HANDBOOK CHANGE SHEET

for

MODEL DY-2508A

DIGITAL CLOCK

PRODUCTION CHANGES

Serials prefixed 148-

Power Supply

Change CR1-CR10 to Diode, silicon, Stk. No. 1281-0028, Mfr. Texas Instru., 1N2071.

Add R8, Resistor, fixed, wirewound, 20 ohm, 10%, 5W, Stk. No. 1160-0010, Mfr. Ward-Leonard, type 5X.

Clock Circuits

Change CR102 to Diode, silicon, Stk. No. 1281-0028, Mfr. Texas Instru., 1N2071.

Use with DY-2508A handbook, pub. 5/61.

9/61

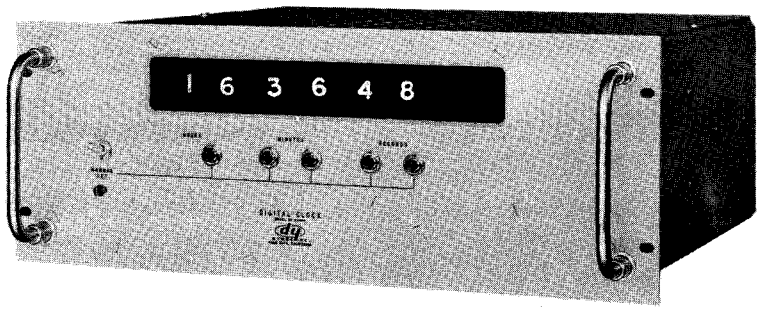
HANDBOOK

for

MODEL DY-2508A

DIGITAL CLOCK

Serials 067-076,
and serials prefixed 125-



DYMEC
A Division of Hewlett-Packard Co.
395 Page Mill Road, Palo Alto, California
 Pub. 5/61

HANDBOOK FOR DY-2508A DIGITAL CLOCK

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SECTION 1

GENERAL

1.1 PHYSICAL DESCRIPTION

The DY-2508A Digital Clock is designed for standard 19" rack mounting and is 7" high and 18" deep (including front panel, and rear panel connectors). Front-panel pull-handles extend an additional 2" out from the panel. The front panel is finished in non-reflecting grey baked enamel, with black-filled engraving.

Six neon-numeral tubes provide a front-panel display of hours, minutes and seconds on a 24-hour basis. Below these display tubes, five pushbutton switches are provided for quickly setting the clock's registration. Each switch independently advances the displayed number above it by one count each time it is pressed, providing the MANUAL SET toggle switch is also depressed. This spring-loaded toggle switch acts as a safety switch preventing accidental operation of the time set, and must be held down while setting the clock's registration.

To prevent loss of time due to accidental operation of a power switch, no on-off switch is provided. A resettable front-panel alarm light indicates whenever the power source has been interrupted, but does not interfere with the clock's return to operation. Pressing the MANUAL SET toggle switch extinguishes the alarm light, when power is restored.

The rear panel of the instrument contains all connectors, as well as a 1.6-ampere fuse.

1.2 ELECTRICAL DESCRIPTION

The DY-2508A Digital Clock is a 24-hour electronic timer which displays the instantaneous time of day in hours, minutes and seconds, utilizing 5/8-inch neon-numeral display tubes, in line. The clock's time data is also supplied in the form of multiple-contact-closure patterns available at output connectors on the rear panel.

The clock's output connections are normally factory-wired, according to specified requirements, to supply either a one-line, four-line or ten-line electrical coding, or some combination of desired codings. As many as four independent external devices (utilizing one-line or ten-line coding) can be operated simultaneously.

The clock can be used for programming system functions, and for adding precise time-of-day information to data-recording and processing equipment. Examples of its versatility include:

Wired for one-line (staircase) coding, it can be used with:
- The DY-2512 Card Punch Coupler
- The DY-2542 Tape Punch Coupler
- The Hewlett-Packard 560A Digital Recorder

Wired for four-line (BCD) coding, it can be used with:
- The DY-2530 Binary/Decimal Register
- The DY-2540 Scanner/Coupler

Wired for ten-line (decimal) coding, it can be used with:
- The -hp- 561B Digital Recorder
- Card Punches
- Electric Typewriters
- Remote Readouts

The clock's output circuits also can be wired to produce contact closures for operating external devices at predetermined times of day or time intervals, to provide precise one-second time markers, and for countdown applications. Contact closures are available for intervals of 1 second, 10 seconds, 1 minute, 10 minutes, 1 hour and 1 day.

A unique feature of the DY-2508A Digital Clock is its ability to hold a time reading for completion of an external function, without loss of a time count. Thus, there can be no ambiguity due to a time change during recording.

As furnished, the clock has provisions for using an external frequency standard of 1 cps as a time base. Internal frequency standards are available as accessories, in the form of self-contained plug-in units. Sockets for these units are contained

in the DY-2508A. One of these time base units is a line-frequency-controlled time base; the other is a 100-kc crystal-controlled time base. Both frequency standards employ phantastron dividers and provide an output frequency of 1 cps. (See drawings C1001-1003 and D2508-1005)

The one-per-second pulses from the time standard operate the first of a series of five stepping relays, each relay operating the next as it adds up (steps) time units obtained from the previous relay. The first row of contacts on each stepping switch is used for programming; the second row is used for lighting the neon-numeral tubes, and the remaining four rows are used for output connections to external devices. (Stepping Switch K105 is of double size, with 12 rows of contacts, but may be considered as two stepping switches mounted together, and operated by one relay.)

1.3 SPECIFICATIONS, ACCESSORIES AND OPTIONS

REGISTRATION:	In-line, 5/8" neon-numeral display, reading directly in hours, minutes and seconds, on a 24-hour basis.
TIME BASE REQUIREMENT:	External one-per-second pulses, ±15 volts, 10 microseconds minimum into 47K ohms. (Internal crystal or line-frequency-controlled plug-in time bases available. See Accessories.)
ACCURACY:	Equal to time base +0, -1 second, non-accumulative. Crystal-controlled 0.01%; line-frequency-controlled 0.1%, nominal.
PULSE OUTPUT:	Positive 10-volt, 35-millisecond, 1-pps marker pulses into a 1000 ohm load. Accuracy equal to time base with approx. 5-microsecond delay. Can be connected through time-of-day of time-interval contacts.

CONTACT-CLOSURE OUTPUT:

4-pole multiple-position switch for each digital place, optionally wired to produce the following codes:

1-line (staircase) code.
4-line (binary-coded decimal) code.
10-line (decimal) code.

SPDT contacts actuate each second for approximately 35 milliseconds. Additional contacts, with a single common connection, actuate at intervals of 10 seconds, 1 minute, 10 minutes, 1 hour and 1 day. At rest, contacts can carry up to 3 amperes a-c or d-c. One-second contacts, rated at 3 amperes non-inductive, can be used to synchronize the disconnection of loads during switching interval.

DIMENSIONS:

19" wide (for rack mounting), 7" high, 17" deep (from inside front panel to rear panel). Add 3/4" to depth for chassis connectors, and 2" for front-panel pulls, 3/16" for front panel.

POWER REQUIREMENT:

115/230 volts, 50/1000 cycle, 100 watts.

STANDARD OPTIONS:

1. First 1-line (staircase) output wiring.
2. Second 1-line (staircase) output wiring.
3. First 10-line (decimal) output wiring.
4. Second 10-line (decimal) output wiring.
5. 4-line (4-2-2-1 BCD) output wiring.
6. 4-line (8-4-2-1 BCD) output wiring.

(Either Option 5, Option 6, or any combination of Options 1 through 4, can be furnished. Other binary-decimal codes, output wiring, or a 12-hour clock available on special order.)

ACCESSORIES:

a. Line-frequency-controlled time base (Dymec Plug-in Unit 9010-0024)
b. Crystal-controlled time base (Dymec Plug-in Units 9010-0024 and 9010-0026)
c. Clock/Recorder Cable (staircase), 6 digits of time, 5 digits of data (Dymec Cable 9030-0012)
d. Clock/Recorder Cable (BCD), 6 digits of time (Dymec Cable 9030-0007)

SECTION 2
OPERATING INSTRUCTIONS

2.1 GENERAL

The operation of the DY-2508A Digital Clock is extremely simple. All connections are made at the rear of the chassis.

The Digital Clock is ready for use as soon as it is plugged into the power source. In order that the clock cannot accidentally be turned off, no on-off power switch is provided. A resettable front-panel alarm light indicates whenever the power has been interrupted. The light can be extinguished by depressing the momentary-contact toggle switch marked MANUAL SET. This alarm does not interfere with the clock's return to operation when power is restored, but merely indicates that there has been a power interruption. The MANUAL SET Switch also acts as a safety switch to prevent accidental operation of the five time-set pushbuttons, directly below the neon-numeral display tubes on the front panel. Each pushbutton independently advances the displayed number above it by one count each time it is pressed, provided that the toggle switch MANUAL SET is depressed. Thus, the clock's registration can be quickly set to the desired time.

When setting time exactly, it is convenient to first set the display several seconds ahead of the actual time; then hold down the MANUAL RESET switch, releasing it the moment that actual time reaches the clock's displayed time.

Caution

When manually setting time on the clock, do not set the units-second position to the number 9, as this may make the clock mis-count.

2.2 OPTIONAL FREQUENCY STANDARDS

The DY-2508A Digital Clock is equipped with two internal sockets, XA101 and XA102, which accept optional plug-in frequency standard units.

When neither of these units is installed, an external time base of one-per-second pulses ±15 volts, 10 microseconds minimum into 47,000 ohms, is required. In this case, the clock contains a dummy plug in place of XA102, which jumpers pin connections 2 and 5 of this socket. (See dwg. D2508-1002.)

When a line-frequency-controlled frequency standard (9010-0024) is installed, the dummy plug is removed from socket XA102, and a dummy plug is inserted in socket XA101, which jumpers pin connections 4 and 12 of this socket. The 9010-0024 unit is plugged into XA102. (See Dwg. C1001-1003.)

When the crystal-controlled frequency standard (9010-0026) is installed, the dummy plug in socket XA101 is removed, and the 9010-0026 unit is plugged into XA101; the unit 9010-0024 is plugged into socket XA102. (See Dwg. D1001-1005.) The 9010-0026 frequency standard uses a 100-kc crystal. By the use of phantastron dividers, the output frequency of this unit is 100 cps.

The input frequency into the 9010-0024 unit, when used alone as a line-frequency-controlled time base, is 60 cps. The input to this unit when used in conjunction with the 9010-0026 crystal-controlled time base, is 100 cps. In either case, the output frequency of the 9010-0024 unit will be 1 cps.

2.3 CONNECTIONS

The number and type of connectors mounted on the rear panel of the DY-2508A depends upon the requirements for which the clock is wired.

When wired for 1-line (staircase) code output, the standard Counter-to-Printer cable is plugged into the Clock's connector J101. A special Clock-to-Recorder cable (Dymec Cable 9030-0012) is then plugged into the Clock's connector J102 and into the Recorder's connector.

When wired for 4-line code output, and using an external device such as the DY-2540 Scanner/Coupler, the Counter is connected directly to the DY-2540. The clock's output to the DY-2540 is taken from the Clock's connector J102.

When wired for 10-line code output, and using an external device such as the -hp- 561B Digital Recorder, the Counter is connected directly to the 561B's connector J102. The Clock's output is taken from the Clock's connectors J109 and J110, and fed into the 561B's connector J101.

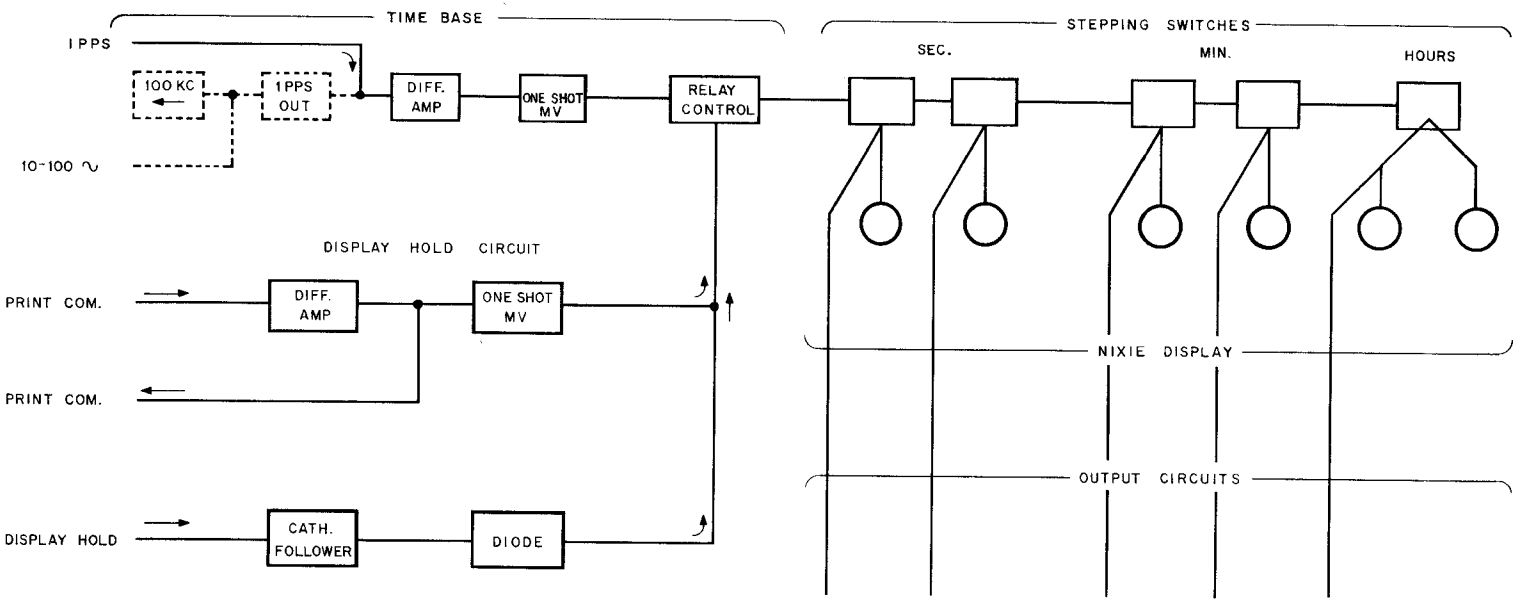


FIGURE 3-1. BLOCK DIAGRAM OF THE DY-2508A DIGITAL CLOCK

SECTION 3
THEORY OF OPERATION

3.1 GENERAL

(Refer to Block Diagram, Fig. 3-1 and Dwg. D2508-1002)

The DY-2508A Digital Clock consists, primarily, of pulse-shaping circuits, a display-holding circuit, relay control circuits, a bank of multiple-level stepping switches, visual and electrical readout circuits, and a power supply. The source of timing pulses for its time base can be an externally-generated signal, a power line signal, or a crystal-controlled oscillator signal. Whichever source is used, the end result must be a precise 1-cps timing pulse input. This pulse is obtained by shaping the 1-cps input signal with a multivibrator.

When using the power-line frequency as a source, the 9010-0024 plug-in unit (A102) is employed. Two phantastron dividers in this unit produce a 1-cps output signal. (See Dwg. C1001-1003.)

When using the 100-kc crystal-controlled oscillator plug-in unit 9010-0026 (A101), the crystal frequency is divided by three phantastrons, producing an output frequency of 100 cps. This output is then fed to A102, where it is further divided by two phantastrons to produce a 1-cps output signal. (See Dwg. D1001-1005.)

After shaping, the 1-cps pulse energizes pulsing control relay K106, which, in turn, operates stepping relay K101, moving it ahead one position for each pulse. Each stepping relay successively controls the operation of the next stepping relay, adding up time units obtained from the previous stepping relay.

The first level on each stepping relay programs the stepping sequence. The second level lights the number elements in the corresponding neon-numeral display tubes. The remaining levels produce coded contact closures for operating external equipment.

3.2 THE DISPLAY HOLD CIRCUIT

The display hold circuit prevents the clock from changing its display while a recorder is operating. It can also be utilized by other associated equipment to prevent a change in this equipment during a recording cycle.

The display hold circuit consists of a cathode-follower and a diode which pass a latching voltage to Relay K101, delaying its operation up to 0.9 second without loss of time count. This delay permits completion of an external function before the clock changes its display.

3.3 OPERATION OF THE PHANTASTRON CIRCUIT

(Refer to Dwg. C1001-1003.)

The phantastron is a pentode tube operating as a feedback integrator. When triggered by a negative pulse applied to its plate or control grid, a phantastron generates a precise negative pulse.

The integrating process which determines the pulse length is automatically terminated by the cathode-to-suppressor bias as the cathode moves positive during the integrating period.

Before integration begins, the circuit is in its stable state, the suppressor grid-to-cathode bias is negative, and all cathode current goes to the screen. Plate voltage is up to its supply level. As the phantastron is triggered, the negative pulse applied to the control grid causes the cathode to go negative, thus causing the suppressor grid voltage to become more positive than the cathode. Some cathode current is thus allowed to flow to the plate, thus dropping the plate voltage.

This drop in plate voltage, coupled through the plate-to-grid capacitor to the control grid, sharply decreases both the screen current and the cathode current. The decreased grid voltage will now try to return to its original stable level, discharging the capacitor through the grid-return resistor to B+.

As the grid tends to move positively toward its stable state, it increases the plate current, which in turn decreases the plate voltage and, via the coupling capacitor, tends to lower the voltage on the control grid. This degenerative action slows the rate of discharge of the capacitor (as compared to its discharge through simple resistance, it is slower by the amplitude factor of the tube).

As the control grid voltage moves positively, it increases cathode current and voltage until the cathode voltage becomes more positive than the suppressor. The suppressor instantly cuts off plate current and lets the plate voltage return to its supply voltage. This voltage rise, coupled to the control grid, further increases cathode current which now must go to the screen.

If plate saturation occurs prior to the time the cathode-suppressor voltage becomes positive, it simply hastens the process by removing the degenerative action caused by the previously decreasing plate voltage. The screen grid voltage is thus a positive pulse whose duration is the discharge time of the plate-to-grid coupling capacitor. This duration can be adjusted over a small range by varying the fixed bias applied to the control grid. The control-grid bias has a small effect on the capacitor discharging rate, more positive bias increasing the rate.

When using the phantastron as a frequency divider, a diode is used in series with the signal applied to the circuit. After the initial input pulse, the lowered phantastron plate voltage reverse biases the diode which blocks further incoming pulses until the plate voltage returns to normal at the end of the phantastron cycle.

The phantastron thus produces one output for a number of input pulses, depending upon the selected integration rate. If the input frequency is to be divided by 10, the integration time is set to last more than nine, but less than 10, periods of the input signal. Every tenth input pulse then triggers the circuit into another cycle of operation. If the input frequency is changed to a different multiple of the selected output frequency, the circuit continues to produce the same output frequency with the same accuracy.

SECTION 4
SERVICING INSTRUCTIONS

4.1 ADJUSTMENTS

Excepting for the time base plug-in units, 9010-0024 and 9010-0026, there are no electrical or mechanical adjustments in the DY-2508A Digital Clock. No circuit requires selected replacement parts or tubes.

4.1.1 Timing Signal Generators (See Dwgs. D1001-1005, C1001-1003.)

The 9010-0026 plug-in unit is adjustable over a very small range by the capacitor C1. In both 9010-0026 and 9010-0024 Timing Signal Generators, each phantastron divider has a potentiometer adjustment which establishes its output frequency. The adjustment is made by measuring the phantastron output frequency on an electronic counter and setting the potentiometer to the center of the range over which it produces the desired frequency. An oscilloscope may be used, as an alternative method.

The above minor adjustments are usually necessary only when a crystal or a tube is replaced.

4.2 MAINTENANCE

The only periodic maintenance required is the lubrication of the stepping switches, the period depending upon the amount of time the clock is in use. These switches are designed for long life and should last indefinitely. Lubrication instructions, as recommended by the manufacturer, are contained in this section. Also contained in this section are charts showing pin connections to connectors, as well as Clock-to-Digital Recorder Cable connections.

4.3 TROUBLE-SHOOTING

In case of failure, visually inspect the instrument, checking the connections between the clock and power source and other instruments; look for loose connections, poor contacts, damaged cables, signs of overheating, loose parts, unlighted tubes, etc. Then measure voltages from the power supply, and at various points in the circuits, comparing the values with those on the schematic diagrams. Check tubes by replacement or on a tube checker.

In case of improper operation, also check the Timing Signal Generators as in Para. 4.1.1; waveforms produced by the multivibrators may be checked on an oscilloscope or electronic counter.

4.4 LUBRICATING THE STEPPING SWITCH

Stepping switches are designed for long life; as with any running mechanism, they require lubrication according to the amount of use. The switches are lubricated at the factory; after the first 30,000 revolutions they should be lubricated again, but only at 150,000-revolution intervals thereafter. If the switch is used very little, lubrication is recommended at six-month intervals. The chart and procedure gives explicit details for lubrication. Attention to this detail will result in long satisfactory service.

(Refer to sketch on Page 4-4.)

1 to 8. ○ Apply Blended Lubricating Oil Spec. 5684 (blended mineral- and paraffin-base oils) as follows:

- 1, 2 — One dip at each end of switch shaft.
- 3 — One dip to each of the yoke bearings.
- 4, 5, 6 — One-half dip to pawl bearing (4). Spread the remainder through the coils of pawl spring (5) and its eyelets, and through the coils of driving spring (6).
- 7, 8 — Small amount to interrupter spring buffer (7) and indicator wheel off-normal lobes (8).

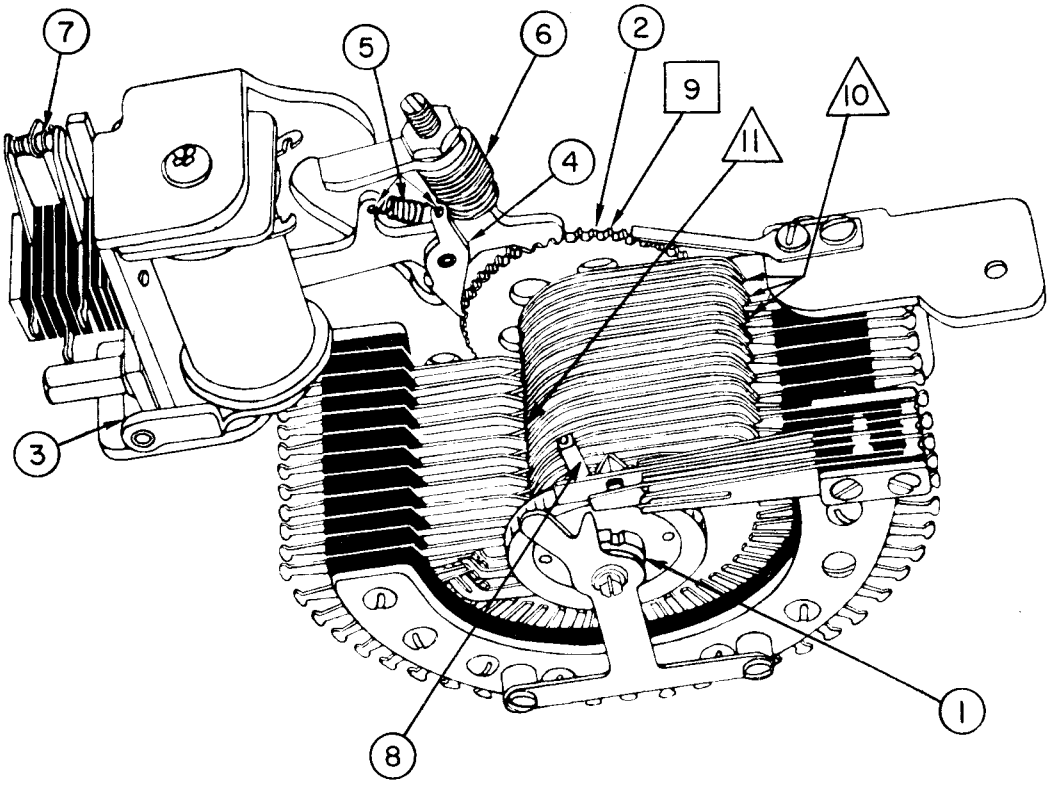
9. ◇ OR □ Apply two dips of Switch Lubricant Spec. 5232-C (blended oil and deflocculated graphite) to ratchet (9), spreading the lubricant evenly over all of the teeth.

10, 11. △ Apply Watch Oil Spec. 5228 (highly refined fish oil) as follows:

- 10 — One-third dip between the tips of each pair of wiper springs with the wipers standing off the bank. Rotate the switch and repeat for the other sets of wipers.
- 11 — One dip between each wiper pair in the path of the brush spring pairs.

Rotate the switch to distribute the lubricants. Wipe off excess lubricant. Do not over-lubricate.

TYPE 45



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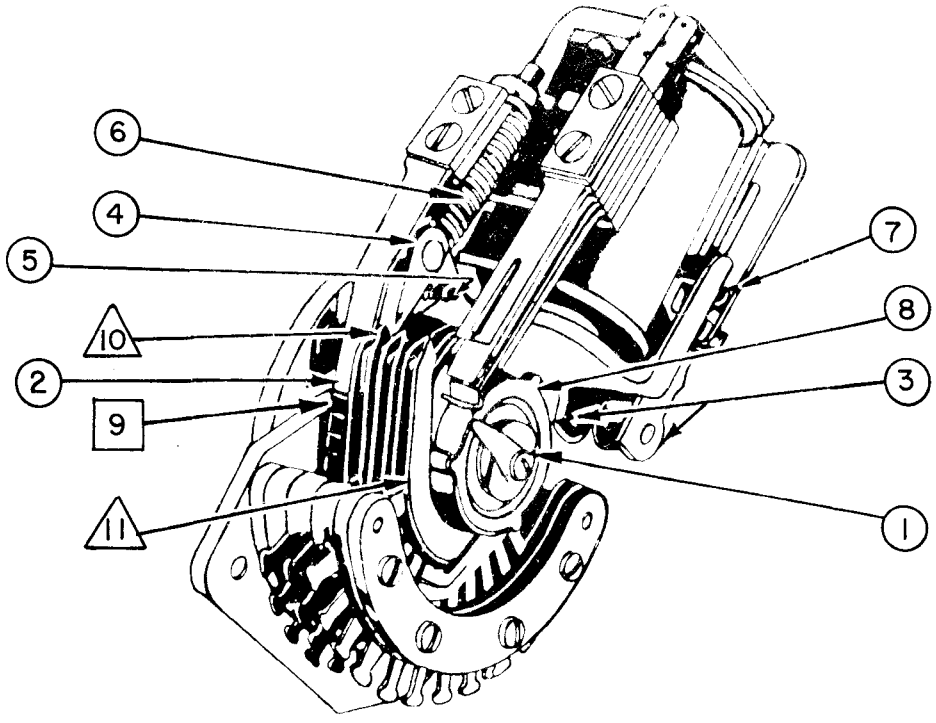
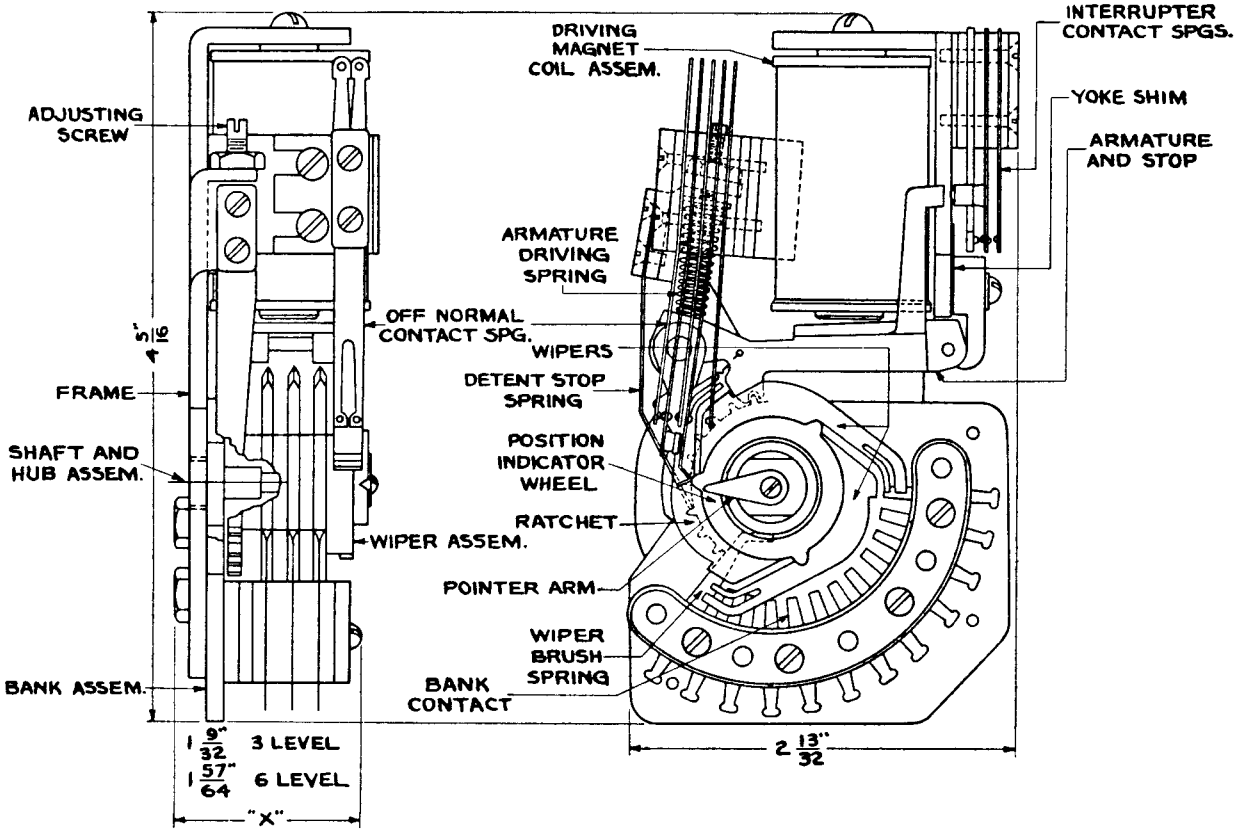
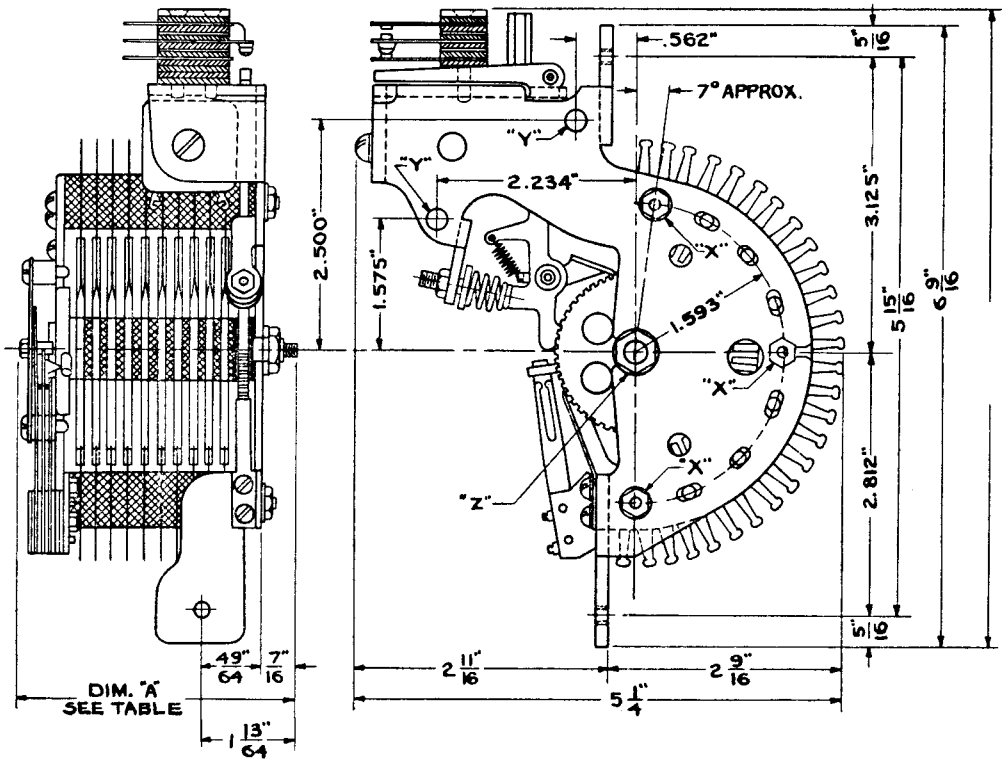



ADJUSTING SCREW
FRAME
SHAFT AND HUB ASSEM.
BANK ASSEM.
5 5/16"
1 9/32" 3 LEVEL
1 57/64" 6 LEVEL
"X"
DRIVING MAGNET COIL ASSEM.
ARMATURE DRIVING SPRING
OFF NORMAL CONTACT SPG.
WIPERS
DETENT STOP SPRING
POSITION INDICATOR WHEEL
RATCHET
WIPER ASSEM.
POINTER ARM
WIPER BRUSH SPRING
BANK CONTACT
INTERRUPTER CONTACT SPGS.
YOKE SHIM
ARMATURE AND STOP
2 13/32"


.562"
5/16"
7° APPROX.
"Y"
"Y"
2.234"
2.500"
1.575"
"X"
1.593"
"X"
"X"
"Z"
3.125"
5 15/16"
6 9/16"
2.812"
5/16"
49/64" 7/16"
DIM. "A" SEE TABLE
1 13/64"
2 11/16"
2 9/16"
5 1/4"

DY-2508A DIGITAL CLOCK

J101 Connections When Using Single-Line Staircase Output

J101 Pin	NK-27-32S Function	Destination	
1	10^0 Counter S.C.	J102 pin	A
2	10^1 Counter S.C.		B
3	10^2 Counter S.C.		C
4	10^3 Counter S.C.		D
5	10^4 Counter S.C.		E
6	10^5 Counter S.C.		F
7	10^6 Counter S.C.		G
8	10^7 Counter S.C.		H
9	10^8 Counter S.C.		J
10	10^9 Counter S.C.		K
11	10^{10} Counter S.C.		L
12	Power Supply Ref.	J102 pin	W
13			
14	+ Print Command	J106	4
15	Ground	Chassis	
16	- Print Command	J106	5
17	+300 Unregulated	J102	X
18	1 PPS Standard	J106	2
19	+300 Regulated	J102	Z
20	Printer Scanning	J106	8
21	+97v Comparator Ref.	J102	a
22	B+ Relay Actuate	J102	b
23			
24			
25			
26			
27			

J101 Connections When Using 4-line or 10-line Output

Pins 14, 15, 16 18, and 20, only are connected as above.

FIGURE 4-1

J102 Connections When Using Single-Line Staircase Output

J102 MS3102A28-21SW Keyed for "W"

Pin	Function	Destination
A	10^0 Counter S.C.	J101 pin 1
B	10^1 Counter S.C.	J101 2
C	10^2 Counter S.C.	J101 3
D	10^3 Counter S.C.	J101 4
E	10^4 Counter S.C.	J101 5
F	10^5 Counter S.C.	J101 6
G	10^6 Counter S.C.	J101 7
H	10^7 Counter S.C.	J101 8
J	10^8 Counter S.C.	J101 9
K	10^9 Counter S.C.	J101 10
L	10^{10} Counter S.C.	J101 11
M	Units Seconds S.C.	R166
N	Tens Seconds S.C.	R167
P	Units Minutes S.C.	R168
R	Tens Minutes S.C.	R169
S	Units Hours S.C.	R170
T	Tens Hours S.C.	R171
U		
V		
W	Power Supply Ref.	J101 pin 12
X	+300 Unregulated	J101 17
Z	+300 Regulated	J101 19 & R172
a	+97v Comparator Ref.	J101 21
b	B+ Relay Actuate	J101 22
c		
d		
e		
f		
g		
h		
j		
k	1 PPS	J106 pin 3
m	Scanning Signal	J106 7
n	DY-2540 Start Command	Not used
p	- Print Command	J106 pin 6
r	+ Print Command	R141
s	Ground	

FIGURE 4-2

DY-2508A DIGITAL CLOCK

J102 Connections When Using 4-Line-Code Output

J102 MS3102A28-21S Keyed normal.

Pin	Function	Format		Destination	
A	10^0	4	8	K101 Level	F
B	"	2	4		E
C	"	2	2		D
D	"	1	1		C
E	10^1	4	8	K102 Level	F
F	"	2	4		E
G	"	2	2		D
H	"	1	1		C
J	10^2	4	8	K103 Level	F
K	"	2	4		E
L	"	2	2		D
M	"	1	1		C
N	10^3	4	8	K104 Level	F
P	"	2	4		E
R	"	2	2		D
S	"	1	1		C
T	10^4	4	8	K105 Level	G
U	"	2	4		F
V	"	2	2		E
W	"	1	1		D
X	10^5	4	8	K105 Level	K
Z	"	2	4		J
a	"	2	2		I
b	"	1	1		H
c					
d					
e					
f					
g	Binary "0"			K101	
h	Binary "1"			K101	
j					
k	1 PPS Standard			J106 pin 3	
m	Scanning Signal			J106 pin 7	
n	DY-2540 Start Command			(when used)	
p	- Print Command			J106 pin 6	
r	+ Print Command			R141	
s	Ground			Chassis	

FIGURE 4-3

DY-2508A DIGITAL CLOCK (Serial 5 & above)

J103 Connector Pin Assignments

J103	Type MS3102A28-12S	
Pin	Function	Destination
A	Units Seconds Closure	K101 (O.N.) & J103 pin G
B	Tens Seconds Closure	K102 (O.N.) & K101 (O.N.)
C	Units Minutes Closure	K103 (O.N.) & K102 (O.N.)
D	Tens Minutes Closure	K104 (O.N.) & K103 (O.N.)
E	Units Hours Closure	K105 (O.N.) & K104 (O.N.)
F	Days Closure	K105 (O.N.)
G	Common	J103 pin A
H	1 PPS Pulses Output	J106 pin 9
J		
K		
L		
M		
N		
P		
R		
S		
T		
U		
V		
W		
X		
Y	Aux. 1 PPS Input	J106 pin 1
Z	N.O. Contacts K106	J105 pin 9
a	N.C. Contacts K106	J105 pin 13
b	Common K106	J105 pin 10
d	Ground	Chassis

FIGURE 4-4

DY-2508A DIGITAL CLOCK

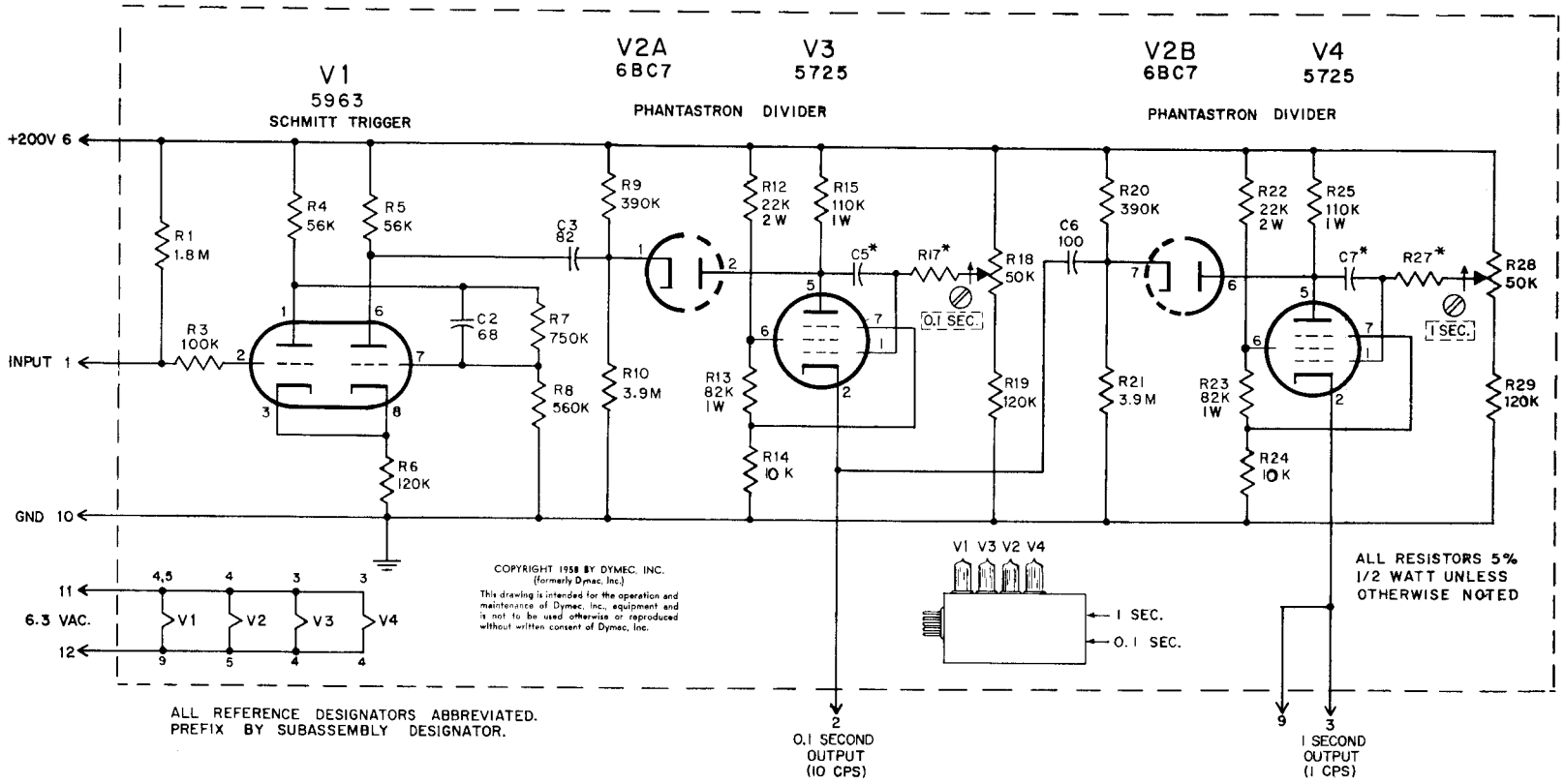
Clock-to-Recorder Cable Connections

NK-27-32S		MS3106B28-21PW
P1	Function	P2
1	Staircase voltage for #1 column of -hp- 560AR	M
2	#2	N
3	#3	P
4	#4	R
5	#5	S
6	#6	T
7	#7	A
8	#8	B
9	#9	C
10	#10	D
11	#11	E
12	Power supply reference voltage	W
13		
14	Positive record command	r
15	Ground	s
16	Negative record command	p
17	+300 vdc unregulated	X
18	1 pps standard	k
19	+300 vdc regulated	Z
20	Recorder scanning signal	m
21	Comparator reference voltage	a
22	B+ relay actuate	b
23		
24		
25		
26		
27		

Output Cable to -hp- 560AR Digital Recorder
DY-2508A Digital Clock

FIGURE 4-5

SECTION 5
FIGURES AND DRAWINGS



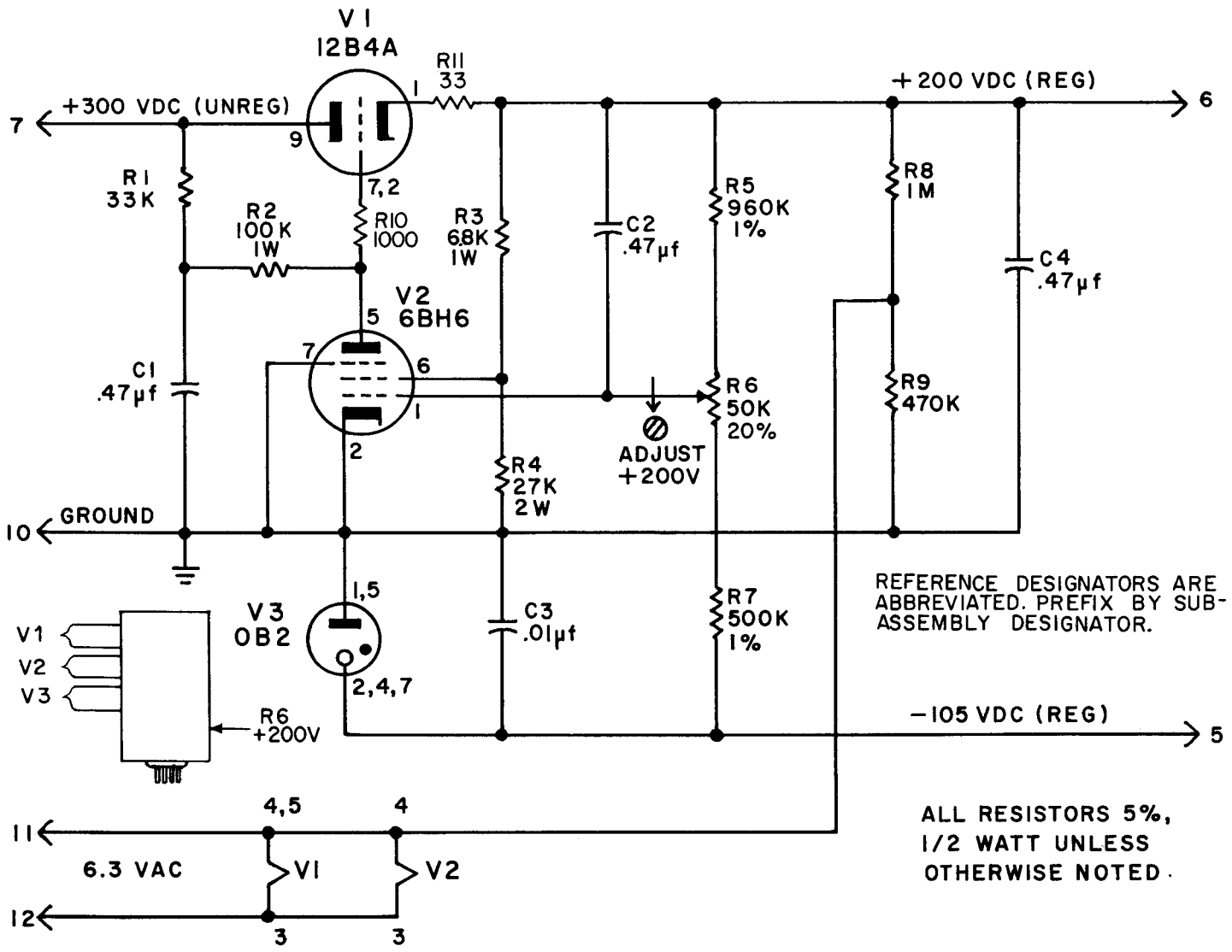
9010-0024 PLUG-IN TIMING SIGNAL GENERATOR

SERIALS 045-076, AND SERIALS PREFIXED 125-

*

PLUG-IN UNIT	INPUT FREQ.	C5	R17	C7	R27	OUTPUT 1	OUTPUT 2
9010-0024	100 CPS 60 CPS	.039µf	2.163 M	.22 µf	4.7 M	10 CPS	1 CPS

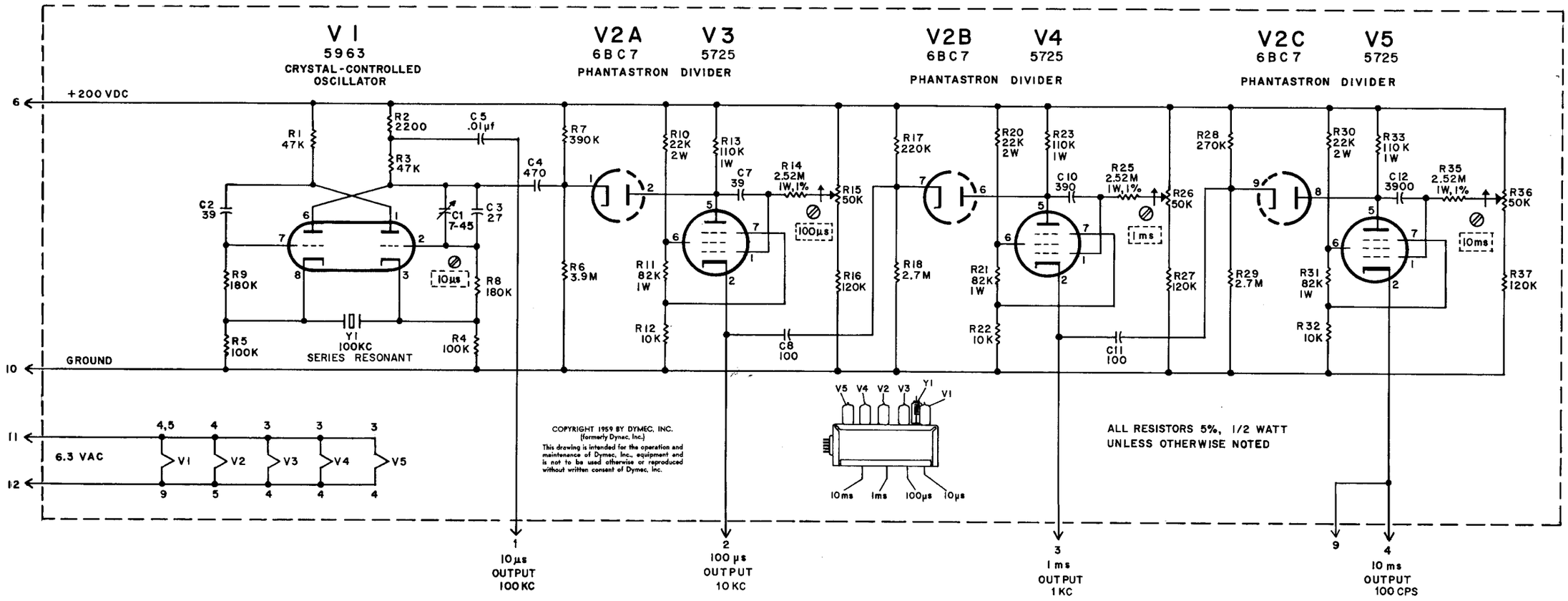
C1001-1003



9010-0023 VOLTAGE REGULATOR

SERIALS 045-076, AND SERIALS PREFIXED 125-

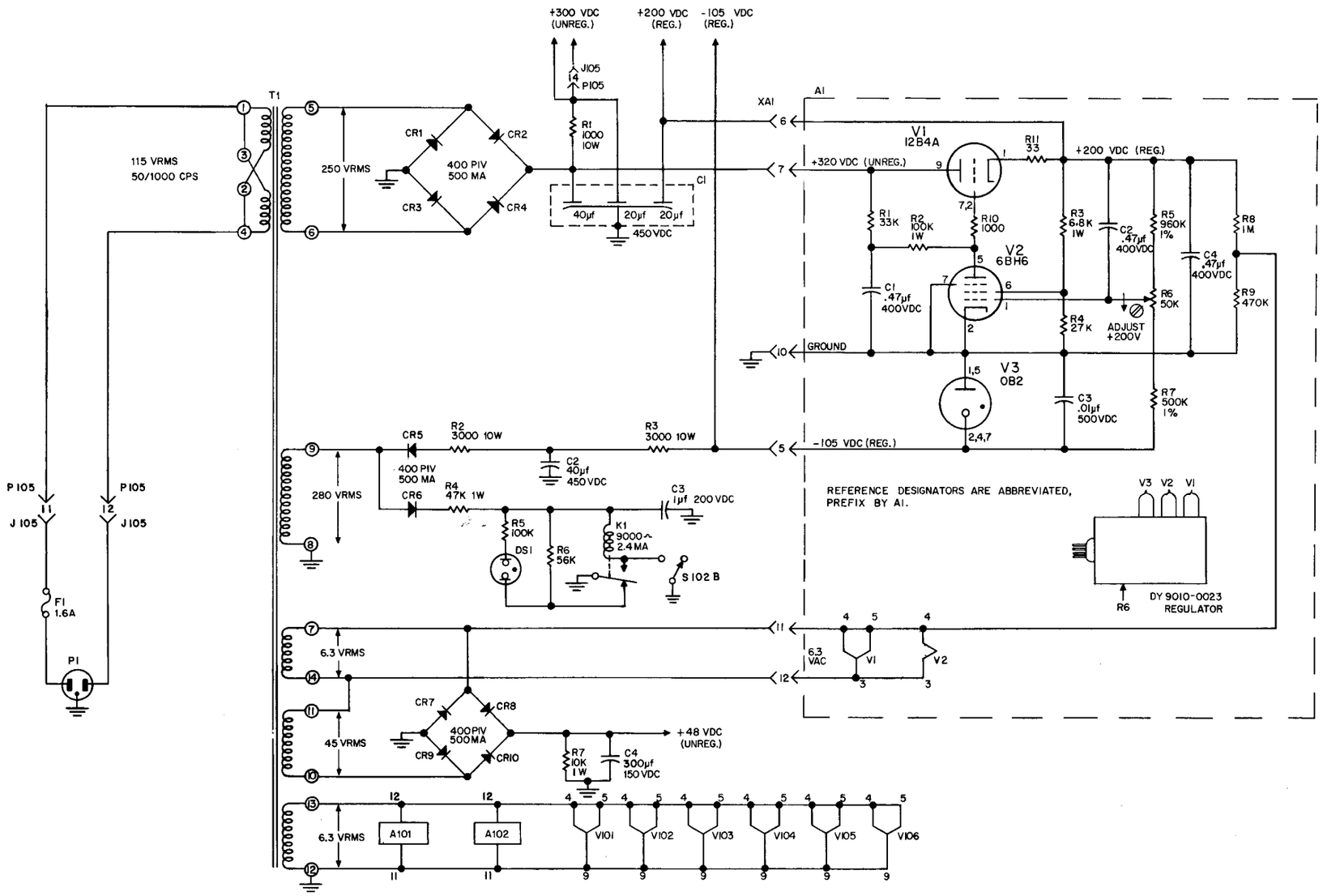
B 1001-1004



9010-0026 TIMING SIGNAL GENERATOR

SERIALS 045-076, AND SERIALS PREFIXED 125-

D1001-1005

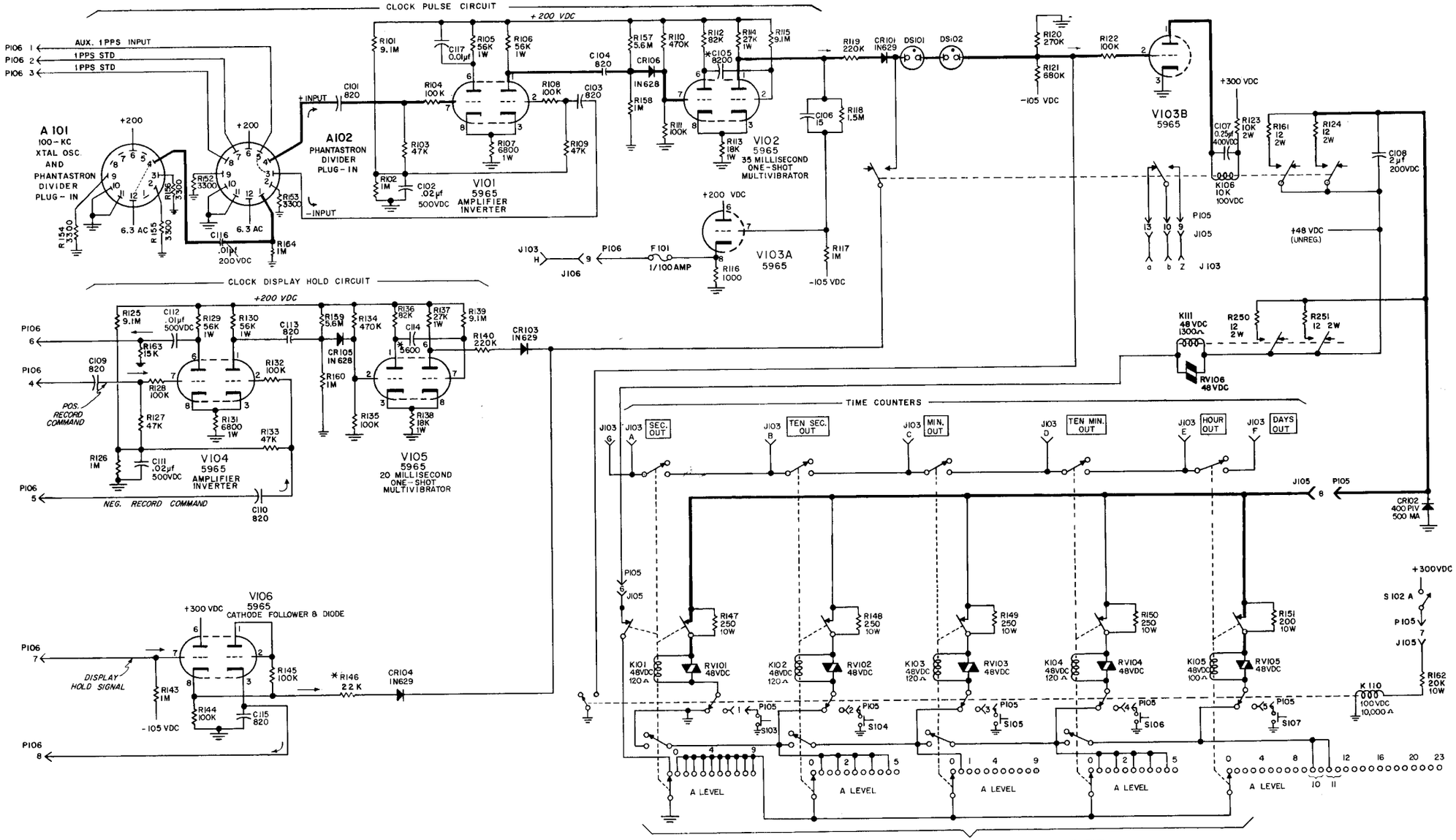


DY-2508A DIGITAL CLOCK

POWER SUPPLY

D2508-1001

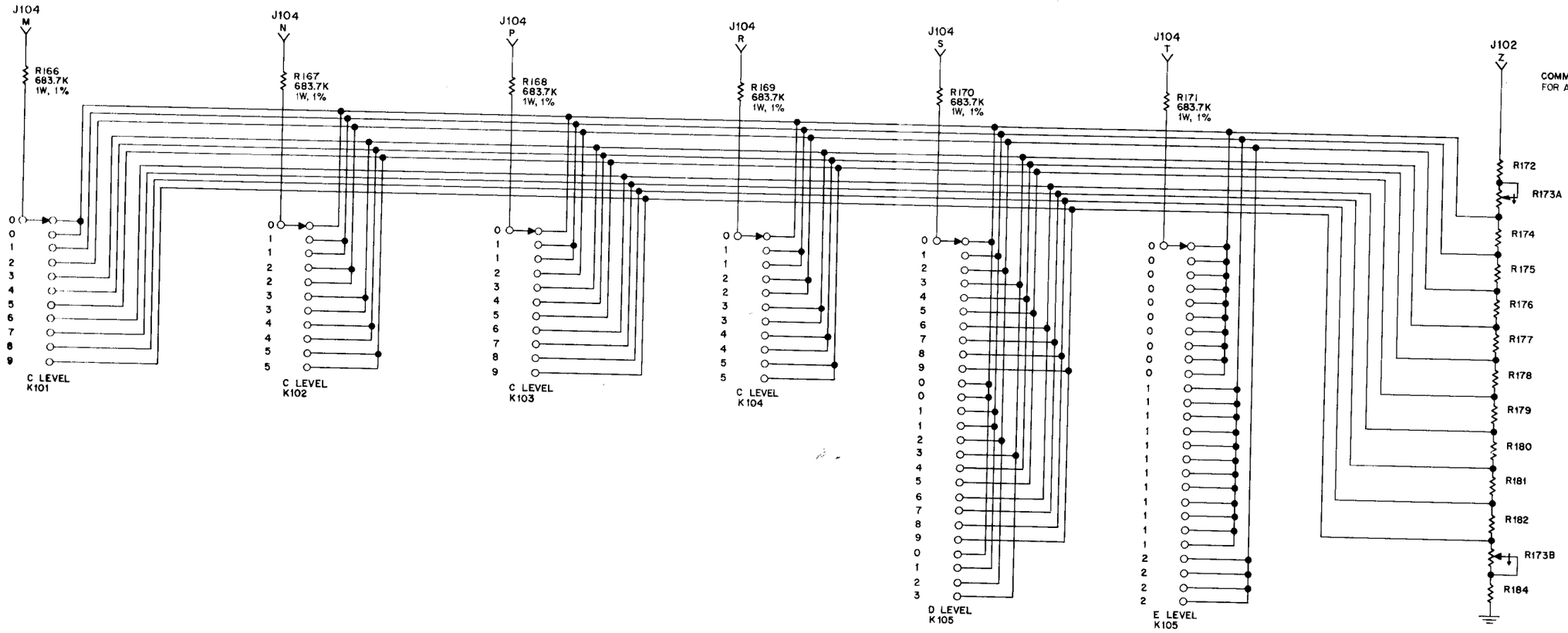
SERIALS 045-076, AND SERIALS PREFIXED 125-



DY-2508A DIGITAL CLOCK
CLOCK CIRCUITS

SERIALS 067-076, AND SERIALS PREFIXED 125-

D2508-1002



DY-2508A DIGITAL CLOCK

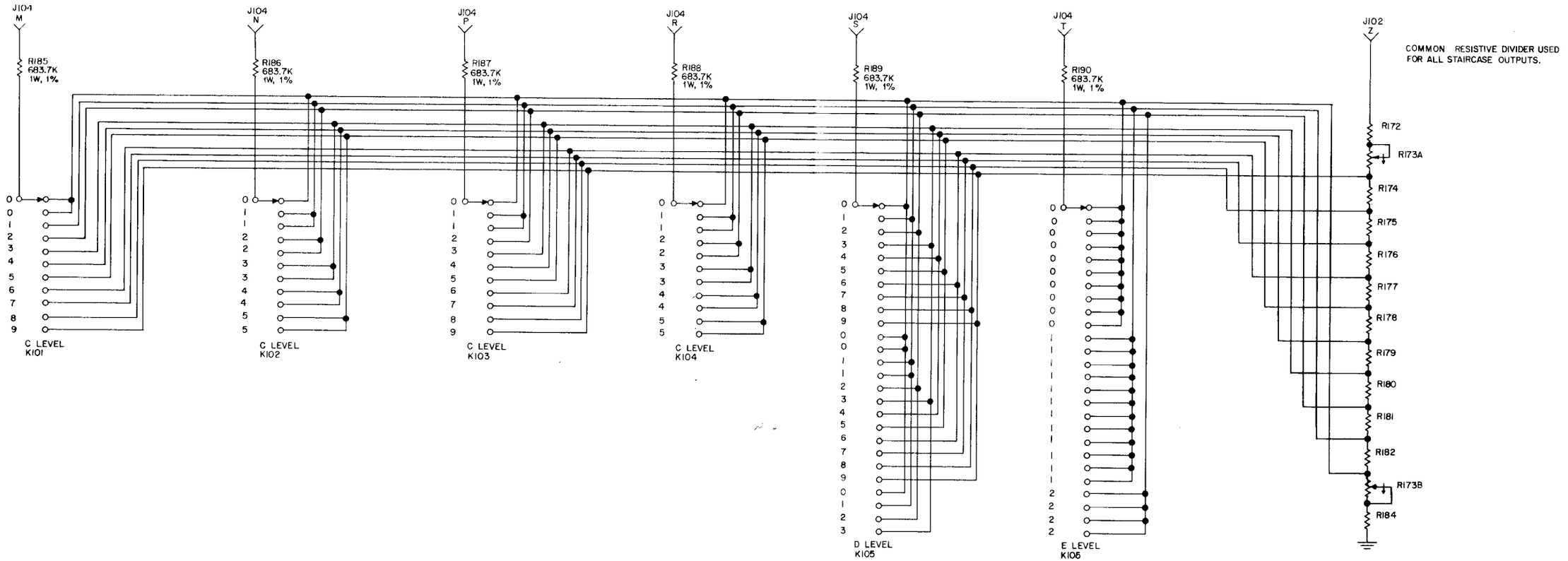
ONE-LINE-CODE OUTPUT CIRCUITS

SERIALS 015-076, AND SERIALS PREFIXED 125-

D2508-1003

RESISTOR	1 STAIRCASE	2 STAIRCASE		
R172	8500* 10W	4000* 10W		
R173A, B	500 WW LINEAR	500 WW LINEAR		
R174 THRU R182	500 5W, 1%	255 5W, 1%		
R184	2500* 10W	1250* 10W		

*FACTORY ADJUSTED.



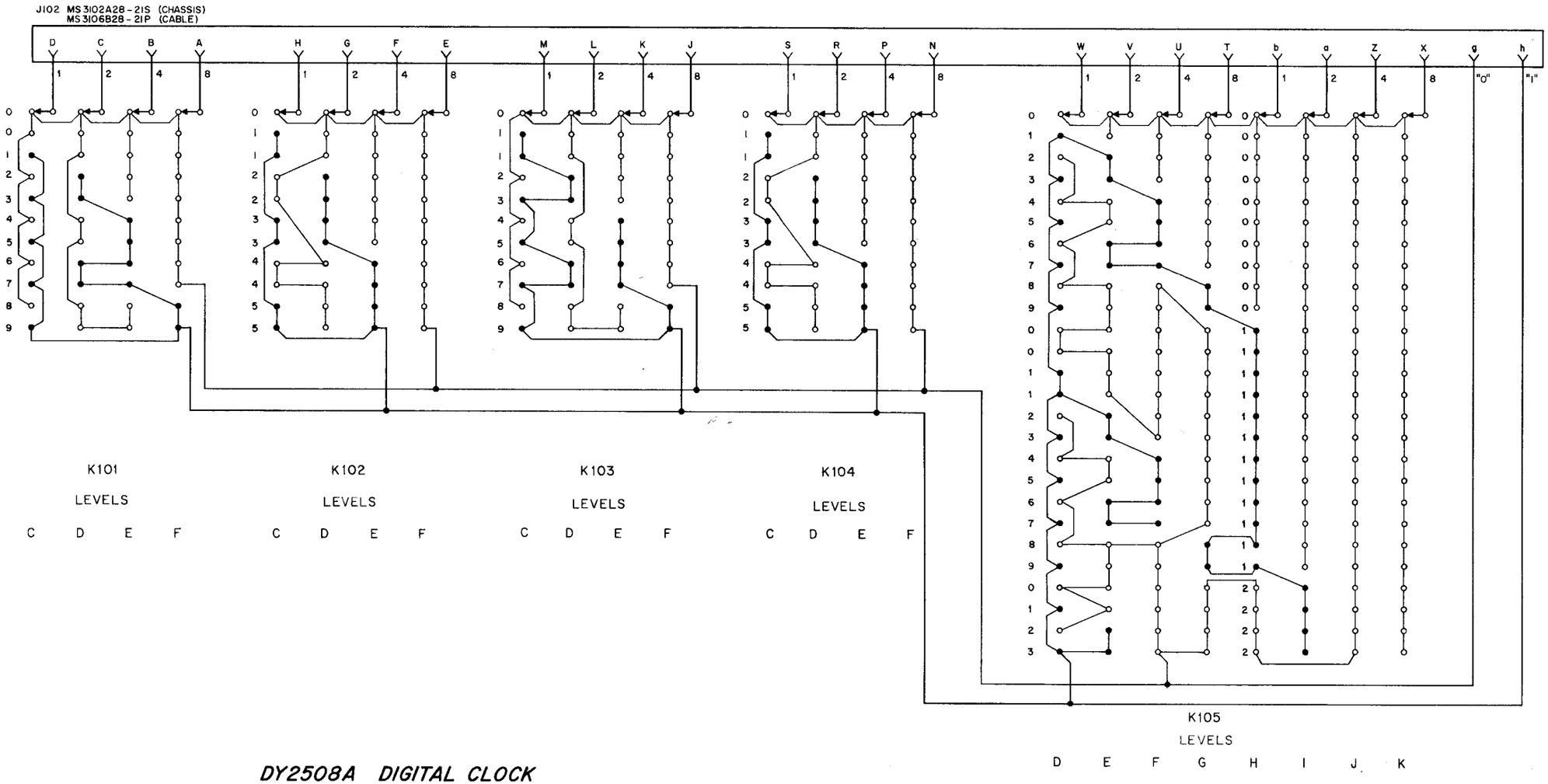
DY-2508A DIGITAL CLOCK
INVERTED ONE-LINE-CODE OUTPUT CIRCUITS

SERIALS 015-076, AND SERIALS PREFIXED 125-

RESISTOR	1 STAIRCASE	2 STAIRCASE		
R172	8500 * 10W	4000 * 10W		
R173A, B	500 WW LINEAR	500 WW LINEAR		
R174 THRU R182	500 5W, 1%	255 5W, 1%		
R184	2500 * 10W	1250 * 10W		

*FACTORY ADJUSTED.

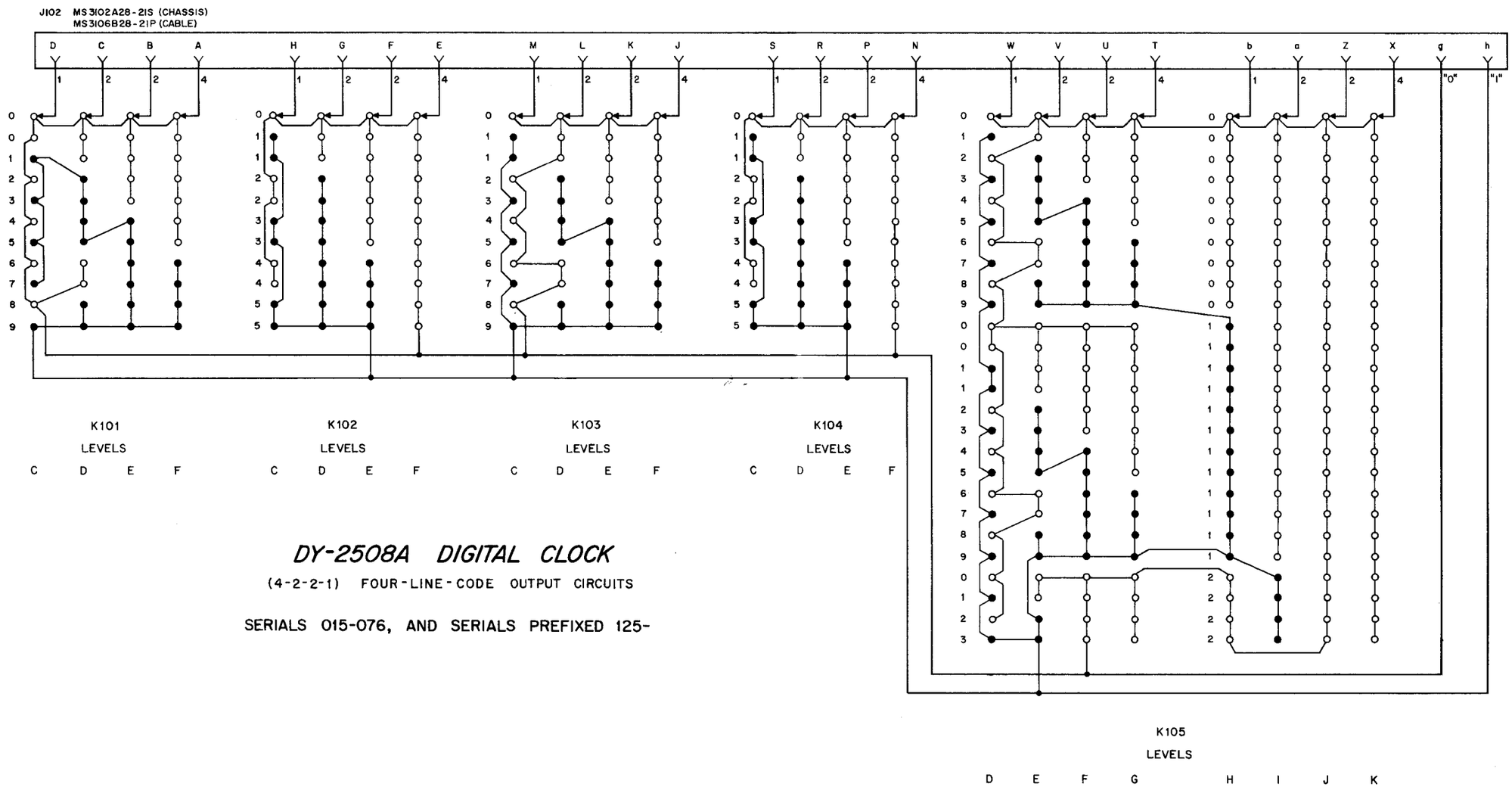
D2508-1004



DY2508A DIGITAL CLOCK

(8-4-2-1) FOUR-LINE-CODE OUTPUT CIRCUITS

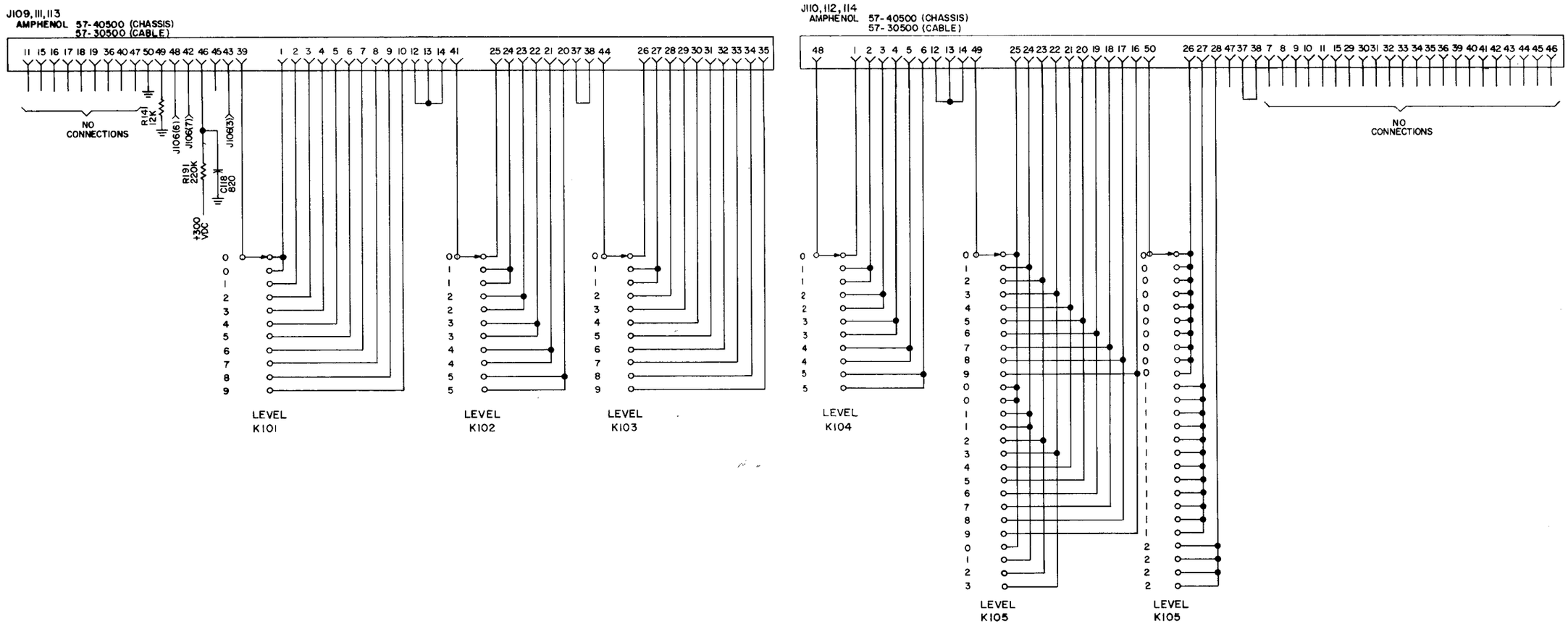
SERIALS 015-076, AND SERIALS PREFIXED 125-



DY-2508A DIGITAL CLOCK

(4-2-2-1) FOUR-LINE-CODE OUTPUT CIRCUITS

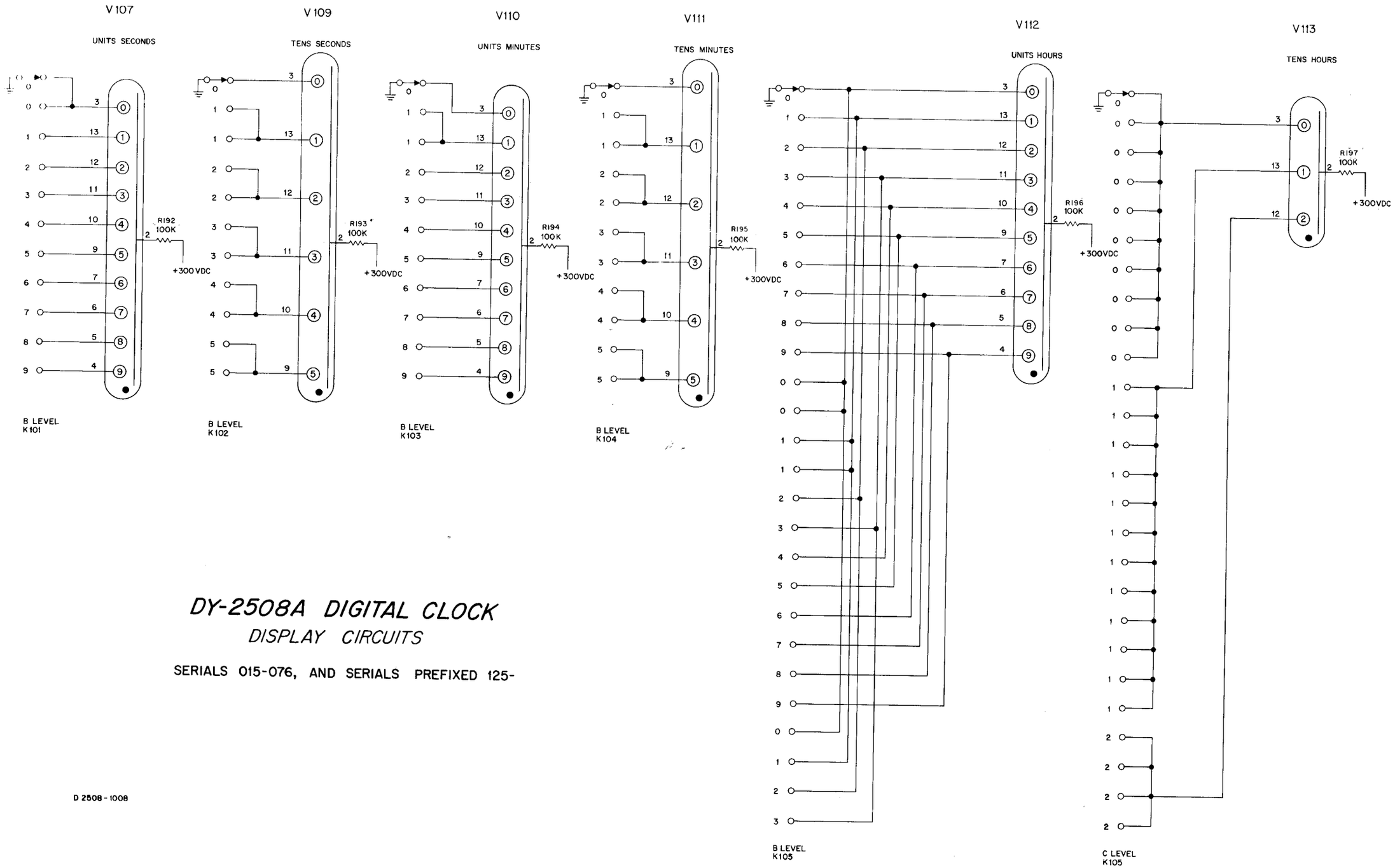
SERIALS 015-076, AND SERIALS PREFIXED 125-



DY2508A
DIGITAL CLOCK TEN-LINE-CODE OUTPUT CIRCUITS

SERIALS 015-076, AND SERIALS PREFIXED 125-

D 2508-1007

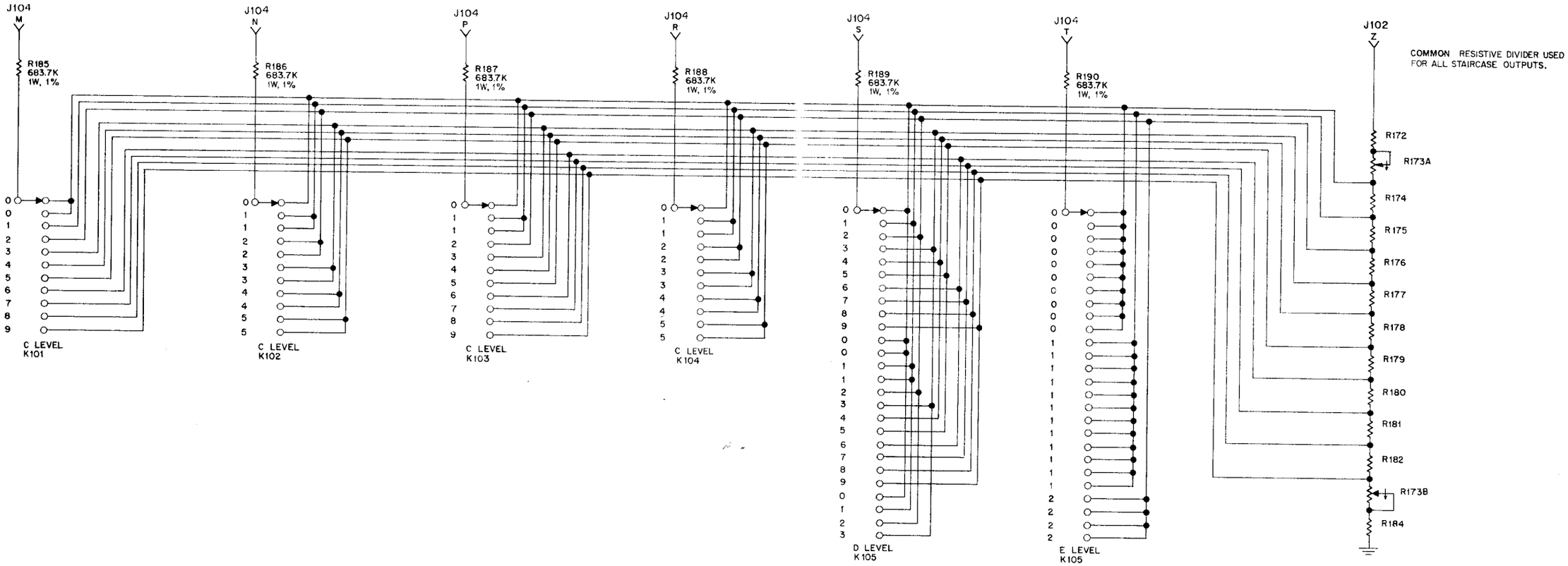


DY-2508A DIGITAL CLOCK

DISPLAY CIRCUITS

SERIALS 015-076, AND SERIALS PREFIXED 125-

D 2508-1008



DY-2508A DIGITAL CLOCK

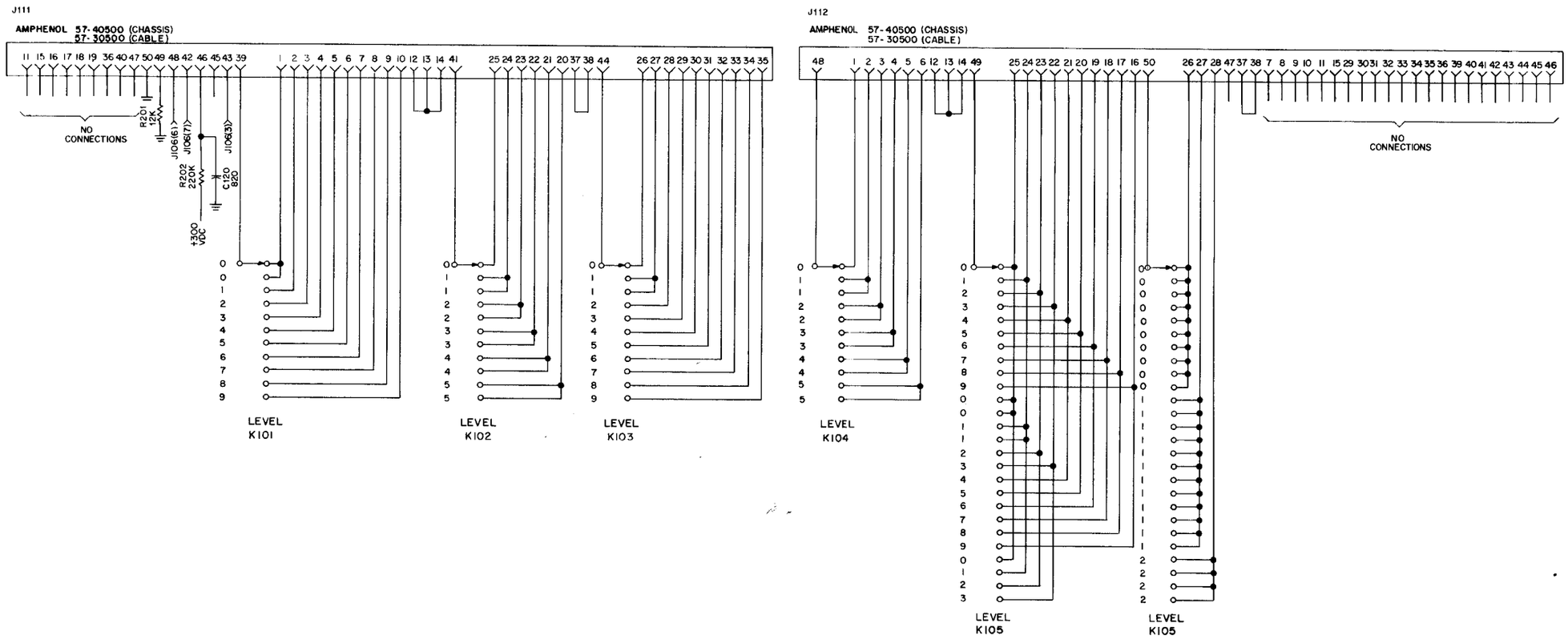
ONE-LINE-CODE OUTPUT CIRCUITS

SERIALS 015-076, AND SERIALS PREFIXED 125-

RESISTOR	1 STAIRCASE	2 STAIRCASE		
R172	8500* 10 W	4000* 10 W		
R173A, B	500 WW LINEAR	500 WW LINEAR		
R174 THRU R182	500 5W, 1%	255 5W, 1%		
R184	2500* 10 W	1250* 10 W		

* FACTORY ADJUSTED.

D2508-1009



DY-2508A
DIGITAL CLOCK SECOND
TEN-LINE-CODE OUTPUT
CIRCUITS

SERIALS 015-076, AND SERIALS PREFIXED 125-

D2508-1011

SECTION 6

TABLE OF REPLACEABLE PARTS

Any changes in the Table of Replaceable Parts will be listed on a Production Change sheet at the front of this manual.

If a part in the Table has only a Dymec stock number, it is a special part that can be obtained only from Dymec. If a part has another manufacturer's stock number, it can be obtained directly from that manufacturer. Manufacturers' code letters are listed on the last page. In most cases parts provided by manufacturers other than those listed can be used if they have the same electrical and physical characteristics, and are equal or better in quality.

To order a part from Dymec, give the instrument model and serial numbers, the description of the part, and the Dymec stock number.

As noted on the schematic diagrams, the electrical values of certain parts are selected to compensate for variations in other components, wiring capacitance, etc. In some instruments a selected part may be omitted (e.g. a selected resistor might be a wire or an open circuit). The schematic diagram gives the nominal value of these parts. When replacing, use the original value of the replaced part.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR SPA•
A101	Generator, timing signal, 100/60 cps	9010-0024	CV	1	
	POWER SUPPLY				
A102	Generator, timing signal, 100 kc	9010-0026	CV	1	
C1	Capacitor: fixed, electrolytic 4x20uf, 450V	1013-0007	CC	1	1
C2	Capacitor: fixed, electrolytic, 40uf, 450V	1013-0004	CC, D16653	1	1
C3	Capacitor: fixed, paper, 1uf, -15 +25%, 200V	1007-0033	RR, MQCS-2-1M	1	1
C4	Capacitor: fixed, electrolytic, 300uf, 150V	1010-0015	X, FP-119	1	1
CR1-10	Diode, silicon: 1N1449/1N1084	1297-0004	AA	10	10
DS1	Indicator, neon, clear	2871-0002	Eldema, 1B1024	1	1
F1	Fuse, 1.6 Amps, 125V, SloBlo	1955-0012	T, 31301.6	1	10
	Fuseholder for above	1065-0001	T, 342012	1	1
K1	Relay, 9K coil, SPDT	1311-0016	Sigma, 11F-9000 G-SIL	1	1
S102B	Switch, toggle, 6 Amp, DPST	1850-0007	R.H. Fisher, 82314B	1	1
T1	Transformer, power	1575-0019	Paeco, 8878	1	1
P1	Cable, power	3170-0001	TT, KH-3088	1	1
R1	Resistor: fixed, wirewound, 1K, 10%, 10W	1161-0014	S, type C-10	1	1
R2, 3	Resistor: fixed, wirewound, 3K, 10%, 10W	1161-0001	S, type 1-3/4E	2	1
R4	Resistor: fixed, composition, 47K, 5%, 1W	1068-4735	B, GB4735	1	1
R5	Resistor: fixed, composition, 100K, 5%, 1/2W	1067-1045	B, EB1045	1	1
R6	Resistor: fixed, composition, 56K, 5%, 1/2W	1067-5635	B, EB5635	1	1
R7	Resistor: fixed, composition, 10K, 5%, 1W	1068-1035	B, GB1035	1	1
	CLOCK CIRCUITS				
C101, 103, 104, 109, 110, 113, 115	Capacitor: fixed, mica, 820uuf, 5%, 500V	1003-0054	Z, KR-1210	7	2
C102, 111	Capacitor: fixed, ceramic, .02uf, -0 +100%, 600V	1005-0004	G, DD-203	2	1
C105	Capacitor: fixed, mica, 8200uuf, 5%, 500V (nominal value)	1003-0066	Z, CR-1282	1	1
C106	Capacitor: fixed, mica, 15uuf, 5%, 500V	1003-0030	Z, RR-1415	1	1
C107	Capacitor: fixed, paper, .25uf, 10%, 600V	1009-0003	Z, CP54B1EF 254K	1	1

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA•
	CLOCK CIRCUITS (Cont'd)				
C108	Capacitor: fixed, paper, 2uf, 10%, 200V	1009-0002	Z, CP54B1EC205K	1	1
C112	Capacitor: fixed, paper, .01uf, 5%, 600V	1007-0006	CC, 109P10356	1	1
C114	Capacitor: fixed, mica, 5600uuf, 5%, 500V (nominal value)	1003-0064	Z, CR-1256	1	1
C116, 117	Capacitor: fixed, ceramic, .01uf, -0, +100%, 600V	1005-0002	B, type 36A	2	1
CR101, 103, 104	Diode, silicon: 1N629	1281-0012	BU	3	3
CR102	Diode, silicon: 1N1449/1N1084	1297-0004	AA	1	1
CR105, 106	Diode, silicon: 1N628	1281-0011	BU	2	2
DS101, 102	Lamp, neon, 1/25W	2871-0004	O, NE-2A	2	1
F101	Fuse, 1/100 Amp, 125V, Slo Blo	1955-0022	HP, G-28A	1	10
J101	Receptacle, 27 pin, male	2535-0025	CU, NK-27-32S	1	1
	Mating connector for above	2535-0011	CU, NK-27-21C-5/8	1	1
	NOTE: See Parts Lists for Optional Outputs Pages 6-9 to 6-13 for required receptacles.				
J102	Receptacle, 37 pin: MS3102A28-21S	2537-0003	CU	1	1
	Mating connector for above: MS3106B28-21P	2540-0002	CU	1	1
J103	Receptacle, 26 pin: MS3102A28-12S	2537-0004	CU	1	1
	Mating connector for above: MS3106B28-12P	2540-0003	CU	1	1
J105, 106	Receptacle, 14 contact, male	2535-0036	HH, 57-30140	2	1
	Mating connectors for above	2535-0037	HH, 57-40140	2	1
K101-104	Relay, stepping, 6 non-bridging levels, 11 position 48V, 2 form C	1311-0014	Auto. Elec., type 44	4	1
K105	Relay, stepping, 12 non-bridging levels, 26 position, 48V, 1 form C	1311-0015	Auto. Elec., type45	1	1
K106	Relay, 10K coil, 110V, 4 form C	1311-0024	Auto. Elec., PE-240-B15	1	1
K110	Relay, 10K coil, 110V, 6 form C	1311-0005	Auto. Elec. PE-167-B12	1	1
K111	Relay, 1300 ohm coil, 48V, 2 form C	1311-0011	Auto. Elec., EQA, RZ-19	1	1

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA.•
	CLOCK CIRCUITS (Cont'd)				
R101, 115, 125 139	Resistor: fixed, composition, 9.1M, 5%, 1/2W	1067-9155	B, EB9155	4	1
R102, 117, 126 143, 158, 160, 164	Resistor: fixed, composition, 1M, 5%, 1/2W	1067-1055	B, EB-1055	7	2
R103, 109	Resistor: fixed, composition, 47K, 5%, 1/2W	1067-4735	B, EB-4735	2	1
R104, 108, 111	Resistor: fixed, composition, 100K, 5%, 1/2W	1067-1045	B, EB-1045	3	1
R105, 106	Resistor: fixed, composition, 56K, 5%, 1W	1068-5635	B, GB-5635	2	1
R107, 131	Resistor: fixed, composition, 6800 ohms, 5%, 1W	1068-6825	B, GB-6825	2	1
R110, 134	Resistor: fixed, composition, 470K, 5%, 1/2W	1067-4745	B, EB-4745	2	1
R112	Resistor: fixed, composition, 82K, 5%, 1/2W	1067-8235	B, EB-8235	1	1
R113, 138	Resistor: fixed,composition, 18K, 5%, 1W	1068-1835	B, GB-1835	2	1
R114, 137	Resistor: fixed, composition, 27K, 5%, 1W	1068-2735	B, GB-2735	2	1
R116	Resistor: fixed, composition, 1K, 5%, 1/2W	1067-1025	B, EB1025	1	1
R118	Resistor: fixed, composition, 1.5M, 5%, 1/2W	1067-1555	B, EB-1555	1	1
R119, 140	Resistor: fixed, composition, 220K, 5%, 1/2W	1067-2245	B, EB-2245	2	1
R120	Resistor: fixed, composition, 270K, 5%, 1/2W	1067-2745	B, EB-2745	1	1
R121	Resistor: fixed, composition, 680K, 5%, 1/2W	1067-6845	B, EB-6845	1	1
R122, 132, 144, 145	Resistor: fixed, composition, 100K, 5%, 1/2W	1067-1045	B, EB-1045	4	1
R123	Resistor: fixed, composition, 10K, 5%, 2W	1069-1035	B, HB-1035	1	1
R124, 161, 250, 251	Resistor: fixed, composition, 12 ohms, 5%, 2W	1069-1205	B, HB-1205	4	1
R127, 133	Resistor: fixed, composition, 47K, 5%, 1/2W	1067-4735	B, EB-4735	2	1
R128, 135	Resistor: fixed, composition, 100K, 5%, 1/2W	1067-1045	B, EB-1045	2	1
R129, 130	Resistor: fixed, composition, 56K, 5%, 1W	1068-5635	B, GB-5635	2	1
R136	Resistor: fixed, composition, 82K, 5%, 1/2W	1067-8235	B, EB-8235	1	1
R146	Resistor: fixed, composition, 22K, 5%, 1/2W (nominal value)	1067-2235	B, EB-2235	1	1
R147-150	Resistor: fixed, wirewound, 250 ohms, 10%, 10W	1161-0016	S, type C-10	4	1
R151	Resistor: fixed, wirewound, 200 ohm, 10%, 10W	1161-0013	AS, type FR-10L	1	1
R152-156	Resistor: fixed, composition, 3.3K, 5%, 1/2W	1067-3325	B, EB-3325	5	2

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA•
	CLOCK CIRCUITS (Cont'd)				
R157, 159	Resistor: fixed, composition, 5.6M, 5%, 1/2W	1067-5655	B, EB5655	2	1
R162	Resistor: fixed, wirewound, 20K, 10%, 10W	1161-0005	S, type 1-3/4	1	1
R163	Resistor: fixed, composition, 15K, 5%, 1/2W	1067-1535	B, EB1535	1	1
RV101-106	Varistor, 48V	1254-0001	Auto.Elec. RY-57	6	2
S103-107	Switch, pushbutton, SPDT	1852-0006	KK, 203	5	2
V101-106	Tube, electron: 5965	1270-0003	ZZ	6	6
	DISPLAY CIRCUITS				
R192-197	Resistor: fixed, composition, 100K, 5%, 1W	1068-1045	B, GB1045	6	2
V107, 109-113	Tubes, electron, digital indicator	1270-0021	ZZ	6	6
	OUTPUT CIRCUITS (See Parts Lists for Optional Output Circuits for details)				
R166-171, 185-190	Resistor: fixed, carbon film, 683.7K, 1%, 1W	1082-0020	NN, type DC-1	12	3
R172	Resistor: fixed, wirewound, 1 staircase, 8500 ohms, 10%, 10W 2 staircase, 4000 ohms, 10%, 10W (nominal value)	 1161-0015 1161-0003	 S, type C-10 S, type 1-3/4	 1 1	 1 1
R173A, B	Resistor: variable, wirewound, dual, 500 ohms each, 2W, linear	1218-0006	R, type 2W	1	1
R174-182	Resistor: fixed, wirewound, 1 staircase, 500 ohms, 1%, 5W 2 staircase, 255 ohms, 1%, 5W	 1180-0002 1180-0005	 AC, type RS-5 AC, type RS-5	 9 9	 2 2
R184	Resistor: fixed, wirewound, 1 staircase, 2500 ohms, 10%, 10W 2 staircase, 1250 ohms, 10%, 10W	 1161-0006 1161-0004	 S, type C-10 S, type 1-3/4E	 1 1	 1 1
R191, 202, 204	Resistor: fixed, composition, 220K, 5%, 1/2W	1067-2245	B, EB2245	3	1
R201, 203	Resistor: fixed, composition, 12K, 5%, 1/2W	1067-1235	B, EB1235	2	1

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA•
	OPTION 1-SINGLE STAIRCASE OUTPUT DWG. D2508-1003				
R166-171	Resistor: fixed, carbon film, 683.7K, 1%, 1W	1082-0020	NN, type DC-1	6	2
R172	Resistor: fixed, wirewound, 8500 ohm, 10%, 10W (nominal value)	1161-0015	S, type C-10	1	1
R173A, B	Resistor: variable, wirewound, dual, 500 ohms ea., 2W, linear	1218-0006	R, type 2W	1	1
R174-182	Resistor: fixed, wirewound, 500 ohms, 1%, 5W	1180-0002	AC, type RS-5	9	2
R184	Resistor: fixed, wirewound, 2500 ohms, 10%, 10W	1161-0006	S, type C-10	1	1
J102	Receptacle, 37 pin: MS3102A-28-21SW*	2537-0003	CU	1	1
	Mating Connector for above: MS3106B-28-21PW*	2540-0002	CU	1	1
	*"W" slot filed in insert				
	OPTION 1 and 2. DUAL STAIRCASE OUTPUT. DWG. D2508-1009. OPTION 1 and 2 INVERTED, DUAL STAIRCASE OUTPUT. DWG 2508-1009				
R166-171 R185-190	Resistor: fixed, carbon film, 683.7K, 1%, 1W	1082-0020	NN, type DC-1	12	3
R172	Resistor: fixed, wirewound, 4000 ohms, 10%, 10W (nominal value)	1161-0003	S, type 1-3/4	1	1
R173A, B	Resistor: variable, wirewound dual, 500 ohms ea., 2W, linear	1218-0006	R, type 2W	1	1
R174-182	Resistor: fixed, wirewound, 225 ohms, 1%, 5W	1180-0005	AC, type RS-5	9	2
R184	Resistor: fixed, wirewound, 1250 ohms, 10%, 10W (nominal value)	1161-0004	S, type 1-3/4E	1	1
J104	Receptacle, 37 pin: MS3102A-28-21SX*	2537-0003	CU	1	
	Mating connector for above: MS3106B-28-21PX*	2540-0002	CU	1	
	*"X" slot filed in insert.				
J102	Receptacle, 37 pin: MS3102A-28-21SW**	2537-0003	CU	1	
	Mating connector for above: MS1306B-28-21PW**	2540-0002	CU	1	
	**"W" slot filed in insert.				

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA•
	OPTION 3. SINGLE 10-LINE OUTPUT	DWG. D2508-0007			
C118	Capacitor: fixed, mica, 820mmf., 5%, 500 VDCW	1003-0054	Z, KR-1382	1	1
R141	Resistor: fixed, composition, 12K, 5%, 1/2W	1067-1235	B, EB1235	1	1
R191	Resistor: fixed, composition, 220K, 5%, 1/2W	1067-2245	B, EB2245	1	1
J109, J110	Receptacle, female, 50-pin	2535-0015	HH, 57-40500	2	1
	Mating connector for above	2535-0021	HH, 57-30500	2	1
	OPTION 3 and 4. DUAL 10-LINE OUTPUT	DWG. D2508-1007 DWG. D2508-1011			
C118, C120	Capacitor: fixed, mica, 820 mmf., 5%, 500 VDCW	1003-0054	Z, KR-1382	2	1
R141, R201	Resistor: fixed, composition, 12K, 5%, 1/2W	1067-1235	B, EB1235	2	1
R191, R202	Resistor: fixed, composition, 220K, 5%, 1/2W	1067-2245	B, EB2245	2	1
J109, J110, J111, J112	Receptacle, female, 50-pin	2535-0015	HH 57-40500	4	1
	Mating connectors for above	2535-0021	HH 57-30500	4	1
	OPTION 5. 4-2-2-1 BCD OUTPUT OPTION 6 8-4-2-1 BCD OUTPUT These options require no parts changes. See Dwgs. D2508-1006 and Dwgs. D2508-1005.				

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA.•
	VOLTAGE REGULATOR SUB-ASSEMBLY 9010-0023				
A1	Voltage Regulator Sub-assembly	B1001-1004	CV	1	1
C1, 2, 4,	Capacitor: fixed, Mylar .47 uf, 10%, 400VDCW	1008-0013	AJ, 338E474K	3	1
C3	Capacitor: fixed, ceramic, .01 uf, -0, +100%, 500VDCW.	1005-0002	B, Type 36A	1	1
R1	Resistor: fixed,composition, 33K, 5%, 1/2W	1067-3335	B, EB-3335	1	1
R2	Resistor: fixed, composition, 100K, 5%, 1W	1068-1045	B, GB-1045	1	1
R3	Resistor: fixed, composition, 6.8K, 5%, 1W	1068-6825	B, GB-6825	1	1
R4	Resistor: fixed, composition, 27K, 5%, 2W	1069-2735	B, HB-2735	1	1
R5	Resistor: fixed, carbon film, 960K, 1%, 1/2W	1076-0013	NN, DC-1/2A	1	1
R6	Resistor: variable, composition, 50K, 20%, 1/4W	1200-0003	BO, Type 70	1	1
R7	Resistor: fixed, carbon film, 500K, 1%, 1/2W	1076-0002	NN, DC-1/2A		
R8	Resistor: fixed, composition, 1M, 5%, 1/2W	1067-1055	B, EB-1055	1	1
R9	Resistor: fixed, composition, 470K, 5%, 1/2W	1067-4745	B, EB-4745	1	1
R10	Resistor: fixed, composition, 1K, 5%, 1/2W	1067-1025	B, EB-1025	1	1
R11	Resistor: fixed, composition, 33 ohms, 5%, 1/2W	1067-3305	B, EB-3305	1	1
V1	Tube, electron, 12B4	1270-0040	ZZ	1	1
V2	Tube, electron, 6BH6	1270-0009	ZZ	1	1
V3	Tube, electron, OB2	1270-0004	ZZ	1	1
	TIMING SIGNAL GENERATOR 9010-0024				
A1	Timing Signal Generator Sub-assembly	C1001-1003	CV	1	1
C2	Capacitor: fixed, mica, 68 uuf, 5%, 500VDCW	1003-0041	Z, RR-1468	1	1
C3	Capacitor: fixed, mica, 82 uuf, 5%, 500VDCW	1003-0042	Z, RR-1482	1	1
C5	Capacitor: fixed, Mylar .039 uf, 2%, 400VDCW	1008-0011	AJ, 355E393B	1	1
C6	Capacitor: fixed, mica, 100uuf, 5%, 500VDCW	1003-0043	Z, RR-1310	1	1
C7	Capacitor: fixed, Mylar, .22 uf, 5%, 400VDCW	1008-0012	AJ, 338E224J	1	1
R1	Resistor: fixed, composition, 1.8M, 5%, 1/2W	1067-1855	B, EB-1855	1	1
R3	Resistor: fixed, composition, 100K, 5%, 1/2W	1067-1045	B, EB-1045	1	1

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA.•
	TIMING SIGNAL GENERATOR (CONT'D) 9010-0024				
R4, 5	Resistor: fixed, composition, 56K, 5%, 1/2W	1067-5635	B, EB-5635	2	1
R6, 19, 29	Resistor: fixed, composition, 120K, 5%, 1/2W	1067-1245	B, EB-1245	3	1
R7	Resistor: fixed, composition, 750K, 5%, 1/2W	1067-7545	B, EB-7545	1	1
R8	Resistor: fixed, composition, 560K, 5%, 1/2W	1067-5645	B, EB-5645	1	1
R9, 20	Resistor: fixed, composition, 390K, 5%, 1/2W	1067-3945	B, EB-3945	2	1
R10, 21	Resistor: fixed, composition, 3.9M, 5%, 1/2W	1067-3955	B, EB-3955	2	1
R12, 22	Resistor: fixed, composition, 22K, 5%, 2W	1069-2235	B, HB-2235	2	1
R13, 23	Resistor: fixed, composition, 82K, 5%, 1W	1068-8235	B, GB-8235	2	1
R14, 24	Resistor: fixed, composition, 10K, 5%, 1/2W	1067-1035	B, EB-1035	2	1
R15, 25	Resistor: fixed, composition, 110K, 5%, 1W	1068-1145	B, EB-1145	2	1
R17	Resistor: fixed, carbon film, 2.163M, 1%, 1W	1082-0042	NN, DC-1	1	1
R18, 28	Resistor: variable, composition, 50K, 20%, 1/4W	1200-0003	BO, Type 70	2	1
R27	Resistor: fixed, composition, 4.7M, 5%, 1/2W	1067-4755	B, EB4755	1	1
V1	Tube, electron, 5963	1270-0002	ZZ	1	1
V2	Tube, electron, 6BC7	1270-0041	ZZ	1	1
V3, 4	Tube, electron, 5725	1270-0018	ZZ	2	2
	TIMING SIGNAL GENERATOR 9010-0026				
A1	Timing Signal Generator Subassembly	D1001-1005	CV	1	1
C1	Capacitor: variable, ceramic, 7-45 uuf, 500VDCW	1001-0001	L, TS2A	1	1
C2	Capacitor: fixed, mica, 39 uuf, 5%, 300VDCW	1003-0005	Z, Type PQ	1	1
C3	Capacitor: fixed, mica, 27 uuf, 5%, 300VDCW	1003-0008	Z, DR-1427	1	1
C4	Capacitor: fixed, mica, 470 uuf, 10%, 500VDCW	1002-0015	V, Type O	1	1
C5	Capacitor: fixed, ceramic, .01 uf, -0, +100%, 1000 VDCW	1005-0002	B, Type 36A	1	1
C7	Capacitor: fixed, mica, 39 uuf, 2%, 500VDCW	1003-0070	V, CM15E390G	1	1

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

REF. DESIG.	DESCRIPTION	DYMEC STOCK NO.	MFR. * & MFRS. DESIG.	QTY.	1-YR. SPA•
C8, 11	Capacitor: fixed, mica, 100uuf, 5%, 500VDCW	1003-0043	Z, RR-1310	2	1
C10	Capacitor, fixed, mica, 390 uuf, 2%, 500VDCW	1003-0069	V, CM20E391G	1	1
C12	Capacitor: fixed, mica, 3900 uuf, 2%, 500VDCW	1003-0069	V, CM30E392G	1	1
R1, 3	Resistor: fixed, composition, 47K, 5%, 1/2W	1067-4735	B, EB-4735	2	1
R2	Resistor: fixed, composition, 2200 ohms, 5%, 1/2W	1067-2225	B, EB-2225	1	1
R4, 5	Resistor: fixed, composition, 100K, 5%, 1/2W	1067-1045	B, EB-1045	2	1
R6	Resistor: fixed, composition, 3.9M, 5%, 1/2W	1067-3955	B, EB-3955		
R7	Resistor: fixed, composition, 390K, 5%, 1/2W	1067-3945	B, EB-3945	1	1
R8, 9	Resistor: fixed, composition, 180K, 5%, 1/2W	1067-1845	B, EB-1845	2	1
R10, 20, 30	Resistor: fixed, composition, 22K, 5%, 2W	1069-2235	B, HB-2235	3	1
R11, 21, 31	Resistor, fixed, composition, 82K, 5%, 1W	1068-8235	B, GB-8235	3	1
R12, 22, 32	Resistor: fixed, composition, 10K, 5%, 1/2W	1067-1035	B, EB-1035	3	1
R13, 23, 33	Resistor: fixed, composition, 110K, 5%, 1W	1068-1145	B, GB-1145	3	1
R14, 25, 35	Resistor: fixed, carbon film, 2.52M, 1%, 1W	1082-0045	NN, DC-1	3	1
R15, 26, 36	Resistor: variable, composition, 50K, 20%, 1/4W	1200-0003	BO, Type 70	3	1
R16, 27, 37	Resistor: fixed, composition, 120K, 5%, 1/2W	1067-1245	B, EB-1245	3	1
R17	Resistor: fixed, composition, 220K, 5%, 1/2W	1067-2245	B, EB-2245	1	1
R18, 29	Resistor: fixed, composition, 2.7M, 5%, 1/2W	1067-2755	B, EB-2755	2	1
R28	Resistor: fixed, composition, 270K, 5%, 1/2W	1067-2745	B, EB-2745	1	1
V1	Tube, electron, 5763	1270-0002	ZZ	1	1
V2	Tube, electron, 6BC7	1270-0041	ZZ	1	1
V3, 4, 5	Tube, electron, 5725	1270-0018	ZZ	3	3
Y1	Crystal, 100 kc	2035-0002	BW, -H-17T	1	1

* Manufacturers' code letters on last page. • Recommended 1-yr. isolated-use spares per MIL-E-17362A.

LIST OF CODE LETTERS USED IN TABLE OF REPLACEABLE PARTS TO DESIGNATE THE MANUFACTURERS

CODE LETTER	MANUFACTURER	ADDRESS
A	Aerovox Corp.	New Bedford, Mass.
B	Allen-Bradley Co.	Milwaukee 4, Wis.
C	Amperite Co.	New York, N. Y.
D	Arrow, Hart & Hegeman	Hartford, Conn.
E	Bussman Manufacturing Co.	St. Louis, Mo.
F	Carborundum Co.	Niagara Falls, N. Y.
G	Centralab	Milwaukee 1, Wis.
H	Cinch-Jones Mfg. Co.	Chicago 24, Ill.
HP	Hewlett-Packard Co.	Palo Alto, Calif.
I	Clarostat Mfg. Co.	Dover, N. H.
J	Cornell Dubilier Elec. Co.	South Plainfield, N. J.
K	Hi-Q Division of Aerovox	Olean, N. Y.
L	Erie Resistor Corp.	Erie 6, Pa.
M	Fed. Telephone & Radio Corp.	Clifton, N. J.
N	General Electric Co.	Schenectady 5, N. Y.
O	General Electric Supply Corp.	San Francisco, Calif.
P	Girard-Hopkins	Oakland, Calif.
Q	Industrial Products Co.	Danbury, Conn.
R	International Resistance Co.	Philadelphia 8, Pa.
S	Lectrohm Inc.	Chicago 20, Ill.
T	Littlefuse Inc.	Des Plaines, Ill.
U	Maguire Industries Inc.	Greenwich, Conn.
V	Micamold Radio Corp.	Brooklyn 37, N. Y.
W	Oak Manufacturing Co.	Chicago 10, Ill.
X	P. R. Mallory Co., Inc.	Indianapolis, Ind.
Y	Radio Corp. of America	Harrison, N. J.
Z	Sangamo Electric Co.	Marion, Ill.
AA	Sarkes Tarzian	Bloomington, Ind.
BB	Signal Indicator Co.	Brooklyn 37, N. Y.
CC	Sprague Electric Co.	North Adams, Mass.
DD	Stackpole Carbon Co.	St. Marys, Pa.
EE	Sylvania Electric Products Co.	Warren, Pa.
FF	Western Electric Co.	New York 5, N. Y.
GG	Wilkor Products, Inc.	Cleveland, Ohio
HH	Amphenol	Chicago 50, Ill.
II	Dial Light Co. of America	Brooklyn 37, N. Y.
JJ	Leecraft Manufacturing Co.	New York, N. Y.
KK	Switchcraft, Inc.	Chicago 22, Ill.
LL	Gremar Manufacturing Co.	Wakefield, Mass.
MM	Carad Corp.	Redwood City, Calif.
NN	Electra Manufacturing Co.	Kansas City, Mo.
OO	Acro Manufacturing Co.	Columbus 16, Ohio
PP	Alliance Manufacturing Co.	Alliance, Ohio
QQ	Arco Electronics, Inc.	New York 13, N. Y.
RR	Astron Corp.	East Newark, N. J.
SS	Axel Brothers Inc.	Long Island City, N. Y.
TT	Belden Manufacturing Co.	Chicago 44, Ill.
UU	Bird Electronics Corp.	Cleveland 14, Ohio
VV	Barber Colman Co.	Rockford, Ill.
WW	Bud Radio Inc.	Cleveland 3, Ohio
XX	Allen D. Cardwell Mfg. Co.	Plainville, Conn.
YY	Cinema Engineering Co.	Burbank, Calif.
ZZ	Any brand tube meeting RETMA standards.	
AB	Corning Glass Works	Corning, N. Y.
AC	Dale Products, Inc.	Columbus, Neb.
AD	The Drake Mfg. Co.	Chicago 22, Ill.
AE	Elco Corp.	Philadelphia 24, Pa.
AF	Hugh H. Eby Co.	Philadelphia 44, Pa.
AG	Thomas A. Edison, Inc.	West Orange, N. J.
AH	Fansteel Metallurgical Corp.	North Chicago, Ill.
AI	General Ceramics & Steatite Corp.	Keasbey, N. J.
AJ	The Gudeman Co.	Sunnyvale, Calif.
AK	Hammerlund Mfg. Co., Inc.	New York 1, N. Y.
AL	Industrial Condenser Corp.	Chicago 18, Ill.
AM	Insuline Corp. of America	Manchester, N. H.
AN	Jennings Radio Mfg. Corp.	San Jose, Calif.
AO	E. F. Johnson Co.	Waseca, Minn.
AP	Lenz Electric Mfg. Co.	Chicago 47, Ill.
AQ	Micro-Switch	Freeport, Ill.
AR	Mechanical Industries Prod. Co.	Akron 8, Ohio
AS	Model Eng. & Mfg., Inc.	Huntington, Ind.
AT	The Muter Co.	Chicago 5, Ill.
AU	Ohmite Mfg. Co.	Skokie, Ill.
AV	Resistance Products Co.	Harrisburg, Pa.
AW	Radio Condenser Co.	Camden 3, N. J.
AX	Shallcross Manufacturing Co.	Collingdale, Pa.
AY	Solar Manufacturing Co.	Los Angeles 58, Calif.
AZ	Sealectro Corp.	New Rochelle, N. Y.
BA	Spencer Thermostat	Attleboro, Mass.
BC	Stevens Manufacturing Co.	Mansfield, Ohio
BD	Torrington Manufacturing Co.	Van Nuys, Calif.
BE	Vector Electronic Co.	Los Angeles 65, Calif.
BF	Weston Electrical Inst. Corp.	Newark 5, N. J.
BG	Advance Electric & Relay Co.	Burbank, Calif.
BH	E. I. DuPont	San Francisco, Calif.
BI	Electronics Tube Corp.	Philadelphia 18, Pa.
BJ	Aircraft Radio Corp.	Boonton, N. J.
BK	Allied Control Co., Inc.	New York 21, N. Y.
BL	Augat Brothers, Inc.	Attleboro, Mass.
BM	Carter Radio Division	Chicago, Ill.
BN	CBS Hytron Radio & Electric	Danvers, Mass.
BO	Chicago Telephone Supply	Elkhart, Ind.
BP	Henry L. Crowley Co., Inc.	West Orange, N. J.
BQ	Curtiss-Wright Corp.	Carlstadt, N. J.
BR	Allen B. DuMont Labs	Clifton, N. J.
BS	Excel Transformer Co.	Oakland, Calif.
BT	General Radio Co.	Cambridge 39, Mass.
BU	Hughes Aircraft Co.	Culver City, Calif.
BV	International Rectifier Corp.	El Segundo, Calif.
BW	James Knights Co.	Sandwich, Ill.
BX	Mueller Electric Co.	Cleveland, Ohio
BY	Precision Thermometer & Inst. Co.	Philadelphia 30, Pa.
BZ	Radio Essentials Inc.	Mt. Vernon, N. Y.
CA	Raytheon Manufacturing Co.	Newton, Mass.
CB	Tung-Sol Lamp Works, Inc.	Newark 4, N. J.
CD	Varian Associates	Palo Alto, Calif.
CE	Victory Engineering Corp.	Union, N. J.
CF	Weckesser Co.	Chicago 30, Ill.
CG	Wilco Corporation	Indianapolis, Ind.
CH	Winchester Electronics, Inc.	Santa Monica, Calif.
CI	Malco Tool & Die	Los Angeles 42, Calif.
CJ	Oxford Electric Corp.	Chicago 15, Ill.
CK	Camloc-Fastener Corp.	Paramus, N. J.
CL	George K. Garrett	Philadelphia 34, Pa.
CM	Union Switch & Signal	Swissvale, Pa.
CN	Radio Receptor	New York 11, N. Y.
CO	Automatic & Precision Mfg. Co.	Yonkers, N. Y.
CP	Bassick Co.	Bridgeport 2, Conn.
CQ	Birnbach Radio Co.	New York 13, N. Y.
CR	Fischer Specialties	Cincinnati 6, Ohio
CS	Telefunken (c/o MVM, Inc.)	New York, N. Y.
CT	Potter-Brumfield Co.	Princeton, Ind.
CU	Cannon Electric Co.	Los Angeles, Calif.
CV	Dymec	Palo Alto, Calif.
CW	Good-All Electric Mfg. Co.	Ogallala, Nebr.

CLAIM FOR DAMAGE IN SHIPMENT

Unless otherwise specified with a purchase order, each Dymec instrument is purchased f. o. b. Palo Alto, California, subject to the terms in the purchase order acknowledgment. As soon as each instrument is received, inspect it for obvious and concealed damage, and test its operation. If the instrument is damaged, immediately file a claim with the carrier's agent; include a description of the instrument (model and serial numbers) and the extent of damage.

WARRANTY

Dymec warrants each instrument manufactured by them to be free from defects in material and workmanship. Our liability under this warranty is limited to servicing or adjusting any instrument returned to the factory for that purpose and to replace any defective parts thereof. Klystron tubes as well as other electron tubes, fuses and batteries are specifically excluded from any liability. This warranty is effective for one year after delivery to the original purchaser when the instrument is returned, transportation charges prepaid by the original purchaser, and when upon our examination it is disclosed to our satisfaction to be defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at cost. In this case, an estimate will be submitted before the work is started.

If any fault develops, the following steps should be taken.

1. Notify us, giving full details of the difficulty, and include the model number and serial number. On receipt of this information, we will give you service data or shipping instructions.

2. On receipt of shipping instructions, forward the instrument prepaid, to the factory or to the authorized repair station indicated on the instructions. If requested, an estimate of the charges will be made before the work begins, provided the instrument is not covered by the warranty.

SHIPPING

All shipments of Dymec instruments should be made via truck or Railway Express. The instruments should be packed in a strong exterior container and surrounded by two or three inches of excelsior or similar shock-absorbing material.

DO NOT HESITATE TO CALL ON US

DYMEC
A Division of Hewlett-Packard Co.
395 Page Mill Road
Palo Alto, California