

**Indian Institute of Technology Delhi**  
**Electrical Engineering Department**

14-08-2013.

**Sub : NIQ for AC Modular Servo System with Function Generator.**

On behalf of duly constituted purchase committee, sealed quotations are invited from the OEMs & Authorized dealers for **AC Modular Servo System with Function Generator** as per specifications given below.

**1. AC Modular Servo System with Function Generator:**

The AC Modular Servo System with Function Generator setup needs to consist of the following components.

**a. AC Modular Servo System:**

Modular servo trainer to permit construction and study of position and speed control systems of various types. It should consist of the following modules/units, combinations of which can be interconnected to form the electrical and mechanical system. Modules should conform to the following specifications:

1. **AC Motor:** Two Phase A.C. Induction Motor Unit, Front Panel with motor waveforms monitoring facility. Current limiting circuit and modulator circuit to transform a DC tachogenerator signal into an AC tacho signal. Accessories: inertia disc, hexagonal spacer with hubs & collars, 30mm long shaft and compatible spanners.
2. **Syncro Transmitter** of standard mechanical dimension with an auxiliary drive motor, the armature energized by an emitter follower, the speed controlled by potentiometer with maximum speed not less than 75 rev./min and the stroboscopic track on the calibrated dial permitting accurate adjustment down to 1 rev/s.
3. **Synchro Transformer Unit** of standard mechanical dimension with calibrated position indicating dial including a stroboscopic disc; with capability of direct coupling to the motor low – speed output shaft by the feedback coupler provided.
4. **Reduction gear tacho unit** Speed reduction ratio of at least 30/1 and a panel to display speed and external DC voltage. Accessories: 2 Hexagonal coupling, each complete with four 'O' rings.
5. **Servo Amplifier** to drive the motor to which it may be connected via 12-way socket with a protective circuit to limit the motor current under overload condition.
6. **Attenuator Unit:** Twin calibrated potentiometers mounted in one case, available for gain and tacho feedback control.
7. **AC Pre-amplifier Unit** with summing facilities for signals from two channels, one of which should have a phase – adjusting control with phase range greater than 150 degrees. An active filter network should be provided for the use in compensation experiments.

*S. Jeyanthan*

**8. Modular/Demodulator Unit:**

- (i) Modulator Section, with a bandwidth of about 60Hz and to be used in conjunction with the operational amplifier unit for injection of suppressed carrier test signals into the system.
- (ii) Demodulator Section: Phase Sensitive rectifier and filter unit for use with 50/60 Hz carriers. Adjustable phase shift network covering 0 to 180 degree to correct the reference input.

9. **Operational Amplifier Unit** with facilities for accepting multiple inputs and should provide for multiple feedback arrangements. It should be operable as a summing amplifier and as a block to introduce extra time constants into the system.

10. **Loading Unit** with thin brake disc to provide variable viscous loads for the motor.

11. **Power Supply:** This unit is used to power the servo motor. It should be operable at 230 V 50 Hz supply. It should be capable to deliver an output of 24V DC, 2A when Unregulated, connectable directly to the servo amplifier via 12 – way socket & Stabilized DC at +/- 15V, 150mA on 4mm sockets to operate smaller amplifier units and to provide reference voltages. 9V – 0 - 9V rms at supply frequency on 4mm sockets to operate an AC error channel. An 18V rms at 50 Hz should be available to provide reference phase.

12 **AC Compensator Unit:** This unit should be capable of realizing various forms of transfer function

13. Leads, base plate couplings and tools set.

All the above units must be compatible with one another and should be connected with standard connectors, which should be provided along with the units. Coupling for the base plate along with appropriate tools set should also be provided.

b. **Function Generator:** The Function Generator conform to the following specifications :

- [1] Output : Sine, square and triangle waveform
- [2] Frequency range : 0.001Hz to 1MHz
- [3] Pushbutton selection of frequency, Range selection x1.0, x0.1, x0.01, x0.001
- [4] Main output of 20V pk to pk,
- [5] Switched and variable attenuation
- [6] TTL-compatible output
- [7] Continuous availability of triangle output at 2V
- [8] Voltage control of frequency (VCF)
- [9] Operates from 200-250V, 50 Hz
- [10] DC offset  $\pm 10$  variable

**Terms and Conditions:-**

Please submit the TECHNICAL and FINANCIAL bids in separate sealed envelopes. Mark the two envelopes clearly as “**Technical Bid**” and “**Financial Bid**”. Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as Quotation for as “**AC Modular Servo System with Function Generator**”. The quote should reach the following address on or before **10/09/2013 up to 5.00PM**.

*S. Jandhona*



**Name : Dr. S. Janardhanan**

**Address : Control Lab,  
Room No. II-214,  
Department of Electrical Engineering,  
IIT Delhi, New-Delhi – 110016 ( India )**

Only those quotations delivered specifically at the aforementioned location, and properly acknowledged, would be considered. Quotations delivered at any other location would not be considered.

1. Please quote the price at FOB / CIF New- Delhi, inclusive of installation charges.
2. Quote should be in Indian Rupees as well as US Dollars or GBP and to be valid for at least three months.
3. Attached all technical literature and list of similar installation done in India.
4. Warranty as per OEM.
5. Mention if you can provide any technical support like training of IIT Delhi personnel at IIT Delhi or in your factory and providing a technical person for operation of the equipment for the initial period of 2 years. Kindly mention about this in technical bid.
6. If the quote is being submitted by the representative of the principals/manufactures themselves, a valid Agency ship/ Dealership certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.
7. The institute reserves the rights to accept/reject any/all quotations without assigning any reasons thereof.
8. Complete set of manuals for the operation of the equipment should be given. All circuit diagrams, other mechanical and electrical schematics must be provided to main unit, sub systems and accessories.
9. Delivery within 20 weeks on receipt of PO.
10. Clearly specify the installation requirements – Such as space, power, frequency, environment ( Temperature and Humidity) .
11. If the item quoted are proprietary in nature, please enclose proprietary certificate from the principals stating “certificate that ----- is proprietary item of M/s ----- and no other manufacture make these items”.
12. If the bidder is Indian agent, the agency certificate should be enclosed.
13. Please produce compliance certificate for the specification.
14. Please ensure that the Indian agent has been enlisted with the Department of Expenditure, evidence may please be attached.
15. All bank charges payable in India are to buyer’s account and the bank charges in seller’s country to seller’s account.

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**( Dr. S. Janardhanan )**

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