ON THE DARK SIDE OF SEQUENCING

By Marshall Williams K5QE
ON THE DARK SIDE OF SEQUENCING

• EVERYONE IS TOLD “YOU MUST HAVE A SEQUENCER”.

• BUT NO ONE TELLS THEM WHY or HOW TO HOOK THEM UP WITH THEIR RIG.

• WE NEED A GENERAL SOLUTION THAT WORKS WITH:
  • ANY RIG
  • ANY PREAMP & POWER AMP
  • AND NO SPECIAL EXPENSIVE BOXES!
Why Do We Need a Sequencer?

- THE OBVIOUS ANSWER IS TO MAKE THINGS HAPPEN IN THE RIGHT ORDER / SEQUENCE!

- IN ORDER TO PROTECT THE PREAMP, POWER AMPLIFIER, ANTENNA RELAYS AND TRANSCEIVER FROM DAMAGE

- WHAT THINGS NEED TO HAPPEN?
Things That Need To Happen In The Right Order

- SWITCH THE CHANGEOVER RELAYS FROM RX to TX
- SWITCH THE POWER AMP FROM STANDBY to TX
- SWITCH THE TRANSVERTER AND RIG FROM RX to TX
- ALLOW THE SYSTEM TO MAKE RF POWER
Typical Connection Of Changeover Relays

- MAIN T/R RELAYS MUST HANDLE FULL TX POWER

THE RELAYS ARE WIRED AS "ENERGIZE TO RECEIVE". YOU MUST PUT +12V ON THE RELAY COILS TO HEAR ANYTHING.
Sequencer Example using DEMI Sequencer

- Other Models Are Similar In Function

**REAR PANEL-RESTING STATE**

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- N/C
- +12V OUT
- PTT-L
- PTT-H
- AUX
- +12 IN

**ALL CONNECTORS ARE RCA JACKS**
Sequencer Example using DEMI Sequencer

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**ALL CONNECTORS ARE RCA JACKS**
A Few Factoids About RF Relays

- RF RELAYS TAKE TIME TO SWITCH OVER--THIS CAN BE 20ms TO 60ms OR MORE!

- RF RELAY CONTACTS BOUNCE WHEN THEY SWITCH

- IF THERE IS RF POWER PRESENT WHEN THE CONTACTS BOUNCE, THERE WILL BE AN ARC WHICH OVER TIME WILL DESTROY THE CONTACTS

- SO PROPER SEQUENCING WILL SAVE YOUR RELAYS AS WELL AS YOUR PREAMPS, AND POWER AMPS
If You Have A Transverter

- THIS IS ACTUALLY THE EASIEST CASE TO HANDLE
- THERE ARE A LOAD OF CONNECTIONS, BUT THEY ARE LOGICAL AND STRAIGHTFORWARD
- THE MOST IMPORTANT THING IS THAT THE SYSTEM CANNOT MAKE ANY RF POWER UNTIL THE PROPER TIME
If You Have A Transverter

STEP 1. REMOVE +12 FROM THE TWO RELAYS
STEP 2. KEY THE AMP
STEP 3. KEY THE TRANSVERTER

THE MAIN T/R RELAY IS WIRED AS ENERGIZE TO RECEIVE

ANTENNA
MAIN T/R RELAY
PREAMP
PROTECTION RELAY
50 OHM LOAD

PTT IN +12 KEY AMP KEY TRANSVERTER
RELAY COIL GND

YOUR RIG
TRANSGVERTER
YOUR AMP

PTT OUT IF OUT IF IN RX IN TX OUT TX IN QRO OUT
Several Things That Do Not Work

- THIS IS THE MOST COMMON ROOKIE SETUP

- WHAT IS WRONG WITH THIS SETUP?

- WHAT IS THE FAMOUS ICOM SPIKE???
Several Things That Do Not Work

- MIKE OR KEY KEYS THE RIG
- RIG KEYS THE RELAYS
- RELAYS TAKE TIME TO GO TO TX
- POWER COMES OUT IMMEDIATELY WHEN RIG IS KEYED
- PREAMP IS GONE!
- WILL A SEQUENCER HELP?
Several Things That Do Not Work

- MIKE OR KEY KEYS THE RIG
- RIG KEYS THE SEQUENCER
- RELAYS TAKE TIME TO GO TO TX
- POWER COMES OUT IMMEDIATELY WHEN RIG IS KEYED
- PREAMP IS GONE!
The General Rule That Works

- **UNLESS YOU HAVE A TRANSVERTER, THE RIG CANNOT KEY THE SEQUENCER**

- **WHAT YOU WANT IS FOR THE SEQUENCER TO KEY THE RIG AS THE LAST STEP**

- **THIS IS HARDER TO DO THAN ONE MIGHT THINK!**
Want The Sequencer To Key The Rig As The Last Step!

- WE MUST NOT ALLOW THE PTT TO OCCUR FROM ANY PLACE OTHER THAN THE SEQUENCER

- WE HAVE TO INTERCEPT ANY PTT SIGNAL THAT COMES FROM ANOTHER SOURCE & REROUTE IT TO KEY THE SEQUENCER.

- THAT WAY ONLY THE SEQUENCER KEYS THE RIG!
WHERE CAN PTT SIGNALS COME FROM?

- VOX ON SSB
- CW KEY IN “BREAK IN” OR “SEMI-BREAK” IN CW
- PTT BUTTON ON THE MICROPHONE
- COMPUTER SOFTWARE KEYING RIG
  - (THIS COULD BE WSJT, WSJT-X, PSK-31, ETC.)
- THE TRANSMIT BUTTON ON THE RIG FRONT PANEL
Vox Is Evil…Turn It Off!!!

AND DON’T ALLOW GEORGE TO CONVINCE YOU OTHERWISE!!

- CONNECT A FOOTSWITCH TO PTT-L ON THE SEQUENCER. THIS WILL START THE SEQUENCER RUNNING WHENEVER YOU STEP ON THE “FOOTFEED”

- AT STEP 3, THE SEQUENCER WILL KEY THE RIG, BUT THE RF RELAYS WILL BE SAFELY SWITCHED AND THE PREAMP & POWER AMP WILL BE PROPERLY PROTECTED

- SEVERAL COMPANIES MAKE QUALITY FOOTSWITCHES
  - HEIL IS ONE, BUT THERE ARE OTHERS
You Must Not Allow CW Break-In Or Semi-Break-In

TURN THEM OFF !!......WHY??

- BECAUSE THE RIG IS BEING KEYED BY THE CW KEY AND NOT BY THE SEQUENCER

- PUT THE RIG ON CW, PUSH THE FOOTSWITCH AND SEND ALL THE CW THAT YOU WANT

- THE SEQUENCER WILL KEY THE RIG AT STEP 3, BUT THE RF RELAY WILL ALL BE SAFELY SWITCHED AND YOUR PREAMP & POWER AMP WILL LIVE FOR ANOTHER DAY
The Microphone PTT Button is a Bit More Difficult to Intercept!

- WE MUST INTERCEPT THE PTT AND REROUTE IT TO THE SEQUENCER
- SEQUENCER MUST KEY RIG NOT THE PTT BUTTON
- REQUIRES A “BREAKOUT” BOX
Computer Keying Your Rig?

- THIS REQUIRES ANOTHER BREAKOUT BOX
- USUALLY THE COMPUTER IS CONNECTED TO A DIGITAL INTERFACE WHICH IS CONNECTED TO THE RIG BY A RIG SPECIFIC CABLE
- THE IDEA HERE IS TO USE BREAKOUT BOX TO BREAK SIGNAL THAT KEYS YOUR RIG & SEND IT OFF TO THE SEQUENCER.
- RADIO SPECIFIC CABLE MAKES IT EASIER
  - PUT JACK ON BREAKOUT BOX SAME AS ON RADIO
  - PLUG THE DIGITAL INTERFACE INTO THAT
  - THEN PUT A CABLE WITH SAME CONNECTOR FROM BREAKOUT BOX TO RADIO
Computer Keying Your Rig? Cont’d

- NOW RE-ROUTE THE “KEY THE RIG” LINE TO PTT-L ON THE SEQUENCER
- THIS IS WHAT WE DID FOR OUR DXPEDIITION TO THE FALKLAND ISLANDS IN MARCH 2015
What About the Transmit Button on the Radio?

- ABANDON HOPE ALL YE WHO PRESS THIS BUTTON!
  - RF POWER COMES OUT IMMEDIATELY!
  - SINCE THERE IS NO WAY TO INTERCEPT THIS SIGNAL INSIDE THE RADIO..PREAMP IS GONE!

- DON’T DO THIS!!
On the Dark Side of Sequencing

Summary

- I HAVE NOT COVERED EVERY POSSIBLE SOLUTION
- MY GOAL WAS TO FIND SOLUTIONS THAT WORK FOR EVERY RIG AND EVERY PREAMP/POWER AMP.
- THESE SOLUTIONS ARE SIMPLE AND ABSOLUTELY RELIABLE.
- QUESTIONS??
- THANKS & 73
- MARSHALL K5QE