MX385 NAV - COMM OWNER'S MANUAL

TKM, INC
14811 NORTH 73rd STREET SCOTTSDALE, AZ 85260

PART # MN0385, REV. 3
NOV 11,1998

EOUIPMENT DESCRIPTION

The unit features digital (LED) displays for active (yellow) frequently channel and
standby (red) frequency channel for both COMM and NAV.

For channel selection a MHz knob and a KHz knob are provided. For 25 Khz increments in
COMM a 25 KHz button is provided. To activate COMM or NAV frequency selection an N/C
button is provided; a 'Tic'* appears in the selected standby channel display.

Channel selection operates on the standby channel only. When the desired channel is
indicted in the standby display it may be placed into the active position by depressing the
"Flip-flop" button located to the left of the displays (labeled COMM and NAV); the active
channel is then placed into the standby position.

The NAV receiver features a VC/ID button to permit selection of the voice or ident reception. In
the Ident condition a 'Tic' is displayed on the active NAV channel display.

The COMM transceiver features a test button that overrides the squelch to verify proper
receiver operation and to allow reception of weak signals. Also provided on the active COMM
display is a 'Tic' to indicate transmitter power output.

The adjustment hole by the MHz switch permits operator adjustment of the display
dimmer range for optimum nighttime brightness.

The adjustment hole by the KHz switch permits squelch adjustment and has a range of 10 db.

• The 'Tic' is the upper half of ' l' and is found to the left of the 100' s digit.

SPECIFICATIONS

Mounting:	Panel mounted, no shock mounting required.
Size:	6.22 x 2.60 x 12.6 inches *w/* connectors.
Weight:	4.2 lbs. excluding external connector and harness.
Power Requirements:	27.5 Vcd
NAV and COMM Recv'r	0.7 A
Max COMM Total *w/* Transmit (Tone)	3.7 A

COMM Transceiver

Crystal Controlled:	760 Channel
Frequency Range:	118.00 to 136.975 MHz
Frequency Stability:	$+ I -$ .003%. -20 to 50C

Transmitter

VHF Power Output:	10 watts minimum. 50 ohm
Modulation:	85% capability with 90% limiting
Microphone:	Dynamic mike containing transistorized pre-amp or carbon (must provide at least 120 m Vrms into 500 ohm load).
Sidetone:	Adjustable up to 20 mw into 500 ohm headphones.
Duty Cycle:	1 minute on, 4 minutes off (20%).

COMM Receiver

Sensitivity:	-103 dbm will provide a 6 db minimum S $+$ N/N (1 KHz. 30%)
Selectivity:	Typical 6 db at $+ I -$ 7.5 KHz. 45 db at $+ I-$ 17.5 KHz. 65 db at $+ I -$ 25 KHz.
Spurious Responses:	Down at least 70 db.
Squelch:	Noise adaptive squelch with manual override.

AGC Characteristics: From -101 to -7 dbm audio output will not vary more than 1 db.

NA V Receiver

Crystal Controlled:	200 Channels
Frequency Range:	108.00 to 117.95 MHz
Sensitivity:	-107 dbm will provide at least half-flag indication.
Selectivity:	Typical 6 db at $+I$ -15 KHz. 50 db at $+I$ -35 KHz. 65 db at $+I$ -50 KHz.
Spurious Responses:	Down at least 70 db.
Ident Filter:	15 db minimum
AGC Characteristics:	From -101 to -7 dbm audio output will not vary more than 1 db.
NA V Receiver Accuracy:	Two sigma limit. $+I$ **-1** degree.
NAV Output:	With LOC adjusted for 0.5 Vrms VOR = 0.71 Vrms (typical) into 20k ohms or greater load impedance.
DME Channeling:	2 x 5
G/S Channeling:	2 x 5

Audio

Auxiliary Audio Inputs:	Seven 500 ohm inputs with 30 db isolation. One high gain input.
Frequency Responses:	Within 6 db from 350 Hz to 2500 Hz
Headphone Output:	40 mw into 500 ohm.
Speaker Output:	1.5 Vrms into auxiliary input Produces 5 watts audio output.

EQUIPMENT LIMITATIONS

The following limitations indicate where the MX385 may be installed and meet the applicable TSO requirements.

1. Equipment is intended for installation within a nonpressurized but controlled temperature location in an aircraft that is operated at altitudes up to 35000 feet MSL.

2. Equipment is intended for use in a Standard Humidity Environment.

3. Equipment is intended to be panel mounted in single and Multi Engine Fixed Wing Aircraft with Reciprocating and Turbo propeller Engines.

4. Equipment shall not be mounted less than 0.3 m from magnetic compass.

5. Unit has not been tested with autopilots.

ASSOCIATED EQUIPMENT

The MX385 is designed to be a direct replacement for the ARC RT385 and RT 485 Units. The unit is dimensionally identical to the ARC units and can therefore use existing aircraft installations. The unit is electrically interchangeable with the ARC units and will provide the proper audio navigation signal and channeling signals for existing installations.

The remote channeling outputs of the unit-permit channeling of Glide Slope receivers and DME using 2x5 channeling codes

INSTALLATION

The MX385 is designed to be an exact replacement for the ARC RT385 and similar units. As a replacement unit the MX385 may be inserted directly into the mounting tray for the ARC unit and tightened down with a long (10" min) standard screwdriver.

To remove the MX385 from the mounting tray it is important to note that the Channel Selector knobs should not be used as handles. Using a long screwdriver, engage the clamp screw thru front panel access hole and rotate it CCW. The unit will be slowly retracted from the mounting tray and when the screw is completely disengaged the MX385 may be removed by sliding it out.

<div align="center">NOTICE TO INSTALLER</div>

The TKM MX385 NAVICOMM is authorized by the FAA to TSO C34e, C36e, C37d, C38d, and C40c. The product is an incomplete system. In order to achieve a complete TSO quality system, the MX385 **must** be installed to configure in conjunction a TSO *C37/C38* authorized antenna and a TSO *C34* authorized navigation receiver. It is the responsibility of the installer to ensure proper installation.

<div align="center">CONTINUED AIRWORTHINESS (HBA 98-18)</div>

Permission is hereby given to installers approved by the recognized aviation authority to reference relevant excerpts from the installation instructions provided by TKM, Inc. in order to fulfill documentation requirements for Instructions for Continued airworthiness. Adequacy of the documents should not be assumed by this permission. Responsibility for ICA documentation rests solely with the applicant. The MX385 product is 'Repair on Condition Only'.

OPERATING INSTRUCTIONS

Operating controls for the MX385 are located on the unit front panel or are remote inputs thru the rear panel.

The unit front panel is shown in figure 1. The left hand COMM readout indicates the active COMM frequency and the right hand COMM readout indicates the standby COMM frequency. The left hand NAV readout indicates the active NAV frequency and the right hand NAV readout indicates the standby NAV frequency. A 'Tic' readout is provided on the upper left hand corner of the first digit of each of the four frequency readouts.

The active COMM 'Tic' indicates the presence of transmitter power.

The standby COMM 'Tic' indicates that the Frequency Selection knobs will control COMM standby frequency.

The standby NAV 'Tic' indicates that the Frequency Selector knobs will control NAV standby frequency.

Power Application. The COMM volume control contains the master power switch and activates both the NAV and COMM functions internal to the MX385.

Frequency Selection. The N/C button is used to activate either the COMM or the NAV frequency selection as indicated by the appropriate 'Tic' display. The MHz and KHz controls can then be used to select a desired standby channel. In COMM the "25" button is used to advance the frequency by 25 KHz.

After the desired standby frequency is selected it may be transferred to thee active position by pressing the flip-flop button to the left of the ACTIVE display. The active and standby channels will be interchanged each time the button is pressed.

Ident/Voice Selection. The ID/VD button can be sued to select a tone filter in order to receive voice signals on the NAV receiver. The switch is also used for frequency storage as described below.

Test. The TEST button is a dual function switch. In normal operation it is used to override the squelch to verify receiver operation and to receive weak signals. The switch is also used for frequency storage as described below.

VT. The VT button is used to test external equipment if the installation has been wired for that function.

Preset Frequency Operation

To erase all frequency presets with one operation simply turn on the power to the radio while holding the TEST button depressed.

Examining/Changing/Inserting/Deleting Frequency Presets

The operation on individual frequency presets is accomplished in EDIT mode. To enter EDIT mode turn on the power to the radio while holding the VT button depressed. When the radio

is in EDIT mode the ACTIVE displays show the reference number of the preset and the STBY displays show the actual preset frequency. After a CLEAR operation as described above, the only presets will be the default of 112.0

EDIT mode operations are performed on either the COMM or NAV preset list according to where the tuning tic indicator is displayed. The tuning tic appears immediately to the left of the COMM or NAV between NAV and COMM preset editing.

Examining Presets (EDIT Mode)
Pressing the COMM button will step to the next frequency in the preset list. Pressing the TEST button will step to the previous frequency in the preset list. Pressing COMM when the last preset is displayed will cause the first preset to display. Similarly pressing TEST when the first preset is displayed will cause the last preset to display. WARNING:
When there is only one preset in the list the radio will not appear to "do anything" when COMM or TEST is pressed. This is because the current, previous, and next presets are all the same preset.

Changing a Preset (Edit Mode)
Press COMM or TEST until the desired insert point is displayed (the new preset will be inserted AFTER this insert point). Dial in the desired frequency using the tuning controls and press NA V. Remember that a preset list may contain a maximum of 50 entries. Insert commands that would cause this limit to be exceeded are ignored.

Deleting a Preset (Edit Mode)
Press COMM or TEST until the preset to be deleted is displayed, then press the VCID switch to delete. If the deleted preset was not at the end of the list all the presets that followed it are renumbered. Each preset list (NAV and COMM) must always contain at least one entry. If there is only one entry remaining in a preset list it may not be deleted (it can be changed to another frequency).

Frequency Preset. Normal Operation
At any time the radio is in normal operation (Not EDIT MODE) COMM preset frequencies may be called into the STDBY frequency display by pressing COMM while the TEST button is depressed. During the time that both buttons are held simultaneously depressed the reference number for the preset appears in the ACTIVE window. Each time this operation is repeated it will copy the "next" preset to the COMM STDBY frequency.

NAV preset operation is similar with the exception that presets are retrieved by pressing NAV while the VC - ID button is depressed.

Dimmer

Display Dimmer Adjustment The dark end of the automatic display dimmer range is adjustable through the front panel hole by the MHz switch marked "D".
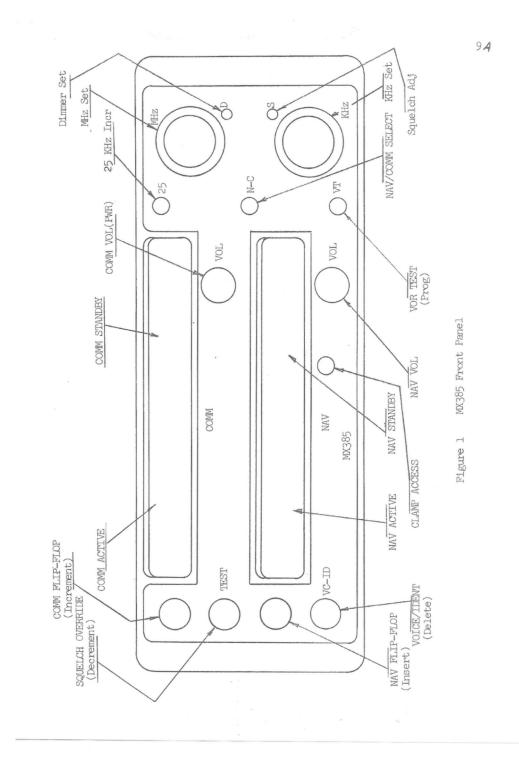
ENVIRONMENTAL QUALIFICATIONS FORM

MODEL MX385 NAV *I* COMM as specified in MX385 Specifications is manufactured by TKM, INC., 14811 NORTH 73rd STREET, SCOTTSDALE, AZ 85260.

CONDITIONS	D0160C para	DESCRIBTION OF TEST
Temperature and Alt.	4.0	Category C1
Low Temperature	4.5.1	Category C1
High Temperature	4.5.2	Category C1
Altitude	4.6.1	Category C1
Decompression	4.6.2	Not Tested
Overpressure	4.6.3	Not Tested
Temperature Variation	5.0	Category C
Humidity	6.0	Category A
Shock	7.0	Tested for all condo
Vibration	8.0	Category M/N (no shock mts).
Explosion	9.0	X: Not Tested
Waterproof	10.0	X: Not Tested
Fluid Susceptibility	11.0	X: Not Tested
Sand and Dust	12.0	X: Not Tested
Fungus	13.0	X: Not Tested
Salt Spray	14.0	X: Not Tested
Magnetic Effect	15.0	Category A
Power Input	16.0	Category B
Voltage Spike Condo	17.0	Category B
Audio Cond. Suscept.	18.0	Category B
Induced Sig. Susceptibility	19.0	Category B
RF Susceptibility	20.0	Category T

| RF Emission | 21.0 | Category B |
| Lightning Susceptibility | 22.0 | X: Not Tested |

Installation Note: The MX385 is designed to be a slide in replacement for ARC radios and as such, shall be installed with all of the original equipment precautions.

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Figure 1   MX385 Front Panel

MX385 Interconnect

The following table lists the pin description for the MX385 interconnects.

J1

Pin #	Description	Pin #	Description
1	Phn sidetone in	14	Phn sidetone out
2	Isol. Audio input	15	Speaker
3	Spare	16	Speaker
4	Aux audio input	17	Mic key
5	Aux audio input	18	Comm phn audio
6	Aux audio input	19	Sidetone out
7	Aux audio input	20	+ 28v audio
8	Aux audio input	21	Comm phn audio
9	NA V audio input	22	+ 28v comm
10	COMM audio input	23	+ 28v nav
11	Ground	24	Ground
12	Spare	25	Spare
13	Mic audio input	26	Spare

J2

Description	Pin #	Computer Board Pin #
DME Common	33	32
DME 1 MHz A	14	22
DME 1 MHz B	13	19
DME 1 MHz C	28	17
DME 1 MHz D	29	20
DME 1 MHz E	30	23
DME 100 KHz A	32	20
DME 100 KHz B	50	33
DME 100 KHz C	11	13
DME 100 KHz D	17	31
DME 100 KHz E	12	16
DME 50 KHz	31	26
GS Common	26	11
GS 1 MHz A	25	9
GS 1 MHz B	39	7
GS 1 MHz C	43	12
GS 1 MHz D	44	15
GS 1 MHz E	48	27
GS 100 KHz A	46	21
GS 100 KHz B	45	18
GS 100 KHz C	27	14
GS 100 KHz D	16	28
GS 100 KHz E	49	30
GS 50 KHz	47	24
ILS Enable	15	25
Nav Composite	18	2
NAVPhone	1	1
+28v Switched	37	5
NAV test	41	8
COMM flip-flop	10	10
Ground	4	3
Ground	21	4
Ground	38	6