Honeywell

MAINTENANCE MANUAL

BENDIX/KING®

KMT 112

MAGNETIC AZIMUTH TRANSMITTER

MANUAL NUMBER 006-15624-0007
REVISION 7 JULY, 2001

WARNING
Prior to the export of this document, review for export license requirement is needed.

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KMT 112

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PART NUMBER	DESCRIPTION
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006-03140-0004	(3) inch Binder.
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REVISION HISTORY

KMT 112 Maintenance Manual

Part Number: 006-15624-XXXX

For each revision, add, delete, or replace pages as indicated.

REVISION No. 7, July 2001

ITEM	ACTION
All pages	Full Reprint, new manual

Revision 7 creates a new stand-alone manual for the KMT 112 which was extracted from revision 6 of the KCS 55/55A maintenance manual, (P/N 006-05111-0006). Any revisions to the KMT 112, beginning with revision 7, will not be a part of the KCS 55/55A manual.

THIS PAGE IS RESERVED

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SECTION IV
THEORY OF OPERATION

4.1 GENERAL

A KMT 112 magnetic flux detector is designed to measure the direction of a magnetic field and convert this information to a three-wire synchro format. This information is used in a slaved compass system as shown in Figure 4-1.

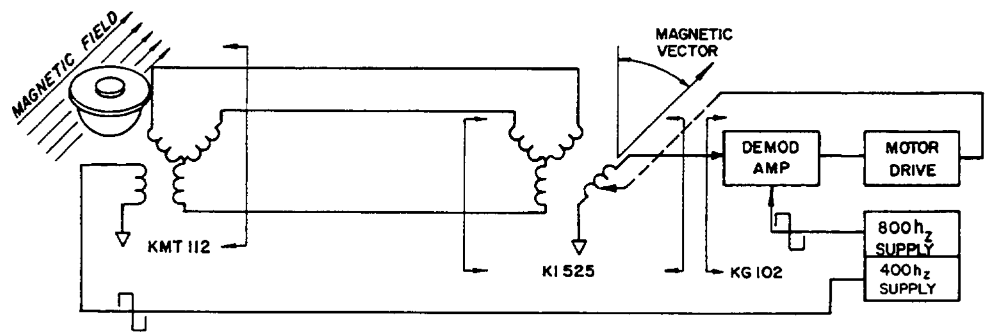

FIGURE 4-1 KMT 112 SYSTEM DIAGRAM

4.2 FLUX VALVE CONSTRUCTION

The flux valve consists of a stack of four high permeability magnetic laminations around which is wound many turns of wire in a toroidal fashion. This coil is excited from a 400Hz source in the KG 102 directional gyro that is capable of driving the magnetic laminations into saturation twice each cycle as shown in Figure 4-2.

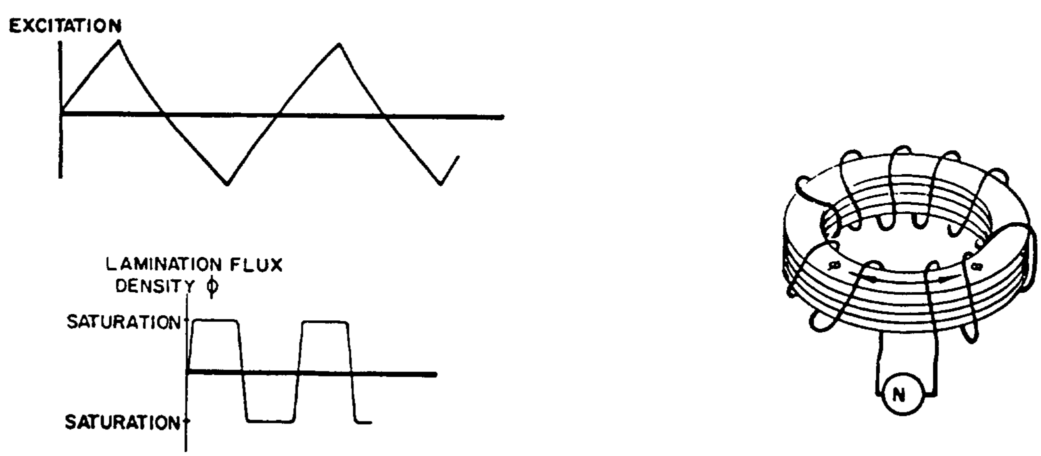

FIGURE 4-2 EXCITATION WAVEFORMS

In addition to the excitation winding described above, a second winding is added to the toroid and acts as a sensing coil. This coil consists of three, 120 degree sections spaced around the toroid and connected as shown in Figure 4-3.

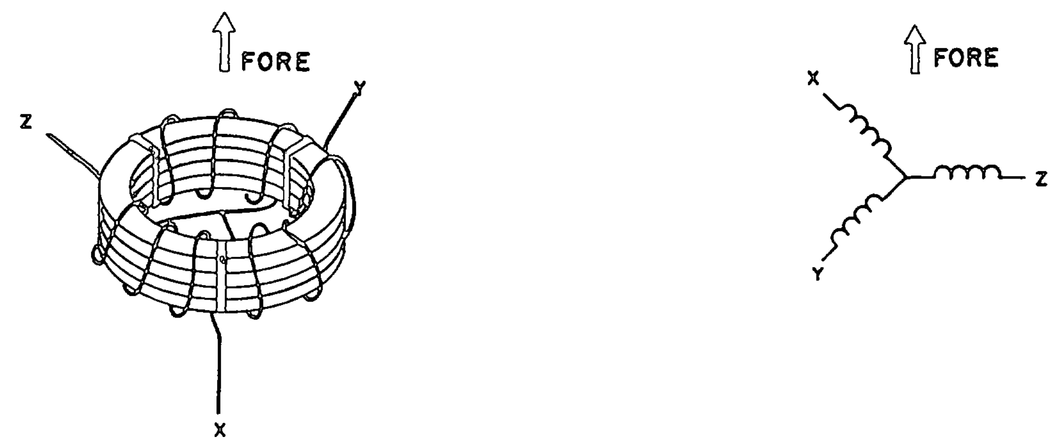

FIGURE 4-3 SENSING COIL CONFIGURATION

4.3 FLUX VALVE OPERATION

Operation of the flux valve is based on the change in permeability that occurs when the magnetic laminations are driven into and out of saturation by the 400Hz excitation signal. When the input excitation voltage is passing through zero, the flux density in the laminations, caused by the excitation is decreasing, causing the core to be in an unsaturated condition. This results in a large increase in core permeability. The earth's magnetic field, seeking the path of least reluctance, will alter its path to conform to the magnetic laminations as shown in Figure 4-4.

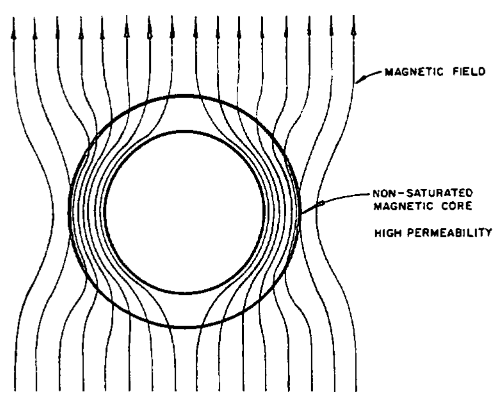

FIGURE 4-4 NON-SATURATED FLUX VALVE FIELD

Since many windings of the sensing coil will be cut by this moving field, a voltage will be induced in the three coil sections. The magnitude of the induced voltage in each section will be a function of the field direction and will be compatible with normal synchro conventions.

As the excitation voltage increases in a positive or negative direction, the flux density in the magnetic core caused by the excitation also increases in a corresponding manner. When the flux density reaches a certain point, further increases in the input voltage, or magnetic field strength H, will result in no further increase in flux density B. This saturation results in a large reduction of the ratio B/H, or the permeability p of the core as illustrated in Figure 4-5.

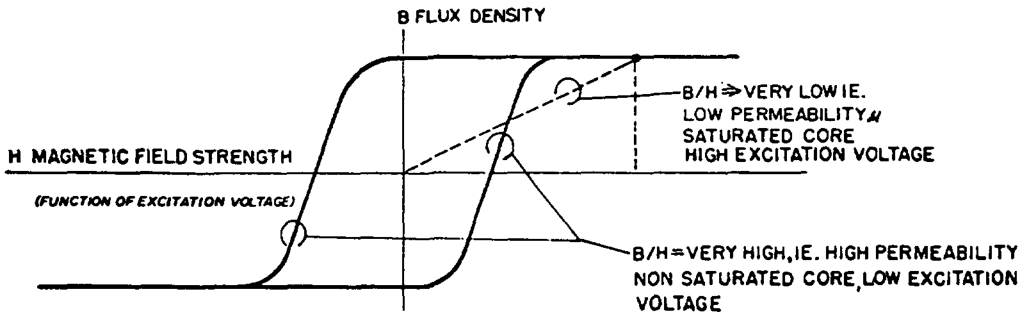

FIGURE 4-5 FLUX VALVE CORE HYSTERESIS DIAGRAM

Because of this reduction in permeability, the earth's magnetic field does not conform as closely to the magnetic core as it did during the non-saturated part of the cycle. See Figure 4-6.

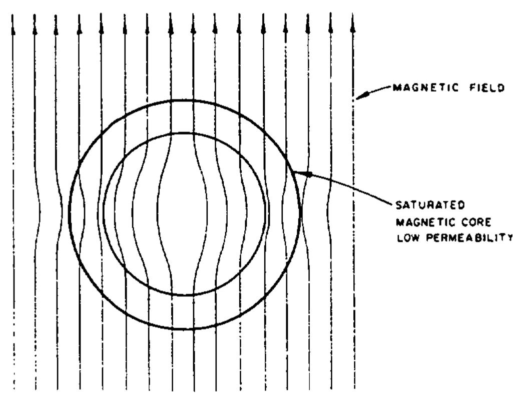

FIGURE 4-6 SATURATED FLUX VALVE FIELD

As before, many windings of the sensing coil will be cut by the earth's field as it moves out of conformance with the magnetic core. This time, however, the induced voltage in the coil sections will be of opposite polarity to what it was when the field moved into conformance with the core. A time history of this induced voltage is shown in Figure 4-7.

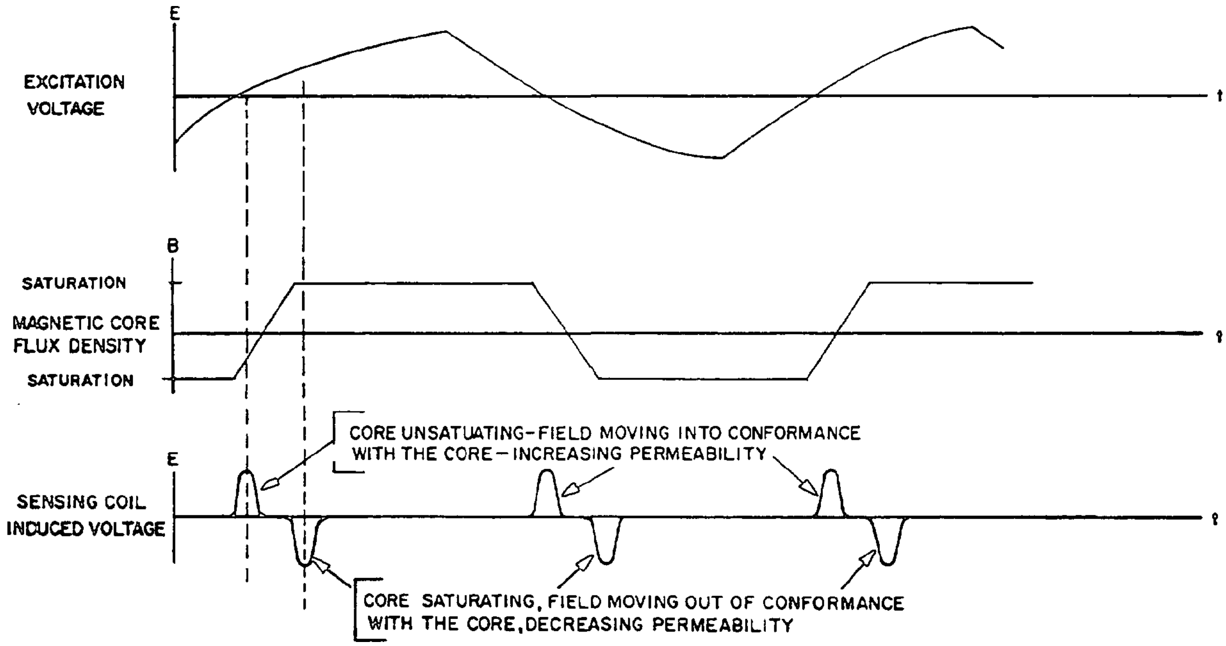

FIGURE 4-7 FLUX VALVE WAVEFORM DIAGRAMS

From the Sensing Coil waveform graph above, it is apparent that a complete cycle of this waveform occurs twice during each cycle of the excitation waveform. That is, each time the magnetic flux resulting from the excitation, reverses direction and causes the core to become unsaturated followed by saturation in the opposite direction, a complete cycle of the output waveform is generated. The magnitude and phase of this waveform is independent of the phase of the input excitation and depends only on the orientation of the coil segment relative to the earth's field.

A universal joint suspension system is used to support the magnetic core from the upper plate of the flux valve. This suspension system allows the core to remain parallel to the earth's surface during non-turning un-accelerating flight. As a result, only the direction of the horizontal component of the magnetic field is detected.

To stabilize the core and suspension system, the flux valve bowl is partially filled with a high viscosity silicon fluid that prevents vibration and other high frequency motion of the aircraft from affecting the magnetic core.

For a complete schematic of the KMT 112 magnetic flux detector refer to Section VI, the Illustrated Parts List.

SECTION V
MAINTENANCE

5.1 TEST AND ALIGNMENT

The following establishes the performance requirements that this unit must meet before it can be used as part of an operational system.

5.1.1 GENERAL REQUIREMENTS

1) Unless otherwise specified all tests shall be conducted with the transmitter in its normal operating position and at ambient room temperature (25 +/- 5 deg. C) and humidity not to exceed 80%.
2) Electrical connections shall be made as shown in Figure 5-1.
3) No warm-up time is required.
4) The synchro control transformer shall be nulled and phased as a control transformer in accordance with the ARINC 407 report.
5) The test limits stated herein apply after the removal of all test equipment inaccuracies.
6) Power Sources
   a) 15.0 ±0. 5 volts D. C., 0. 25 amps. max.
   b) 28 ±2 volts D. C., 1. 5 amps max.

5.1.2 TEST REQUIREMENTS

5.1.2.1 SCALE ERROR TEST

1) Place the KMT 112 in a magnetic shielding chamber and align the foremark on the transmitter with the white boss. Connect the equipment as shown in Figure 5-1.
2) The axis of the magnetic shielding chamber must be parallel to an East/West vector.
3) Adjust the gauss pot to 0.18.
4) The toggle switch on the shielding chamber must be in the "Pot" position.
5) The toggle switch on the error meter box must be in the "index error" position.
6) Rotate the shielding chamber to align the top surface of the KMT 112 with the horizon (Position "A").
7) Between the two concentric cylinders of the shielding chamber there is an opening through which a disk can be turned. The disk has detent positions every 30 degrees. Rotate the disk until the fore on the KMT 112 is aligned with the East/West axis of the shielding chamber. Read the error in degrees on the meter and record it as the index error.
8) Switch the toggle switch on the error meter box to the "index adjust" position.
9) Zero the error meter by adjusting the index zero knob.
10) Rotate the disk in a clockwise direction, when viewed from the top, to the next 30 degree detent position and record the error. Continue rotating the disk and record the error. Continue rotating the disk and record the error every 30 degrees. The error shall not be larger than ±4 degrees at any position.

5.1.2.2 HEADING TEST

1) Rotate the shielding chamber to tilt the top surface at the KMT 112 10 degrees with the horizon (Position "B").

2) Repeat the scale error test as described in Section 5.1.2.1 (10) above. The errors obtained in this test shall not differ from the errors obtained in Section 5.1.2.1 (10) by more than 4.0 degrees.

5.1.3 SIGNAL STRENGTH TEST

Loosen the clamp and raise the KMT 112 over the bosses of the holding fixture. Rotate the KMT 112 approximately 90 degrees in the clockwise direction when viewed from the top. The error meter should deviate full scale in the positive direction.

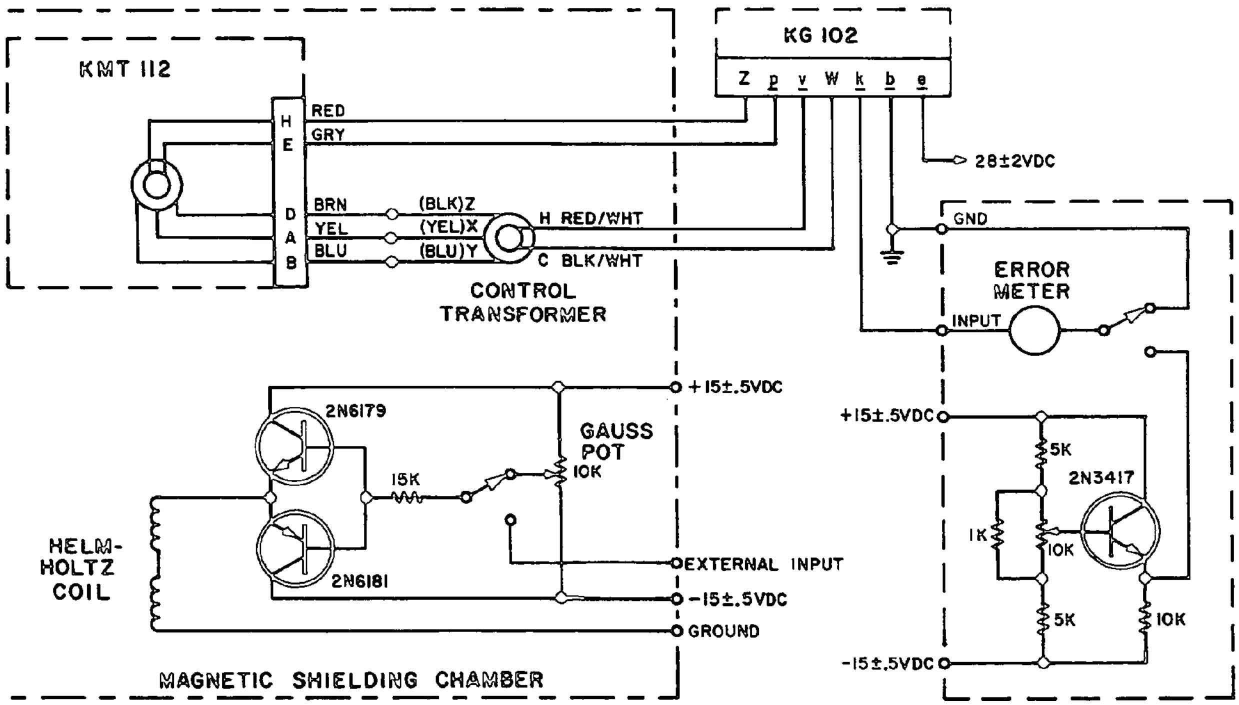

FIGURE 5-1 KMT 112 TEST EQUIPMENT SETUP

TEST DATA SHEET
KMT 112 MAGNETIC AZIMUTH TRANSMITTER

I. Index Error ______________ (8 deg. max)

II. Scale error test

Heading	Error (Max +/-4.0 deg.)
0 deg.	______________
30 deg.	______________
60 deg.	______________
90 deg.	______________
120 deg.	______________
150 deg.	______________
180 deg.	______________
210 deg.	______________
240 deg.	______________
270 deg.	______________
300 deg.	______________
330 deg.	______________
Algebraic difference of maximum and minimum errors	______________ (8 deg. max.)

III. Heading Test

Heading	Error	Error in 5.1.2.1 (10)*	Difference (4. 0 deg. Max)
0 deg.	____________	____________	____________
30 deg.	____________	____________	____________
60 deg.	____________	____________	____________
90 deg.	____________	____________	____________
120 deg.	____________	____________	____________
150 deg.	____________	____________	____________
180 deg.	____________	____________	____________
210 deg.	____________	____________	____________
240 deg.	____________	____________	____________
270 deg.	____________	____________	____________
300 deg.	____________	____________	____________
330 deg.	____________	____________	____________

* Refer to section 5.1.2.1 (10) above.

IV. Signal Strength Test

Full scale in positive direction ______________

Tested by ____________________ Date___________

Inspected by ____________________ Date___________

5.2 OVERHAUL

5.2.1 VISUAL INSPECTION

This section contains instructions and information to assist in determining, by visual inspection, the condition of the KMT 112 assembly. These inspection procedures will assist in finding defects resulting from wear, physical damage, deterioration, or other causes. To aid inspection, detailed procedures are arranged in alphabetical order.

A. Connectors

Inspect the connector bodies for broken parts; check the insulation for cracks, and check the contacts for damage, misalignment, corrosion, or bad plating. Check for broken, loose, or poorly soldered connections to terminals of the connectors. Inspect connector hoods and cable clamps for crimped wires.

B. Housing

Inspect the housing for deformation, dents, punctures, cracks, or badly worn surfaces..

5.2.2 CLEANING

A. Use a clean, lint-free cloth lightly moistened with a regular cleaning detergent to remove foreign matter from the housing. Wipe dry with a clean, lint-free cloth.

B. Clean the connector with a hand controlled air jet (25 psi maximum) and a clean lint free cloth lightly moistened with a regular cleaning solvent.

5.2.3 DISASSEMBLY /ASSEMBLY PROCEDURES

The KMT 112 is a sealed, non-repairable unit. If there is a KMT 112 malfunction the unit should be replaced.

5.3 TROUBLESHOOTING

Refer to the troubleshooting flow chart, figure 5-2.

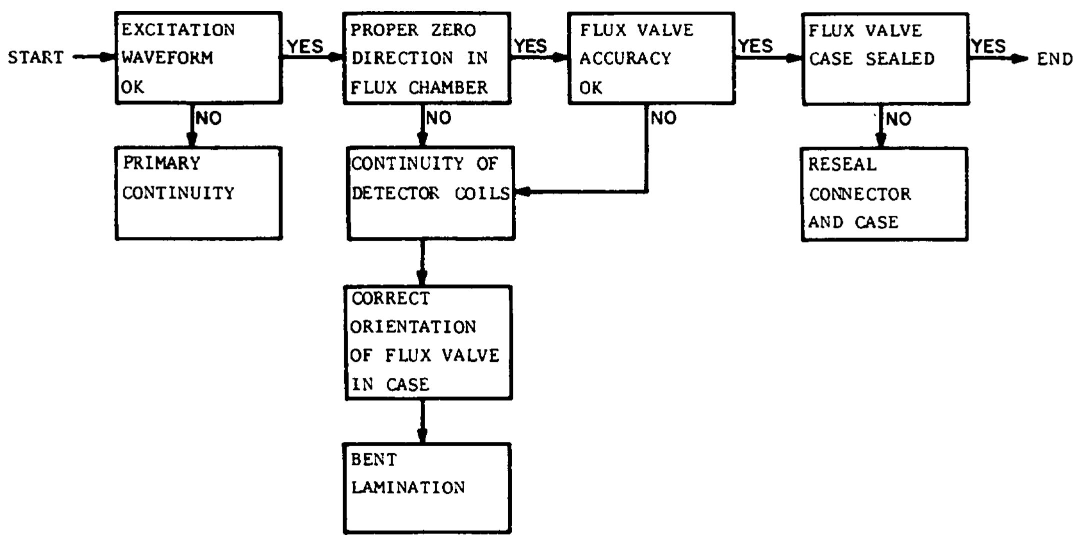

FIGURE 5-2 KMT 112 TROUBLESHOOTING FLOW CHART

ILLUSTRATED PARTS LIST

6.1 General

The Illustrated Parts List (IPL) is a complete list of assemblies and parts required for the unit. The IPL also provides for the proper identification of replacement parts. Individual parts lists within this IPL are arranged in numerical sequence starting with the top assembly and continuing with the sub-assemblies. All mechanical parts will be separated from the electrical parts used on the sub-assembly. Each parts list is followed by a component location drawing.

Parts identified in this IPL by Honeywell part number meet design specifications for this equipment and are the recommended replacement parts. Warranty information concerning Honeywell replacement parts is contained in Service Memo #1, P/N 600-08001-00XX.

Some part numbers may not be currently available. Consult the current Honeywell catalog or contact a Honeywell representative for equipment availability.

6.2 Revision Service

The manual will be revised as necessary to reflect current information.

6.3 List of Abbreviations

Abbreviation	Name
B	Motor or Synchro
C	Capacitor
CJ	Circuit Jumper
CR	Diode
DS	Lamp
E	Voltage or Signal Connect Point
F	Fuse
FL	Filter
FT	Feedthru
I	Integrated Circuit
J	Jack or Fixed Connector
L	Inductor
M	Meter
P	Plug

Table 1
Abbreviations

Abbreviation	Name
Q	Transistor
R	Resistor
RT	Thermistor
S	Switch
T	Transformer
TP	Test Point
U	Component Network, Integrated Circuit, Circuit Assembly
V	Photocell/Vacuum Tube
W	Waveguide
Y	Crystal

Table 1 (Continued)
Abbreviations

6.4 Sample Parts List

BOM NUMBER/DESCRIPTION/REVISION

DESCRIPTION

ASSEMBLY VERSION

UNIT OF MEASURE

REFEERENCE DESIGNATOR

QUANTITY

PART NUMBER

FIND NUMBER

FINAL ASSEMBLY 071-01578-0000 REV AC

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
C2001	106-04224-0047		CAP CHIP .22UF X7R	EA	1.00
C2002	106-04224-0047		CAP CHIP .22UF X7R	EA	1.00
C2003	106-04224-0047		CAP CHIP .22UF X7R	EA	1.00
R2038	139-03241-0000		RES CH 3.24K EW 1%	EA	1.00
R2039	139-02430-0000		RES CH 243 EW 1%	EA	1.00
R2040	139-00750-0000		RES CH 75.0 EW 1%	EA	1.00
TP2001	008-00309-0000		TEST POINT SURF MN	EA	1.00
TP2002	008-00309-0000		TEST POINT SURF MN	EA	1.00
U2005	12051354-0001		PP-IC,UPD482234G5-	EA	1.00
U2006	12051354-0001		PP-IC,UPD482234G5-	EA	1.00
U2021	12061010-0001		SI-IC,MEMORY CNTLR	EA	1.00
U2022	12061014-0001		SI-IC,DSP.CONTROLL	EA	1.00
Y2001	04416054-0015		XTAL OSC,36.000MHZ	EA	1.00
Y2002	04416054-0014		XTAL OSC,20.000MHZ	EA	1.00
	002-09229-0000		GP BOARD	RF	.00
	009-09229-0000	1	GP BOARD	EA	1.00
	01243055-0001	2	INSULATOR,THERMAL	EA	3.00
	01250068-0001	3	SPACER, HEADER	EA	6.00
	016-01040-0000		COATING TYPE AR	AR	1.00
	016-01442-0000	4	E-6000 CLEAR SEALA	AR	1.00
	192-09229-0000		GP BOARD	RF	.00
	300-09229-0000		GP BOARD, FPD500	RF	.00
	34050-0084	6	SPACER,THD'D	EA	2.00
	46086-0007	5	SCREW,CAPTIVE,4-40	EA	3.00

The above is only a sample. The actual format and style may vary slightly. A 'Find Number' column, when shown, references selected items on the BOM's accompanying Assembly Drawing. This information does not apply to every BOM. Therefore, a lack of information in this column, or a lack of this column, should not be interpreted as an omission.

Figure 6-1
Sample Parts List

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6.5 KMT 112 FINAL ASSEMBLY

071-01052-0000 Rev. AA

SYMBOL	PART NUMBER	FIND NO	DESCRIPTION	UM	0000
	016-01013-0000		VAC GREASE DC 976	AR	1.00
	016-01047-0000		SILICON OIL SF 96	AR	.00
	016-01071-0000		DC RTV 3140	AR	.00
	016-01082-0000		DC RTV 3145	AR	1.00
	016-01412-0000		LOCTITE 425	AR	1.00
	019-02186-0000		COIL DETECTOR	EA	1.00
	030-01004-0000		CLIP LOCKING	EA	1.00
	030-02189-0001		5 PIN PLUG	EA	1.00
	057-01493-0001		S/N TAG, KMT 112	EA	1.00
	073-00665-0001		BOBBIN RTNR W/F	EA	1.00
	076-01434-0001		PIVOT SPRT W/F	EA	1.00
	076-01577-0000		PIN PIVOT	EA	4.00
	088-00369-0000		COVER	EA	1.00
	088-00373-0000		BOWL	EA	1.00
	088-01291-0000		COIL HOLDER	EA	1.00
	089-06273-0000		SCR SEAL 8-32X1/4	EA	1.00
	089-07005-0004		SCR PHS 4-40X1/4	EA	2.00
	092-05015-0013		EYELET BRS FNL	EA	9.00
	150-00018-0010		TUBING SHRINK WHT	IN	2.00
	187-01077-0000		O-RING	EA	1.00

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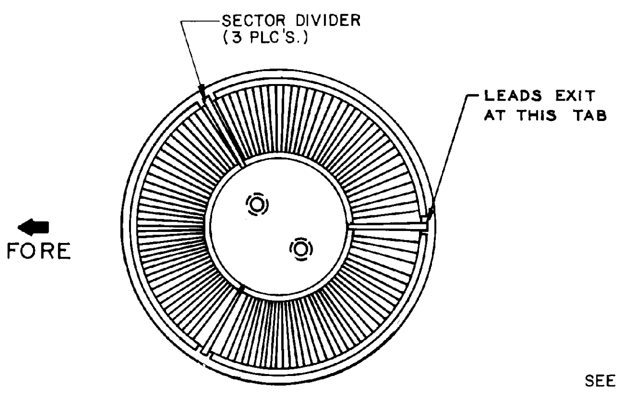
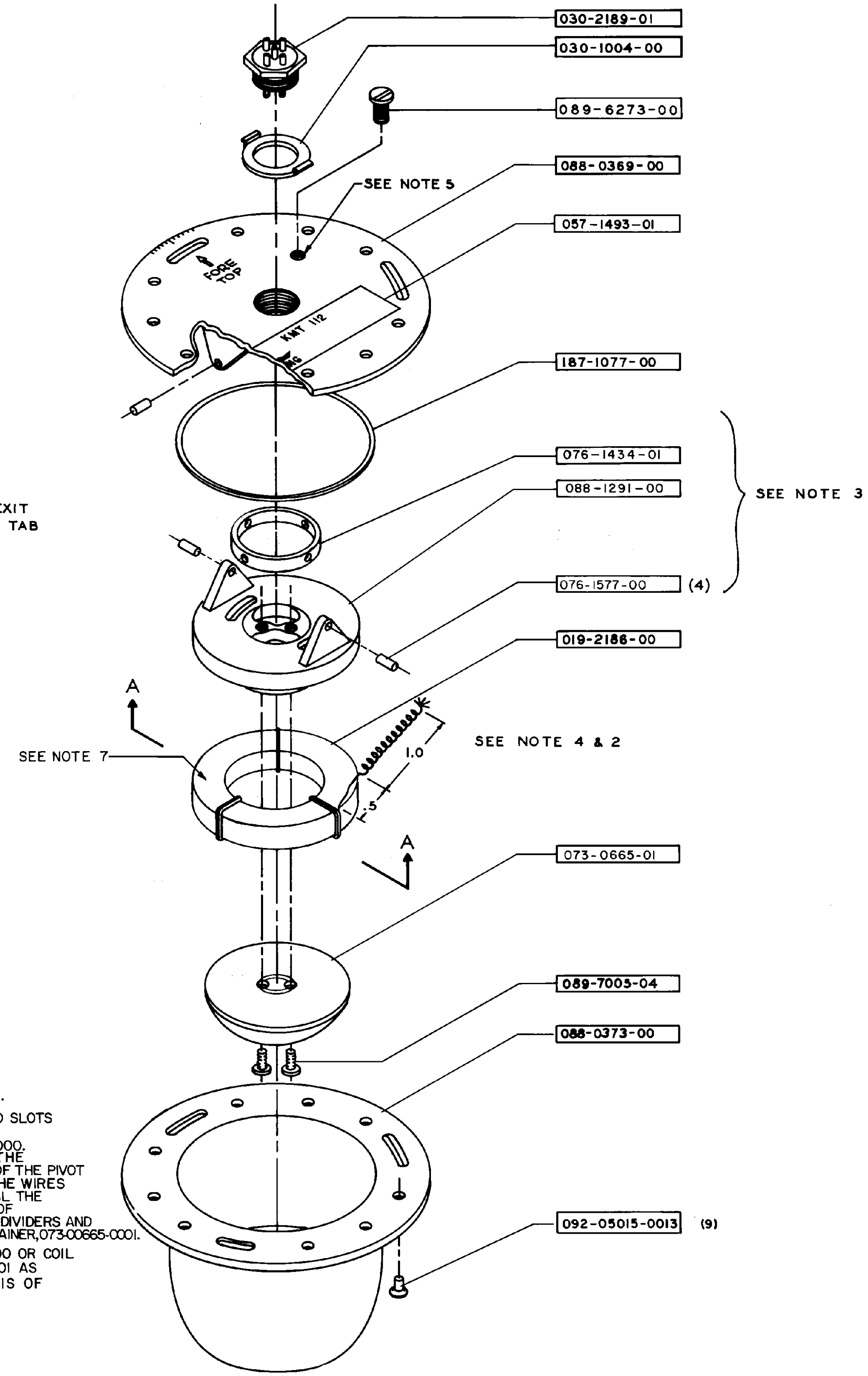
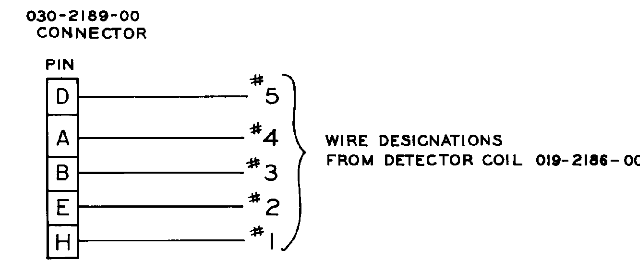


SECTION "A-A"
SCALE 2:1





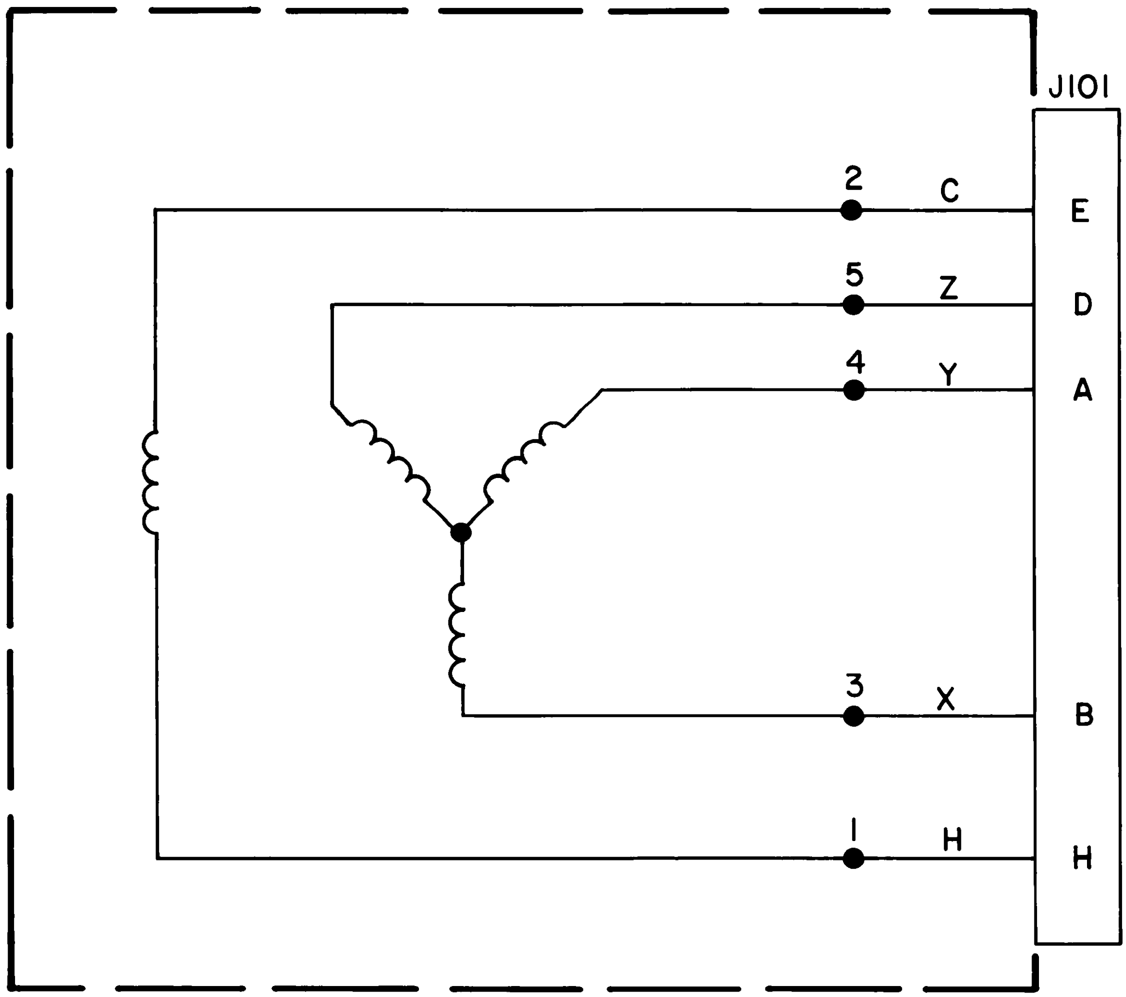
NOTES:

1. FOR COMPLETE ITEM DESCRIPTION SEE B/M 071-1052-00.
2. ROUTE THE COIL WIRE PIGTAIL THROUGH THE NEAREST OF THE TWO SLOTS IN THE COIL HOLDER 088-01291-0000. FILL THE SLOT CAVITIES COMPLETELY AND EVENLY WITH RTV 3145 ADHESIVE 016-01082-0000. EMBED 3-5 LOOPS AT THE COIL END OF THE WIRE PIGTAIL WITHIN THE ADHESIVE. THEN ROUTE THE FIVE LEADS THROUGH THE CENTER OF THE PIVOT SUPPORT 076-01434-0001 AND THEN TO THE CONNECTOR. AFTER THE WIRES HAVE BEEN SOLDERED TO THE CONNECTOR PER THE SCHEMATIC, SEAL THE CONNECTOR WITH RTV 3140 (016-01071-0000) TO PREVENT LEAKAGE OF THE DAMPING FLUID. WIRE MUST NOT BE PINCHED BETWEEN SECTOR DIVIDERS AND COIL HOLDER, 088-01291-0000 OR BETWEEN SECTOR DIVIDERS & COIL RETAINER, 073-00665-0001.
3. PRESS PIVOT PIN 076-1577-00 THROUGH COVER 088-0369-00 OR COIL HOLDER 088-01291-0000 AND INTO PIVOT SUPPORT 076-1434-01 AS SHOWN. COIL HOLDER MUST ROTATE FREELY ABOUT THE AXIS OF THE PIVOT PINS WITH NO SIGNS OF INTERFERENCE.
4. COIL ABOUT A 5/64 DIA. ROD IN THE DIRECTION OF A LEFT HAND THREAD.
5. AFTER ASSEMBLY FILL THE UNIT THROUGH THIS HOLE WITH SILICONE OIL, 016-1047-00 (0.52 OZ; 15 CC., REQUIRED.) EPOXY, SCREW (089-6273-00) TO COVER.
6. APPLY LOCKTITE 425(016-01412-0000) TO THREADS OF SCREWS (089-7005-04), USE SPARINGLY.

NOTES CONT:

7. THE SIDE OF THE COIL FACING UPWARD (TOWARD 088-0370-00) MUST BE THE SIDE IDENTIFIED WITH TAPE OR OTHER MEANS IN NOTE IB5 ON 019-2186-00. IDENTIFYING MARK MUST BE REMOVED BEFORE THE COIL IS INSTALLED.
8. AFTER WIRES ARE SOLDERED TO THE CONNECTOR, BEND THE WIRES 180° BACK TOWARD THE CONNECTOR SO THEY RUN ALONG THE BACKSIDE OF THE SOLDER CUPS. LEAVE 1/16 INCH LONG STRAIN RELIEF LOOPS FROM THE ENDS OF THE SOLDER CUPS. CAREFULLY FIT 3/16 INCH LENGTHS OF SHRINK TUBING KPN 150-0018-10 OVER THE SOLDER CUPS AND WIRES AND SHRINK. THE RTV IN NOTE 2 MUST SEAL THE CONNECTOR TO THE COVER, RTV MUST COMPLETELY COVER THE SHRINK TUBING, SOLDER CUPS, AND 3-5 LOOPS OF THE COIL PIGTAIL.
9. ADD HIGH VACUUM GREASE (016-1013-00) TO MATING SURFACES OF BOWL (088-0373-00) AND COVER (088-0369-00) CONTACTED BY THE "O" RING (187-1077-00).

FIGURE 6-2 KMT 112 FINAL ASSEMBLY DRAWING
(Dwg. 300-00841-0000 Rev. AA)



NOTES:

1. MARKS —●— (3) ARE WIRE IDENTIFICATION NUMBERS.

FIGURE 6-3 KMT 112 SCHEMATIC
(Dwg. 002-00307-0000 Rev. 2)

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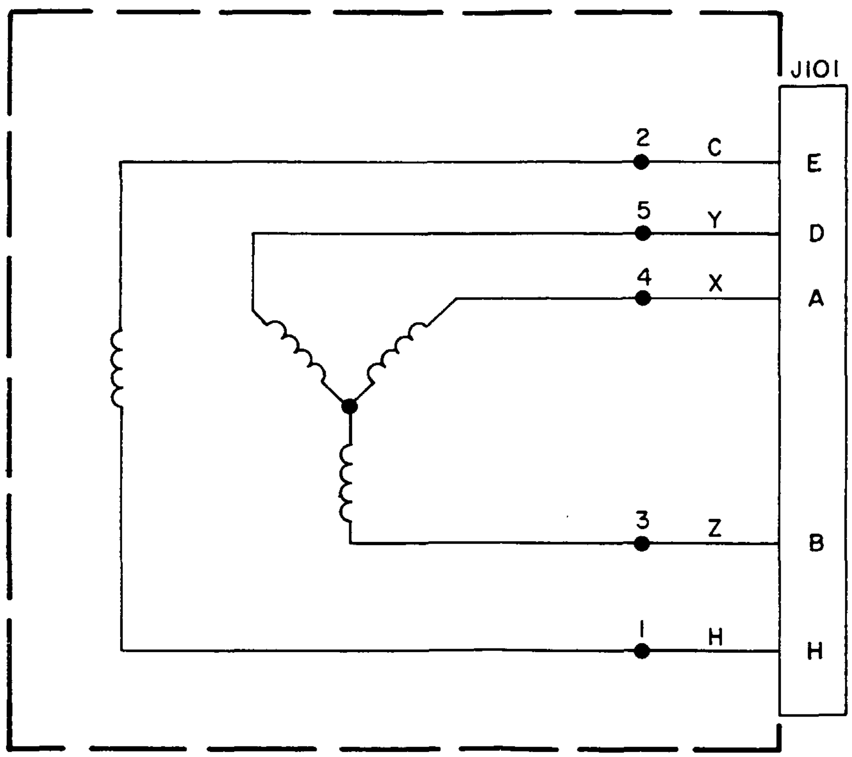

NOTES:

1. MARKS —3●— ARE WIRE IDENTIFICATION NUMBERS.

FIGURE 6-3A KMT 112 SCHEMATIC
(Dwg. 002-00307-0000 Rev. 1)

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