

# DOVETRON

## MULTIPATH CORRECTION & IN-BAND DIVERSITY

### DEFINITIONS

**MULTIPATH CORRECTION:** The ability of a terminal unit to re-establish the correct transitions (beginnings and endings) of the incoming Mark and Space pulses, when they have been stretched, smeared and over-lapped on each other by the time delays created by Multipath Propagation.

**IN-BAND DIVERSITY:** The ability of a terminal unit to automatically copy Single-Channel, i.e., Mark-Only or Space-Only signals, such as caused by Selective Fading, which is a form of Multipath Distortion.

### PURPOSE

When a RTTY signal is transmitted thru the HF medium, the Mark and Space pulses are often distorted in TIME and FREQUENCY by a phenomenon known as Multipath Propagation. This simply means that the signals from the transmitter are arriving at the receiver over more than one path.

Since these paths are of different lengths, their propagation or transit times differ significantly. In the case of polar and equatorial side-paths, RTTY pulses can be delayed by as much as 95%.

This time discrepancy creates an apparent stretching of the Mark and Space pulse, because although the Mark pulse on the shortest path has terminated and the Space pulse has begun, the Mark pulse is still arriving (late) via the second (longer) path. When this common condition occurs, a terminal unit without Multipath Correction cannot differentiate between the "right" pulse and the "wrong" pulse, and at best produces a large quantity of bias distortion in its slicer and keyer circuits. Often when the pulses are stretched into an over-lap condition, they cancel each other in the terminal unit, which just contributes further to errors.

The Dovetron MULTIPATH CORRECTOR™ recognizes when a new pulse has started and when the old one should have terminated, even if the old one is still arriving via a longer path. A Multipath Combiner circuit prevents over-lapping pulses from cancelling each other within the terminal unit.

Multipath Propagation also produces a form of distortion called Selective Fading. If the Mark Pulse arrives at the receiver over two different paths exactly 180 degrees out of phase, the signal is highly attenuated or even cancelled at the antenna and in the receiver.

Dovetron's IN-BAND DIVERSITY design permits the terminal unit to automatically derive all the necessary information from one channel while the second channel is missing. In fact, a second psuedo channel is generated from the information present in the one remaining channel and both are processed thru the Multipath Corrector, which eliminates the bias distortion in the one remaining channel.

This ability to generate correct information from a single channel has been expanded by AC coupling the Dual-Assessor circuits directly ahead of the MULTIPATH CORRECTOR™ to permit generation of the psuedo channel even when one channel has been invaded by a CONTINUOUSLY interferring tone.

To overcome the FREQUENCY dispersive problems of Multipath Distortion, precise computer-designed Bessell-Function filters with their equal group-delay and transient-response characteristics are used in the channel and low pass filter circuits.

**DOVETRON**MPC-1000R REGENERATIVE RTTY TERMINAL UNIT

MPC-1000R/BASIC \*\* MPC-1000R/TSR-200D \*\* MPC-1000R/TSR-500D

The BASIC MPC-1000R is an expandable version of the MPC-1000C with a TMS-100 Tri-Mode AFSK Tone Selector, which provides three separate sets of front panel selectable AFSK Mark-Space tone pairs for the Phase-Continuous Tone Keyer.

The Standard range of these tone pairs is 1175 Hz. to 3200 Hz. One tone pair may be extended lower in frequency by adding two resistors to the TMS-100 Assembly.

When supplied as a BASIC-R, the internal TSR cables are secured in a TSR Adapter assembly. The front panel Speed Switches and Memory Controls are non-functional. MARK & FSK Autostart are standard.

A TSR-200D Teleprinter Speed Converter-Signal Regenerator Assembly may be mounted above the TSR Adapter and interconnected with a single short cable. In this configuration (MPC-1000R/TSR-200D), the front panel Speed switches select both the signalling baud rate and the output baud rate to the local teleprinter. The Memory Controls are non-functional, since the TSR-200D does not contain a memory section. Digital Autostart is provided by the TSR-200D Assembly.

A TSR-500D Teleprinter Speed Converter-Signal Regenerator Assembly may be mounted in a Basic-R by replacing the TSR Adapter assembly with a TSR-500D assembly.

This configuration (MPC-1000R/TSR-500D) provides Signal Regeneration, Speed Conversion, a 200 Character FIFO Memory, Keyboard-controlled Word Correction, Phasing (BLANK/LTRS Diddle), Variable Character Rate, Character Rate Over-Ride, Automatic Word Storage Over-Ride, Automatic Stop-Bit Length Selection, TEE DEE Inhibit and all the other functions of the TSR-500D Assembly.

The 200 Character Memory may be Preloaded and Recirculated with either off-the-air signals or with data generated from the local teleprinter.

Digital Autostart is available if the DAS-100 Digital Autostart Module has been installed in the TSR-500D.

The RIF-100 Remote Interface Module may be installed in all three of the "R" models to provide automatic switching between Transmit and Receive upon receipt of a keyboard generated ground closure. When used with keyboards that supply a "ground" as each key is depressed, a time constant circuit maintains the terminal unit in the Transmit (Send) mode while a message is being sent.

A KOS-100 (Keyboard Operated Send) module is also available, which puts the MPC-1000R/TSR-500D into Send whenever the TU is receiving data from the local teleprinter. Any keyboard signal actuates the KOS-100 automatically. If a TID-100 Station Identifier Assembly is also installed in the terminal unit, depressing the BREAK button on the keyboard will automatically put the TU into Send, trip off the Identification sequence and switch the TU to Preload, permitting data entry when the TID-100 is sequencing. Pressing the BREAK button during a transmission commands the TID-100 to "identify" at the end of the transmission automatically.

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## MPC-1000R MARK II

The latest addition to the Dovetron E-Series is the MARK II version of the ubiquitous MPC-1000R Regenerative RTTY Terminal Unit.

The MARK II is the logical combination of the MPC-1000R and the BBP-100 Binary Bit Processor.

The BBP-100 provides three functions:

- 1) High performance axis restoration,
- 2) Selectable Bandwidth, and
- 3) Hysterisis Multipath Correction.

The combination of these three functions permit operation very close to the theoretical error-rate curve.

Axis restoration is accomplished with a "track and hold" logic circuit that permits accurate zero-crossing determinations on very weak and poor quality signals.

The selectable bandwidth feature permits optimization of the SNR of the terminal unit to the baud rate of the incoming signal.

A three position front panel switch permits operator selection of one of three active bandwidth modules on the BBP-100 assembly. Two additional bandwidth modules are stored in passive sockets.

The active bandwidths are 45.45, 50.0 and 74.2/75.0 baud. The passive bandwidths are 56.88 and 110 Baud. Other bandwidth combinations are available on request.

The design of the bandwidth switching circuit is such that a new bandwidth may be selected during signal reception without introducing errors from switching transients or circuit response time.

The hysteresis-controlled Multipath Corrector circuit is fully automatic and corrects for bias distortion created by time/frequency dispersive multipath distortion.

In addition to the inclusion of the BBP-100, the front panel Mark and Space VFOs have been extended in range to include the commercial tone pair 1070 Hz - 1270 Hz.

A fifth position (marked SBR) on the Signal Speed Select switch normally selects the proper clock frequency for 110 baud (100 WPM) ASCII operation. When an SBR-100 Selectable Baud Rate module is installed on the TSR-500D board, a preset "privacy" Baudot baud rate may be selected. The SBR-100 also permits other than 110 baud ASCII operation.

The original DIGITAL position of the Autostart Select switch has been re-labeled SCL-DAS and provides control of the SCL-100 Selective Calling option and/or the DAS-100 Digital Autostart module.

A 115/230 VAC mains select switch is mounted internally at the rear panel for rapid mains interface.

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The MPC-1000R Mark II RTTY Terminal Unit contains a factory-installed BBP-100 Binary Bit Processor. This device provides front panel selectable bandwidth, a new method of axis restoration and a hysteresis mode of Multipath Correction.

Unless indicated differently on the tag on the top cover of the terminal unit, the three bandwidth positions are:

WIDE: 75.0 Baud, 100 WPM.

MEDIUM: 50.0 Baud, 66 WPM.

NARROW: 45.45 Baud, 60 WPM.

Two extra bandwidth modules are plugged into storage sockets at the left rear of the BBP-100 assembly: 57 Baud and 110 Baud.

The frequency range of the front panel VFOs has been expanded downward to 1000 Hz, permitting the use of 1275 Hz as a center frequency for a  $\pm 42.5$  and  $\pm 85$  Hz shift scheme. The landline modem tone frequencies of 1070 Hz and 1270 Hz are also tuneable.

The front panel photocell for CRT intensity control is omitted in the Mark II and the photocell that controls the intensity of the solid state cross display is mounted in the lower left quadrant of the SSD-100 display.

If equipped with a KOS-100 Keyboard Operated Send assembly, a Mark II KOS-100 board is installed. This Mark II version of the KOS permits the use of either a positive or a negative PTT circuit.

Since this KOS-PTT circuit will function with either polarity, it may also be used with current-limited (100 milliamperes maximum) AC circuits.

If equipped with a TID-100 Station Identifier, a Mark II version of the TID-100 is installed.

The new Mark II TID-100 shifts the keyed Mark tone downward, away from the Space tone channel. R8 (47K) determines the amount of downward shift and may be changed by individual operators to suit their own preference.

If upward shift (toward the Space channel) is preferred, move the blue wire connected to KOS E-Point 56 to KOS E-Point C at the middle (rear edge) of the KOS-100 assembly.

The Mark II DAS-100 Digital Autostart Module is AC coupled, which prevents a Space Character left in the output register of the UART from locking-on the Autostart relay.

The Mark II SSD-100 Solid State Cross Display module contains four plug-in 10 segment bargraph display modules.

The Mark II MPC-1000R also contains a 115/230 VAC power mains select switch, which is mounted internally on the rear panel.

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## MPC-1000CR REGENERATIVE RTTY TERMINAL UNIT

### E - SERIES

The MPC-1000CR Regenerative RTTY Terminal Unit is similar to an MPC-1000C, but contains a TSR-200D Speed Converter-Signal Regenerator assembly and a front panel Signal Speed Selection switch.

In addition to the MPC-1000C's MARK and FSK Autostart modes, a Digital Autostart mode is also provided and is front panel selectable.

The Signal Speed switch permits selection of 60, 67, 75 and 100 WPM Baudot and 110 Band (100 WPM) ASCII communication signal speeds, and is used to select the baud rate of the incoming and outgoing signals.

An 8 pole DIP switch on the TSR-200D assembly is normally used to set the Regenerator's output speed to whatever is required by the local teleprinter.

The front panel Signal Speed switch selects the baud rate of the incoming-outgoing signal.

A switch mounted on the TSR-200D assembly permits the front panel switch to simultaneously select both the input and output baud rates for straight-thru (no speed conversion) operation.

Whenever the MPC-1000CR is switched to SEND (locally or remotely), the TSR-200D is switched automatically from Receive to Send by solid state inversion of the two clocks.

When in the Send mode, the signal regenerated by the local teleprinter is regenerated (and speed converted if desired) to less than 0.5% bias distortion before being transmitted by the AFSK Tone Keyer.

The Regenerator Section (TSR-200D) may be programmed for 5, 6, 7 or 8 level operation, with or without Parity and with Total Stop Bit (TSB) selection. The 5 level Baudot code may be programmed for a 1.0 or 1.5 character unit Stop Bit. The 6, 7 and 8 level codes may be programmed for either 1.0 or 2.0 character unit Stop Bits.

The Regenerator Section may also be set to reject any received character that does not include a valid Stop Bit.

When the Regenerator Section is inhibited by another board mounted switch, the MPC-1000CR functions as an asynchronous MPC-1000C.

During severe propagation conditions or very weak signals, the error of the MPC-1000CR is at least 10 times better than MPC-1000C.

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## ADDITIONAL FEATURES - E-Series

The latest E-Series represents six years of development and refinement and include the following additional features:

SOLID STATE CROSS DISPLAY The SSD-100 Display consists of a plug-in module with a cross pattern of light emitting diodes. Additional LEDs in three quadrants of the cross display indicate Multipath Distortion, loop current and Signal Loss. A photocell in the fourth quadrant automatically controls the light intensity of the display.

AUTOMATIC THRESHOLD LEVEL Upon acquisition of an incoming signal, an electronic tracking circuit sets the threshold level of the terminal unit, permitting "deep-tracking" during flat fades into the noise. A similar circuit compensates for signal-power loss when operating in single channel (Mark only or Space only) modes.

KEYBOARD ACTUATED AUTOSTART Depressing the BREAK button at the local keyboard actuates the FSK Autostart circuit, turning on the local teleprinter's motor and permitting retrieval of messages left in the typing unit during unattended operation.

AUTOSTART DELAYED TIMEOUT FSK Autostart time-out is automatically inhibited during data entry and provides a 20 second time-out period after the last character is sent, providing adequate time for station identification procedures.

INPUT AMPLIFIER PROTECTION High speed diodes protect against high voltage transients generated by external audio switching circuits and comm-center patch panels.

TONE KEYSER OUTPUT A 0 dbm transformer-coupled AFSK output option is available on special order (Standard in C/DK and CR/DK units).

ADJUSTABLE HIGH LEVEL NEUTRAL LOOP Internal strapping provides either 40/60 or 20 mil 120 VDC neutral loop operation.

POLAR KEYSER OPTIONS The DK series offers both Polar and Neutral high level keyers. Polar voltages are  $\pm 48$ ,  $\pm 50$ ,  $\pm 60$  and  $\pm 80$ . Polar currents available are 20, 40 or 60 mils. Other levels are available on special order. The PKC-100 Polar Keyer option provides high level polar keying in the C and R Series.

GOLD PLATED SOCKETS All integrated circuits and transistors are socket mounted in side wipe sockets for ease of maintenance and service.

KEYBOARD OPERATED SEND The KOS-100 option permits Send/Receive control of the terminal unit and peripheral transmitters and receivers from the keyboard of the local teleprinter.

SELECTIVE CALLING The SCL-100 Sel-Cal option may be plugged into the TSR-500D and provides four character turn-on and turn-off of local teleprinter.

DIGITAL AUTOSTART The DAS-100 Digital Autostart option provides a character recognition, speed determining form of autostart that is not actuated by non-RTTY interfering signals.

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## TSR-200D TELEPRINTER SPEED CONVERTER-REGENERATOR

### SIGNAL REGENERATION, SPEED CONVERSION & DIGITAL AUTOSTART

The TSR-200D is a 5.0" X 6.25" printed circuit board assembly that mounts inside of the MPC-1000CR (Neutral Keyer) and MPC-1000CR/DK (Neutral-Polar Keyer) RTTY Terminal Units. It may also be installed in the MPC-1000C, MPC-1000C/DK and MPC-1000R (Basic-R) Terminal Units.

The TSR-200D provides three functions: Signal Regeneration, Speed Conversion and Digital Autostart.

All incoming and outgoing signals are regenerated to less than 0.5% bias distortion, significantly lowering the error rate of badly distorted or weak RTTY signals.

The Dual Crystal-Controlled Clock permits UP-DOWN Speed conversion between the standard communication baud rates (45.45, 50.00, 57.88, 75.0 and 110).

The Digital Autostart section operates on both Character Recognition and Speed Determination principles and prevents false starts on up-side-down signals or on signals operating baud rates other than for which the Signal Speed switch has been set. It is practically impervious to false starts as normally caused by SSB, CW or noise interference.

The Regenerator Section is a CMOS Universal Asynchronous Receiver-Transmitter (UART) and may be programmed by a board-mounted switch for 5, 6, 7 or 8 level codes, with or without Parity, Stop Bit Verification and the total number of Stop Bits to be attached to the end of the regenerated character.

Stop Bit Verification, when enabled, requires that the UART receive a valid stop bit on each received character before the character will be regenerated.

Total Stop Bit (TSB) selection permits a 1.0 or 1.5 character unit Stop Bit to be affixed to the end of each regenerated character when the UART is programmed for 5 level Baudot operation.

When programmed for 6, 7 or 8 level operation, the Stop Bit selection circuit provides either a 1.0 or a 2.0 character unit Stop Bit.

The Speed Conversion feature may be enabled or inhibited with a board-mounted slide switch. When inhibited, both the input and output clock ports of the Regeneration Section are clocked from the Signal Speed section of the Dual Clock.

The Signal Regeneration circuit may be bypassed by a second board-mounted slide switch for straight-thru asynchronous operation.

The Digital Autostart feature functions regardless of the setting of the Signal Regeneration and Speed Conversion switches.

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BBP-100 BINARY BIT PROCESSOR

December 1, 1978

627 FREMONT AVE.

SOUTH PASADENA, CALIFORNIA 91030

**213-682-3705**

The two weakest links in the signal processing chain in an RTTY Terminal Unit are "bandwidth" and "axis-restoration".

Bandwidth concerns signal to noise ratio (SNR) and axis-restoration pertains to the terminal unit's ability to correctly establish the proper zero-crossings between Mark and Space. Most axis-restorers are baud rate limited and perform poorly when the Mark and Space pulses are stretched over each other by multipath distortion.

Dovetron has developed a new method of axis-restoration that includes automatic Multipath Correction and selectable bandwidth.

This Binary Bit Processor (BBP) is an integral part of the Dovetron Baseband terminal unit, which is an extremely high-performance commercial unit.

Although Dovetron had not planned to offer the BBP concept in the MPC Series, the recent development of the TEMPTEST Model MPC-1000T has made the BBP available on a single PC assembly that can be easily installed in any MPC Series terminal unit. The part number of this assembly is BBP-100.

When tested on weak, noisy signals, an MPC-1000C/BBP-100 combination showed an error rate improvement over a standard MPC-1000C of 34 times (3400%).

Rotten signals that were not readable on the standard TU were easily readable on the MPC-1000C/BBP-100.

The BBP-100 also incorporates selectable bandwidths of 45.45/50.00, 56.88, 74.2/75.0, 110 and 150 Bauds, which optimize the terminal unit for 60, 66, 75, 100, 106 and 200 WPM Baudot and 100 WPM ASCII operation.

Since the new method of Multipath Correction is fully automatic, the front panel (MPC) switch permits operator selection of any two of these bandwidths.

If the front panel switch is replaced with a "center-off" type of switch (Alco Part Number MTA-106E), three bandwidths may be selected, permitting the terminal unit to be optimized to the incoming baud rate.

Installation of the BBP-100 in a D or E Series MPC terminal unit is fairly simple. Remove 14 op-amps from their sockets, remove about a dozen capacitors from the mainboard, and snip out six resistors. The BBP-100 is plugged into the mainboard thru the now empty op-amp sockets.

In the earlier B and C Series units, six of the soldered-in op-amps must be replaced with 8-pin IC sockets to accomplish the plug-in interface between the mainboard and the BBP-100 assembly.\*\*

The BBP-100 will start showing up in production MPC terminal units in early 1979. A BBP-100K retrofit kit for existing units will be available in January 1979.

BBP-100K Retrofit Kit: \$145.00 Postpaid USA. ALCO MTA-106E SW: \$3.00 PP.

\*\*Note: To determine which Series a particular terminal unit belongs to, remove the bottom cover and check the board ID number. The "Series" is identified by the letter following the board number: A75100-D is D Series, A75100-B is B Series. Kits for B/C Series will include required sockets.  
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## KOS-100 KEYBOARD-OPERATED-SEND ASSEMBLY

The KOS-100 assembly is a 5.0" X 6.0" printed circuit board assembly that mounts inside the MPC Series terminal units.

Its function is to monitor the loop line between the terminal unit and the local teleprinter, the status of the Memory Section of the TSR-500D and the stat of the TID-100 Station Identifier.

When the TID-100 is installed with a KOS-100 aseembly, their logic is interconnected thru a 16 pin header assembly.

The KOS-100 normally ignores all space transitions on the loop line that are generated within the terminal unit. When it senses a space transition that was generated outside of the terminal unit by the local keyboard, Tee Dee, etc., it switches the terminal unit into Send. A variable time-out control on the KOS-100 permits a time-out period of 1 to 10 seconds. At the end of the time-out period, the terminal unit is switched back to Receive automatically.

This effectively provides Send/Receive control of the TU right at the local keyboard.

If a TID-100 is also installed, momentarily depressing the BREAK button on the keyboard (or opening the loop line) for 0.5 seconds switches the terminal unit to Send AND to Preload AND sends a start command to the TID-100, which immediately starts its identification sequence. At the end of the ID sequence, the terminal unit is switched back to Operate and any data entered into the memory during the ID sequence is outputted normally. The time-out sequence begins when the Memory Section is empty. If the Phasing Pulse has been enabled, it is automatically turned ON during the time-out period.

During a transmission with data in the Memory Section, the BREAK button may be depressed, entering a stored command in the KOS-100 to enable the TID-100 at the end of the transmission, i.e., when the Memory Section empties.

A momentary contact closure to ground at the rear panel CW ID connector immediately forces the terminal unit into Preload and starts the ID sequence. This feature permits the use of a "timer" to automatically insert ID sequences into transmissions at selected intervals.

The KOS-100 also provides a remote Lock signal to the rear panel LOCK connector whenever it has switched the terminal unit into Send. The standard Lock command is Ground-Send and Open-Receive and is intended for remote operation of a companion transmitter/receiver via their push-to-talk (PTT) lines.

An inverted Lock command may be provided for system's use by inserting the proper components in open locations on the KOS-100 board. This circuitry may be configured for Ground-Receive and for Send: +5VDC, +15VDC, or an Open circuit.

For VOX control of the companion transmitter, the KOS-100 is also capable of enabling the AFSK tone keyer in the terminal unit only during periods of transmission.

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## SSD-100 SOLID STATE CROSS DISPLAY

The SSD-100 Solid State Cross Display replaces the CRT and its high voltage power supplies in the MPC-Series RTTY Terminal Units.

The display is arranged in the traditional cross pattern and consists of high intensity (4.0 millicandelas) red, rectangular LEDs (Light Emitting Diodes). The operation of the display can be best described as a "center-off, dual-bargraph" and has a typical linearity of 0.5%.

The incoming Mark signal is displayed by the horizontal row of LEDs and the Space signal is displayed vertically.

The fast response time of the LEDs provide a truer indication of signal conditions. Weak or low S/NR signals are easier to tune in, since the SSD-100 does not display the "ball of noise" or retrace lines normally seen in a CRT display.

In addition to "Instant-On" operation and greatly increased reliability, there is no degradation with age or duty-cycle. The LEDs selected for the SSD-100 have a life expectancy in excess of 100,000 hours, ten times better than a CRT.

The MTBF (Mean Time Before Failure) of the entire terminal unit is significantly increased by the removal of the heat generating CRT assembly and the high voltage components in the CRT's power supply.

A separate LED in the upper left quadrant of the cross pattern monitors the Mark and Space input channels and "flashes" in the presence of time or frequency dispersive multipath distortion, indicating a probable increase in error rate, and suggesting that the Multipath-Corrector should be turned on.

The two LEDs at the apex of the cross pattern light only if the terminal unit is properly tuned to the incoming signal, and if the sense of the signal (Normal-Reverse) is the same as the terminal unit's sense.

Separate LEDs in two other quadrants indicate the status of the internal loop, the Signal Loss circuit and the Send-Receive mode of the terminal unit, making the SSD-100 more than just a tuning indicator, but also a central display of operator-required information.

A light sensitive photocell in the fourth quadrant monitors the ambient light conditions at the operating position and automatically adjusts the light output level of the SSD-100 to a comfortable viewing level.

The front panel bezel contains an anti-glare optical filter and provides 30% more viewing area than the original CRT bezel. When turned off, the optical filter appears as a black glass window.

The SSD-100 may be viewed easily from 75 feet. Under similar conditions, a CRT display is difficult to view from 10 feet.

Three "Set and Forget" potentiometers on the SSD-100 assembly provide Mark-Gain, Space-Gain and Photocell-Threshold. All integrated circuits, transistors and the photocell plug into gold-plated sockets for ease of maintenance.

A plug-in cable connects the SSD-100 to the terminal unit's main board.

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## DAS-100 DIGITAL AUTOSTART MODULE

Most RTTY Terminal Units that incorporate an autostart circuit use some form of Analog autostart.

The MARK mode of the Dovetron MPC-1000R is pure analog. It is designed to respond to signal energy in the Mark channel.

The FSK mode (probably a Dovetron innovation) is a mixture of analog and digital that senses a "change of state" of the analog energy in either one or both of the channels.

Being analog, both modes are susceptible to false starts from noise, static crashes, CW, AM, SSB, off-speed RTTY and other energy sources.

To overcome the shortcomings of these analog systems and their false starts, Dovetron has designed a DIGITAL AUTOSTART MODULE (DAS-100) that utilizes two purely digital techniques: Character-Recognition and Speed-Determination.

The Character-Recognition circuit "looks" for a Space character, which was chosen as the "enable" signal since it follows every word in normal communications and consequently is very repetitious.

The Speed-Determination logic rejects all Space characters that are not received at the same speed that has been selected by the front panel Signal Speed switch of the MPC-1000R/TSR-500.

In operation, the Word Storage FIFO of the TSR-500 stores the initial incoming word. When the trailing Space character is decoded, the auto-start circuit is enabled, which in turn, starts up the local teleprinter.

After a short delay (which permits the teleprinter to get up to operating speed), the stored word is released into the main memory, where it is regenerated, speed-converted and sent on to the teleprinter.

At the same time, the Word Storage FIFO is brought on line as part of the main memory. This permits a smooth continuous flow of data thru the digital system and prevents the last word of a transmission from being left in memory should no Space character be sent at the end of the transmission.

This digital method of autostart virtually eliminates false starts by noise, static crashes, CW, AM, SSB, off-speed RTTY or non-RTTY signals. It does not respond to Marking carriers or CR and LF signals. It may also be used as a method of selective calling, by setting the "start-up" time-constant to require a predetermined minimum number of consecutive Space characters at the beginning of a transmission.

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## TID-100 TELEPRINTER IDENTIFIER

The TID-100 Teleprinter Identifier is a 5.0" X 3.5" printed circuit board assembly that is designed to mount inside of all MPC Series Rtty Terminal Units.

Although intended to be used as a Morse CW IDer, it may be programmed to output either Baudot or ASCII teleprinter codes.

When outputting a teleprinter code, the free-running clock is easily adjusted to the appropriate baud rate.

The TID-100 consists of four socket-mounted CMOS devices and a 128 bit diode-programmable matrix. The matrix is designed so that the programming diodes lay flat on the printed circuit board, making installation and code reading very easy.

Two LEDs on the board monitor the status of the internal counter circuit and the outputted code. The latter permits visual verification of the code during matrix programming.

When installed in an MPC-1000C or MPC-1000CR, a second transistor keyer displays the transmitted code sequence on the front panel Signal Loss LED.

When installed in an MPC-1000R, the code sequence is displayed on front panel Memory Empty LED. If the Phasing Pulse mode of the TSR-500D is enabled, when the TID-100 is identifying, it automatically interrupts the "diddle" signal which would otherwise interfere with the identification code that was being transmitted.

When installed with a KOS-100 Keyboard-Operate-Send assembly, the TID-100 interfaces to the KOS via a 16 pin header and mounts directly on the KOS assembly.

In this application, when the KOS-100 enables the TID-100, the MPC-1000R terminal unit is switched into Preload, which permits data to be entered into the terminal unit while the TID-100 is "identifying".

At the end of the identification cycle, the terminal unit is switched from Preload to Operate, and the preloaded contents of the Memory Section is transmitted.

If a CW ID command is initiated by the keyboard BREAK button while the Memory Section contains data, the "start" latch in the KOS-100 is held-off until the Memory Section empties, i.e., at the end of the transmission.

Power requirement of the TID-100 is one mil Standby and seven mils in Transmit.

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# DOVETRON TSR-400D SIGNAL REGENERATION, SPEED CONVERSION, DIGITAL AUTOSTART & BAUDOT-ASCII CODE TRANSLATION.

In addition to providing all of the functions of the TSR-200D, the TSR-400D also provides Baudot to ASCII Code Translation.

The primary purpose of the TSR-400D is to permit a Baudot-coded signal to be printed or displayed on an ASCII-coded Receive Only (RO) ASCII teleprinter or video display unit.

A typical application would be where the user has selected a modern ASCII terminal to be used to receive an existing Baudot weather or press circuit.

The ASCII outputs are available (simultaneously) in:

- 1) TTL: +5 volts Mark, Zero volts Space.
- 2) EIA RS232C: -12 volts Mark, +12 volts Space.
- 3) MIL STD 188C: +6 volts Mark, -6 volts Space.
- 4) Neutral Loop (20 milliamperes-28VDC), Active or Passive.
- 5) Parallel Seven (7) Wire: +5 volts Mark, Zero volts Space.

All outputs are available on the TSR-400D board in a 14 pin DIP connector.

The TTL, EIA, MIL and Neutral Loop outputs are also available at individual E-Points.

The 20 mil Neutral Loop is switch-selectable for either ACTIVE or PASSIVE operation. In the ACTIVE mode, the TSR-400D provides the 20 mils of loop current. In the PASSIVE mode, the loop current may be provided from an external battery or from the companion terminal.

In both ACTIVE and PASSIVE modes, the neutral loop current is monitored by an internal loop current regulator circuit that disconnects and protects the internal loop keyer circuit if the current exceeds 35 mils.

The Parallel Seven-Wire ASCII output is normally tri-stated (high impedance output) when not in use. A ground on the CONTROL line (eighth wire) provides data output.

When the terminal unit is operated in the Transmit mode, all Baudot characters entered from the local Baudot keyboard are reflected back thru the Baudot-ASCII translation section and displayed on the ASCII terminal.

The TSR-400D may be installed in all Dovetron terminal units, in lieu of the TSR-200D or TSR-500D Regeneration assemblies.

When factory installed, the 20 mil ASCII loop output is connected to the 3-Way loop connector on the rear panel. The 20-60 mil Baudot loop is connected to the 2-Way connector. Both loop outputs may be used simultaneously.

A separate crystal controlled oscillator and digital divider permits ASCII baud rates of 110, 150, 300, 600, 1200, 2400, 4800 and 9600 baud.

Specifications subject to change without notice.

# DOVETRON

## TSR-500D TELEPRINTER SPEED CONVERTER-REGENERATOR

### SIGNAL REGENERATION, SPEED CONVERSION & WORD CORRECTION

The TSR-500D is a 6.25" X 7.25" printed circuit board assembly that mounts inside of the MPC-1000R. It provides Signal Regeneration, Speed Conversion and keyboard-controlled Word Correction. With the addition of the DAS-100 Digital Autostart Module, it also provides Digital Autostart.

The 200 Character FIFO Memory Section may be Preloaded and Recirculated with either off-the-air signals or data generated at the local teleprinter.

The Dual-UART Regenerator Section regenerates incoming and outgoing signals to less than 0.5% bias distortion and permits local copy while the Memory Section is being Preloaded or Recirculated. It also permits local copy while retaining the contents of the Memory.

This Regenerator Section may be programmed by a board mounted switch for 5, 6, 7 or 8 level codes, with or without Parity, Stop Bit Verification and the total number of Stop Bits to be attached to the end of the regenerated character.

Total Stop Bit (TSB) selection permits a 1.0 or 1.5 CU Stop Bit to be affixed to the end of a 5 level Baudot character. If the UARTs are programmed for 6, 7 or 8 level codes, the TSB may be either a 1.0 or a 2.0 CU Stop Bit. When enabled, the Stop Bit Required (SBR) function forces the UARTS to reject any character that does not contain a valid Stop Bit.

The Dual Crystal-controlled Clock permits Up-Down Speed Conversion between the standard communication baud rates: 45.45, 50.00, 57.88, 74.20 (75.00) and 110.0 bauds.

Five 40 character FIFO cells comprise the 200 character Memory Section. The Input FIFO is utilized as a Word-Storage Cell for the Word Correction function. A Space character following an acceptable word transfers the word out of the Input FIFO into the main Memory Section. A keyboard generated Blank character erases the contents of the Input FIFO, thus providing a convenient method of correcting each word as it is generated.

An Automatic Word-Storage Over-Ride circuit automatically empties the contents of the Input FIFO into the Main Memory Section whenever the Input FIFO contains 39 characters. In this way, the Input FIFO can not be over-run by data that does not contain Space or Blank Characters, such as RY tapes, etc.

An Automatic Stop-Bit Length Selection circuit permits the Dual-UARTs to be programmed for 1.0 CU Stop-Bits during Receive and automatically to be switched to 1.5 CU Stop-Bits during Send, thus minimizing the error rate between two teleprinters operating with different stop bit lengths.

A Phasing Pulse mode generates either a BLANK or LTRS character when the TSR-500D is in Send and the Memory Section is empty.

Variable Character Rate is provided in the Send mode to create a better balance between the energy levels of the transmitted Mark and Space channels. An Automatic Character Rate Over-Ride circuit prevents the Memory Section from being over-run by machine speed or fast keyboard operation. A Tee Dee Inhibit circuit controls data entry from tape-filling or memory peripherals.

# DOVETRON

## SELECTIVE CALLING (SEL-CAL) OPTIONS

The purpose of Selective Calling is to permit a local teleprinter to be turned on by a coded signal from a remote sending station. This is normally done by establishing a predetermined "turn-on" code, and when this code is received, activating the local teleprinter.

Both of the Dovetron Sel-Cal options provide this type of local turn-on, and in addition, also permit the teleprinter to be turned-off by another predetermined code.

In the event that the sending station forgets to send a turn-off code, or fades away during a transmission, the local teleprinter will be timed-out by the terminal unit's digital autostart circuits.

The digital autostart circuits will also initiate time-out if the sending station inverts "sense" or changes baud rate in the middle of a transmission.

To accomplish Selective Calling in the MPC-1000CR, MPC-1000CR/DK or MPC-1000R/TSR-200(D), the original TSR assembly is replaced with the TSR-200DS.

In the MPC-1000R/TSR-500(D), an SCL-100 module is plugged directly into the TSR assembly, and interconnected to the DAS-100 Digital Autostart module.

Selective Calling may also be installed in the MPC-1000C, MPC-1000C/DK and the Basic-R version of the MPC-1000R by installing the TSR-200DS assembly in the terminal unit.

The Sel-Cal functions of both the TSR-200DS and the SCL-100 may be used even if the signal regeneration and speed conversion features of the TSR unit have been disabled, provided the signal speed switch has been set to the same baud rate as the incoming signal and the Normal-Reverse switch has been set to the proper sense.

The turn-on and turn-off codes are programmed into the Sel-Cal units via board-mounted DIP switches. As an example, the turn-on code of ZCZC may be selected by programming a Z character (MSSSM) into the first DIP switch, a C character (SMMMS) into the second DIP switch and so on for the third and fourth character.

When the ZCZC combination is decoded by the Sel-Cal circuit, a start command is sent to the autostart circuits, which in turn enables the local teleprinter.

The turn-off code is a single character that must be received in a four character sequence. If the N character is selected, four sequential Ns (NNNN) initiate autostart time-out. It is also programmed via a board-mounted DIP switch.

Normal time-out after receipt of a proper turn-off code is 20 seconds. This period may be lengthened or shortened by changing the value of a resistor on the main board of the terminal unit.

Any Baudot character of the CCITT International Telegraph Alphabet No. 2 (Murray Code) may be used in the turn-on/turn-off codes.

# DOVETRON

## MPC E-SERIES OPTIONS

### RIF-100 REMOTE INTERFACE MODULE

The RIF-100 Remote Interface Module is a 1.0" X 2.0" printed circuit card assembly that may be mounted in all MPC Series terminal units.

Standard E-Series Dovetrons are configured for "systems" operation and require a +5 to +15 VDC to be applied to the rear panel LOCK connector to remotely switch the terminal unit from Receive to Send. On the MPC-1000R, the +15 VDC is provided at a rear panel connector.

When the RIF-100 is installed, a slide switch permits selection of the standard system configuration (+5/+15-Send/Zero-Receive) or an inverted KOS configuration: Ground-Send/Open-Receive.

When set for KOS (Keyboard-Operated-Send) and used with a keyboard that generates a ground signal every time a key is depressed, a time constant circuit on the RIF-100 holds the terminal unit in Send during the short time intervals between the sequential depressing of the keys.

When installed in the MPC-1000R, the RIF-100 in KOS mode will also enable the AFSK Tone Keyer output during Send, effectively permitting VOX control of the companion transmitter.

This combination of VOX control and terminal unit Send/Receive permits keyboard control right at the local teleprinter.

### PKC-100 POLAR KEYS CARD

The PKC-100 Polar Keyer option may be installed in lieu of the standard high level Neutral Keyer in the MPC-1000C, MPC-1000CR and MPC-1000R. Generally, if polar keying is required in the C and CR, the C/DK or CR/DK provide greater flexibility since they both contain switch selectable polar and neutral keyer circuits that are also current selectable.

The PKC-100 provides high level polar outputs of  $\pm 50/\pm 60$  volts at 20 to 60 mils, and polar inputs of  $\pm 5$  to  $\pm 100$  VDC.

### HVP-100 HIGH VOLTAGE POLAR ADAPTER

The HVP-100 High Voltage Polar Adapter may be installed in an MPC-1000C/DK or MPC-1000CR/DK to provide a  $\pm 80$  volts polar output at 20 mils for those teleprinters that require a  $\pm 80$  volts polar drive.

### ISOLATED-BALANCED AFSK TONE KEYS OUTPUT

The MPC-1000C/DK and MPC-1000CR/DK provide a transformer AFSK output, nominally  $\emptyset$  dbm (600 ohms). The MPC-1000C, MPC-1000CR and MPC-1000R provide a single-ended, 500 ohm resistive output of approximately 60 millivolts peak to peak, which is suitable to drive SSB transmitters. This output level may be increased up to  $\pm 10$  dbm upon request. A transformer coupled output is available for the C, CR and R on special order.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# DOVETRON

## MPC-1000T -TEMPEST- RTTY TERMINAL UNIT

The Dovetron TEMPEST MPC-1000T offers a secure RTTY Terminal Unit for radio teleprinter applications.

Similar to a CRT-equipped MPC-1000C, the MPC-1000T also offers front panel selectable bandwidths for optimizing the terminal unit to the baud rate of the incoming signal, and a new method of high-performance signal assessment.

This new assessor circuit, the Binary Bit Processor (BBP-100) provides extremely low error rate copy on weak, noisy and badly distorted RTTY signals.

Five standard bandwidth modules are stored within the MPC-1000T: 50, 57, 75, 110 and 150 Baud.

Any three of these bandwidth modules may be plugged into active sockets on the BBP-100, permitting operator selection of the selected bandwidth via a front panel switch.

This selectable bandwidth feature, plus the variable Mark and Space channels and the 2 inch CRT cross display, permits optimum reception of RTTY signals with various tone frequencies, shift widths, baud rates, and propagation conditions.

Field testing of the MPC-1000T with the BBP-100 Assessor has shown error reductions by as much as 34 times on poor quality signals.

The BBP-100 also provides automatic multipath correction on signals that have been distorted by time or frequency dispersive multipath propagation.

The basic design of the MPC-1000T provides full in-band diversity reception during deep selective fading, and the automatic threshold control circuit permits signal tracking thru deep flat fades.

The single ended audio input is transformer-isolated with nominal impedance of 600 ohms.

The dual FSK outputs are configured for MIL 188C and EIA RS232C serial, and may be used simultaneously.

Keyboard entry may be either MIL 188C or RS232C.

For AFSK operation, a 0 dbm output is provided from the internal phase-continuous, sine wave AFSK Tone Keyer. This tone keyer doubles as BITE self-test.

All input and output signals enter and exit thru rear panel mounted BNC connectors.

Power mains entry is thru a Sealtron 8001-14S-7P-FP (or equiv.) connector.

The MPC-1000T is designed to operate on AC lines of 115 or 230 volts, 40 - 400 Hz. Voltage tolerance is  $\pm 25\%$ . Power consumption is 12 Watts.

A TEMPEST version of the MPC-1000CR, providing Signal Regeneration, Speed Conversion and Digital Autostart, is also available: MPC-1000CR/T.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# DOVETRON

MPC-1000C/DK UNIVERSAL DUAL-KEYER TERMINAL UNIT

## E-SERIES

The DK (Dual-Keyer) version of the MPC-1000C contains both a Polar and a Neutral high level keyer: MPC-1000C/DK.

Selection of either keyer is made via an internal switch.

The proper loop currents (20, 40 or 60 mils) in either Polar or Neutral mode are also switch-selectable.

A third switch selects either Full Duplex or Half Duplex operation.

The programming instructions for these switches are etched permanently on the the internal printed circuit board (DKB-100), permitting reprogramming without consulting the (often misplaced) instruction manual.

A rear panel switch selects the power mains requirement: 100-125 VAC or 200-250 VAC. Line frequency tolerance is 40 to 450 Hz.

Rear panel connectors are provided for Dual Diversity, Selective Calling and Remote Control.

The polar output levels are tailored for teleprinters requiring  $\pm 50/\pm 60$  volts polar loops.

The HVP-100 High Voltage Polar Adapter may be installed for those teleprinters requiring  $\pm 80$  Volts polar at 20 mils of loop current.

The TSR-200D may be installed internally to provide Signal Regeneration, Digital Autostart and Speed Conversion.

When Digital Autostart is provided, it replaces the FSK mode of Autostart, since they are essentially redundant.

The standard AFSK tone keyer output is an isolated  $\emptyset$  dbm (600 ohms). The output level is adjustable via a rear panel mounted potentiometer.

The RIF-100 Remote Interface Module may be installed.

The KOS-100 Keyboard-Operate-Send assembly may also be installed for keyboard control of the Send/Receive functions.

EIA RS232C and MIL STD 188C FSK outputs are also available for low level polar operation. Polar inputs of  $\pm 5$  to  $\pm 100$  volts are acceptable without adjustment.

A rear panel 15 amp fuse is provided in the local printer's motor autostart power line.

All other specifications of the MPC-1000C/DK are similar to the MPC-1000C Multipath-Diversity RTTY Terminal Unit.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# DOVETRON

MPC-1000CR/DK UNIVERSAL DUAL-KEYER TERMINAL UNIT

## E-SERIES

The DK (Dual-Keyer) version of the MPC-1000CR contains both a Polar and a Neutral loop keyer: MPC-1000CR/DK.

Selection of either keyer is made via an internal switch.

The proper loop currents in either polar or neutral mode are also switch-selectable.

A third switch selects either Full Duplex or Half Duplex operation.

The programming instructions for these switches are etched permanently on the internal printed circuit board, permitting reprogramming without consulting the (often misplaced) instruction manual.

A Digital autostart mode is provided in addition to the standard Mark and FSK autostart modes and prevents the local teleprinter from false-starting on non-RTTY signals, up side down RTTY signals and RTTY signals that are operating at an incompatible baud rate.

If the MPC-1000CR/DK is set for 66 WPM (50 Baud), it will not autostart on 75 WPM (57 Baud) or 100 WPM (75 Baud) signals and vice versa.

This feature effectively permits remote call-up of a teleprinter by Baud rate selection. It also prevents an incompatible signal from false-starting a teleprinter and printing unintelligible garble.

The TSR-200D is completely programmable for the number of bits per character (5, 6, 7 or 8), the total number of stop bits, the stop bit requirement, odd-even parity and polarity selection for the output keyers.

The front panel Signal Speed select switch may be used for up-down speed conversion, or it may be used to select the baud rate of straight-thru regeneration.

A rear panel switch selects the power mains requirement: 100-125 VAC or 200-250 VAC. Line frequency tolerance is 40 to 450 Hz.

Rear panel connectors are provided for Dual Diversity, Selective Calling and Remote Control. The MPC-1000C makes an ideal dual diversity companion terminal unit, and the SCR-1000 Selective Calling-Recognition unit will provide Sel-Cal and Answer-Back functions.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

# DOVETRON

## TBA-1000 BAUDOT-ASCII CODE TRANSLATOR

The TBA-1000 is a self-contained Baudot-ASCII and ASCII-Baudot Code Translator that may be used in either Full-Duplex or Half-Duplex modes. It is packaged in a 17" X 3.5" X 9" cabinet, which may be rack mounted in a standard 19" wide rack, and operated from either 115 or 230 VAC, 40 to 400 Hz mains.

Dual crystal-controlled clocks permit Baudot baud rates of 45.45, 50.00, 56.88, 74.2-75.0 and 110 baud, which are front panel selectable.

ASCII baud rates of 110, 150, 300, 600, 1200, 2400, 4800 and 9600 baud are selectable via an 8 pole DIP switch mounted on the dual clock board.

Internal switches select the various I/O configurations. Baudot I/O may be set for high or low level. The high level, neutral I/O may be selected as either active or passive. In the active mode, loop currents of 20, 40 or 60 mils may be selected. In the passive mode, the loop current is supplied externally.

The low level Baudot I/O may be either EIA RS232C (-12 Mark, +12 Space) or MIL STD 188C (+6 Mark, -6 Space).

The ASCII I/O is also switch-selectable for high or low level neutral. In the active mode, the TBA-1000 provides 20 mils at 28 VDC. The low level interface may be either EIA RS232C, MIL STD 188C or TTL. A parallel ASCII I/O is available thru a removable cover on the rear panel and is configured as TTL.

Signal Regeneration to less than 0.5% bias distortion and up-down speed conversion are accomplished by two CMOS Universal Asynchronous Receiver-Transmitters (UARTs).

A 192 character FIFO buffer memory has been provided in the ASCII-Baudot section to prevent character over-runs when down-converting from ASCII to Baudot. A Data-Inhibit circuit automatically flags when the Memory is two-thirds full (128 characters). This memory section may be preloaded with keyboard control from the local ASCII keyboard.

A variable character rate circuit has been provided with a front panel control to permit slower than machine-speed outputting of the Baudot signal. The Blank-Fill generates BLANK Baudot characters when the Memory section is empty and may be controlled from the front panel or from the local ASCII keyboard.

In the Half-Duplex mode, Transmit-Receive functions may also be controlled from the front panel or the local ASCII keyboard. Certain remote control functions, such as LOCK, PTT, IDENT and PHASING INHIBIT are also keyboard controllable. These lines permit peripheral control.

A front panel switch permits NORMAL, DOWN-SHIFT-ON-SPACE or LTRS ONLY operation. An internal switch permits the outputting of Baudot FIGS ONLY.

Five front panel LEDs monitor the status of the Memory Section: EMPTY, 1/3, 2/3 and FULL. Additional LEDs monitor the other control states and both the ASCII and Baudot high level loops.

An internal switch permits selection of Baudot FIGS/S or FIGS/J for the BELL function in the ASCII-Baudot Section. A ROM change is required to permit FIGS/J (BELL) operation in the Baudot Section (CCITT #2) and is available upon request. A TBA-1000 Bypass option is also available on special order.

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE



AMATEUR PRICE LIST

October 1980

627 FREMONT AVE.  
SOUTH PASADENA, CALIFORNIA 91030

**213-682-3705**

Amateur Radio Operators may purchase the following Dovetron RTTY Terminal Units at a substantial discount. All amateur orders must be accompanied by a call sign that is verifiable in the Amateur Radio Callbook, or by a QSL. Terms of Sale are payment with order. Deliveries are made on a FIFO (First-In, First-Out) basis, are intermixed with governmental and commercial orders, and vary from Stock to 90 days ARO.

MPC-1000C	Single Tone Pair AFSK Tone Keyer & Neutral Loop:	\$795.00
MPC-1000CR-II TSR-200D	Signal Regeneration, Speed Conv. & Digital Auto-start. Single Tone pair & Neutral Loop. TSR-400D and TSR-600D may be substituted at additional cost:	\$995.00
MPC-1000R-II (BASIC-R)	Contains BBP-100 Binary Bit Processor with Selectable Bandwidth and Triple Tone Pair AFSK Tone Keyer. Front panel Speed Select and Memory Control Switches are not functional. May be expanded with TSR assemblies:	<u>\$895.00</u>
MPC-1000R-II TSR-200D	Signal Regeneration, Speed Conversion and Digital Autostart per TSR-200D specifications:	\$1095.00
MPC-1000R-II TSR-500D DAS-100	Signal Regeneration, Speed Conversion, Digital Auto-start, 200 Character FIFO Memory, Word Correction, Variable Character Rate, TD Inhibit & Blank Diddle:	\$1195.00
MPC-1000R-II (FULL HOUSE)	Same as above, plus factory-installed KOS-100 and TID-100. KOS provides keyboard control of Send/Rec, automatic AFSK Tone Monitor in display and CW IDer:	\$1295.00

All MPC Series terminal units are supplied with the SSD-100 Solid State Cross Display with Multipath Distortion Indicator (U. S. Patent 4229698). All Mark II units contain BBP-100 Binary Bit Processor (Standard Bandwidths: 50, 75 and 110 Baud) and Automatic Multipath Correction.

OPTIONS AVAILABLE FOR MPC-SERIES TERMINAL UNITS

DAS-100	Digital Autostart Module for use with TSR-500 assembly:	\$ 40.00
KOS-100	KB Send/Receive, Tone Monitor & CW IDer Control kit:	\$ 75.00
SCL-100	Sel Cal Module for TSR equipped terminal units:	\$125.00
TID-100	Station Identifier for Morse, Baudot or ASCII codes:	\$ 60.00
TSR-200D	Signal Regen., Speed Conversion & Digital Autostart:	\$200.00
TSR-400D	TSR-200D with simultaneous R/O ASCII Output:	\$400.00
TSR-500D	Dual UART S/R, S/C, 200 Char. Memory & Word Corr:	\$400.00
TSR-600D	TSR-200D with Dual Station-Group Sel Cal & WRU Answerback:	\$450.00
TBA-1000	Baudot-ASCII/ASCII-Baudot Code Translator:	\$495.00
Shipping-Insurance (MPC & TBA), CONUS & HAWAII via UPS Blue:		\$ 30.00

Specify tabletop or rackmount cabinet, 115 or 230 VAC mains, Baud Rates, AFSK Tone Frequencies, Loop Current and required options.

MAILING ADDRESS, BOX 267, SOUTH PASADENA, CALIFORNIA 91030

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COMMERCIAL PRICE LIST

October 1980

627 FREMONT AVE.  
SOUTH PASADENA, CALIFORNIA 91030

**213-682-3705**

MPC-1000C	Single Tone-Pair AFSK Tone Keyer, Neutral Loop and simultaneous RS232C & MIL 188C FSK Outputs:	\$ 1250.00
MPC-1000C/DK	Dual Keyer (Polar-Neutral) version of MPC-1000C:	\$ 1395.00
MPC-1000CR TSR-200D (II)	Signal Regeneration, Speed Conversion & Digital Autostart. Single Tone-Pair AFSK & Neutral Loop:	\$ 1495.00
MPC-1000CR/DK TSR-200D (II)	Dual Keyer (Polar-Neutral) version of MPC-1000CR:	\$ 1650.00
MPC-1000R TSR-200D (II)	Signal Regen., Speed Conv. & Digital Autostart. Triple Tone-Pair AFSK Tone Keyer & Neutral Loop:	\$ 1695.00
MPC-1000R TSR-500D DAS-100 (II)	Signal Regen., Speed Conv. & Digital Autostart. 200 Character Buffer Memory and Word Correction. Triple Tone-Pair AFSK Tone Keyer & Neutral Loop:	\$ 1895.00
MPC-1000T TEMPEST (II)	Tempest version of MPC-1000C. Contains BBP-100 Binary Bit Processor with Selectable bandwidth. Outputs are MIL 188C, EIA RS232C and AFSK $\emptyset$ dbm. Keyboard (data) entry is $\pm 5$ to $\pm 100$ VDC Polar:	\$ 1695.00
MPC-1000CR/T TSR-200D SBR-100 (II) TEMPEST	Tempest version of MPC-1000CR. Same I/O as MPC-1000T. TSR-200D provides Signal Regeneration, Speed Conversion and Digital Autostart. SBR-100 Selectable Baud Rate Module is standard:	\$ 1995.00

All Dovetron terminal units contain the SSD-100 Solid State Cross Display. All Mark II units contain the BBP-100 Binary Bit Processor with front panel selectable bandwidth and Automatic Multipath Correction.

OPTIONS AVAILABLE FOR MPC-SERIES TERMINAL UNITS

ATM-100	Automatic Tone Monitor for non-KOS equipped units:	\$ 50.00
BAL-100	Isolated-Balanced AFSK Tone Keyer Output (C, CR & R):	\$ 50.00
BAL-200	Same as BAL-100 with adjustable output level:	\$ 75.00
DAS-100	Digital Autostart Module for use with TSR-500D:	\$ 60.00
KOS-100	Provides KB control of Send/Receive and tone monitor:	\$ 100.00
LCO-100	Linear Channel Oscillator option (300 to 3000 Hz.):	\$ 100.00
PKC-100	High Level Polar Keyer option for MPC-1000R:	\$ 300.00
SBR-100	Selectable Baud Rate option for TSR assemblies:	\$ 50.00
SCL-100	Selective Calling module for TSR assemblies:	\$ 150.00
TMS-200	Triple Tone-Pair AFSK Tone Keyer option:	\$ 100.00
TSR-200D	Signal Regen., Speed Conv. & Digital Autostart Assy:	\$ 250.00
TSR-400D	TSR-200D Functions with simultaneous RO ASCII Output:	\$ 450.00
TSR-500D	Signal Regen., Speed Conv. & 200 Character Memory:	\$ 450.00
TSR-600D	TSR-200D Functions with Dual Sel Cal & WRU Answerback:	\$ 500.00

Other options are available. Consult factory for details.

.BA-1000	Baudot-ASCII/ASCII-Baudot Code Translator with Signal Regeneration, Speed Conversion and 192 char. buffer:	\$ 595.00
TBB-100	Neutral loop bypass option for TBA-1000:	\$ 50.00

MAILING ADDRESS, BOX 267, SOUTH PASADENA, CALIFORNIA 91030

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

## MPC-1000C setup

Mark tone: 2125 Hz  
 Space tone: 2295 Hz (170 Hz shift)  
 Input impedance: 600 ohms transformer coupled  
 Loop 20 ma  
 Line voltage: 110 VAC  
 C52 removed per Dovetron's ASCII operation instruction sheet

## BBP-100 Mark II

Narrow bandwidth: 50 baud (66 wpm 5 level)  
 Medium bandwidth: 75 baud (100 wpm 5 level)  
 Wide bandwidth: 110 baud (100 wpm 8 level)

## KOS-100 setup

KOS: on  
 Tempest: off  
 Orange wire lifted from the Remote 1 jack and tied back  
 Gray (#8) and white (#9) wire tied to Remote 1 jack  
 (+12 volts on remote 1 will ground the Lock jack and put the TU into transmit)

## SBR-100 setup

65 baud (88 wpm 5 level) = BCD 58

## TSR-200 setup

Switch	8	EPS	Zero	Left
	7	SBR	No	Left
	6	NB1	Zero	Left
	5	NB2	Zero	Left
	4	TSB	One	Left
	3	SP Cal	Off	Right
	2	Parity	No	Left
	1	FSK	EIA	Left

Regen: On  
 Speed: On  
 Clock 2: 75 baud (100 wpm 5 level) BCD = 50 (1200 Hz)  
 R52 bridged with a 47K resistor to drop the DAS hold time to 5-10 sec  
 Wire from J7 (AFSK In) to feedthru 88 removed  
 Yellow wire (#4) moved from J6 (EIA FSK) to J7  
 Orange wire from front panel Regen switch moved from J7 to feedthru 88

## Cabling

Microphone input	AFSK output
Microphone PTT	Lock
Speaker output	Audio input
EIA 2 (transmit)	AFSK output
EIA 3 (receive)	EIA FSK
EIA 4 (RTS)	Remote 1

## TR7 Control Settings

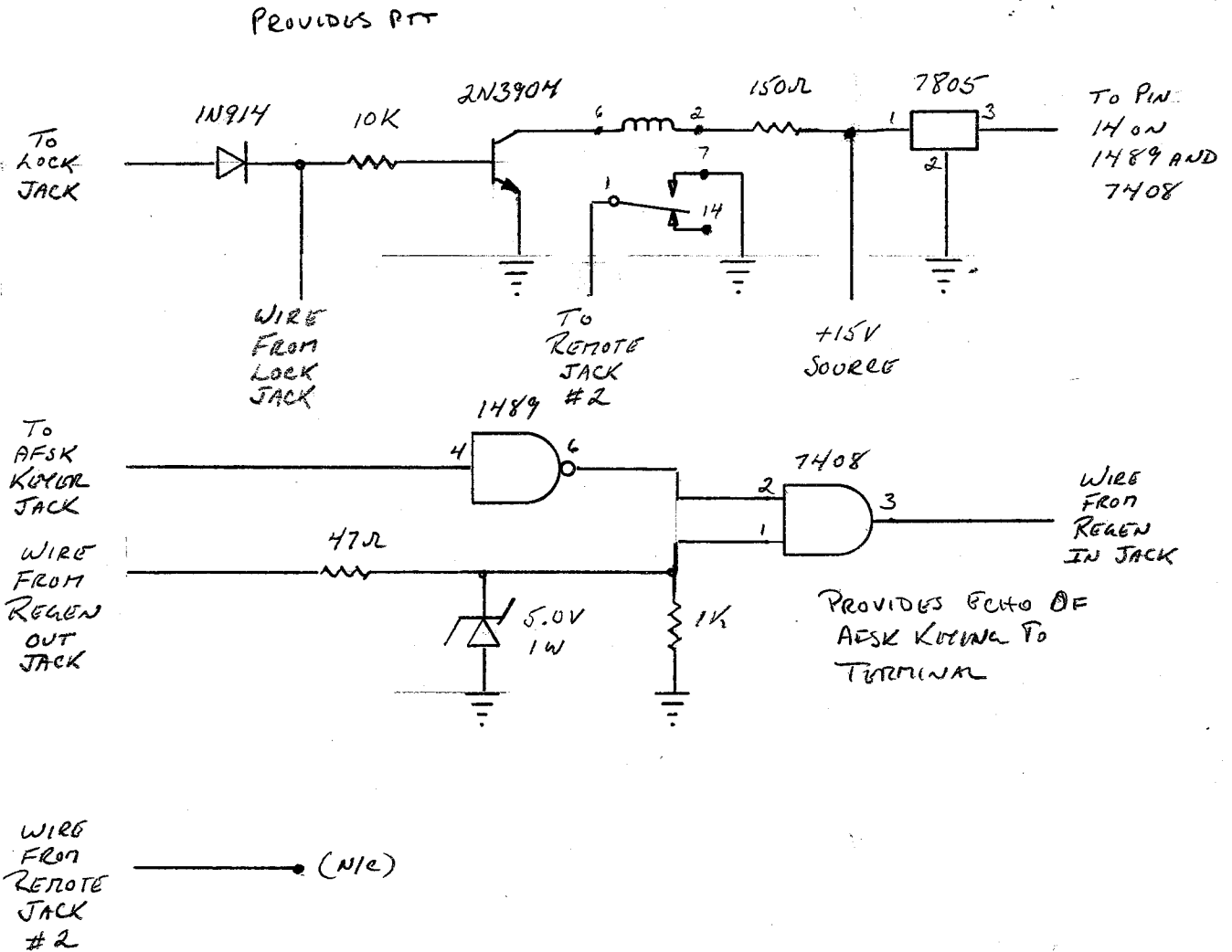
PTT/VOX	in
F/S	in
PBT	in
BW A	in
B	out
RIT	in
Mode	LSB
PBT	slightly less than 9 o'clock
RIT	12 o'clock
AF	9 o'clock
RF	Full cw

## MPC 1000R Control Settings

Level	9 o'clock
Signal	desired baud rate
Loop	75
Mode	MS
AFSK	A
Threshold	10 o'clock
MPC/Off	MPC
Clear/Unload	n/a
Op/Recir	n/a
Mark	2125
Space	2295
Mark/FSK	FSK
Auto/Motor	Autostart
Rec/Sent	Rec
Power/Off	Power

## Cables

AFSK Keyer	RS232 2 TD
EIA	RS232 3 RD
Remote Lock	RS232 4 RTS
Audio Input	Audio from receiver
AFSK	Audio to transmitter
Remote 2	PTT line from xmtr



REMOVE JUMPER BETWEEN AFSK KEYER JACK AND REGEN AFSK JACK.  
 REMOVE REMAINING WIRE ON AFSK KEYER JACK AND SOLDER TO  
 REGEN AFSK JACK.

9 June 92

Dear John,

Received your letter of the 23d of May today, and congratulations on getting the MPC-Pk232 working together. I hope you enjoy the combination as well as I enjoy mine.

This is the busy time of the year here in the North, and afraid it will be Fall before I will be back on the air. Our summers are so short, one must make the best of them while they last, so have been spending most all my free time working in the yard, and at our Cabin on the Little Susitna River.

Regarding the use of the MPC as a "stand-alone" modem, there is no reason that it could not be used with a PC-Compatable system in that mode, however, one must have software that will allow the ASCII output of the computer to be converted to five level BAUDOT prior to its getting to the MPC. I am not familiar with Dave Rice's CompRtty program, therefore I don't know if it will perform this task or not.

As the MPC was designed for dry loop keying of the old mechanical RTTY machined, several things must be taken into consideration before one could use it as a dedicated modem with a computer system.

On the receive side, one must convert the "TTL" level output to RS-232 level before inputting to the computer. This is not too complicated if one uses a MAX-232 IC circuit, as all the necessary parts are included in the chip, however the send side is a horse of a different color. The MPC is looking for "dry loop keying", ie a set of dry keyboard contacts keying the internal 20 or 60 ma loop of the MPC. In order to do this with the computer, one would have to construct either an RS-232 to 20/60ma converter, or possibly use a Stelma Polar Relay to isolate the loop.

As you can see John, it is not a simple matter to do what would like to do, however it could be accomplished, however it may well be that one strains at a gnat while passing a camel.

I am afraid that there is no simple way to do the isolation/switching that you would like to do. It appears to me that it would have to be either one or the other, as the two operating modes are totally different.

Wish I could give you more positive answers to your request, but at this time I am at a loss for the information.

I do wish you well in your endeavors, however I think it might be a case of re-inventing the wheel, as most have gotten away from using the "current loop" keying scheme.

Best 73 for now, See you on the air after the frost returns.

B.B.

