ORION-EMG
"ORISTROB" STROBOSCOPE
TYPE 2371/B

APPLICATION

The stroboscope is siutable primarily for the measurement of rotating or vibrating speed of revolving or vibrating mechanism and for invesigation of such motions during their operating time, in form of vers slow moving or standing images. It is possible to watch many movements apparently in slow motion or apparently standing still. Typical uses are found in investigating motors, ventilators, belt-transmissions, cogwheels, gear, valve shafts, fast moving threads, bands, vibrating or bending springs etc.

Due to the considerable illuminating power simultaneous investigation may be done by several persons, so the instrument is very useful for demonstration purposes.

A very useful application of the stroboscope is the adjustement of several indenpendent machnies or machine parts to a common revolution rate, furthermore convenient determination of the revolution of low torque mechanisms without applying mechanical load.

DESCRIPTION

Fig. 1. shows the control panel of the instrument, Fig. 2 the circuit diagram and Fig.3 the arrangement of the tubes. The designations on the Figs. are identical with those used on the list of components.

The instrument consists of a variable frequency multivibrator, a flash-lamp and a power supply.The multivibrator may be tuned from 10 to 250 c/s in two ranges.

An 1/μF charging condenser in connected parallel to the flash-lamp. When applying a positive plus to the control grid of the lamp, the condenser discharges through the gas-filled lamp causing an intensive flash of 5-10 microsecond duration. The necessery trigger pulses may be taken from the multivibrator or from the mains. Another possibility is the use of an externel contactor or a separate electrical pulse generator. In all these cases the lamp gives flashes corresponding to the control frquency.

The flash-lamp is located in a chromiumplated parabolic reflector so that its 1 inchlong flashing arc is exactly in the focus.

On the control panel are to be found mains switch /2/, phase switch /S3/, synchronizing input terminals /2/ and /2/ input and /1/ output terminal connecting to phase shifter and synchronizer/. Next to these is selector switch /S/. On the top of case we find the frequency control disc with illuminated scale drum, calibrated directly in r.p.m.

For casier reading two zeros from the end of the characters are ommited and the dial-reading shall be multiplied by 100/ e.g. at dial-reading 30 the right value is 3000 r.p.m./. The various positions of the selector switch are indicated by pilot lamps located above. When in use,the instrument's handle may be held in the left hand and the control knobs can be operated by the right hand for easiest convenience.

SETTING INTO OPERATION

Before plugging the line cord into the power socket, the line voltage selector must be adjusted to the mains voltage wanted.After reoving of four fastening screws on the left si de wall, the instrument may be pulled out rightward of its box.Now the mains transformer terminal board is accessible and the adjustment necessary may be done after Fig.2. After actuating the mains switch on the control panel, allow five minutes for a proper warming-up, to get the necessary inner temperatur for measuring with accuracy given in technical date.

OPERATING INSTRUCTIONS

When illuminating with the light of a flashlamp, a rota - ting periodically moving or vibrating object at certain frequency seems to be standing or slow moving. The image of the object will be standing, when the rotation or vibration pro second /frequency/ is identical with the flashing frequency of the lamp. Standing image may appear also when the flashing frequency is 1/2, 1/3, 1/4, or 2,3,4 times of the frequency of

movement. In order to indentify the correct frequency, turn the frequency control dial from the highest speed towards lower speed until the single standing image appears. This is the correct rotating or vibrating frequency which may be read in r.p.m. or c.p.s. respectively. It is advisable to use, at examination of rotating bodies, a clearly recognizable mark on the body itself /e.g. chalk-mark/. If you see only on mark, the speed or quotient thereof may be read of the scale.

If the revolution rate to be examined is greater than that of the flashing frequency, the scale must be tuned to two synchronized frequences started from the highest speed. If the two readings are X and Y respectively, the true revolution rate will be obtained as follows:

$$\text{r.p.m.} = \frac{X \cdot Y}{X - Y}$$

where X ist the higher scale value. At very high speed the value of X and Y are progressively lower and the result in more inaccurate. This inaccuracy may be eliminated by choosing X and Y points far from each other and by using the formula.

$$\text{r.p.m.} = \frac{X \cdot Y}{X - Y}$$

where n is the number of images between X and Y.

At revolutions lower than the lowest flashing frequency this latter will be divided by the number of images observed. This may be applied with good resultat very low speeds too, provided that the working room has been darkened.

The selector switch of the instrument has six positions. At the first two the flash lamp is driven by the builtin multivibrator. In the third position the lamp is controlled by the 50 c/s mains frequency, and in the fourth position an external mechanical contactor may be connected trough terminals /20/ to the instrument. In the fift and sixth positions the multivibrator can be synchronized externally. This synchronization may be done up to 3000 r.p.m. in the fifth and up to 15.000 r.p.m. in the sixth position. The synchronizing signal will be connected to terminal /20/ also.

At above messurements, the phase switch /3/ is in its lower position.

The stroboscope lamp may be controlled by external electrical pulses also. In this case the phase-switch shall be switched-over and the pulse signal will be connected to the input terminals /2/.

In this upper position of the phase-switch, the signals of the multivibrator may be obtained at output terminal /1/ for messuring, calibrating or investigating of any other electronic instrument.

There is a possibility for calibration of the built - in multivibrator during its operation also. A built - in vibrating reed, placed into the reflector serves for this purpose. This vibrating reed is actuated by the 50 c/s mains voltage, showing thereby apparently standing image at the mains frequency and its harmonics. Turn the scale drive to 3000 r.p.m. and adjust potentiometer /P2/ until the reed seems to be standing. After this, repeat the adjustement et 750 r.p.m. With potentiometer /P4/. Should occur some displacement relating the divisions at one end of the scale, this can be corredted by potentiometer /P1/ and the scale ends are checked again.

In the following table some calibrating points are collected for calibration of several r.p.m. by using the vibrating read:

Scale r.p.m.	Frequency c/s.
600	10
666.6	11.1
750	12.5
857.1	14.3
1000	16.66
1200	20
1500	25
2000	33.3
3000	50

At these revolutions the vibrating reed shows always a standing image. The above values are obtained by dividing the 6000/min. frequency of the reed by 10, 9, 8, 7, 6, 5, 4, 3 and 2.

Perfectly standing image may be obtained by using an external mechanical contactor.

The potentiometers serving for calibration may be adjusted trough bores provided on the back panel, the first bore serving for potentiometer /P2/ the second for potentiometer /P1/ and the third for potentiometer /P4/.

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TECHNICAL DATA

Revolution rates measurable resp. testable		
with besic frequency	:	600 - 15.000 rpm
with multiple frequency	:	up to 100.000 rpm
Accuracy above 750 rpm	:	± 2 %
under 750 rpm	:	± 5 %
Number of flashes	:	600 - 15.000 flashes/min
Flashing duration	:	5 - 10 /usec
Flashing rate	:	10 - 250 c/s adjustable in two ranges
Modes of synchronisation	:	Internal synchronisation /by multivibrator/
		Internal synchronisation /with 50 cps/
		External synchronisation
Tubes	:	6J6, NSP2 /NSP1/, AZ 21
Pilot lamp	:	5 pieces 6.5 V, 0.1 A
Power consumption	:	approx. 75 Watt
Finish	:	Enamelled steel-sheet casing with leather handles
Dimensions	:	280x220x220 mm
Weight	:	16.5 lbs /7.5 kg/

SERVICE INSTRUCTIONS

The principles to be followed in service are the same as those used with any other electronic apparatus. No particular maintenance is necessary for the instrument.

It must be mentioned again, that the output voltage of the multivibrator may be obtained ath the output terminals. Its operation is therefore easily controlable without opening the casing by using an oscilloscope.

After removing the four testening screws on the leftside wall, the instrument may be pulled out of its case.

By careful use of control knobs and switches, the life of the instrument may be increased considerably. It must not be forgotten, that the life of a stroboscope-lamp is limited. In order to make full use of the stroboscope-lamp an intermittent use is recommended. The instrument must not be turned on for more than 15 minutes in an hour in order to the longest possible life. For the same reason the supply voltage /mains voltage/ must not exceed its nominal value by more than 5 %. In the case of a higher line voltage, a dropping resistor or regulating transformer must be used.

The parabolic reflector must be kept clean and dustfree.

LIST OF COMPONENTS

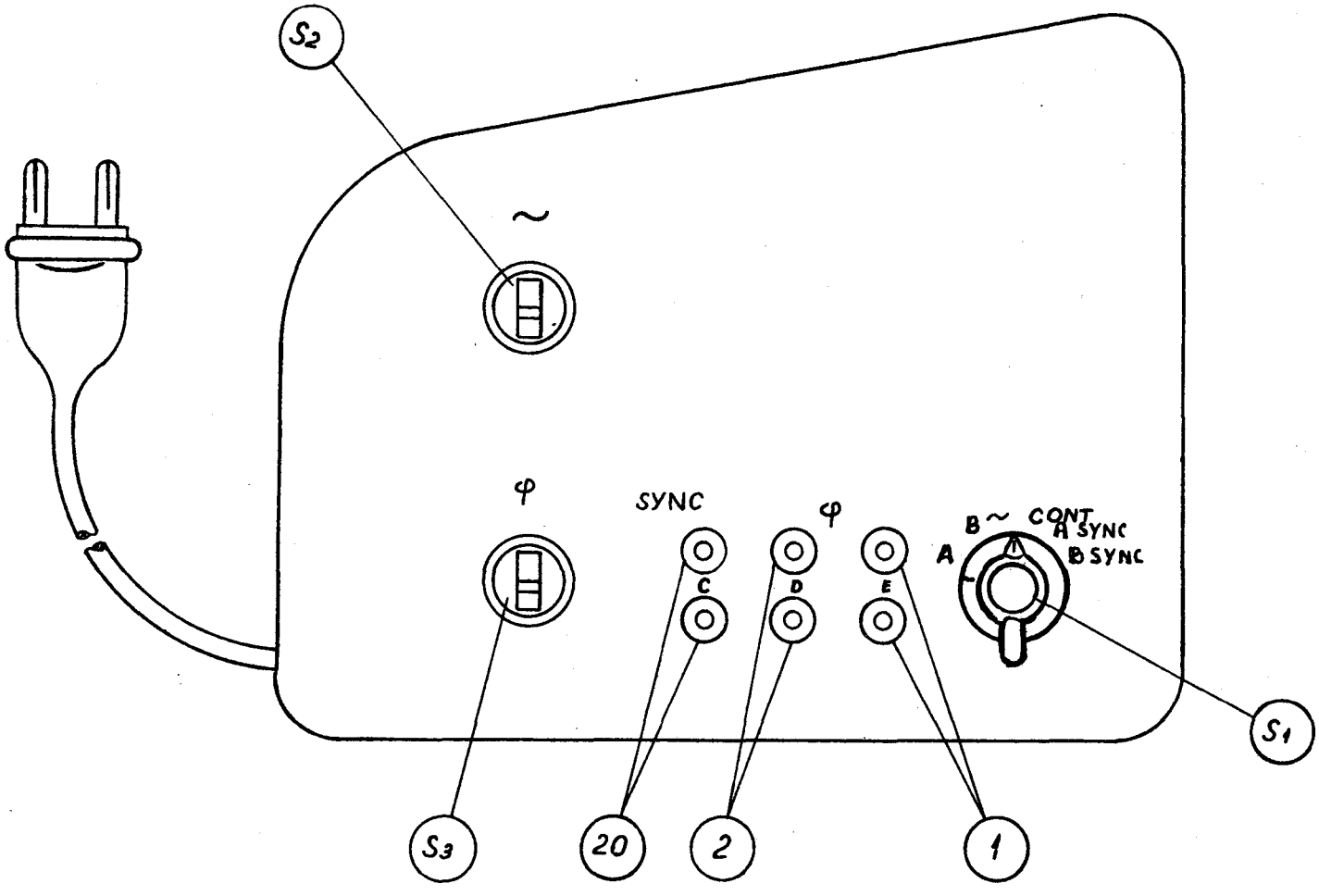
No.	Denomination	Value		Toler ± %	Working voltage Volt	Rated capacity Watt
C 1.	Paper condenser	1	nF	20	400	
C 2.	" "	10	"	20	400	
C 3.	" "	1	"	20	400	
C 4.	" "	50	"	20	400	
C 5.	" "	1	"	20	400	
C 6.	" "	10	"	20	400	
C 7.	" "	50	"	20	400	
C 8.	" "	1	"	20	400	
C 9.	Ceramic condenser	100	pF	10	350	
C10.	Electrolytic cond.	4	µF		450/500	
C11.	Paper condenser	1	nF	20	400	
C12.	" "	1	µF	10	400	
C13.	Electrolytic cond.	32	"		450/550	
L 1.	Vibration-coil					
P 1.	Potentiometer	220	kOhm	10		0.3
P 2.	Wire potentiometer	8.5	"	10		3
P 3.	"	50	"	10		12
P 4.	"	8.5	"	10		3
P 5.	"	10	"	10		3
R 1.	Resistor	330	kOhm	10		0.5
R 2.	"	100	"	10		1
R 3.	"	100	"	10		1
R 4.	"	10	"	10		1
R 5.	"	510	"	10		0.5
R 6.	"	10	"	10		1
R 7.	"	47	"	10		1
R 8.	"	20	"	10		1
R 9.	"	51	"	5		3
R10.	Wire resistor	6	"	10		15
R11.	Resistor	470	"	10		0.5
R12.	Wire resistor	3	"	10		15
R13.	Resistor	68	"	5		3
R14.	"	10	"	10		1
S 1.	Switch					
S 2.	Mains switch					
S 3.	Switch					

No.	Denomination	Value	Toler ± %	Working voltage Volt	Rated capacity Watt
T 1.	Mains transformer				
V 1.	Tube	6J6			
V 2.	"	NSP2			
V 3.	"	AZ21			
V 4.	Pilot lamp	6.5 V, 0.1 A			
V 5.	"	6.5 V, 0.1 A			
V 6.	"	6.5 V, 0.1 A			
V 7.	"	6.5 V, 0.1 A			
V 8.	"	6.5 V, 0.1 A			
1.	Terminal				
2.	"				
20.	"				
34.	Voltage selector				
35.	Fuse				
38.	Power cord and plug				

1962. január
IV.jav.kiadás

Fk.: Kiskapusi László

"TEMPÓ"KSZ./Msz:122.A/4. 9 old. 300 p./
Fv.: Szendrő Sándorné



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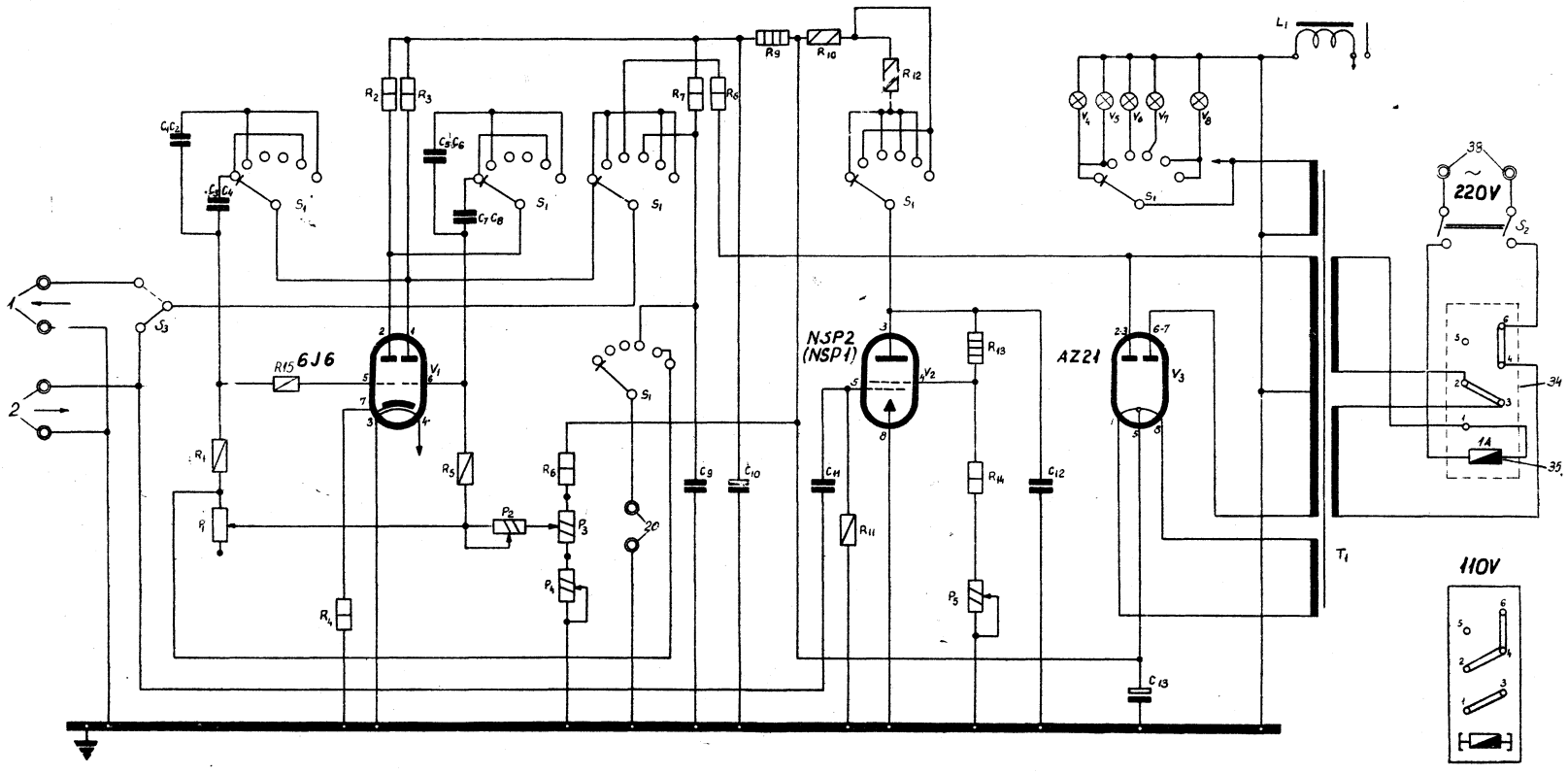

A C_2, C_4, C_6 és C_7 kondenzátorok értékei a C_1, C_3, C_5 és C_8 kiegészítő kondenzátorok értékeivel, amelyek válogatással az elektromos beállításkor egymással párhuzamosan kötendők be, adják a beírt kapacitás összértéket.

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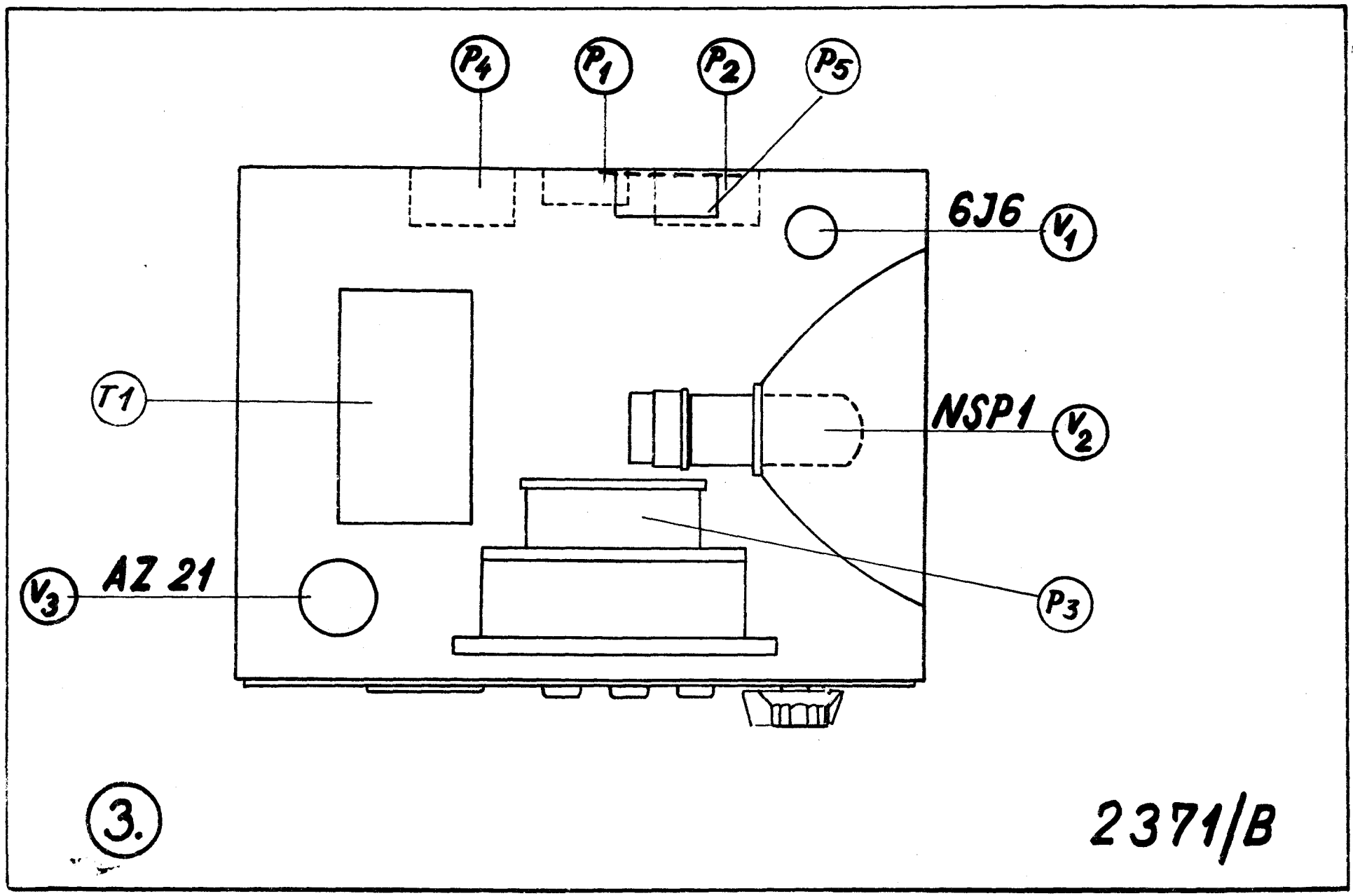
P4
P1
P2
P5
6J6
V1
T1
NSP1
V2
V3
AZ 21
P3
3.
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