

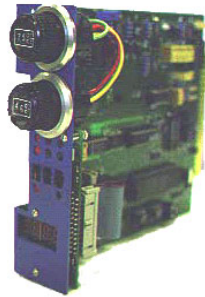
Electronics Upgrade/Update

As part of Mansco Products continuing effort to provide the most effective and reliable instrument available, an electronics upgrade was released in June 2004 with a featured change of a new model Slide Chassis model. The current model Transducer is now TOVM 1.4, which incorporates the changes included in model TOVM 1.3 from the older TOVE model Transducers.

TOVM 1.3 Upgrades from Model TOVE Transducers

New J11M Board features include:

- In-line Probe Performance Tests:
 - T ½ (measures functionality)
 - Frequency
 - Count (measures probe's reliability)
- Built-in Simulator
- Built-in Calibrations features
- More user-friendly start-up features with complete front panel access
- Microprocessor controlled diagnostic system with storing capabilities
- LED display of Probe performance tests
- Improved stability



New J13M Board features include:

- User-friendly Gain and Compensation Adjustment Pots
- Push Button Automatic Compensating Temperature Balance
- Broad Range Temperature Output
- LED Readout of direct Process Temperature
- Improved stability



Upgraded Slide Chassis features:

- Improved 15V Power Supply.
- Improved 24V Power Supply.
- 5-Volt Power Supply.
- Provides more reliability and accuracy.

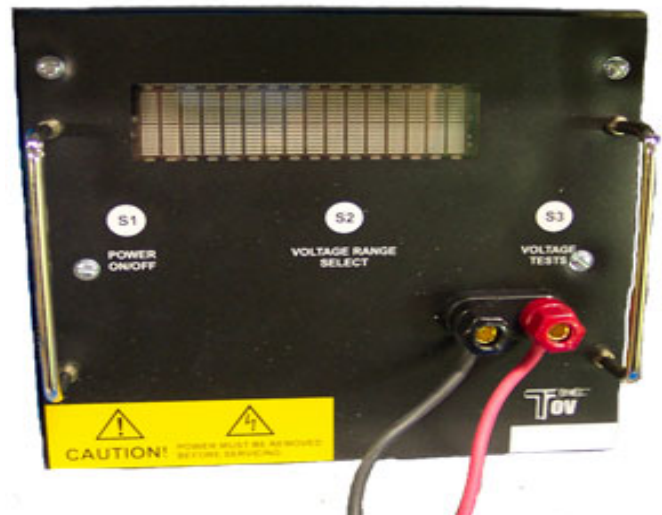
J14 BOARD

The J14 DC-DC Converter Board that utilizes the new 5-volt power supply and converts it to +15 volts and -15 volts outputs that are utilized by the J11M and J13M Boards for optimum performance.

Upgrade to TOVM 1.4

New SC-03 features include:

- On-line Power Tests:
 - Automatic at start-up
 - Can be performed manually during TOV System operation
- Built-in true differential VOM
- LCD display of voltages and voltage checks
- Easier disconnect from Transducer
- Microprocessor controlled



Feature	TOVM 1.4	TOVM 1.3	TOVE
Outputs	4	4	4
Compensated Viscosity	√	√	√
Uncompensated Viscosity	√	√	√
Broad Temperature Output	√	√	Not Available
Compensating Temperature	√	√	√
Frequency Balance ("Elasticity")	Not Available	Not Available	√
Backplane Wiring Configuration	TOVM 1.4	TOVM 1.4	TOVE
Pressure Compensation Over 50Kg/cm ² (700PSI) range	Standard	Standard	Optional
Linear Temperature Compensation: within +/- 14°C (57.2°F) from setpoint	Standard	Standard	Standard
In-line Probe Performance Tests for testing Probe operating parameters: <ul style="list-style-type: none"> • T½ (Probe's functionality) • Frequency • Count (Probe's reliability) 	Standard	Standard	Not Available
Built-in Simulator feature	Standard	Standard	Not Available
Push Button Compensating Temperature Balance	Standard	Standard	Not Available
LED Readout of Direct Process Temperature	Standard	Standard	Not Available
Differential Voltage Meter	√	Not Available	Not Available
Power Supply Checks	ALL	+/-15V Out ONLY	+/-15V Out ONLY
LCD Meter Display	√	Not Available	Not Available

Upgrading Your TOV Viscometer Transducer

To Upgrade from TOVE to TOVM 1.4, backplane wire changes are required and must be performed by certified Mansco Products engineers. New J11M, J13M, and J14 Boards will be installed and the Slide Chassis will be replaced with a new SC-03 model. This upgrade may be performed at a customers site or at Mansco Product's facility.

Requirements for upgrading From TOVE to TOVM 1.4	
Requires Transducer wire changes by a Mansco Products certified engineer	v
Requires new J11M Board	v
Requires new J13M Board	v
Requires new J14 Board	v
Requires new Slide Chassis Model SC-03	v

To upgrade from TOVM 1.3 to TOVM 1.4, a new Model SC-03 Slide Chassis must be purchased and installed in place of the existing Model SC-02 Slide Chassis.

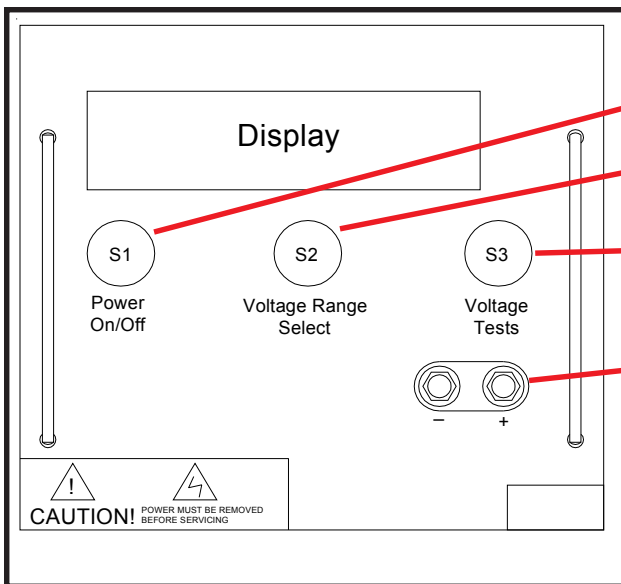
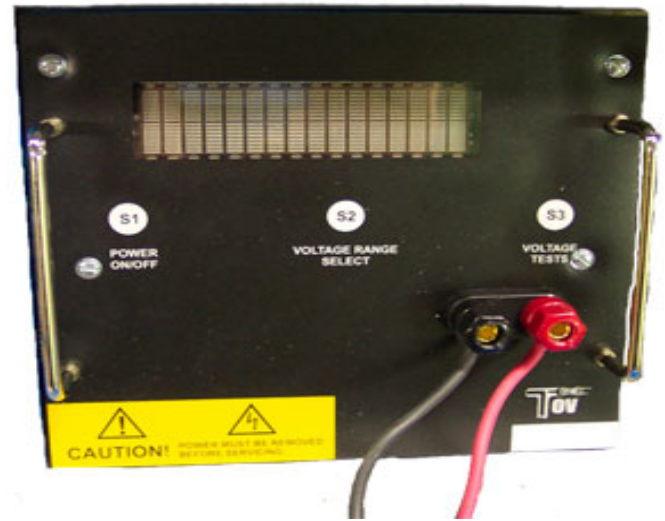
Requirements for upgrading From TOVM 1.3 to TOVM 1.4	
Requires Transducer wire changes by a Mansco Products certified engineer	
Requires new J11M Board	
Requires new J13M Board	
Requires new J14 Board	
Requires new Slide Chassis Model SC-03	v

*Terms, delivery, and conditions vary. If these options do not meet your particular needs or if you have any questions, please contact Mansco Products at +215.674.4395 or your local sales agent.

For more information, please contact
Mansco Products:
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or visit our web site at:
<http://www.manscoproducts.com>

TOV Transducer: Slide Chassis Model SC-03

The latest model Slide Chassis (SC-03) has been released in June 2004. It provides new features and updated performance compared to its predecessors Model SC-01 and Model SC-02. The SC-03 is standard in all Model TOVM 1.4 and is retro-fittable into TOVE and earlier model TOVM Transducers.



- **S1:** Power on/off
- **S2:** Voltage Range Select: Press to toggle between 50.00 and 10.000 volt ranges
- **S3:** Voltage Tests: Press to Toggle through the Voltage Test results or to Voltmeter
- **Test lead jacks:** Red = plus, Black = minus, measure Transducer board test point a (except VI Board) by inserting the + into the test point to be measured and the - into the J11M, J13M, J15P or J17 board test point 12 (Common).

The model SC-03 Slide Chassis includes a new “true” differential VOM with an LCD display of all voltage measurements.

The meter has two ranges, 0.00 to 50.00VDC and 0.000 to 10.000VDC. The table to the right shows the specifications for the voltage measurements and display.

Description	Performance Characteristic
Differential analog inputs	8
Input Impedance: 50.00V range 10.000V range	10 Meg 2 Meg
Common Mode Analog Inputs	16
Measuring Resolution	12bit (Min)
Analog Measurement Resolution 50.00V range 10.0000V range	10mV 1mV
Accuracy	+/- .2%
Power Supply	Insulated 110VAC/220VAC
Display resolution	4 Decimal digit

Model SC-03 Slide Chassis includes new on-line voltage checks of all Transducer power supply voltages. The Power Checks are performed automatically upon start-up and may be manually checked at any time during TOV System operation with no affect on the operation display.

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POWER IS O.K.**

Test #	Voltage	Evaluates	Acceptance Level
1	+5VDC	+5 voltage from 15/5V P.S. in SC-03	+/-10%
2	+15VDC	+15 volts from 15/5V P.S. in SC-03	+/-10%
3	-15VDC	-15 volts from 15/5V P.S. in SC-03	+/-10%
4	+24VDC	+24V P.S. #1 from D 24V P.S. Board in SC-03	+50%, -20%
5	+24VDC	+24V P.S. #2 from D 24V P.S. Board in SC-03	+50%, -20%
6	+15VDC	+15 volts from J14 DC-DC Converter board	+/-10%
7	-15VDC	-15 volts from J14 DC-DC Converter board	+/-10%

The table to the right indicates the differences between the 3 model Slide Chassis that may be found in the field. Model SC-03 supercedes all previous models and is interchangeable into model TOVE and TOVM Transducers with no changes to the Transducer wiring.

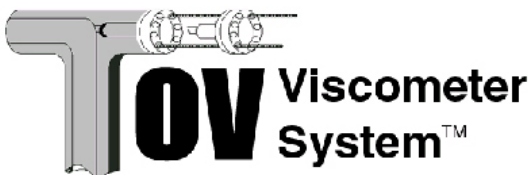
Please note, for certain TOVE and TOVM models, not all Power Checks are used and may return failed results if the Power Supply is not present.

Features	SC-01	SC-02	SC-03
Field Service requirements	110VAC, 50/60 HZ	110VAC, 50/60 HZ	110VAC, 50/60 HZ
+/-15 and 5 Volt P.S.	15V ONLY	15/5V	15/5V
24 Volt Power Supplies	Two Individual 24V PS	Dual 24V PS Board	Dual 24V PS Board
Meter Board SC-MB-1,-2	Standard	Standard	N/A
Digital Voltmeter SC-M-1,2	Standard	Standard	N/A
Power Monitor Board	N/A	N/A	Standard
Power Checks	+/-15V ONLY	+/-15V ONLY	ALL Power Supplies
Startup-Power Tests	N/A	N/A	Standard
Voltage Ranges:	0.00 +/- 20.00 0.000 +/- 2.000	0.00 +/- 20.00 0.000 +/- 2.000	0.00 +/- 50.00 0.000 +/- 10.000
Fuse Protection	Standard	Standard	Standard
Voltage measurement method	One sided from analog common	One sided from analog common	True Differential
Use in Transducer Models	TOVE	TOVE TOVM 1.2 (Std) TOVM1.3 (Std) TOVL 1.0 (Std)	TOVM 1.4 (Std) TOVL 1.1 (Std) Earlier Models: Retrofit

For more information, please contact:

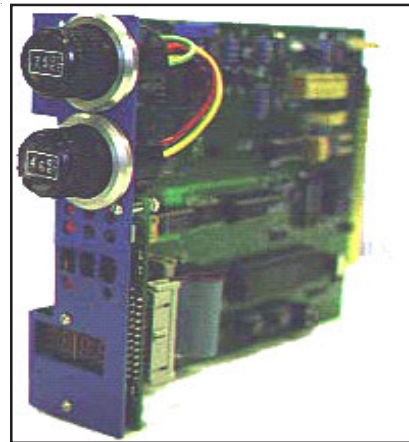
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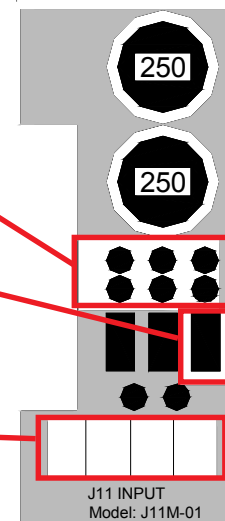
TOV Transducer J11M Board

The Mansco Products TOV System is the leading in-line viscosity control instrument. As part of Mansco's continuing effort to provide the most effective and reliable in-line viscosity equipment in the world, an electronics upgrade was released in 1999 with changes to the TOV Transducer including a newly developed J11M Board. This new board includes microprocessor technology along with other market leading enhancements.



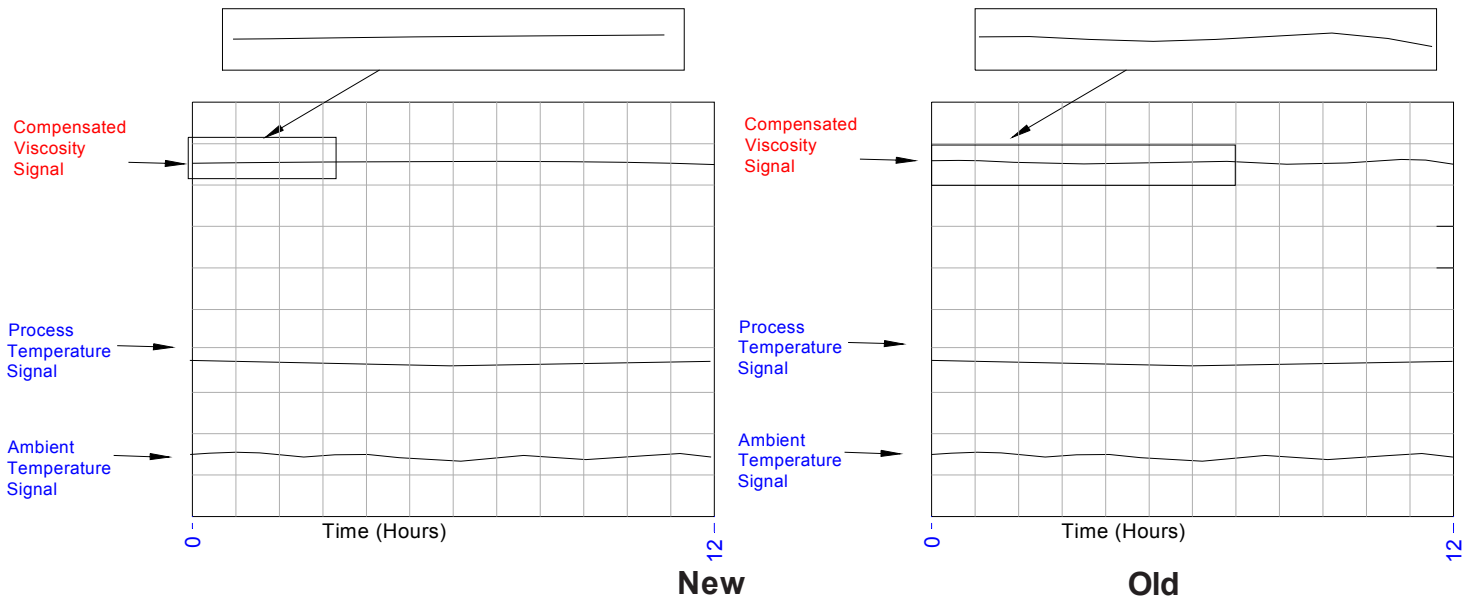
Key Features of the J11M Board:

- 4 In-line Probe Performance Tests For testing Probe operating parameters:
 - T ½ (measures functionality)
 - Frequency
 - Count (measures reliability)
- 4 Built-in Calibrations features.
- 4 Built-in Simulator feature for simulating a probe signal without disconnecting the Probe from the Transducer.
- 4 More simplistic, user-friendly start-up features with complete front panel access to all adjustment pots.
- 4 New LED Readouts of Probe performance tests.
- 4 Microprocessor system with diagnostic features.
- 4 Improved stability (see "Stability Charts" on next page).



NEW J11M Input Board

THE J11 BOARD OFFERS IMPROVED STABILITY FEATURE



New components improve the stability under same condition testing between the Old J11A Board for the TOVE Transducer and the New J11M Board for the TOVM Transducer

J11 BOARD DATA MEASUREMENT SPECIFICATIONS				
MODE	AIR		OIL	
	Accuracy	Repeatability	Accuracy	Repeatability
T 1/2	1%	1%	1%	2%
Frequency	.1%	.1%	.1%	.1%
Display	.5%	.1%	.5%	.1%
Count	1%	1.25%	1%	1.25%

Note: All percentages are displayed as a percentage of the indicated reading.

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THE J11 BOARD PROVIDES ONLINE TESTING CAPABILITY

- 4 Quick and easy check of TOV Probe function.
- 4 Comparative test between the current state and the previously stored state of the probe under control conditions.
- 4 Eliminates concern about the operating condition of the probe, thereby saving costly probe removal and disassembly to determine its condition.
- 4 Immediate test results indicating TOV performance.

THE MANSCO PRODUCTS TOV VISCOMETER SYSTEM™

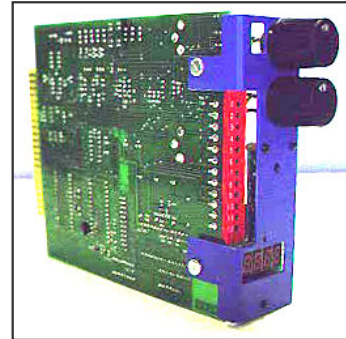
The Torsional Oscillatory Viscometer (TOV) system was developed over 38 years ago to measure in-line viscosity. Today, after 38 years of field experience and 3 system upgrades, the TOV System is the most sensitive stand-alone device available for measuring viscosity and temperature in an in-line environment. The TOV Probe's superior performance in measuring viscosities continues to be convincing. Plants have experienced excellent viscosity control with a repeatability factor of 99.5%.

The temperature measurement is accurate to within $\pm 0.1^\circ\text{C}$ of the balance point enabling extremely precise temperature compensation. The overall performance and reliability continue to provide low maintenance process solutions.

For more information, please contact the
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 or visit our web site at:
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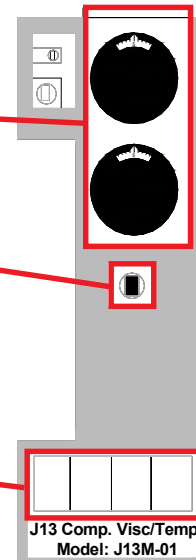
TOV Transducer J13M Board

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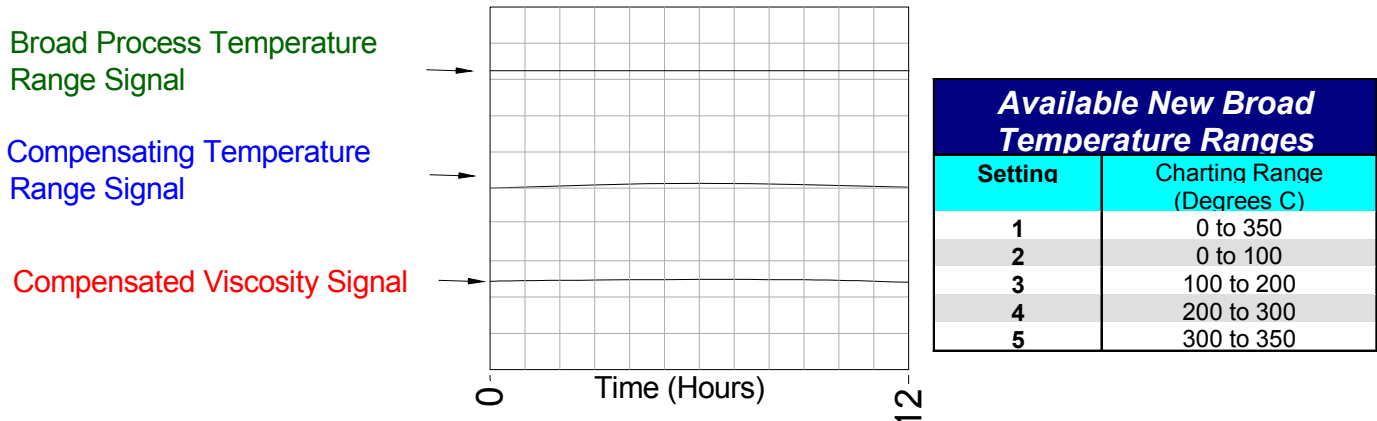
Key Features of the J11M Board:

- 4 Gain and Compensation Adjustment Pots
- 4 New Push Button Automatic Compensating Temperature Balance
- 4 New Broad Range Temperature Output (see Broad Temperature Ranges on next page)
- 4 New LED Readouts of Direct Process Temperature
- 4 Improved stability (see Chart on next page).



NEW J13M Compensated Viscosity/
Temperature compensation Board

THE J13 BOARD OFFERS IMPROVED STABILITY FEATURE



- 1 Chart unit = Approx. .5% change in viscosity (for this test and product only)
- 1 Chart Unit = 1°C change in Compensating Temperature
- 1 Chart Unit = 3.5°C change in Broad Range Temperature span of 0°C to 350°C.

J13 BOARD DATA MEASUREMENT SPECIFICATIONS		
Measurement	Accuracy	Repeatability (% of reading)
Temperature LED Reading	1%*	.1%
Temperature Balance	± .05 volt	.1%
Compensating Temperature Output	1°C/Volt	.1%
Broad Temperature Output	Varied	.1%
Compensation Response	1 Chart Unit/.05% Viscosity Change	.1%

* Percentage of span from Temperature Balance Point

About Mansco Products

Mansco Products has been manufacturing and supporting the Torsional Oscillatory Systems (TOV) System since its inception in the early 1960's. Over the past 3 decades, Mansco has developed its leading reputation for quality products and service. Mansco continues its vision of quality products and quality service equals quality solutions. Combining our reputation as an industry leader along with our vision for the future, we are and will continue to be "the in-line viscosity vendor." The TOV System remains the same quality instrument that industry

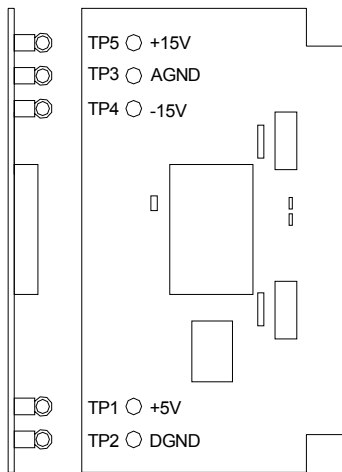
leaders rely on for their viscosity control. With new enhanced features and better analysis tools, the TOV now is easier than ever to use.

For more information, please contact the
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 or visit our web site at:
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TOV Transducer J14 Board

The Mansco Products TOV System is the leading in-line viscosity control instrument. With the introduction of the TOVM and TOVL Transducers, a new J14 Board was introduced. The J14 Board converts +5V input to +15V and -15V for use in the J11M and J13M Boards. The table and figure below show the J14 Board test points and voltages. There are no adjustments to the voltages on this board.



J14 DC-DC Converter Board Voltages			
+ TP	- TP	Voltage	Supplies
1	2	+5.00V ± 0.1	Vin from SC
4	3	-15.00V ± 0.25	Vout to J11M/J13M
5	3	+15.00V ± 0.25	Vout to J11M/J13M

For more information, please contact:

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TOV Memo

To: All TOV Viscometer System Users and Customers
From: Mansco Products Technical Desk
Date: 09/01/04
Re: Model SC-01 Slide Chassis used in TOVE Transducers

NEW Slide Chassis Benefits, Phase Out of Old Model

With the release of the new J11 and J13 Boards for the TOV Transducer, a new Slide Chassis (Model SC-02) was offered with:

- Significant benefits:
 - Better Performance
 - Better Reliability
 - NEW 15 and 5 Volt Power Supply
 - NEW Dual 24 Power Supply Board
- Compatible with TOV Transducer models TOVE and TOVM
- Provides necessary power for the NEW Upgrades (J11 and J13 Boards)

The latest model Slide Chassis SC-03 includes the same features of model SC-02 and additional features:

- On-line Power checks
- True differential VOM
- LCD display of voltages and Power check results
- Compatible with TOV Transducer models TOVE and TOVM

Mansco Products is recommending all TOV Viscometer System customers upgrade from Model TOVE to Model TOVM 1.4 Transducer and from Model TOVM 1.3 to TOVM 1.4. The original model (SC-1) power supplies will no longer be serviced nor spare parts available. Model SC-02 Slide Chassis will continue to be serviced with limited spare parts availability.

As always, Mansco Products will continue to support all models, as long as possible. However, manufacturers of older model parts have discontinued production of these parts. Mansco Products is offering new and improved parts at comparative pricing.

If you have any questions or need further information, please contact us at +215.674.4395

Thank you.



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