

**SERIES 400V  
VARIABLE FREQUENCY  
OSCILLATORS**

## SECTION I GENERAL INFORMATION

### 1-1. INTRODUCTION

1-2. The Series 400V variable frequency oscillators are plug-in units which provide frequency-determining signals for the Elgar AC Power Sources. Elgar Corporation manufactures two types of variable frequency oscillators; the decade dial oscillators which provide digital selection of frequency from 10 to 10990 Hz in three push-button selected ranges, and the narrow-range continuously-variable oscillators with frequency ranges of 45-70 Hz, 350-450 Hz, and 300-500 Hz. Single-, two- and three-phase versions of both types of oscillators are available. The oscillator frequencies are stable and accurate and the signal amplitude is stable, but uncalibrated. The signal amplitude is variable, at the front panel of the associated Elgar AC Power Sources, from zero to the full rated output of the power source.

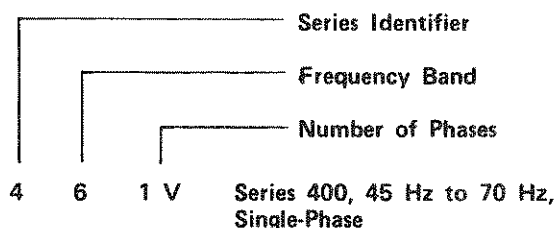
### 1-3. SCOPE OF MANUAL

1-4. This manual describes the Elgar Series 400V variable frequency oscillators. It includes specifications, operating instructions, circuit description with circuit diagrams, maintenance information and parts list.

### 1-5. MODEL NUMBERING SYSTEM

1-6. The decade dial oscillators are designated Model 401V, 402V or 403V, the last digit indicating single-, two- or three-phase capability. The narrow range, continuously variable oscillators are identified by a three-digit number for single-band units and a four-digit number for two-band units. The numbering system is described in Figure 1-1. Frequency digit 3 denotes a frequency range of 300-500 Hz; frequency digit 4 denotes 350-400 Hz; and frequency digit 6 denotes 45-70 Hz.

#### A. Single Band Identification Model Number:



#### B. Dual Band Identification Model Number:

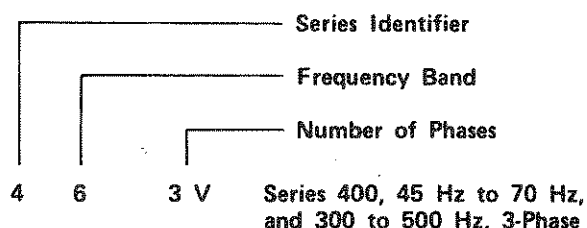


Figure 1-1. Model Numbering System

## 1-7. GENERAL DESCRIPTION

1-8. The oscillator plugs into the front panel of the Elgar power source and is secured by two cap-screws. Frequency output of the decade dial oscillator is selected by three decade switch dials and a vernier potentiometer which provides continuous resolution between the least significant decade frequency steps. Pushbutton switches select ranges of 10-109 Hz, 100-1099 Hz and 1000-10990 Hz.

1-9. Frequency output of the narrow-band continuously variable oscillators is controlled by a calibrated vernier potentiometer on the front panel which gives continuous resolution between the lowest and highest frequencies of the operation frequency band. Two-band instruments have push-button selectors on the front panel for high or low frequency band selection. Output frequencies available are:

Low band:	45 Hz to 70 Hz
High band:	350 Hz to 450 Hz or 300 Hz to 500 Hz

## 1-10. RESISTANCE PROGRAMMING

1-11. When an Elgar Plug-In Oscillator has been equipped for resistance programming the output voltage of the AC Power Source the model number will indicate so by including a "P" at the end of the number.

1-12. Resistance programming is accomplished by connecting an external resistor between pins 11 and 12 of Connector J1, located on the rear panel of the AC Power Source. The value of the resistor is typically at 500 ohms per volt, refer-

enced to the output of the AC Power Source on the 0.0 to 130V range.

1-13. The external resistor is in fact taking the place of the feedback resistor in the operational amplifier circuit of the oscillator. It is important to know that during initial calibration this resistor must be matched to the input resistor of the operational amplifier to obtain a gain of 1. Once this is accomplished the front panel amplitude control may be rotated to the desired full scale output voltage on the AC Voltage Meter located on the front panel of the Power Source. The reading is typically 130V and in effect provides the 500 ohms per volt calibration.

## 1-14. TANDEM OPERATION

1-15. For all single phase Series 400 Plug-In Oscillators whose model number ends in a T (4X1.XXT) R115, a 475 ohm, 1% resistor and a jumper between pins 9 and 21 have been added for tandem operation.

1-16. For all two or three phase oscillators whose model number ends in a T (4X3.XXT) a jumper has been added between pins 9 and 21 for tandem operation. (Note: R115 is already present.)

1-17. The addition of the jumper between pins 9 and 21 enables the master AØ signal to also be routed to the slave unit allowing the system to be operated in the tandem configuration.

## 1-18. SPECIFICATIONS

1-19. Specifications for the Series 400V oscillators are listed in Table 1.

Table 1-1. Specifications

OUTPUT SIGNAL AMPLITUDE	Approximately 2 VRMS
HARMONIC DISTORTION	Less than 0.25% of oscillator output
FREQUENCY ACCURACY	
Decade Dial Oscillators	$\pm 1\%$ of set value
Narrow Range Oscillators	$\pm 0.25\%$ of set value
TEMPERATURE COEFFICIENT	
of Output Amplitude	$\pm .02\%$ /°C
of Output Frequency	$\pm .02\%$ /°C

Model	Output Frequencies	Output Configuration
401V	X 1/10 range . . . . . 10-109.9 Hz	1 Phase
402V	X 1 range . . . . . 100-1099 Hz	2 Phase
403V	X 10 range . . . . . 1000-10990 Hz	3 Phase
461V		1 Phase
462V	45-70 Hz	2 Phase
463V		3 Phase
441V		1 Phase
442V	350-450 Hz	2 Phase
443V		3 Phase
431V		1 Phase
432V	300-500 Hz	2 Phase
433V		3 Phase
4641V		1 Phase
4642V	Low Band . . . . . 45-70 Hz	2 Phase
4643V	High Band . . . . . 350-450 Hz	3 Phase
4631V		1 Phase
4632V	Low Band . . . . . 45-70 Hz	2 Phase
4633V	High Band . . . . . 300-500 Hz	3 Phase

NOTE: External Sync, optional in all models, denoted by ES after model number.

## SECTION II

### PRELIMINARY INSPECTION AND OPERATION

#### 2-1. INSPECTION UPON RECEIPT

2-2. The Elgar plug-in oscillators are aligned, calibrated, and tested prior to shipment. The instrument is therefore ready for immediate use upon receipt. The following checks should be made however, to assure the instrument has suffered no damage during shipment.

2-3. Make a visual inspection of the shipping container prior to accepting the package from the carrier. If extensive damage to the shipping container is evident, a description of the damage should be noted on the carrier's receipt, and signed by the driver or carrier agent. If damage is not apparent until the instrument is unpacked, a claim for concealed damage should be placed with the carrier and all shipping containers and filler material saved for inspection. Forward a report of damage to the Elgar Service Department, who will provide instructions for repair or replacement of the instrument.

2-4. Visually inspect instrument for physical damage when it is removed from shipping container. Test functional operation of instrument as soon as possible. If damage is evident, or instrument does not function properly, notify the carrier immediately. Carrier's claim agent will prepare a report of damage to be forwarded to the Elgar Service Department. You will be advised as to the action necessary to have the instrument repaired or replaced.

#### 2-5. INSTALLATION

2-6. The oscillator is quickly and easily installed by plugging it into the space provided on the front

panel of the Elgar power source. When oscillator is fully inserted, and the captive screws secured, the unit is ready for operation.

#### NOTE

Remove power from amplifier when installing oscillator.

#### 2-7. OPERATION

2-8. After installation in the Elgar power source, the oscillator operates automatically, receiving its power from the power source and requiring only that the front panel controls be set for the desired frequency and range. The amplitude of the power source output is controlled by the AMPLITUDE control on the front panel of the power source. In two- and three range oscillators, off-frequency operation and excessive output amplitude may result if none or more than one of range switch push-buttons are depressed simultaneously.

#### NOTE

The frequency calibration of the decade dial oscillator is accurate only when the vernier pot is in the CAL position.

#### 2-9. OPERATION WITH EXTERNAL SYNC

2-10. Oscillators with model numbers ending in ES are equipped for external synchronization. The external sync signal should be approximately 10V peak-to-peak either sine or square wave. This signal is transformer isolated in the oscillator to avoid

cross-grounding problems. The external sync terminals are connected to pins 11 and 12 of the Jones S312AB receptacle on the rear panel of the Elgar power source. The phase angle between the power source output and the synchronizing signal is a function of the synchronizing signal amplitude and waveshape and of the difference between the oscillator free-running frequency and the sync signal frequency. This phase angle may be varied somewhat by slightly varying the oscillator tuning. Figure 2-2 illustrates a typical Plug-in Oscillator/AC Power Source interconnection.

#### 2-11. INTERCONNECTIONS FOR TWO OR THREE PHASE OPERATION

2-12. Three-phase oscillators may be installed directly in Elgar three-phase power sources without special connections. Where two-phase or three-phase power sources are made up by stacking two or three of the Elgar single-phase power sources, the oscillator is installed in the A-phase power source. Oscillator signals are carried to the B-phase and C-phase power sources through a cable (furnished with the oscillator) interconnecting the Jones S312AB sockets on the rear panels of the power source. The B-phase and C-phase sources must have Model 400-B and 400-C dummy plug-ins installed to complete the signal interconnection. The front panel AMPLITUDE con-

trol on the A-phase power source acts as a master control to vary all the outputs simultaneously, while the B-phase and C-phase AMPLITUDE controls act merely as balance controls to set the B-phase and C-phase output voltages equal to the A-phase output voltage.

2-13. With those single-phase Elgar power sources which have dual output windings, two power sources may be interconnected for three-phase wye operation. One of the output windings on each of the A-phase and B-phase sources is used for the A-phase and B-phase outputs. The C-phase output is synthesized by inverse series connection of the remaining two windings, as diagrammed in Figure 2-1.

#### 2-14. EXTERNAL SIGNAL

2-15. Single-phase continuously-variable oscillators are equipped with a front-panel closed-circuit jack for external signal operation. A 2-3 VRMS external signal may be introduced by plugging a Switchcraft No. 750 plug into the jack, the closed-circuit jack automatically disconnecting the internal signal. The front panel AMPLITUDE control is effective with the external signal connection.

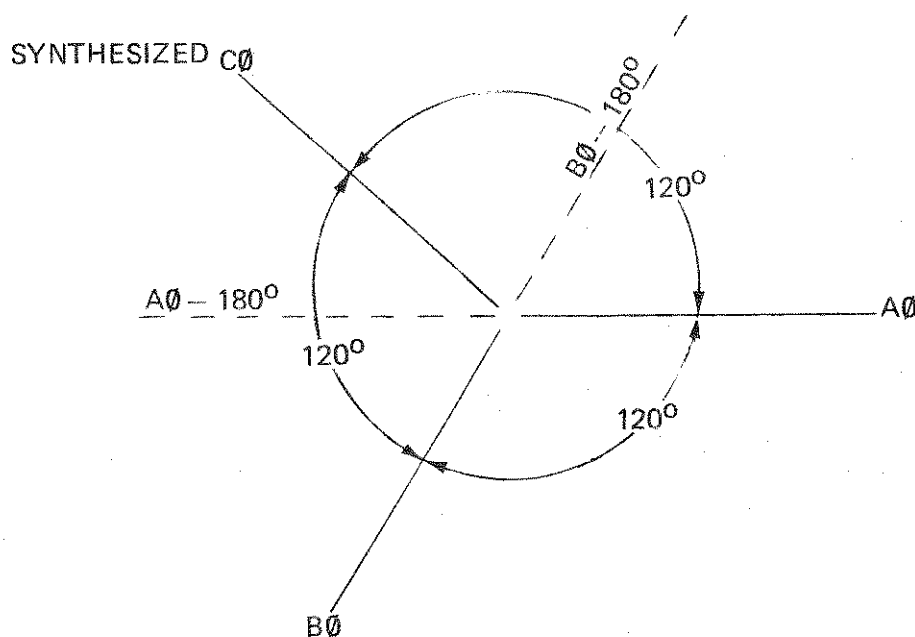


Figure 2-1. 2 Amplifier 3Ø Wye Configuration

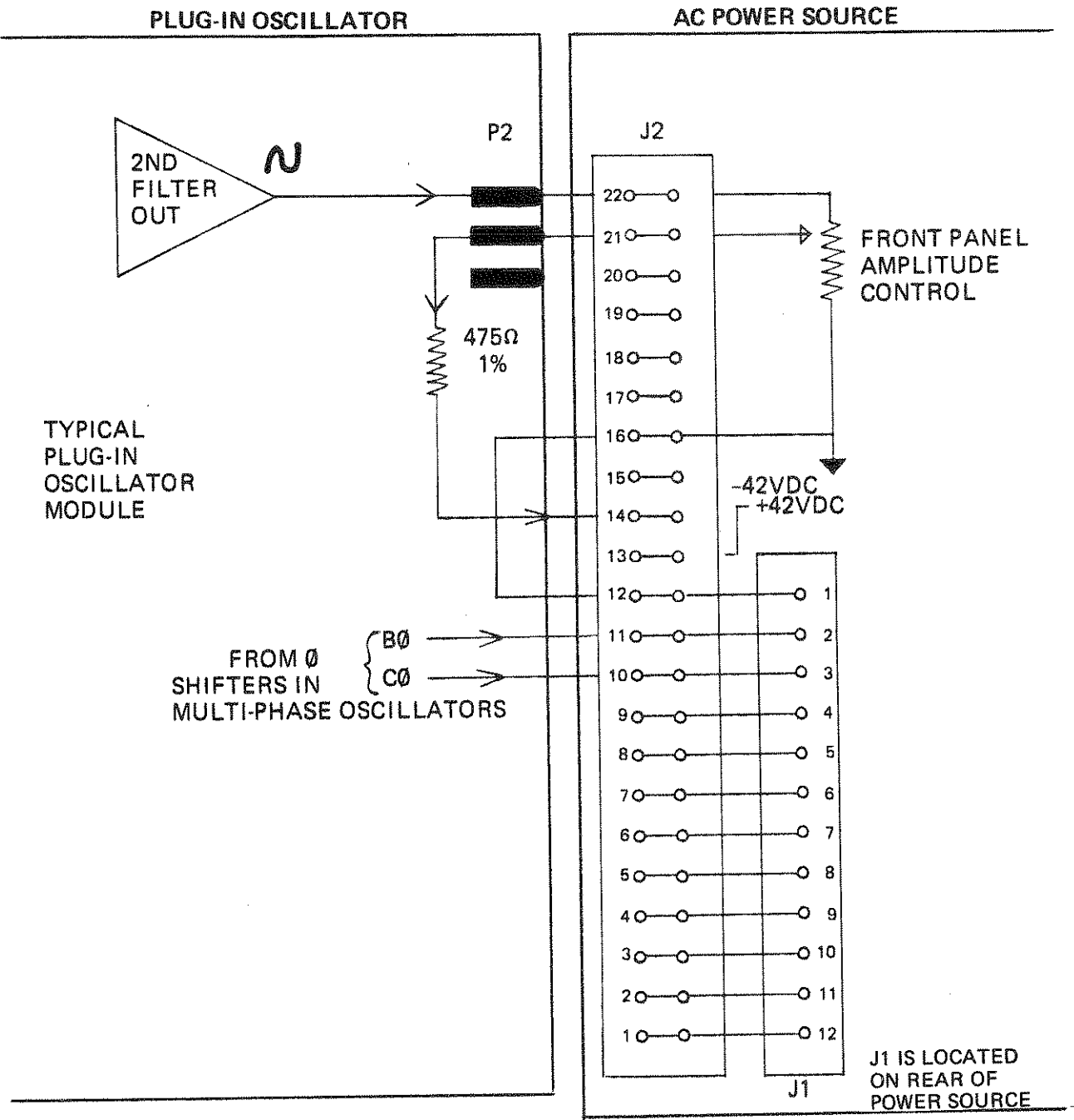


Figure 2-2. Typical Plug-in Oscillator/Power Source Interconnection