

OPERATING INSTRUCTIONS - KOS-100

(MPC-1000R/TSR-500D)

When a KOS-100 Keyboard-Operated-Send board is installed in the MPC-1000R terminal unit:

- 1) The terminal unit and the companion transmitter-receiver may be switched from Receive to Send by depressing any data key on the local teleprinter's keyboard, by depressing the local BREAK button, or by opening the high level neutral loop momentarily.
- 2) With a TID-100 Station Identifier installed, holding down the break button (or opening the local loop) for more than 500 milliseconds (0.5 seconds) at the beginning of a transmission, will switch the MPC-1000R to Send and initiate an identification sequence. During this ID sequence, the memory section of the TSR-500D will be switched to Preload and local data may be generated and stored.

At the end of the ID sequence, the terminal unit will switch back to Operate (still in Send) and transmit the data that has been preloaded.

- 3) If the BREAK button is depressed for longer than 500 milliseconds in the middle of a transmission, the ID sequence will not start until the data stored in memory has been transmitted and the front panel Memory EMPTY LED lights.

The KOS time-out period does not start its count-down until the Memory EMPTY LED lights, or until the TID-100 finishes its ID sequence, whichever is later.

- 4) A momentary ground applied to the rear panel CW ID connector will immediately switch the MPC-1000R from Operate to Preload and an ID sequence will be started. During the ID sequence, additional data generated locally will be stored in the TSR Memory. At the end of the ID sequence, the terminal unit will switch back to Operate and the preloaded data will be transmitted.

A preset timer may be connected to this CW ID connector for automatic IDing during prolonged transmissions.

Provisions have been made on the KOS-100 board to provide a positive going (+15 volts) signal when the KOS-100 is in the Send mode. This signal may be used for enabling and resetting the preset timer.

- 5) A solid state switching circuit has been provided on the KOS-

100 board that automatically displays the transmitted AFSK tones in the cross display when the KOS-100 is in Send.

- 6) The rear panel LOCK connector is configured as an open-collector transistorized switch and provides a PTT (Push to Transmit) control line for the companion transmitter. This PTT circuit may be of either positive or negative polarity. AC circuits may also be keyed, but must be current-limited to prevent damage to the keying transistors. A maximum of 100 milliamperes is a good limit.

Two manual controls are provided on the KOS-100 board for operator convenience and both are located in the right front corner of the KOS-100 board.

- 1) VARIABLE TIME-OUT

The time-out period of the KOS-100 is variable from approximately 1.0 second to 20.0 seconds and the control potentiometer (KOS-R17) is linear. A mid-scale setting of KOS-R17 will provide a 10 second time-out period.

The time-out period commences its count-down when the front panel Memory EMPTY LED lights, or when the TID-100 ID sequence terminates, whichever is later.

Since the MPC-1000C and MPC-1000CR do not contain a memory section, the time-out period commences at the end of each character that is sent from the local keyboard. A pseudo "Memory Empty" signal is generated by the KOS-R4 resistor that is installed on the LOS-100 when it is used in an MPC-1000C or MPC-1000CR terminal unit.

- 2) KOS CONTROL SWITCH

The KOS Control Switch (KOS-S1) is set to the right (ON) if the MPC-1000R is to be controlled by the KOS-100.

It is set to the left if the Send/Receive modes of the terminal unit are to be controlled remotely.

When set to the right (ON), the rear panel LOCK connector is configured for PTT operation per Item 5 above.

When set to the left (OFF), the rear panel LOCK connector is electrically connected to the MPC main board just as if the KOS-100 were not installed, and a +5 to +15 volts applied to the LOCK connector will force the terminal unit into SEND.

With the KOS CONTROL switch set for ON, the front panel switches are set for normal operation. The RECEIVE/SEND switch is left in the REC position during normal KOS operation.

### PTT CONTROL OF TRANSMITTER

As indicated in a previous section, the PTT voltage from the companion transmitter may be either positive or negative polarity. The NPN and PNP keying transistors are not current limited, and will be damaged if the current on this line exceeds 500 mils.

### VOX CONTROL OF TRANSMITTER

If the transmitter does not have a convenient PTT line, the transmitter may be controlled by its VOX circuit.

To use the KOS-100 to provide VOX control of the transmitter, unplug the DAS-100 Digital Autostart module and lift it out of the way.

Locate the jumper at the left edge of the TMS-100 Tri-Mode Tone Selector board and cut in the middle. It is not necessary to remove this jumper. Just cut it "open".

Remove the TSR-500D, observing how the cables are plugged into the TSR sockets. You will note a notched corner on the top of the cable connectors that denotes Pin 1. The corresponding Pin 1 on the sockets is probably also notched (depending on which type of socket is used), but Pin 1 is always the left-front corner as viewed from the front of the terminal unit.

If for any reason the cable manufacturer improperly coded the cable connector, Dovetron has added a drop of red laquer at the Pin 1 location on top of the connector.

With the TSR-500D removed (or folded out of the way), add a four (4.0) inch wire to KOS-B. This is the fifth E-Point from the left at the rear edge of the KOS-100 Board.

Connect the other end of this 4.0 inch wire to the open E-Point in the left-front corner of the TMS-100 board.

Now when the KOS-100 is in Send, KOS-B supplies +15 volts to the TMS-100 board enabling the tones of the AFSK Tone Keyer.

If the AFSK output of the terminal unit is plugged into the audio input circuit of the transmitter, and the VOX circuits of the transmitter are turned on, the enabling of the AFSK tone keyer by the KOS-100 will automatically put the transmitter into Send. When the KOS-100 goes back to Receive, the tones from the AFSK tone keyer will be turned off, and the transmitter will also turn off.

When making this KOS-B to TMS-100 connection, be sure to cut the

jumper before applying power. If the jumper is not cut, the 5.1 volt zener on the TMS-100 board will be annihilated by the +15 volts from the KOS-100 board.

When modified for VOX operation, the terminal unit's AFSK tone keyer will produce tones only when the terminal unit is in the SEND mode. When the front panel mode switch is set to MS-REV (RY Generator), it is necessary to "write-in" some data from the keyboard, which tells the KOS-100 to switch the terminal unit into SEND.

#### PRESET TIMER OPERATION

A preset timer may be connected to the rear panel CW ID connector.

During a prolonged transmission, every time the preset timer applies a momentary ground, the terminal unit will be switched to Preload and the TID-100 Station Identifier will cycle thru a single ID sequence.

At the end of the ID sequence, the terminal unit will switch back to Operate and output any data that was entered into the terminal unit during the ID sequence.

To function properly, the preset timer should be controlled by the terminal unit, i.e., it should be reset to "zero-time" whenever the KOS-100 (and terminal unit) switch to Send, and it should be disabled when the terminal unit is in Receive.

If it is not disabled, it will issue ID commands at preset intervals while receiving traffic.

The KOS-B E-Point on the KOS-100 goes high when the KOS is in Send. This command line has been provided to control the TMS-100, per the above section, but it can also be used to control an external preset timer.

To do both functions, a diode steering circuit should be used to isolate the TMS-100 from the preset timer. Such a circuit consists of two diodes with their anodes both connected to KOS-B. The cathode of one diode will be routed to the TMS-100 E-Point. The cathode of the other diode can be brought out to the preset timer. In this way, two circuits can be controlled by KOS-B, but the two circuits have no influence on each other.

#### OPERATIONAL NOTES

With the KOS-100 board over-riding the Send/Receive controls of the terminal unit, it is no longer possible to leave the memory in Recirculate and to switch back to Receive to listen on the transmitting frequency.

The logical reason for this is that as long as the Memory EMPTY LED is out (and it will be out because the Memory Section still contains data), the KOS-100 holds the terminal unit in Send.

Clearing the Memory with the front panel CLEAR switch permits the

KOS-100 to immediately start its count down to time-out.

If the TSR-500D board has been completely removed and the rear panel REGEN ON-OFF has been switched OFF, KOS-R4 must be installed to provide a "psuedo" Memory Empty signal.

In lieu of installing R4, the TSR-500D may be left connected via its J1 (left front) power cable, and merely lifted out of the way. As long as J1 is connected, the Memory Empty circuit will be powered and permit testing and servicing of the KOS-100.

## FIELD INSTALLATION OF KOS-100 IN THE MPC-1000R

The KOS-100 Assembly Print 75174 and Schematic Print 75177 contain a great deal of information regards the various methods of operating a KOS-100 in an MPC Series terminal unit.

When installed in an MPC-1000R with a TSR-500(D) assembly, the logic of the KOS-100 is interconnected to the logic of the TSR-500(D). When installed in an MPC-1000C or MPC-1000CR, which does not contain the TSR-500(D), the KOS-100 board must be modified by installing a 100K (R4) resistor on the KOS-100 board.

If a TID-100 is to be used with the KOS-100, R27B is installed and R27A is not installed. If the TID-100 is not used, R27A is installed and R27B is omitted.

If the KOS-100 is supplied as a retrofit kit (KOS-100K), a 16 pin high profile socket is included with the kit, which MUST be installed on the BOTTOM of the TID-100 board. This socket acts as an interface between the TID and the KOS and plugs into the 16 pin male header (J1) on the TOP of the KOS-100 board.

A mechanical drawing in the lower left corner of Print 75174 details this interconnection of the TID-100 and KOS-100 boards.

To install the KOS-100 in an MPC-1000R/TSR-500(D)/TID-100:

- A) Remove the TSR-500(D) board and lay aside.
- B) Disconnect the six wires connected to the TID-100, remove it from the terminal unit, and install the 16 pin high profile socket on the BOTTOM at location J1. Pin orientation is not important.
- C) Remove the 2.0 inch bolts (3) in the main board that were used to support the TID-100 and TSR-500(D) assemblies.
- D) Install the three 2.5 inch bolts that have been provided with the KOS-100K kit.

Do not disconnect the original wires (TID-100) from the main board of the terminal unit, as some of them will be used in the KOS installation.

When connecting wires to the E-Points at the rear edge of the KOS-100, the wires may be inserted from either the top or the bottom of the board. Some of these E-Points have been duplicated at the front edge of the KOS board, and if more convenient, may be used.

The following installation scheme is the standard factory installation as done by Dovetron and assumes that the TID-100 is also being used. In this configuration, a CW ID start command is stored in the KOS-100 whenever the local BREAK button is depressed for more than 0.5 seconds and a CW ID sequence will be automatically sent at the end of a transmission (when the Memory Empty LED comes ON), before the KOS-100 starts to time-out and switch back to Receive.

This configuration also permits a timer to be plugged into the rear panel CW ID connector command automatic CW ID sequences every ten minutes during prolonged transmissions. During these CW ID sequences, the TSR-500(D) assembly is switched from Operate to Preload, permitting the memory section to store data entered during the CW ID sequence. At the end of the sequence, the memory section is switched back to Operate and the stored data is released for transmission.

## KOS-100 INTERCONNECTIONS TO THE MPC-1000R

The following instructions are detailed clarification of the INSTALLATION notes on Assembly Print 75174 and the OPERATION notes on Schematic 75177.

The term "E-Point" means "exit point" and is a connecting point on a printed circuit board where a wire may be attached. As an example, KOS-80 means Exit Point number 80 on the KOS-100 board. MPC-80 means E-Point 80 on the main board of the MPC-1000R terminal unit.

When the KOS board has an E-Point with the same number as an E-Point on the MPC board, it is a good indication that they are going to be connected together.

- 1) Connect a 4.0 inch wire between KOS-80 and MPC-80.  
The MPC-80 connection may be made to the plated-thru hole just to the right of E-80 in the left rear corner of the MPC main board. This location was originally intended for R17A. If R17A has been installed, remove it and discard it.
- 2) Connect a 7.0 inch wire between KOS-TP1 and MPC-TP1.  
MPC-TP1 is located directly behind the large white capacitor C47) on the left side of the terminal unit.
- 3) Connect a 7.0 inch wire between KOS-E and the cathode side of the front panel LOOP indicator (LED).  
The cathode of this LED has a green wire connected to it. Do not disconnect the green wire.

NOTE: High heat will damage the LED. If the LED is damaged, the new LED will have to be installed with the proper polarity. The cathode of a LED is usually identified by a flat spot on the side of the LED's case next to the cathode lead, and this lead is usually the longest of the two leads.

- 4) Connect a 7.0 inch wire between KOS-ME and the anode side of the front panel Memory EMPTY LED.  
The anode side of this LED has a green wire on it that is part of the J1 TSR cable (J1-5). If a TID-100 was installed in the MPC-1000R, this LED probably had a short green wire attached to it. This short wire can be installed in the front edge KOS-ME instead of using the 7.0 inch wire to the rear KOS-ME, but future servicing of the MPC main board will be more difficult.
- 5) KOS-B is not connected to the MPC at this time.  
KOS-B may be used to enable the tones of the AFSK Tone Keyer when the KOS-100 is in Send, or to reset an external preset timer, when the KOS-100 is commanded to SEND. Both functions may be accomplished by "diode-Sterring".  
AFSK Tone Control is accomplished by removing the jumper on the TMS-100 board and connecting KOS-B to the open E-Point in the left front corner of the TMS-100 Board. This mode of operation will permit VOX control of the companion transmitter, but inhibits the use of the RY Generator (MS-REV) with the terminal unit is in Receive. See Note 10 on 75177.
- 6) KOS J1-14 is connected to the white-yellow wire in the TSR J1 cable.

If the TID-100 was originally installed, this wire (J1-14) was connected to the PHASING E-Point on the TID-100. If the IDer was not installed, you will find J1-14 (white-yellow) still unused in the J1 cable. Fish it out of the cable harness and connect it to KOS J1-14.

- 7) KOS-S9 is connected to the front panel OPERATE-PRELOAD-RECIRCULATE toggle switch (S9 on TSR print 75143).

The easiest way to do this is to locate the ORANGE wire (J1-3) in the TSR J1 cable about four (4.0) inches from the CONNECTOR end of the cable and cut this Orange wire at this point. Fish out enough of the Orange wire (using the end going to the switch) to connect to KOS-S9. The 4.0 inch section left in the connector end of the cable will not be used.

- 8) KOS -V will be connected to the regulated -15 volt supply on the MPC main board.

A convenient -V connection is a feed-thru just to the right of Z25 and just to the left of pin 1 of Z29. There are two feed-thrus in this area and the correct one is the feed-thru with the wide current-carrying trace on it. Use a 4.0 inch wire.

- 9) KOS-50 is the system ground connection. Connect a 4.0 inch wire between KOS-50 and MPC-50, which is directly behind the rear panel Audio Input connector.

The original TID-100 ground has connected to MPC-50 and this original wire may be used to connect to KOS-50.

- 10) Connect a 4.0 inch wire between KOS +V and MPC +V.

MPC +V is available on the forward terminal tie point just to the right of the audio input transformer (T2). The original TID-100 +V was connected to this point and the wire is probably long enough to connect to KOS +V.

- 11) KOS-C, KOS-A and KOS-D will not be connected to the MPC at this time.

KOS-D is an optional inverted PTT control line and the components for this PTT line are normally not installed on the KOS-100 board.

KOS-C and KOS-A can provide a remote LED indicator to indicate when TID-100 is sending the CW ID sequence, but since this is accomplished in the MPC-1000R already, these E-Points are not used.

- 12) Connect a 6.0 inch wire between KOS-J15 and the rear panel LOCK connector MPC-J15.



Disconnect the yellow wire that is connected to MPC-J15, but do not disconnect wire from main board. It will be used later in Step 17.

- 13) Connect a 6.0 inch wire between KOS-J6 and the rear panel REGEN IN connector (MPC-J6).

Do not disconnect either the gray or the red (jumper) wires that are already attached to MPC-J6.

- 14) KOS-J11 is not connected to the MPC at this time.

A remote ground applied to KOS-J11 will force the KOS-100 into the Send mode. It has been provided on the KOS-100 board for a future systems-application.

- 15) KOS-J9B is not connected to the MPC at this time.

Consult Note 5 on Schematic Print 75177 for information concerning the use of KOS-J9B.

- 16) KOS-J9A will be connected to the rear panel CW ID connector (MPC-J9).

When originally assembled by Dovetron, MPC-J9 was connected to MPC-56 with a long (12 inches) blue wire. This wire was folded up and tucked behind the CRT assembly. If a TID-100 was installed, the wire was cut at the center and both ends were connected to the TID-100 board.

Use the blue wire that is connected to the CW ID connector (MPC-J9) on the rear panel for the connection to KOS-J9A. The other blue wire will be used later in Step 19A.

- 17) Connect KOS-84 to MPC-84.

Use the yellow wire that was disconnected from the LOCK connector (MPC-J15) in Step 12 above.

- 18) Connect an 8.0 inch wire between KOS-TP10 and MPC-TP10.

MPC-TP10 is located just to the right of the TU's center-line and slightly in front of the AFSK Tone Keyer chip (Z43) XR2206C.

- 19( A) If the TID-100 has been programmed for CW MORSE code, connect KOS-56 to the blue wire that is connected to MPC-56.

This blue wire is the other half of the blue wire that is described in Step 16 above.

- B) If the TID-100 has been programmed for Baudot or ASCII

teleprinter codes, no connection is made to KOS-56, but a 15 ohm resistor (or wire jumper) must be installed at location R42 on the KOS-100 board. Location R42 is just in front of the KOS-TP10 E-Point.

20) KOS-F is not connected to the MPC-1000R.

A +15 volts applied to KOS-F can be used to force ON the Tone Monitor section of the KOS-100.

MPC-F may be used for this application, if desired. MPC-F is the anode end of CR55, which is located in the front right corner of the MPC main board. If KOS-F is connected to MPC-F, the Tone Monitor will be turned ON whenever the front panel Receive-Send switch is put in SEND.

THIS COMPLETES THE ELECTRICAL INSTALLATION OF THE KOS-100 BOARD.

#### MECHANICAL INSTALLATION

Install a 3/4 inch spacer (Item37) on each of the three 2.5 inch bolts (Item 40) that were installed in the MPC main board in Step D above.

Slip the KOS-100 assembly into place on the three bolts and temporarily secure in place with a single 3/16 nut (Item 39) on the right-most bolt.

Dress the KOS-MPC interconnect wires neatly and be sure that none are pinched between the KOS-100 board and the mounting bolts and spacers.

\*With no signal applied, and with front panel LEVEL control set fully CCW, turn on power and measure the Combiner Offset at MPC TP3. Since TP3 is covered by the KOS-100, it can be measured from the bottom of the terminal unit or at the anode end of CR51, which is directly under the front panel mode switch on the main board. The anode end is to the left.

\*Adjust the voltage at this point to -400 millivolts (-0.4 volts) by adjusting R221, which is accessible thru the large hole in the KOS-100 board. This combiner offset voltage is discussed on Page 31 of the MPC-1000C section of the instruction manual. Turn off MPC-1000R.

Install a 3/8 spacer (Item36) on the two left-most bolts.

Install the modified TID-100 board on top of the KOS-100, mating the 16 pin high profile socket (TID-J1) with the 16 pin male header (KOS-J1).

\*MPC-1000R serials below R700 only. Mark II units contain the BBP-100 and do not require adjustment of combiner offset.

Install a 3/16 inch nut (Item 39) on top of the TID-100 board and securely tighten them and the 3/16 inch nut on top of the KOS-100 board on the right-most bolt.

Following the mechanical installation print (75174), install a 3/8 inch spacer (Item 36) on the two left-most bolts and a 7/8 inch spacer (Item 38) on the right-most bolt.

**CAUTION:** Incorrect installation of the TSR-J1 cable will result in damage to the TSR-500(D). In installing all the TSR cables, the little flat spot in the corner of the cable connector denotes Pin 1. Pin 1 of the corresponding TSR's cable socket is indicated by the EIA standard coding. In all cases, Pin 1 is the forward, left corner of the socket.

If the TSR-500(D) has had the DAS-100 Digital Autostart module installed, a slight modification will have to be made to this module to permit proper fitting of the top lid.

Remove and discard the top cover of the DAS-100 module. It will not be used.

Clip off the top portion of the three "Fastek" board supports that originally secured the top cover of the DAS-100. Do not clip off the curved horizontal portions of these supports.

Install the DAS-100 in the TSR-U11 socket as originally installed.

THIS COMPLETES THE MECHANICAL INSTALLATION OF THE KOS-100 BOARD AND THE TERMINAL UNIT MAY BE PLACED BACK IN SERVICE.

Before installing the top lid, set the miniature toggle switch on the KOS-100 board (KOS-S1) to the Right, and set the Time-Out potentiometer (KOS-R17) to mid-scale. This mid-scale setting will provide approximately a 10 second time-out. The range of this potentiometer is 1.0 seconds to 20.0 seconds and is linear.

With an incoming signal, and with all front panel controls in their normal positions (REC-SEND switch left in REC), the REC LED (KOS-DS1) on the KOS-100 board will flicker.

When a local keyboard key is depressed, or the BREAK button is depressed, the XMIT LED (KOS-DS2) will light, indicating that the KOS-100 is in the SEND mode. The tones from the AFSK Tone Keyer will be displayed in the CRT or SSD-100 Display. At the end of the time-out period, the XMIT LED will extinguish and the KOS-100 will switch back to RECEIVE.

If the BREAK Button on the local keyboard is depressed for longer than 500 milliseconds (0.5 seconds), the TID-100 will be enabled and a CW ID sequence will be transmitted. This CW ID sequence may be seen in both the front panel cross display and in the flickering of the Memory EMPTY LED.

Consult OPERATING INSTRUCTIONS - KOS-100 (MPC-1000R/TSR-500D) for additional information.