MOAS Features implemented and not – K1XM

Implemented features

No coax switches needed
       Relays only

Handles all antenna switching
       Controls StackMatch™ and 4-squares
       Works with radios with separate VHF antennas such as IC-706 or FT-857
       Supports 64 antenna selections (62 antennas plus "none" and "dummy load")
       Independent control of 64 relays

Automatic antenna selection
       Only usable antennas are shown
       Non-transmit antennas are only used when no transmit antenna is available

Failsafe
       Will not transmit into a non-transmitting antenna
       Status indicator when on non-transmitting antenna
       Antenna changes only when in receive (hotswitch prevention)
       Two radios on one band, second is connected to dummy load or no antenna

Automatic bandswitch
       Multiple radio types
              Yaesu or LPT port
              Ten-Tec Orion
              Icom analog
       Manual override

Multiband antenna support
       Multiband antennas are available on all bands where they are usable
       Proper handling of tribander stacks with two feedlines
       Bandpass filters selected separately from antennas

Antenna groups
       Rapid switch between antenna systems

Receive antennas
       Different transmit and receive antennas may be selected
       Antennas may be set up as receive-only on any band

SO2R support
       Independent antenna selection for two stations
       Antennas in use on one station are unavailable to other
       Quick swap of antennas between stations

Memory

>Returning to a band gets the last antenna used on that station on that band
>Returning to an antenna group on a band gets last antenna used in that group

Table Driven

>Antennas can be changed without rewriting microprocessor code
>Human-readable data file

Small Size

>Control unit fits comfortably on desktop. It is built into a Ten-Tec TPB45 (6.5" w x 2.5" h x 5.5" d) box.

Low Priority Goals

Field-updatable

>Tables can be loaded from PC using serial connection
>Firmware can also be updated from PC using the same connection

Internationalization

>Non-English antenna names (within the limits of the LCD character generator)

Future Enhancements

Multiple simultaneous antenna systems

Non-Goals

Non-Roman characters

Asymmetric antenna configurations where antennas available to only one radio
>Different band capabilities are supported

More than two stations

SO2R station control

Crossband operation

Transmit inhibit during relay switching (not needed with this design)

MOAS Design Notes – K1XM

Controller and Switch

Two box solution. The controller box goes on the desk, the switch box goes near the relays. They use an RS-232 serial connection for communication.

Antenna Selection

One knob will be used to select between all antennas. This includes selecting antennas of a stack or directions of a 4-square. Only antennas that are usable on the operating band will be offered.

The currently selected antenna will be shown on an LCD display.

Memory

The controller remembers what antennas were last used by each station on each band. When returning to a band the previously used antenna will be selected if possible. Some of this data will be stored in EEPROM.

SO2R

Each station has an antenna selection knob. The controller will not offer antennas which conflict with the antenna the other station is using.

Real-Time

There only time-critical function is switching between transmit and receive. This is handled entirely within the switch box.

T/R switching time should be less than 100 microseconds.

Display

The LCD display has four lines of 16 characters. The top two lines are for station 1, the bottom two for station 2.

For each station the top line displays the station name (5 characters), the band (3 characters), and the status (6 characters). The second line displays the name of the currently selected antenna.

The LCD is DSTN and backlit using LEDs for higher readability.

This type of display costs between $20 and $30.

Microprocessor

An Atmel ATMEGA16 is the control processor. It has 32 I/O pins. They are divided into four 8-bit ports (A-D) and used as follows:

A0-A5   Radio 1 digital band information
A6   Radio 1 analog band information
A7   Radio 2 analog band information

B0-B5   Radio 2 digital band information
B6   Radio 1 transmit inhibit
B7   Radio 2 transmit inhibit

C0   LCD/Pushbutton selection
C1-C7   Shared between LCD display and pushbuttons

D0, D1   RS-232 TX and RX
D2-D7   Rotary encoders

This microprocessor costs around $7.50.

The switch processor is an Atmel ATMEGA8515. It has 35 I/O pins. They are divided into four 8-bit ports (A-D) and one 3-bit port (E) as follows:

A0-A7   Relay outputs 0-7

B0-B7   Relay outputs 8-15

C0-C7   Relay outputs 16-23

D0, D1   RS-232 TX and RX
D2   Radio 1 TX input
D3   Radio 2 TX input
D4-D6   Shift register outputs

E0-E2   Shift register outputs

The D port shift registers could be moved to the E port to free up the D port pins for additional TX inputs if necessary.