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VOR-3 VIDEO OPERATED RELAY

ELECTRONICS

The Video Operated Relay module is designed to control two relays for various applications by sensing the horizontal sync in the applied video. Some of these applications include: basic ATV repeater, link or beacon control, with automatic station identification at the end of a transmission or every 9 minutes during continuous transmission to satisfy FCC Rules, or control of any device that needs to be activated when video is sensed such as remote pause control of a VCR. A SPDT relay is used to switch a transmitter's power supply of up to 6 Amps on upon sensing horizontal sync. The horizontal sync frequency is sensed by a tone decoder whose frequency is set to 15734 Hz +/- 200 Hz by an on board pot using a frequency counter on the 10K test point (TP) resistor. A DPDT relay is used to switch between received video and ID video sources plus an extra set of contacts. The 6 modes of operation are controlled by a specially programmed PIC and selected by an on board digiswitch, panel rotary switch or remotely using 6 of the relay contacts on a DTMF-8 board.

To change modes, turn off power to the board, turn off all modes, turn on new mode then turn power back on. With the exception of the RS-232 mode, you can change modes with the power on, but the new mode will not function until the current mode has completed its full operation. The yellow status LED will flash during power up for about 1 second or stay on if more than one mode is selected.

MODE 1 - RPT, ATV REPEATER

With no video input, the Power relay will be in the normally closed (NC) contact state, the video relay energized in the normally open (NO) contact state and its video LED will be lit. This keeps DC power to the transmitter off and ID video selected. To set the horizontal sync sensitivity pot on the output of the sync separator, apply the minimum weak, snowy video signal you want the repeater to key up on. Slowly advance the pot from full CCW until the Green Sync detect LED lights. When the Sync LED lights the Power relay will switch to the NO contact, its power LED will also light and the video relay switches to the NC contacts. This will enable DC power as well as sending the received video to the transmitter. If the video is continuously applied for 9 minutes, the video relay will switch to the NO contacts temporarily for 5 seconds to ID. When the input video is dropped, the Sync LED will go out, the Video relay LED will go out as the ID video on the NO contacts are switched in but the Power relay NO and its LED will stay on for 20 seconds of transmitter hang time before dropping out.

MODE 2 - VTX, CONTINUOUS TRANSMIT VIDEO

The Power relay will be continuously energized and the NO will make contact regardless of video input. The Power LED will also be on but the video relay will be off in the NC state. This mode is usually used for testing purposes to transmit the received video as long as necessary.

MODE 3 - IDTX, CONTINUOUS TRANSMIT ID

This is the same as Mode 2 except the video relay is energized, video LED on and NC contacts selected to continuously transmit the ID video for testing purposes.

MODE 4 - BEACON

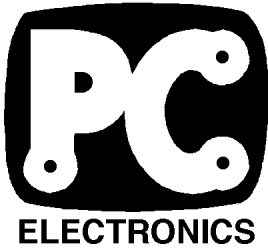
The power relay and its LED will energize and the NC contacts selected initially for 10 seconds and then switch off to the NO contacts for 10 minutes before repeating the 10 seconds on and 10 minutes off beacon cycle. The video relay is continuously energized, NC contacts selected to transmit the ID video and its LED on. Video input has no effect but may turn on the Sync LED if video is present at the input.

MODE 5 - VOR, VIDEO OPERATED RELAY

This is a very flexible mode where there are many different applications that require relay contacts to switch upon sensing video. When horizontal sync is sensed, the Sync, Power and Video LED's will all light within 200 ms and both relays will switch from their NC to NO state. When video is removed the relays will return to their NC state after 100 ms and the LED's will go out. There are then 3 sets of relay contacts that can be used - one 6 Amp and two 1 Amp contact. This mode is good for switching a remote pause control on a VCR or to unquench a speaker on a TV if the video input is connected to either of their composite video outputs.

MODE 6 - RS-232

The power and video relays can be controlled externally by a computer, Basic Stamp or modem with a RS-232 buss if other than the standard modes and timing supplied in the PIC are desired. Mode 6 uses 9600 baud, no parity, 8 data, 1 stop. VOR-3 "G" solder pad connects to a DB9 connector pin 5, "O" connects to pin 2 and "I" connects to pin 3. Sending ss<enter> to find out if sync is being detected returns a 0 if no sync and 1 = sync. Sending id 0<enter> turns off the Video relay and selects the NC contacts. Sending id 1<enter> turns it on and selects the NO contacts. Sending tx 0<enter> selects the NC contact and tx 1<enter> selects the NO contact of the Power relay.

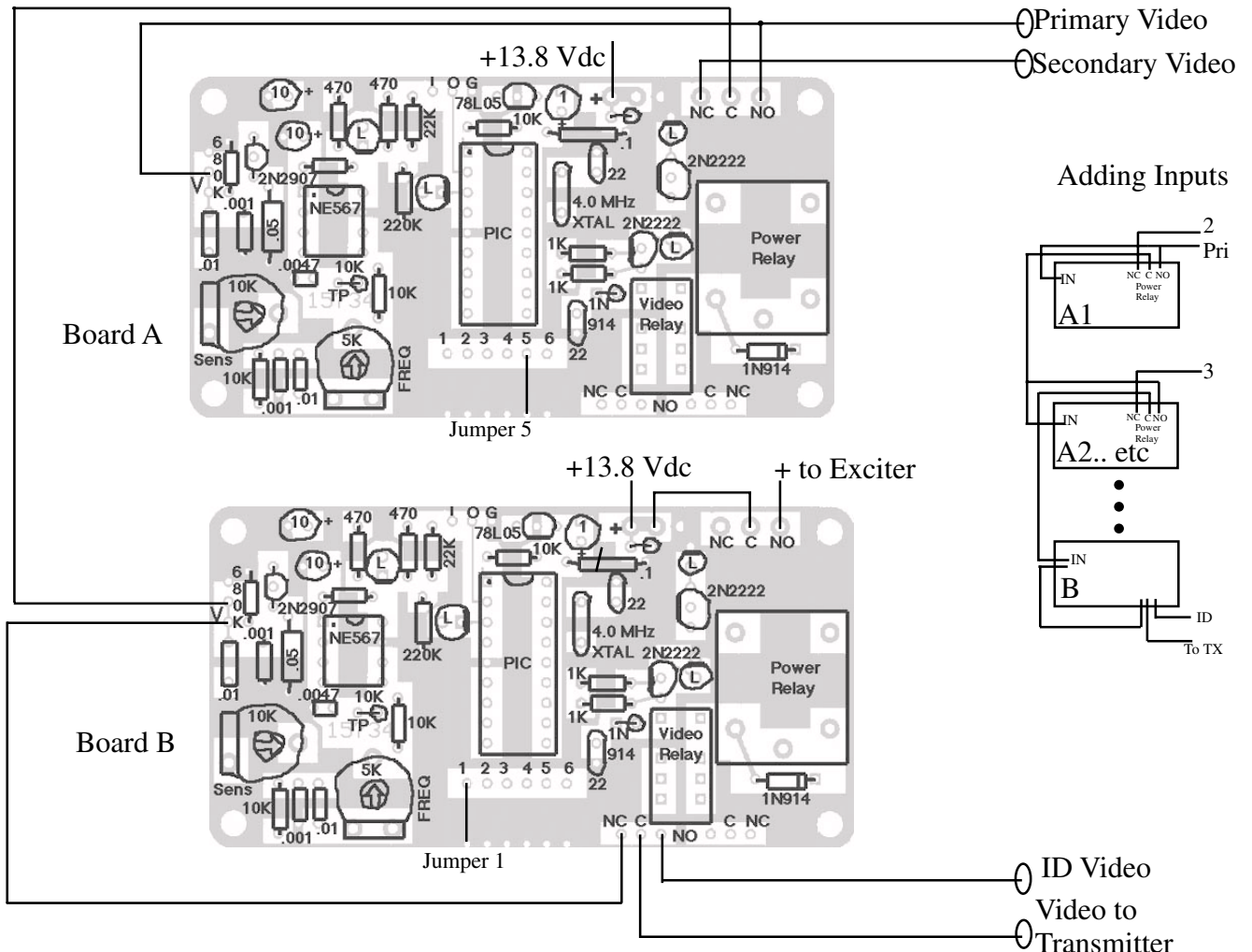


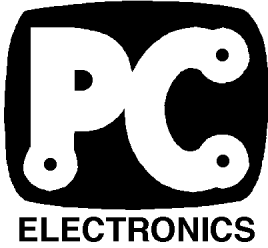
VOR-3 VIDEO OPERATED RELAY 2+ Input ATV Repeater Control App. Note

By Tom O'Hara W6ORG

Some ATV repeaters may want to add a crossband video input or link. This can easily be accomplished with the addition of another VOR-3 board. The primary video input from the ATV repeater receiver will still be switched in when ever anyone comes on, even if the secondary video is on, and the ID timers act normally on board B. The repeater can still be used for normal operation, say during Space Shuttle missions with out manual or remote control of the repeater by a designated control operator - a common complaint. This addition is also great to try out cross band repeating or link by adding the second receiver at an inband repeater site. Actually additional VOR-3's using the power relay as in board A and connected in series between Board A and B will add more inputs in descending priority. However we suggest using the ATVC-4 for more than two inputs.

The two VOR-3 boards are connected as shown below. With no video from either source, the ID video is selected to go to the transmitter video input on board B. When horizontal sync is sensed from the primary video source, both VOR-3 boards activate and the relays select the primary video through the power relay on board A and the Video relay on board B. The A boards have mode 5 selected and board B repeater mode 1. When no primary video is present, but there is secondary video, it is selected and passed on to VOR-3 board B. Either primary video, or secondary video will key board B. Only board B power relay is used to key the transmitter.

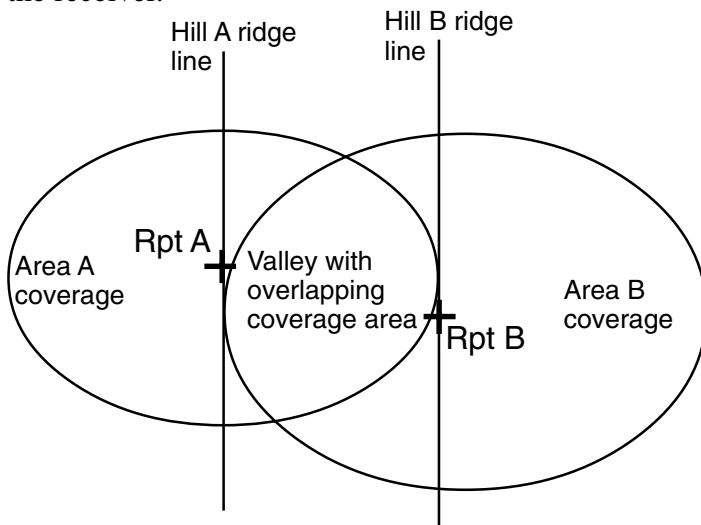




VOR-3 VIDEO OPERATED RELAY ATV Repeater Voting Application Note

Depending on terrain, power, antenna polarity, coordination and other variables, a new ATV repeater may not be able to operate without interfering with an existing one. However, with this voting system, a new repeater can operate in an area with overlapping coverage whenever the primary repeater is not on the air. There is often a problem between adjacent mountain ranges, during inversion skip or for occasional special purpose portable ATV repeaters at public service events.

421.25 MHz is the most popular ATV repeater output frequency because the lower the frequency the farther the line of sight distance given the same transmitter power level, antenna gains, etc. This frequency is also cable channel 57 which allows hams to try ATV by just sticking up an antenna at very little cost. But there can only be one inband ATV repeater on 70 cm in any area since there needs to be at least 12 MHz separation between the input and output frequencies so that the VSB filter attenuation curve is down far enough to keep from desensitizing the receiver.

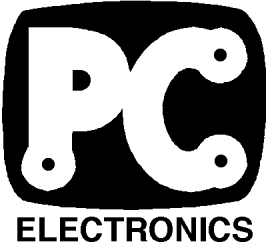


One of the most common scenarios is the interference potential to ATVers in the valley in-between mountain ranges. Those in the valley would be able to receive both ATV repeaters depending on signal strength, beam pattern, etc. They could be working someone on repeater B who is on the other side of the hill when someone in Area A comes on not knowing that if both repeaters come on simultaneously, the person in the valley will receive interference. If Repeater B is coordinated and A is not, then it is A's responsibility to insure there is no interference. The voting system discussed here can allow repeater A to operate legally anytime that repeater B is not on the air.

At the new, or secondary repeater site, a receiver and antenna must be added set to the output frequency of the primary, or existing coordinated ATV repeater - it is OK if this is the same frequency as your repeater output. The receiver does not necessarily have to be an ATV receiver, it can just be a scanner or other low cost receiver that can tune to the frequency and has enough of an audio response to produce some horizontal sync at the speaker output that can be detected by the VOR-3 board. This will allow using 421.25 MHz, or other same frequency, for both repeaters in overlapping coverage areas. If there is just one FM voice or other mode coordinated repeater that could be interfered with, then Board A in the wiring diagram could be replaced with a CTCSS decoder or relay contacts to some kind of carrier operated relay. For more than one other repeater, more receivers and relays could be added but it may soon become impractical.

There may be occasional times when both repeaters will be on because the new repeater is transmitting first and will not be inhibited until the new repeater stops transmitting for 5 seconds. Also the new repeater could be keyed if there is more than 20 seconds when no one is transmitting to the existing ATV repeater.

In any case, it is best to try to work out a co-channel agreement with the owner of the existing coordinated repeater which likely will require that you demonstrate that your new repeater will be inhibited from operating whenever his is on the air and using the same frequency. Many frequency coordinators will coordinate a co-channel repeater in the same coverage area if there is a signed agreement between the two repeater owners. Coordination would protect you from a 3rd new repeater, but coordination is not necessary if your repeater does not come on when someone is using the coordinated repeater. This is a more efficient use of the spectrum.



VOR-3 VIDEO OPERATED RELAY ATV Repeater Voting Application Note cont.

If there are other transmitters at the new repeater site, you will need a single narrow bandpass filter in the antenna line to keep the receiver from being overpowered. It is always good amateur practice to have a bandpass filter in all antenna lines at a comm site to prevent intermod generation and desense. If you use a low cost scanner receiver, you may also have to put it into a shielded enclosure to keep RF from coming in through the plastic case.

When the primary ATV repeater is not on the air, the secondary video is looped through the normally closed power relay contacts on board A before going to the video input on board B. In this state, Board B will operate the secondary repeater normally. When a secondary video comes on, Board A loses its +13.8 Vdc which is connected to the normally closed contacts of board B, thereby making board B inactive. If there is no secondary video and the primary ATV repeater comes on, the board A power relay will open and no secondary video will get to board B and allow it to operate. The primary repeater has 20 seconds after drop out before the secondary repeater can be keyed up to allow some time between transmissions.

