

Theory Of Operation

1) SETUP/KNOCKDOWN (U1A, Q1, Q2, Q3, Q4, Q11 and Q12):

U1A is one half of an IC dual type-D flip flop, an MC14013B. U1A is configured as a data latch. The CLEAR input, pin 4, is wired low. At power-up, the PRESET input of U1A, pin 6, is momentarily taken high via C2 and R9 and causes the "Q" output, pin 1, to go high and the "not-Q" output, pin 2, to go low. The "Q" output is connected to pin 1 of J6 and the "not-Q" output is connected to pin 3 of J6. If JU1 is across pins 1 and 2 of J6, then the repeater will be in the "Set-up" condition at power-up. If JU1 is across pins 2 and 3 of J6, then the repeater will be in the "Knockdown" condition at power-up.

The electronic switch, Q2/Q3, causes the Set-up/Knockdown action by applying or removing voltage at the ignition control, pin 10, of "J3-TX". After power-up, the Setup or Knockdown state may be changed remotely with a signal from pin 4 of "J5-RX" or locally with front panel switch S3. S3 is a momentary contact switch that is debounced by the Q11/ Q12 latch circuit. The yellow "SET-UP" LED, CR3, illuminates to indicate the Set-up state.

As the Setup/Knockdown circuit goes from the Knockdown to the Set-up state, Q1 is momentarily turned on by Q3 via the C1/R2 timing circuit. The push to talk (PTT) input of the "receiver" radio, pin 3 of "J5-RX" is pulled low by Q1 and keys the transmitter. The "COR" LED, CR2, will briefly flash during the moment that Q1 is conducting.

The external alarm input of the "receiver" radio, pin 4 of "J5-RX", is held low by Q4 during the Set-up state. As the Setup/Knockdown circuit changes from Set-up to Knockdown, Q4 turns off. The transmitter of the "receiver" radio will key and send an Emergency Alarm if that feature has been enabled.

2) VOX (Q9):

Any audio signal present at pin 1 of "J1-RX" or pin 11 of "J5-RX" causes Q9 to conduct. This in turn will activate the drop-out delay and push to talk circuitry.

3) COR BUFFER (Q15):

Q15 is a dc amplifier (buffer) for the COR signal from pin 8, through S2-3, or from pin 14, through S2-2, of "J5-RX". The output of Q15 is switched from a low state during inactivity of the repeater to a high state with an active low state for the COR signal.

4) AUDIO GATE (Q6 and Q8):

The audio gate, Q8, enables and disables the audio from the "receiver" radio. The audio input to Q8 is from pin 1 of "J1-RX" or pin 11 of "J5-RX". The output of Q8 is applied to pin 11 of "J4-ACC" and potentiometer, R23. The output of R23 is applied to S2-5 and S2-6. S2-5 will route the audio to the "flat transmitter audio", pin 5 of "J3-TX" and "J4-ACC". S2-6 will route the audio to the "microphone transmitter audio", pin 3 of "J2-TX" and pins 2 of "J3-TX" and "J4-ACC". R23 is used to adjust the "receiver" radio audio output to the proper level for the "transmitter" radio audio input. The audio gate is enabled with an active dc level low at either pin 8 or pin 14 of "J5-RX". The gate can also be hard enabled if S2-7 is closed.

5) DROPOUT DELAY AND PTT (Q5, Q10, U1B and Q7):

The dropout delay circuit uses the second half of U1, the MC14013B dual D flip flop to generate a PTT signal for the "transmitter" radio. The Q output, pin 13, of U1B is low if the repeater is inactive. When an input signal is present at the "receiver" radio, either pin 8 or pin 14 of "J5-RX" will be pulled low and turn off Q15. Q5 will turn on and discharge C3. Q10 will turn on when the voltage across C3 is less than 4.5 Vdc. The output from Q10 pulls the PRESET input of U1B high. The Q output of U1B switches to a high state and turns on Q7. Pin 4 of "J2-TX" and pin 3 of "J3-TX" are pulled low and key the "transmitter" radio PTT. The red "COR" LED, CR2, illuminates.

The dropout delay is generated when Q5 ceases to conduct. Q10 will remain on until the voltage across C3 reaches 4.5 Vdc or greater. S2-10 and S2-11 are used to switch in the appropriate resistance to generate the desired time constant.

S1 on the front panel is used to enable the repeater function and will not allow Q7 to conduct unless it is in the enable (in) position. S1 also interrupts the COR signal from pin 8 or pin 14 of "J5-RX" and the output of the VOX circuit to disable the repeater.

6) REVERSE KEY-UP:

Whenever pin 8 of "J3-TX" goes low, it will pull pin 3 of "J5-RX" low. When the reverse key-up function is being used, as in the bi-directional repeater configuration, S2-3 must be open and no functions can be programmed which will use pin 8 of "J5-RX". A NULL with active LOW STATE on pin 8 will prevent any unwanted reverse key-up.