BENDIX/KING

GENERAL AVIATION AVIONICS DIVISION

INSTALLATION MANUAL

KFM 985

AIRBORNE FM TRANSCEIVER

MANUAL NUMBER 006-00652-0000
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Allied
Signal *Aerospace*

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GENERAL INFORMATION

1.1 INTRODUCTION

This manual contains information relative to the physical, mechanical, and electrical characteristics of the Bendix/King Silver Crown KFM 985 Airborne FM Transceiver.

Installation and operating procedures are also included.

Information relative to the maintenance, alignment, and procurement of the replacement parts may be found in the Maintenance Manuals.

EQUIPMENT DESCRIPTION

The KFM 985 is a panel mounted, integrated radio package designed to provide the integration of separate VHF and UHF units into one configuration.

The KFM 985 is a dual-transceiver system that can be configured in any combination of Bendix/King VHF or UHF modules, covering the 148-174 MHz, 403-457 MHz or 450-512 MHz bands. Configurations available include dual VHF, dual UHF, VHF and UHF, or any combination, including Downband (LowSplit) UHF. It is fully compatible with aircraft audio systems and headsets.

The KFM 985 is fully self-contained packaged in a three inch high, standard Dzus-width unit. The display is LCD and can be preprogrammed to either display the receive frequency, the selected channel, or using the alpha-numeric capabilities, a user defined name to correspond to the selected channel/frequency.

The KFM 985 is only available in a +14 V dc voltage version. If the unit is to be installed in a +28 V dc aircraft Bendix/King recommends the use of a KA 39 voltage (+28 V dc to +14 V dc) converter. If the KA 39 is not used an equivalent type is recommended.

TECHNICAL CHARACTERISTICS

KFM 985 GENERAL SPECIFICATIONS

Physical Dimensions:

Height:	3 in. 7.62 cm.
Width:	5.75 in. 14.60 cm.
Length:	5.32 in. 13.51 cm.
Weight:	1.97 lbs. 0.90 kg

FCC Type Acceptance:

ASY 90Q LT 30001 Parts 22,74,90
ASY 90Q LT 20001 Parts 22,74,80,90
ASY 90Q LT 20002 Parts 22,74,80,90
ASY 7BL LT 20001 Parts 22,74,80,90

Modulation Characteristics:

15KOF2D
16KOF3E
16DOFXE

1.3

KFM 985 GENERAL SPECIFICATIONS

Mounting: Panel

Cooling: Forced-air cooling not required.

Vibration: Constant total excursion of .02 in. from 5 to 50 Hz with a maximum acceleration of 1.5 G. Constant acceleration of 0.5G from 50 to 200 Hz.

Shock: Panel mount, no shock mounting required.

Frequency Range:

VHF Module: 148-174 MHz.
UHF Module: 450-512 MHz.
Downband UHF Module: 403-457 MHz.

Output Power:

VHF Module: 5 W
UHF Module: 4 W
Downband UHF Module: 4 W

Stability - PPM:

VHF Module: ±5
UHF Module: ±5
Downband UHF Module: ±5

Channel Spacing:

VHF Module: 30 Khz - programmable in increments of 5 or 12.5 kHz.
UHF Module: 25 kHz.
Downband UHF Module: 25 kHz.

Modulation:

VHF Module: 15KOF2D, 16KOF3E, 16DOFXE
UHF Module: 15KOF2D, 16KOF3E, 16DOFXE
Downband UHF Module: 15KOF2D, 16KOF3E, 16DOFXE

Receiver Selectivity - dB:

VHF Module: 70
UHF Module: 70
Downband UHF Module: 70

Receiver Sensitivity - 12dB Sinad - μV

VHF Module: .25
UHF Module: .30
Downband UHF Module: .30

Channels: Up to 210[*] cumlative total of both modules in one KFM 985.

Channel capacity may be reduced depending on customer ordered options.

1.3

KFM 985 GENERAL SPECIFICATIONS

Power Consumption:

+ 14 V dc Input: 1.6 A max.

1.4   CONFIGURATIONS AVAILABLE

Figure 1-1 lists the available configurations of the KFM 985 and the features of each configuration.

Bendix/King PART NUMBER 062-00142	FEATURES			
	INPUT VOLTAGE	MAIN/ AUXILIARY	SPACING	FREQUENCY RANGE
-0100	14 V dc	VHF/VHF	30/30 kHz*	148 - 174 MHz
-0200	14 V dc	VHF/UHF	30 kHz* 25 kHz	148 - 174 MHz 450 - 512 MHz
-0300	14 V dc	UHF/VHF	25 kHz 30 kHz*	450 - 512 MHz 148 - 174 MHz
-0400	14 V dc	UHF/UHF	25 kHz	450 - 512 MHz
-0500	14 V dc	UHF/D-UHF	25 kHz 25 kHz	450 - 512 MHz 407 - 457 MHz
-0600	14 V dc	D-UHF/UHF	25 kHz 25 kHz	407 - 457 MHz 450 - 512 MHz
-0700	14 V dc	D-UHF/D-UHF	25 kHz	407 - 457 MHz
-0800	14 V dc	VHF/D-UHF	30 kHz* 25 kHz	148 - 174 MHz 407 - 457 MHz
-0900	14 V dc	D-UHF/VHF	25 kHz 30 kHz	407 - 457 MHz 148 - 174 MHz

FIGURE 1-1 KFM 985 CONFIGURATIONS AVAILABLE

VHF modules are programmable in increments of 5 or 12.5 kHz.

UNITS AND ACCESSORIES SUPPLIED

Bendix/King KFM 985 Airborne Transceiver P/N 062-00142-0X00 supplied.

1.5.1   KFM 985 INSTALLATION KIT

The KFM 985 Airborne Transceiver Install Kit, P/N 050-02216-0000, contains the following parts:

PART NUMBER	DESCRIPTION	UM	QTY	VENDOR NAME & PART NUMBER
030-01066-0000	LATCH DISK	EA	1	Bendix/King
030-01447-0000	CONN 25P SUBD HOOD	EA	1	Bendix/King
030-01173-0000	D-SUB CONN	EA	1	Bendix/King
030-01157-0011	SOCKET CRIMP 20G	EA	25	Bendix/King

UNITS AND ACCESSORIES REQUIRED, BUT NOT SUPPLIED

Antennas, covering the 148-174 MHz, 403-457 MHz or 450-512 MHz bands, will be determined by the configuration of VHF, and/or UHF, and/or UHF Downband. Fifty Ohm vertically polarized antennas of the appropiate frequency range(s) are required.

OPTIONAL UNITS AND ACCESSORIES REQUIRED

If the avionics voltage supply bus is +28 V dc, a Bendix/King KA 39 Voltage Converter (P/N 071-01041-0001) is required.

Dzus rails are required and are available in one (1) foot sections under the following part numbers; straight type P/N 092-00045-0002 and or angle type P/N 092-00050-0002.

1.8   RELATED PUBLICATIONS

Figure 1-2 lists related publications for the KFM 985 Airborne FM Transceiver.

PUBLICATION	BENDIX/KING MANUAL NUMBER
EPH Series Portable Radio Service Manual	006-01202-00XX
LPU Series Portable UHF Service Manual	006-05689-00XX
KFM 985 Pilots Guide	006-08491-00XX

FIGURE 1-2 LIST OF RELATED PUBLICATIONS

1.9   LICENSE REQUIREMENTS

This equipment must be licensed by the Federal Communications Commission (FCC) before being used. Your Bendix/King dealer can assist you in filing the appropriate application fro the FCC, and will program each radio with the authorized frequencies and signaling codes.

1.10   SERVICE INFORMATION

If any unusual or specific service problem arise, contact Bendix/King, General Aviation Avionics Division, 400 North Rogers Road, Olathe, Kansas, 66062. No equipment should be returned to the factory for repair until a Return Authorization (RA) Form is requested and received from the Customer Service department of Bendix/King, General Aviation Avionics Division.

SECTION II

INSTALLATION

2.1   GENERAL INFORMATION

The purpose of this section is to provide service personnel with installation information pertaining to the KFM 985 Airborne FM Transceiver. Close adherence to these suggestions will assure a more satisfactory performance from the equipment.

Installation instructions are supported by mechanical outline drawings and electrical interconnection drawings. These drawings located at the back of this section, should be reviewed by the installing agency and requirements peculiar to the particular airframe established before installation is begun.

2.2   UNPACKING INFORMATION

Use care when unpacking the unit. Open shipping cartons and carefully remove all items. Check components to insure that all items identified on the packing list are included. Visually inspect each item for damage incurred during shipment, i.e. inspect for dents, deep abrasions, chipped paint etc. If any item is damaged, notify the transportation carrier immediately.

2.3   PREINSTALLATION TESTING

Since the unit has been tested prior to shipment, preinstallation testing is not required. If preinstallation testing is desired, however, reference should be made to TESTING and TROUBLESHOOTING, of the Component Maintenance Manual for the particular unit. Refer to Section I of this manual for a list of Component Maintenance Manuals.

2.4   EQUIPMENT INSTALLATION

2.4.1   GENERAL

The following paragraphs contain information pertaining to the initial installation of the KFM 985 Airborne FM Transceiver, including instructions concerning the location and mounting of the any supporting equipment.

The equipment should be installed in the aircraft in a manner consistent with acceptable workmanship and engineering practices and in accordance with the instructions set forth in this publication. To ensure that the equipment has been properly and safely installed in the aircraft, the installer should make a through visual inspection and conduct an overall operational check of the system on the ground prior to flight.

CAUTION

AFTER INSTALLATION OF THE CABLING AND BEFORE INSTALLATION OF THE EQUIPMENT, A CHECK SHOULD BE MADE WITH AIRCRAFT PRIMARY POWER SUPPLIED TO THE MOUNT CONNECTOR TO ENSURE THAT POWER IS APPLIED ONLY TO THE PINS SPECIFIED IN THE INTERCONNECT DIAGRAM/S, FIGURES 2- AND 2-.

The KFM 985 installation will conform to standards designated by the customer, installing agency and existing conditions as to the unit location and type of installation. However, the following suggestions should be considered before installing your KFM 985.

2.4.2   AVIONICS COOLING REQUIREMENTS FOR PANEL MOUNTED EQUIPMENT

The greatest single contributor to increased reliability of all modern day avionics is to limit the maximum operating temperature of the individual units whether panel or remote mounted. While modern day individual circuit designs consume much less electrical energy, the watts per cubic inch dissipated within avionics units remains much the same because of high density packaging techniques utilized. Consequently, the importance of providing avionics stack cooling is essential to the life span of the equipment.

While each individual unit may not require forced air cooling, the combined heat load of several units operating in a typical avionics stack will significantly degrade the reliability of the avionics if provisions for stack cooling are not incorporated in the initial installation. Recommendations on stack cooling are contained in Bendix/King Installation Bulletin #55. Failure to provide stack cooling will certainly lead to increased avionics maintenance costs and may void the warranty.

2.4.3   LOCATION OF EQUIPMENT

A.   Antenna Locations

The configuration will define parameters of antenna(s) installation. The antenna(s) should cover the desired frequency range. The dimensions and footprint pattern for the antenna should be provided by the manufacturer. The location will vary with different aircraft types.

The antenna should be well removed from ant projections, the engine(s), and propeller(s). It should also be well removed from landing gear doors, access doors, or other openings which will break the ground plane for the antenna as a surface directly beneath the antenna should be a flat plane over as large area as possible.

A back-up plate should be used for added strength on thin-skinned aircraft.

To prevent rf interference, the antenna must be physically mounted a minimum distance of three feet from the KFM 985 and the wiring harness.

The unit antenna should be mounted a minimum of six feet away from the DME antenna and four feet from the ADF sense antenna.

Where practical, plan the antenna location to keep cable lengths as short as possible and avoid sharp bends in the cable to minimize the VSWR.

Avoid running other cables or wires near the antenna cable.

On pressurized aircraft, the antenna should be sealed using RTV No. 3145 (P/N 016-01082-0000) or equivalent around the connector and mounting hardware.

All antenna mount should be sealed around from the outside for moisture protection using RTV or equivalent.

Mount the antenna in as clean as environment as possible, away from exhaust gases and oils. The antenna should be kept clean. If left dirty (oil covered), the range of the unit may be affected.

B.   Unit Mounting Location

The panel mounted KFM 985 can be mounted in any convenient location that is free of excessive heat and vibration and which provides reasonable access for inspection and maintenance. To achieve maximum performance, the KFM 985 should be installed adjacent to other unit with similar functions. Except for antenna cables, the length of cables from the KFM 985 connector/s is not critical because the unit interfaces are designed with high impedance inputs, low impedance outputs, and low noise characteristics. Forced-air cooling can be provided but is not a requirement. Outline and mounting drawing Figure 2-1 shows the unit dimensions.

Care should be exercised to avoid mounting the equipment near equipment operating with high pulse current or high power outputs such as radar and satellite communication equipment. In general, the equipment should be installed in a location convenient for operation, inspection, and maintenance, and in an area free from excessive vibration, heat, and noise generating sources.

2.4.4   KFM 985 INTERWIRING AND CABLE HARNESS FABRICATION

A.   General

Figure 2-3 is a detailed interwiring diagram for installations. The interwiring diagram requires thorough study before installation of the aircraft wiring.

Cabling must be fabricated in accordance with Figure 2-3. The length of the wires to parallel pins should be approximately the same length, so that the best distribution of current can be effected. BENDIX/KING recommends that all wires including spares as shown on the interwiring diagram be included in the fabricated harness. However, if full wiring is not desired, the installer should ensure that the minimum wiring requirements for the features and functions to be used are incorporated.

When the cables are installed in the aircraft, they must be supported firmly enough to prevent movement and should be carefully protected against chafing. Additional protection should also be provided in all locations where the cables may be subject to abuse.

2.4.4 A.
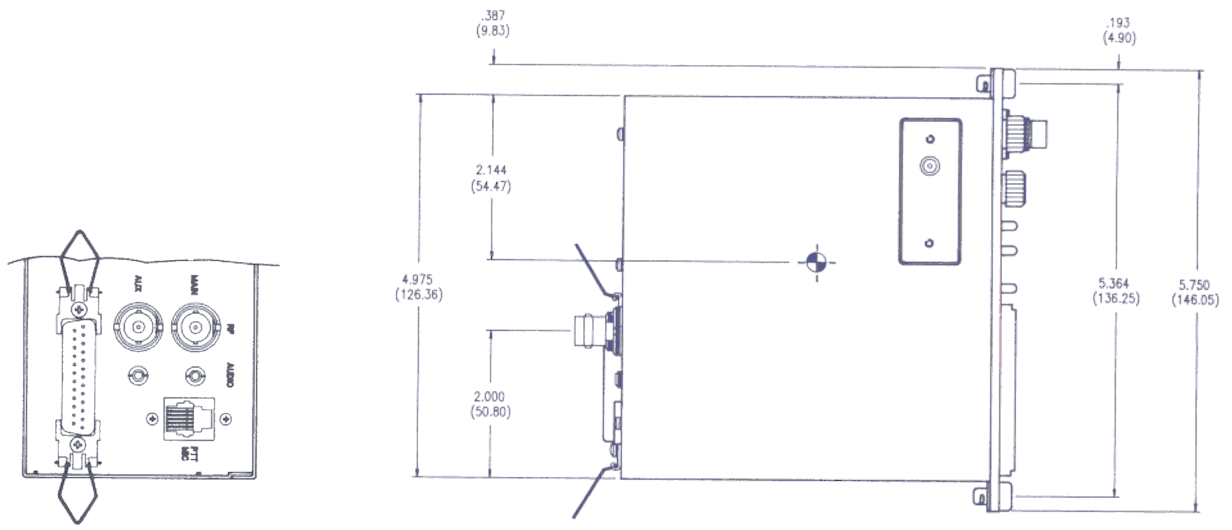
TOP VIEW
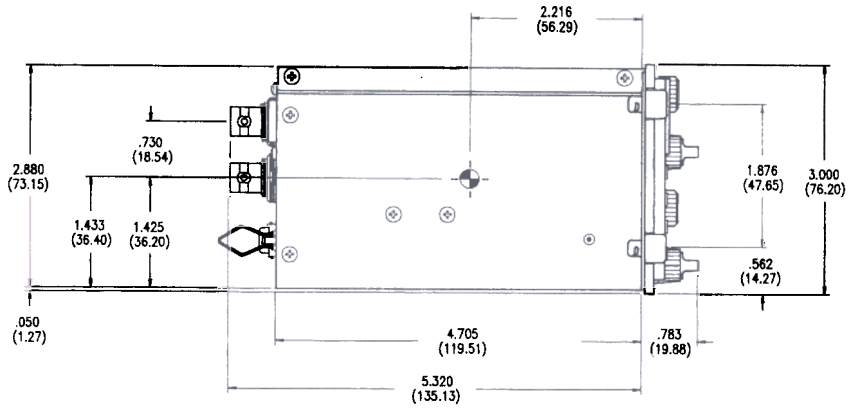
SIDE VIEW

NOTES :

1. DIMENSIONS IN ( ) ARE IN MILLIMETERS.

2. SPECIFICATIONS :

	KFM 0985
SIZE	89.73 IN^3
WEIGHT	2.2 LBS (1.0 KG)
POWER	1.6 AMP. MAX. AT 13.8 VOLTS
LIGHTING	0.4 AMP. MAX. CURRENT
CONNECTOR	25 PIN D-SUB CONNECTOR

FIGURE 2-1 OUTLINE AND MOUNTING DRAWING
(Dwg No 155-05996-0000 R0)

CUTOUT DIM. FOR
FRONT PANEL
MOUNT

5.620
(142.75)

5.364
(136.24)

.128
(3.25)

2.930   1.876
(74.42) (47.65)

.527
(13.39)

FRONT VIEW

2-4

2.4.4 A.

KFM 985   P1

PHONE HI	-Fc	1
PHONE LO		2
SPKR HI		5
SPKR LO		6
PTT	hr	7
MIC AUDIO HI	Kr	8
MIC AUDIO LO		9
SHIELD		10
KEY VOLT		11
LIGHTING RET.		12
MON.		13
PROG.		14
LIGHTING +13.75 V dc		15
LIGHTING +27.5 V dc Dr		16
+13.75 V dc POWER Dr 9		19
GROUND		20

600 Ω
8 Ω
TO A/C AUDIO SYSTEM (ONLY ONE OUTPUT MAY BE USED)

SEE NOTE 2
SEE NOTE 3
SEE NOTE 3
INSTRUMENT DIMMER BUS
18 AWG — 5 A
18 AWG
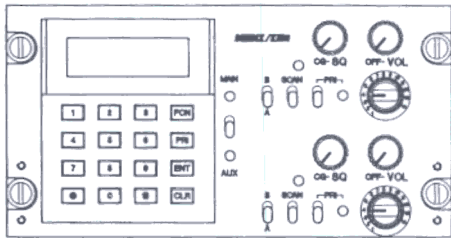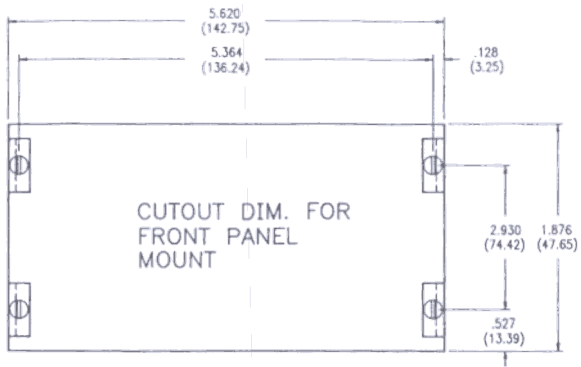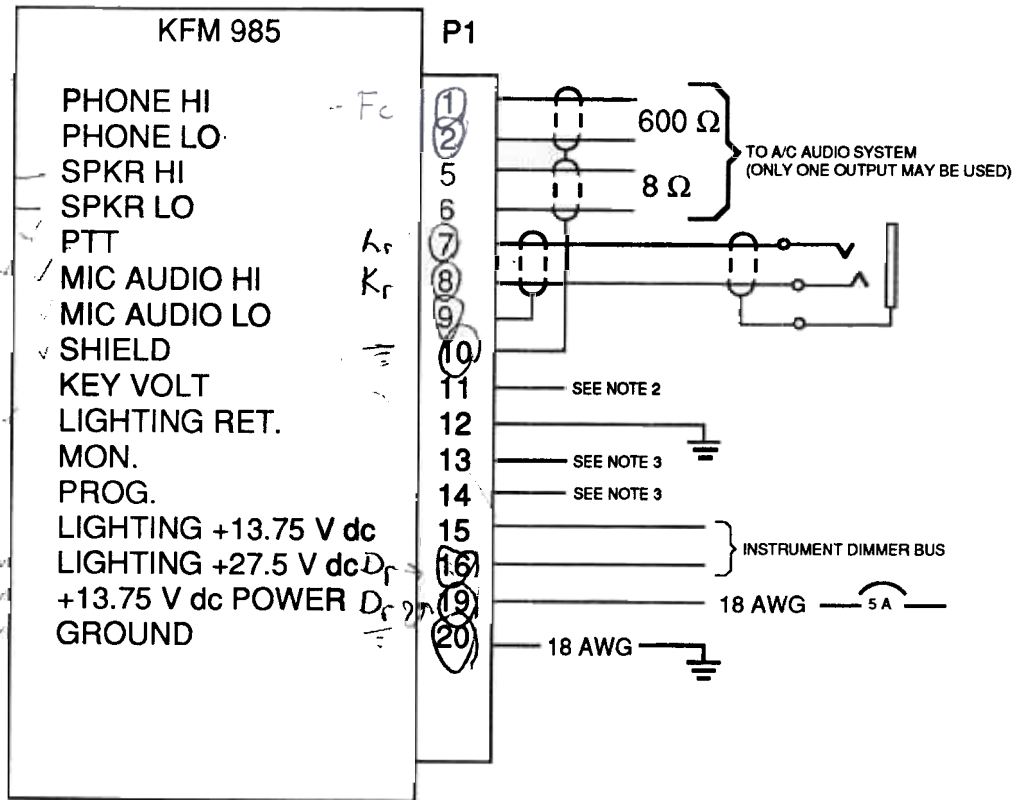
NOTES:

1. ALL WIRING #24 AWG UNLESS OTHERWISE NOTED.
2. ENCRYPTION MODULE SUPPLY PIN.
3. FOR UNIT PROGRAMMING
4. ANTENNA CONNECTIONS NOT SHOWN.

OPTIONAL KA 39 (P/N 071-01041-0001)

GROUND
KA 39

+27.5 V dc ——▶ B   B ——▶ 13.75 V dc @ .75 A
+27.5 V dc ——▶ A   A ——▶ 13.75 V dc @ 1.5 A
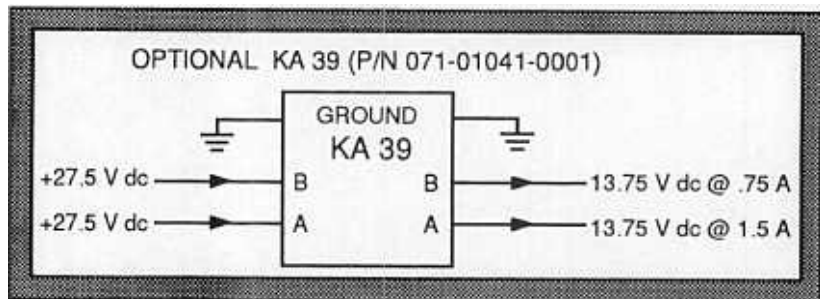
INSTALLATION ACCESSORIES:

ANTENNA CONN. RG 142, 1 EA., P/N 030-00005-0000
LATCH DISK, 2 EA., P/N 030-01066-0000
MATING CONN., 1 EA., P/N 030-01173-0000
SOCKETS 24 AWG, 10 EA., P/N 030-01157-0011
SOCKETS 18 AWG, 2 EA., P/N 030-1186-0000
BACKSHELL, 1 EA., P/N 030-01447-0000
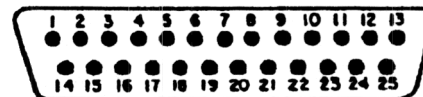
CONNECTOR VIEWED FROM WIRING SIDE

FIGURE 2-2 INTERCONNECT AND WIRING DIAGRAM

2.4.4 A.

In wire bundles, the cabling should not be tied tightly together as this tends to increase the possibility of noise pickup and similar interference. When routing cables through the airframe, the cables should cross high-level lines at a right angle.

The installer must be knowledgeable of any system variations peculiar to the installation.

Notes on the interwiring diagram, Figure 2-3 describe wire sizes and other particulars related to the system interwiring.

The following guidelines are recommended:

(1) The installing facility will supply and fabricate all external cables following the instructions provided as per Figure 2-3. The required connectors are supplied as part of the Installation Kit (P/N 050-02216-00XX).

(2) The KFM 985 and the associated wiring harness must be kept a minimum of three feet from the transceiver/receiver antenna coax and the termination connector of the antenna to prevent rf interference from the antenna.

(3) Do not route the transceiver/receiver antenna coax near ADF sense or loop antenna cables.

B. Primary Power and Circuit Breaker Requirements and Wiring

The KFM 985 unit receives primary power from an aircraft +14 V dc power source via an aircraft circuit breaker or if +28 V dc is required a KA 39. The unit also receives lighting power from the aircraft dimmer bus and the aircraft day/night lighting power source.

Power connection requirements are shown on interwiring diagram Figure 2-3.

C. Connectors

All connectors and mating connectors for the KFM-985 units are identified on the appropriate outline drawing, Figures 2-3. These connectors are supplied in accessory connector kits listed in Section I of this manual.

(1) Main Connector

The transceiver main connector is mounted on the rear panel. The connector is a D-subminiature 25 pin. With the exception of the antenna coax connections, all of the necessary electrical connections are delivered through the main connector.

The mating D-subminiature 25 pin connector for the main connector is supplied with the Accessory Assembly Kit (P/N 050-02216-0000).

(2) Antenna Connectors

The two discrete coaxial cable connectors on the transceiver rear plate (see Figure 2-1) connects to the specific-band antenna by a coaxial cable and BNC connector.

(3) Headset Connections

The connections are accessed from the rear connector. (Refer to Figure 3-1/-2)

(4) Programming Connector

This connector is a modular multiport (six position, female) RJ11C and mates with the male version. Allows the unit to be externally programmed by using a special RS232 interface cable.

D. Equipment Mounting

All mechanical installation drawings, connector assembly diagrams, interwiring diagrams, and connector pin assignment tables referenced in this section are located in this section of the manual. Determine the mounting location for system components per Paragraph 2.4 B.

2.4.4 D.

Prior to installing any equipment, make a continuity check of all wires and cables associated with the system. After the continuity check, apply power and check for proper voltages at system connectors, and then remove power before continuing installation.

(1) Transceiver

The mounting for the transceiver should be panel mounted using dimensions specified in the manufacturer's applicable outline drawing. The unit should be wired according to the system interwiring diagram, Figure 2-3.

To allow for inspection or repair of the wiring of the connector assembly itself, sufficient lead length should be left so that when the mounting hardware for the rear connector assembly is removed the rear connector assembly may be pulled forward several inches. Also a bend should be made in the harness (at the rear connectors) to allow water droplets that might form on the harness due to condensation, to drip off at the bend and not collect in the connector.

The unit mounting hole location and dimensions are aircraft-type-dependent and must be determined prior to installation. Clean all surfaces prior to placing the mount in place.

The unit uses Dzus fasteners to secure them to the instrument panel. Use the applicable outline drawings, Figures 2-1 through 2-2, as a guide to position the unit and to cut and drill the instrument panel. Attach the Dzus fastener brackets behind the instrument panel in the proper locations shown on the outline drawing. The unit has four Dzus fasteners, one at each of the four corners. After connecting the cable assemblies to the rear connectors, insert the control panel into the instrument panel. Make certain the cable assembly is not pinched or severely twisted before tightening the Dzus fasteners.

(2) Antennas

For frequency-specific antenna outline drawing, installation procedures, and mounting dimensions, refer to the manufacturer's instructions.

2.5   INSPECTION, SYSTEM CHECKOUT, AND FLIGHT TEST PROCEDURE

2.5.1   INSPECTION

Figure 2-4 is a visual inspection/check procedure that should be performed after system installation as part of a system checkout. In addition, the procedure should be used as a periodic maintenance inspection check.

EQUIPMENT	INSPECTION/CHECK PROCEDURE
KFM 985 Airborne FM Transceiver	(1) Inspect external surface for damage. (2) Check that the unit is properly installed and that retaining mechanism is securely tightened. (3) Ensure that all connections into the unit are properly mounted and secure.
Antennas	(1) Inspect external surfaces for damage. (2) Check that antenna is properly mounted and mounting screws are tight. (3) Ensure that antenna coaxial cable connector is properly mated and secure.

FIGURE 2-3 INSPECTION/CHECK PROCEDURE

2.5.2   TRANSCEIVER CHECKOUT

A.   General

Installation of the transceiver system requires three stages of testing to ensure the proper operation of the transceivers. Initially, prior to installation of the transceiver, a system interwiring check is performed. This check verifies that the aircraft and all transceiver system interconnections are correct, before power is applied. After the unit is installed a visual inspection of the equipment and connections is made. The post-installation test is used to apply power and functionally checkout the system. Successful completion of the post-installation test verifies the proper operation of the KFM-985 Airborne FM Transceiver.

B.   Interwiring Check

To check the aircraft and transceiver system interconnections proceed as follows:

(1)   Check that all cables and interwiring are installed in accordance with the Interwiring and Cable Fabrication instructions (paragraph 2.4.4).

(2)   Check wiring for proper destinations, opens, and shorts, per interconnect diagrams Figure 2-3.

C.   Visual Inspection

In conjunction with system installation, perform the visual inspection/check procedure (Figure 2-4 in this section).

D.   Post-Installation Test

This test verifies the proper operation of the KFM-985 Transceiver System. The following tests are performed on the ground.

(1)   Pretest Setup

The following steps apply/check the KFM-985 system input power, configure the operational controls, and verifies that the system is ready for testing.

(a)   Check KFM-985 system source power as follows:

(b)   Confirm that aircraft +14 V dc/+28 V dc power source is operational (i.e. check aircraft power bus meter).

(c)   Confirm that the aircraft panel background lighting power source is operational by adjusting the cockpit dimmer switch for proper cockpit panel illumination.

Note

Steps two through five provide control settings for the KFM-985. The instructions are relevant to both the MAIN and AUX radios and unless otherwise noted will not be repeated for different version of radios. Any exceptions will be addressed.

(d)   On KFM-985, to receive set the controls as follows:

1)   Set the ON/OFF switch to ON.

2)   Set MAIN/AUX toggle switch to MAIN (selects transceiver #1).

3)   Set the Squelch switch to "threshold squelch setting".

4)   Set the rotary channel selector switch to desired channel.

5)   Check for proper info on LCD display and audible signal indicating the radio is operational.

(e)   To transmit, set the controls as follows:

1)   Select the channel (not a receive only channel).

2)   Key the mic and check for illumination of TX indicator lamp.

2.5.2 D.

(2)   Taxi-Run and Flight Test

Note

Perform the following test after the post-installation and preflight checks indicate that normal operation is possible.

CAUTION

DURING ENGINE START-UP PROCEDURES, KEEP ALL NAVIGATION - COMMUNICATION - RADAR EQUIPMENT TURNED OFF. LARGE VOLTAGE SPIKES MAY BE GENERATED WHICH COULD DAMAGE TRANSISTOR AND INTEGRATED CIRCUIT EQUIPMENT.

Once airborne, check for proper transceiver operation by communicating with another aircraft or a handheld or a base station on the ground to verify that the unit will both transmit and receive.

2.6   REMOVAL AND REPLACEMENT

A. Transceiver

(1)   Removal

(a)   Loosen the four 1/4-turn Dzus fasteners (located on control unit front panel) that secure the control unit to mounting surface.

(b)   Gently pull control unit forward to expose rear connectors.

(c)   Disconnect control unit connectors.

(2)   Reinstallation

(a)   Reconnect connector to rear of control unit.

(b)   Carefully slide control unit into position and tighten the four 1/4-turn Dzus fasteners to hold unit firmly in place.

B. Antennas

For antenna removal and reinstallation procedures refer to manufacture's documentation.

SECTION III
OPERATION

3.1 GENERAL

The Bendix/King KFM 985 is a dual-transceiver system utilizing a single keyboard/display module. The Main and Auxiliary transceiver modules offer a user the choice of VHF, UHF, or downband UHF combinations.

3.2 UNIT CONTROLS

3.2.1 KEYBOARD/DISPLAY MODULE

The keyboard/display module shows channel information for the selected transceiver (Main/Top or Auxiliary/Bottom). The keyboard/display can be used to program frequencies, labels, and other transceiver functions. See the Programming section, 3. for a detailed discussion. The LCD display provides the following indications:

A. Channel Label

Depending on the program features, this can be the channel number, frequency, or designated name.

B. Group Number

The keyboard/display module can control a total of 15 groups (14 channels per group). Groups 1 - 7 are for the Main/Top transceiver and groups 8 - 15 are for the Auxiliary/Bottom transceiver.

C. Group Label

Each group can be programmed with a designated name.

D. Annunciators

PR - (priority scan channel), **TX** - (transmit), **RX** - (receive), **SCN** - (scan), **ID** - (Automatic Number Identifier - ANI), and **CG** (Code Guard™)

3.2.2 MAIN/AUX SWITCH

The two transceivers are designated as Main (top) and Auxiliary (bottom). The MAIN/AUX toggle switch selects one of the transceivers for information display and transmit operation. A yellow LED above or below the MAIN/AUX toggle switch indicates which transceiver is selected. Both transceivers can be used simultaneously for receive operation.

3.2.3 TRANSCEIVER CONTROLS AND INDICATORS

Each transceiver has an individual set of controls and indicators. Starting at the upper left, these include:

A. **TX Indicator** - Glows when the transceiver is transmitting.

B. **CG-SQ knob** - Adjusts squelch setting or sets Code Guard operation (full counterclockwise).

C. **OFF-VOL knob** - Turns transceiver power on or off, and adjusts receive volume level.

D. **A/B toggle switch** - VHF: A = high transmitter power, B = low transmitter power; UHF: A = repeater operation, B = talk around operation.

E. **SCAN toggle switch** - Activates scan activity on scan list channels and the selected channel.

F. **PRI toggle switch** - Activates scan activity on the priority channel.

G. **PRI Indicator** - Glows when receiving a signal on the priority channel. Also indicates Busy Channel, if enabled.

H. **Channel Selector knob** - Selects a channel for transmit and receive operation.

Note

All controls required to operate the KFM 985 are located on the unit front panel. (See Figure 3-1)

3.2.3

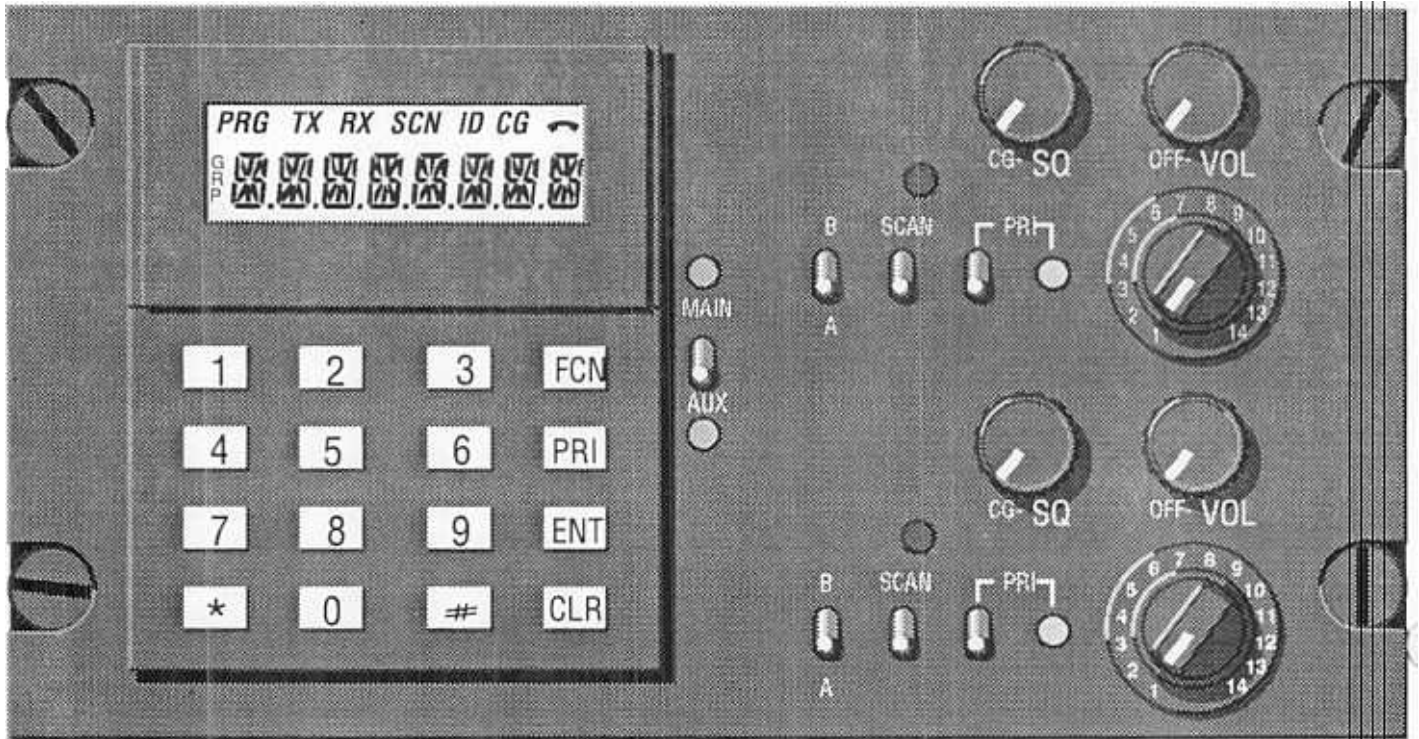FIGURE 3-1 KFM 985 AIRBORNE FM TRANSCEIVER SWITCHES, INDICATORS AND DISPLAY

DETAILED OPERATING MODES

Note

All information in this manual is always superseded by the
latest engineering software and hardware documentation.

3.3.1 RECEIVE

For each transceiver (Main and Auxiliary):

A. Turn power ON by rotating the Volume knob clockwise past the OFF detent. The PRI
   indicator will flash, the display will show the current group number, then the channel label. A beep will
   sound, indicating the radio is operational.

B. Select a channel by rotating the Channel Selector knob.

C. Adjust the squelch by rotating the Squelch knob clockwise until noise is audible. Set the volume to a
   comfortable level, then rotate the Squelch knob backwards (counterclockwise) until quiteing is achieved
   (squelch threshold). Continuing in a counterclockwise direction tightens the squelch setting, allowing
   only stronger signals to open the squelch and be heard.

TRANSMIT

A. Press and hold the microphone switch (this will be accomplished by various methods depending on the
   installation).

B. Check the display for the TX annunciation and the red illumination of the transmit indicator.

C. Continue to key the mic until transmission is complete.

Note

If the transmission indicator does not glow and a tone sounds, you are on a receive-only-channel, or the channel
is busy (if Busy Channel Lockout is installed). Rotate the Channel Select knob to an authorized transmit channel.

If the length of your message exceeds the present time out timer setting, the transmitter will automatically shut
off and a tone will sound. If you want to continue this transmission, release the PTT (Push-To-Talk) switch, then
press it again and continue talking.

3.3.3 CODE GUARD OPERATION

Code Guard™ allows one radio group of radios to be selectively called within a system. If your radio has been
programmed with Code Guard™, use the following receive and transmit instructions.

A. Receive

   Turn power ON by rotating the Volume knob clockwise past the OFF detent. Adjust the squelch by
   rotating the Squelch knob clockwise until noise is audible. Set the volume to a comfortable level, then
   rotate the Squelch knob backwards (counterclockwise), past the detent for Code Guard™ operation. A
   message will be heard only when your Code Guard™ is received.

B. Transmit

   Before transmitting on Code Guard™channels, monitor the channel by turning the Squelch knob
   clockwise, off the detent. If the channel is not busy, press and hold the microphone switch. The red
   transmit indicator will glow when transmitter is on. Release the microphone switch to end the
   transmission. Reset the squelch knob to the Code Guard™ position.

3.3.4 GROUP OPERATION

A. Group Description

   The Channel Select knob has 14 positions. The two transceivers are separated into "groups" of 14
   channels. The keyboard/display can control a maximum of 15 groups, so the total number of groups

3.3.4 A.

in BOTH transceivers cannot exceed 15. The MAIN (top) transceiver utilizes groups one through seven and the AUX (bottom) transceiver utilizes groups eight through 15.

For simplification purposes each group should be looked upon as an individual 14-channel radio. Each group can be programmed to have an "individual identity" with the same operational and built-in features as described earlier.

Groups can be given labels for easy identification, such as **DISPATCH** or **SECTOR 14**. Press the [#] key on the keypad twice to see the group number, followed by the group label. (See programming section 3.3.6 for instructions on changing group labels.

B. Group Selection

To avoid confusion, switch the **SCAN** and **PRI** switches to the OFF position. By pressing the [#] key on the keypad. The group number (of operation) will be displayed i.e. **grp 05**.

After approximately three seconds the radio reverts to normal operation and the display shows the channel selected.

To change groups, press the [#] key and then the desired number key to reference the group number. After three seconds the radio reverts to normal operation for the selected group and the display shows the channel number selected. All scanning and priority functions selected affect only the channels within the group of operation.

When changing groups, if a non-programmed or invalid number is selected (05, for example), the display will show **nogrp05** and the radio will return to the previously selected valid group.

C. HI/LO Transmit Power (VHF Transceiver only)

Placing the **A/B** toggle switch in the A position enables full transmitter power. The B position reduces power to the programmed low power setting.

D. Talk Around (UHF Transceivers only)

Placing the **A/B** toggle switch in the A position enables repeater operation. The B position (Talk Around) allows the radio to transmit on the receive frequency of the channel selected. This allows the user to talk directly to another transceiver when out of the range of the repeater.

3.4 BUILT IN FEATURES

The BENDIX/KING KFM 985 is based on a microprocessor core that allows extra features and operational characteristics to be built into the radio. Your dealer will help define the best operational settings for your system and program them into the radio.

Additional transmit and receive frequencies can be added. If you wish to monitor other local radio systems that fall anywhere in your band, a frequency with or without Code Guard™ can be added to your radio.

The radio comes equipped with a time out timer. This is used to limit the duration of calls and to guard against accidentally locking on the transmitter and tying up the radio system. The duration of the time out timer can be changed. (0-225 seconds)

A DTMF/ANI encoding feature is also available. If enabled , a sequence of DTMF tones similar to the tones used by a standard pushbutton telephone will be transmitted each time the transmit PTT switch is activated. If DTMF and ANI are both enabled, the ANI tone sequence will be transmitted only after the [ENT] key is pressed while the transmit PTT switch is activated. A sidetone of the ANI number transmitted will also be heard through the speaker. You can program or change the ANI number you will send.

A SCAN delay is included to allow a response to a transmission to be received before the scanner moves on to search for new activity. If you find that your scanner is restarting before message replies are heard, you can increase the scan delay time. (0-7.5 seconds)

There are three different priority modes available. These are discussed in the section Priority Operation, starting on page X. Your dealer can help you choose the best one for your system needs.

3.4.1   OPERATIONAL FEATURES AVAILABLE

A. Scan Operation

When in the Scan mode, the radio receiver samples channels in a predetermined list (scan list) looking for activity. If an active channel is found, the scanning action stops and the message on that channel is heard. Once the message stops, the receiver will wait for a response before scanning resumes. This waiting period is called the "scan delay time." It is adjustable (from 0 seconds to 7.5 seconds). The scan list has also been preset. On some radios you will be able to add or delete channels from your scan list. The channel to which the Channel Selector Knob is set is always included in the scan list.

(1) Place the SCAN toggle switch in the SCAN (up) position.

Scan operation occurs only while the radio is receiving. After SCAN is enabled, SCN flashes on the upper middle of the display in the alpha numeric mode or two dashes flash on the right hand side of the display in the numeric mode indicating that the radio is scanning the channels in the Scan List.

or

When a signal is detected, scanning stops and the signal being received is heard, with the active channel shown on the right side of the LCD display in numeric mode or the active channel label in the alpha mode. The radio receiver stays on that channel until activity ceases and resumes scanning after the "scan delay" time.

If you wish to transmit on the last active scan channel, turn the Channel Select Knob on top of the radio to match that channel. The channel numbers in the display (numeric mode) will now match.

(2) Turn SCAN toggle switch **OFF** for normal transmit/receive operation. When the PTT is pressed while in the scan mode, the radio transmits on the "transmit" (left side of display in numeric mode) channel. Upon release of PTT, the radio receiver will hold on that channel. If no activity occurs during the "scan delay" time, the radio resumes scanning.

B. Scanning Code Guard™ Channels

To scan for channels with programmed Code Guard™, rotate the Squelch knob completely counter-clockwise, past the detent. When a signal is detected, scanning stops and the Code Guard™ for that channel is checked. If the proper Code Guard™ is present, the radio receives that channel until Code Guard™ ceases. If the proper Code Guard™ is not present the radio receiver will resume scanning immediately.

C. Changing the Scan List

The KFM 985 can be programmed with a permanent or changeable scan list. If you have programmed your system for a changeable scan list use the following steps to enter or clear channels. To avoid confusion, turn OFF the PRI and SCAN toggle switches on the top of the radio.

Turn the Channel Select Knob to the channel to be entered or cleared.

(1) To ENTER a channel into the scan list, press the [ENT] key on the keyboard. A short beep will be heard. "SCN" will be shown in the LCD display.

(2) To CLEAR a channel from the scan list, press the [CLR] key. A short beep will be heard, and the "SCN" in the display will disappear.

D. Permanent Scan List

To make the scan list permanent enter the programming mode for CH 00 (General Performance Variables). Press the [FCN] key until Group 1 functions appear (1-12345). Press the digit 5 so it begins to flash, then press the [ENT] key. The scan list is now permanent in the normal operation mode and cannot be changed until the scan lockout function has been reversed. Refer to the programming section of this manual for additional details.

E. Priority Operation

Priority operation consists of receiving on any channel while still monitoring for a message on the priority channel. Priority can also be used in combination with Scan operation. When scanning a priority channel that uses Code Guard™, the radio will lock on to that channel and messages will be heard only when the correct code has been detected.

3.4.1 E.

When the **PRI** (priority) toggle switch is turned **ON**, the channel designated "priority" is sampled **4** times per second, regardless of activity on any other channel. The flashing "SCN" on the upper middle of the display indicates that the radio is sampling the priority channel. If a signal is received on the priority channel, the radio receiver will lock on to that channel for the duration of the transmission.

When the **SCAN** toggle switch is **ON** and the **PRI** toggle switch is **OFF**, normal scanning will occur but the priority channel will not be sampled. If both scan and priority toggles are off, the radio will function as in basic operation.

If you do not know which priority mode is preset for your radio, the following sequence will identify it.

- Set **PRI** and **SCAN** toggle switches to **OFF**.

- Rotate Channel Select Knob, stopping at each detent and view LCD Display.

- If a "PR" symbol (in the upper left of the LCD Display) does not appear for any channel, you have priority Mode A.

- If "PR" is displayed, rotate the Channel Select Knob to a different channel, then turn the **PRI** toggle **ON**.

- If the LCD channel stays on your selected channel, you have priority Mode B.

- If the LCD channel changes to the priority channel, you have priority Mode C.

There are three priority modes:

(1) **Priority Mode A** -- The priority channel is tied to the Channel Select Knob. When the selector is set on channel 5, this is the priority channel. If the selector is switched to channel 8, this becomes the priority channel. You will transmit on the frequency chosen by the Channel Select Knob.

Priority Mode A Details:

In this mode, the priority channel is tied to the Channel Select Knob. When the SCAN and PRI (priority) Toggle Switches are ON, scanning will occur until an active scan channel is found. The radio will receive the active channel while continuing to sample the priority channel 4 times per second. If during this sampling the priority channel becomes active, the Priority Indicator will light. The radio receiver will go to the priority channel and hold for the duration of the transmission. The priority channel will be shown on the right hand side of the display in numeric mode.

If you wish to reply to a message on the priority channel, press the PTT and you will transmit on the priority channel. Once activity ceases on the priority channel, the radio returns to scan operation.

(2) **Priority Mode B** -- The priority channel is fixed. You will transmit on the frequency chosen by the Channel Select Knob.

Priority Mode B Details:

This mode fixes one channel in the radio as the priority channel. With the SCAN toggle switch **OFF** and PRI (priority) toggle switch **ON**, the radio can receive on the knob-selected channel while still sampling the priority channel. If the priority channel becomes active, the Priority Indicator goes on and the radio holds on the priority channel for the duration of the transmission. If you wish to reply to a message on the priority channel, you must rotate the Channel Select Knob to the priority channel, then transmit.

With both **SCAN** and **PRI** toggle switches **ON**, normal scanning operation will occur until the scanner locks on to an active channel. The priority channel will continue to be sampled 4 times per second while the radio is listening to this active channel. If activity occurs on the priority channel, the radio will override the active scan channel, go to the priority channel, and hold for the duration of the transmission. If you wish to reply to a message on the priority channel, you must rotate the Channel Selector Knob to the priority channel, then transmit. Once activity has ceased on the priority channel, the radio returns to scan operation.

3.4.1 E.

(3) **Priority Mode C** -- The priority channel is fixed. When the PRI toggle switch is ON, you will transmit on the priority channel regardless of the Channel Select Knob setting.

Priority Mode C Details:

With the PRI toggle switch ON and SCAN switch OFF, radio operation is exactly the same as in Mode B. The fixed priority channel is sampled 4 times a second. If activity occurs on the priority channel, the radio will go to the priority channel and hold for the duration of the transmission. If you wish to reply to a message heard on the priority channel, press the PTT switch and the radio will automatically transmit on the priority channel regardless of the setting of the Channel Select Knob. In Priority Mode C the radio will always transmit on the priority channel if the PRI toggle switch is ON. The Priority Indicator will come on as a reminder that you are transmitting on the priority channel. Once activity has ceased on the priority channel, the radio will return to the Channel Select Knob receive channel.

With both SCAN and PRI toggle switches ON, the radio will scan until it locks on to an active channel. The priority channel will continue to be sampled 4 times a second while the radio is listening to this active channel. If activity occurs on the priority channel, the radio will override the active scan channel, go to the priority channel and hold for the duration of the transmission. If you wish to reply to a message on the priority channel, press the PTT switch and the radio will automatically transmit on the priority channel, regardless of the setting of the Channel Select Knob. In Priority Mode C the radio will always transmit on the priority channel if the PRI toggle switch is on. The Priority Indicator will come on to remind you that you are transmitting on the priority channel. Once activity ceases on the priority channel, the radio returns to scan operation.

F. Changing the Priority Channel

The fixed priority channel used in Priority Mode B and C can be programmed to be permanently set or may be changeable. If your radio has changeable priority, use the following steps to make this change.

Note

Only one channel can be designated as the priority channel.

To avoid possible confusion, turn off the **PRI** and **SCAN** toggle switches on the top of the radio.

(1) Rotate the Channel Select Knob to the channel that you wish to enter as the new priority channel.

(2) Pressing [PRI] key causes a short beep, with the letters "PR" displayed, indicating that the displayed channel is now the priority channel. A channel can be both a priority and a scanned channel. Due to multiple sampling of the same channel, maximum performance occurs when the priority channel is not also a scan channel.

G. Setting Priority Channel Lockout

To lockout a priority channel setting the radio must first be programmed for priority mode B or C.

(1) With the radio in normal operation mode set the channel select knob to the desired priority channel.

(2) Press the [PRI] key on the keyboard. PR should appear on the display.

(3) Enter the programming mode by selecting the appropriate Group #, pressing and holding the FCN key until the -- -- -- 1D is displayed and entering the password code.

(4) While in CH 0 press the [FCN] key until Group 1 functions appear (1-12345).

(5) Press the digit 4 on the keyboard. The 4 in the display should now be flashing.

(6) Press ENT. Return the radio to normal operation mode by turning the radio off, then back on again. The channel selected as priority channel should show PR on the upper portion of the display.

To verify priority channel lockout set the channel select knob to a different channel and press the [PRI] key. The PR symbol should not appear in the display.

3.4.1

H.   User Code Guard™ Selection

Certain BENDIX/KING Radio models allow user selection of Code Guard™ values independent of the Channel Select knob setting. This is accomplished using the keyboard. The radio has been programmed by your dealer to enable or disable this feature. The programming has also assigned a transmit frequency and Code Guard™ and a receive frequency and Code Guard™ to each position shown on the Channel Select Knob. The Code Guard™ values for Channels 1-9 can be pulled away from their normal pairing and matched with any of the other frequencies in the radio.

For example, to use the Code Guard™ values of Channel 9 with the frequencies of Channel 5:

(1)   Turn OFF the PRI and SCAN toggle switches on the top of the radio.

(2)   Set the Channel Select Knob to Channel 5.

(3)   Press the [9] key on the radio keyboard. The radio will now operate on the frequencies of Channel 5 with Channel 9 Code Guard™ values.

During normal operation in the numeric mode, the LCD will show two numbers: the transmit/receive channel on the left ( ) and the selected Code Guard™ values on the right ( ) with the CG symbol.

The CG is illuminated above the channel label in the alpha mode.

(4)   Press the [0] key to reset all values to the original programming. Or press a different digit key (1-9) to select a new set of Code Guard™ values.

Note

In scan or priority scan mode, the display will not show selected user Code Guard™ values, nor will it use operator-selected Code Guard™ values in scan mode.
Once a Code Guard™ value has been selected by the keyboard it will not change even if power is interrupted or if the Channel Select Knob is changed.

I.   Busy Channel Operation

If your radio has been programmed for busy channel operation, it will operate in one of the following three modes.

(1)   Busy Channel Indication

The yellow Busy Channel Indicator will glow if there is carrier activity on the channel selected. If the channel selected is a Code Guard™ channel and the correct code is not detected, the Busy Channel Indicator will remain on for the duration of the carrier activity and no messages will be heard. During Scan and Priority Scan operation, the Busy Channel Indicator will glow when activity is detected on any channel that is in the scan list.

When scanning Code Guard™ channels, with the Squelch knob set to the Code Guard™ position, and the activity has been detected, the Busy Channel Indicator will glow for the time period necessary to determine if the proper Code Guard™ has been received, causing the LED to "flash" at various rates. In Priority Scan operation, the Busy Channel Indicator will remain on for the duration of the carrier activity.

(2)   Busy Channel Lockout

The Busy Channel Lockout feature applies only to those channels programmed for receive Code Guard™ operation. When carrier activity has been detected on the channel selected, the receive Code Guard™ is checked. If the proper code is present, you will be able to transmit on that channel, even if the Squelch knob is not in the Code Guard™ position. If an incorrect code or carrier activity only is detected, the transmitter is disabled, an alert tone is heard, and the LCD displays the word "Busy" when the radio's PTT is depressed.

Channels not programmed for receive Code Guard™ operation will transmit regardless of carrier activity.

3.4.1 I.

(3)   Busy Channel Lockout Override

This mode operates in the same manner as Busy Channel Lockout with the exception that you are able to override and transmit by turning the Squelch Knob off the Code Guard™ position.

J.   ANI Operation

A DTMF/ANI encoding feature is also available. If enabled, a sequence of DTMF tones similar to the tones used by a standard pushbutton telephone will be transmitted each time the transmit PTT switch is activated. A sidetone of the ANI number transmitted will also be audible through the front speaker.

K.   DTMF Operation

If the DTMF feature is enabled, operate the DTMF function simply by pressing and holding the PTT switch and then press any of the 12 keys desired. An audible sidetone will be generated and heard through the front speaker.

The [FCN], [PRI], [ENT], and [CLR] keys respond as DTMF tones A, B, C, and D respectively.

3.5   PROGRAMMING

There are three different methods to program the Bendix/King KFM 985.

A.   Use the units keyboard/display as described below.

B.   Transfer a unit's programmed setting to another unit of the same type by using a cloning cable.

C.   Program a unit from a computer by using an RS232 interface cable. Contact Bendix/King for the programming cable, software and manual required.

3.5.1   ENTRY INTO PROGRAMMING MODE

Option one, using the unit keyboard/display to program the unit.

A.   Select channel group to be programmed.

B.   Press and hold [FCN] key. Approximately three seconds later the LCD will display - - - ID.

C.   Release [FCN] key. The radio is now in the password entry mode.

Note

New radios shipped from the factory are assigned the password code 000000.

D.   Enter six-digit password code. Without the correct password code, you cannot proceed with programming.

While entering the password code the display will not change but a beep will sound after each key is pressed. If the password code is entered incorrectly, the radio will reset to normal operation. Repeat step D.

E.   To keep the password code unchanged, press the [ENT] key and continue with normal programming. To change the password code, press the [FCN] key and enter a new six-digit password code. The digits are displayed as you enter them.

Note

Do not use the numeral one 1 for the first digit of the password code - the radio will malfunction. The password code can contain the digits 0 through 9, *, and #. If you make an error enteering the new password code, press [CLR] and try again.

F.   Press [ENT] key to store new password code and proceed to programming mode. The display will change to **PRG Ch 00**.

3.5.2 GENERAL PERFORMANCE VARIABLES (CHANNEL 0)

Channel 0 is the portion of the program that controls genrral performance variables for each group of 14 channels. The channel 0 settings for each group must be programmed seperately. Before entering the Programming mode select the group to be programmed; set th[#] key, number keys for the desired group, press the [ENT] key.

The same password code is used for all groups in the radio.

Note

Settings listed as Group One functions, Group Two functions, and Group Three functions refer to programming function groups, not channel groups.

Press the [FCN] key repeatedly to view the settings in Channel 0, then loop back to the Ch 00 entry point. Channel 0 settings include:

Automatic Number Identification (ANI)

Transmitter Timeout Timer

Scan Delay Time

- Group One functions:

  - Battery Saver
  - Priority Scan Operation
  - Priority Key Lockout
  - Scan List Lockout

- Group Two functions:

  - Enable User Code Guard
  - Busy Channel Operation
  - ANI Enable
  - DTMF Enable

- Group Three functions:

  - Back Light Enable Conditions
  - Alpha/Numeric Mode Enable
  - Backlight DurationGroup Label

A. Automatic Number Identification (ANI)

   (1) The LCD will display PRG Ch 00 after entering the programming mode.

   (2) Press the [FCN] key.

   (3) The display will indicate the ID number (as many as seven digits may be used). The ID number can be used for either radio management or transmitted as a DTMF tone burst for ANI purposes. The ANI can be enabled or disabled.

   (4) If no change is needed for the ID number, press the [FCN] key to advance to the next section.

     (a) A new number can be entered by pressing [CLR]. Press the number keys to enter the number. The digits will appear to right of the display and move to the left. Press the [ENT] key to store the new ID number and advance to the next section. If the new ID number will be used only for cloning, press [FCN] instead of [ENT] to advance to the next section. The ID number will not be stored locally.

     (b) If desired, the existing ID number can be incremented one digit by pressing [PRI]. Then press the [ENT] key to store the new ID number and automatically advance to the next section.

3.5.2

B. Transmitter Time Out Timer

(1) After the ID number is set, the upper display will indicate PRG TX. This is the duration of the transmitter Time Out Timer. OSEC means the Time Out Timer is disabled. Press the [FCN] key to advance to the next section if no change is needed, or if a new setting is only to be cloned, not stored locally.

(2) Press the [PRI] key to increase the Time Out Timer duration by 15 seconds, with a maximum of 225 seconds (3 minutes, 45 seconds). Press the [PRI] key after 225 seconds to reset the duration to zero.

(3) Press the [CLR] key to set the Time Out Timer duration to zero.

(4) Press the [ENT] key to store the changed setting and advance to the next section.

C. Scan Delay Time

After the Time Out Timer is set the upper display will indicate PRG SCN. This is the duration of the scan delay time in seconds.

(1) Press the [FCN] key to advance to the next section if no change is needed, or if a new setting is only to be cloned, not stored locally.

(2) The scan delay duration can be changed by pressing the [PRI] or [CLR] key. Each press of the [PRI] key will increase the scan delay time by .5 seconds up to 7.5 seconds. Another press after 7.5 seconds resets to 0. Pressing the [CLR] key will automatically reset the value to 0. Press the [ENT] key to store the chosen value and automatically advance the program to the next section.

NOTE

It is not recommended to leave the scan delay time at 0 seconds.

D. Channel 0 Group One Functions

After the scan delay time is set the LCD will display PRG 1-12345. This is a group of five individual functions that can be enabled or disabled. When a function is enabled, the corresponding number in the display will flash. When the function is disabled the number is steady. If you wish to change the function from enable to disable or vice versa, press the number key corresponding to that function.

Example: If function #4 (Priority Key Lockout) is disabled, the 4 in the display will not be flashing. If the [4] key is pressed, the 4 in the display will flash, signifying that Priority Key Lockout is enabled. A subsequent press of the [4] key will return Priority Key Lockout to a disabled status.

(1) Battery Saver Inhibit

When function 1 is enabled (flashing) the battery saver is turned off . The battery saver should be turned off in the KFM 985.

(2) Priority Scan

Functions 2 and 3 are used to define Priority Scan operation. There are three types of Priority Scan available:

Priority Mode A - The Priority Channel follows the position of the channel select knob.

Priority Mode B - The Priority Channel is fixed. You will transmit on the channel selected by the channel select knob channel.

Priority Mode C - The Priority Channel is fixed. When the [PRI] toggle switch is on, you will transmit on the Priority Channel regardless of the channel select knob setting.

3.5.2 D.(2)

To set Function 2 and 3 for Priority Mode A, B, or C, use the following chart:

	FUNCTION 2	FUNCTION 3
PRIORITY MODE A	DISABLE (STEADY)	DISABLE (STEADY)
PRIORITY MODE B	ENABLE (FLASHING)	DISABLE (STEADY)
PRIORITY MODE C	ENABLE (FLASHING)	ENABLE (FLASHING)

(3)   PRI Key LockOut

When function 4 is enabled (flashing) the [PRI] key is locked out in the operating mode. The user will not be able to change the designation of the Priority Channel. When function 4 is disabled (steady) the user will be able to change the channel that is designated as Priority Channel.

(4)   Scan List Lock Out

When function 5 is enabled (flashing), the user will not be able to change the channels in the scan list. When disabled (steady), the user can enter or delete channels from the scan list.

(5)   Store Group One Settings

Once each function 1-5 is set as desired, you can store the changes, discard the changes, or disable all 5 functions. Press the [ENT] key to store new Group One settings into memory and advance to the next section. Press the [FCN] key to advance to the next section without saving changes. Press the [CLR] key to disable all Group One functions (steady). Then press the [ENT] key to store the disabled settings into memory and advance to the next section.

E.   Channel 0 Group Two Functions

After Group One functions are set, the LCD will display **PRG 2-12345** for Group Two functions. As with Group One functions, the enabled function number will flash. The disabled functions remain steady.

(1)   User Code Guard Selection

When function 1 is enabled (flashing) the user will be able to press the keyboard to independently select the Code Guard values that are programmed into Channels 1 thru 9 while operating on any Channel 1 thru 14. When disabled the user will be unable to use the keyboard for Code Guard selection.

(2)   Busy Channel Operation

Functions two and three are used to set Busy Channel operation. There are three types of busy channel operation available:

(a)   Busy Channel Indicator - The yellow LED illuminates when any activity on the channel selected has been detected.

(b)   Busy Channel Lockout - The yellow LED illuminates and the transmitter PTT is disabled when activity on the channel selected has been detected.

(c)   Busy Channel Override - This function is similar to Busy Channel Lockout except the transmitter PTT can be activated by rotating the squelch control clockwise off the detent CG position. To set Busy Channel operation use the following chart:

	FUNCTION 2	FUNCTION 3
BUSY CHANNEL INDICATION	DISABLE (STEADY)	ENABLE (FLASHING)
BUSY CHANNEL LOCKOUT	ENABLE (FLASHING)	ENABLE (FLASHING)
BUSY CHANNEL OVERRIDE	ENABLE (FLASHING)	DISABLE (STEADY)

(3)   ANI Enable

When function 4 is flashing (enabled) the seven digit number entered in the ID number portion of the Channel 0 will be transmitted on each press of the PTT button. When functions 4 and 5 are both enabled (flashing) the ANI tone sequence will be

3.5.2 E.

transmitted only after the [ENT] key is pressed while the transmit PTT switch is activated. A sidetone of the ANI number transmitted will also be heard through the speaker.

(4)   DTMF Enable

When function 5 is flashing (enabled) the keypad becomes active for manual DTMF operation.

(5)   Store Group Two Settings

Once Group Two functions are set as desired, you can store the changes, discard the changes, or disable all 5 functions. Press the [ENT] key to store new Group One settings into memory and advance to the next section. Press the [FCN] key to advance to the next section without saving changes. Press the [CLR] key to disable all Group One functions (steady). Then press the [ENT] key to store the disabled settings into memory and advance to the next section.

F. Channel 0 Group Three Functions

After Group Two functions are set, the LCD will display **PRG 3-12345** for Group Three functions. As with Group One and Group Two functions, the enabled function number will flash. The disabled functions remain steady.

(1)   Backlight on Main Channel Activity

When function 1 is enabled (flashing) the LCD backlight will illuminate each time the display receives input related to the main channel. This includes displayed changes in the selected channel and the PR, TX, and SCN annunciators.

The LCD will not illuminate if backlight duration is set to **LITE OFF**.

(2)   Backlight on Scan Channel Activity

When function 2 is enabled (flashing) the LCD backlight will illuminate each time the display receives input related to the scan channel. This includes displaying the scan channel and the CG annunciator.

The LCD will not illuminate if backlight duration is set to **LITE OFF**.

(3)   Backlight on Other Display Activity

When function 3 is enabled (flashing) the LCD backlight will illuminate each time the display receives input not related to the main or scan channel. This is not used often, but includes the - - - **id** prompt for password input.

The LCD will not illuminate if backlight duration is set to **LITE OFF**.

(4)   Backlight on Key Press

When function 4 is enabled (flashing) the LCD backlight will illuminate each time a key is pressed on the keypad, even if pressing the key has no other effect. The LCD will not illuminate if backlight duration is set to **LITE OFF**.

(5)   Alpha numeric Mode

When function 5 is enabled (flashing) the LCD operates in Alpha Numeric mode. When disabled (steady) the LCD operates in standard (7-segment) display mode. This disables display of channel and group Alpha Numeric labels.

(6)   Store Group Three Settings

Once each function 1-5 is set as desired, you can store the changes, discard the changes, or disable all 5 functions.

Press the [ENT] key to store new Group Three settings into memory and advance to the next section. Press the [FCN] key to advance to the next section without saving changes.

Press the [CLR] key to disable all Group Three functions (steady). Then press the [ENT] key to store the disabled settings into memory and advance to the next section.

3.5.2

G. Backlight Duration

After Group Three functions, the LCD displays the current backlight duration setting. Available settings are **LITE OFF, 1 SEC ON,** one second increments up to **6 SEC ON,** and **LITE ON.**

If no change is need, press the [FCN] key to advance to the next section.

Press the [CLR] key to set backlight duration to zero and display **LITE OFF.**

Press the [PRI] key to increase backlight duration by 1 second increments from **LITE OFF,** to **1 SEC ON, 2, 3, 4, 5, 6 SEC ON, LITE ON** (illumination remains on constantly) then back to **LITE OFF.**

Press the [ENT] key to store changes and advance to the next function.

Press the [FCN] key to advance to the next function without storing changes.

NOTE

The backlight illuminates for the new displayed setting. For example, if you press the [PRI] key to change the setting from 2 SEC ON to 3 SEC ON the backlight immediately illuminates for three seconds.

H. Group Label

After the Backlight Duration setting, the LCD displays the current label for the channel group. Each channel group can have a label of up to eight characters or spaces. The characters can include 0 - 9, A - Z, -, *, $, /, +, %, \, |, _, <, >, h, or blank.

If no change is needed, press the [FCN] key to advance to the next section.

(1) To Change the Label:

   (a) Press the [CLR] key. The display becomes blank.

NOTE

Press the [CLR] key a second time to restore thecurrent label.

   (b) Press the [#] key to toggle a decimal on or off after the current character.

   (c) Press the [PRI] key repeatedly to cycle through characters 0 - 9, A - Z, -, *, $, /, +, %, \, |, , <, >, h, blank, then back to the start again. If you pass the desired character, press the [PRI] key repeatedly until you loop around to it again.

   (d) Press the [FCN] key to shift the display left by one position, leaving position eight blank.

   (e) Press the [ENT] key to store changes and proceed to the Ch 00 entry point.

I. Review Channel 0 Values

Press the [FCN] key repeatedly to display each value in Channel 0, then loop back to the **Ch 00** entry point.

J. Enter Channel Frequencies and Code Guard Values

Once Channel 0 programming is complete, the LCD will display **PRG Ch 0.** Any channel number can now be pressed to allow access to the frequency and Code Guard values for that channel.

NOTE

A valid receive frequency must be programmed into each channel intended for use. If a 0 value or an invalid frequency is programmed, the LCD will give a false reading in the operation mode, and may result in radio malfunction. If a malfunction occurs, reset the radio by turning it off and then back on. Valid frequencies are:

VHF - 148 MHz to 174 MHz.
UHF - 450 MHz to 512 MHz
UHF (D) - 403 MHz to 457 MHz

3.5.2 J.

(1) Press 1 and the LCD will display **PRG CH 1**. This is the entry point for channel 1 values.

(2) Press the **[FCN]** key and the upper part of the LCD will display **PRG RX**. This is the receive frequency for channel 1 (in MHz).

(3) If the displayed frequency is correct, press the **[FCN]** key to advance to the next value. If a new frequency is desired, press the **[CLR]** key followed by the digits of the desired frequency. Then press the **[ENT]** key to store this frequency and automatically advance to the next value.

(4) After the receive frequency is set, the upper part of the LCD will display **PRG RX CG**. This is the Code Guard value for Channel 1 receive.

NOTE

0.0 indicates carrier squelch operation.

If the displayed value is correct, press the **[FCN]** key to advance to the next value.

If a new value is desired, press the **[CLR]** key to reset the display to 0.0. Press the number keys **0** thru **9** to enter a Tone Code Guard value.

To enter a Digital Code Guard value, first press the **[CLR]** key, then the **[#]** key, causing the letter d to appear followed by three zeros. Enter the desired digital code using keys **0** thru **7** (keys **8** & **9** do not respond). Pressing the **[PRI]** key after the three-digit code has been entered allows the digital code to be inverted. When the displayed value is correct, press the **[ENT]** key to store the Code Guard value and automatically advance to the next value.

(5) After the receive Code Guard is set the upper part of the LCD will display **PRG TX**. This is the transmitter frequency for Channel 1. If it is correct, press the **[FCN]** key to advance to the next value.

If you wish to change it, press the **[CLR]** key followed by the frequency in MHz then **[ENT]** to store the new frequency and automatically advance to the next value.

(6) After the transmit frequency is set the upper part of the LCD will display **PRG TX CG**. This is the Code Guard value for Channel 1 transmit (**0.0** indicates carrier squelch). If this value is correct press the **[FCN]** key to advance to the next value.

If a new value is desired, press the **[CLR]** key to reset the display to **0.0**. Press the number keys **0** thru **9** to enter a Tone Code Guard value.

To enter Digital Code Guard, first press the **[CLR]** key, then the **[#]** key, causing the letter d to appear followed by three zeros. Enter the desired digital code using keys **0** thru **7** (keys **8** & **9** do not respond). Pressing the **[PRI]** key after the three digit code has been entered allows the digital code to be inverted. When the displayed value is correct, press the **[ENT]** key to store the Code Guard and automatically advance to the next value.

(7) After the transmit Code Guard is set, the LCD will display the channel label. If this label is correct press the **[FCN]** key to proceed to the entry point.

If a new label is desired, press the **[CLR]** key. The display becomes blank.

NOTE

Press the **[CLR]** key a second time to restore the current label. Press the **[#]** key to toggle a decimal on or off after the current character. Press the **[PRI]** key repeatedly to cycle through characters 0 - 9, A - Z, -, *, $, /, +, %, \, |, _, <, >, h, blank, then back to the start again. If you pass the desired character, press the **[PRI]** key repeatedly until you loop around to it again. Press the **[FCN]** key to shift the display left by one position, leaving position eight blank. Press the **[ENT]** key to store changes and proceed to the Ch 01 entry point.

(8) After the channel label is set, the display will loop back to the Channel 1 entry point. If you wish to review the frequencies and Code Guard values in Channel 1, subsequent pressing of the **[FCN]** key will show each value and then loop back to the Channel 1 entry point.

3.5.2 J.

(9) After Channel 1 information is set, the display will loop back to show **PRG CH 1**. Press the [CLR] key followed by the digits of any other channel number to gain access to the frequencies and Code Guard values for that channel. Each channel is then programmed using the same technique as previously outlined for Channel 1.

(10) After the frequencies and Code Guard values are entered for each channel, the channel select knob can be modified to limit it's travel. The procedure is as follows:

Remove the channel select knob from the radio. There are two pins. The pins can be set to limit the travel from two to 14 channels as needed. Place the pins in to the appropriate hole and reinstall the channel select knob. For example, to limit the travel to channels 1-10 set the pins as shown in the illustration to the left.

3.5.3 LEAVE THE PROGRAMMING MODE

Rotate the On/Off/Volume knob on the top of the radio counter clockwise to the Off position.

Normal radio operation will occur on the next power up.

• Group Programming •

• Channel 0 settings affect one "group" of 14 channels. Each group must be programmed separately. To select a group for programming, perform the following steps:

  • Set the radio to normal operation mode by turning it off, then on.

  •• Select the group to be programmed by pressing the [#] key followed by the desired group number. If an invalid group number has been selected (for example, group 5) the LCD will display no group 05. To exit this mode either turn the radio off, then on; or enter a valid group number from the keypad.

  ••• Enter the programming mode and set the values.

NOTE

The same password code is used for all groups in the radio.

3.5.4 CLONING A RADIO

Any unit with internal keyboard and display is capable of transferring its program to another similar unit of the same frequency band. The units are referred to as the Master unit (original) and the Clone unit (copy from master).

A. Attach the MASTER switch end of the cloning cable into the connector of the Master radio.

NOTE

One plug of the cloning cable has a push button Master switch. This plug must be plugged into the connector of the Master radio (if the master is a hand held radio).

B. Power up the Master radio by rotating the On/Off/Volume knob clockwise past the detent.

C. To put the Master radio (hand held only) in the programming mode, press and hold the MASTER switch. Then press the [FCN] key until the LCD displays - - - Id.

D. Enter the correct Password Code to proceed to CH 0.

E. Review the values in the program. Any changes required must be made at this time.

F. Connect the other plug of the cloning cable into the connector of the radio to be cloned.

G. Power up the Clone radio.

H. Press the [*] key on the Master radio keyboard. The display will flash PRG signifying that the radio is ready to download.

I. Press the [FCN] key on the Master radio keyboard. The program in the Master will be downloaded to the Clone. The Clone will send back the program to the Master to verify successful cloning.

J. If the download was successful, the Master will resume flashing PRG. Power down the Clone. Disconnect the cable. Normal radio operation will occur on the next power up.

K. If the download was not successful the Master will display FAIL and multiple beeps will follow. Failure to down load the Master program can be due to:

(1) Incorrect radio types.

(2) Improper connection.

(3) Failure to power up radio.

(4) Clone set in programming mode.

NOTE

To stop Fail mode, press the [CLR] key, power down the radios, and try again.

3.5.5 GROUP CLONING

Cloning radios can only be accomplished group by group. Settings for any group in a Master radio can be downloaded to any group in the clone radio. To perform group cloning:

A. While in normal radio operation, select the group number in the Master radio to download from by pressing the [#] key followed by the desired group number.

B. Set the Clone radio to the group that is to receive the download using the same method as in A.

C. Follow the cloning procedures outlined earlier.

Only the Channel 0 and channel 1-14 information for the selected Master group will be downloaded to the selected Clone radio group.

3.5.6 SPECIAL CLONING INSTRUCTIONS

It is possible to change Channel 0 values on the Master radio, hold them in a temporary memory, and download them to the clone without actually entering them into the permanent memory of the Master. This is convenient for sequential identification numbers used to identify a series of portables in a radio system. Assuming that the frequencies, Code Guard values, and other Ch 0 values are common for all radios in the system, but that the radio identification number should be unique to each radio, the following method would be used to clone additional radios for the system.

A. Program the Master radio with all frequencies, Code Guard values, and Channel 0 values that will be common to all radios.

B. Advance the display to show the Master radio's ID number - for example, #100.

C. Press the [CLR] key; press 1 2 5. #125 is now in temporary memory.

D. Press *, connect the cable to the radio and download by pressing [FCN]. ID #125 is now stored in permanent memory of the Clone.

E. After download, press the [CLR] key. Disconnect the Clone. The Master radio display will show that #125 is still being held in the temporary memory of the Master.

F. Press [PRI]. This will increment the ID number one digit to #126. (Note: any new number can be entered at this point by pressing the [CLR] key and using the digit keys to enter the new number.)

G. Press *. Connect the cable to the second clone and download by pressing [FCN].

H. Any number of radios can be coded with different or sequential ID numbers using this technique. The ID number in the permanent memory of the Master will remain unchanged as #100.

3.5.7   SCAN LIST AND PRIORITY CHANNEL CLONING

When a Master downloads to a Clone, the Scan List and Priority Channel designations are also transferred to the clone.   This includes Priority Mode and any lockout functions. If electing to program a Clone with a set Priority Mode, Priority Channel, and Scan List along with the respective lockout functions (if desired), the Master radio must first be programmed with these parameters.   Hence whatever is programmed in the Master will be downloaded to the clone radio.

3.6   TONE CODE GUARD VALUES

The tone Code Guard system may be set for any frequency in the range of 67 to 255.9 Hz. However, since most systems adhere to the Electronic Industry Association (EIA) standards, tones should be selected from the following EIA list. In order to insure optimum performance, tone selection for use on the same radio frequency (RF) channel or adjacent channels in the same coverage area should be made from one of the Groups A, B, or C to the maximum degree possible.   BENDIX/KING guarantees optimum receiver performance only if tone frequencies below 220 Hz are chosen.

GROUP A		GROUP B		GROUP C
67.0	151.4	71.9	146.2	74.4
77.0	162.2	82.5	156.7	79.7
88.5	173.8	94.8	167.9	85.4
100.0	186.2	103.5	179.9	91.5
107.2	203.5	110.9	192.8	
114.8	218.1	118.8	210.7	
123.0	233.6	127.3	225.7	
131.8	250.3	136.5	241.8	
141.3				

The assignments in a given area shall be made from one of the Groups A, B, or C.

3.7   DIGITAL CODE GUARD VALUES

Codes for the Digital Code Guard system may be chosen from the following list. Since there are no EIA standards for the performance or compatibility of Digital Code Guard systems it is recommended that an operational test be made on the intended system before wholesale assignments are made. In some cases either or both the transmit and receive codes will require an inverted code to operate with existing systems. This can be done during the code programming of the system. Usually systems using direct unit to unit transmission (systems without mobile relays, repeaters, remote control, etc) may use codes from the table. Systems with relays etc. may use code variations for system control and operational efficiency. The system operator or engineer should be consulted regarding the operational requirement on such systems.

023	065	131	165	245	315	411	466	612	703
025	071	132	172	251	331	412	503	624	712
026	072	134	174	261	343	423	506	627	723
031	073	143	205	263	346	431	516	631	731
032	074	152	223	265	351	432	532	632	732
043	114	155	226	271	364	445	546	654	734
047	115	156	243	306	365	464	565	662	743
051	116	162	244	311	371	465	606	664	754
054	125								

All controls required to operate the KFM 985 are located on the unit front panel. (See Figure 3-1)