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ORNL/TM-5645
(Vol. 8 of ORNL/TM-5638)

ORELA Data Acquisition System Hardware

Vol. 8: Instruction Manual for the
Ground Isolation Driver and Receiver Cards on the
Quiet Ground System at ORELA

J. W. Reynolds

OAK RIDGE NATIONAL LABORATORY

OPERATED BY UNION CARBIDE CORPORATION FOR THE ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION

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INSTRUMENTATION AND CONTROLS DIVISION

ORELA DATA ACQUISITION SYSTEM HARDWARE

Vol. 8: Instruction Manual
for the
Ground Isolation Driver and Receiver Cards
on the
Quiet Ground System at ORELA

J. W. Reynolds

NOTICE This document contains information of a preliminary nature. It is subject to revision or correction and therefore does not represent a final report.

OAK RIDGE NATIONAL LABORATORY
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Other volumes in this series of reports on *ORELA Data Acquisition System Hardware* are:

ORNL/TM-5638	Introduction
ORNL/TM-5639 (Vol. 2 of ORNL/TM-5638)	Four-Channel Priority Multiplexers (Q-5036-1, -3, -12 through -25, and -29)
ORNL/TM-5640 (Vol. 3 of ORNL/TM-5638)	Scaler Interfaces (Q-5036-1, -2, -4 through -11, -29, and -30)
ORNL/TM-5641 (Vol. 4 of ORNL/TM-5638)	ORELA Device Controllers (Q-5098)
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ORNL/TM-5644 (Vol. 7 of ORNL/TM-5638)	Instruction Manual for the Multiplexer Channel and Scaler Interface Tester (Q-5130)

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ABSTRACT

This report describes the principle of operation of the ground isolation module, two types of ground isolation at ORELA, and instructions for testing the ground isolation circuit cards.

1. INTRODUCTION

The Ground Isolation Driver and Receiver Tester, ORNL Instrumentation and Controls Division Drawing Series Q-5094, uses a Nuclear Instrument Module (NIM) bin for the ± 12 V dc power supply to the tester. The tester was designed for testing the ground isolation circuit cards, Dwg. Nos. Q-5072-5 through -13 (odd numbers only),* used at ORELA. A Model 1513 Iso-Switch¹ rated at $10^{10} \Omega$ resistive isolation is used on the circuit cards.

The tester generates (at a repetition rate of 9.6 kHz) either a positive or negative going pulse between the levels -3 V and ground or +5 V and ground. The pulses are then supplied to a driver circuit (Dwg. Nos. Q-5072-5, -7, -11, and -13) which is connected by an external cable to a receiver circuit (Dwg. No. Q-5072-9). The output of the circuit under test, either driver or receiver, is then observed with an oscilloscope. The details of pulse generation are given in Sect. 4.

The setup procedure for the variety of isolation card types used at ORELA is given below in Sect. 3 and Table 3. A set of "standard" circuits (an operating card of each type that is reserved for use with the tester) is required to act as a receiver or driver for the circuit under test. A functional description of the controls is contained in Sect. 2.

1.1 How the Iso-Switch Works

The following description of the Iso-Switch is from an Iso-Switch data sheet:²

The heart of the ISO-SWITCH is a fast-response, transformer-coupled, DC-to-DC converter to provide isolation between the input and output circuits. This DC-to-DC converter uses a signal-powered, VHF oscillator which operates at approximately 30 MHz, a coupling transformer, and a detector, whose respective functions in the overall ISO-SWITCH circuit are indicated and explained below:

* See Sect. 5, Engineering Drawings, for the Q-drawings cited in this volume.

ISO-SWITCH BLOCK DIAGRAM

Oscillator ON = Output transistor saturated ON (switch closed)

Oscillator OFF = Output transistor OFF (switch open)

The VHF oscillator converts input signal energy from DC logic levels for ON/OFF to a VHF presence-absence condition for ON/OFF. When the input signal is strong enough to drive the oscillator, the ON condition exists; when the input signal is weak or absent, the OFF condition exists.

The transformer couples VHF energy from the oscillator to the detector and provides DC isolation between input and output. This transformer is specially made to reduce capacitive coupling between input and output, as well.

The detector rectifies the VHF energy and filters the resulting envelope of pulsating DC to minimize VHF ripple, thus deriving a "copy" of the original digital true/false input signal to the oscillator. This derived ON/OFF signal is fed to the ISO-SWITCH output stage to control the ON/OFF condition of the output, which is either a "floating transistor" (as illustrated) or an open collector I.C. power gate, depending on ISO-SWITCH model.

The regulator function is used on transistor output models to standardize switching delays for ON/OFF and to minimize the effects of load current variation upon the ON/OFF delays.

In summary, the Iso-Switch may be considered a very high speed, isolated, all solid state, sensitive relay, with blocking diodes in the coil and contact circuits. That is, when polarized drive power is fed to the oscillator (relay coil), polarized load current is allowed to pass through the saturated transistor output switch (relay contacts).

Other parameters for the Iso-Switch, typical circuits, etc. are contained in Iso-Switch Data Sheets 831, 836, 869, 870A, and 871A. The ground isolation circuits and etched circuit layouts, Dwg. Nos. Q-5072-5 through -13 (odd numbers only), are contained in the Appendix. The odd drawing numbers are schematics that are assembled on even number etched circuit cards; for example, the Dwg. No. Q-5072-5 circuit is assembled on etched circuit card Dwg. No. Q-5072-6.

1.2 Types of Isolation

Two types of isolation are used at ORELA. They are double and single isolation, shown in Figs. 1 and 2 respectively. With double isolation, signals to and from the computer can be shifted in dc level from 0/-3 V to +5/0 V and inverted by the choice of driver and receiver cards (see Table 1). Double isolation requires a master circuit at one end of a twisted pair and a slave circuit at the other end. The master end has a source of power and a load resistor. See Fig. 3 for typical wiring of master and slave circuits.

Table 2 contains a reference drawing, circuit type, etc. for each piece of equipment using the isolators. The circuits for ICS 142-1 and 2¹ are in the Appendix.

2. CONTROLS

Refer to Dwg. No. Q-5094-2 for the panel layout of the Ground Isolation Driver and Receiver Card Tester.

2.1 DC POWER Switch

The DC POWER switch controls the ± 12 V dc from the NIM bin connector to the tester circuits. It is recommended that DC POWER be OFF when changing cards.

Fig. 1. Double isolation for signals (a) to and (b) from the SEL 810B computer.

Fig. 2. Single isolation for signals (a) to and (b) from the SEL 810B multiplexer.

Table 1. Compatible input and output pulses
for any combination of input/output cards

<u>Input</u>		<u>Output</u>	
Pulse	Schematic	Schematic	Pulse
Q-5072-5 (DEC-R)	Q-5072-9A (DEC-R)

Q-5072-7 (DEC-R)
Q-5072-11A (RTL)	Q-5072-9C (RTL)

Q-5072-13A (RTL)
ISC142-1 (TTL)	ISC142-2 (TTL)

Note that driver, Dwg. No. Q-5072-13B and receiver, Dwg. No. Q-5072-9B are used in single isolation systems.

ORNL-DWG 76-15947

*MASTER CIRCUIT
WITH RESISTORS*

*SLAVE CIRCUIT
LESS RESISTORS*

Fig. 3. Master and slave isolator wiring.

Table 2. Isolator cards used at ORELA

Unit	Reference Dwg. No.	Circuit Type ^a	Driver ^b	Receiver ^b
PDP-4	Q-2956-38	Slave	-5	-9A
PDP-9	Q-5072-1 and -3	Slave	-5	-9A
4/9 Link	Q-5072-15	Master	-5	-9A
4/9 MPXR	Q-5036-25	Master	-11A	-9C
MPXR	Q-5036-25	Slave	-13B	-9B
Scaler	Q-5036-30	Master	-11A	-9C
Device Controller	Q-50098-1, -3, and -4	Slave	ISC 142-1	ISC 142-2
Isolated Pulse Generator	Q-5109-1	Slave	ISC 142-1	ISC 142-2

^a Master cards have a resistor to pin A.

^b Dash numbers for circuit are for ORNL I&C Drawing Series Q-5072 in the Appendix.

2.2 +5/+12 Switch

This switch selects either +5 V dc or +12 V dc for the experimenter voltage on pin B of the driver and receiver cards. See Table 3 for setting by circuit number.

2.3 Drive Pulse Connector

The Drive Pulse is a coaxial connector output used to trigger an oscilloscope. The dc levels of the output pulses are 0 and -3 V or 0 and +5 V. The Drive Pulse amplitude and polarity are selected by the DRIVE PULSE Selector switch. The width of the drive pulse can be adjusted by using the top potentiometer on the monostable multivibrator module³ (R302) in location B2.

Table 3. Tester settings

Test Circuit			Master Switch	Standard Circuit			Drive ^a Selector	+5/+12	Driver Output	Receiver Output
Location	Type	Type		Location						
A2	-5	M ^b	DRVR	S	-9A	A4	0	--	+	0
		S	RCVR	M			-		0	-
A2	-7	M	DRVR	S	-9A	A4	0	--	+	0
		S	RCVR	M			-		0	-
A4	-9A	M	RCVR	S	-5	A2	0	--	+	0
		S	DRVR	M			-		0	-
A4	-9B	S	OFF	-	TTL ^c	A2	+	+5	+5	+
						0			0
A4	-9C	M	RCVR	S	-11A	A2	+	+5	+	+
						0		0	0
A2	-11A ^d	M	DRVR	S	-9C	A4	+	+12	+	+
						0		0	0
A2	-13A ^d	M	DRVR	S	-9C	A4	+	+12	+	+
		S	RCVR	M			0		0	0
A2	-13B ^d	S	RCVR	-	TERM ^e	A4	+	+12	+	+
						0		0	0
A2	-1 ^e	S	DRVR	M	-9C	A4	+	+5	+	+
						0		0	0	
A4	-2 ^e	S	RCVR	M	-11A	A2	+	+12	+	+
						0		0	0	

^aThe opposite polarity pulse will invert both driver and receiver output.

^bM and S denote master and slave circuit respectively.

^cSee Dwg. No. Q-5094-1 for circuit.

^dRemove signal end of 110 terminating resistors before checking.

^eIso-Switch Corporation No. ISC 142-X. Use 18- to 36-pin adapter card.

2.4 DRIVE SELECTOR Switch

A four-position switch selects the pulse polarity and amplitude: 0 to +5 V, +5 to 0 V, -3 to 0 V, or 0 to -3 V. The pulse is routed to the DRIVE PULSE output and to the five inputs of the driver circuit card (location A2). The positions of the DRIVE SELECTOR switch are given in Table 3 for the Drawing Series Q-5072 schematics listed in the Appendix.

2.5 MASTER Switch

A three-position switch grounds the driver end, the receiver end, or neither side of the twisted pairs in the DRIVER, RECEIVER, and OFF positions respectively. The MASTER switch settings are given in Table 3 for the schematics listed in the Appendix.

2.6 Outputs

The output test points are used to monitor the output waveforms of the circuit under test. The top row of test points are receiver outputs; the bottom row are driver outputs.

3. TEST OPERATION

- (1) Turn the DC POWER OFF.
- (2) Place the circuit to be tested in slot A2 or A4 per test circuit column of Table 3. Note master- and slave-type circuits.
- (3) A standard circuit is selected and placed in slot A4 or A2 per standard circuit column of Table 3. Note master- and slave-type circuits.
- (4) Set the MASTER switch per master switch column of Table 3.
- (5) Set the DRIVE SELECTOR switch per drive selector column of Table 3.
- (6) Set the +5/+12 switch per column of Table 3.
- (7) Recheck settings. Turn DC POWER ON.
- (8) Trigger oscilloscope with DRIVE PULSE. For a Tektronix 454A, set as follows: TRIGGER - CHAN 1 ONLY

MODE - ALT

A TRIGGERING - Positive slope (Negative slope for Dwg. Nos. Q-5072-5, -9A and -9B); INT Source; dc Coupling; adjust LEVEL as required.

CH1 - 2 V/cm; dc input; adjust the ground level for approximately mid-scale.

(9) Monitor the receiver OUTPUTS or the driver OUTPUTS on CH2 of a 454A oscilloscope with a deflection amplitude of 2 V/cm or 5 V/cm respectively. Adjust the ground level for 3 cm below mid-scale.

4. TESTER THEORY OF OPERATION

An R405³ oscillator module, see Dwg. No. Q-5094-1, generates a 100-nsec-wide positive going pulse at a repetition rate of 9.6 kHz. This pulse triggers an R302 one-shot module. The R302 output is the $\overset{\circ}{\text{—}}\text{—}\text{—}$ drive pulse; it is inverted by an R107 module to form the $\overset{\circ}{\text{—}}\text{—}\text{—}$ drive pulse, and is inverted and shifted in dc level by a W603 module to form the $\overset{+}{\text{—}}\text{—}\text{—}$ drive pulse. The output of the R107 also feeds a W603 module which forms the $\overset{+}{\text{—}}\text{—}\text{—}$ drive pulse. The width of the R302 output pulse can be adjusted from 400 to 4000 nsec by a potentiometer on the circuit card.

The circuits for a terminator card used to test Dwg. No. Q-5072-13B and a TTL driver card used to test Dwg. No. Q-5072-9B are given on Dwg. No. Q-5094-1.

5. ENGINEERING DRAWINGS

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Q-5072-7	14
Q-5072-9A	15
Q-5072-9B	16
Q-5072-9C	17
Q-5072-11A	18
Q-5072-13A	19
Q-5072-13B	20
Q-5094-1	21
Q-5094-2	22

PDP-9/BIOS INTERFACE

NOTES:

1. C_S , R_T & R_S are optional components for increasing rise time, and eliminating ringing on cables.
2. OUT+ and OUT- are wired with twisted pairs to the receiver (Q-5072-9) IN+ and IN- respectively.

CKT	IN	OUT+	OUT-
1	D	E	F
2	H	J	K
3	L	M	N
4	P	R	S
5	T	U	V

PDP-9 $C_S = 180 \mu\text{mf}$ PDP-4 $C_S = 180 \mu\text{mf}$ **Etched Circuit Q-5072-6**

COORDINATOR J. W. Reynolds

OAK RIDGE NATIONAL LABORATORY
INSTRUMENTATION AND CONTROLS DIVISIONORELA PDP-9/BIOS INTERFACE
GND. ISOLATING DRIVER
O TO -3 INPUT

7-1-71 2 680Ω was 200Ω pot JWR

5-11-71 1 Add bypass cap & 27K base resistor JWR

DATE NO. REVISION BY

DESIGN J. W. Reynolds DRAWN J. W. Reynolds DATE 9-17-70

ACCEPTED

J. W. Reynolds

APPROVED

J. W. Reynolds

Q-5072-5 R2

SPECIALTY COATINGS, INC. IN 14-2

CKT	IN	OUT+	OUT-
1	D	E	F
2	H	J	K
3	L	M	N
4	P	R	S
5	T	U	V

NOTES:

1. R_T & C_S are optional components for increasing rise time, and eliminating ringing on cables.
2. OUT+ and OUT- are wired with twisted pairs to the receiver (Q-5072-9) IN+ and IN- respectively.

Etched Circuit Q-5072-B

COORDINATOR J. W. Reynolds

OAK RIDGE NATIONAL LABORATORY
INSTRUMENTATION AND CONTROLS DIVISIONORELA PDP-9/810B INTERFACE
GND. ISOLATING DRIVER
- 3 TO 0 INPUT

DESIGN	NO.	REVISION	BY
9-17-71	2	680 Ω was 200 Ω pot	JWR
5-11-71	1	Add bypass cap. & 27K base resis.	JWR
DATE	NO.	REVISION	BY
DESIGN	J. W. Reynolds	DRAWN	9-17-70

ACCEPTED

APPROVED

Q-5072-7 R2

GENERALTY COATING, INC. JAN 12-70

CKT	IN+	IN-	OUT
1	E	F	D
2	J	K	H
3	M	N	L
4	R	S	P
5	U	V	T

NOTES:

1. IN+ and IN- are wired with twisted pairs to a driver (Q-5072-5 or 7) OUT+ and OUT- respectively.
2. R0 15K in PDP-9
1.1K in PDP-4

Etched Circuit Q-5072-10

COORDINATOR J.W. Reynolds

OAK RIDGE NATIONAL LABORATORY
INSTRUMENTATION AND CONTROLS DIVISIONORELA PDP-9/810B INTERFACE
GND. ISOLATING RECEIVER
DUAL ISOLATOR 0 TO-3 OUT

9-1-71	2	680Ω was 200Ω pot.	JWR
5-11-71	1	Add bypass capacitors	JWR
DATE	NO.	REVISION	BY
DESIGN	J. W. Reynolds	DRAWN	Shirley
DATE	9-17-70	ACCEPTED	J. W. Reynolds
		APPROVED	J. W. Reynolds, Jr.

Q-5072-9A R2

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CKT	IN +	IN -	OUT +
1	E	F	D
2	J	K	H
3	M	N	L
4	R	S	P
5	U	V	T

Etched Circuit Q-5072-10

COORDINATOR J.W. Reynolds			
OAK RIDGE NATIONAL LABORATORY INSTRUMENTATION AND CONTROLS DIVISION			
ORELA PDP-9/810B INTERFACE GROUND ISOLATING RECEIVER SINGLE ISOLATOR 0 to +3 OUT			
8-23-71	1	Add 820 Ω resistor	JWR
DATE	NO.	REVISION	BY
DESIGN	DRAWN		DATE
J.W. Reynolds	WFG		7-14-71
ACCEPTED		APPROVED	
J.W. Reynolds		J.W. Reynolds	
		Q-5072-9B _{R1}	

SPECIALTY CONTROLS, INC. 216 12-60

CKT	IN+	IN-	OUT
1	E	F	D
2	J	K	H
3	M	N	L
4	R	S	P
5	U	V	T

NOTES:

1. IN+ and IN- are wired with twisted pairs to a driver (Q-5072-5 or 7) OUT+ and OUT- respectively.

Etched Circuit Q-5072-10

COORDINATOR	J.W. Reynolds
OAK RIDGE NATIONAL LABORATORY INSTRUMENTATION AND CONTROLS DIVISION	
ORELA PDP-9/810B INTERFACE GND. ISOLATING RECEIVER DUAL ISOLATOR 0 TO +3 OUT	
DATE	NO.
DESIGN	J. W. Reynolds
DRAWN	J. W. Reynolds
DATE	2-18-72
ACCEPTED	J. W. Reynolds
APPROVED	J. W. Reynolds
Q-5072-9C R0	

SPECIALTY COATINGS, INC. 1M 12-80

NOTES:

1. C_S , R_T & R_S are optional components for increasing rise time and eliminating ringing on cables.
2. OUT+ and OUT- are wired with twisted pairs to the receiver (Q-5072-9A) IN+ and IN- respectively.

CKT	IN	OUT+	OUT-
1	D	E	F
2	H	J	K
3	L	M	N
4	P	R	S
5	T	U	V

P.C. Board Dwg. Q-5072-12

COORDINATOR J.W. Reynolds

OAK RIDGE NATIONAL LABORATORY
INSTRUMENTATION AND CONTROLS DIVISIONGROUND ISOLATING DRIVER
DOUBLE ISOLATOR - 0 to +3 INPUT

1-2-72	2	Dwg was -11, 680 res. was pot.	JSW
5-11-71	1	Add bypass cap. & 27K base resistor	JSW
DATE	NO.	REVISION	BY

DESIGN	DRAWN J.W. Reynolds	DATE 1-5-70	ACCEPTED J.W. Reynolds	APPROVED J.W. Reynolds	Q-5072-11A R2
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FORMALTY CONTROL, REV. 12-82

CKT	IN	OUT+	OUT-
1	D	E	F
2	H	J	K
3	L	M	N
4	P	R	S
5	T	U	V

OUT+ and OUT- are wired with twisted pairs to the termination.

Etched Circuit Board Dwg. Q-5072-14

COORDINATOR *J.W. Reynolds*

OAK RIDGE NATIONAL LABORATORY
INSTRUMENTATION AND CONTROLS DIVISION

GROUND ISOLATING DRIVER
SINGLE ISOLATOR +3% 0 INPUT

5172	1	TERM. WAS 150Ω EACH	<i>me</i>
DATE	NO.	REVISION	BY
DESIGN		DRAWN <i>St. B. King</i>	DATE 1-27-72

ACCEPTED *J. W. Reynolds* APPROVED *J. W. Reynolds* Q-5072-13B R1

SPECIALTY COATINGS, INC. 1M 12-69

		<p>NOTES:</p> <ol style="list-style-type: none"> 1. Material to be 3.2 mm (.125) inch thick CB-76-F ALUMINUM anodizing sheet. Metal-photo processed with satin finish. 2. Image toning shall be employed. Finished panel shall have jet black lettering and clear anodized aluminum background. 3. Direction of lines due to mill finishing shall be parallel to the MINOR dimension. 4. Recommended procedure is to punch or drill all holes from front side of panel and deburr holes on the back side of panel. 5. Panel must be flat within plus or minus .38 mm (.015). 6. Finish must be free of scratches, burrs, and sharp edges on both sides of panel. 7. A Mylar film negative will be supplied by Company for direct copying. 8. Maximum tolerance of punched holes to be plus or minus .13mm (.005). 9. Trim panel to dimensions shown by machining (SHEARING WILL NOT BE ACCEPTED) and locate and drill holes marked ⊕ and ⊗ per ORNL Dwg. Q-2800-6. 10. Maximum tolerance on location of holes marked as below to be .38 mm (.015) from indicated centers. <p>⊗ .172" Dia. ⊕ .250" Dia. ⊕ 3/8" Dee</p>
<p>COORDINATOR <i>J.W. Reynolds</i></p> <p>OAK RIDGE NATIONAL LABORATORY INSTRUMENTATION AND CONTROLS DIVISION</p> <p>ORELA DIGITAL DATA GROUND ISOLATION DRVR & RCVR TESTER PANEL</p>		<p>1 1 DRIVER MONITOR POINTS ADDED <i>JWR</i></p> <p>DATE NO. REVISION BY</p> <p>DESIGN DRAWN DATE ACCEPTED APPROVED </p> <p><i>J.W. REYNOLDS</i> <i>W.F.G.</i> <i>2-11-71</i> <i>JWR</i> <i>JWR</i> <i>Q-5094-2 R1</i></p>

REFERENCES

1. Iso-Switch Corporation, 2955 Randolph Street, Costa Mesa, California 92626.
2. Iso-Switch Corporation, *Data Sheet 870A*, p. 2, March 1969.
3. Digital Equipment Corporation, see *DEC Logic Handbook*, C-105, 1968 ed.

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APPENDIX

ISO-SWITCH	MODEL ISC-142-1 ISOLATED DIGITAL LINE DRIVER COUPLER LEVEL SHIFT CARD SPECIFICATIONS (DEC COMPATIBLE) 2955 RANDOLPH STREET, BOSTON, MASSACHUSETTS 02114

K CORPORATION		

GENERAL

Iso-Switches are high-speed isolating digital data couplers. They are directly compatible with DTL and TTL circuits and provide complete flexibility for adapting these signals to non-compatible and/or remote loads. They are particularly useful for transmitting and receiving digital data at high bit rates over long lines through electrically noisy environments.

DESCRIPTION

This ISC-142-1 provides four independent, isolated digital line driver circuits. Each circuit consists of one model M223 Iso-Switch and an associated 100 ohm pull-up resistor. The card is double-clad glass epoxy, mates with a 36 contact edge-on connector, and is electrically and mechanically compatible with the DEC (Digital Equipment Corp.) families of logic modules. Pins A, B, C and A2, B2, and C2 (the standard DEC power bus pins) are not used. The ISC-142-1 is normally used in conjunction with the ISC-142-2 isolated digital line receiver card to achieve high data rates with complete electrical isolation of transmitting station A from the cable, and the cable from receiving station B.

INPUT

Each switch input is floating, polarized to permit current flow in only one direction, and is the equivalent of 5 DTL loads (approximately 800 ohms), but will accept signals as large as 15V without damage. With 4.0V input signal, unit will draw about 5ma. When driven by DTL or TTL circuits, the drive unit should be connected as a current sink per sketch of typical IC input to Iso-Switch above.

OUTPUT

Each Iso-Switch output is floating (completely isolated from input ground and power), is polarized, and will switch loads up to 35V max and 100 ma max. In the usual transmitter/receiver configuration (see reverse side) a 10 volt cable supply is used. (For higher power switching capability up to 35V 150ma and up to 60V 100ma, contact factory.)

NOTE: Resistors R1-2-3-4 are wirewound components (because of power dissipation) with inherent "ringing" on fast-switching signals. Because of the ringing, these are generally not suitable for driving fast logic circuits directly. Output from these resistors should be used only when driving a transmission cable or other capacitive load.

ISOLATION OF INPUT/OUTPUT/GROUND--EACH MODULE ON BOARD

Voltage 500V Resistance 10^{10} ohm Capacitance 10pf

SWITCHING SPEED

With 4.0V signal in, and with the output switching 10V and 100ma: OFF to ON will be ≤ 300 n sec and ON to OFF will be ≤ 300 n sec.

DETAILED MODULE SPECS

See Data Sheet 871 ref Iso-Switch Model M223.

PHYSICAL SPECIFICATIONS

ISC-142-1 contains 4 independent Iso-Switches Model M223 and four associated 100 ohm 1 1/2 watt pull-up resistors.

Board is 2-7/16" wide x 5-1/2" long (including handle) and is compatible with DEC (Digital Equipment Corp.) module line. One card slot is required.

Board material is .062" glass epoxy G10, with 2 oz. copper clad.

Mates with DEC 36-pin connector blocks# H-803 and H-807.

Operating temperature 0°C to +71°C. Storage temperature -40°C to +85°C.

PIN CONNECTIONS & BLOCK DIAGRAM R1-2-3-4=100ohm, 1 1/2 watt wire-wound.
R5 Through 16 and Z1-2-3-4 void as delivered.

MODEL ISC-142-1 ISOLATED DIGITAL
LINE DRIVER COUPLER LEVEL SHIFT CARD
SPECIFICATIONS (DEC COMPATIBLE)
CONTINUED

ISC-142-1 USED AS DIGITAL LINE DRIVER (in conjunction with ISC-142-2 Digital Line Receiver) Isolates input and output systems from the cable and provides "universal interface" flexibility at each end of the cable.

ISC-142-1 USED AS LEVEL SHIFTER/COUPLER (See Catalog 870).

The ISC-142-1 is delivered as a standard item with R1-2-3-4=100 ohms for use as a line driver with 10V cable supply. Customer can modify board to other resistors, or factory will quote on special dash numbers with appropriate documentation.

PRICE PER BOARD (4 isolated line drivers):

1-10 = \$136.75 11-25 = \$121.35 26-75 = \$108.25 76-200 = \$105.50

DELIVERY: Stock to 3 weeks.

TERMS: FOB Costa Mesa, California. 1/2% 20 Days Net 30. Prices and specifications subject to change without notice.

ISO-SWITCH®

2955 RANDOLPH STREET, COSTA MESA, CALIFORNIA 92626 TELEPHONE (714) 540-3244

ISO-SWITCH **K CORPORATION**

MODEL ISC-142-2 ISOLATED DIGITAL
LINE RECEIVER/COUPLER/LEVEL SHIFT
CARD SPECIFICATIONS (DEC COMPATIBLE)

GENERAL- Iso-Switches are high-speed isolating digital data couplers. They are directly compatible with DTL and TTL circuits and provide complete flexibility for adapting these signals to non-compatible and/or remote loads. They are particularly useful for transmitting and receiving digital data at high bit rates over long lines through electrically noisy environments.

DESCRIPTION- The ISC-142-2 provides four independent, isolated digital line receiver circuits. Each circuit consists of one model M213 Iso-Switch and associated resistors and zener diode. The card is double-clad glass epoxy, mates with a 36 contact edge-on connector, and is electrically and mechanically compatible with the DEC (Digital Equipment Corp.) families of logic modules. Pins A, B, C and A2, B2, and C2 (the standard DEC power bus pins) are not used.

The ISC-142-2 is normally used in conjunction with the ISC-142-1 isolated digital line driver card to achieve high data rates with complete electrical isolation of transmitter station A from the cable, and the cable from the receiving station B.

INPUT- Each switch input is floating, polarized to permit current flow in only one direction, and is the equivalent of 5 DTL loads (approximately 800 ohms). Each input is clamped with a 5.1V zener diode in parallel with a 510 ohm cable terminating resistor. (Caution! There is no series current limiting resistor in series with the zener, since it is anticipated that this card will be used in conjunction with the ISC-142-1 Digital Line Driver Card, whose pull-up resistors R1-2-3-4 are in series with the zener diode at receiver input via the cable.) (See applic. note.)

OUTPUT- Each Iso-Switch output is floating (completely isolated from input ground and power), is polarized, and will switch loads up to 35V max and 50 ma max. Normally, (see reverse side) the output of each receiver is tied to the 5V power supply of the DTL/TTL circuitry at the receiver end of the cable. If a higher voltage supply is used, it may be necessary to change the 510 ohm 1/4 watt resistor. If desired, factory will provide a new dash number for other pull-up resistors, along with appropriate documentation. (For higher power switching capability up to 35V 150 ma and up to 60V 100ma, contact factory.)

ISOLATION OF INPUT/OUTPUT/GROUND--EACH MODULE ON BOARD

Voltage 500V

Resistance 10^{10} ohm

Capacitance 10pF

Z-1346 B

SWITCHING SPEED- With 4.0V signal in, and with the output switching 10V and 50ma: OFF to ON will be 300 n sec and ON to OFF will be 300 n sec.

DETAILED MODULE SPECS - See Data Sheet 871, ref Iso-Switch Model M213.

PHYSICAL SPECIFICATIONS- ISC-142-2 contains four independent Iso-Switches Model M213/M213, 8 associated 510 ohm 1/4 watt carbon resistors, and 4 zener diodes 5.1V.

Board is 2-7/16" wide x 5-1/2" long (including handle) and is compatible with DEC (Digital Equipment Corp.) module line. One card slot is required. Board material is .062" glass epoxy G10, with 2 oz. copper clad. Mates with DEC 36-pin connector blocks# H-803 and H-807. Operating temperature 0°C to +71°C. Storage temperature -40°C to +85°C.

PIN CONNECTIONS & BLOCK DIAGRAM R1-2-3-4-5-6-7-8 void as delivered.

R9-10-11-12-13-14-15-16=510 ohm 1/4 watt carbon.

Z1-2-3-4=5.1V, 400 mw zener type 1N 751 or equal.

ISC-142-2 USED AS DIGITAL LINE RECEIVER (in conjunction with ISC-142-1 Digital Line Driver). Isolates input and output systems from the cable and provides "universal interface" flexibility at each end of the cable.

See diagram on next page.

MODEL ISC-142-2 ISOLATED DIGITAL
LINE RECEIVER COUPLER LEVEL SHIFT
CARD SPECIFICATIONS (DEC COMPATIBLE)
CONTINUED

ISC-142-2 USED AS LEVEL SHIFTER COUPLER Into System B at Far End of Cable. As mentioned in "Output" paragraph above, the receiver typically drives DTL or TTL circuitry, and the 510 ohm 1/4 watt pull-up resistor R9, etc, is an appropriate value. If higher voltage or currents are being switched at the System B interface, customer can modify board to other resistors, or factory will quote on special dash numbers with appropriate documentation. (See Catalog 870).

PRICE PER BOARD (4 Isolated Line Receivers).

1-10 = \$131.45 11-25 = \$116.85 26-75 = \$103.75 76-200 = \$101.20

DELIVERY: Stock to 3 weeks.

TERMS: FOB Costa Mesa, Calif. 1/2% 20 Days Net 30. Prices and specifications subject to change without notice.

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ORNL/TM-5645
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