

I N S T R U C T I O N B O O K

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F M D E V I A T I O N I N D I C A T O R



BIRD

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SPECIFICATIONS FOR MODEL 3180 FM DEVIATION INDICATOR

Input/Output Impedence.....	50 ohms
Frequency.....	50MHz \pm 50kHz
Power Range.....	0.5 - 10W maximum
Peak Deviation for "ON" Indication.....	3kHz \pm 1kHz at 5W 1kHz modulated frequency
Audio	
Frequency Response.....	500-3000Hz
Output Maximum.....	3.0mW into 15 ohms at 20kHz deviation
Power Requirements.....	1, 9V dc lithium battery (Altus AL9V)
Battery Life.....	120 hours minimum
Temperature Operating.....	0°C-50°C (32°F-122°F)
Temperature Storage.....	-55°C-125°C (-67°F-257°F)
Insertion Loss.....	1% maximum (-.05db) at 50MHz
Connectors.....	Female BNC
Earphone Connection.....	Sub-Minax receptacle
Dimensions.....	4-17/64"L x 3/8"W x 1"H (108 x 85.7 x 25.4mm)
Weight.....	115 oz. (326g)
Finish.....	Bright nickel plate

SECTION I - INSTALLATION

1-1. GENERAL

1-2. The Model 3180 is a completely portable unit and is not intended for permanent mounting. Its small size makes it convenient to be carried separately or in a case with other test equipment. This equipment is rugged and impervious to moisture and therefore can be used in adverse weather conditions if necessary.

1-3. CONNECTIONS

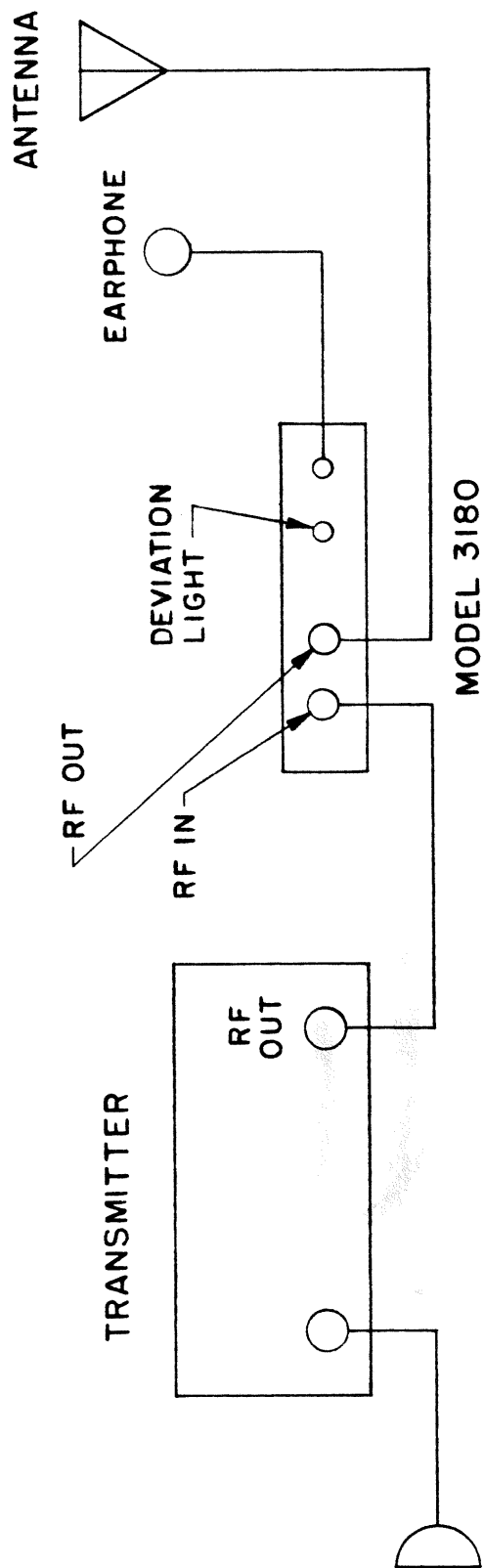
1-4. Connect the RF output of the transmitter to the input of the Model 3180. The output of the unit may be connected to either an antenna or an acceptable RF dummy load. See Figure 1-1.

1-5. Use 50 ohm coaxial cables, RG58-A/U or equivalent, equipped with mating BNC connectors for the connections. Often a small 10 watt load resistor can be attached directly to the output jack.

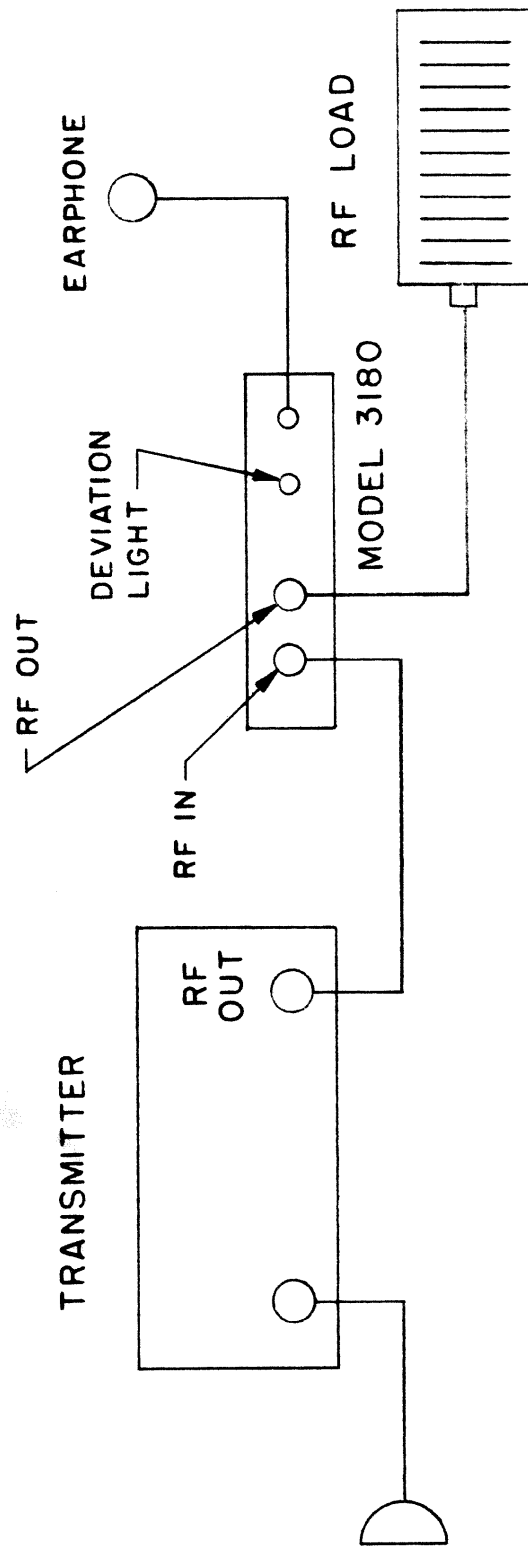
1-6. If the connections are inadvertently reversed, and power is applied, there will be no adverse effects to the unit. Turn off power and connect correctly for proper operation.

1-7. If the unit is to be used in the audio mode, connect the earphone to the sub-minax receptacle and switch the mode switch to the audio position.

Figure 1-1. Model 3180 Connections.



- OR -



SECTION II - THEORY OF OPERATION

2-1. GENERAL

2-2. The Model 3180 FM Deviation Indicator was designed for the purpose of detecting frequency modulation of a RF carrier. The unit utilizes a FM receiver to detect the modulation from a RF signal. The audio output of this FM receiver is used to either turn on a deviation lamp or the amplified audio output may be used with earphones for monitoring. The Model 3180 is factory turned for a 50MHz carrier frequency operation at a power level between a minimum of 0.5 watts to 10 watts maximum.

2-3. For the following operational description refer to Figure 2-1. Block Diagram.

2-4. THRULINE COUPLER

2-5. The Thruline coupler of the deviation indicator allows the RF power from the transmitter to pass with a minimum amount of insertion loss. This makes the unit especially suitable to be left in the transmission line for in-operation monitoring of the transmitters modulating stage.

2-6. If the deviation indicator is left in the transmission line, care must be taken not to exceed a power rating of ten watts as damage to the unit may result. The unit samples a small amount, about 35db, of RF line power which is coupled to the input of the FM demodulator section.

2-7. FM DEMODULATOR

2-8. The FM demodulator is actually a FM receiver that is tuned to demodulate a FM signal of 50MHz. The deviation level is directly proportional to the amplitude of the demodulated audio signal. The audio signal out of the demodulator is coupled either to the deviation level detector or the audio section depending on the position of the mode switch (S2). The receiver also controls the tune lamp (D2). This lamp will glow if the transmitters output power is less than 0.5 watts or its output frequency is other than 50MHz. When the transmitter is operating at 50MHz and the output power is sufficient for valid testing, the tune lamp will be off.

2-9. DEVIATION LEVEL DETECTOR

2-10. When the mode switch (S2) is placed in the LT position, the audio output of the receiver is coupled to an amplifier. The amplified audio signal is then converted to a dc voltage by the detector diode and low pass filter network. This dc voltage is directly proportional to the transmitter's deviation level. This dc voltage is compared to a reference voltage which is adjusted at the factory during the units calibration. As the transmitter's FM deviation increases, so does the dc voltage at the input of the comparator. When this voltage becomes larger than the reference voltage, the comparator turns on and causes the DEV lamp (D3) to glow. This provides a visual indication that the transmitter is frequency modulated.

2-11. AUDIO SECTION

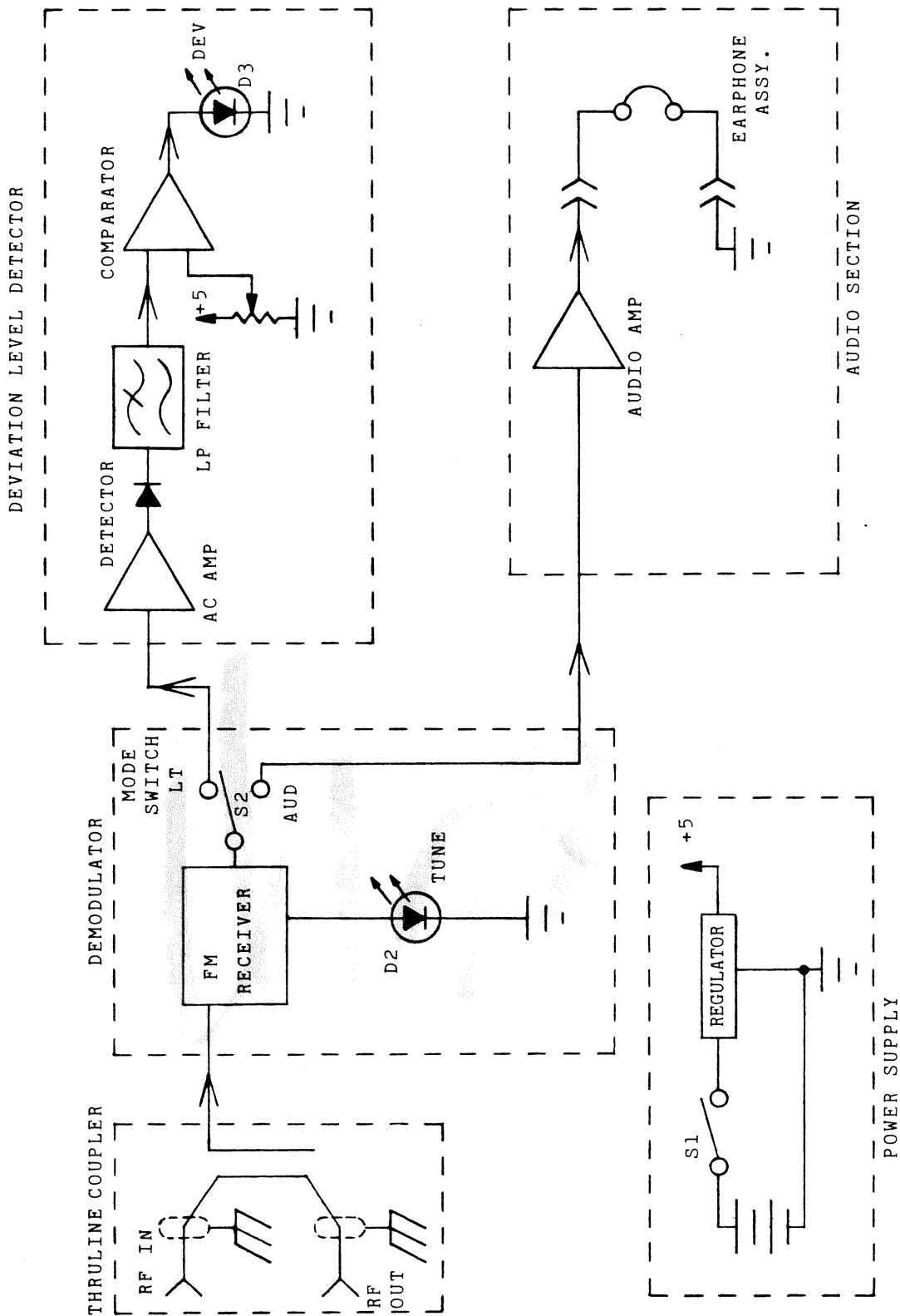
2-12 When the mode switch (S2) is moved to the AUD position, the output from the receiver is coupled to an audio amplifier. This amplifier provides sufficient gain of the audio signal to drive the provided earphone assembly. This allows an operator to monitor the audio signal to determine if the transmitter's modulator is operating properly.

2-13. POWER SOURCE

2-14. Power for the deviation indicator is supplied by one 9 volt transistor radio type battery. The useful operational life of the battery is approximately 120 hours. Battery power is switched in and out of the circuit by (S1) and is adjusted to five volts by a voltage regulator.

Figure 2-1. Block Diagram.

MODEL 3180 BLOCK DIAGRAM



SECTION III - OPERATING INSTRUCTIONS

3-1. OPERATION

3-2. Connect the Model 3180 to the RF power source as described in Paragraph 1-3. Place the ON/OFF switch toggle in the ON position.

3-3. If audio operation is desired, switch the mode switch to the AUD position. The modulated signal can be heard through the earphone when the transmitter is keyed.

3-4. If visual operation is desired, put the mode switch in the LT position. The DEV lamp on the control panel will glow indicating the presence of a modulated signal when the transmitter is keyed.

3-5. When operation of the unit is complete, place the ON/OFF switch in the OFF position to conserve the battery. It will not be necessary to disconnect the unit from the RF transmission line providing RF power will be less than 10 watts.

SECTION IV - MAINTENANCE

4-1. GENERAL

4-2. The Model 3180 is a very rugged unit and is constructed to withstand the effects of adverse environmental conditions. It requires very little maintenance other than to occasionally clean the outside surface and replace the battery.

4-3. CLEANING

4-4. If it should become necessary to clean the unit, use only a mild detergent solution on a soft cloth. Dry thoroughly with a soft cloth afterwards.

4-5. The RF and audio connectors can be cleaned with any acceptable dry solvent on a cotton swab stick.

4-6. BATTERY REPLACEMENT

4-7. If the unit ceases to function properly, or if there is any indication that the battery is weak and requires replacing, proceed as follows:

- a. Remove the six #4-40 pan head screws that secure the cover plate on the unit.
- b. Remove the cover to expose the battery and circuit board. Disconnect the battery lead and replace the battery with the same or equivalent type for 9 volt operation.
- c. Replace cover and reinstall the #4-40 screws.

4-8. REPAIRS

4-9. Further repairs or replacement of parts other than battery replacement in the field is not recommended. This is especially true during the first year warranty period. We strongly advise that all defective units be returned to the factory for repair and recalibration. Please contact Bird Electronic Corporation before returning any defective item.

4-10. Because of our repair policy on this unit, no replacement parts list is provided.

SECTION V - PREPARATION FOR RESHIPMENT

5-1. GENERAL

5-2. Sufficiently pad the unit to protect the connectors and switches from damage during shipment. Place the padded unit in an appropriate container and seal securely. It is wise, if possible, to save the original shipping container for possible reshipment or storage.

LIMITED WARRANTY

We are proud of the high quality of our product and we warrant to the original purchaser that each new instrument of our manufacture will for a period of one year after original shipment be free from defects in material and workmanship under normal and proper operating conditions and that properly used during such period it will perform in accordance with our applicable specifications.

Our obligation and the purchaser's exclusive remedy for any defect or failure to meet specifications shall be limited, at our option, to repair or replacement, or if we determine said defect or failure to be so defective as to preclude remedying by repair or replacement, the purchaser's sole and exclusive remedy shall be limited to refund of the purchase price. We shall have no obligation if defects result from improper use, operation above rated capacities, repairs not made by us, or misapplication of the equipment. Our warranty does not extend to the failure of semiconductor devices and batteries, or to equipment and parts made by others except to the extent of the original manufacturer's warranty to us. No other warranty is expressed or implied. Bird Electronic Corporation is not liable for consequential damages.

Warranty returns must be first authorized by the factory office and are to be shipped prepaid.