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INSTRUCTION BOOK

OPERATING INSTRUCTIONS

TERMALINE® COAXIAL LOAD RESISTOR SERIES 8000



Electronic Corporation
Cleveland (Solon) Ohio USA

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Instruction Book Part Number 920-8000S Rev. A

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Safety Precautions

The following are general safety precautions that are not necessarily related to any specific part or procedure and do not necessarily appear elsewhere in this publication.

Keep Away From Live Circuits

Operating personnel must at all times observe normal safety regulations. Do not replace components or make adjustments inside equipment with the high voltage supply turned on. To avoid casualties, always remove power.

Do Not Service or Adjust Alone

Under no circumstances should any person reach into an enclosure for the purpose of service or adjustment of equipment except in the presence of someone who is capable of rendering aid.

Safety Earth Ground

An uninteruuptible earth safety ground must be supplied from the main power source to test instruments. Grounding one conductor of a two conductor power cable is not sufficient protection. Serious injury or death can occur if this grounding is not properly supplied.

Shock Hazard

Do not attempt to disconnect an RF transmission line while RF is present. Radiated RF power is a potential health hazard.

Resuscitation

Personnel working with or near high voltages should be familiar with modern methods of resuscitation.

Safety Symbols

WARNING
Warning notes call attention to a procedure, which if not correctly performed, could result in personal injury.

CAUTION
Caution notes call attention to a procedure, which if not correctly performed, could result in damage to the instrument.

This symbol appears on the equipment indicating there is important information in the instruction manual regarding that particular area.



☞ NOTE: Calls attention to supplemental information.

WARNING STATEMENTS

The following safety warnings appear in the text where there is danger to operating and maintenance personnel and are repeated here for emphasis.

WARNING
Never attempt to disconnect RF equipment from the transmission line while RF power is being applied. Leaking RF energy is a potential health hazard.

WARNING
This product contains a resistor substrate made of beryllium oxide. This is a potentially toxic ceramic and may be harmful to your health. Beryllia oxide must be disposed of in accordance with the legal statutes dealing with hazardous material.
Do not attempt to repair this unit, but return to BIRD ELECTRONIC CORPORATION.

CAUTION STATEMENT

The following equipment caution appears in the text whenever the equipment is in danger of damage and is repeated here for emphasis.

CAUTION
Do not operate these loads continuously above their maximum power rating. Load failure will result.

SAFETY STATEMENTS



USAGE

ANY USE OF THIS INSTRUMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR THE INSTRUMENT'S SAFETY PROTECTION.

USO

EL USO DE ESTE INSTRUMENTO DE MANERA NO ESPECIFICADA POR EL FABRICANTE, PUEDE ANULAR LA PROTECCIÓN DE SEGURIDAD DEL INSTRUMENTO.

BENUTZUNG

WIRD DAS GERÄT AUF ANDERE WEISE VERWENDET ALS VOM HERSTELLER BESCHRIEBEN, KANN DIE GERÄTESICHERHEIT BEEINTRÄCHTIGT WERDEN.

UTILISATION

TOUTE UTILISATION DE CET INSTRUMENT QUI N'EST PAS EXPLICITEMENT PRÉVUE PAR LE FABRICANT PEUT ENDOMMAGER LE DISPOSITIF DE PROTECTION DE L'INSTRUMENT.

IMPIEGO

QUALORA QUESTO STRUMENTO VENISSE UTILIZZATO IN MODO DIVERSO DA COME SPECIFICATO DAL PRODUTTORE LA PROZIONE DI SICUREZZA POTREBBE VENIRNE COMPROMESSA.



SERVICE

SERVICING INSTRUCTIONS ARE FOR USE BY SERVICE -TRAINED PERSONNEL ONLY. TO AVOID DANGEROUS ELECTRIC SHOCK, DO NOT PERFORM ANY SERVICING UNLESS QUALIFIED TO DO SO.

SERVICIO

LAS INSTRUCCIONES DE SERVICIO SON PARA USO EXCLUSIVO DEL PERSONAL DE SERVICIO CAPACITADO. PARA EVITAR EL PELIGRO DE DESCARGAS ELÉCTRICAS, NO REALICE NINGÚN SERVICIO A MENOS QUE ESTÉ CAPACITADO PARA HACERIO.

WARTUNG

ANWEISUNGEN FÜR DIE WARTUNG DES GERÄTES GELTEN NUR FÜR GESCHULTES FACHPERSONAL.

ZUR VERMEIDUNG GEFÄHRLICHE, ELEKTRISCHE SCHOCKS, SIND WARTUNGSARBEITEN AUSSCHLIEßLICH VON QUALIFIZIERTEM SERVICEPERSONAL DURCHZUFÜHREN.

ENTRENTIEN

L'EMPLOI DES INSTRUCTIONS D'ENTRETIEN DOIT ÊTRE RÉSERVÉ AU PERSONNEL FORMÉ AUX OPÉRATIONS D'ENTRETIEN. POUR PRÉVENIR UN CHOC ÉLECTRIQUE DANGEREUX, NE PAS EFFECTUER D'ENTRETIEN SI L'ON N'A PAS ÉTÉ QUALIFIÉ POUR CE FAIRE.

ASSISTENZA TECNICA

LE ISTRUZIONI RELATIVE ALL'ASSISTENZA SONO PREVISTE ESCLUSIVAMENTE PER IL PERSONALE OPPORTUNAMENTE ADDESTRATO. PER EVITARE PERICOLOSE SCOSSE ELETTRICHE NON EFFETTUARRE ALCUNA RIPARAZIONE A MENO CHE QUALIFICATI A FARLA.

About This Manual

This instruction book covers the models 8080, 8085, 8163, 8164, 8166, 8173, 8431 Termaline Coaxial Load Resistor.

This instruction book is arranged so that essential information on safety is contained in the front of the book. Reading the Safety Precautions Section before operating the equipment is strongly advised.

The remainder of this Instruction Book is divided into Chapters and Sections. At the beginning of each chapter a general overview will be given, describing the contents of that chapter.

Operation

First time operators should read Chapter 1 - Introduction, Chapter 2 - Theory of Operation, and Chapter 3 - Installation, to get an overview of equipment capabilities and how to install it. An experienced operator can refer to Chapter 4 - Operating Instructions. All instructions necessary to operate the equipment, are contained in this section.

Maintenance

All personnel should be familiar with preventative maintenance found in Chapter 5 - Maintenance. If a failure should occur, the troubleshooting section will aid in isolating and repairing the failure.

Parts

For location of major assemblies or parts refer to the part lists in Chapter 5.

Changes To This Manual

We have made every effort to ensure this manual is accurate at the time of publication. If you should discover any errors., or if you have suggestions for improving this manual, please send your comments to our factory. This manual may be periodically updated, when inquiring about updates to this manual refer to the part number and revision level on the title page.

Table Of Contents

Safety Precautions . . . . . **i**

Warning Statements ii

Caution Statements iii

Safety Statements. iii

About This Manual v

Introduction **1**

Purpose and Function 1

Performance Characteristics and Capabilities 1

Dimensions and Weight 1

Power and Utility Requirements 2

Environmental Requirements 2

Items Furnished. 2

Items Required 2

Tools and Test Equipment 2

Specifications. 3

Theory of Operation **5**

General 5

Installation **7**

General 7

Mounting Location. 7

Operating Instructions **9**

Use and Function of Controls 9

Initial Adjustments 9

Start-Up 9
Normal Operation 9
Operation Under Emergency, Adverse or Abnormal Conditions . . 9
Shutdown 9
Emergency Shutdown 10
Maintenance 11
Cleaning 11
Outside Surface 11
Inspection. 11
Preventive Maintenance. 12
RF Assembly Test 12
DC Resistance 12
Disassembly. 12
RF Connector 12
Reassembly 13
RF Connector 13
Repairs. 13
Customer Service. 13
Storage 14
Shipment 14
RF Connector 14
Replacement Parts List 14

Chapter 1

Introduction

This instruction book is intended for use by operators of the Models 8080, 8085, 8163, 8164, 8166, 8173, and 8431 Termaline Coaxial Load Resistor.

This chapter contains introductory information including product specifications, items supplied, and accessory items available.

Purpose and Function

The Series 8000 Termaline Load Resistors are portable, general purpose 50 ohm coaxial transmission line terminations. They are self-contained units, liquid free and air cooled, requiring no outside power source or additional equipment. They provide accurate, dependable, and practically nonreflective terminations for testing and adjusting transmitters under nonradiating conditions. These loads are useful for the following purposes:

- As a substitute antenna.
- For tuning RF transmitters under nonradiating conditions.
- For making routine tests and adjustments.
- As a substitute for any circuit loading element.
- To measure, with a suitable indicating device, the power output of any coaxially transmitted RF signal within their rating.

Performance Characteristics and Capabilities

Series 8000 dry loads can absorb their individual maximum rated RF power levels continuously and dissipate them harmlessly as heat over their entire frequency range. Because they are dry, they are attitude insensitive and can therefore, with some restrictions, be used in any position. Consult the Specification Sheet, Page 3, for a listing of their individual power ratings, frequency ranges, and VSWR values.

Dimensions and Weight

Consult the Specifications on Page 3 for the size and weight of each load.

Power and Utility Requirements

These loads are passive devices that are self contained and do not require any external source of power or utility to function other than the RF input power.

Environmental Requirements

These loads should be operated in a dust and vibration-free environment. The ambient temperature range should remain between -40°C and +45°C (-40°F and +113°F) for proper operation. Allow at least six inches of clearance around the units to permit an unimpeded access of convection air currents for adequate heat dissipation.

Items Furnished

Series 8000 Loads are normally equipped with a Quick-Change "QC" connector for convenient and easy interchange with other AN type "QC" connectors. Model 8431 has a Small Quick-Change "SQC" connector which is not interchangeable with "QC" types. Consult the Specification Sheet, Page 3, for the connector type normally supplied with each load.

Items Required

The only other item required is a mating connector on the coaxial transmission line to which the load will be connected.

Tools and Test Equipment

Only a screwdriver will be necessary for changing the "QC" connectors. None of these loads are subject to any further disassembly. An ohmmeter or resistance bridge with an accuracy of one percent or better at 50 ohms is useful for checking the resistance value of the RF section assembly.

Specifications

Impedance	50 ohms nominal
Ambient Temperature	-40°C to +45°C (-40°F to +113°F)
Cooling Method	Convection air currents
Operating Position	Any ††

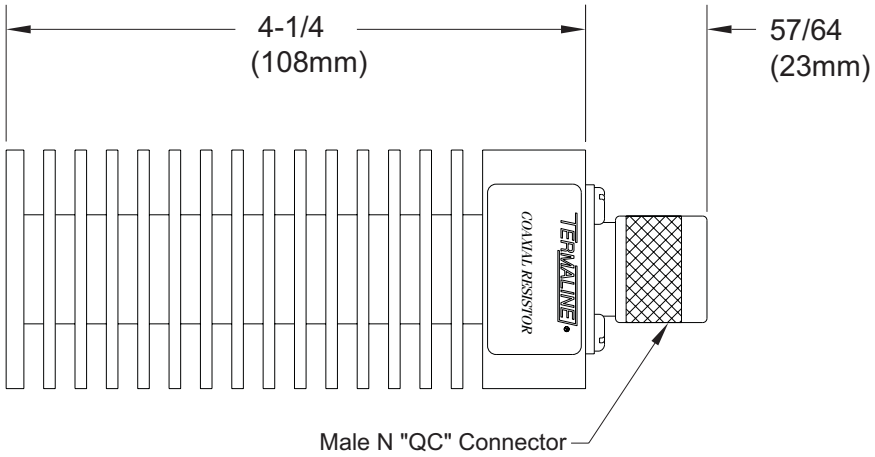
MODEL	MAX. VSWR	CONNS.	MAX. WATTS	FREQ. MHz	SIZE	WT. OZ.
8080	1.1 dc-1000 1.25 1000-3500	N-M†	25	dc-3500	5-9/64"L x 1-1/4"sq (130.6 x 31.8 mm)	9 (225g)
8085	1.1 dc-1000	N-M†	50	dc-3500	5-9/64"L x 1-3/4"sq	15 (425g)
8163	(Similar to Model 8164, see Installation, Chapter 2)					
8164	1.1 dc-1000 1.2 1000-2500	N-F†	100	dc-2400	6-63/64"L x 2-3/4"sq (177.4 x 69.9 mm)	48 (1.36 kg)
8166	1.1 dc-1000 1.2 1000-2500	N-M†	150	dc-2500	7-31/64"L x 4"sq (190 x 101.6 mm)	96 (1.36 kg)
8173	1.1 dc-1000 1.25 1000-2000	N-F†	300	dc-2000	9"L x 9-9/16"H x 5-1/8"W (228.6 x 242.9 x 130.2 mm)	100 (2.84 kg)
8431	1.1 dc-1000	N-F*	500/600	dc-2500	13-7/64"L x 7-1/8"H x 9-1/4"W (333 x 181 x 235 mm)	206 (5.9 kg)

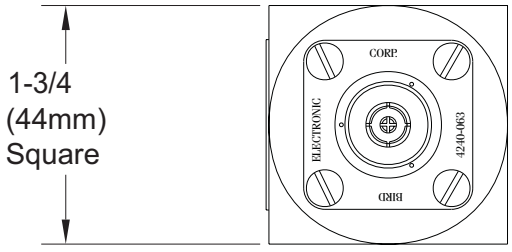
†"QC" Connector

* "SQC" Connector

†† See Text

Figure 1
Model 8085 Outline Drawing





Chapter 2

Theory of Operation

General

The resistive element, in these dry Termaline Loads, is individually selected for its accuracy, and enclosed in a heat sink housing. The housing is specially contoured inside to provide the load with its unusually low reflection characteristics throughout its entire frequency range. The housings for the 25, 50, 100, and 150 Watt models are deeply slotted and painted black with a lusterless finish to improve their heat dissipation. Models 8173 and 8431 are fabricated with sheet metal fins to more efficiently meet their higher heat dissipation requirements.

Chapter 3

Installation

General

These loads may be used for portable operation or fixed installation. The Models 8080, 8085 and 8164 are, in general, light enough to be attached directly to the mating RF connector of another device such as a Bird Thruline Wattmeter or simply set on the workbench like the Models 8166, 8173, and 8431. Attach the load resistor as close as possible to the transmitter's output and use only suitable connectors. Try to connect direct to minimize cable length and avoid the use of adapters as much as possible. The Model 8166, because of its weight, has a provision for special mounting. The housing has four tapped mounting holes on one side. They are 1/2 inch (13 mm) deep for 8-32 screws and arranged in a 6-3/8 x 1-3/4 inch (162 x 44.4 mm) rectangle. The Model 8431, mounted horizontally, will dissipate up to 500 Watts, and mounted vertically, up to 600 Watts. Model 8173 should be operated only in a horizontal position.

The Model 8163 Termaline Load Resistor is identical to the Model 8164 load electrically and physically except for mounting holes. The Model 8163 load resistor has four mounting holes with Heli-Coil stainless steel inserts to accommodate 8-32 mounting screws. These mounting holes are located two on the lower front face of the unit and two on the lower rear face.

Mounting Location

Allow at least six inches of clearance around these units to permit an unimpeded access of natural convection of air for adequate heat dissipation. Place the loads to permit the shortest possible cable length between the unit and the transmitting equipment.

Chapter 4

Operating Instructions

Use and Function of Controls

These loads, being passive devices, have no indicators or operating controls.

Initial Adjustments

No initial adjustments are required other than to connect the load to the RF source by means of a coaxial cable equipped with a suitable matching connector plug.

Start-Up

Connect these loads to the transmitting equipment under test with 50 ohm coaxial cable where necessary (RG-8A/U, RG-9/U, RG-213/U or equal) equipped with a suitable plug which mates with the RF input connector of the load. After the load has been connected to the transmitter, proceed according to the transmitter manufacturer's instructions. When reconnecting the antenna, it may be necessary to slightly readjust the transmitter due to possible differences in VSWR between the load and the antenna system.

Normal Operation

> CAUTION
> Do not operate these loads continuously above their maximum power rating. Load failure will result.

Having no indicators or operating controls, these loads require no special operating procedures or surveillance when the stated performance limits are not exceeded.

Operation Under Emergency, Adverse or Abnormal Conditions

These units will sustain an input moderately greater than their maximum rated power for short periods of time. Such loading must be spaced at reasonable intervals to allow sufficient time for cooling to a safe temperature. Apply the excessive power for a few minutes at most and allow at least a half hour for adequate cooling before reapplying power. Because of the excessive heat generated by overloading, touch the load with caution to avoid painful burns.

Shutdown

These loads, being passive devices, have no operating controls to be turned off. Their source of RF power must be turned off instead.

Emergency Shutdown

> WARNING
> Never attempt to disconnect RF equipment from the transmission line while RF power is being applied. Leaking RF energy is a potential health hazard.

Turn off the RF power at its source.

Chapter 5

Maintenance

Troubleshooting

For corrections requiring repair or replacement of components, refer to the appropriate section for your specific model.

Table 1

PROBLEM	POSSIBLE CAUSE	REMEDY
Excessive overheating	Transmitter power too high	Reduce transmitter power.
	Faulty RF resistor	Return to factory for repair.
High or low dc resistance values	Faulty RF input "QC" connector	Replace.
	Loose "QC" connector	Tighten with screwdriver.
	Faulty RF resistor	Return to factory for repair.

Cleaning

Outside Surface

The outside surface of these loads should be wiped free of dust and dirt when necessary. The principle maintenance required by the operator will be to periodically wipe the accumulated dust and lint off of the radiator fins. Excessive collection of dust and lint on the cooling fins will interfere with efficient dissipation of heat. If the Teflon insulator or metallic contact surfaces of the connector should become dirty or grimy, wipe them off with a soft cloth. Use a contact cleaner that is self-drying and leaves no residue to clean the hard to reach internal portions.

Inspection

With the rugged and simple construction of the loads, periodic inspection will be necessary at only about six-month intervals. Inspection should include the items listed below:

a. Cleanliness - Keep the housing and connector free of grime.

b. Inspect the load for completeness and general condition of the equipment.

c. A Troubleshooting Chart lists the commonly encountered problems, their possible causes and remedies. Use this chart as a guide when analyzing symptoms.

Preventive Maintenance

Due to the basic simplicity of construction, the major requirement for preventive maintenance is to keep the equipment clean, particularly the radiator fins. It is important to maintain the heat transfer efficiency of the cooling fins.

RF Assembly Test

DC Resistance Check the condition of these load resistors by accurate measurement of the dc resistance between the inner and outer conductors of the RF input connector. Use a resistance bridge or ohmmeter with an accuracy of one percent or better at 50 ohms for this purpose. The measured resistance should be a nominal 50 ohms. For greater accuracy the resistance of the load should be carefully checked prior to use at ambient room temperature. This resistance value should be recorded and used as a reference. Subsequent resistance measurements should not deviate more than two percent from this value.

Disassembly

Except for the "QC" connector, "SQC" on Model 8431, there is no disassembly possible with these loads. To change the connector use the following procedure.

RF Connector The connector is a "QC" design which permits easy interchange with the use of only a screwdriver. This process does not interfere with the essential coaxial continuity of the load resistor RF input. For replacement, proceed as follows:

a. Remove the four 8-32 x 5/16 inch pan head machine screws from the corners of the RF connector.

b. Pull the connector straight out of its socket.

Reassembly

RF Connector

To install a new connector, reverse the procedures in paragraph RF Connector, Disassembly. Be sure that the projecting center pin on the connector is carefully engaged and properly seated with the mating socket of the load resistor input.

Repairs

WARNING

This product contains a resistor substrate made of beryllium oxide. This is a potentially toxic ceramic and may be harmful to your health. Beryllia oxide must be disposed of in accordance with the legal statutes dealing with hazardous material.

Do not attempt to repair this unit, but return to BIRD ELECTRONIC CORPORATION.

Due to the unitized nature of the construction, these loads are not field repairable other than replacement of the "QC" connector.

Repairs beyond what is covered in this instruction book will require return of the equipment to Bird Electronic Corporation for service. Please consult the factory.

Customer Service

Any maintenance or service procedure beyond scope of those provided in this section should be referred to a qualified service center. Bird Electronic Corporation maintains complete repair and calibration facilities at the following addresses:

Service Group

U.S.A. Sales and Manufacturing
Bird Electronic Corporation
30303 Aurora Road
Cleveland (Solon), Ohio 44139-2794
Phone: (440) 248-1200
Fax: (440) 248-5426

Sales Offices

For the location of the sales office nearest you, give us a call or visit our Web site at

http://www.bird-electronic.com

Storage No special preparations for storage are necessary other than to cover the equipment to keep out dust and dirt. Store these units in a dry and dust-free environment where the ambient temperature will remain within the -40°C to +45°C (-40°F to +113°F) working range of the loads.

Shipment

RF Connector

Wrap the RF connector with padding and tape securely in place. Pack and brace the load in a suitable shipping container; a corrugated paper box should suffice.

Replacement Parts List

Models 8080, 8085, 8164, 8166, and 8173 use "QC" connectors only.

Available QC Type Connectors

N-Female	4240-062	LT-Female	4240-018
N-Male	4240-063	LT-Male	4240-012
HN-Female	4240-268	C-Female	4240-100
HN-Male	4240-278	C-Male	4240-110
LC-Female	4240-031	UHF-Female	4240-050
LC-Male	4240-025	UHF-Male	4240-179
	7/8" EIA Air Line	4240-002	

Model 8431 uses "SQC" small connectors only.

N-Female	4100-014
M-Male	4100-015
UHF-Female	4100-017
UHF-Male	4100-021
C-Female	4100-045

LIMITED WARRANTY

All products manufactured by Seller are warranted to be free from defects in material and workmanship for a period of one (1) year, unless otherwise specified, from date of shipment and to conform to applicable specifications, drawings, blueprints and/or samples. Seller's sole obligation under these warranties shall be to issue credit, repair or replace any item or part thereof which is proved to be other than as warranted; no allowance shall be made for any labor charges of Buyer for replacement of parts, adjustment or repairs, or any other work, unless such charges are authorized in advance by Seller.

If Seller's products are claimed to be defective in material or workmanship or not to conform to specifications, drawings, blueprints and/or samples, Seller shall, upon prompt notice thereof, either examine the products where they are located or issue shipping instructions for return to Seller (transportation-charges prepaid by Buyer). In the event any of our products are proved to be other than as warranted, transportation costs (cheapest way) to and from Seller's plant, will be borne by Seller and reimbursement or credit will be made for amounts so expended by Buyer. Every such claim for breach of these warranties shall be deemed to be waived by Buyer unless made in writing within ten (10) days from the date of discovery of the defect. The above warranties shall not extend to any products or parts thereof which have been subjected to any misuse or neglect, damaged by accident, rendered defective by reason of improper installation or by the performance of repairs or alterations outside of our plant, and shall not apply to any goods or parts thereof furnished by Buyer or acquired from others at Buyer's request and/or to Buyer's specifications. In addition, Seller's warranties do not extend to the failure of tubes, transistors, fuses and batteries, or to other equipment and parts manufactured by others except to the extent of the original manufacturer's warranty to Seller.

The obligations under the foregoing warranties are limited to the precise terms thereof. These warranties provide exclusive remedies, expressly in lieu of all other remedies including claims for special or consequential damages. SELLER NEITHER MAKES NOR ASSUMES ANY OTHER WARRANTY WHATSOEVER, WHETHER EXPRESS, STATUTORY, OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS, AND NO PERSON IS AUTHORIZED TO ASSUME FOR SELLER ANY OBLIGATION OR LIABILITY NOT STRICTLY IN ACCORDANCE WITH THE FOREGOING.

DECLARATION OF CONFORMITY

Manufacturer: Bird Electronic Corporation
30303 Aurora Road
Cleveland, Ohio 44139-2794

Product: Termaline RF Coaxial Load Resistors

Models:			
	8065	8431	8085
	8166	8431-020	8085A020
	8173	8431-030	
	8173-030	8164	

The undersigned hereby declares, on behalf of Bird Electronic Corporation of Cleveland, Ohio, that the above-referenced product, to which this declaration relates, is in conformity with the provisions of the following standards;

1. European Safety Standard EN 61010-1:1993 - Safety, Group II.

This standard is in accordance with Council Directive 73/23/EEC and 93/68/EEC.

The technical documentation file required by this directive is maintained at the corporate headquarters of Bird Electronic Corporation, 30303 Aurora Road, Cleveland, Ohio.

Ken DeVore
QA/Metrology Manager
Bird Electronic Corporation

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