DOVETRON TELEPRINTER SPEED CONTROLLER TSC-1000

OPERATING INSTRUCTIONS

FAILURE to read these brief instructions may result in unsatisfactory operation of the TSC-1000 and the companion teleprinter

The DOVETRON TSC-1000 Teleprinter Speed Controller consists of an AC/DC converter driving a DC/AC converter. The output of the second converter drives the teleprinter's synchronous motor through a coupling-isolation transformer. The output of the TSC is varied both in frequency and amplitude, depending upon the speed selected.

Although designed primarily as an electronic gear-shift for the Teletype Corporation's Models 28, 32, 33 and 35, the TSC-1000 may be used with the Kleinschmidt, Mite Corporation, Creed and other teleprinters that are equipped with 50/60 Hz synchronous motors and 100 WPM (74.2 baud) gears.

Since the TSC-1000 controls both the frequency and amplitude of the voltage supplied to the motor, no over-heating of the motor will be experienced.

SERIES-GOVERNED MOTORS ARE INSENSITIVE TO LINE FREQUENCY AND WILL NOT RESPOND TO THE SPEED-CHANGE COMMANDS OF THE TSC-1000 and should not be used.

Calibration of the front panel control is accurate only if the teleprinter is geared for 100 WPM, but the TSC may be used to change the speed of teleprinters with gears for other speeds. As an example, a 75 WPM device may be slowed down to 60 or 67 WPM. Likewise, a 60 WPM machine may be sped up to 67 or 75 WPM, provided the teleprinter is mechanically capable of running at the faster speed.

INSTALLATION

Model 28/35 (RO, KSR & KTR), Kleinschmidt TT-98/TT-100

The simplest installation is to connect the TSC between the teleprinter and the power mains. At the slower speeds (60 and 67 WPM), the internal copy lights will not light to full brilliance, because the output of the TSC is reduced in amplitude as the teleprinter is slowed down. At 60 WPM the output voltage of the TSC is between 70 and 80 vac.

The best installation is to provide a separate power lead between the output of the TSC and the teleprinter's motor.

Model 28/35 ASR, Model 32/33 (all models) and Mite Corporation Midgets.

A separate power lead is required between the output of the TSC and the motor of 28ASR, etc., because these teleprinters contain internal power supplies and other circuitry that require a line voltage of 105 vac or more. When running at slow speed, the output of the TSC may be as low as 70 vac and these internal supplies may become marginal.

THE BEST INSTALLATION FOR ANY TELEPRINTER INCLUDES THE PROVISON FOR A SEPARATE POWER LEAD BETWEEN THE TSC AND THE INTERNAL MOTOR OF THE TELE-PRINTER.

STARTING

Place the DOC (DIRECT-OFF-CONTROLLER) Switch in the OFF position. Connect the TSC to the teleprinter. Turn the teleprinter's main power switch ON. If the separate power cord installation has been used, the internal copy lights and power supplies will be powered-up.

Switch the DOC switch to the DIRECT position (up). The teleprinter will now start and be running at 100 WPM from the regular mains. (If the mains are 50 Hz the teleprinter's speed will be approximately 82 WPM).

Position the RANGE control on the front panel of the TSC straight up.

Switch the DOC switch through the OFF position to the CONTROL position.

The teleprinter is now running at whatever speed is indicated by the speed switch on the front panel of the TSC.

CHANGING SPEEDS

Switch the SPEED switch to the desired speed (60-67-75-100 WPM), and the teleprinter will immediately shift to that speed.

Switching from a higher speed to a slower speed is accomplished in about 100 milliseconds. The teleprinter's motor immediately slows down and synchronizes itself to the lower frequency output of the TSC.

When switching from a lower speed to a faster speed, switch up one speed position at a time. Each speed change will require about 100 milliseconds: KSRs are faster, ASRs are a little slower, depending on their physical condition and load on the typing unit at the moment of shifting.

The neon light on the front panel of the TSC glows at full brilliance when the teleprinter has reached the indicated speed. Partial brilliance indicates that the motor is still accelerating to the higher speed.

Proper lubrication and shaft alignment of the ASR will keep the up-shifting time well under one second from 60 WPM to 100 WPM.

If the teleprinter stalls or stops during a speed change (a rare occurence caused by a simultaneous zero-crossing of the motor drive voltage and a heavy load condition caused in the teleprinter by the incoming signal), merely switch the DOC switch back to DIRECT (to restart the motor) and then immediately back to CONTROLLER.

Frequent stalling usually indicates a very low line condition or a very heavy load on the teleprinter. Voltage regulation may be required to maintain an adequate line voltage (115 vac ±10%) to the TSC to cure the former. In the latter, the heavy load condition may be caused by binding shafts and gears, open loop current, or a need for lubrication.

"Dry" machines put a very heavy load on the TSC and the synchronous motor.

SPEED RANGES

TSC SPEED SETTING	RANGE CONTROL POSITION		
	Left	Center	Right
60 WPM	50	60	70
67 WPM	57	67	77
75 WPM	65	75	85
90 WPM	80	90	100
100 WPM	90	100	110+

RANGE CONTROL

The RANGE control must be straight up (centered) for the calibration of the SPEED control to be accurate.

Often what appears to be a badly distorted signal is really a signal running either slower or faster than one of the standard speeds. A slight adjustment of the RANGE control will often improve copy by synchronizing the receiving teleprinter to the speed of the sending device.

CAUTION: Always return the RANGE control to the center position when changing from the receiving mode to the transmitting mode, or the signal from the TSC-controlled teleprinter will be running at some speed other than a FCC authorized standard (60, 67, 75 or 100 WPM ±5%).

ELECTRONIC RANGE FINDING

The unique design of the TSC permits the second half of the output voltage cycle to be shortened or lengthened in time, permitting the RANGE control to be used as an electronic range-finder. The mechanical range-finder inside of the teleprinter should be left in that position which has afforded the widest range and best copy in the past.

When copying a weak or badly distorted (DX-type) signal, the RANGE control should be adjusted for best copy.

Generally, badly distorted signals that are generated by pitted or improperl adjusted sending contacts can be better copied with a slight reduction (2 to 5%) of the receiving teleprinter's speed. This is accomplished by turning the RANGE control counter-clockwise).

Signals with propagation (multi-path, etc.) distortion are usually copied better with a speed increase (RANGE control clockwise).

It is not uncommon to find a station that can be copied better with an advanced speed on the keyboard signal and a reduced speed on the TeeDee signal, even when the sending station is using an ASR! Such a situation indicates that one or both of the sending contacts need maintenance.

VOLTAGE TABLE

The following table compares the amplitude output and the frequency output of the TSC under load (Ex: 28KSR and 28ASR):

Speed (WPM)	Freq (Hz)	KSR (vac)	ASR (vac)
60	36.8	79	70
67	40.5	88	79
75	45.0	95	86
90	54.0	100	92
100	60.0	109	100

If the output voltage of the TSC drops below 70 vac (under load) at 60 WPM, the power mains are probably too low. A line regulator or voltage boosting auto-transformer may be used to raise the line voltage at the TSC's input.

In an area with consistently low line voltage, the output of the TSC can be raised about 5% by replacing the 75Ω, 100 watt power resistor on top of the chassis with a 50Ω, 100 watt power resistor, effectively lowering the current limiting resistance of the two paralled resistors from 30Ω, 200 watt to 25Ω, 200 watt.

CAUTION: Always remove the power plug of the TSC from the power mains before attempting to service the unit.

SPECIAL APPLICATIONS

The TSC-1000 may be operated from DC mains and from AC mains of 25 Hz to 400 Hz.

For low or high frequency (AC) operation, disconnect the fan-motor's leads from the DOC switch and relocate to those switch contacts that are connected to the two RED wires coming from the secondary of the output transformer, thus operating the fan-motor from the output of the TSC.

For DC operation, it will be necessary to replace the fan-motor with a DC unit, or make some other arrangement for cooling. Do not block the perforated front and rear panels that permit cooling air to be circulated thru the unit.

WARRANTY

The TSC-1000 is warranted by DOVETRON to be free of defects for a period of 30 days.

If a failure is experienced within 30 days of purchase, return the TSC to DOVETRON with a letter detailing the failure, PREPAID. If inspection shows that the TSC has not been mistreated or abused, the TSC will be repaired or replaced at no charge and returned, freight charges prepaid by DOVETRON.

If a failure is experienced after 30 days of purchase, return the TSC to DOVETRON with a letter detailing the failure, PREPAID. After repair, the TSC-1000 will be shipped back, freight charges and repair costs COLLECT. Any warranties granted to DOVETRON will be passed on to the original purchaser for a period of one year.

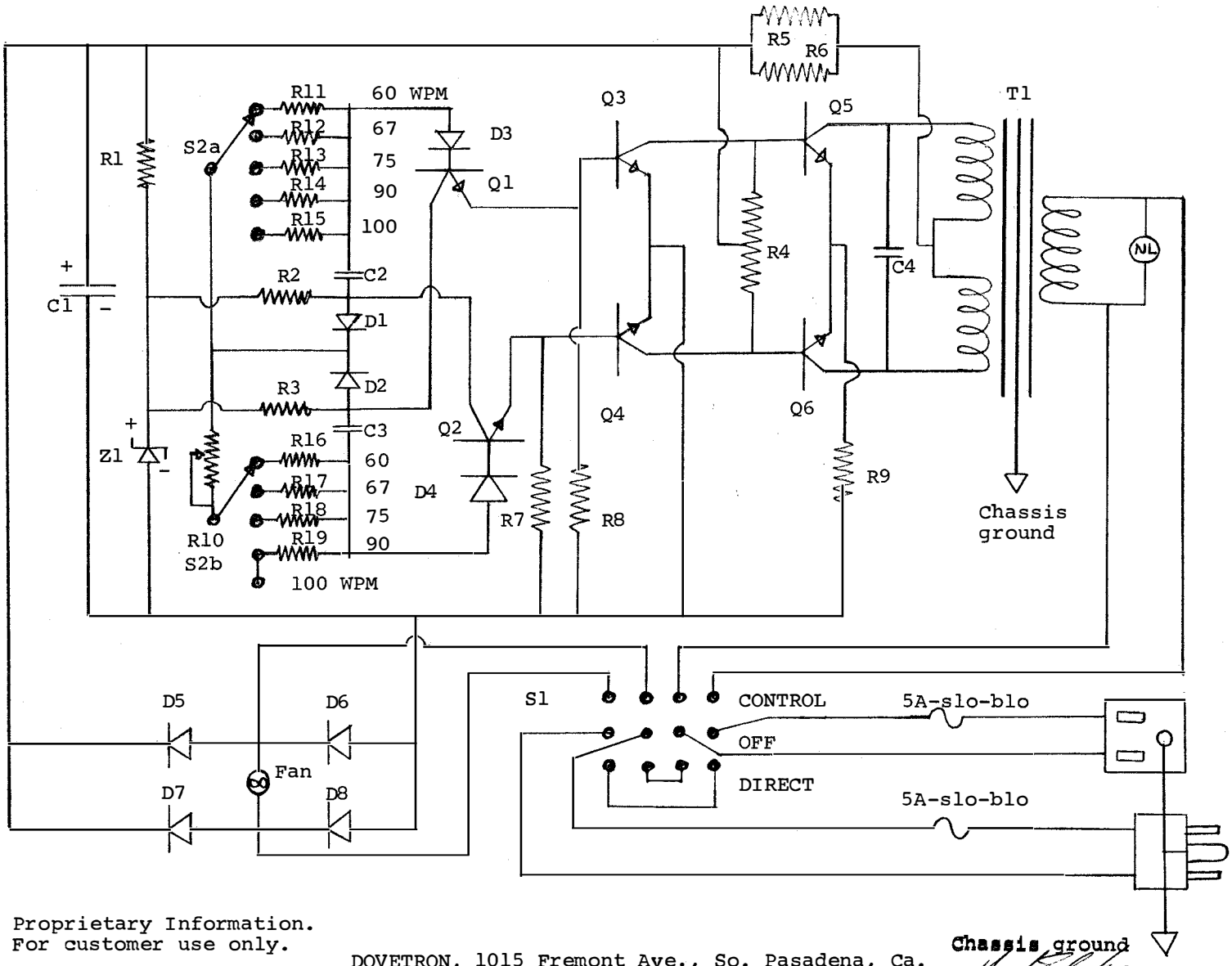
Spare parts may be purchased directly from DOVETRON and a prompt reply will be made to any inquiries.

Prices and specification are subject to change without notice.

DOVETRON
1015 Fremont Avenue
South Pasadena, California
91030 (P O Box 267)
213-682-3705

July, 1972

DOVETRON TELEPRINTER SPEED CONTROLLER TSC-1000



Proprietary Information.
For customer use only.

DOVETRON, 1015 Fremont Ave., So. Pasadena, Ca. 91030
213-682-3705

DOVETRON TELEPRINTER SPEED CONTROLLER TSC-1000

PARTS LIST

C1	900 Mfd, 150 Vdc, Electrolytic, computer-grade.
C2,C3	1 Mfd, 5%, 100 Vdc, mylar, non-polarized.
C4	1 Mfd, 20%, 400 Vdc, mylar, non-polarized.
D1,D2,D3,D4	Switching diode, silicon, Type 1N914.
D5,D6,D7,D8	Power diode, silicon, 3 amp, 400 piv, Type 30S4.
F1	Fan with 3.5" blade, 250 CFM, 50/60 Hz, 110 vac.
N1	Neon lamp indicator assy with 100K resistor.
Q1,Q2	Transistor, silicon, high-beta, Type 2N3569.
Q3,Q4	Transistor, silicon, switching, Type 2N697.
Q5,Q6	Transistor, power, hi-voltage, Type DTS-721(46).
R1	5,000 ohms, 5 watt, wire-wound.
R2,R3	2200 ohms, 1/4 watt, 5%, carbon composition.
R4	1000 ohms, 100 watt, wirewound, center-tapped.
R5	50 ohms, 100 watt, wirewound.
R6	75 ohms, 100 watt, wirewound.
R7,R8	390 ohms, 1/4 watt, 5%, carbon composition.
R9	1 ohm, 10 watt, wirewound.
R10	Potentiometer, 10,000 ohms, 2 watt, linear.
R11	18,000 ohms, 1/4 watt, 5%, carbon composition.
R12	15,000 ohms, " " " "
R13, R16	13,000 ohms, " " " "
R14	12,000 ohms, " " " "
R15	10,000 ohms, " " " "
R17	11,000 ohms, " " " "
R18	9100 ohms, " " " "
R19	5600 ohms, " " " "
S1	Toggle switch, 12 terminal, 4PDT, center-off.
S2	Rotary switch, 2 pole, 5 position, shorting.
T1	Isolation transformer, 230 ct./115 vac, 150 watt.
Z1	Zener diode, 18-22 volts, 1 watt.

There are no critical or hand selected components in the DOVETRON TSC-1000. Component replacement may be made on "an equal" basis with the following exceptions:

T1 should be Triad part number N67A.
Q5 and Q6 should be Delco DTS-721, family 46.
S2 must be "make before break": Centralab p/n PA-1002.

Replacement parts may be ordered directly from DOVETRON and will be shipped same day from stock: Parts cost and freight COLLECT. Pricing structure generally follows the Allied or Newark catalog, or slightly less.

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South Pasadena, Calif. 91030
213-682-3705 (P O Box 267).

DOVETRON

1015 FREMONT AVE.
SOUTH PASADENA, CALIFORNIA 91030
213-682-3705

This DOVETRON Teleprinter Speed Controller (S/N 124) is equipped with AUTOSTART circuitry and differs slightly from the schematic shown in the instruction manual. A new manual with the correct schematic and operating instructions will be forwarded to the purchaser in a couple of weeks.

The new AUTOSTART circuitry permits starting of the TSC by merely switching the DOC switch from the OFF position to the CONTROL position. It is no longer necessary to start in the DIRECT position first.

For AUTOSTART operation, leave the DOC switch in the CONTROL position and select the desired speed with the front panel WPM switch. When external power is applied to the TSC, the teleprinter will be started on the standard mains and within be 500 milliseconds be automatically switched by an internal relay to the output of the TSC. When shut down, the AUTOSTART circuit resets in approximately 750 milliseconds.

The AUTOSTART circuitry performs a third function of limiting the initial turn-on current surge to the motor, thus affording protection for the terminal unit's autostart components.

ADDENDUM TO OPERATING INSTRUCTIONS

TSC-1000 with AUTOSTART (S/N 100 up)

All Dovetron TSC-1000 Teleprinter Speed Controllers with serial numbers of 100 and up contain an automatic autostart circuitry that is compatible with terminal units and time clocks, etc.

It is no longer necessary to start the teleprinter in the DIRECT position of the DOC SWITCH. When switched from OFF to CONTROL, the TSC-1000 will start the teleprinter from the mains and then switch the teleprinter to the output of the TSC. The TSC is brought up to full output at the same time.

This circuitry also provides a "soft" start for the TSC and is accomplished in approximately 350 milliseconds.

For slow speed autostart operation (60 to 95 WPM), put the DOC switch in the CONTROL position, select the desired speed with the WPM switch and position the RANGE control appropriately.

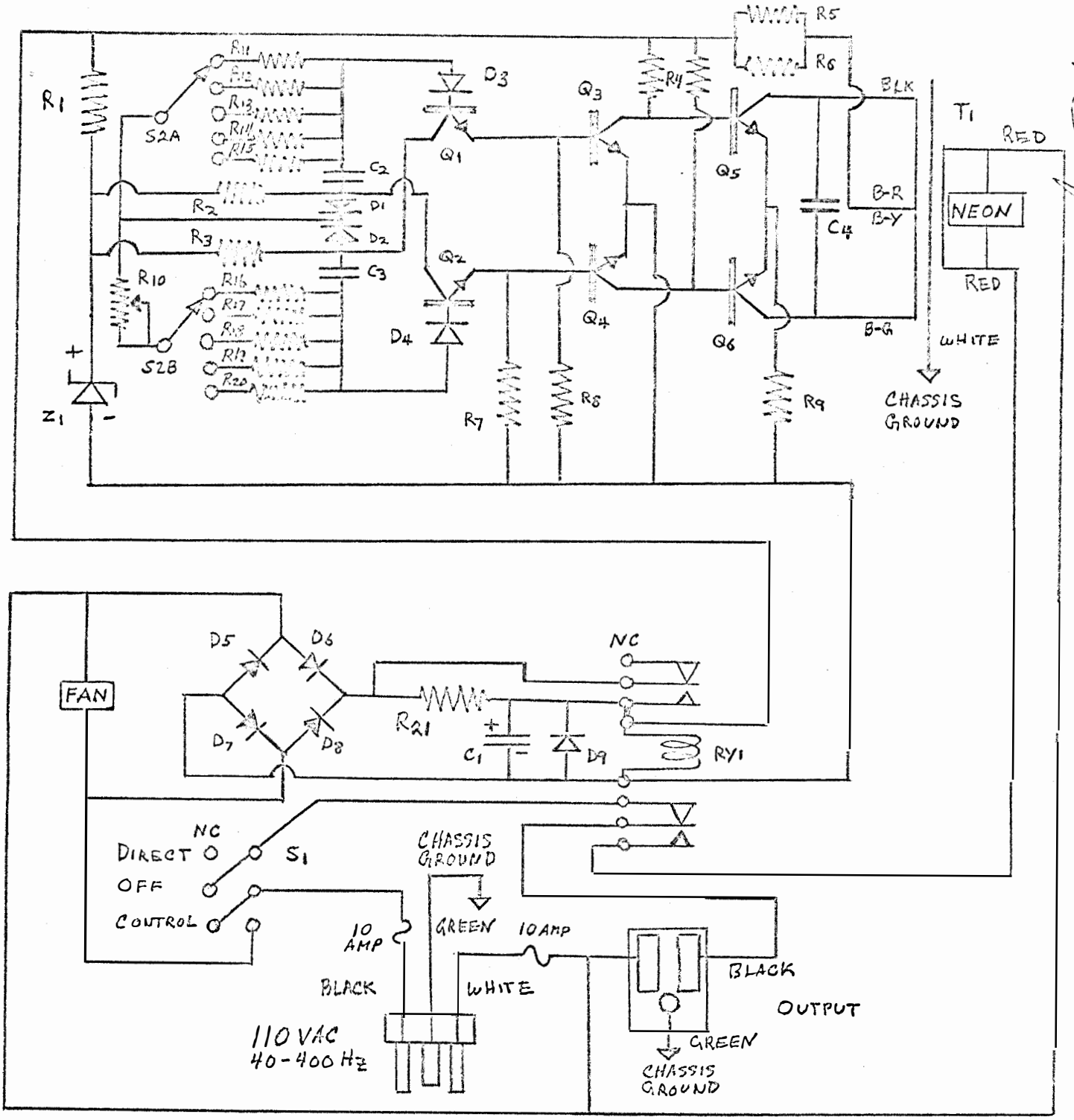
For 100 WPM (or faster) autostart, put the DOC switch in the DIRECT position for operation directly from the power mains. If experience shows the machine is limber enough to be started 100% of the time in the CONTROL position, then of course the 100 WPM control position may be used.

The autostart function is accomplished by a DPDT relay (RY1) utilizing the charging time constant of the filter capacitor C1 and current limiting resistor R21. R21 is shorted out by RY1 after the autostart is accomplished.

If for any reason the TSC fails to function properly during initial set-up, remove the four bottom screws and check RY1 for proper operation. It is possible, although not probable, that the armature of this relay may be jammed by shipping shock. If the relay fails to pull in, R21 will operate "hot" and protect the TSC from damage.

In normal operation this resistor is shorted out by the relay and will run at room temperature.

DOVETRON, 1015 Fremont Avenue, South Pasadena, California, 91030. 213-682-3705. (P O Box 267).



DOVETRON TSC-1000 TELEPRINTER SPEED CONTROLLER WITH AUTOSTART (s/n 100 & up)

DOVETRON TSC-1000 TELEPRINTER SPEED CONTROLLER
WITH AUTOSTART: All Serial Numbers above 100.

PARTS LIST

C1	750-1000 Mfd, 150/165 Vdc, electrolytic, computer grade.
C2,C3	1 Mfd, 5%, 100 Vdc, Mylar, non-polarized.
C4	1 Mfd, 20%, 400 Vdc, Mylar, non-polarized, low D/F.
D1,D2,D3,D4	Switching diode, silicon, Type 1N914.
D5,D6,D7,D8	Power Diode, Silicon, 3 amp, 400 PIV, Type 30S4.
F1	Fan with 3.5" blade, 110 Vac, 50/60 Hz, Type 3M365.
N1	Neon Lamp indicator assembly with 100K resistor.
Q1,Q2	Transistor, silicon, high-beta, Type 2N3569.
Q3,Q4	Transistor, silicon, switching, Type 2N5859.
Q5,Q6	Transistor, Power, 5 amp, 400 PIV, Type SDT-403.
R1	5,000 ohms, 5 watt, wire-wound.
R2,R3	2200 ohms, 1/4 watt, 10%, carbon composition.
R4	1000 ohms, 100 watt, wire-wound, center-tapped.
R5,R6	75 ohms, 100 watt, wire-wound.
R7,R8	1000 ohms, 1/4 watt, 10%, carbon composition.
R9	1 ohm, 10 watt, wire-wound.
R10	Potentiometer, 10,000 ohms, 2 watts, linear.
R11	17,000 ohms, 1/4 watt, 5%, carbon composition.
R12	15,000 ohms, " " " "
R13	13,000 ohms, " " " "
R14	12,000 ohms, " " " "
R15	10,000 ohms, " " " "
R16	13,000 ohms, " " " "
R17	11,000 ohms, " " " "
R18	9100 ohms, " " " "
R19	6600 ohms, " " " "
R20	5600 ohms, " " " "
R21	75 ohms, 10 watts, wire-wound.
RY1	Relay, DPDT, 10 amp contacts, 120 Vdc, 10,000 ohm coil.
D9	Same as D5-D8.
S1	Toggle Switch, 6 terminal, 2PDT, center-off.
S2	Rotary Switch, 2 pole, 5 position, shorting.
T1	Isolation transformer, 230 Vac C.T./115 Vac, 150 watts.
Z1	Zener Diode, 18-22 volts, 1 Watt.

DOVETRON, 1015 Fremont Avenue, South Pasadena,
California, 91030. 213-682-3705 (Box 267).

DOVETRON

1015 FREMONT AVE.
SOUTH PASADENA, CALIFORNIA 91030
213-682-3705

TO: All Dovetron TSC-1000 Teleprinter Speed Controller users. April, 1973.

SUBJECT: Field Modification to prevent power transistor failures.

The early TSC-1000 used DTS-721 (or 723) power transistors, which were rated at 1000 volts, but had a low beta and tended to run hot. Some field failures were experienced from secondary breakdown. An earlier field memo recommended replacing the 50Ω, 100W power resistor with a 75Ω, 100W unit.

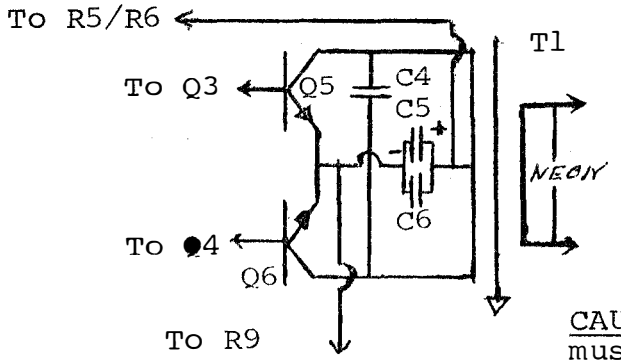
TSC-1000s with serial numbers above 100 incorporated the 75Ω resistor, and autostart circuit and high beta, but lower voltage (400vdc) xsistors, which operate at room temperature.

In either model, the despiking capacitor (C4) keeps the kick-back spike from the output transformer down to about 350 volts. If the 400 volt transistors were really 400 volt transistors all would be well, but the transistor manufacturers "fudge" once in a while, and a few of the 400 volt transistors have failed in the field. This failure is a "voltage" failure and is evidenced by a collector to emitter short (puncture).

All current production Dovetrons (S/N 160 and up) contain a simple modification that reduces the kick-back spike to 225 volts. The power transistors should literally last forever.

The modification consists of paralleling two capacitors (20Mfd, 150volts electrolytic and 0.1Mfd, 150 volts, ceramic disc or tubular) and connecting this network between the center tap of the power transformer and the emitters of the power transistors. The positive polarity end of the electrolytic should go to the xfrmr's center tap. Do not ground the cases of either capacitor, since both ends of this circuit are above chassis ground. The 20 Mfd capacitor absorbes the power spike and the 0.1 Mfd capacitor catches any high speed (low energy, but high voltage) transients.

The following drawing should be self explanatory:



C5 20 Mfd, 150 Vdc, electrolytic with an insulated case.
C6 0.1 Mfd, 150 Vdc, disc/tubular.

The center tap of the transformer is the point where the B/R and B/Y wires are connected together. The common point forthe emitters of Q5/Q6 and R9 (1 ohm) is a pad on the PC card.

CAUTION: The + end of the electrolytic (C5) must go to the xfmr's C/T. Do not let the case of this capacitor short to chassis gnd.

Dovetron will supply a pair of these capacitors at no charge to owners of serials above 150* Serials below 150: $2.50 postpaid.

*Upon request. The modification kit will include a two terminal tie point.

All Dovetrons returned to the factory for repair, up-date or modification will have this modification made at no charge.

Hank Scharfe, W6SKC

MAILING ADDRESS, BOX 267, SOUTH PASADENA, CALIFORNIA 91030