MPC-1000R
R785
E-0410

INSTRUCTION MANUAL

TSR-500D
DIGITAL AUTOSTART DAS-100
MK II

DOVETRON MPC-1000R

3BP-100

TSR-500D/DAS-100

REGENERATIVE RTTY TERMINAL UNIT

DIGITAL AUTOSTART

E-SERIES

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MPC-1000R.400 and up.

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PREFACE

The Dovetron MPC-1000R Regenerative RTTY Terminal Unit normally consists of an E-Series Main Frame (Board Number A75100A-E), a TMS-100 AFSK Tri-Mode Tone Selector Assembly, a TSR-500D Signal Regenerator Board and a DAS-100 Digital Autostart Module.

When supplied with the TSR-500D/DAS-100 combination, the terminal unit provides Signal Regeneration, Speed Conversion with a 200 Character FIFO Buffer Memory, Keyboard-Controlled Word Correction and Digital Autostart.

The MPC-1000R is also available as a BASIC-R with a TSR Adapter (75156) which replaces the TSR-500D assembly, and functions as an MPC-1000C with a TMS-100 Tri-Mode Tone Selector.

If a TID-100 Station Identifier board is factory installed, it is mounted underneath the appropriate TSR assembly.

The KOS-100 Keyboard Operated Send option (if installed) is usually used in conjunction with a TID-100 assembly and is mounted underneath the TID-100.

A SCL-100 Selective Calling module may be plugged directly into the TSR-500D assembly for Sel Cal functions.

A PKC-100 Polar Keyer option is also available for use with Polar (double current) teleprinters.

With a TSR Adapter installed, the front panel Memory Empty LED is always lit and the Memory Function and Speed Selection switches are inoperative.

With the TSR-200D/TSR Adapter combination installed, the Signal and Loop Speed switches select the input and output baud rates of the TSR-200D Regenerator assembly.

The front section of this manual details the digital section (TSR-500D) of the terminal unit and the rear section (which is an MPC-1000C manual) details the mainboard section.

In case of conflict between the front and rear section of the manual, the information provided in the TSR-500D section should be considered correct.

OPERATING HINTS

MPC-1000R and TSR-500D

For the operator who prefers to turn on a new piece of equipment and read the manual later, the following is offered:

1) Remove the top lid and inspect the large-scale (LSI) integrated circuits and the four inter-connecting cables for a firm fit in their sockets. It is not unusual for transportation vibration to loosen them in their sockets.

2) Set the rear panel LOOP adjustment pot to midscale and check that the REGEN ON-OFF switch is in the ON position (UP).

3) Attach the power cord, teleprinter's loop line and an audio line from the receiver.

   A) Power cord should be grounded for safety and maximum performance.

   B) Teleprinter's loop line should NOT be grounded thru either loop jack. The teleprinter's loop line must be floating. If a three-way plug with a shield is used, insert it into the rear panel loop connector marked: 3-Way. The shield may be grounded to the terminal unit's cabinet.

   C) The input impedance of the MPC-1000R is 600 ohms, but the terminal unit may be driven with low impedance speaker audio lines, provided the audio is turned up high enough. Many receivers have phone patch or anti-vox outputs, which are usually in the 500 to 2500 ohm region and they make ideal audio sources for the terminal unit.

4) Place all the front panel toggle switches UP, except the Autostart/Motor Control switch. Place it in the Motor ON position.

5) Set the LEVEL control to 9 o'clock and the THRESHOLD control to 12 o'clock.

6) Set the MODE switch to MS, which is the proper position for normal In-Band Diversity operation.

7) Adjust the Mark and Space VFOs to the desired tone frequencies.

8) Set the SIGNAL Speed Switch to the anticipated speed of the incoming signal.

9) Set the LOOP Speed Switch to the speed of the local teleprinter. (45 Baud = 60 WPM, 75 Baud = 100 WPM, etc.)

10) Tune in a known RTTY signal, peaking the Mark and Space VFOs for maximum amplitude of the horizontal and vertical CRT traces and start copying. If the copy is garbled, reverse the NORMAL/REVERSE switch.

11) Now sit back and read the rest of this manual and discover how easy it is to implement all the operating features and functions.

COMMON QUESTIONS

HOW DO I SEND A BLANK CHARACTER OVER THE AIR TO COMPLETE A WRU SEQUENCE IF THE WORD CORRECTION CIRCUIT IS GOING TO ERASE WITH EACH BLANK CHARACTER RECEIVED?

Press the UNLOAD button down, which will turn ON the Memory Full LED and momentarily turn OFF (for about 20 seconds) the Word Correction circuit and let a Blank character be transmitted without erasing the Word Sortage FIFO section of the memory.

HOW CAN I SHORTEN THE TD INHIBIT TIME DELAY?

Locate R76 (22 Meg) and R77 (9 Meg) on the TSR-500D board. These two resistors are in series (31 Meg) and provide the standard time delay. Jumpering of either resistor will shorten the time delay period.

WHEN THE TU IS FIRST TURNED ON, AND THE MEMORY IS CLEARED, THE MEMORY EMPTY LED CONTINUES TO FLASH FOR ABOUT FOUR SECONDS. IS THIS NORMAL?

When first powered-up (turned on), some TID-100 CW IDers will sequence thru their coded program one time. The flashing you see at turn-on with a cleared Memory is the CW ID being sent by the TID-100.

HOW CAN I PROGRAM A TWO-LINE CQ INTO MEMORY AND THEN GET IT TO RECIRCULATE AT MACHINE SPEED RATHER THAN AT THE SLOWER CHARACTER RATE SPEED THAT I HAVE PRESET WITH THE REAR PANEL POT?

If you have preloaded less than 160 characters into the memory, it is going to recirculate at the slower character rate. You can force it to machine speed by depressing the UNLOAD switch. After about 20 seconds, it will slow back down to the slower character rate. To keep it at machine speed during Recirculation, load in the message (two lines), and if the Memory Full LED has not come on (indicating 160 or more characters in storage), depress the UNLOAD switch (forcing the Memory Full LED ON) and load in about 10 Blank characters from the keyboard. This will top-off the memory with at least 160 characters and it will then recirculate continuously at machine speed.

THE MPC-1000R UP-CONVERTS JUST FINE ON RECEIVE, BUT I CANNOT GET DOWN-SPEED CONVERSION WHEN IN SEND. I AM FSKING MY TRANSMITTER (NOT AFSK) AND USING THE EIA (RS232C) FSK OUTPUT ON THE BACK OF THE TERMINAL UNIT.

There are three different FSK outputs available at the rear panel.

1) EIA RS232C (Mark -12V and Space +12V)

2) MIL STD 188C (Mark +6V and Space -6V)

3) REGEN FSK (Mark +12V and Space -12V)

The EIA and MIL FSK outputs are regenerated (and speed-converted) only during Receive. They have been provided for interfacing to video display units and low level typing units.

The REGEN FSK output is the regenerated and speed-converted output of the TSR-500D Regenerator and is jumpered internally to the input of the AFSK Tone Keyer.

IS THERE ANY CONVENIENT WAY TO SET THE VARIABLE CHARACTER RATE POT AT THE REAR PANEL FOR MY PREFERRED TRANSMITTING SPEED?

Set Pole 2 of S3 on the TSR-500D board to the right, enabling the Phasing Pulse (Blank Diddle). Put the Memory Control switch in Recirculate, the terminal unit into Send and Clear the Memory. The local teleprinter will not cycle thru Blanks and the rear panel Character Rate pot may be adjusted to your preferred output speed.

WHEN I SWITCH THE MODE-SWITCH TO MS-REV (RY GENERATOR), ALL I GET IS A STRING OF Ys. WHY DON'T I PRINT RYs LOCALLY?

A string of Mark-Space Reversals (MS-REV) by definition never has two sequential Space bits, so the UART Regenerators will never translate out a letter R, whose first bit is always a Space following the Start Bit which is also a Space Bit. If the receiving station is not using a UART regenerator ahead of the teleprinter, it will print RYs, if the RY speed control R163 on the main board is set properly.

MAYBE ONCE A WEEK, THE DIGITAL AUTOSTART PERMITS THE TELEPRINTER'S MOTOR TO START AND RUN FOR A PERIOD OF TIME BEFORE AUTOMATICALLY TURNING OFF. WHAT IS HAPPENING?

If a random noise crash or static burst just happens to load a Space Character, this Space Character will be held in the output register of the UART and the Digital Autostart circuit will sense this and turn on the teleprinter. The next noise crash (which may not happen for a long period of time) will load a different character and the Digital Autostart will then start to time out. During this period of printer Turn-On, the printer will not print garble, because if another noise crash were received, the output register of the UART would have had the Space Character replaced with another character.

IS THERE AN EASY WAY TO REMOTE CONTROL THE SEND-RECEIVE FUNCTION OF THE TERMINAL UNIT WITH JUST A REMOTE SWITCH TO GROUND?

The +15 VDC Regulated that is supplied to the rear panel connector is current limited. It can be jumpered right into the LOCK connector with a second wire going to your remote switch. When the switch is ground (closed), the +15 VDC will be pulled to ground and the TU will be in Receive. When the switch is open, the +15 VDC will put the TU into Send. Remember that the front panel Send-Receive switch must be in Receive when using remote control.

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SECTION I - DESCRIPTION

The MPC-1000R Regenerative RTTY Terminal Unit is basically an MPC-1000C Multipath-Diversity RTTY Terminal Unit with a TSR-500D Teleprinter Speed Converter-Regenerator mounted internally to provide Signal Regeneration, Speed Conversion, up to 200 characters of Silastic Buffer Storage and keyboard-controlled Word Correction.

The front panel contains switches for basic control of the regeneration, speed conversion and memory exercising functions.

Rear panel connectors permit remote control of the other functions, such as Phasing On-Off, Word Erase, etc.

The Word Correction function is automatic and keyboard-controlled via internal circuitry that is capable of recognizing the SPACE and BLANK characters generated by the local teleprinter.

In addition, the MPC-1000R contains a TMS-100 Tri-Mode AFSK Tone Selector assembly, which permits front panel selection of one of three different Mark-Space-Shift combinations that have been preset for the AFSK Tone Keyer.

All other front panel controls perform in the same manner as their counter parts on the MPC-1000C.

For this reason, the E-Series manual for the MPC-1000C pertains to the MPC-1000R unless specifically noted in the following paragraphs or on the accompanying MPC-1000R prints and schematics.

When the rear panel REGEN ON-OFF switch is in the OFF position, the TSR-500D Regenerator assembly is inhibited, and the MPC-1000R functions as an MPC-1000C. With this switch OFF, the TSR-500D may be removed for service and the terminal unit continued to be used as a non-regenerating modem.

When the REGEN ON-OFF switch is in the ON position, all incoming and outgoing signals (except Mark-Space Reversals from the RY Generator) are regenerated to less than 0.5% bias distortion.

Since the input and output baud rates of the Regenerator may be controlled by the front panel speed switches, and may be set to different speeds, the Regenerator section may also be used as a simultaneous up-down speed converter.

A silastic buffer storage section prevents character over-runs during Down-Speed Conversion, and may be Preloaded and Recirculated.

This buffer memory section consists of five 40 character FIFO buffer elements for a total storage of 200 characters.

SECTION II - THEORY OF OPERATION

The TSR-500D Teleprinter Speed Converter-Regenerator is a digital device that performs Signal Regeneration, Up-Down Speed Conversion, Buffer Storage, Word Correction, Phasing Pulse Generation (BLANK or LTRS) and Variable Character Rate Control.

These functions are accomplished thru the use of a pair of Universal Asynchronous Receiver/Transmitters (UARTs), First-in First-out (FIFO) Silastic memory chips, a crystal-controlled oscillator and various logic and switching elements.

The crystal-controlled oscillator operates at 60 KHz and uses a tuning-fork type piezoelectric quartz crystal.

The output of this oscillator is divided down by two separate BCD/N stages which are switch controllable and provide the two separate clock frequencies required by the UARTs for up-down speed conversion.

The Signal Speed clock is Clock 1 and the Loop Speed clock is Clock 2.

With the MPC-1000R in Receive and the Memory section in Operate, Clock 1 drives the Input register and Clock 2 drives the Output register of Uart 1. When the TU is switched to SEND, the two clocks are reversed.

If the two clocks have been set to the same frequency, that is, the same speed, UART 1 functions solely as a regenerator.

When the two clocks are set for different speeds, the UART also functions as a speed converter, because it is outputting the data at a different speed than it took it in at.

When the MPC-1000R is in SEND-Recirculate (as when calling CQ from the preloaded memory), both the input and output registers of UART 1 are being driven by Clock 1, the Signal Speed clock.

When in RECEIVE-Preload, the output register is not permitted to output, because the memory is being deliberately loaded-up.

For this reason, a second UART has been implemented in the TSR-500D. Its input clock is <u>always</u> Clock 1 (Signal Speed) and the output clock is <u>always</u> Clock 2 (Loop Speed). Since the Loop Speed is identical to the local teleprinter's Baud rate, UART 2 provides local copy even when the TSR-500D is Recirculating or Preloading at Signal Speed.

A Memory Hold circuit (three elements of U25) has been incorporated which permits the local teleprinter to receive an incoming message via UART 2 when the Memory is recirculating.

This permits the operator to Preload the Memory with a CQ (or any other message), and to switch the TU to SEND-Recirculate, which will repetitiously transmit the contents of the Memory over and over again.

At the end of the transmission, the TU may be switched to Receive, leaving the Memory intact (still in Recirculate), and receiving an incoming answering signal, without loosing the Preloaded message.

If no answer is received, the TU may be switched back to SEND and it will immediately resume sending the originally Preloaded message.

If an answer is received, when the TU is switched back to Send, the Memory is simply cleared with the front panel CLEAR switch and the Memory switched to OPERATE.

Whenever the MPC-1000R is in RECEIVE, the Space-shift feature of the Word Correction circuit is inhibited by CR13 and the Input FIFO will always function as part of the main memory.

The Blank Erase circuit in Receive is also inhibited (when it is necessary to do so), because when the main memory section fills, it will enable the TD Inhibit circuit which in turn inhibits the Blank Erase circuit via CR15.

In other words, in Receive, with five FIFOs, a full 200 character buffer memory is provided.

The Dual One-Shot (U22) provides the automatic Variable Character Rate Control and functions only in SEND. It also provides the logic for the Phasing Pulse circuit, which only operates when the TU is in SEND and the Memory section is empty.

The BLANK and LTRS character generation is accomplished by pulling the tri-state output lines of FIFO 1 (OUTPUT FIFO-U4) either to ground or up to +5 volts thru the 4.7K resistors at R40 thru R47. These FIFO lines automatically go to tri-state when the Memory is empty.

As supplied by the factory, the BLANK character is enabled. LTRS character may be generated by removing the jumper AB and installing a jumper or 15 ohm resistor at AC.

The BLANK "diddle" is preferable, because it will not affect the FIGS or LTRS state of the receiving teleprinter.

A LTRS "diddle" may interfere with a slow typist's ability to send a FIGS character and then a numeral. If the LTRS character is automatically inserted by the diddler between the FIGS and the numeral, the receiving teleprinter will be back in LTRS case by the time the numeral character arrived, and the character Y

would be printed instead of the numeral 6, etc.

The LTRS character generation mode has been incoroporated on the TSR-500D for commercial and military users that require an automatic SPACE pulse (Start) to be sent during Marking periods to phase crypto equipment.

Other options on the TSR-500D are the inverters provided on the input and output lines. Jumpers have been provided to permit easy inversion of these signal lines when interfacing the TSR-500D to other types of data modems.

The Memory Clear line (J1-1) is connected to the front panel Memory Clear switch and clears all five FIFOs. The Word Erase line (J2-7) goes to a rear panel connector (Word Erase) and only clears the Input FIFO. A contact closure to ground at this connector will provide Word Erase and has been provided for users of teleprinters that do not have a keyboard BLANK button. Automatic Memory Clear is provided by C20.

If the UARTs have been programmed for Stop Bit NOT Required (SBR switch S3 set to NO), breaking the local loop line with the keyboard BREAK line will also provide WORD ERASE. But breaking the loop via the BREAK key will also let the local typing unit run open and possibly print garble. A separate Word Erase button is probably preferable.

If the rear panel Word Erase connector is not being used, this connector may be converted to a Space Cal line by removing Jumper X2 and installing Jumper X1 on the TSR-500D board.

This Space Cal line may also be used as a full-shift CW-ID connector.

If the TID-100 Station Identifier has been coded for Baudot or ASCII code generation (as used in an Answer back mode), the open-collector output of the IDer may be connected to this Space Cal line.

Most TSR-500D assemblies are factory-supplied with 5 FIFOs, i.e., 200 characters of storage.

FIFOs U4 and U8 are always installed and provide the minimum 80 characters of storage.

If any of the optional FIFOs (U5, U6 or U7) are not installed, ten jumpers or low resistance resistors are installed in lieu of the missing FIFO and socket. These locations are detailed on print 75142, upper right corner.

Additional FIFOs may be field-installed in any of these locations by removing the ten jumpers and installing a socket and a Fair-

child 33511 or 33512 FIFO package.

To break-out the parallel data lines between the Input and Output registers of Uart 1 (for routing to some other peripheral device, such as a processor or additional memory), replace FIFO U5 or U6 with a 28 pin/cable assembly, or hard-wire directly to the jumper locations under the socket.

Code Conversion peripherals will not function properly with the TSR-500D, because the input and output registers of both UARTs are always set to the same coding level by NB-1 and NB-2 of the UART Program switch S3.

Although all logic elements in the TSR-500D are CMOS, they are fully-buffered to interface with TTL logic.

When interfacing to other CMOS circuits that are operating at higher levels, such as +12 or +15 volts, remember that Q1 is switching between zero to +5 volts.

The keyboard-controlled Word Correction circuit has been implemented at the Input FIFO (U8).

Whenever the MPC-1000R is in SEND, this Input FIFO stores the data from the local keyboard or Tee Dee. When it receives a SPACE character from the local teleprinter (which would normally be sent at the end of a word), the Input FIFO releases the word into the next FIFO (U7) and the word ripples down thru the memory to the first open location.

SPACE character recognition is accomplished in U12.

If an incorrect or mis-spelled word has been entered into the Input FIFO, it may be erased by sending a BLANK character from the local teleprinter.

BLANK character recognition is accomplished in U13.

The main memory section may contain one, two, three or four 40 character FIFO elements (U4 thru U7). Whenever the last FIFO in this section is filled, the Input FIFO (U8) is brought on-line as an over-flow FIFO, which adds 40 additional characters of storage to the main memory section.

Word Correction is automatically inhibited when the Input FIFO is in the Over-Flow mode and is accomplished by CR14 and CR15.

These diodes are tied back to the Set-Reset latch circuit in the Tee Dee Inhibit circuit, which in turn, is enabled when the last FIFO in the main memory section is filled.

For example, with 5 FIFOs installed, the Tee Dee Inhibit circuit is enabled when 160 characters have been stored, but the fifth FIFO comes on-line and lengthens the memory to 200 characters. This effectively prevents lost characters from overfilling the Memory, because at the same time the TD Inhibit circuit is enabled, the Variable Character Rate circuit is inhibited and the output character rate is raised to machine-speed.

The length of time that the character rate is maintained at machine speed is controlled by the time-constant of C17, R76 and R77. The factory installed values permit the memory to be emptied out at machine speed before the character rate is smoothly (not abruptly) lowered back to the preselected character rate.

The front panel Memory FULL LED lights when 160 characters have been stored and stays lit while the memory is outputting at machine speed.

The Word Correction circuit may be completely inhibited at all times by adding a jumper at location X2, which defeats the Space Character recognition circuit and removing the diode at CR2, which defeats the BLANK character recognition circuit.

With the Word Correction circuit disabled in this way, all the FIFO storage elements in the TSR-500D function as standard FIFOs in both SEND and RECEIVE.

An inversion scheme has also been provided on the control line (J1-8) that switches the TSR-500D between Receive and Send.

When installed in an MPC-1000R terminal unit, R62A and CR8 are installed and R62B and CR9 are omitted. This permits a zero signal (provided by pull-down resistor R61) to keep the TSR-500D in Receive until a +5 to +15 volts is applied by J1-8.

For other control applications, R62B and CR9 may be installed in place of R62A and CR8, in which case, the Control Line is pulled-high thru R63 and inverted by U24, putting the TSR-500D into Receive. A ground at J1-8 pulls the line low, which is inverted to a high state by the inverter U24, putting the TSR-500D into SEND.

Double inverters are used as LED drivers (DS1 and DS2) and assure full brilliance of both the front panel and board mounted LEDs.

Although the FIFO FULL line has been brought out from each FIFO in the J2 (rear) cable, they are not used when the TSR-500D is installed in an MPC-1000R.

Their primary purpose is to indicate the status of each FIFO (Full

or Empty) when the TSR-500D is used as a support element in a peripheral-type piece of equipment.

These lines are normally high (+5 volts) when the FIFO is empty and go to zero when the FIFO fills.

The five lines may be buffered (and inverted) thru a single hex inverter (such as the 14069) and used to drive individual LED indicators.

They may also be used to drive a digital to analog converter circuit, which in turn would easily drive an analog meter which would indicate the amount of storage, i.e., 20%, 40%, 60%, 80% and Full.

INTERNAL LOGIC - UART #1/MEMORY SECTION and UART #2 SECTION

The output register of UART 2 is always clocked at the speed set by the LOOP SPEED switch and provides local teleprinter copy when UART 1 and its memory section are being clocked at the speed set by the SIGNAL SPEED switch.

MEMORY	RECEIVE	SEND
OPERATE MODE	200 characters of FIFO memory. Word Correction circuits are disabled. Local teleprinter is driven by UART 1 and the Memory section. If down-converting, the Memory Full LED will light when 160 characters have been backed up in the memory section. Normally, the Memory EMPTY LED will be lit, since the OPERATE mode is usually set for straight-thru or up-conversion of the baud rate.	200 characters of FIFO memory. Word Correction is enabled and Input FIFO functions as a word-storage element that transfers a complete word to the main memory upon receipt of a Space character, or erases the complete word upon receipt of a Blank character. Memory Full LED lights on 160th character indicating only 41 characters of storage remaining (40 FIFO + 1 UART character), Input FIFO comes on-line as an over-flow storage element, Word Correction is inhibited, and Character Rate is automatically raised to machine speed until memory has been emptied. When Memory Full LED extinguishes, Word Correction is re-enabled and output speed returns to preset Character Rate. Local copy is provided by local keyboard.
PRELOAD MODE	200 characters of memory. Memory Full LED lights on 160th character, indicating only 41 characters of unused memory remain. Local printer is driven by UART 2 and prints what is being preloaded into the Memory Section by UART 1. Word Correction is disabled.	200 characters of memory. Word Correction is inhibited at 160th character and input FIFO comes on-line as over-flow FIFO when Memory Full Led is lit. Local copy is provided by the local keyboard.
RECIRCULATE MODE	Local printer is driven by UART 2 and provides local copy of recieved signals. This mode permits receiving an answer to a CQ without having to switch to Operate which would run out preloaded memory.	Local copy via UART 2 while UART 1 and Memory section are being recirculated at Signal Speed. Provides up-conversion when Signal Speed is less than LOOP Speed.

SECTION III - FRONT PANEL CONTROLS

AFSK SWITCH

The three positions of the AFSK Tone Keyer Switch (A, B & C) select the pre-set Mark and Space tones that have been calibrated into the tone keyer via the rear panel tone keyer calibration pots. Each pot is a 20 turn cermet potentiometer of infinite resolution and has a clutch action at the end of travel. Over-running the pot during calibration will not damage it.

To calibrate the Space tone, turn the REGEN ON-OFF switch to OFF, and remove the LOOP fuse, which breaks the loop line. This forces the AFSK tone keyer into Space. The Loop may also be opened by depressing the local teleprinter's Break button.

REGENERATOR/MEMORY SECTION SWITCHES

The SIGNAL and LOOP Signal Speed switches are calibrated in Baud. Each switch controls an independent BCD/N divider section that is driven by a common crystal-controlled oscillator.

The SIGNAL switch should be set to the baud rate of the RTTY circuit. The LOOP switch should be set to the baud rate of the local teleprinter. It is generally advantageous that the local teleprinter be operated at a baud rate equal to or faster than the fastest baud rate signal to be received.

The Memory section is controlled by two front panel toggle switches. These switches are labelled CLEAR-UNLOAD and OPERATE-PRELOAD-RECIRCULATE.

The CLEAR-UNLOAD switch is normally in its center-off position. When lifted to CLEAR, this switch immediately dumps the contents of the entire memory.

When lowered to the UNLOAD position, the preset Character Rate is increased to machine speed and the FULL LED indicator lights.

During this period (FULL LED lit), the Tee Dee INHIBIT circuit is enabled and permits an external relay to open the solenoid circuit of a tape-pulling TD, thus preventing character overruns during down-conversion of the baud rate.

This UNLOAD action is also automatically enabled whenever the last FIFO element in the main memory section is filled.

During normal operation, the OPERATE-PRELOAD-RECIRCULATE switch is left in the OPERATE position.

Moving the switch to PRELOAD permits the Memory Section to accept and store RTTY signals, either from the incoming signal (Receive) or from the loop (Send).

When Preloading in the Receive mode, a second UART (U2) provides regeneration and speed conversion from signal speed to loop speed and premits local copy.

In the RECIRCULATE position, the contents of the Memory are recirculated in UART #1 (U3) at Signal speed if in Send and at Loop speed if in Receive.

When recirculating the memory in Send, the second UART again provides local copy.

During normal (OPERATE) operation, the EMPTY LED will be lit, indicating that the incoming signal is flowing thru the Memory and not being stored.

If down-converting (i.e., copying a 50 Baud signal on 45.45 Baud teleprinter), this LED will extinguish as the Memory starts to store the over-runs, and will light again when the incoming signal "marks" long enough for the Memory to empty out.

In the Send mode, if the Character Rate has been set to something less than machine speed, a fast typist will be able to enter data into the Memory faster than it will be taken out.

If the Memory is filled, the FULL LED will light, indicating that the Input FIFO is absorbing the momentary overflow, that the slower Character Rate has been increased to machine speed and that the Tee Dee Inhibit Circuit has been enabled.

At the end of the machine speed emptying-out period, the FULL LED will extinguish and the Character Rate will drop smoothly (not abruptly) back to its preset, slower than machine speed Character Rate.

SECTION IV - PROGRAMMING THE REGENERATOR SECTION

Assuming that the MPC-1000R/TSR-500D is to be used for Radio RTTY communication (5 level Baudot), program the UARTs via the 8 pole DIP switch (S3):

SWITCH POLE	FUNCTION	MODE	SWITCH POSITION
8	NB1	Zero	LEFT
7	NB2	Zero	LEFT
6	TSB	1.5	RIGHT
5	SBR	NO	LEFT
4	PRTY	NO	LEFT
3	RPT	NO	RIGHT
2	PHSG	OFF	LEFT
1	PRLD	YES	RIGHT

UART CODING (NB-1 & NB-2) POLE 8 & 7

The Regenerator Section of the TSR-500D consists of a pair of Universal Asynchronous Receiver/Transmitters (UART), which may be programmed for 5, 6, 7 or 8 level codes via poles 7 and 8 of Switch S3.

These poles are identified as NB-1 and NB-2. The coding chart for NB-1 and NB-2 is etched on the PC board. For five level Baudot coding, NB-1 and NB-2 are both switched to ZERO (LEFT).

TOTAL STOP BITS (TSB) POLE 6

When programmed for a five level code, some UARTS permit the total number of Stop Bits to be set to 1.5, instead of the more common 1.0 or 2.0 character units.

This permits a character unit coding of 7.5, instead of 7.0 or 8.0.

The TSR-500D has been designed with an Automatic Stop Bit Length Select circuit.

When Pole 6 is programmed to the RIGHT for a 1.5 CU Stop Bit, the UARTs are programmed for a 1.5 CU Stop Bit when the TSR-500D is in SEND and for a 1.0 CU Stop Bit when the TSR-500D is in RECEIVE.

Selecting Pole 6 to the LEFT provides a 1.0 CU Stop Bit in both Send and Receive.

To permit a 1.5 CU Stop Bit in both Send and Receive, remove the diode directly below the U3 UART and change the 100K resistor at R39 to a 10K, 5% resistor.

RECEIVED STOP BIT REQUIRED (SBR) POLE 5

Switch pole 5 sets the SBR (Stop Bit Required). Normally, it is best to leave this function in the NO position. There is no reason to force the UART to dump a good character just because the Stop Bit was not detected.

With the high redundancy of the English and Spanish languages, it is always better to print a character, even if it is wrong, because the automatic Stop Bit generated by the UART will prevent the local teleprinter from losing signal synchronization.

PARITY SELECT (PRTY) POLE 4

Switch pole 4 permits selection of PARITY, a function not normally used in Radio TTY communication. This switch should be left in the NO position.

If Parity is required, consult the manufacturer's spec sheet on the particular UART installed in the TSR-500D.

Most Uarts select Parity in the following way:

NP	ESP	MODE
Ø	Ø	ODD
Ø	1	EVEN
1	Ø or 1	NO

PRELOAD AND RECIRCULATE (PRLD & RPT) POLE 3 & 1

Switch poles 1 and 3 provide Preloading and Recirculation of the Memory section. Since these positions are over-ridden by the front panel toggle switches, both of these switches MUST be in the RIGHT position: REPEAT-NO and PRELOAD-YES.

PHASING (BLANK-LTRS) PULSES (PHSG) POLE 2

Programming the PHASING function ON will provide an automatic generation of the BLANK character when the MPC-1000R is in SEND and the Memory section is empty. This BLANK character may be changed to a LTRS character by removing the jumper in the BLANK location and inserting a 15 ohm resistor in the LTRS location just to the right of it.

The BLANK character has an advantage over the LTRS character, since the case state (FIGS or LTRS) of the receiving teleprinter will not be changed by receipt of the BLANKS character.

The LTRS character option has been provided for commercial users that require Phasing Pulses (single Start pulses) during periods of inactivity to maintain synchronization of their crypto equipment.

The PHASING option (BLANKS or LTRS) may be inhibited entirely by switching Pole 8 of the UART program switch to OFF (LEFT) position or by grounding the rear panel PHASING connector. It is automatically inhibited when the MPC-1000R is in the REC mode or when the TID-100 is enabled.

The repetition rate of the BLANK (or LTRS) character is determined by the setting of the CHARACTER RATE adjustment pots. One pot is board-mounted on the TSR-500D assembly and the other is on the rear panel of the MPC-1000R.

VARIABLE CHARACTER RATE (R74)

Character Rate is normally set for some rate less than machine speed.

Its sole purpose is to lengthen the Stop Bit duration of each regenerated character as it is transmitted, smoothing out the signal at the receiving teleprinter. This slower character rate does not change the basic baud rate of the outputted signal.

As an example, a 45.45 Baud signal that normally has a speed of 60 WPM (at machine speed), may have its Character Rate slowed to 40 or 45 WPM by merely lengthening the stop pulse on the end of each character.

A dual one-shot circuit at U22 provides this "long stop" pulse.

With a slower character rate, the main memory section may be filled more easily, and should this happen, the Character rate is automatically increased to full machine speed.

At the same time, the Input FIFO element that normally provides Word Correction comes on-line as an overflow FIFO and its entire 40 character storage may be used in the normal mode.

When this condition occurs, the front panel FULL LED will light, indicating to the operator that he has filled the main memory and is outputting the stored data at machine speed.

It also indicates that if he is inputting at a faster rate than the output rate and that the Input FIFO has come on-line as an overflow buffer.

Whenever the FULL LED is lit, the TEE DEE Inhibit circuit is also enabled and may be used to inhibit a tape pulling Tee Dee or to provide an aural or visual alarm.

NOTE: If any difficulty is experienced with dropping an occasional character while recirculating at machine speed, increase the value of R73 (20K) to 27K. This will slow down the spoon-feeding rate of the Dual One-Shot U22 when operating at machine speed.

This is also an effective way of stretching the time duration of the Stop Bit and may be used to generate long Stop Bits should the requirement arise. The higher the value of R73, the longer the Stop Bit will be. A 27K resistor at R73 will provide a Stop Bit length of approximately 2.0 when putputting at machine speed.

SECTION V - DUAL CLOCK

The dual-clock is crystal-controlled at 60.000 KHz. Two identical divider sections divide this frequency down to those frequencies required by the UART's input and output clock ports for operation at the various Baud rates.

The front panel speed select switches are calibrated in terms of Baud:

SWITCH CAL	ACTUAL BAUD	SPEED - WPM
45	45.45	60 (61.3)
50	50.00	66.6
57	56.88	75
75	74.2/75.0	100/106
110	110.00	100/ASCII

When the MPC-1000R is in REC, Clock 1 provides the SIGNAL speed clock frequency to the input clock port of the UART regenerator (U3). Clock 2 provides the LOOP speed clock frequency to the output clock port.

When the MPC-1000R is switched from REC to SEND (locally or remotely), Clock 1 and Clock 2 are interchanged at the UART by the bilateral steering section. The input and output data lines are also interchanged at the Uart's data ports simultaneously.

This switching action permits an incoming signal to be up-converted to a faster teleprinter during REC, and the teleprinter's faster keyboard signal to be down-converted to the slower signal rate during SEND.

SECTION VI - TEST POINTS (TSR-500D)

Test points have been provided on the TSR-500D assembly to aid in trouble shooting.

TP-1: CRYSTAL OSCILLATOR OUTPUT

The oscillator circuit is comprised of a Statek "tuning-fork" type quartz crystal and a CMOS 4007 dual complementary pair plus inverter. This type of oscillator requires very low current and often requires two or three seconds to start oscillating after turn-on. The nominal frequency of the crystal is 60.000 KHz ±0.05%.

TP-2: CLOCK 1 OUTPUT

The frequency at TP-2 is the output of the BCD/N dividers U18 and U19 as programmed by the SIGNAL Speed Select switch located at S1.

TP-3: CLOCK 2 OUTPUT

The frequency at TP-3 is the output of the BCD/N dividers U20 and U21 as programmed by the LOOP Speed Select switch located at S2.

Clock 1 and Clock 2 should output the following frequencies, depending on the setting of their respective speed switches:

45 Baud (60 WPM)	732 Hz.
50 Baud (66 WPM)	800 Hz.
57 Baud (75 WPM)	909 Hz.
75 Baud (100 WPM)	1200 Hz.
110 Baud (100 WPM ASCII)	1765 Hz.

TP-7: UART INPUT CLOCK

The frequency at TP-7 is the Input Clock to UART #1 (U3) at the output of the bilateral steering section. In REC, it is Clock 1 and in SEND it is Clock 2.

TP-4: UART OUTPUT CLOCK

The frequency at TP-4 is the output Clock to the UART (U3) at the output of the bilateral steering section. In REC, it is Clock 2 and in SEND it is Clock 1.

In PRELOAD, TP-7 and TP-4 will both have Clock 1 signals when the MPC-1000R is in REC. When in SEND, both test points will have Clock 2 signals.

In RECIRCULATE, both test points will have Clock 2 in REC and CLOCK 1 when in SEND.

Since Uart #1 is being clocked by Clock 1 when the MPC-1000R is in SEND/RECIRCULATE, and the local teleprinter is normally geared to match Clock 2, a second Uart (U2) has been provided whose input clock is always Clock 1 and output is always Clock 2.

During SEND/RECIRCULATE (and RECEIVE/PRELOAD), the local teleprinter will copy the outgoing-recirculated signal at Loop Speed (S2) although the signal is being outputted at whatever Signal Speed has been selected by S1.

TP-5: UART DATA INPUT LINE

This test point is the same as pin 20 on the Uart #1, which is the DATA INPUT port. In REC, it will contain the unregenerated incoming signal, and in SEND, it will contain the unregenerated signal as originated at the local teleprinter, Tee Dee, etc.

TP-6: UART DATA OUTPUT LINE

This test point is the same as pin 25 of the Uart #1, which is the DATA OUTPUT port. In REC, it will contain the regenerated incoming signal, and in SEND, it will contain the regenerated outgoing signal from the local teleprinter, Tee Dee, etc.

TP-8: SPACE CAL

A ground to this point will force the AFSK tone keyer into the Space condition, if the rear panel REGEN ON/OFF switch is in the ON position.

TP-9: TONE ENABLE

This TP goes high on SEND, i.e., +5 volts, and may be jumpered to the TMS-100 Tri-Mode Tone Selector assembly at the rear panel to provide an automatic turn-on of the internal Tone Keyer when the MPC-1000R is put in SEND. To accomplish this action, the jumper wire on the TMS-100 must be removed.

SECTION VII - UART NUMBER TWO

UART No. 2 (U2) provides local copy when the MPC-1000R (and TSR-500D are in the Receive-Preload and Send Recirculate modes.

The Input Clock of UART No. 2 is ALWAYS Clock 1, i.e., Signal Speed.

The Output Clock of UART No. 2 is ALWAYS Clock 2, i.e., Loop Speed.

It is automatically utilized whenever the signal being processed by Uart No. 1 (U3) and the FIFO Memory Section is operating at Signal Speed, which normally would not be copiable on the local teleprinter, which is operating at Loop Speed.

Its function is to up-convert Signal Speed signals to the baud rate of the local teleprinter.

It also provides local teleprinter copy on incoming signals when the terminal unit is in Receive and the Memory Section is in Re-circulate.

This permits a previously stored CQ to be held in the Memory, while the operator switches the TU to Receive and listens for a QSL.

If a QSL is not received, switching the terminal unit back to SEND permits the previously preloaded CQ to be transmitted again without the need for preloading the Memory a second time.

SECTION VIII - WORD CORRECTION

Unless specifically inhibited by installing Jumper X6 on the TSR-500D board, the TSR-500D provides keyboard-controlled Word

The Word Correction circuitry functions only when the terminal unit is in SEND.

Whenever a word is generated by the local keyboard, the entire word is entered and stored in the input FIFO (U8). It is transferred as a complete word when a SPACE character is generated by the local keyboard.

If the word entered is correct, it will be automatically transferred when the keyboard operator "spaces" and goes on to the next word.

If the word is incorrect or mis-spelled, it may be erased from the Input FIFO by the operator merely sending a BLANK character from the local keyboard.

If SBR (Stop Bit Required) has been set to NO, opening the loop via the BREAK button will also erase the unwanted word.

The Space-Shift function is accomplished by SPACE character recognition in U12.

The Blank-Erase function is accomplished by BLANK character recognition in U13.

With SBR set at NO, opening the loop (by pressing the keyboard BREAK button) fakes the input register of the UART into accepting a BLANK character. This Blank character will be shifted into the Input FIFO and perform the Word Erase function. The UART will not accept a second BLANK character in this manner until the loop has been restored to Marking and broken again a second time.

With SBR set at YES, the UART will reject the open condition when it checks for a valid Stop Bit and finds the loop still in a Space condition.

Although using the BREAK button to generate a BLANK character for Word Erase will work, breaking the loop will let the teleprinter's typing unit run open if it is connected in series with the keyboard, and the result may be printed garble.

A rear panel WORD Erase connector has been provided for the operator who does not want keyboard erase with a BLANK character, or in the event that the local teleprinter does not have a BLANK character key.

To inhibit keyboard control of Word Erase, remove CR2 (1N4148) from the TSR-500D board.

A contact closure to ground at the rear panel Word Erase connector (J20) will provide a Clear signal to the Input FIFO (U8). The front panel CLEAR switch will clear all of the FIFOs.

The Word Correction circuitry is automatically inhibited by CR14 and CR15 whenever the main Memory section fills completely, permitting the Input FIFO to come on-line as a standard 40 character storage element.

SECTION IX - AUTOMATIC WORD STORAGE OVER-RIDE

Whenever the TSR-500D is in SEND, the input FIFO is used as a Word Storage FIFO and is controlled by the receipt of a Space or Blank character generated by the local keyboard or Tee Dee. This is Word Correction.

When pulling tapes without Space characters, the input FIFO would normally load up with forty characters and then be over-run. To prevent this from happening, an Automatic Word Storage Over-Ride circuit (consisting of C25, R85, C18 and C19) has been provided.

Whenever the input FIFO "flags" that it has accepted 39 characters and is about to be over-run, it automatically transfers its contents to the main Memory Section, thus making room in its 40 character memory for additional data.

SECTION X - AUTOMATIC MEMORY CLEAR

Without Automatic Memory Clear, the Memory Section of the TSR-500D would self-load with 200 random characters every time the terminal unit is initially turned on.

If not cleared manually by the front panel CLEAR switch, these 200 characters of garble would output at machine speed to the local teleprinter.

A 10 MFD capacitor at C20 holds down the Memory Reset line for a few hundred milliseconds at turn on, thus providing a cleared memory at turn-on.

SECTION XI - TEE DEE INHIBIT CIRCUIT

The TD INHIBIT circuit is an open collector transistor switch, 2N697 (Q4).

This circuit is not current-limited within the terminal unit, but the collector curcuit does contain a polarizing diode.

Current limiting of this circuit is normally accomplished by the impedance of the external relay, used to control the TD solenoid. This relay is not furnished by Dovetron, and any fast 12 or 24 VDC relay is adequate. The external relay should have a despiking diode across its solenoid. If 110 VDC switching is required, the 2N697 may be replaced with a 2N3439 or similar high voltage transistor.

SECTION XII - PARALLEL DATA OUTPUT OPTION

All eight parallel data lines of the Memory section are available for expansion to peripheral equipment via a 16 hole pattern located under FIFOs U5, U6 and U7.

When FIFOs are not installed in these locations, jumpers or low-resistance resistors are factory-installed for circuit continuity.

SECTION XIII - VARIABLE FEATURES

Many variable features have been provided on the TSR-500D assembly.

SPACE CAL may be had on J2-7 by installing Jumper X1 and removing Jumper X2 (which provides Word Erase at the rear panel).

DATA INPUT is normally considered to be Mark High and Space Low. The Data Input line may be inverted at Jumper X3. Cut out the etch and install jumper, bringing inverter U24 into the circuit.

The input FSK line is factory configured for EIA RS-232C polarity, Mark Low and Space High. This polarity may be reversed to accept MIL 118C by removing Jumper BC and installing Jumper AC at the output of the Inverter U16.

DATA OUTPUT is normally configured as Mark High and Space Low. Its polarity may be reversed at Jumper X4, which brings inverter U23 into the output circuit.

The AFSK KEYER is normally configured for EIA-232C polarity of

Mark Low and Space High. Changing the jumper at X5 changes polarity to the MIL 188C configuration of Mark High and Space Low. Adding R60 (1K) reduces output at J2-9 from ±12 volts to ±6 volts.

SECTION XIV - CHARACTER RATE CONTROLS

Two Character Rate controls have been provided on the MPC-1000R.

One is located on the TSR-500D assembly (R74) and should be set full CCW.

The rear panel Character Rate control (located directly above the AUDIO INPUT connector) will now set the preferred Character Rate. Full CCW (as viewed from the rear of the TU) produces normal machine speed.

To assure smooth UART operation when recirculating, if slower than machine speed operation is not desired, set the Character Rate just slightly below normal machine speed.

SECTION XV - REGEN ON/OFF SWITCH

With the rear panel REGEN ON/OFF switch in the OFF position, the MPC-1000R functions as a standard MPC-1000C and the PHASING and WORD ERASE connectors, and the Character Rate control are inoperable, as are the front panel Speed Switches, the Memory Section Switches and the EMPTY and FULL LED indicators.

With the REGEN ON/OFF switch in the ON position, all incoming and outgoing data (except MS reversals) are processed thru the TSR-500D regeneration circuits.

SECTION XVI - MS REVERSALS (RY GENERATOR)

When the MODE switch is in the MS-REV position (in both SEND and REC functions), the AFSK tone keyer outputs mark-space reversals, whose baud rate is dependent on the setting of R163 on the main board.

When in DIV OFF, MO, MS (Normal operation) or SO, and in REC function, the EIA and MIL FSK outputs are regenerated, since they are driven by the regenerated high level loop keyer on the main

board. A 3rd FSK signal (+12 Mark and -12 Space) is available at REGEN FSK (J8) at the rear panel.

When in SEND, EIA and MIL FSK outputs are not regenerated but the REGEN FSK output at J8 is regenerated. If the Memory section is empty and no data is being entered, this REGEN FSK will output the PHASING pulse (selectable BLANKS or LTRS character), if the Phasing switch at S3 (pole 8) is ON, and if the rear panel PHASING port has not been grounded.

SECTION XVII - REMOTE CONTROL

The front panel REC-SEND switch may be left in the REC position, and the MPC-1000R may be remotely switched to SEND by applying +5 to +15 volts to the rear panel LOCK connector.

A regulated source of +15 volts has been provided at the rear panel for this purpose and is current-limited to 3 mils.

Do not attempt to use this voltage source for external relays, etc.

If the +15 volt is shorted, or over-loaded, no damage will occur within the terminal unit. The accidental application of high voltages to this port from an external source will not damage the the terminal unit either.

The impedance protection of this +15 volt source is accomplished by a 4.7K resistor mounted on a terminal strip next to the 600 ohm audio input transformer.

A Remote Interface (RIF-100) option is available to permit manual selection of either the standard remote control configuration or a "ground for Send" configuration.

SECTION XVIII - DAS-100 DIGITAL AUTOSTART MODULE

The DAS-100 Digital Autostart Module replaces the CMOS 14011 originally installed in location U11 on the TSR-500D board. It monitors the output of the parallel receiver register of UART U3. When it recognizes a SPACE character, it sends a start command to the autostart circuits on the main board via a wire connected to its output port (AUTO).

This digital autostart mode of operation also functions when the

rear panel REGEN ON-OFF switch is in the OFF (down) position.

Although the digital autostart is always connected to the autostart circuits, its commands are over-ridden by MARK and FSK autostart commands when the front panel switch is in the MARK or FSK position.

With the Character Recognition pot (R1) set to mid-range, at machine speed three space characters must be recognized to initiate autostart. At slower keyboard speeds, a single space character can initiate autostart, since the single output register of the UART will contain the Space character information for a longer time period.

For proper operation, the terminal unit Signal Speed Select switch must be set to the speed of the incoming signal and the terminal unit's "sense" switch must be set for the right polarity, i.e., Normal or Reverse.

If up side down, the DAS-100 may turn on with a FIGS character, but normally not enough FIGS characters are sent in straight text to allow the DAS-100 threshold circuits to charge up.

The ØØ line from the DAS-100 module permits the word storage FIFO of the TSR-500D to hold the incoming data in memory until the DAS-100 has started the local teleprinter and the printer's motor has had sufficient time to come up to full speed.

Setting R1 to extreme clockwise requires a string of 10 or more Space characters sent at machine speed to initiate turn on, thus providing a limited form of selective calling.

If the TSR-500D is equipped with the SCL-100 Selective Calling module, the DAS-100 monitors the incoming signal and in the event that a Turn-Off code is not received by SCL-100, will start a time out event after loss of a copiable RTTY signal. It will also initiate time out if the incoming signal inverts or changes baud rate.

Normal installation (without SCL-100 option) is: AUTO connected to E-16 on main board (feed thru directly in front of capacitor C57) and ØØ connected to corresponding ØØ on main board (directly in front of K1 autostart relay). The module itself is plugged into socket U11 on TSR-500D board.

SECTION XIX - TMS-100 TRI-MODE SELECTOR

The front panel AFSK tone combination Select Switch controls the

state of two bilateral CMOS switches (14066) mounted on the TMS-100 board at the rear panel. This card contains six multi-turn Cermet potentiometers, two of which are selected by each position of the front panel AFSK Tone Select switch.

The three different combinations of Mark-Space-Shift tones are completely independent of each other, and provide the operator with a convenient method of quickly changing AFSK shifts.

In position C, R15 and R16 locations have been provided to permit installation of resistors to permit generation of lower than normal Mark and Space tones for wire line modem use. To utilize R15 and R16, open the circuit etch on the top of the TMS-100 board and install appropriate resistors. Metal film resistors are recommended for good long term stability.

SECTION XX - AFSK TONE INHIBIT OPTION

As supplied by Dovetron, the MPC-1000R outputs the AFSK tones from the internal AFSK Tone Keyer in both the Receive and Send modes, which in turn, permits RY generation in both modes.

Provisions have been made to permit the generation of these AFSK tones only when the TU is in SEND.

This permits:

1) The front panel SEND switch to be effectively used to turn a SSB transmitter ON via its internal VOX circuitry. When the TU is put in SEND, the AFSK tones are turned on, which are sensed by the transmitter's VOX circuit, which in turn, immediately turns on the transmitter or transceiver.

2) Some transceivers pass audio from the audio (microphone) input stages thru to the audio output stages even during Receive. This is a function of their particular VOX circuitry. The AFSK tone Inhibit feature will silence the AFSK tones during these periods of Receive and prevent the AFSK tones from leaking thru to the audio output.

To inhibit the AFSK tones during Receive, remove the jumper installed between the TONE CONTROL E-Point and the +15 VDC E-Point on the left side of the TMS-100 card. Connect a wire between the TONE CONTROL (or the open E-Point next to it) and the anode of CR54 on the TU's main board.

TP9 on the TSR-500D board may also be jumpered to the Tone Control E-Point to provide +5 volts on Send.

With the AFSK tones inhibited during Receive, the RY Generator will no longer supply Mark-Space Reversals to the local teleprinter when the MPC-1000R is in Receive.

SECTION XXI - KOS-100 KEYBOARD-OPERATED-SEND OPTION

The KOS-100 is hardwired into the MPC main frame and interfaces to the TID-100 Station Identifier thru a 16 pin header and socket interconnect.

The KOS-100 permits the terminal unit and companion transmitter to be put into the SEND mode by merely depressing one of the keys of the local teleprinter.

Opening the loop momentarily (BREAK button, etc.) puts the terminal unit into Preload while the TID-100 is identifying.

A variable time out control permits 1 to 10 second time out (return to receive mode) after the Memory Section has emptied.

SECTION XXII - RIF-100 REMOTE INTERFACE OPTION

The RIF-100 may be used to invert the remote LOCK line from +V to Lock to a Ground to Lock configuration. It also provides a convenient method of KOS control when used with teleprinters or electronic keyboards that provide a ground closure each time a key is depressed.

SECTION XXIII - SCL-100 SELECTIVE CALLING WITH TURN-OFF OPTION

The SCL-100 may be plugged into a TSR-500D Regenerator assembly and provides Sel-Cal Turn On with receipt of a 4 character code. The Turn Code is programmed into the SCL-100 via multiple DIP slide switches. The TURN-OFF code is a four character sequence and this character (single character) is also switch selectable. The SCL-100 is interconnected to the DAS-100 Digital Autostart module in such a way to provide automatic turn off in the event of signal loss or baud rate change.

SECTION XXIV - BALANCED TONE KEYER OUTPUT

The standard AFSK tone keyer output is 500 ohms, unbalanced.

A balanced AFSK tone keyer output is available as an option and is field-installable.

The recommended audio transformer is a Triad TY34X or equivalent.

Installation should be made per Dovetron print 75120A or 75143.

Note: In order to provide a balanced (in addition to isolated) configuration, the secondary's center-tap is grounded. This is the RED wire. It is mandatory that this center-tap be lifted from ground, if this output is to be used to drive a single-ended (grounded) audio input stage of a transmitter.

If the ground is not lifted, operating into an unbalanced line will put a short across half of the transformer's secondary winding.

Unless specified differently, the balanced output characteristics are:

600 ohm, balanced, Ø dbm.

When making a field installation, two convenient ground locations for the Red and Green wires will be found next to E55, which is also Ground.

SECTION XXV - SSD-100 SOLID STATE DISPLAY OPTION

The SSD-100 is a solid state replacement for the 2 inch CRT display. Since it operates from low voltage (+5 and +15 volts), it also obviates the requirement for the CRT's high voltage power supplied and associated circuitry.

It consists of a dual-bargraph configured as an RTTY tuning cross and utilizes rectangular high brilliance red LEDs mounted behind an optical filter. A high-low intensity circuit is controlled by the front panel mounted photocell. An internal photocell mounted behind the optical filter may also be used.

A single LED in the upper left quadrant of the cross display indicates the presence of time dispersive multipath distortion.

Two LEDs at the apex of the cross display indicate acquisition of

signal (AOS) and proper tone selection.

The SSD-100 may be retrofitted into all MPC terminal units originally equipped with CRT displays.

SECTION XXVI - TID-100 TELEPRINTER IDENTIFIER OPTION

If installed in the MPC-1000R, the TID-100 is mounted between the main board and the TSR-500D Regenerator assembly.

Output 1 is connected to E56 on the TU's main board. The START line is connected to J9 at the rear panel (CW ID). A momentary ground at J9 initiates the TID-100, which keys the CW ID circuit in the TU at approximately 10 WPM. This configuration provides narrow shift CW ID.

Output 2 is used to key the Memory Empty LED and give a front panel indication that the TID-100 is functioning during its operate cycle.

SECTION XXVII - EXTERNAL PERIPHERALS

Rear panel connectors have been provided for interfacing data peripherals, such as microprocessors, crypto equipment, code converters, selective calling units, etc.

These connectors are labelled REGEN IN and REGEN OUT, and have a jumper installed in them inside the TU.

The FSK drive line to the AFSK tone keyer and the AFSK Keyer lines are also available at the rear panel and have an internal jumper between them.

These jumpers may be removed (with the REGEN ON/OFF switch in either position) for peripheral interfacing.

All four of these lines are impedance buffered to protect the internal circuits from over-stresses from outside.

SECTION XXVIII - ADDENDA (MAIN BOARD CHANGES)

The main PC board in the MPC-1000R is identical to the main board that is used in the E Series MPC-1000C and the main board print

(75103-E) applies with a very few minor variations. The variations are called out on the MPC-1000R REGENERATIVE FUNCTION DIAGRAM (MPC-1000C/TSR-500D/TMS-100/TID-100). Information on this print supercedes any conflicting information in the MPC-1000C manuals or prints.

The following applies to all MPC-1000R terminal units:

1) R5 has been changed from 10K to 270K. The PC board input gain pot that controls the feedback of z2 is factory set to mid-range.

2) R143 and R146 have been changed from 2.0K to 2.49K, and expand the tone range of the AFSK tone keyer.

3) R206 and R207 were single-turn tone adjustment pots on the rear panel. They have been replaced by the TMS-100 Tri-mode Selector assembly.

4) The Mark and Space VFO timing capacitors are 0.056 Mfd polycarbonates, similar to those used in the MPC-1000C.

5) R179A has been changed from 1.5 Megohm to 1.0 Megohm and permits the CRT dot to deflect all the way off of the CRT's screen. CR53 is not installed. See page 18 of MPC-1000C Section.

6) CR38 has been replaced with a 2K, 5%, 1/4 watt carbon-film resistor and provides harder keying for the high level loop keyer.

7) Dual Diversity connectors are provided on the rear panel of the MPC-1000R. These connectors may be used for an external CRT display by moving the wires in E53 and E54 to E51 and E52.

DOVETRON TID-100 TELEPRINTER IDENTIFIER

OPERATING INSTRUCTIONS

The TID-100 Teleprinter Identifier may be programmed for Morse, Baudot or ASCII code generation.

Programming instructions for Morse Code generation are etched right on the TID-100 PC board.

Instructions for programming the TID-100 in either Baudot or ASCII codes are contained on the TID-100 print 75128A.

The speed at which the characters are generated are controlled by a potentiometer (R1) mounted right on the PC board. For Morse Code, this potentiometer is normally set full CCW and provides a CW speed of approximately 10 WPM.

If used for Baudot or ASCII code generation, R1 must be adjusted for the desired baud rate.

Z1 is a quad two-input Nand gate. The first two sections are used as a clock and the last two sections are used as a set-reset latch.

This IC (Z1) should be unbuffered CD4011 or MC14011. Buffered units will have the suffix B (example: MC14011BCP) and should not be used. The RCA CD4011AE is an excellent choice.

Output 1 is configured as an open-collector transistor switch and may be used to key the CW ID line of an RTTY Terminal Unit. It will not key a dry circuit and is not current limited.

Output 2 is also an open-collector transistor and may be used to key an external (or front panel) indicator. It is used this way in the Dovetron MPC Series terminal units.

The Phasing Inhibit (PI) lines are provided to shut off the Phasing Pulse (Blank Diddle) of the TSR-500D during the identifying period.

To initiate a code sequence, a momentary ground is applied to the START line, which sets the Latch circuit and enables the Clock circuit.

The Clock circuit runs until the Latch circuit is reset by a pulse from Z2/Z3 (pins 13 or both) via C3. While the Clock is running, the Clock LED (DS1) will flash with each Clock pulse.

The coded output from the Matrix drives the Code Keyers (Q1 and A2) via DS2.

It is normal for DS2 to extinguish before DS1, since the 128 character matrix is not usually fully programmed.

Power requirements are +5 to +18 volts, 1 Ma. standby, 7 Ma. operating.