

Michel

MC 60

Operation / Installation



## MC60 NAVIGATION CONVERTER AND INDICATOR

### OPERATION AND INSTALLATION

#### DESCRIPTION

The MC60 NAV Converter converts and displays a variety of navigation signals and is completely solid state. All displays are LED's and provide a high degree of reliability. Deviation displays are bar graphs comprised of five yellow dots and five red dots. Annunciation displays are individual LED's and are color coded to reduce ambiguity.

The acceptable input signals include ARINC, ARC, and NARCO (Mark 12) for VOR and Localizer; Glide Slope meter drivers, GPS meter drivers; and Marker Beacon lamp drivers. Display selection is accommodated by grounding appropriate enable lines.

The display, shown in Figure 1, includes an Up, Right, Down and Left bar graph; Glide Slope (GS), Inner (I), Outer (O), Zonal (Z), To (T), From (F), and Track (Trk) annunciator lights; and a digital readout. The digital readout indicates Bearing in degrees in the VOR mode, LOC in the Localizer mode, back for back course LOC, and GPS for GPS.

Front panel controls include a MODE switch to toggle between "normal" VOR operation and Tracking operation, a RCP switch to toggle between TO and FROM operation, an OBS control to select a bearing in the "normal" VOR operation, a VOR centering control, a LOC centering control, and a DIMMER adjustment. The centering and dimmer controls are located behind mounting screws and are normally adjusted on installation.

An autopilot output is provided on the rear panel for Left-Right control.

#### OPERATION

The operating controls and display are shown in Figure 1.

#### VOR

VOR operation is available in two modes which can be selected by the "Mode" button. The tracking mode is indicated by the activation of the "Trk" light. The absence of the "Trk" light and the display of a bearing in the digital display indicates the normal VOR indicator operation.

In the tracking mode the left and right bar graphs are off. If a valid VOR signal is input, the bearing to or from the station will be displayed and the Valid light will be on. To or from selection is made by pressing the "Rcp" button. If a valid VOR signal is not present the digital display will be three dashes.

In the normal mode the OBS will allow selection of the desired bearing. The "Rcp" button is used to select to or from bearings. When a valid VOR signal is input, the Valid light will be on and the left or right bar graph will indicate the deviation from the desired bearing. The direction of correction is the same as the traditional fly-to-the needle system; in this case fly-to-the-tip-of-the-bar-graph. Each dot of the bar graph represents one degree bearing deviation.

## **LOCALIZER**

When a localizer channel is selected on the associated NAV receiver the digital display will indicate "LOC". If a valid signal is present the "To" light and the "Valid" light will be on. The bar graph indicates the direction and amount of correction required. The "Right" bar graph indicates fly right and the "Left" bar graph indicates fly left.

If back course localizer is selected (by external switching) the digital display will indicate "bac" and the Left and Right bar graphs will be reversed.

## **GPS**

If GPS is selected (by external switching) the digital display indicates "GPS" and the "Valid", "To", and "From" lights and the "Left" and "Right" bar graphs are under control of the installed GPS unit.

## **GLIDE SLOPE**

When a valid Glide Slope signal is input to the MC60 the "GS" light is on and the vertical bar graphs are activated. The "Up" bar graph indicates fly up and the "Down" bar graph indicates fly down. The loss of a valid signal turns off the "GS" light and the vertical bar graphs.

## **MARKER BEACON**

The three Marker Beacon lights (I, O and Z) will be activated when the appropriate control signals are input.

## **DIMMING**

Automatic dimming is included in the unit and adjustment of the dim level can be made by removing the upper left mounting screw and with a 0.080 diameter jewelers screw driver inserted in the hole set the desired dim level. The bright level is not adjustable.

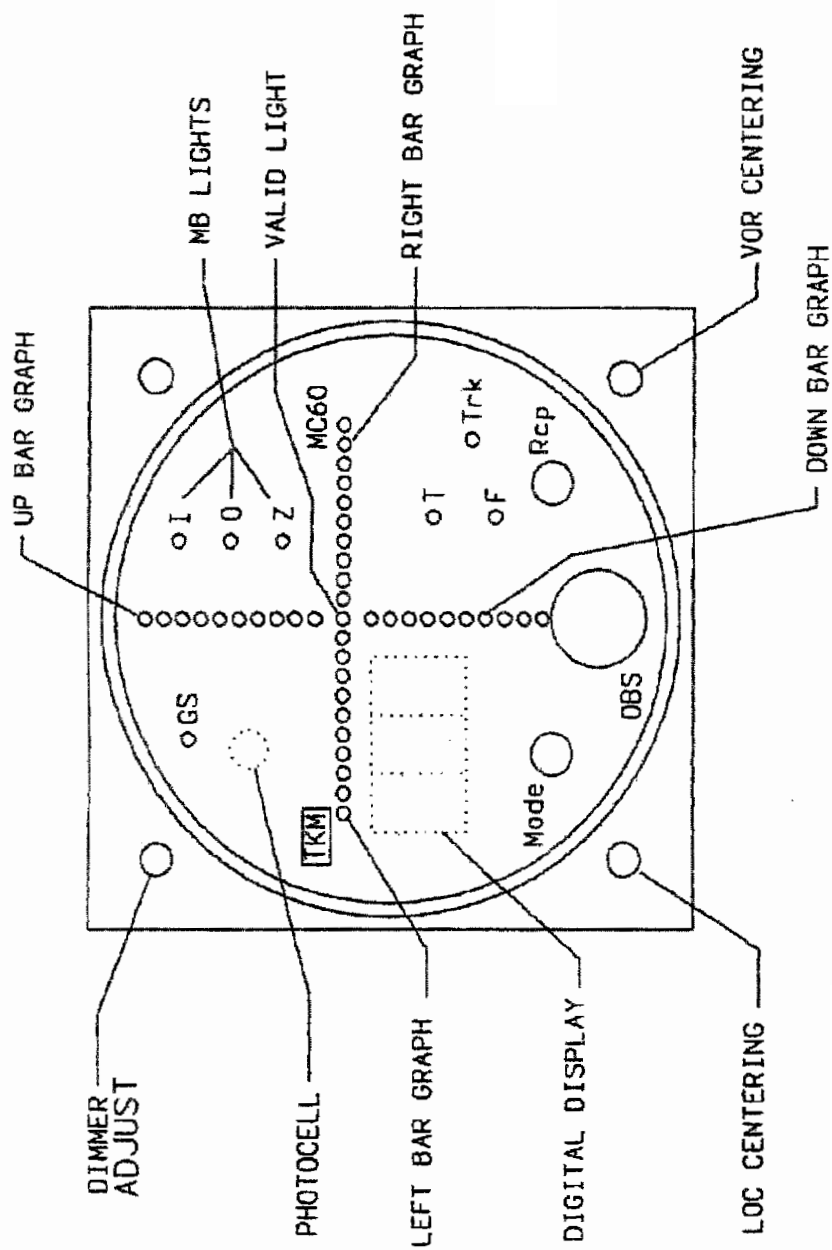
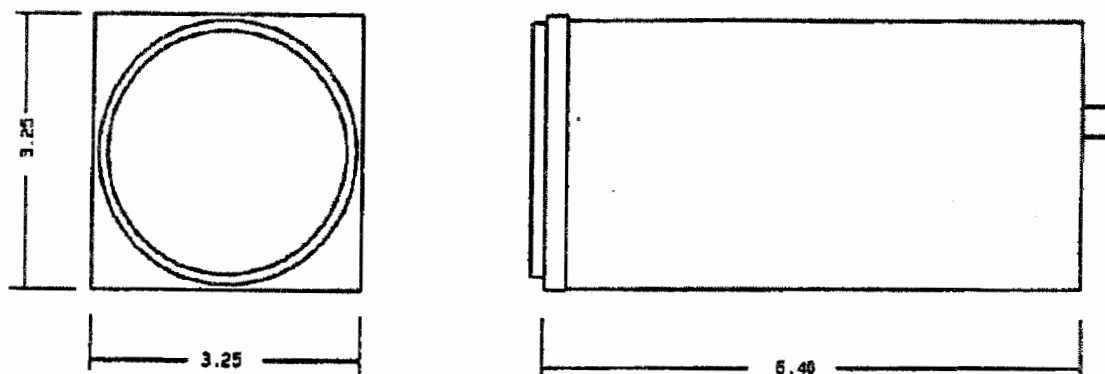
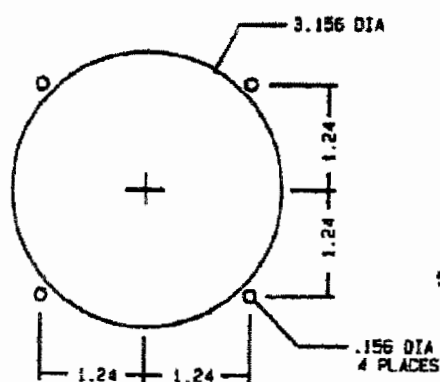


FIGURE 1  
MC60 NAV CONVERTER



OUTLINE DIMENSIONS



PANEL CUTOUT

Mounting screws should not penetrate more than  
 .25 inches into Front Panel.  
 5/16 6-32 Pan head screws are recommended.

FIGURE 2

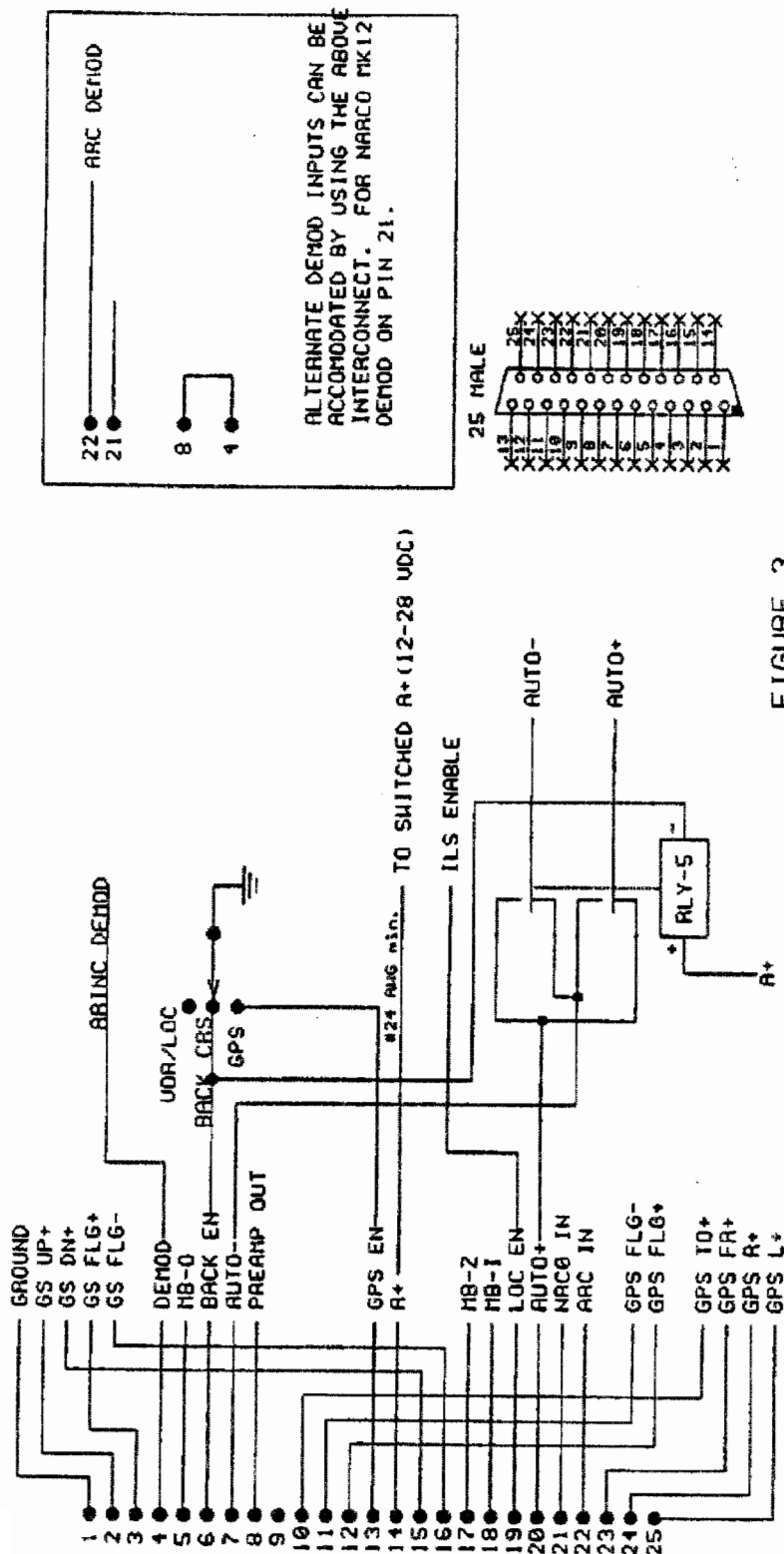


FIGURE 3  
MC60 INTERCONNECT

# ENVIRONMENTAL QUALIFICATION FORM

Model MC60 Navigation Converter as specified in MC60 Specifications is manufactured by TKM, Inc., 14811 North 73rd Street, Scottsdale, AZ 85260.

Conditions	DO160C para.	Description 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 conditions
Vibration	8.0	Category M/N (no shock mts)
Explosion	9.0	X: not tested
Waterproofness	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 Cond.	17.0	Category B
Audio Cond. Suscept.	18.0	Category B
Induced Sig. Suscept.	19.0	Category B
RF Susceptibility	20.0	Category T
RF Emission	21.0	Category B
Lightning Suscept.	22.0	X: not tested



## **INSTALLATION**

### **Mechanical**

The unit is intended for installation in the instrument panel. While the unit does not have parallax error as is common with meter type displays it is still desirable to locate the unit with a good viewing angle to get good display contrast and ease of pilot control.

The outline dimensions and panel cutout is shown in Figure 2. Since the mounting holes are used for system adjustments it is important to use the correct length screws. The screws should not penetrate more than .25 inches into the front panel. 5/16 6-32 pan head screws are recommended.

### **Electrical**

An interconnect diagram is shown in Figure 3. As indicated the Demod signal may be derived from three different signal formats. The primary input is designed to interface with the ARINC standard. A preamplifier is included in the MC60 to accommodate an ARC level signal or a NARCO Mark 12 level.

The unit will operate with an A+ input of 12 to 28 vdc and has a current drain of 0.5 A maximum.

Back course localizer is accommodated internally by grounding the BACK-EN line. Auto pilot output is not affected by the BACK-EN so if it is necessary to provide back course reversal for autopilot a polarity reversal relay must be added.

Marker beacon lights are activated by grounding the appropriate line. Maximum current for each line is 20 ma.

### **Thermal**

The MC60 does not require cooling for normal installations. However, particularly in 28 vdc. Installations with maximum deviation on both bar graphs in bright ambient light, it may be necessary to add some convection cooling. The temperature of the rear panel of the unit should not exceed 75 C.

### **System Checkout**

The unit is designed to interface with a variety of NAV receivers. It is important to have the proper demod signal level for the selected input to the MC60. The following tests should be made to verify proper operation:

With a centered localizer signal applied to the NAV receiver, adjust the LOC CENTERING for a centered bar graph display. For better accuracy the autopilot output can be monitored with an accurate meter.

Apply a localizer signal with an adjustable deviation. With a deviation of .095 DDM the 6<sup>th</sup> dot of the bar graph should just activated. This should be checked in both directions. Adjust the demod level as required.

For VOR the VOR CENTERING should be adjusted in the "normal" mode to match the displayed bearing to the bearing input to the NAV receiver. A deviation check should be made to verify that a 10 degree bearing change results in exactly 10 dots deflection on the bar graph.

## LIMITATIONS

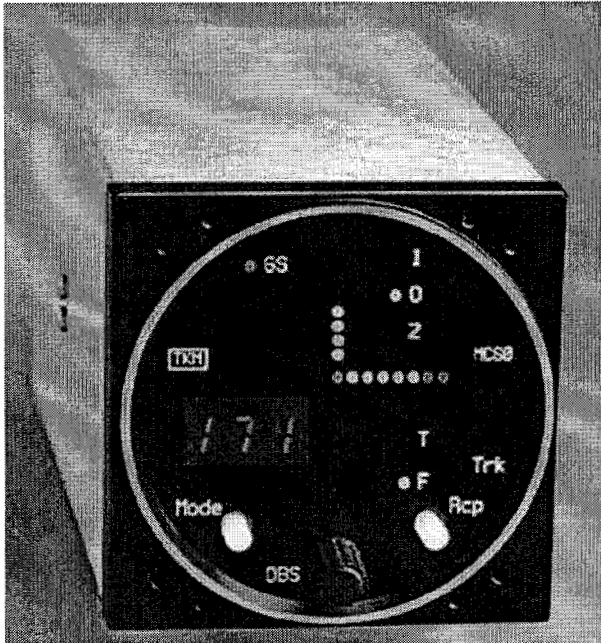
The following limitations indicate where the MC60 may be installed and meet the applicable TSO requirements.

1. The equipment is intended for installation within a non pressurized 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 turbopropeller engines.
4. Equipment shall not be mounted less than 0.3 m from magnetic compass.
5. Unit has not been tested with autopilots.

# Avionics

**TKM inc.**

## **MC-60 NAV Converter-Indicator**



The MC60 NAV Converter is designed to provide a display for a variety of NAV signals including VOR, LOC, Back course LOC, GS, GPS and MB.

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The VOR display includes a L/R bar graph with an OBS and a tracking mode with reciprocal selection. When GPS is selected by grounding the enable line, GPS is displayed in the OBS window and VOR and LOC functions are disabled. When GPS is not enabled the VOR/LOC selection is made by the ILS enable line from the associated NAV receiver. Back course selection is made by grounding the back course enable line.

The digital display includes OBS, bearing, LOC, BAC, and GPS. The bar graph display contains 10 dots for Left, Right, Up and Down. The center dot is used to indicate valid signals for LOC, VOR, or GPS. A GS light indicates a valid GS signal.