SYLVANIA NEWS

TECHNICAL SECTION

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ANNOUNCING SYLVANIA 3" OSCILLOSCOPE NEW SERVICE INSTRUMENT

One of the most useful instruments in any service shop is an oscilloscope, and of the several possible sizes probably the three inch is the most popular. Sizes smaller than the three inch are extremely convenient for portable work but the pattern obtainable is a little small for most purposes. The five inch and larger types are certainly best for laboratory and precision work, but are more expensive and bulky than many serviceman would like.

Figure 1 shows the Sylvania Type 131 oscilloscope designed for servicemen and now added to the fast growing line of Sylvania service instruments. Previously announced were the type 134 Polymeter (Sept. Sylvania News) and the type 139 and 140 Tube Testers (August News).

Figure 2 shows the complete schematic diagram. The heart of the instrument is of course the Sylvania type 3AP1 Cathode Ray tube. The saw tooth oscillator uses the well-known type 884. Two type 7C7's are used for the horizontal and vertical amplifiers, and the high voltage is supplied by a type 5Y3GT. Amplifier voltages are supplied by a type 7Y4.

The sweep circuit covers the range of 15 cycles to 40,000 cycles per second with 5 steps on the selector switch. Provision is also made for external synchronizing when desired. The amplifier response is uniform within 3 db. from 10 cycles to 100 kilocycles and has a sensitivity sufficient to cause a one inch total deflection with a maximum of 0.5 volts rms input. When the amplifiers are disconnected by turning the gain switches to the lowest position the deflection plates are connected directly to the input giving a sensitivity of approximately 19 volts rms per inch peak to peak.

Since the circuit cut was prepared a change has been found advisable in R17 in order to allow a factory adjustment of the low frequency sweep. Resistor R17 becomes a 400 ohm potentiometer with a 750 ohm fixed resistor between it and ground.

SYLVANIA TYPE 131 OSCILLOSCOPE

FIGURE 1

The instrument is equipped with a removable transparent scale and a hood is provided to reduce the effect of room lighting on the screen visibility.

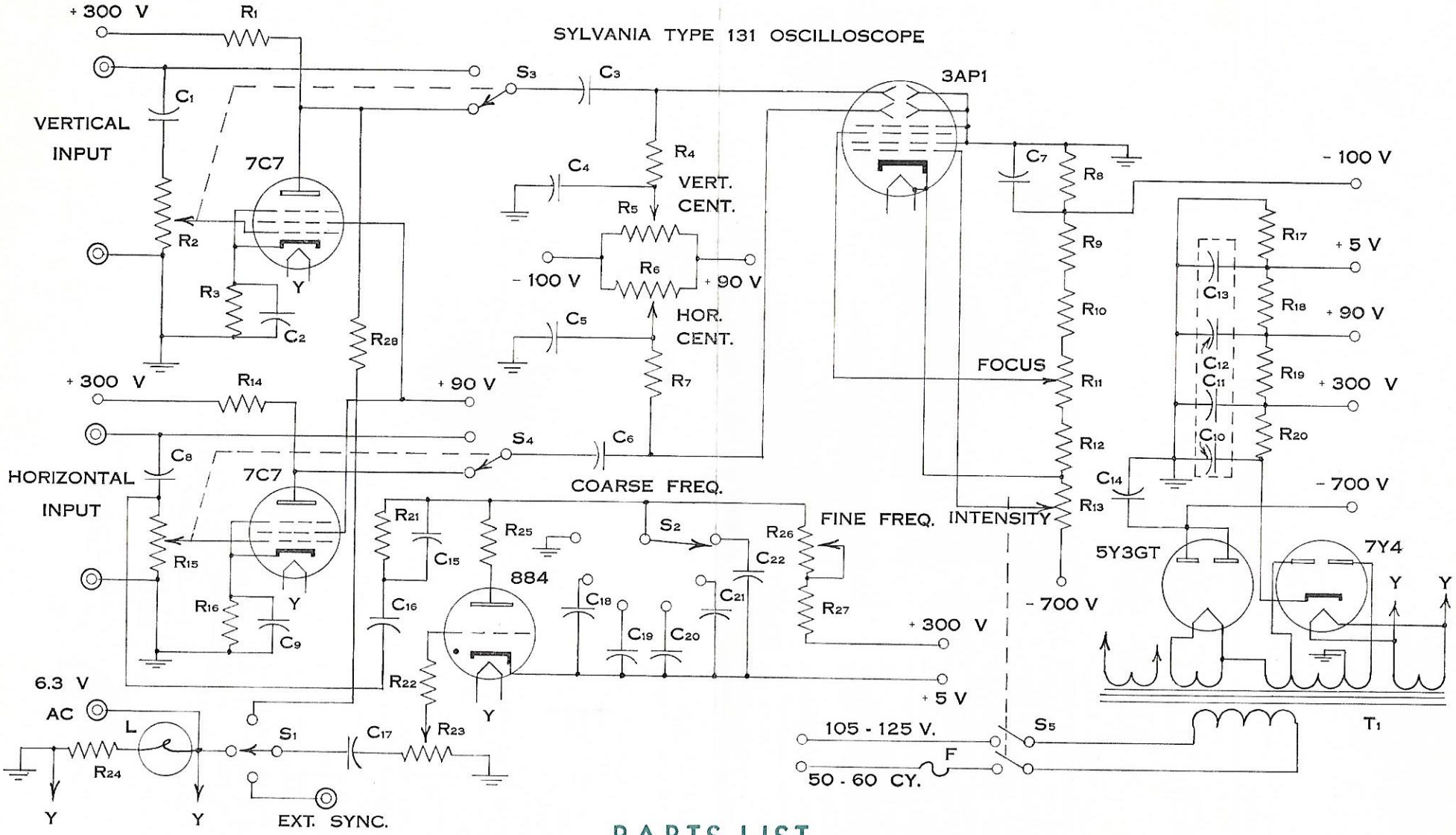
All the controls, including those for beam centering are on the front panel and the interior layout is specially designed to permit ready access to any part for replacement if it should ever be necessary.

Specific operating instructions will not be repeated here as they are familiar to most servicemen and are given in the instruction book included with the instrument. Suggested hook-ups for use in checking or adjusting audio amplifiers, receiver alignment, filter circuits and hum analysis are also included in the instruction book.

Radio amaters and experimenters will also be interested in other uses such as modulation measure-

(*Continued on page T-36*)

COMPLETE SCHEMATIC CIRCUIT



PARTS LIST

SYMBOL	DESCRIPTION	RATING	% TOL.
C1	Condenser, Tubular Paper	0.25 μf., 600 V.	+30, −20
C2	Condenser, Tubular Paper	0.004 μf., 400 V.	+20, −10
C3	Condenser, Tubular Paper	0.1 μf., 400 V.	+30, −20
C4	Condenser, Tubular Paper	0.01 μf., 400 V.	+30, −20
C5	Same as C4		
C6	Same as C3		

SYMBOL	DESCRIPTION	RATING	% TOL.
C7	Same as C1		
C8	Same as C1		
C9	Same as C2		
C10	Condenser, Can Type Electrolytic	10 μfd., 450 V.	
C11	Condenser, Can Type Electrolytic	10 μfd., 450 V.	
C12	Condenser, Can Type Electrolytic	10 μfd., 450 V.	
C13	Condenser, Can Type Electrolytic	20 μfd., 25 V.	

PARTS LIST (Continued)

SYMBOL	DESCRIPTION	RATING	% TOL.
C14	Condenser, Can Type Paper	1.0 μf., 1000 V.	
C15	Condenser, Mica	10 μμf., 500 V.	±10
C16	Condenser, Tubular Paper	0.5 μf., 400 V.	+30, −20
C17	Same as C3		
C18	Condenser, Tubular Paper	0.25 μf., 400 V.	±20
C19	Condenser, Tubular Paper	0.04 μf., 400 V.	±20
C20	Condenser, Tubular Paper	0.008 μf., 400 V.	±20
C21	Condenser, Mica	1000 μμf., 500 V.	±10
C22	Condenser, Mica	220 μμf., 500 V.	±10
F	Fuse, Type 3AG	1 ampere	
L	Lamp—Incandescent Bayonet	6-8V., 0.15 A.	
R1	Resistor—Composition	82,000 ohms, ½ W.	±10
R2	Resistor—Variable, linear taper	1 meg., ½ W.	±20
R3	Resistor—Composition	820 ohms, ½ W.	±10
R4	Resistor—Composition	2.2 meg., ½ W.	±10
R5	Resistor—Variable, linear taper	3 meg., ½ W.	±20
R6	Same as R5		
R7	Same as R4		
R8	Resistor—Composition	0.15 meg., ½ W.	±10
R9	Resistor—Composition	0.1 meg., ½ W.	±10
R10	Same as R8		
R11	Resistor—Variable, linear taper	0.15 meg., ½ W.	±20
R12	Resistor—Composition	68,000 ohms, ½ W.	±10
R13	Resistor—Variable, linear taper	35,000 ohms, ½ W.	±20
R14	Same as R1		
R15	Same as R2		
R16	Same as R3		
R17	Same as R3: See article for change		
R18	Resistor—Composition	15,000 ohms, 1 W.	±10
R19	Resistor—Composition	33,000 ohms, 2W.	±10
R20	Resistor—Wire wound	3000 ohms, 10 W.	±5
R21	Same as R4		
R22	Resistor—Composition	27,000 ohms, ½ W.	±10
R23	Resistor—Variable, Audio taper	50,000 ohms, ½ W.	±20
R24	Resistor—Composition	33 ohms, ½ W.	±10
R25	Resistor—Composition	390 ohms, ½ W.	±10
R26	Resistor—Variable, linear taper	4 meg., ½ W.	±20
R27	Resistor—Composition	0.39 meg., ½ W.	±10
R28	Resistor—Composition	1.0 meg., ½ W.	±10
S1	Switch—Rotary, S.P. 3T Non-shorting		
S2	Switch—Rotary, S.P. 6T Non-shorting		
S3	Switch—Variable Resistor Mounting S.P. 2T		
S4	Switch—Variable Resistor Mounting S.P. 2T		
S5	Switch—Variable Resistor Mounting 2P. S.T.		

MORE DATA ON EUROPEAN TUBES

Requests for information on the proper Sylvania tubes to be used as substitutions for European types are still a fair percentage of our mail. The following list is in addition to those previously published in the December 1945 and the March-April 1946 issues. Reference is made to the base figures shown in the December issue. Those of you who were not on our mailing list at that time may obtain a copy of this issue on request.

TABLE I

Type	Base Figure	1	2	3	4	5	6	7	8	Notes
ABC1	4	H	S	P	NC	Dp	Dp	K	H	(2)
ABL1	4	H	NC	P	Gs	Dp	Dp	K+S	H	(2)
AB1	1	H	P	H	S					(9) K in center
ACH1	7 Pin	H	K+S	P	Go	Ga	Gs	H		(2)
AC6/Pen	7 Pin	H	K	Gs	S	P	Su	H		(2)
AF3	4	H	S	P	Gs	NC	Su	K	H	(2)
AF7	4	H	S	P	Gs	NC	Su	K	H	(2)
AK1	7 Pin	H	K+S	P	Ga	G1	Gs	H		(2)
AK2	4	H	S	P	Gs	Go	Ga	K	H	(2)
AL3	4	H	NC	P	Gs	G	NC	K	H	
AL4	4	H	NC	P	Gs	G	NC	K	H	
AM2	4	H	NC	P	T	G	tie to K	K	H	
AX1	1	F	P	F	P		tie			
AZ1	4	F	NC	F	NC	NC	P	NC	F	
B409	1	F	P	F	G					
B443/S	1	F	P	F	G					Gs in center
CBC1	4	H	S	P	NC	Dp	Dp	K	H	(2)
CB2	5 Pin	H	P	P	K+S	H				
CF7	4	H	S	P	Gs	NC	Su	K	H	(2)
CK1	4	H	S	P	Gs	Go	Ga	K	H	(2)
CL2	4	H	NC	P	Gs	NC	NC	K+Su	H	(2)
CL4	4	H	NC	P	Gs	NC	NC	K+Su	H	(2)
CY1	4	H	NC	P	NC	NC	NC	K	H	
DAC21	2	F	S	P	NC	NC	Dp	NC	F	(2)
DBC21	2	F	S	P	NC	Dp	Dp	NC	F	(2)
DF21	2	F	S	P	Gs	NC	Su	NC	F	(2)
DF22	2	F	S	P	Gs	NC	Su	NC	F	(2)
DK21	2	F	S	P	Go	Gs	NC	Ga	F	(2)
DLL21	2	Fc	Gt1	Pt1	Gs	Gt2	Pt2	F	F	
DL21	2	F	NC	P	Gs	G	NC	NC	F	
D1	Not Given									
EBF2	4	H	S	P	Gs	Dp	Dp	K	H	(2)
EBL1	4	H	NC	P	Gs	Dp	Dp	K+S	H	(2)
EBL21	2	H	P	G	Gs	Dp	Dp	K+Su	H	
ECH21	2	H	P	Ga	Go	Gs	G	InjG	H	(6)
EFM11	3	NC	RC	P	G	K	T	H	H	
EF8	4	H	S	P	G3	G2	G4	K	H	(2)
EL2	4	H	NC	P	Gs	NC	NC	K	H	(2)
EM1	4	H	NC	P	T	G	NC	K	H	
EZ2	4	H	NC	P	NC	NC	P	K	H	
E443H	1	F	P	F	G					Gs in center
E446	1	H	Gs	H	G					(9) K in center
E449	7 Pin	H	K+S	P	G4	G3	G2	H		(2)
HL41DD	2	H	K	P	NC	Dp	S	Dp	H	(2)
KTW61	2	S	H	P	Gs	Su	NC	H	K	(2)
Pen 45	2	H	K	P	Gs	G	S	NC	H	
SP41	2	H	K	P	Gs	Su	S	NC	H	(2)
SP42	2	H	K	P	Gs	Su	S	NC	H	(2)
T41	2	H	K	P	NC	G	S	NC	H	
UU4	1	H	P	H+K	P					
U21	1	H	NC	H+K	NC					(9)
U2020	4			F			F			
VP41	2	H	K	P	Gs	Su	S	NC	H	(2)
X65	2	NC	H	P	Gs	Go	Ga	H	K	(2)
Y61/Y63	2	NC	H	P	G	RC	T	H	K	
43IU	1	H	P	H+K	P					
225DU	7 Pin	F1	F1	P1	NC	P2	F2	F2		

Notes:
(2) Cap connected to grid.
(6) Cathode connected to locking lug.
(9) Cap is connected to plate.

Abbreviations.
Dp—Diode Plate
G—Control Grid
H—Heater
K—Cathode
Su—Suppressor Grid
InjG—Injector Grid
F—Filament
Ga—Oscillator Anode
NC—No Connection
T—Target
S—Shell
Fc—Filament Center
Go—Oscillator Grid
Gs—Screen Grid
P—Plate
T1, 2—Triode 1 or Triode 2

Pin numbering system used in above table and in figures is arbitrarily taken similar to the RMA system used in this country. It is probably different from any European system which may appear on either the socket or the tubes.

This information has been compiled from various sources and while we believe it is correct, we can accept no responsibility for errors.

CORRECTION

A mistake slipped into the article on Selenium rectifiers last month. In the first paragraph the maximum operating voltage is stated as 76 volts per disc. The correct figure of course is 26 volts per disc since 5 times this gives 130 volts the rated maximum voltage for A. C. lines.

EUROPEAN TUBE DATA *Cont'd.*

Required Type	Filament Volts	Filament Current	Suggested Replacement	Rewire Socket D	Change Socket E	Realign F	Add Top Cap Connection G	Remove Cap Connection H	Change Bias or Plate Volts K	Notes (1)
ABC1	4.0	0.65	7B6	D	..	..	G	..	..	(2)
			7C6	D	..	..	G	..	..	(2)
			7E6	D	..	..	G	..	..	(2)
ABL1	4.0	2.25	7C5 + duodiode or change complement to make a duodiode available from another substitution.							(2)
AB1	4.0	0.65	7A6	..	E	..	..	H	..	(2)
			6H6GT	..	E	..	..	H	..	(2)
ACH1	4.0	1.0	6J8G	..	E	F	..	..	..	(2)
			7J7	D	..	F	..	H	..	(2)
			7S7	D	..	F	..	H	..	(2)
AC6/Pen	4.0	1.75	42	..	E	..	..	H	..	(2)
			2A5	..	E	..	..	H	..	(11)
			7C5	..	E	..	..	H	..	(2)
AF3	4.0	0.65	7A7	D	..	F	G	..	..	(2)
			7B7	D	..	F	G	..	..	(2)
AF7	4.0	0.65	7C7	D	..	F	G	..	..	(2)
			6J7G	..	E	F	..	..	..	(2)
AK1	4.0	0.65	2A7	..	E	F	..	..	..	(11)
			6A7	..	E	F	..	..	..	(2)
			7A8	..	E	F	G	..	..	(2)
AK2	4.0	0.65	7J7	D	..	F	G	..	..	(2)
			6J8G	..	E	F	..	..	..	(2)
			7A8	D	..	F	G	..	..	(2)
			2A7	..	E	F	..	..	..	(11)
AL3	4.0	1.85	42	..	E	..	..	..	..	(2)
			6F6	..	E	..	..	..	.	(2)
			7B5	D	..	..	..	..	..	(2)
			2A5	..	E	..	..	..	..	(11)
AL4	4.0	1.75	7C5	..	E	..	..	..	..	(2)
			6V6GT	..	E	..	..	..	..	(2)
4AM2	4.0	0.32	2E5	..	F	..	..	..	..	(11)
			6E5	..	E	..	..	..	..	(2)
			6U5	..	E	..	..	..	..	(2)
AX1	4.0	2.0	80	..	E	..	..	..	..	(2)
			5Y3G	..	E	..	..	..	..	(2)
AZ1	4.0	1.1	80	..	E	..	..	..	..	(2)
			5Y3G	..	E	..	..	..	..	(2)
B409	4.0	0.15	49	..	E	..	..	..	..	(11)
			112A	..	E	..	..	..	..	(2)
B443/S	4.0	0.15	1J5G	..	E	..	..	..	..	...
			1G5G	..	E	..	..	..	..	...
CBC1	13.0	0.20	14E6	D	..	..	..	H	..	...
			6K7GT	..	E	..	..	..	..	...
			6SR7	..	E	..	..	H	..	...
CB2	13.0	0.20	7A6	..	E	..	..	..	..	...
			6H6	..	E	..	..	..	..	...
CF7	13.0	0.20	14C7	..	E	F	..	H	..	...
			12J7GT	..	E	F	..	..	..	...
CK1	13.0	0.20	14B8	D	..	F	..	H	..	...
			12A8GT	..	E	F	..	..	..	...
			14J7	D	..	F	..	H	..	...
CL2	24.0	0.20	35A5	..	E	..	G	..	..	...
			35L6GT	..	E	..	G	..	..	...
CL4	30.0	0.20	35A5	..	E	..	..	H	K	...
			35L6GT	..	E	..	..	H	K	...
CY1	20.0	0.20	35Z3	..	E	..	..	..	..	...
			35Z5GT	..	E	..	..	..	..	...
DAC21	1.4	0.025	1LH4	D	..	..	..	H	..	...
DBC21	1.4	0.05	1N5G	..	E	Use as triode for Transformer coupling				
			1LN5	D		Use as pentode for Resistance coupling				
DF21	1.4	0.025	1LN5	D	..	F	..	H	..	...
			1LC5	D	..	F	..	H	..	...
DF22	1.4	0.05	1N5GT	..	E	F	..	..	..	...
			1LN5	D	..	F	..	H	..	...
DK21	1.4	0.05	1LA6	D	..	F	..	H	..	(4)
			1A7GT	..	E	F	..	..	..	(4)
DLL21	1.4	0.10	None	..	..	..	..	..	..	...
			Use two tvpe 1C5G or 1A5G Change circuit to use one output pentode.							
DL21	1.4	0.05	1LA4	D	..	..	..	..	..	...
D1	4.0	0.20	2W3GT	..	E	..	..	..	..	(11)
			2V3G	..	E	..	..	..	..	(11)
			2X2	..	E	..	..	..	..	(11)
			2Z2	..	E	..	..	..	..	(11)
EBF2	6.3	0.20	7R7	..	E	..	..	H	Parallel Heaters	
			14R7	..	E	..	..	H	Series Heaters	
EBL1	6.3	1.50	7C5 + duodiode or change complement to make a duodiode available from another substitution.							
EBL21	6.3	0.90	Same as EBL1	..	..	..	..	..	..	...
ECH21	6.3	0.33	7S7	D	..	F	..	..	..	(8)
			7J7	D	..	F	..	..	..	...
EFM11	6.3	0.20	6N5	..	E	..	..	..	..	(10)
EF8	6.3	0.20	None	..	..	..	..	..	..	...
			Recommend change in circuit to use 7A8, 6A8G, etc.							
EL2	6.3	0.20	7B5	..	E	..	..	H	..	...
			6K6	..	E	..	..	H	..	...
			6F6	..	E	..	..	H	..	...
EM1	6.3	0.20	6N5	..	E	..	..	..	..	...
EZ2	6.3	0.40	7Y4	..	E	..	..	..	..	...
			6X5GT	..	E	..	..	..	..	...
E443H	4.0	1.1	47	..	E	..	..	..	..	(11)
			42	..	E	..	..	..	..	(2)
			2A5	..	E	..	..	..	..	(11)
E446	4.0	1.1	57	..	E	F	..	..	..	(11)
			(Note: Cap is plate connection)							
			77	..	E	F	..	..	..	(2)
E449	4.0	1.2	None	..	..	..	..	..	..	...
			Recommend change in circuit to use 7B7 or 7A7							(2)
HL41DD	4.0	0.65	7E6	D	..	F	..	H	..	(2)
			6R7G	D	..	F	..	..	..	(2)
KTW61	6.3	0.30	6SK7GT	D	..	F	..	H	..	...
			6K7GT	D	..	F	..	..	..	...
			7A7	..	F	F	..	H	..	...
Pen 45	4.0	1.75	46	..	E	..	..	..	..	(11)
			47	..	E	..	..	..	..	(11)
			6V6	..	E	..	..	..	..	(2)
			7C5	D	..	..	..	..	..	(2)
SP41	4.0	0.65	7V7	D	..	F	..	H	..	(2)
			7W7	D	..	F	..	H	..	(2)
SP42	4.0	0.95	7V7	D	..	F	..	H	..	(2)
			7W7	D	..	F	..	H	..	(2)
T41	4.0	1.5	884	..	E	F	..	..	..	(2)
			885	..	E	F	..	..	..	(11)
UU4	4.0	2.2	80	..	E	..	..	..	..	(2)
			5Y3G	..	E	..	..	..	..	(2)
U21	2.0	1.65	2X2	..	E	..	..	..	..	...
U2020	110-125	0.200	Ballast Tube; See December 1945 Sylvania News.							
VP41	4.0	0.65	7H7	D	..	F	..	..	..	(2)
			7AH7	D	..	F	..	..	..	(2)
X65	6.3	0.30	6J8G	D	..	F	..	..	..	...
			7J7	..	E	F	..	H	..	...
Y61/Y63	6.3	0.30	6E5	D	..	..	..	..	..	(10)
			6G5	D	..	..	..	..	..	...
43IU	4.0	2.5	80	..	E	..	..	..	..	(2)
			5Y3G	..	E	..	..	..	..	(2)
225DU	4.0	0.5	Two 2W3	..	E	..	..	..	..	(11)

Notes

(2) The filament of the suggested type may not be hot enough to work properly unless the primary taps permit adjustment to the correct voltage.

(4) Filament type triode-hexode converters are not made here. The suggested converters should work with the same coils.

(8) The European tube has the injector grid of the hexode brought out separately. Connect this to the oscillator grid when replacing with the recommended substitute.

(10) Change circuit to standard American practice. Ray control is internally connected in our tubes.

INTERCHANGEABLE TYPES

RE134	Same as B409
RES164	Same as B443S
RES964	Same as E443H
RENS1234	Same as E449
M/S Pen	Same as E446
4H2	Same as AF3
4V1	Same as ABC1
4E1	Same as AL4
14ONG	Same as AZ1

SYLVANIA TYPE 131 OSCILLOSCOPE

(*Continued from page T-33*)

ments, wave form analysis and frequency determination. Many other uses may also be found and as these applications become important to servicemen we will try to have detailed articles on the subject in the "News." Suggestions from servicemen on particular problems would be welcomed and if it seems that enough readers are interested we hope we can arrange for an article on the subject.

The type 131 oscilloscope is the latest addition to Sylvania's expanding line of test equipment. It is now available at your Sylvania distributor's.

A few references are listed below for those who wish to go into a more detailed study of certain problems: Guide to Cathode-Ray Patterns—Merwyn Bly; Measurements in Radio Engineering—F. E. Terman; Photographing Patterns on Cathode Ray Tubes—Electronics, Feb. '44; Industrial Applications of the Oscilloscope—Radio News, Nov. 1943; The Cathode Ray Tube at Work—John Rider.