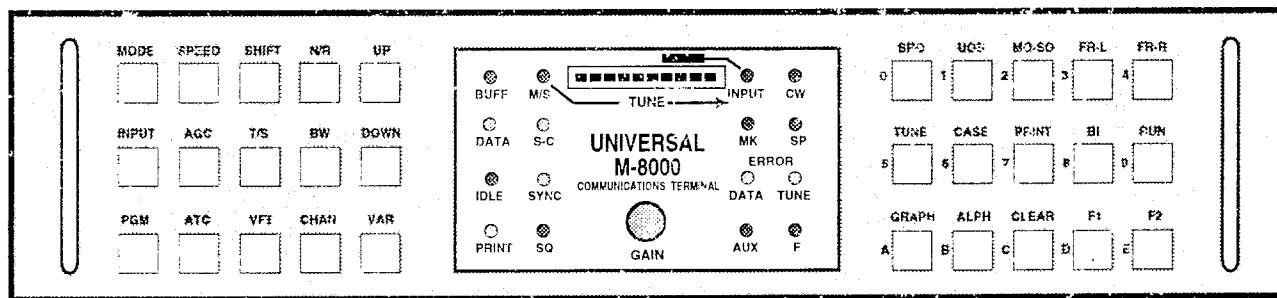


UNIVERSAL M-8000

Version 5

Owner's Manual



Universal Radio, Inc.
6830 Americana Pkwy.
Reynoldsburg, Ohio 43068

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Version 5

Owner's Manual

By
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&
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1.0 INTRODUCTION

You are now the owner of the most versatile communications terminal available. This state-of-the-art device offers a host of features and capabilities never before offered in a unit of this class.

This unit was designed as a commercial grade piece of equipment, with the professional operator in mind. Of course it is also more than suitable for the advanced hobbyist.

We recommend that you read this manual thoroughly in order to obtain the full performance capability engineered into this product. This manual provides users with information necessary for proper installation and operation of the Universal M-8000v5 in normal operating situations. Additional information on specific operating and installation situations may be obtained by contacting your dealer.

Important Note: Listeners are reminded that the unauthorized interception and/or divulgence of private non-broadcast radio or satellite communications may violate federal and/or state laws.

2.0 GENERAL DESCRIPTION

The Universal M-8000v5 provides video output of Morse, Baudot, ASCII, Packet, PACTOR, Simplex Telex Over Radio (SITOR), a variety of both simplex and duplex ARQ and FEC codes, PICCOLO code, ACARS and POCSAG and GOLAY paging codes and Facsimile images when attached to a communications receiver and a color VGA monitor. A variety of matrix and laser printers may also be added.

This converter includes capabilities and features usually not found on other units of its kind. Key advanced features include:

- Bit inversion decoding of Baudot codes.
- Decoding of the SITOR codes (modes A and B).
- Decoding of the ARQ (TDM Moore) codes.
- Decoding Packet 300 baud and 1200 baud (AX.25).
- Decoding PACTOR
- Decoding of three shift Russian Cyrillic to video.
- Decoding of PICCOLO multi-tone signals.
- Decoding of POCSAG and GOLAY pager signals.
- Decoding of the ACARS VHF radioteletype mode.
- Literal display mode.
- Databit code analysis mode.
- A unique retro-print feature allows the user to obtain hard copy of received data after reception.
- Crystal controlled tone filters with frequency and bandwidth optimized, to the selected shift and speed, by the internal microprocessor.
- Remote computer, or terminal, control of operation.
- User programmable initialization and Sel-Cal codes.
- Automatic filter tuning by microprocessor.
- VFT (FDM) demodulator operation.
- Eleven, user programmable, recallable operating memories.
- Full-color on-screen tuning aids including input and tone filter levels, x-y tuning 'scope' and spectral display.

3.0 INSTALLATION

3.1 LINE VOLTAGE SELECTION

Before connecting the M-8000 to the power mains, check that the voltage selection switch on the rear panel is set to the proper voltage. This switch is located directly below the power cord connector. If you are connecting the unit to 110-120 V.A.C. mains, the switch must be set so that "115V" is visible. For connection to 220-230 V.A.C. power, the switch must be set so that "230V" is visible.

The switch setting may be changed by using a small screwdriver, paper clip, or fingernail. Make certain that the selector switch is set fully to the proper side before connecting the power cable. Do not change the setting of this switch unless the power cord is unplugged from the mains outlet.



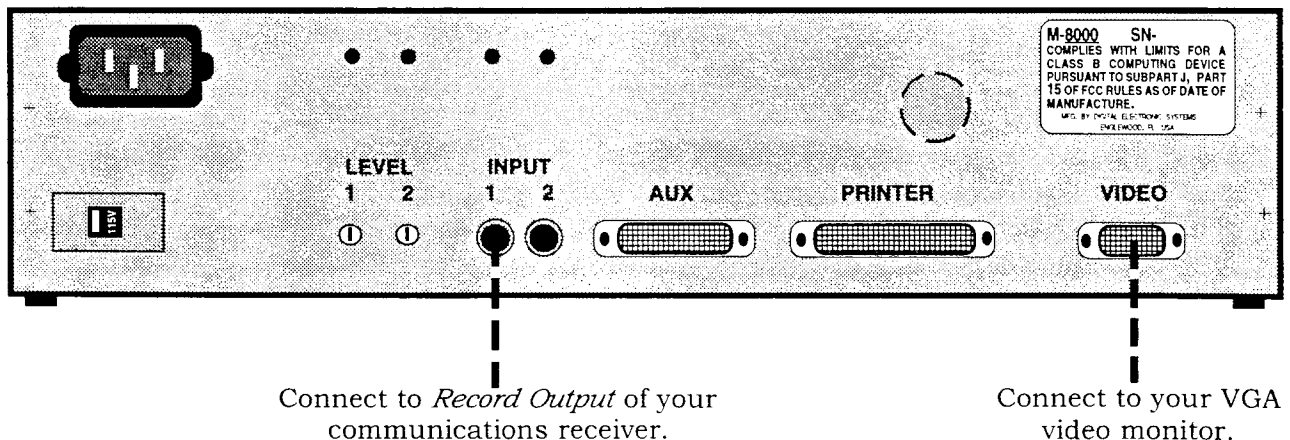
Warning: Attempting to operate the unit with the voltage selection switch improperly set may result in serious permanent damage to the equipment and/or serious personal injury.

3.2 RECEIVER CONNECTION

Any good quality communications receiver will suffice for use with the M-8000. However stability, sensitivity and selectivity are the most important attributes of a good RTTY communications receiver. Examples of suitable shortwave receivers would include:

- | | | | |
|------------------|------------------|---------------|-----------------|
| • Kenwood R-1000 | • Yaesu FRG-7000 | • Icom R-70 | • Lowe HF-150 |
| • Kenwood R-2000 | • Yaesu FRG-7700 | • Icom R-71A | • Lowe HF-225 |
| • Kenwood R-5000 | • Yaesu FRG-8800 | • Icom R-72 | • Lowe HF-235 |
| • Drake R-8 | • Yaesu FRG-100 | • Icom R-9000 | • W-J HF1000 |
| • Drake SW-8 | • JRC NRD-515 | • JRC NRD-525 | • JRC NRD-535/D |

The best point of connection to your receiver would be the Record or Line output. If your receiver does not provide such outputs, then you may connect the M-8000 "INPUT" to the earphone or speaker outputs using the two conductor phone plug (supplied) and an appropriate length of two conductor wire. Shielded wire should be used for this cable.



■ RECEIVER INPUT LEVEL ADJUSTMENT

The M-8000 provides for a wide range of audio input levels from receivers. For proper operation of the unit, however, it is imperative that the input level of the M-8000 be set to correctly match the receiver to be used. This is quite simply done as follows:

1. Connect the audio output (record, line, speaker, phones, etc.) from your receiver to the 1 INPUT of the M-8000.
2. Turn on the M-8000 and receiver.
3. Tune in a fairly strong RTTY signal (precise tuning is not important at this point).
4. Adjust the LEVEL 1 control on the rear panel while observing the on-screen "INPUT 1" level display bar. The level control should be set so that the displayed level is at the border between the two green segments on the level bar. A small flat-blade screwdriver should be used to adjust the LEVEL control.
5. Repeat the above procedure for the second input by using INPUT 2 and LEVEL 2 and observing the "INPUT 2" level bar.

NOTE: Do not over-drive the input stages of the M-8000. Input levels which cause an input bar level to light the bright red segment (at the extreme right of the bar) may degrade the performance of the unit.

3.3 VIDEO MONITOR CONNECTION

The most important consideration in selecting a video monitor is to ensure that it is compatible with the M-8000 output. The M-8000 generates a full 640 x 480 16 color analog VGA graphics display with a nominal horizontal frequency of 31.5 kHz. and a vertical frequency of 60 Hz. The M-8000 employs the widely-used 15 pin mini-D for the video output connector.

The quality and sharpness of the displayed image depends upon the resolution of the video monitor. This resolution is controlled by two factors: video bandwidth and phosphor dot pitch. With bandwidth (measured in megahertz (MHz.)) the higher the number, the better the performance. When comparing dot pitch, however, the lower (smaller) the number is the better the quality will be. A dot pitch of 0.31 millimeters (mm) will give good results.

When selecting a video monitor for use with the M-8000, remember that monitors with an FCC Part 15 class "B" certification have been tested to tighter EMI and RFI emission standards than those with a class "A" emission rating, and as such radiate less interference to short-wave radio signals.

You may want to consider investing in a multi-sync monitor at this point. While these sophisticated monitors command a premium price, their flexibility may prove worthwhile as higher resolution displays become more prevalent.

The video monitor is connected to the "VIDEO" jack on the rear panel. If your video monitor is equipped with a connector other than the 15 pin mini-D, then an adapter must be used to mate your connector with the M-8000. These adapters are often available at local computer stores.

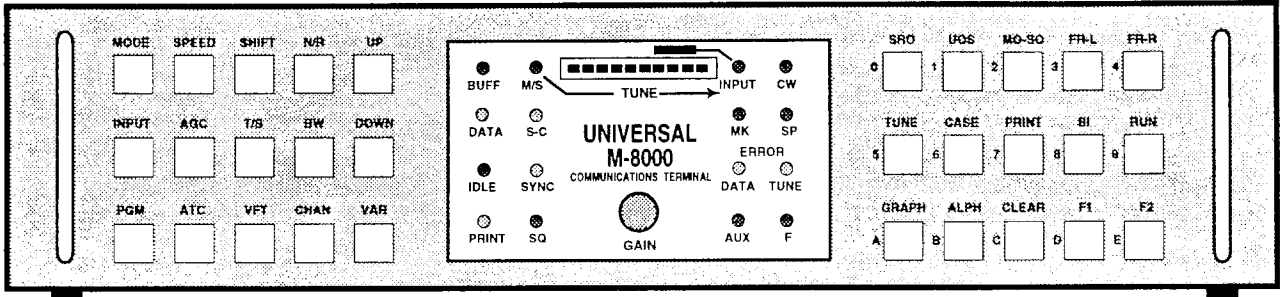
■ THE VIDEO SCREEN

The top 26 rows of the screen are reserved for displaying received text. Below this area is a graphics tuning indicator section. In modes where these tuning indicators are not usable (Morse, DataBit, FAX or Paging modes), this section of the screen is automatically converted for use as displaying additional text (graphics in FAX mode). This conversion to text may also be initiated manually, by user command, to provide a 30 line by 80 character display in any text mode, if the tuning aids are not needed. The bottom two lines of the screen are used as status lines to display the setting of the various operating parameters affected by the control keys.

4.0 OPERATING CONTROLS

4.1 POWER SWITCH

The power to the M-8000 is controlled by a toggle switch located behind the right hand rack handle. Up is *ON*, down is *OFF*.



4.2 KEYPAD FUNCTIONS

The M-8000 uses 30 push-button keys to control the majority of operating functions. Some of these keys are capable of providing more than one function by using them in conjunction with the **F1** or **F2** keys. These alternate functions are activated by pressing the **F1** or **F2** key and then pressing the appropriate multi-function key. When one of the alternate functions (F1 or F2) is active, the F LED will blink and the appropriate F on the status line will also blink. The alternate function enable will turn off as soon as any control key is pressed. To disable the alternate selection without performing an alternate function, simply press the appropriate **F** key a second time.

Whenever a key is pressed, a short beep tone (1000 Hz.) will be heard. If the pressed key has no function in the selected mode of operation, or if the limits to the function of that key have already been reached, then a lower frequency tone (500 Hz.) will be heard. These tones can be enabled or disabled by the user in the PROGRAM function.

Pressing and holding certain keys will cause the function of that key to repeat, just as if the key were pressed and released multiple times. Keys that do this are noted below by the {repeats} indication after the function description.

The functions associated with several of the keys have 'variable' capabilities. When these keys are pressed, in addition to performing the indicated operation, the status line indicator for that function will be highlighted. When a status line function is highlighted, the **UP** and **DOWN** keys may be used to step through the available values or vary the value of that function. The selected function will remain highlighted until another control key with variable capability is pressed or the **VAR** key is used to select another variable function. Keys that operate in this manner are noted below by the {variable} indication after the function description.

LEFT HAND KEY ARRAY

MODE	Steps through the available operating modes in the following sequence: Baudot, ASCII, Packet, PACTOR, Sitor-A, Sitor-B, Autor, FEC-A, FEC-S, ARQ-M2, ARQ-M4, ARQ-E, ARQ-E3, ARQ-S, SWED, ARQ6-90, ASYNC, SYNC, ACARS, POCSAG, GOLAY, PICCOLO, FAX and Morse. {repeats} {var.}
F1+ MODE	Direct entry of mode.
F2+ MODE	Short-cut, expert mode.
SPEED	Steps through the available standard speeds of operation for the selected mode. {repeats} {variable}
F2+ SPEED	Direct entry of speed.
SHIFT	Steps through the six pre-set shifts of the high or low tone sets or through the seven pre-set tone pairs in the modem mode. {repeats} {variable}
F2+ SHIFT	Direct entry of shift.
N/R	Selects between Normal and Reverse sense of the demodulator.
UP	Increases the value of the currently selected variable parameter. {repeats}
INPUT	Switches between audio input 1 and input 2.
F1+ INPUT	Turns the DIVERsity function on or off.
AGC	Selects AGC off, AGC on or LIMiter.
T/S	Selects the demodulator Tone Set as high tones, low tones or modem tones.
F1+ T/S	Selects external demodulators.
F2+ T/S	Direct entry of Mark tone frequency.
BW	Modifies the BandWidth of the demodulator filters from the NOMinal value in steps ranging from -3 (narrowest) to +3 (widest). {variable}
DOWN	Decreases the value of the currently selected variable parameter. {repeats}
F2+ PGM	Accesses the menu-driven programming function of the M-8000.
ATC	Turns the Automatic Threshold Circuit on or off.
VFT	Selects the Voice Frequency Telegraph demodulator mode (FDM).
F2+ VFT	Direct entry of Space tone frequency.
CHAN	Steps through the available VFT tone channels within the selected channelization mode. If VFT demodulator is not in use, CHAN selects the desired ARQ-M2 or ARQ-M4 channel to monitor.
F1+ CHAN	Selects the desired ARQ-M2 or ARQ-M4 channel to monitor.
VAR	Steps through the various operating parameters which are capable of variable operation: MODE, SPEED, SHIFT, BW or no variable functions.

RIGHT HAND KEY ARRAY

SRO	(Speed Read Out) Initiates the speed evaluation function.
UOS	(Unshift On Space) Turns the UOS function on or off in all Baudot based codes. In ASCII mode selects parity operation.
MO-SO	(Mark Only - Space Only) Enables the Mark filter or Space filter to operate alone or both filters to operate simultaneously.
FR-L	(FRame Left)
FR-R	(FRame Right)
TUNE	Activates the automatic demodulator filter tuning function.
F2+ TUNE	Activates the automatic filter tuning and speed setting function.
CASE	Manually steps through the cases for Baudot-based RTTY modes: Figures, Letters and National. (National in three-shift alphabets only).
PRINT	Selects the printer output mode to be: OFF, ON, SPC (space character), S-C (sel-cal) or SQU (squelch).
F1+ PRINT	Causes the indications on the status lines to be sent to the printer.
F2+ PRINT	Activates the retro-print function. The last 2048 characters received are placed in the printer output buffer and a printer selection of ON is assumed. The retro-print function will turn off when the printer buffer empties. While retro-print is active, the status line will indicate "PRN=RET".
F1/F2+ BI	Control the operation of the Baudot-based Bit Inversion decoding function.
RUN	Starts or stops the transfer of received data to the video screen and printers. This function operates only in the following modes: SYNC (databit) and FAX.
GRAPH	Sets the front panel LED bar-graph to indicate either the audio level to the tone filters or the output of the Mark / Space filters.
F2+ GRAPH	Controls whether the video display will be 80 x 26 text characters with graphic tuning aids or 80 x 30 text with status lines only. When the display is switched from one format to another, the screen is automatically cleared.
ALPH	Selects the desired Baudot or Baudot-based code ALPHabets of: ITA (ITA-2), TLX (Telex), MIL (Military) and CYR (Cyrillic).
F1+ ALPH	Switches the Literal code conversion option on or off.
CLEAR	Clears the video display screen.
F1+ CLEAR	Clears the printer buffers (except in FAX mode it clears the screen).
F2+ CLEAR	Clears the spectral display.

In addition to the above functions, each of the right-hand control keys is labeled with a number (0-9) or letter (A-E). These keys are also used for numeric entry and/or programming functions.

