Hays Cleveland
Div. of UniControl Inc.

Series 7000
Manual/Auto Station
with
Analog Input and Analog Output
(Ratio Function)

Instruction Manual 7246.01

This manual includes the following models:

7261-110-00, 7261-120-00, 7261-210-00, 7261-220-00
7271-110-00, 7271-120-00, 7271-210-00, 7271-220-00

INSTRUCTION MANUAL 7246.01
M/A Station with Analog In/Analog Out

Instruction Manual ED - 7246.01

SAFETY WARNINGS

(Safety symbols and terminology per ANSI Z21.)

Failure to comply in full with the following safety requirements can result in equipment damage and personal injury/death.

1. Read the entire manual to become familiar with the use and operation of this device.
2. Only qualified personnel should attempt to install, wire, commission, startup, service or operate this device.
3. This device is not suitable for use in an explosive ambient atmosphere.
4. Before working on this device, be sure that you understand the processes affected by this device completely.
5. Before working on this device, be sure that any process affected by this device is secure and safe for servicing.
6. Take appropriate precautions to avoid electric shock when working with this device near water.
7. Exercise caution while wiring or working on this device. Multiple voltage sources may be present: take appropriate precautions to avoid electric shock.

Hays Cleveland
Division of UniControl Inc.
Controls & Instrumentation Products

1111 Brookpark Road • Cleveland OH 44109 • (216)398-4414 • Fax (216)398-8558
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CLEVELAND MANUAL/AUTO STATIONS
RATIO FUNCTION
SERIES 7000
INSTRUCTION MANUAL

CONTENTS

CLEVELAND MANUAL/AUTO STATIONS
RATIO FUNCTION
SERIES 7000

1 INTRODUCTION

1.1 Description

The Cleveland 7000 Ratio Station is one of a series of panel mounted electronic instruments designed to generate or condition standard process control signals. In the automatic mode, the station's output is the input signal multiplied by a constant factor selected by the operator. In the manual mode, the output is a locally generated signal, manually adjusted by the operator.

1.2 Specifications

POWER REQUIREMENT:	120 vac nominal, 105-130 vac 50-60 hz., .04a.
ISOLATION:	300 v maximum, lines to case
OUTPUT SIGNAL RANGE:	1-5 v or 4-20 ma dc
OUTPUT LOAD LIMITS:	250 ohms minimum for 1-5 v 750 ohms maximum for 4-20 ma
INPUT SIGNAL RANGE:	1-5 v or 4-20 ma dc
INPUT IMPEDANCE:	100,000 ohms for 1-5 v 250 ohms for 4-20 ma dc
RATIO RANGE:	X0 to X10
RATIO SCALES:	Linear: 0-10, Square Root: 0-3.3
AUXILIARY METER RANGE:	1-5 v or 4-20 ma dc
AUXILIARY METER IMPEDANCE:	20,000 ohms for 1-5 v 250 ohms for 4-20 ma
AUXILIARY METER ISOLATION:	50 v maximum, meter terminals to any other signal terminal
AMBIENT TEMPERATURE RANGE:	5 to 50° C. 41 to 122° F.
STABILITY VS. TIME:	Less than 2% f. s. change in output per week, non-accumulative
STABILITY VS. LINE VOLTAGE:	Less than 1% change in output for a 10% change in line voltage

1.3 Model Numbering System

The Station is described by its model number as indicated below. GG will normally be 00 unless the station contains a special feature, which has been assigned a GG number by the factory. Special features are described in an instruction manual supplement. Name plates containing the model number are located on the station chassis and on the housing.

7 A B C — D E F — GG

A.	Type:	
	Manual/Auto Station	2
B.	Function:	
	Ratio — Narrow (0 to .9)	6
	Ratio — Narrow (0 to .5)	7
C.	Power Supply:	
	Integral	1
D.	Input:	
	4-20 ma dc	1
	1-5 v dc	2
E.	Output:	
	4-20 ma dc	1
	1-5 v dc	2
	Switched	3
F.	Auxiliary Meter:	
	None	0
	4-20 ma dc	1
	1-5 v dc	2
GG.	Special Feature:	
	None	00

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2 INSTALLATION

2.1 Mechanical

Panel cut outs may be made by referring to figure 1. The station may then be installed as shown in figure 1. CAUTION: While the station is ruggedly constructed, meters are inherently susceptable to damage from rough handling or severe vibration. Do not install the station in a panel until the panel machining has been completed.

2.2 Electrical Inspection

If desired, the following bench test may be performed prior to installation to assure that the station is working properly.

2.2.1 Connect 120 vac to terminals 1 and 2.

2.2.2 Connect a variable signal source of the proper range to input terminals 10 (+) and 11. The signal source can be any variable power supply that will furnish 20 ma at 5 v.

2.2.3 Switch the manual-automatic switch to AUTO.

2.2.4 On current output models only, short terminal 4 to terminal 5.

2.2.5 Set the RATIO knob at 1 on the ratio scale.

2.2.6 Vary the input signal from 0 to 100% and see that the OUTPUT meter indicates an output signal that is approximately equal to the input signal.

2.2.7 Set the RATIO knob at 2 on the ratio scale.

2.2.8 Vary the input signal from 0 to 50% and see that the OUTPUT meter indicates an output signal that is approximately 2 times the input signal.

2.2.9 Press and hold the BAL button, seeing that the OUTPUT meter can be varied by turning the MAN knob.

2.2.10 Switch the manual-automatic switch to MAN.

2.2.11 See that the output can be varied from 0 to 100% by turning the MAN knob from fully counterclockwise to fully clockwise.

2.2.12 Press and hold the BAL button, seeing that the OUTPUT meter now indicates the input signal level.

2.3 Field Wiring

Power line voltage must not be applied to any terminals other than 1 and 2 or serious damage may result. The optional auxiliary meter is isolated from the input — output circuitry allowing it to be connected to any circuit without additional isolation.

2.3.1 Current Output models 72XX-X1X-00

On these models, the negative input and negative output terminals are at different electrical potentials and must not be externally interconnected. Typical field connections are shown in figure 3.

2.3.2 Voltage Output models 72XX-X2X-00

On these models, the negative input and negative output terminals are directly connected internally. Typical field connections are shown in figure 4.

3 OPERATION

The station has two operator selected modes of operation, manual or automatic, with means provided for transferring between the two modes without disturbing the station's output (bumpless transfer). There are no internal operator adjustments and no regular maintenance is required.

3.1 Manual Mode

When the manual-automatic switch is in the MAN position, the operator controls the station output entirely by positioning the 10 turn MAN knob. The output, read on the OUTPUT meter, is increased by turning the knob in a clockwise direction. The knob has no hard stops at 0 or 100% output, but turning it beyond these limits will neither change the output nor damage the station. In the manual mode, turning the RATIO knob will not affect the station output.

3.2 Automatic Mode

When the manual-automatic switch is in the AUTO position, the station multiplies an input signal by an amount selected on the RATIO dial. The multiplied input signal appears at the output and is displayed on the OUTPUT meter. For example, if the input signal is 30% of full range (2.2 v or 8.8 ma) and the RATIO knob is set at 2, the station output will be 2 X 30% or 60% (4.4 v or 13.6 ma).

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The RATIO control has a dual knob, the large section being a single turn course adjustment and the small section, a 10 turn fine adjustment. The small knob has no hard stops, but turning it beyond its effective limits will neither change the output nor damage the control. In the automatic mode, turning the MAN knob will not affect the station output.

3.3 Transferring

For a bumpless transfer from one mode to the other, select the procedures below which best fit the requirements of the control system.

3.3.1 Manual to automatic transfer, input adjustment method:

Observe the OUTPUT meter reading. Push the BAL button and remotely adjust the input signal so that the meter reads the same as when the button is released. Release the button and switch the manual-automatic switch to AUTO.

3.3.2 Manual to automatic transfer, ratio adjustment method:

Observe the OUTPUT meter reading. Push the BAL button and adjust the RATIO dial until the meter reads the same as when the button is released. Release the button and switch the manual-automatic switch to AUTO.

3.3.3 Manual to automatic transfer, output adjustment method:

Push the BAL button and observe the OUTPUT meter reading. Release the button and adjust the MAN knob until the meter reads the same as when the button is depressed. Switch the manual-automatic switch to AUTO.

3.3.4 Automatic to Manual Transfer:

Observe the OUTPUT meter reading. Push the BAL button. While it is depressed, adjust the MAN knob until the meter reads the same as when the button is released. Release the button and switch the manual-automatic switch to MAN.

4 CIRCUITRY

4.1 Power Supply

The signal circuitry is isolated from the line voltage on terminals 1 and 2 by step down transformer T1. See figures 6 and 7. The output of T1 is rectified to ± 28 v.d.c. by bridge rectifier BR1. Current from the +28 v. supply is supplied to the positive current output terminal and to transistor Q3 through R18 for voltage output models or through the output load for current output models. Current is also supplied through resistors R23 and R22 to 13 v. regulator diodes D3 and D2 respectively. Power from the 13 v. supplies is used to operate amplifiers A1, A2 and A3, and to supply current through R24 to the 6.2 v. reference regulator D4. Current from the 6.2 v. supply passes through R25 and R29 to the manual potentiometer R31. R29 is adjusted for 5 v. at R31 to establish the maximum manual output signal. Current is also supplied to potentiometer R27 through R26. The wiper of R27 and therefore the output (10) of voltage follower A1, is set for 1 v. The output of A1 establishes the elevated zero reference for output meter M1 and the minimum output level for manual potentiometer R31.

4.2 Automatic Mode

In the automatic mode, the input (automatic) signal from terminals 10 and 11 appear across the RATIO potentiometer R30. The wiper of R30 is connected, through R5 to the input (5) of X 10 multiplier A2. Thus, the input signal is first divided by an amount selected by the operator and then multiplied by A2. For example, if R30 is set at mid range ("5" on the linear ratio dial) a 10% input signal is divided by .5 by R30 and then multiplied by 10 by A2, resulting in an output of 50% or 5 times the input signal. If the RATIO dial is set at "6" the output of A2 will be 6 times the input signal, etc.

The output of A2 is then connected to the input of A3 through manual-automatic switch S1 and R14. A3 will always maintain, by negative feedback, a voltage at input A3-4 equal to the voltage applied to A3-5. Thus if 2 v. is present at A3-5, the voltage present at the output, A3-10, will be the voltage required to turn on Q3 sufficiently to produce 2 v. at the emitter of Q3. This voltage is then fed back through R15 to A3-4, making the two inputs equal in voltage.

On voltage output models, this voltage is also present at output terminal 6. R19 is not used. On current output models, the voltage present at the emitter of Q3 causes a current to flow through R19 that is equal to the voltage present divided by the resistance of R19. In the example given, the current would then be .008 a. or 8 ma. This current flows through Q3 to current output terminal 5. R18 is not used in current output models.

OUTPUT meter M1 normally reads the 1-5 v. signal appearing at the emitter of Q3. When the balance switch, S2 is pushed, the meter reads the manual signal present at the wiper of R32. Q2 is used as a zener diode to protect M1 from overload.

4.3 Manual Mode

When the manual-automatic switch, S1 is switched to MAN, the automatic signal at A3-5 is replaced by the manual signal from the wiper of manual potentiometer R31. The function of S2 is also changed so that when it is depressed, M1 will indicate the automatic signal present at A2-10.

5 MAINTENANCE

If a malfunction occurs, repairs should be attempted only by individuals thoroughly familiar with solid state analog control circuitry.

5.1 Trouble Shooting

The following check list may be used to assist in locating faulty components.

	SYMPTOMS	FAULT
5.1.1	Station operates properly but OUTPUT meter does not indicate	Meter coil open, R11, R10 or Q2 shorted
5.1.2	Auxiliary meter does not indicate	Meter coil open, R3, R4 or Q1 shorted
5.1.3	Output signal present only when no load is connected (voltage output models)	Field wiring shorted
5.1.4	Output signal present only when output terminals are shorted (current output models)	Field wiring open
5.1.5	Maximum output at all times	Q3 shorted, A3 inoperative
5.1.6	No output	T1, BR1, A3 or Q3 inoperative R14, R16, R17, or S1 open
5.1.7	Minimum output signal too high or too low	A1 inoperative, R12, R26, R28, R24, or D4 open or shorted
5.1.8	Unit functions properly in manual mode but not in automatic mode	Faulty manual-automatic switch R30, R5, R9, R7 or R8 open A2 inoperative
5.1.9	Unit functions properly in automatic mode but not in manual mode	R25 or R29 open or shorted R31 faulty

5.2 Alignment

To align a properly working unit:

5.2.1 Switch the manual-automatic switch to MAN.

5.2.2 Turn the MAN knob fully counterclockwise.

5.2.3 Connect a meter of the proper range to the output terminals.

5.2.4 Apply 120 vac to terminals 1 and 2.

5.2.5 Adjust R27 for the minimum specified output signal.

5.2.6 Turn the MAN knob fully clockwise.

5.2.7 Adjust R29 for the maximum specified output signal.

5.2.8 Switch the manual-automatic switch to AUTO.

5.2.9 Turn the Ratio knob fully counterclockwise.

5.2.10 Adjust R6 so that, again, the output will be at its minimum specified output.

5.3 Factory Repairs

A defective station may be returned to the factory for repair service. Factory authorization must be obtained before shipping. Pack it securely and include a detailed description of the difficulties experienced. Replacement parts may also be obtained from the factory. Include model and serial number in the order. All units returned for replacement or repair must be shipped to the factory prepaid.

5.4 Replaceable Parts

All .25 watt resistors listed below are 1% tolerance, metal film type. All .5 watt and 2 watt resistors are 5% tolerance, carbon composition. All 3 watt resistors are 1% tolerance, wire wound.

ITEM	PART NO.	DESCRIPTION
A1	AC16312	Amplifier, Operational
A2	AC16312	Amplifier, Operational
A3	AC16312	Amplifier, Operational
BR1	AC14033	Rectifier, Bridge
C1	AC16301	Capacitor, 500 ufd.
C2	AC16718	Capacitor, 100 ufd.
D2	AC16408	Diode, zener, 1N4743
D3	AC16408	Diode, zener, 1N4743
D4	AC20305	Diode, zener
M1	AC16766	Meter, 0-200 ua.
M2	AC20299	Meter, 50-250 ua.*

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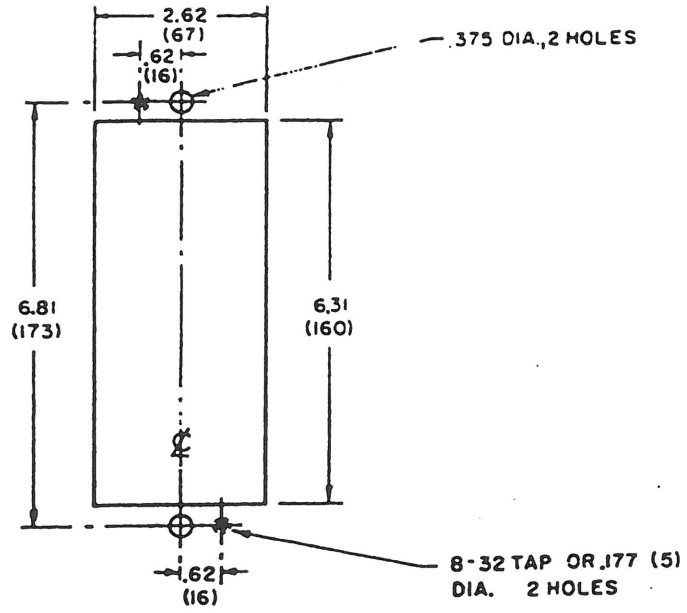
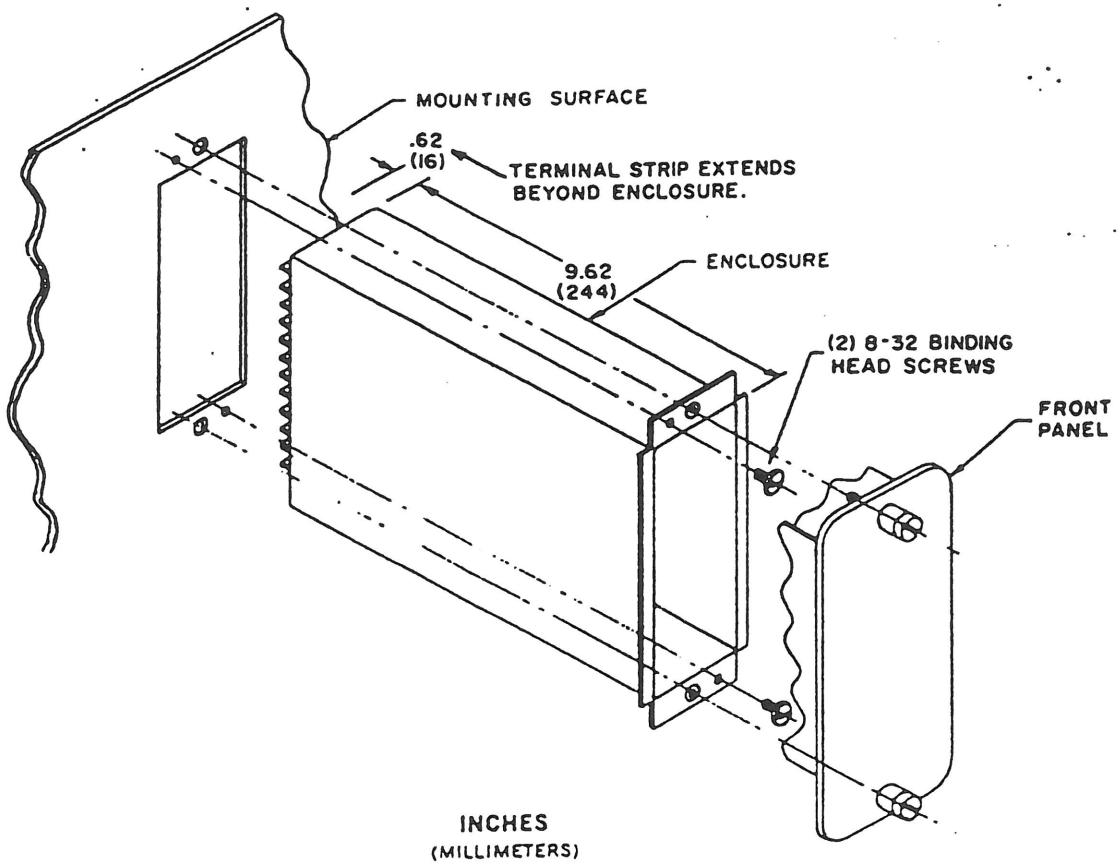
ITEM	PART NO.	DESCRIPTION
Q1	AC15682	Transistor, 2N3417*
Q2	AC15682	Transistor, 2N3417
Q3	AC14526	Transistor, 2N3053
R1	AC17374	Resistor, 250 ohms, 3 watt*
R2	AC17374	Resistor, 250 ohms, 3 watt*
R3	AC20306	Resistor, 4.64k ohms, .25 watt*
R4	AC20307	Resistor, 15k ohms, .25 watt*
R5	AC14142	Resistor, 22k ohms, .25 watt*
R6	AC18339	Potentiometer, 10k ohms
R7	AC15528	Resistor, 4.7k ohms. .5 watt
R8	AC17536	Resistor, 200k ohms, .25 watt
R9	AC20315	Resistor, 22.1k ohms, .25 watt
R10	AC20307	Resistor, 15k ohms, .25 watt
R11	AC20306	Resistor, 4.64k ohms, .25 watt
R12	AC13549	Resistor, 1k ohms, .5 watt
R13	AC14142	Resistor, 22k ohms, .5 watt
R14	AC14142	Resistor, 22k ohms, .5 watt
R15	AC14142	Resistor, 22k ohms, .5 watt
R16	AC15528	Resistor, 4.7k ohms, .5 watt
R17	AC20308	Resistor, 220 ohms, 2 watt
R18	AC14146	Resistor, 560 ohms, .5 watt
R19	AC17374	Resistor, 250 ohms, 3 watt
R22	AC20309	Resistor, 560 ohms, 2 watt
R23	AC12420	Resistor, 1k ohms, 2 watt
R24	AC13549	Resistor, 1k ohms, .5 watt
R25	AC16503	Resistor, 270 ohms, .5 watt
R26	AC12414	Resistor, 12k ohms, .5 watt
R27	AC18823	Potentiometer, 1k ohms
R28	AC13830	Resistor, 1.8k ohms, .5 watt
R29	AC18823	Potentiometer, 1k ohms
R30	AC20313	Potentiometer, 100k ohms
R31	AC20300	Potentiometer, 2k ohms
S1	AC20314	Switch, toggle
S2	AC17265	Switch, pushbutton
T1	AC16780	Transformer, Power
	AC20304	Strip, terminal
	AC14534	Cooler, transistor
	AC13940	Pad, transistor
	AC17296	Knob, round
	AC20311	Knob, dual skirted
	AC17173	Cap
	BA20526	Assembly, housing
	AC20531	Standoff, male-female

* Not used on some models.

CLEVELAND MANUAL/AUTO STATIONS
RATIO FUNCTION
SERIES 7000



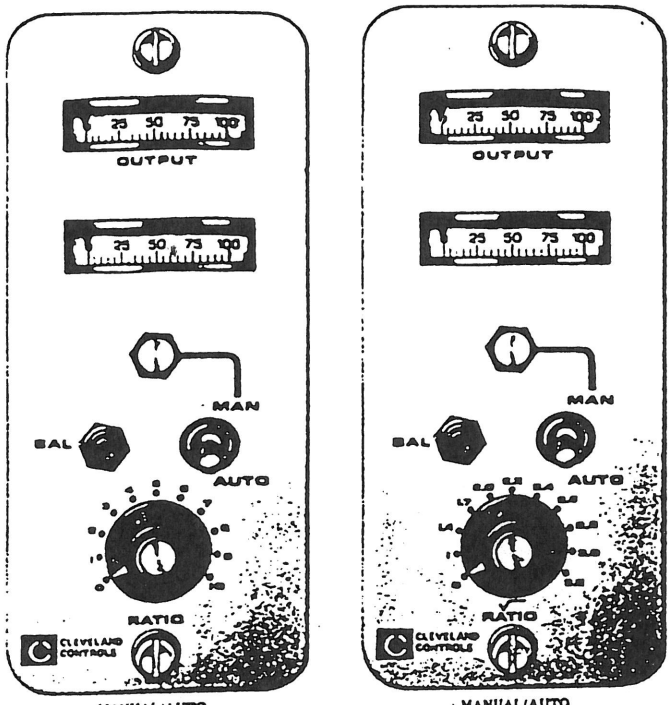
MOUNTING SURFACE CUT-OUT



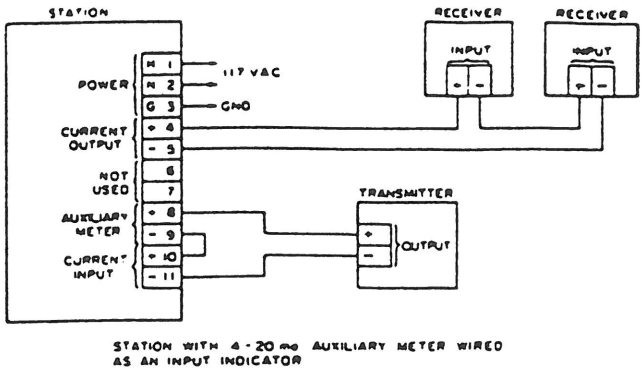
DIMENSIONS — INSTALLATION

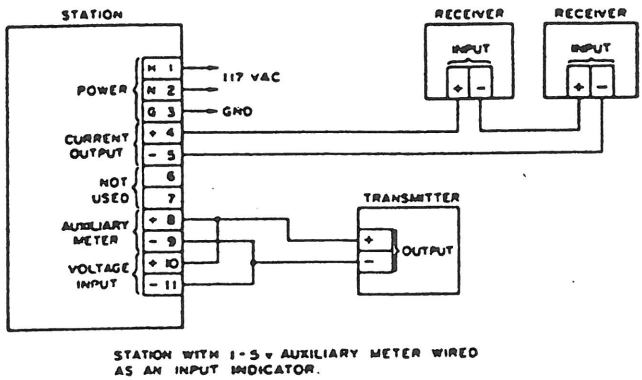
FIGURE 1

CLEVELAND MANUAL/AUTO STATIONS
RATIO FUNCTION
SERIES 7000



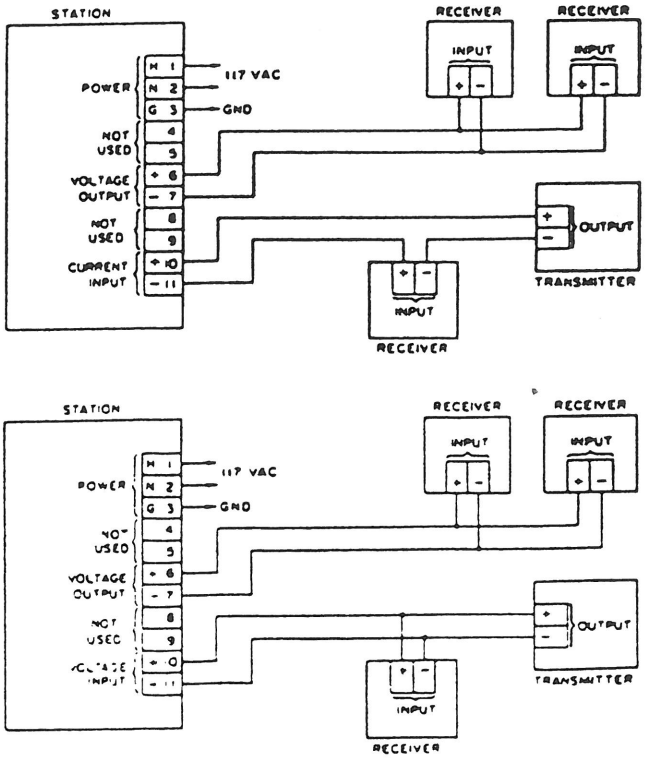
FRONT PANELS
FIGURE 2





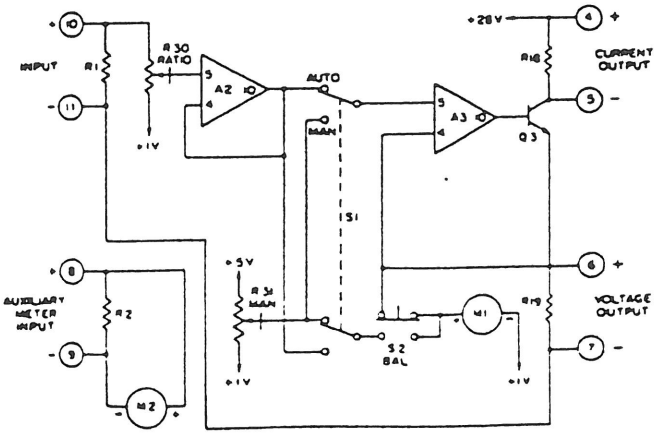
FIELD WIRING
CURRENT OUTPUT STATIONS

FIGURE 3



FIELD WIRING
VOLTAGE OUTPUT STATIONS

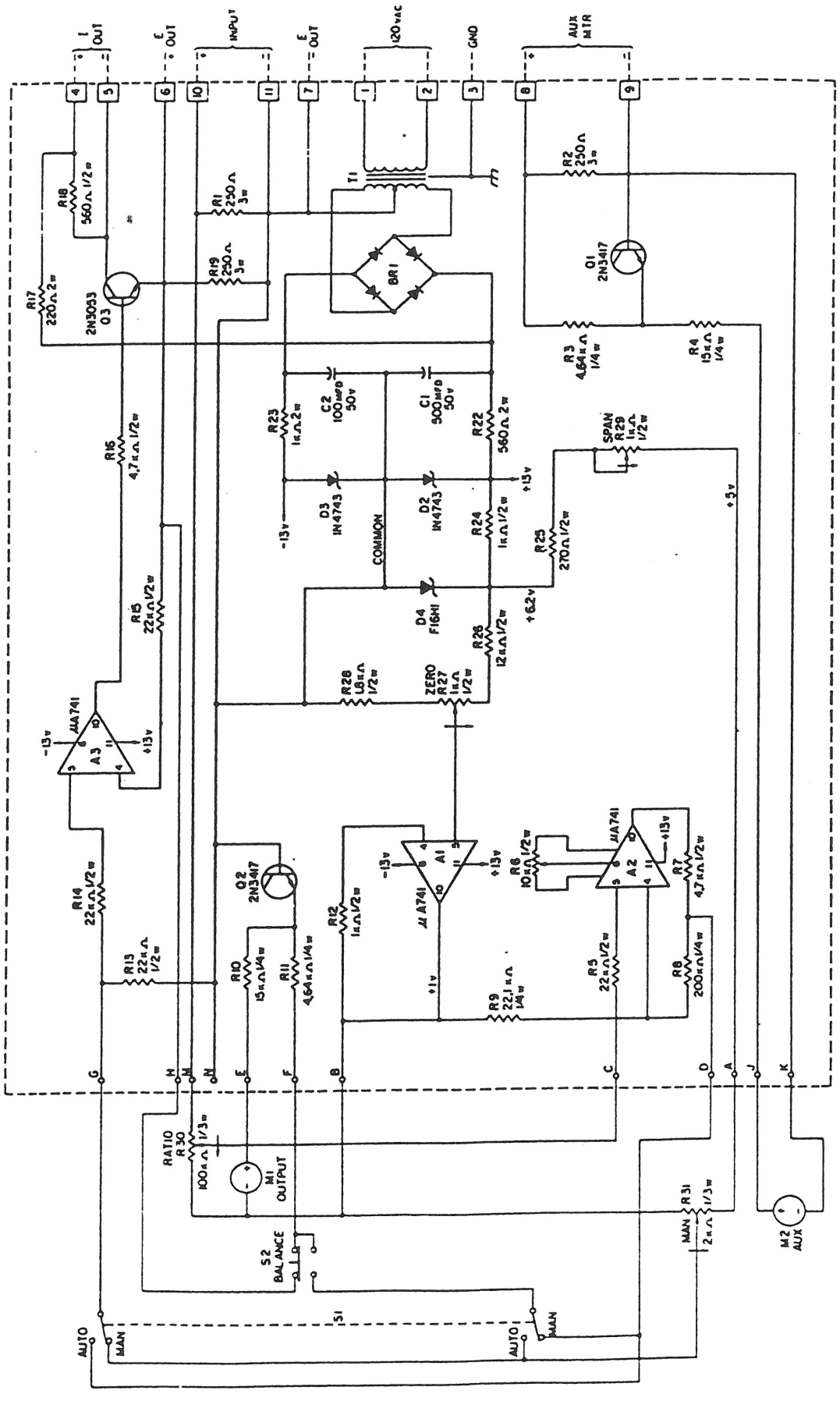
FIGURE 4



SIMPLIFIED SCHEMATIC

FIGURE 5

CLEVELAND MANUAL/AUTO STATIONS
RATIO FUNCTION
SERIES 7000



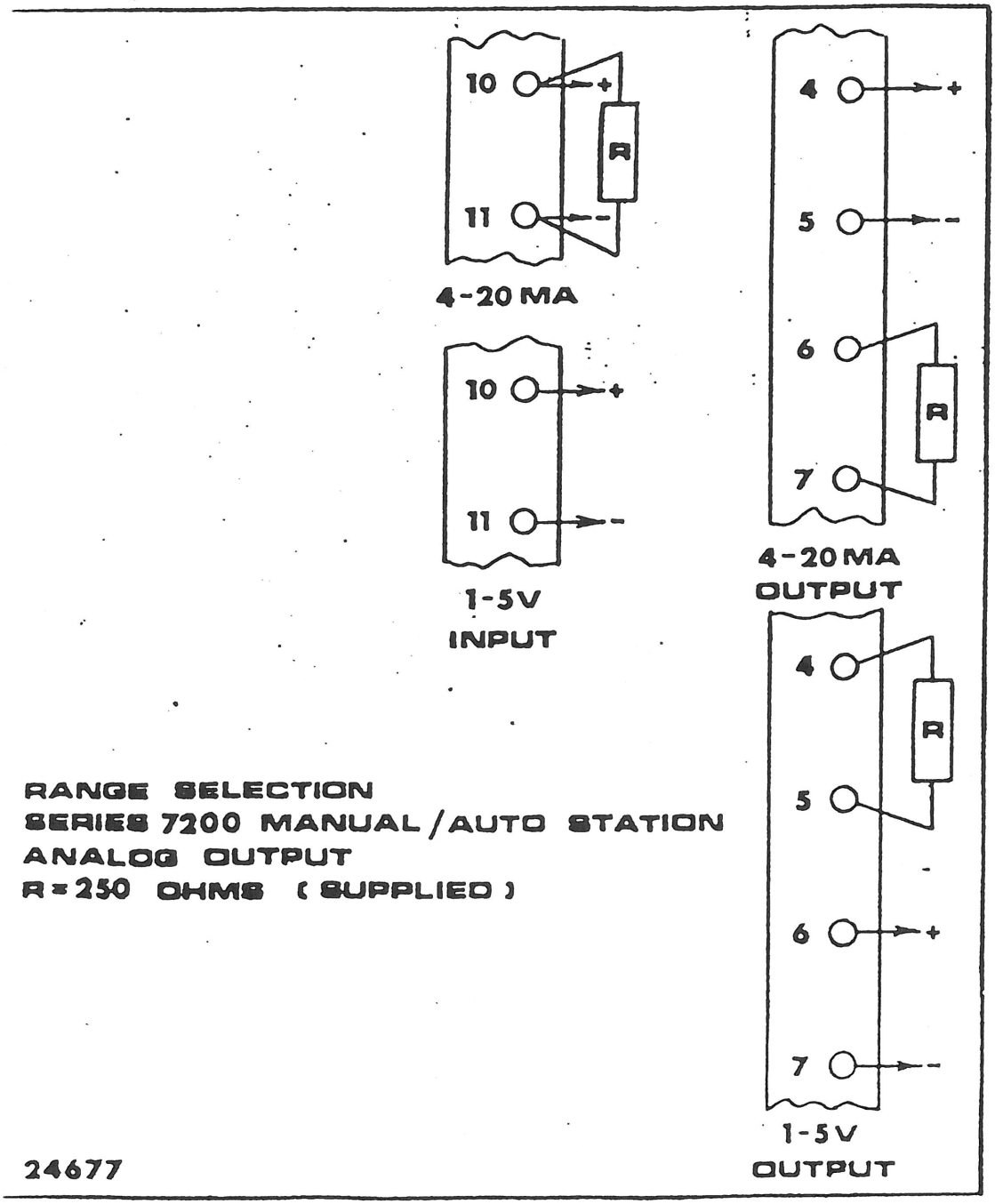
NOTES:
1. ALL VOLTAGE MEASURED FROM COMMON.
2. R1 & R2 USED ONLY FOR 4-20 MA INPUT.
3. R19 USED ONLY FOR 4-20 MA OUTPUT, R18 NOT USED.
4. R18 USED ONLY FOR 1-5v OUTPUT, R19 NOT USED.
5. M2 & ASSOCIATED COMPONENTS ARE OPTIONAL.

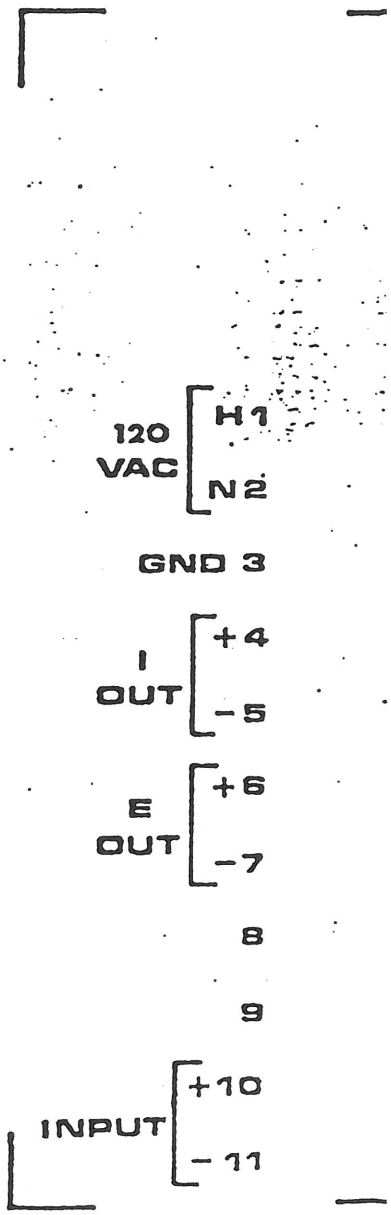
COMPLETE SCHEMATIC

FIGURE 6

CLEVELAND CONTROLS, INC.
CLEVELAND MANUAL/AUTO STATIONS
RATIO FUNCTION ANALOG OUTPUT
SERIES 7200
SUPPLEMENT 5.1.78

Effective January 1978 the 7200 Series Manual/Auto Stations terminal strip markers were revised and a programming decal added. The standard stations did not change, only the above items. These stations can be identified by the inclusion of these decals on the chassis. Decals are as shown below.





Terminal Marker Strip

THE STANDARD AVAILABLE STATIONS ARE AS LISTED BELOW

EVERY CONTROL REQUIRES THE USE OF ONE JUMPER ASSEMBLY P/N 22901 PER EACH "R" CALLOUT IN THE "FIELD TERMINALS" COLUMN. R= 250 OHM RESISTOR ASS'Y ACROSS FIELD TERMINALS INDICATED 0 = OPEN CIRCUIT ACROSS FIELD TERMINALS INDICATED.

FIELD PROGRAMMING CHART

Model Number	Sub-Assembly	Instr. Man. No.	Input Range	Output Range	Field Terminals 4-5	6-7	8-9	10-11
7211-110-00	23170	7216.0X	4-20 MA	4-20 MA	O	R	O	R
7211-120-00	23170	7216.0X	4-20 MA	1-5 V	R	O	O	R
7211-210-00	23170	7216.0X	1-5 V	4-20 MA	O	R	O	O
7211-220-00	23170	7216.0X	1-5 V	1-5 V	R	O	O	O
7261-110-00	23183	7246.0X	4-20 MA	4-20 MA	O	R	O	R
7261-120-00	23183	7246.0X	4-20 MA	1-5 V	R	O	O	R
7261-210-00	23183	7246.0X	1-5 V	4-20 MA	O	R	O	O
7261-220-00	23183	7246.0X	1-5 V	1-5 V	R	O	O	O
7271-110-00	23183	7246.0X	4-20 MA	4-20 MA	O	R	O	R
7271-120-00	23183	7246.0X	4-20 MA	1-5 V	R	O	O	R
7271-210-00	23183	7246.0X	1-5 V	4-20 MA	O	R	O	O
7271-220-00	23183	7246.0X	1-5 V	1-5 V	R	O	O	O

SERIES 7300 MANUAL STATIONS

A B C - D E F G - H H	MODEL NO.	B/M NO. AND DESCRIPTION
A Type 3-Manual Station	7311-0310-00	B/M 21211 Switched output FIG 2
B Function 1-Basic	7311-0210-00 7311-0110-00	B/M 21365 Analog Output FIG 1
C Power Supply 1-Integral		
D Input 0-None		
E Output 1-4 to 20 MA 2-1 to 5 v. 3-Switched		
F Output Meter 1-Yes		
G Auxiliary Meter 0-None		
I Specials 00-None		

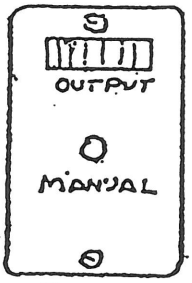


FIG 1

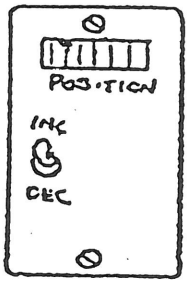


FIG 2

NOTE:

DRAWING LIST	B/M NUMBER
A26778	B/M N21211
A26781	B/M N21365

1229	11-80	RLS	IT	
ERA No	DATE	BY	CKD	
G RELEASE No A-666				
N R5	DATE 4-18-79	CKD R.E.		
D R.E.	DATE 4-26-78	SCALE ~		

SERIES 7300
MANUAL STATIONS

MODEL NOMENCLATURE

CLEVELAND CONTROLS, INC.
1111 BROOKPARK RD. CLEVELAND, O., 44109
.XX = ±.015 .XXX = ±.005 ANGLES = ±1°

DISTRIBUTION | SHEET 1 OF 2

A-20437 | REV. A

IMMIT REPRO.

SERIES 7300 MANUAL STATIONS
OLD NOMENCLATURE - OBSOLETE

7040-001S-504 Dual Manual Station - Pt No. 16684, for New Canaan 2 Meters, 2 Inc-Dec Switches, Meter Power Supply Wiring Dwg. 16688

M	ERA No	DATE	BY	CKD
	1229	11-80	ES	LT

SERIES 7300
MANUAL STATIONS

MODEL NOMENCLATURE

OWG RELEASE No		
DWN PS	DATE 9/30/80	CKD LT
APPD	DATE	SCALE

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1111 BROOKPARK RD. CLEVELAND, O., 44109

DISTRIBUTION

A-20437

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Telephone: 216.398.4414

Fax: 216.398.8556

email: **customerservice@unicontrolinc.com**

Visit us on the WEB!

http://www.hayscleveland.com

Repairs

Damaged or defective units may be returned to the factory for repair. However, factory authorization must be obtained before shipping whether warranty or non-warranty service is required, and all units must be shipped prepaid.
A letter of transmittal that includes the following information should accompany the returned instrument:

1. Location, type of service, and length of time in service of the unit.

2. Description of the faulty operation of the device and the circumstances of the failure.

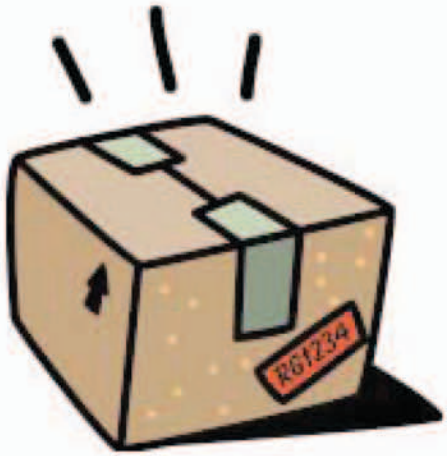
3. Name and telephone number of the person to contact if there are questions about the unit.
4. Indicate whether warranty or non-warranty service is requested.
5. Attach Purchase Order for all out-of-warranty repairs.
6. Complete shipping instructions for the return of the repaired instrument.
7. Original purchase order number and date of purchase.
8. Return Goods Authorization number provided by the factory when you called.

Clearly label the shipping container:

RETURN FOR REPAIR

Model _____

RG # _____



Ship prepaid to:

HAYS CLEVELAND

1111 Brookpark Road

Cleveland OH 44109-5869

216-398-4414

Please follow this procedure. It expedites handling of the returned item, and avoids unnecessary additional charges for inspection and testing to determine the problem before repairing it.

Service

A **Maintenance and Service Contract** can ensure trouble-free, economical operation of **Hays Cleveland** equipment for many years. One-time on-site service by a factory-trained service engineer can also be provided as needed. Contact Hays Cleveland for information on these service options.

Standard Terms and Conditions of Sale

TERMS OF SALE: 1% discount if paid in ten (10) days, net amount due and payable in thirty (30) days.

AGREEMENT OF SALE: Acceptance by Seller of any order placed for goods whether submitted on Buyer's purchase order form or on seller's Sales Order Acknowledgment form, shall be subject to Seller's Standard Terms and Conditions of Sale and is conditioned upon the Buyer's acceptance of these Standard Terms and Conditions.

TERMS OF CONTRACT: Any terms or conditions of the buyer's order which are inconsistent with these terms and conditions shall not be binding on the Seller and shall not be considered applicable to the sale or shipment of goods or materials. Unless buyer shall notify Seller in writing to the contrary within ten (10) days after the mailing of the Sales Contract by Seller, acceptance of the terms and conditions hereof by Buyer shall be indicated and, in the absence of such notification, the sale and shipment by Seller of the goods and materials covered hereby shall be conclusively deemed to be subject to the terms and conditions hereof.

PRICES: All prices and specifications and applicable discounts are subject to change without notice. Sales contracts which call for delivery in the future will be billed at prices in effect at the time of shipment. Shipping weights shown are approximate and subject to change without notice.

SHIPMENT AND PAYMENTS: All prices contained on the Sales Contract are F.O.B. factory in Cleveland, Ohio. No freight is allowed on any shipments. Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department, and at any time seller may require payment in advance or satisfactory security or guarantee that invoices will be promptly paid when due. If buyer fails to comply with any terms of payment, seller, in addition to its other rights and remedies, but not in limitation thereof, reserves the right to withhold further deliveries or terminate the Agreement, and any unpaid amount thereon shall become due immediately. Terms of payment shall be as set forth on the Sales Contract.

DELAYS AND DEFAULTS: Delays or defaults in delivery by Seller of the goods and materials covered by the Sales Contract shall be excused so far as the same is caused by fire, strikes, accident, governmental regulation, or any delays unavoidable or beyond reasonable control of Seller. In no event shall Seller be liable for any consequential, special, or contingent damages on account of any default or delay in delivery.

NONCANCELLATION: Orders are not subject to suspension, reduction, or cancellation, except on terms that will indemnify Seller against loss.

SPECIFICATIONS: Seller relies on specifications and other data furnished by the Buyer, an architect, contractor, or consulting engineer in all phases of the work covered by the Sales Contract. Seller shall be responsible to check quantities only. Alterations to or changes in specifications, approval of samples, changes in delivery instructions and all other instructions must be submitted in writing to Seller.

In the event Seller performs design or engineering work at the request of Buyer, an architect, contractor, consulting engineer, or representative in any phase of the work covered by the Sales Contract, Seller shall not be responsible for any damages claimed by Buyer as a result of alleged errors or defects in such design or engineering work.

WARRANTY AND LIMITATION OF LIABILITY: Seller warrants that the goods supplied by it have been manufactured in accordance with its standard manufacturing practices and conform to the contract or catalog description set forth in the order. Seller further warrants that the goods supplied by it are fit for the ordinary purpose or purposes specified in its catalog for which such goods are used when installed in accordance with Seller's recommended installation procedures. Except as stated herein, Seller makes no express warranty with respect to goods supplied by it and Seller makes no warranty that the goods are fit for any particular purpose.

When the use of materials not manufactured by Seller is suggested by Seller's recommended installation procedures or otherwise, Seller makes no express warranty with respect to such materials nor that such materials are merchantable or fit for any particular purpose.

Seller will, at its sole option, credit, repair or replace, any goods supplied by it which its examination shall disclose to its satisfaction are defective in workmanship or material and are returned to it within one year from the date of shipment and any claim not made within this period shall conclusively be deemed waived by Buyer. Credit, repair or replacement will be preconditioned upon examination of the goods by Seller, and, if requested by Seller, return of the goods to Seller at its direction and expense. No goods are to be returned to Seller without its written consent. Seller shall not be liable for any expense incurred by Buyer in order to remedy any defect in its goods. Seller shall not be liable for any consequential, special, or contingent damage or expense, arising directly or indirectly from any defect in its goods or from the use of any defective goods. The remedies set forth herein shall constitute the exclusive remedies available to Buyer and are in lieu of all other remedies.

CLAIMS: Claims for shortage of goods or for mistakes or errors in billing must be presented within forty-five (45) days from the date of shipment of goods and must state the packing slip number and container number applicable to the claim. Any claim not so presented will be conclusively deemed waived.

TAXES: Any federal taxes or other government charges on the sale, shipment, or installation of the goods or equipment covered by the Sales Contract shall be added to the price and paid by Buyer, or, in lieu thereof, the Buyer shall furnish the Seller with tax-exemption certificates acceptable to the taxing authority. The procedure also applies to duty and other similar charges on export sales. Seller is not responsible for sales and/or use tax in any state other than Ohio. The purchase made under this Sales Contract must be exempt or paid directly by Buyer. If Seller is required to pay any such tax, there shall be added to the prices quoted herein all such state and local taxes. Buyer agrees to reimburse and save Seller harmless from all such state and local taxes, including interest and penalties thereon, which may at any time be payable to any state or local government unit with respect to the sale of any goods or materials covered by the Sales Contract.

CORRECTIONS: Typographical or clerical errors contained in the Sales Contract, including prices, are subject to correction by the Seller.

FAIR LABOR STANDARDS: All goods covered by the Sales Contract have been produced in conformity with all applicable provisions of the Fair Labor Standards Act of 1938 as amended.

RENEGOTIATION: Unless advised by Buyer in writing, Seller assumes that Buyer's order and the Sales Contract are not renegotiable under the Renegotiation Act of 1951.

APPLICABLE LAW: All questions arising out of the Sales Contract, which shall be deemed an Ohio contract, shall be governed by the laws of the state of Ohio.

EXCLUSIVE TERMS: The Sales Contract shall constitute the complete contract between the parties, and no one has authority to depart from the terms and conditions set forth therein, nor to make any representations or arrangements other than those printed thereon whether in the execution or in the performance of the Sales Contract, unless the same are written on the face of the Sales Contract or are given in writing with it or in pursuance of it, and are fully approved in writing by an officer or authorized employee of the Seller.

LIMITATION FOR SUITS: Any controversy or claim arising out of or relating to this Sales Contract or the breach thereof, must be commenced within one (1) year after the cause of action accrued.

Intentionally Blank

Hays Cleveland
Div. of UniControl Inc.
1111 Brookpark Road
Cleveland OH 44109