and recommend a Blackmore Model BJST-60KG DJ speaker support tripod that will raise the base of the antenna to a bit over 6 feet. The speaker tripod is sturdy, collapsible for portability, and accepts the antenna 1" PVC lower tube section. The tripod can be purchased from a variety of sources including Amazon for \$25. The internal diameter of the tripod tube may be too small to accept the lower antenna PVC tube. In that case, use a hacksaw to make two cuts in the lower antenna PVC tube running parallel the tube and running approximately 3 inches from the end of the tube. Two cuts will make four total cuts in the PVC allowing the diameter to shrink slightly and fit inside the tripod upper tube.



Blackmore Speaker Tripod
(Not fully extended)



Channel Master TV Rotator

**** For both portable and fixed operation, the receive loop should be located as far as possible from noise generating sources as far as practical from your transmitting antenna.*

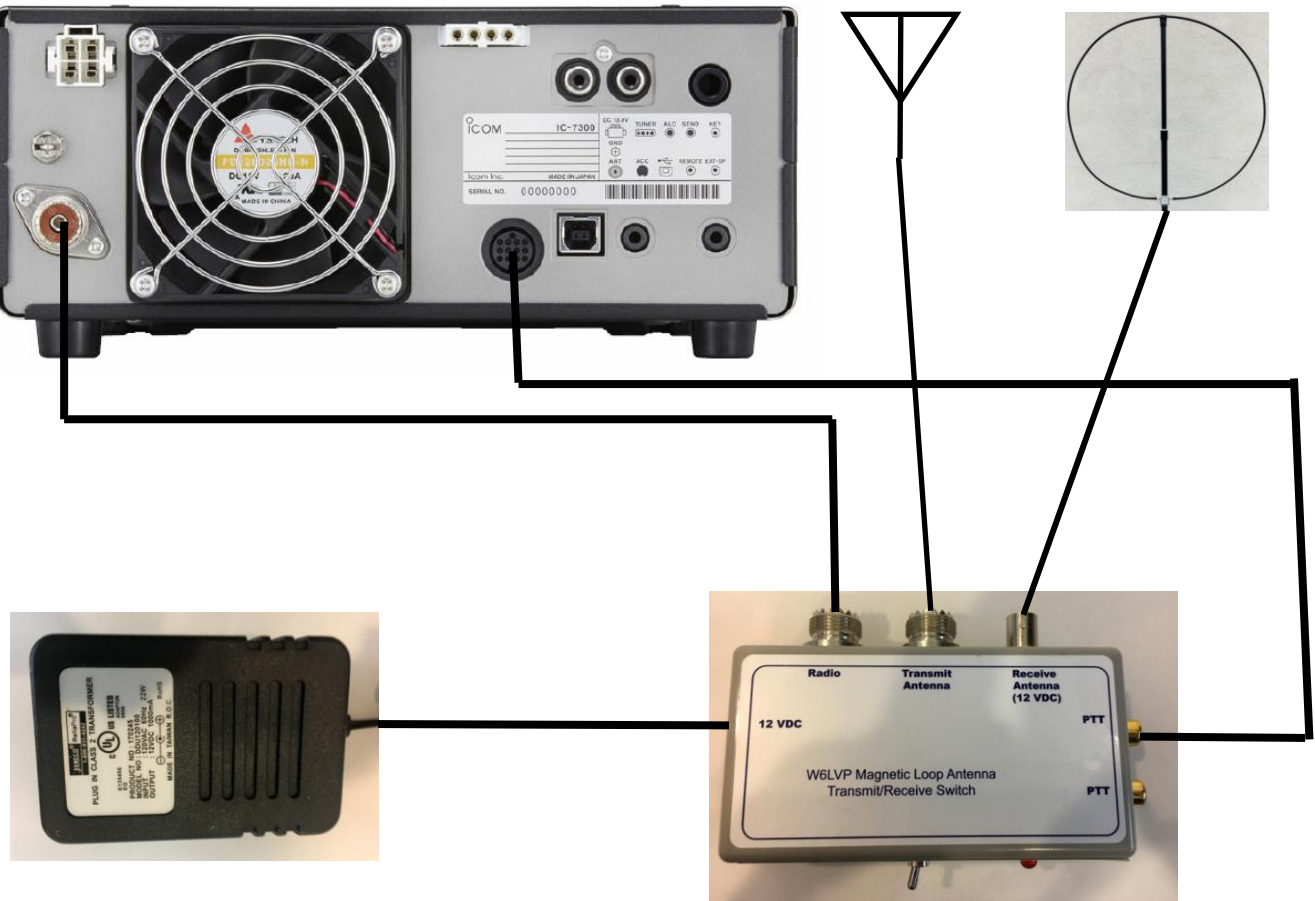
Assembly of the antenna is extremely straightforward. Insert the upper $\frac{3}{4}$ " PVC tube with coaxial cable loop attached into the top of the 1" PVC lower tube section. Connect the two BNC connectors on the ends of the coaxial cable loop to the BNC connectors on each side of the loop amplifier. Insert the lower 1" PVC tube into the top of a rotator, portable tripod, or other similar mounting arrangement. The coaxial cable loop can be adjusted to a round shape which has only cosmetic benefit. Slight deformation of the coaxial cable loop will not affect loop performance.

Coaxial 50-ohm cable with either BNC connectors or other connectors and BNC adapters can be used to connect the antenna to its power source and transmit/receive switch located in the shack.

The transmit/receive switch unit can be operated three ways – (1) using a transceiver without a separate receive antenna input or (2) using a transceiver without a separate receive antenna input and with a transmit power amplifier or (3) with a separate receiver or with a transceiver with separate receive antenna input. Option three could also include a power amplifier.

OPT 1) Using the W6LVP mag loop antenna with a transceiver without separate receive antenna input.

When using the W6LVP magnetic loop with a transceiver not having a separate receive antenna input and without a power amplifier, connect it as follows:



- Connect a short 50-ohm cable with PL-259 connectors between the transceiver antenna connector and the RADIO connector on the transmit/receive switch.
- Connect a short shielded audio cable with RCA plugs (or other connector appropriate for the transceiver) between the transceiver PTT output and either of the transmit/receive switch PTT jacks.
- Connect the transmit antenna coax cable from the transmit antenna to the TRANSMIT ANTENNA SO-239 connector on the transmit/receive switch.
- Using a 50-ohm coaxial cable with BNC connectors or other connectors and BNC adapters, connect the transmit/receive switch RECEIVE ANTENNA input to the loop amplifier output.

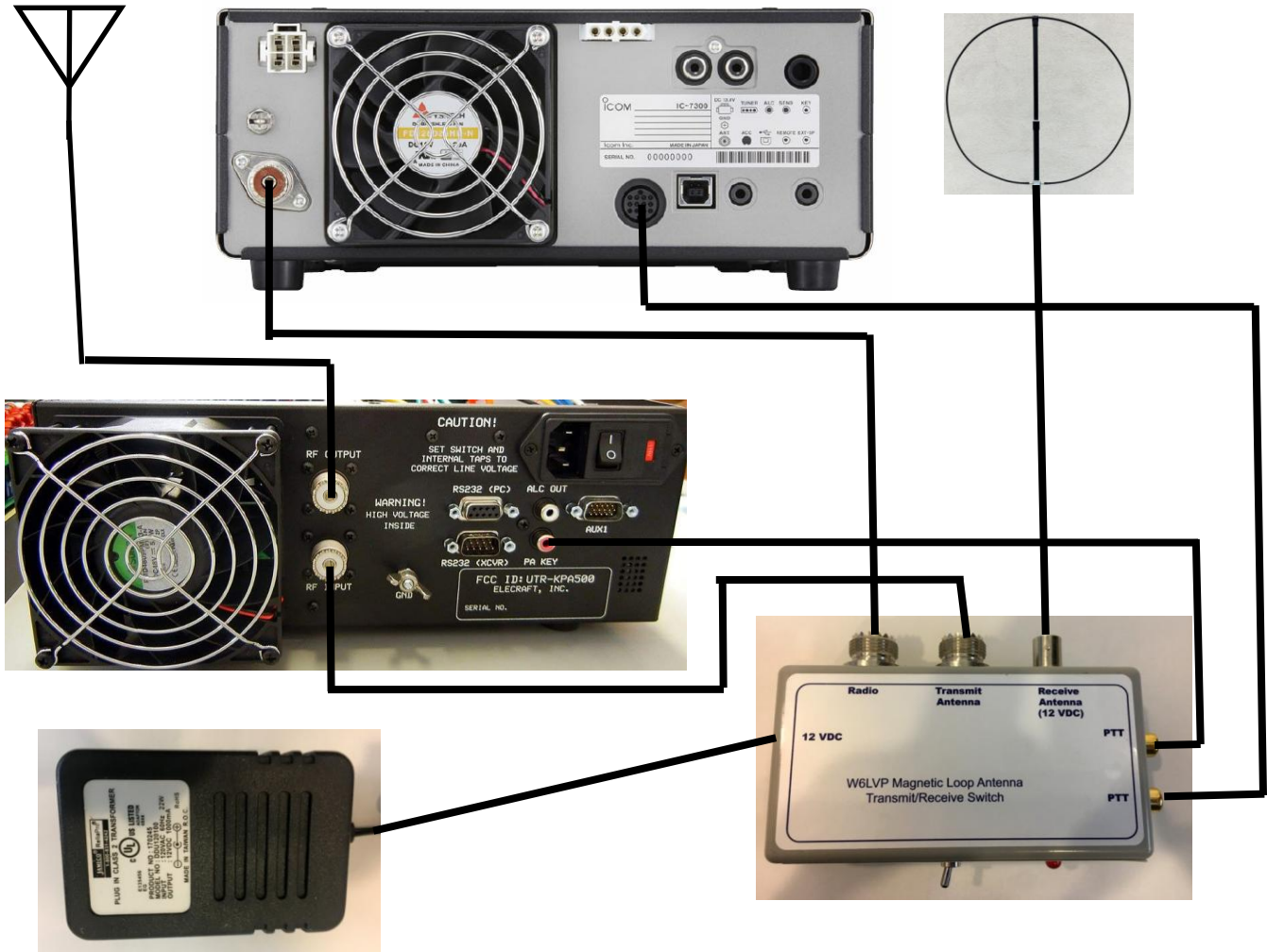
- Connect the 12 VDC power adapter to the transmit/receive switch and turn the power switch to ON. After a short delay, the RECEIVE LED will illuminate.
- Turning the transmit/receive switch power off or removing transmit/receive switch power will force the transceiver to directly connect to the transmit antenna and the receive loop antenna will not be used.
- The red LED on the front of the transmit/receive switch indicates that the switch is in receive mode. When PTT is activated causing transmit or when the power switch is turned off, lack of LED illumination indicates that the switch is in transmit mode.
- If you are using an antenna tuner, it should be placed between the Transmit/Receive Switch Transmit Antenna connector and transmit antenna.

Hint:

The power switch on the Transmit/Receive unit can be used to select your transmit antenna or the loop for receive. Power on with the RECEIVE LED illuminated indicates that your receive signal will come from the loop. Power off with the RECEIVE LED not illuminated indicates that your receive signal will come from your transmit antenna. Particularly if your transmit antenna is horizontally polarized, it is not uncommon for one antenna or the other to have a better receive signal at a given time and on a specific band. You can use the power switch on the Transmit/Receive unit to quickly and easily select the better signal.

OPT 2) Using the W6LVP mag loop antenna with a transceiver without separate receive antenna input and with a separate high power amplifier.

When using the W6LVP magnetic loop with a transceiver not having a separate receive antenna input and with a high-power amplifier, connect the transmit/receive switch between the transceiver and power amplifier as follows:



- Connect a short 50-ohm cable with PL-259 connectors between the transceiver antenna connector and the RADIO connector on the transmit/receive switch.
- Connect a second short 50-ohm cable with PL-259 connectors between the transmit/receive switch TRANSMIT ANTENNA connection and the power amplifier input.

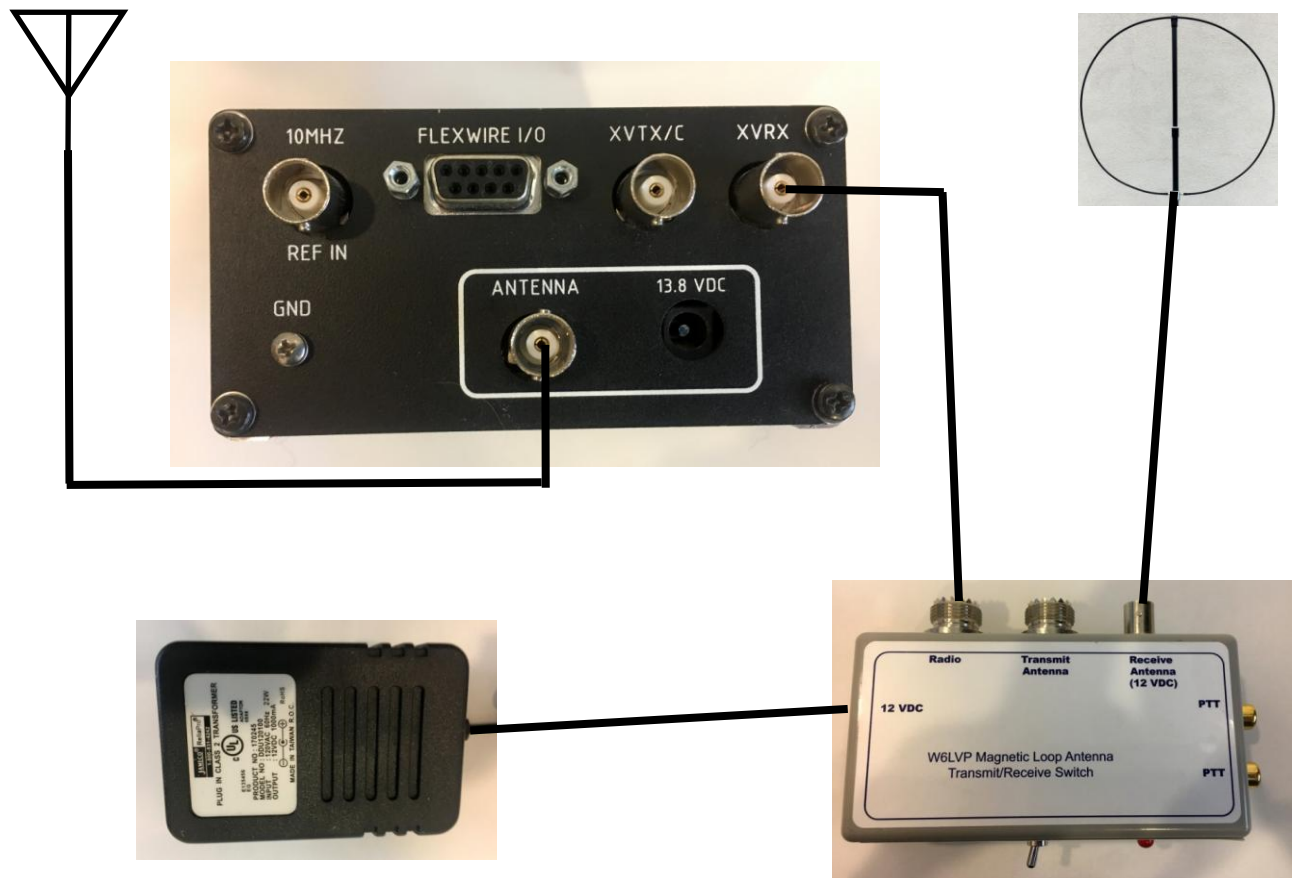
- Connect a short shielded audio cable with RCA plugs (or other connector appropriate for the transceiver) between the transceiver PTT output to either of transmit/receive PTT RCA jacks.
- Connect a short shielded audio cable with RCA plugs (or other connector appropriate for the power amplifier) between the other transmit/receive RCA jack and the power amplifier PTT input.
- Using a 50-ohm coaxial cable with BNC connectors or other connectors and BNC adapters, connect the transmit/receive switch RECEIVE ANTENNA input to the loop amplifier output.
- Connect the 12 VDC power adapter and turn the transmit/receive power switch to ON. After a short delay, the RECEIVE LED will illuminate.
- Turning the transmit/receive switch power off or removing its power source will force the transceiver to directly connect to the power amplifier and the receive loop antenna will not be used.
- The red LED on the front of the transmit/receive switch indicates that the switch is in receive mode. When PTT is activated causing transmit or when the switch is turned off, lack of an LED illumination indicates that the switch is in transmit mode.
- If a lower power transceiver uses an intermediate exciter amplifier before a higher power amplifier, the transmit/receive switch should be placed between the transceiver and the lower power exciter. PTT should be obtained from the transceiver. Some exciter amplifiers have separate PTT input and output with timing to allow the power amplifier PTT keying to be properly timed. The transmit/receive switch should be controlled by transceiver PTT output.
- If you are using an antenna tuner, it should be placed between the power amplifier output connector and transmit antenna.

Hint:

The power switch on the Transmit/Receive unit can be used to select your transmit antenna or the loop for receive. Power on with the RECEIVE LED illuminated indicates that your receive signal will come from the loop. Power off with the RECEIVE LED not illuminated indicates that your receive signal will come from your transmit antenna. Particularly if your transmit antenna is horizontally polarized, it is not uncommon for one antenna or the other to have a better receive signal at a given time on a specific band. You can use the power switch on the Transmit/Receive unit to quickly and easily select the better signal.

OPT 3) Using the W6LVP mag loop antenna with a transceiver with separate receive antenna input or with a receiver separate from the transceiver.

When using the W6LVP magnetic loop with a transceiver having a separate receive antenna input or with a receiver, connect it as follows:



- Connect a short 50-ohm cable with PL-259 connectors between the transceiver receive antenna connector or the receiver antenna connector and the RADIO connector on the transmit/receive switch.
- Using a 50-ohm coaxial cable with BNC connectors or other connectors and BNC adapters, connect the transmit/receive switch RECEIVE ANTENNA input to the loop amplifier output.
- The transmit antenna connections are not used.
- Connect the 12 VDC power adapter and turn the transmit/receive switch power switch to ON. After a short delay, the RECEIVE LED will illuminate.
- Turning the antenna switch power off or removing its power source will disable the receive loop antenna.

- In this configuration, the red LED is a power indicator.
- Transmit/Receive Switch PTT is not used.
- If you are using an antenna tuner, it should be placed between the transceiver transmit antenna connector and transmit antenna.

There is a unique operating situation when using the W6LVP Transmit/Receive switch with a separate receiver.

The W6LVP Transmit/Receive switch includes a circuit to protect the loop amplifier during transmit. Failure of a PTT signal to switch the transceiver output from the receive loop antenna to the transmit antenna during transmit could damage the loop amplifier. The protection circuit senses an RF signal on the RADIO connection and switches the transceiver from the receive loop to the transmit antenna if a PTT signal is not present.

If the receive loop is close to the transmit antenna or the transmit power level is high, the signal on the RADIO connection coming from the loop amplifier can be strong enough to activate the protection mechanism. This can be recognized by a flash or flicker of the RECEIVE LED.

Although this condition will not harm or damage either the loop amplifier or T/R switch, it can be addressed a couple of ways. One option that may not be practical in all cases is to position the loop antenna further away from the transmit antenna. Another option is to use the PTT signal from the transceiver to control the T/R switch and cause it to transition to transmit mode whenever the transceiver is transmitting. Each time the transceiver begins to transmit and asserts its PTT output, the T/R switch will shift to transmit mode and the LED will turn off until the transmission is ended and the PTT signal is removed.

If the antenna is to be used exclusively with a receiver and the Transmit/Receive switch will never be connected to a transmitter, a simple modification can be made to the T/R switch board to prevent the LED flicker. Contact me at jlplummer@vcnet.com for details.

TIPS

Whether manually with a helper or using a remotely controlled rotator, the loop antenna can be oriented either for optimum desired signal reception or minimum noise. Testing has indicated that orientation for minimum noise has the greatest benefit. Noise sources change throughout the day and on different bands making a rotator very handy. There may be cases where the loop can be rotated to separate two stations operating on the same frequency – optimize one and minimize the other.



There is a short delay between the end of PTT assertion and when the transmit/receive switch returns to receive mode. The length of this delay is factory set but if necessary, the length of the delay can be adjusted. Remove the bottom cover of the Transmit/Receive switch and rotate the adjustment screw on the top of the trimpot clockwise to increase the delay time and counterclockwise to reduce it.

Use the electrical tape provided to wrap the loop BNC connectors where they attach to the magnetic loop amplifier. Start wrapping the tape about two inches from the end of the BNC connector and continue wrapping until touching the side of the amplifier. Wrap the tape around the cable in the direction that will cause the BNC connector to tighten.



If for better mounting, you need the length of the bottom PVC tube to be a bit longer, a 1" PVC coupler, a short section of 1" PVC tube for your extension, and some PVC cement from your local hardware store or Home Depot will solve the problem.

If you need to install the antenna so that it is somewhat fixed but also a easy to relocate, I recommend constructing an H-frame support using 1 ¼" PVC tubing. Turns out that the lower 1" PVC tube of the antenna will fit perfectly inside 1 ¼" PVC tubing. I create an "H" base that is 2 to 3 feet square with a PVC tee pointing straight up the center. It needs to be pretty straight in order to make your antenna vertical. I then glue a 4 to 5 foot section of 1 ¼" PVC tube into the H-frame to support the antenna. I make a couple of cuts in the support vertical tube at the top where the antenna will enter so that the tube can be squeezed a bit to clamp the antenna. I then put a hose clamp around the outside of the 1 1/4" tube to keep the antenna from slipping or rotating. An H-frame can also be used to support a rotator.

For super quick and easy portable setup, a short length of pipe or rebar can be driven into the ground to support the bottom of the antenna extension mentioned above.

Use only the supplied 12 VDC linear power adapter or equivalent. Do not use a switching 12 VDC power adapter as it will inject noise into the received signals.

NEVER CONNECT THE TRANSMIT/RECEIVE SWITCH RECEIVE ANTENNA CONNECTOR (BNC) TO THE TRANSCEIVER ANTENNA OR RECEIVE ANTENNA CONNECTOR. THE CABLE FROM THE TRANSMIT/RECEIVE SWITCH TO THE LOOP IS USED FOR BOTH THE RECEIVED RF SIGNAL FROM THE LOOP AMPLIFIER AND 12 VOLTS DC POWER FOR THE LOOP AMPLIFIER. THAT 12 VOLTS DC COULD DAMAGE THE INPUT TO A TRANSCEIVER OR RECEIVER.

NEVER CONNECT THE OUTPUT OF A TRANSCEIVER OR POWER AMPLIFIER TO THE MAGNETIC LOOP AMPLIFIER. THIS ANTENNA IS FOR RECEIVE ONLY.

Optionally, the transceiver should be configured for 20 milliseconds (typical default setting for many transceivers) or greater delay from transmit start (PTT active) to RF output. Although there is a built-in protection circuit in the transmit/receive switch, lack of PTT connection between the transceiver and transmit/receive switch could allow RF from the transceiver to damage the magnetic loop amplifier.

Warranty

All products manufactured by W6LVP are warranted to be free from defects in material and workmanship for a period of one (1) year from date of shipment. W6LVP's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by W6LVP. If W6LVP's products are claimed to be defective in material or workmanship, W6LVP shall, upon prompt notice thereof, issue shipping instructions for return to W6LVP (transportation-charges prepaid by Buyer). Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing. The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation, damaged from severe weather including floods, or abnormal environmental conditions such as prolonged exposure to corrosives or power surges, or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's specifications. In addition, W6LVP's warranties do not extend to other equipment and parts manufactured by others. The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages.

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