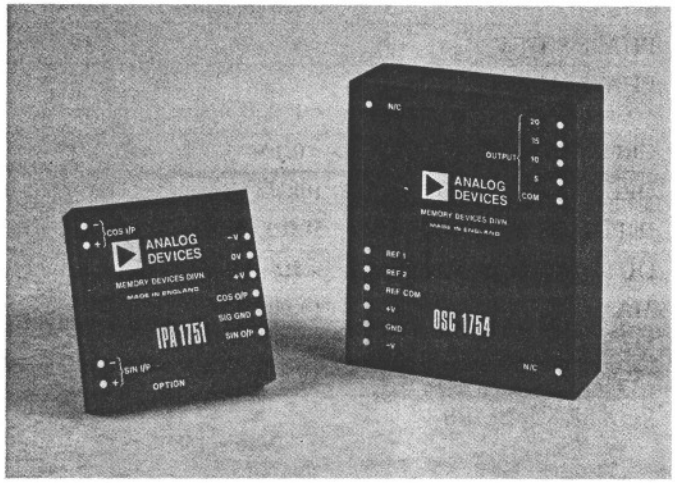
Inductosyn™ Preamplifier and Power Oscillator

IPA1751, OSC1754

FEATURES
IPA1751
Encapsulated for Protection
Phase Shift <5°
Phase Match >1°
Load Capacity 10,000pF

OSC1754
Isolated Output
Multi-Tapped
Quadrature Reference Output

APPLICATIONS
The IPA1751 and OSC1754 when used with one of the IRDC1730 series Inductosyn/resolver-to-digital converters offers the user all the electronic modules necessary for the Inductosyn to controller interface.



GENERAL DESCRIPTION

IPA1751

The output signals from an Inductosyn slider are at a low level of the order millivolts and requires amplification and buffering before transmission to an Inductosyn to digital converter. The IPA1751 provides the necessary gain and output impedance for this purpose.

Any gain mismatch in the two channels amplifying the sine and cosine outputs of the Inductosyn slider contributes to the system error. The IPA1751 with a 0.15% gain match over the temperature range only contributes an error of 0.23 micron using a 2mm pitch Inductosyn. By carefully controlling phase mismatch to less than 1° the error contribution is only 0.2 micron in a 2mm pitch Inductosyn.

The IPA1751 with an output resistance of less than 3 ohms and a capability of driving a cable capacity of 10,000pF is totally suited to machine tool application where the Inductosyn to digital converter is remote from the measuring Inductosyn.

OSC1754

The OSC1754 provides the drive for energization of the Inductosyn track. Transformer isolated outputs are available at four voltages that allows a wide range of track resistance to be accommodated. In addition to the power output, a two low power outputs are provided one in phase and one 90° in advance of the power output. The necessity for a quadrature output is for the reference input of the IRDC, since Inductosyn track impedance is predominantly resistive, the slider sine and cosine output voltages are in phase quadrature with the voltage.

The demands on the absolute accuracy of the phase, frequency and amplitude are not exacting owing to the method of conversion used in the IRDC that is tolerant to all these parameters (see IRDC1730/31/33 Data Sheets).

MODELS AVAILABLE

Model IPA1751/560 is a two channel preamplifier 1kHz to 10kHz operating 0 to +70°C.

Model OSC1754/500 is a power oscillator at 10kHz operating 0 to +70°C.

Inductosyn is a registered trademark of Farrand Industries, Inc.

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Telex: 924491 Cables: ANALOG NORWOODMASS

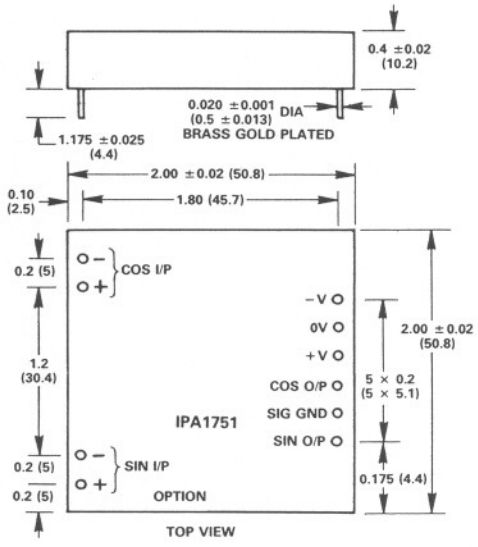
SPECIFICATIONS (typical @ +25°C over full range of power supply inputs unless otherwise noted)

Model	IPA1751/560
GAIN	1300 ± 10%
GAIN MISMATCH	
Channel to Channel	
Over Temperature Range	± 0.15% (equivalent to 2.5 arc mins)
PHASE SHIFT	<5°
PHASE MISMATCH	
Channel to Channel	<1°
CROSSTALK	<0.1%
OPERATING FREQUENCY	10kHz
INPUT RESISTANCE	5kΩ ± 10%
OUTPUT RESISTANCE	<5Ω
MAX LOAD CAPACITY	10,000pF
MAXIMUM SIGNAL OUTPUT LEVEL	3V rms
POWER SUPPLIES	
Voltage	± 12V to ± 15V
Current	30mA max
TEMPERATURE RANGE	
Operating	0 to + 70°C
Storage	− 55°C to + 125°C
SIZE	2.0″ × 2.0″ × 0.4″ (50.8mm × 50.8mm × 10.2mm)

NOTE
Specifications subject to change without notice.

OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).



HYBRID INDUCTOSYN PREAMPLIFIER AND POWER OSCILLATOR

The IPA1764 and OSC1758 are extended temperature devices (−55°C to +125°C) with performance similar to the IPA1751 and OSC1754 described in this data sheet. U.S. MIL-STD-883B processing is available on these products.

These products are housed in a hermetically sealed 18-pin double DIP metal case – 0.775″ (19.7mm) × 0.975″ (24.8mm) × 0.2″ (5.1mm).

OTHER PRODUCTS

We manufacture a range of Inductosyn/resolver-to-digital converters specifically designed for the numerical controlled machine tool and robot applications.

IRDC1730 – 12-bit parallel binary output with analog velocity output, direction and ripple carry logic outputs. Tracking rate up to 170 revolutions per second.

IRDC1731 – A serial output converter with 4,000 counts per revolution, direction and ripple carry output. Tracking rate up to 100 revolutions/pitches per second.

IRDC1732 – A low cost hybrid. Twelve-bit parallel tri-state latched binary output.

IRDC1733 – With the features of the IRDC1730 without analog velocity and at a reduced cost.

In addition to this above range, we manufacture a complete range of modular and hybrid synchro/resolver-to-digital and digital-to-synchro/resolver converters.

ABSOLUTE MAXIMUM VALUES

Sin & Cos I/P	± V
+V Pin	+ 17V
−V Pin	− 17V
Sin & Cos O/P 1k Load	± 10V

Indefinite Short Circuit Proof

SPECIFICATIONS (typical @ +25°C with ±15V supplies unless otherwise noted)

Model	OSC1754/500	Comments and Conditions
FREQUENCY	10kHz ±5%	Over Temperature Range
OUTPUTS	20V rms	With +V = ±15V
ISOLATED POWER O/P	15V rms 5 Watts 10V rms Maximum 5V rms	All Output Meet ±5% Tolerance Over Temperature Range Fully Loaded.
REFERENCE 1	2.5V rms @ 4mA max in Phase with Power Outputs	Additional 7% max Change No Load to Full Load.
REFERENCE 2	2.5V rms @ 4mA max 90° Phase Advanced WRT Power Outputs	N.B. All Outputs Vary Proportional to +V Supply
POWER SUPPLY	+12V to +15V	
	100mA max	No Load
	500mA max	Full Load
−V	−12 to −15	
	20mA max	Independent of Load
TEMPERATURE RANGE		
Operating	0 to +70°C	
Storage	−55°C to +125°C	
SIZE	3.125″ × 2.625″ × 1″	
	(79.4mm × 66.7mm × 25.4mm)	
WEIGHT	8 oz	
	224g	

NOTE
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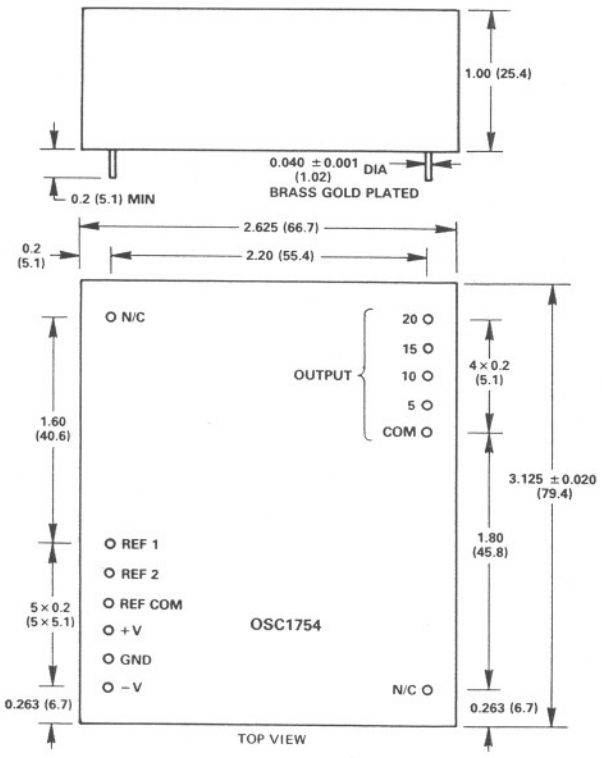
OUTLINE DIMENSIONS

Dimensions shown in inches and (mm).



ABSOLUTE MAXIMUM VALUES

+V Pin . . . . . +18V
−V Pin . . . . . −18V

APPLICATION OF OSC1754 AND IPA1751

The diagram below shows a "hookup" with the preamplifier power oscillator and an IRDC1733 with an Inductosyn. Precise application information is not possible as the Inductosyn in its application has many variables.

Current Set Resistor

This resistor is used to match the voltage output of the oscillator to the Inductosyn track resistance and provide the manufacturer's recommended current. By variation of the voltage outputs and current resistance, track by this up to approximately 30 feet (9.1 meters) can be accommodated.

Decoupling

The preamplifier and oscillator have internal high frequency decoupling capacitors on the supply lines, however, it is recommended that electrolytic decoupling capacitors are connected close to the module pins.

Channel Gains

There are several ways to achieve a signal value of 2.5V rms at the converter input. When setting gains it is important that the 2.5V rms signal is the maximum in either channel.

Within the limits set by noise, slider exactation can be varied. A useful feature of the tracking converter is its ability to reject incoherent and common mode noise.

As the input impedance of the IRDC is resistive, the gain can be scaled by the addition of series resistors. The required value is 2.22kΩ per excess volt, the mismatch being more important than the absolute value. A mismatch of 0.1% in the values gives rise to an error of 0.0000787 of the Inductosyn pitch.

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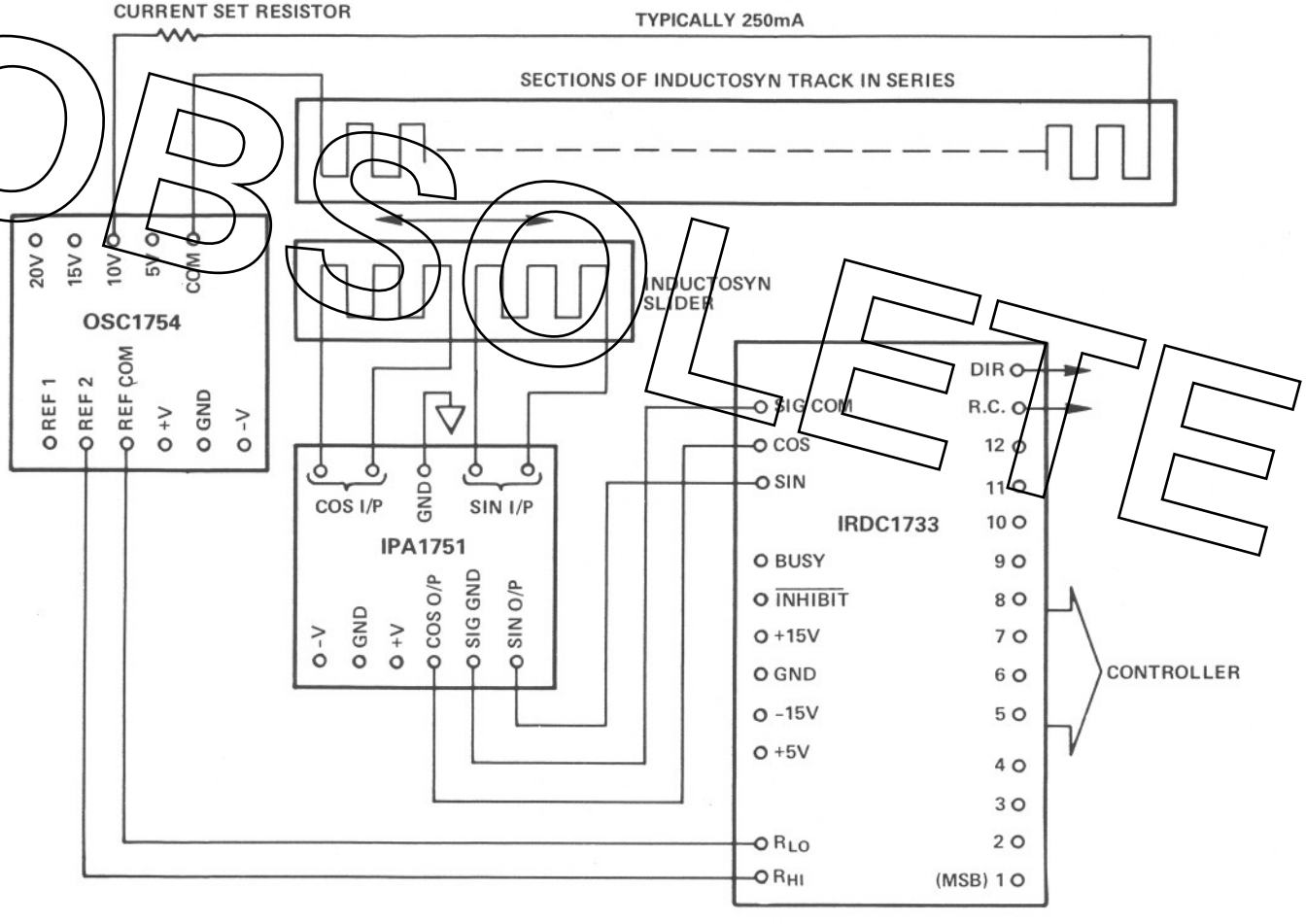

Use of IRDC1733 with Inductosyn Preamplifier IPA1751 and Power Oscillator OSC1754

ORDERING INFORMATION

IPA1751/560 Preamplifier 0 to +70°C
OSC1754/500 Oscillator 10kHz, 0 to +70°C