SPARTA
ELECTRONIC CORPORATION

CENTURY SERIES
Models 4510, 4515, 4520 and 4525
Tape Cartridge Reproducers

TECHNICAL MANUAL

5851 FLORIN-PERKINS ROAD / SACRAMENTO, CALIFORNIA / TELEX 377-488 CABLE SPARTA / (916) 383-5353
A Division of Computer Equipment Corporation

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Tape Cartridge Reproducers

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SPARTA ELECTRONIC CORPORATION
5851 FLORIN-PERKINS ROAD SACRAMENTO, CALIFORNIA 95828
A DIVISION OF COMPUTER EQUIPMENT CORPORATION

SPARTA ELECTRONIC CORPORATION

Dear Customer:

Careful attention to Quality Control is another important element in our daily effort to provide you with excellence of product and service. At SPARTA each piece of equipment and sub-assembly receives numerous inspections and tests in the process of production. The final results must measure within our exacting requirements before it is shipped to you. Listed below are just a few of the major check points and tests this particular piece of equipment has received before being prepared for shipment. Should you note any discrepancy in the appearance or operation of your SPARTA Product or if you have any general comments as to how we might be of greater service, your suggestions will be greatly appreciated.

CENTURY SERIES MODEL NO: 4615

PURCHASER KABN DATE: 6-19-74

SERIAL NO. 1173 CALIB. BY Bud Dwight

	✓ Internal Mech. & Soldering
	✓ Mech. operation & Press Roller Adj.
	✓ Fuse & Power Supply Voltage (Playback)
	✓ Azimuth Adj. (Play Back)
	✓ Equalization set (Play back)
L +6 dbm R —	dbm. Output Level (600 ohms)
L -56DB R —	Signal/Noise
.11%	Wow & Flutter
	✓ Cue Amp. Sensitivity
	✓ Tone Output
	✓ Remote Control Start & Stop
	✓ 150 Hz. End of Message & Ind. Lamp.
	✓ Fuse + Power Supply Voltage (Record)
	✓ Bias Trap Adj. (Record)
	✓ Bias Trap Adj. (Cue)
	✓ Bias Current Adj. (Record)
	✓ Bias Current Adj. (Cue)
	✓ Azimuth Adj. (Record)
	✓ Equalization (Record)
	✓ Audio Current VU Meter Calib.
1.8%	✓ Dist. Total System
	✓ 150 Aux. Cue (Record)
	✓ Remote Control
A ✓ B ✓ C	✓ Input Source
	✓ Encoder R/PB
	✓ Crosstalk Cue to Prog
	Meter Cal:
51K	✓ 1 KHz
22K	✓ 150 Hz
68K	✓ Bias
	Run In

FREQ. RESPONSE MONO LEFT CHANNEL

50Hz	-.5	db
75Hz	Ø	db
150 Hz	+.6	db
300 Hz	-1	db
400 Hz	Ø	db
600 Hz	-.5	db
1 KHz	Ø	db
2.5 KHz	+.4	db
5 KHz	Ø	db
8 KHz	Ø	db
10 KHz	Ø	db
12 KHz	Ø	db
15 KHz	-.6	db

RIGHT CHANNEL STEREO

50Hz		db
75Hz		db
150Hz		db
300 Hz		db
400 Hz		db
600 Hz		db
1 KHz		db
2.5 KHz		db
5 KHz		db
8 KHz		db
10 KHz		db
12 KHz		db
15 KHz		db

Stereo Units

N/A	Channel Separation
	Phasing

CONTENTS

ELECTRONIC ADJUSTMENTS

MECHANICAL ADJUSTMENTS (See Figure 1)

REPLACEMENT & ALIGNMENT OF TAPE HEADS (See drawing P-120487)

INTRODUCTION

The Century Series of cartridge reproducers are intended for broadcast and industrial applications requiring continuous duty capability and highest quality performance. Each model meets or exceeds all applicable NAB Standards.

The Century Series tape transport has been specifically designed to accept the NAB Type A (Model 300) cartridges, and delivers optimum performance with loads of up to 10 1/2 minutes of lubricated tape.

Monaural reproducers use a standard 2 track, single head configuration, with the program amplifier connected to the upper track, and the cue amplifier connected to the lower track. Stereo reproducers use the NAB standard 3 track head. The top track is the left program channel; the lower track is for cue tones.

In the recording process, a 1000 Hz (cycles per second) tone, of about 1 second duration, is automatically recorded on the cue track each time the cartridge transport is started in the record mode. Each reproducer is furnished with a detector circuit which responds to this tone by stopping the transport. This cues the cartridge to the beginning of the announcement. The 1000 Hz tone is called the primary cue tone.

Models 4515 and 4525 have an additional detector circuit which responds to the secondary cue tone frequency of 150 Hz. This tone is popularly called the E.O.M. tone, standing for "end-of-message", and is used in automation and for other control or signaling functions. When a 150 Hz tone is detected, a relay contact closure is connected to terminals at the rear of the reproducer

chassis. This signal can be used to advance an automation system to the next "event" or turn on a light in a nearby studio as a signal to an announcer to begin speaking etc. On Century Series Recorders, the E.O.M. tone can be put on the cue track during either play or record conditions, making it possible to audition a cartridge before placing the tone on the cue track.

Several mounting configurations are available for Century Series equipment:

Single table top, with flip top cover
Dual table top, with flip top cover
Triple rack mount, with panel lock screws.
Quad custom cabinet, with walnut grain finish.

Bottom plates with no-mar rubber feet are provided with table-top configurations, and must be removed for use in the triple rack mount or quad cabinet. Each module can slide forward in the rack mount and quad cabinet for convenient access to all adjustments and for head cleaning. Additionally, the rack mount has front panel lock screws to secure the modules, and removable tabs on the rear of the p.c. board covers, to prevent the modules from being inadvertently removed from the rack.

Record modules are the same size as the reproducer modules and can mount in any of the multiple module housings. When a record module is used, it is attached to the right side of a reproducer module (as viewed from the front) with hardware provided, and the two modules slide in and out of their housing as one unit.

GENERAL DESCRIPTION

Four basic models are available:

4510 - mono reproducer, with standard 1kHz stop tone detector.
4515 - mono reproducer, with added 150 Hz EOM tone detector.
4520 - stereo reproducer, with standard 1 kHz stop tone detector.
4525 - stereo reproducer, with added 150 Hz EOM tone detector.

All electronics for audio reproduction and tone detection are on a single plug-in printed circuit board, as is the power supply regulator. Thus, each model uses the same basic p.c. board, less unneeded circuit components. All electronic adjustments are accessible through the p.c. board cover.

Integrated circuits have been used in both the program and cue amplifiers, to provide best performance, while minimizing the number of components required. The IC's are interchangeable between all circuits and are plug-in, for ease of trouble shooting in case of a malfunction.

A 1700 rpm hysteresis syncronous motor is utilized in Century Series reproducers, and runs only when a cartridge is inserted. The inherently smoother high speed motor is coupled to the flywheel-driven capstan via dual flutter-filter belts, resulting in unsurpassed flutter and wow characteristics, plus cool-running operation.

Monaural reproducers can be field-converted to stereo operation, if desired. All units are wired for stereo operation, and require only the stereo p.c. board, stereo head, an additional output transformer, and a 2 channel LCR to replace the single channel LCR used for audio switching.

Each reproducer is also factory wired for later connection to a record module, in case additional record capacity is required. The price of the record module includes a record head and head mount. The record modules are available in four basic models.

4710 - mono record, with standard 1000 Hz stop tone generator.
4715 - mono record, with added 150 Hz EOM tone generator
4720 - stereo record, with standard 1000 Hz stop tone generator.
4725 - stereo record, with added 150 Hz EOM tone generator.

Remote Control of start/stop functions is available on the barrier strip at the rear of each reproducer module. Audio outputs are also taken from the barrier strip. Additionally, an amplified cue channel output is provided, which can be used to check cue tones, as well as connect to an automatic logging system for automation applications. If the optional 150 Hz EOM tone detector is included, its contact closure appears at barrier strip terminals also.

SPECIFICATIONS

Frequency Response:	50-15,000 Hz ± 2db
Noise:	55db or more below saturation recording (mono) 52db or more below saturation recording (stereo)
Distortion:	2% or less
Wow & Flutter:	0.2% or less
Equalization:	NAB (adjustable)
Audio Output:	600 ohms balanced, +6 dbm nominal, +16 dbm maximum
Cue Signals:	NAB primary cue (stop) 1 KHz standard; secondary cue (EOM) 150 Hz optional; EOM signal provided as Form A contact closure.
Tape Speed:	7.5 ips; shielded hysteresis synchronous motor; non-magnetic dynamically balanced flywheel; multiple belt flutter-filter drive system.
Playing Time:	2 seconds to 10-1/2 minutes, NAB size A cartridge
Remote Control:	All functions available
Mounting:	Single desk, dual desk, 7" rack mount adaptor for 3 modules, custom walnut grain cabinet for 4 modules (15" H x 14" W x 15 1/2" D)
Dimensions:	Playback module and record amplifier module each 6" H x 5-3/4" W x 14" D
Power:	117 volts, 60Hz (available for other power line standards on special order)
Weight:	16 lbs, including lid

INSTALLATION

UNPACKING:

After removing the equipment from the shipping container, carefully inspect it for shipping damage. If damage is discovered, make a written request to the carrier for inspection, and retain all cartons and fillers. The carrier is responsible for any damage incurred in shipping, but the claim must be promptly filed by the receiver.

ENCLOSURES:

Table top units are shipped with lids installed. However, Triple Rack Mounts and Quad Cabinets are shipped separately from the transport modules. The modules slide in from the front, and in the Triple Rack Mount can be fastened in place by turning the front panel lock screws clockwise. There is a tab on the rear of the p.c. board cover on rack mounted units which can be turned upward to prevent accidental removal.

AUDIO & CONTROL CONNECTIONS

Barrier Strip Pin:

1. Left Channel + Audio Out
2. Left Channel - Audio Out
3. Common Shield

} Monaural

4. Right Channel + Audio Out
5. Right Channel - Audio Out
6. Common Shield
7. Decoder Out (cue track audio)
8. Remote Stop (mom. sw. to -25)
9. -25 vdc
10. Remote Start (mom. sw. to -25)
11. End of Message Contact Closure
12. End of Message Contact Closure

} Optional

OPERATION

CARTRIDGE INSERTION: The cartridge should be inserted firmly so as to bring the pinch roller fully into position. The cartridge pushes the contact arm only about 3/8" and this limited motion is translated into nearly 90 degrees rotation of the pinch roller shaft, thus a certain amount of force is required.

READY INDICATION: When a cartridge is inserted the Touchbar glows red on the left side, indicating a "ready" condition. The motor starts when the cartridge is inserted and requires approximately 2 1/2 seconds to reach operating speed.

CARTRIDGE PLAY: Depress the right side of the Touchbar to start the cartridge. The bar will glow green, indicating a "play" condition. The Touchbar should not be tapped to start a cartridge, as the spring tension of the switch contacts may cause the bar to bounce back and actuate the stop contacts momentarily.

CARTRIDGE STOP: Since a stop tone is automatically recorded at the beginning of each announcement, the cartridge will stop itself after playing, cued to the beginning of the announcement. It is also possible to stop the cartridge manually by momentarily depressing the left side of the Touchbar.

CARTRIDGE RELEASE : To remove the cartridge, push the Release Button located to the side of the cartridge slot. This retracts the pinch roller and allows the cartridge to be withdrawn. On later models the cartridge can also be released by lifting the end of the cartridge that extends through the front panel. Pause momentarily to let the pinch roller retract before withdrawing the cartridge. The cartridge cannot be released while being played.

E.O.M. INDICATION: On reproducers equipped with the optional secondary cue tone detector (end-of-message signal) a visual indication of the presence of the tone is provided. When the tone is detected, the left side of the Touchbar glows red for the duration of the tone.

ELECTRONIC ADJUSTMENTS

AUDIO LEVEL: The output level of the program amplifier (s) is factory set to +6dbm. At time of installation it may be necessary to change this setting. R24 is the left channel (mono) gain control; R6 is the right channel gain control. Both can be reached through the access hole in the p.c. board cover. Do not disturb the setting of the equalization control(s).

EQUALIZATION: The program amplifier(s) have been adjusted to conform with the NAB Standard Reproducing Characteristic. No further adjustment should be required until considerable head wear has occurred. The control(s) should then be adjusted for flattest response during playback of a frequency response test cartridge. If no test cartridge is available, the equalization should be set to produce natural sounding high frequencies. R23 is the left channel (mono) equalization control. Both can be reached through the access hole in the p.c. board cover.

STOP TONE SENSITIVITY: The 1000 Hz primary tone detector sensitivity is adjusted by R8. This control is factory set to operate the stop circuit with a tone 10db lower than the NAB specified tone level. The control can be reached through an access hole in the p.c. board cover, if adjustment is necessary.

E.O.M. TONE SENSITIVITY: The 150 Hz secondary tone detector sensitivity is adjusted by R4. This control is factory set to close relay K2 with a tone 10db lower than the NAB specified tone level. The control can be reached through an access hole in the p.c. board cover, if adjustment is necessary.

An accessory a-c outlet is provided on the rear of each reproducer module, so that a single power cord can supply operating voltage to a group of modules. Each module is simply plugged into its neighbor, and the power cord from the last one plugs into the wall outlet. The accessory outlets are not fused or switched.

MECHANICAL ADJUSTMENTS (See Figure 3)

The following step by step adjustments apply only to Century Series decks utilizing the Push/Lift Release.

SOLENOID POSITION: (Normally required only when replacing solenoid) First loosen catch plate screw, then raise the pinch roller and engage the pivot arm with the catch plate. Move the armature and plunger assembly toward the solenoid until the armature roller contacts the solenoid. Loosen the mounting screws and position the solenoid so that the armature and plunger assembly are on parallel planes. Tighten all four screws. Release the pinch roller and check for free movement of the plunger throughout its range of travel. Verify the position after tightening the screws.

PINCH ROLLER PRESSURE: Make adjustments in the following sequence.

(a) Raise the pinch roller and operate start switch.

(b) Loosen the catch plate screw.

(c) Insert screwdriver blade into the notches in the edge of the rocker arm and catch plate.

(d) Twist the blade counter-clockwise to increase pinch roller pressure.

(e) Tighten the catch plate screw when the capstan indents the pinch roller about 1/64" (indentation barely visible).

CARTRIDGE RELEASE: Set the release adjust screw so that the pivot arm is held by the full thickness of the catch plate. First loosen the lock nut, then turn the screw until the pivot arm is even with top surface of the catch plate. While making the adjustment, hold forefinger on top side of lift release arm using downward pressure. This will allow the adjustment to be made without tripping the release mechanism. Holding screw in adjusted position, tighten the lock nut.

ARMATURE RETURN STOP: Loosen the return stop screw and position the stop so that the lip of the stop locks the rocker arm in the down position while the solenoid is energized, but clears the rocker arm completely when the solenoid releases. The armature travel length should be about 1/8". Note that the rocker arm must go under the lip of the armature return stop when the armature is in contact with the solenoid -- this inhibits the push and lift releases from operating while a cartridge is being played.

ROTARY LIFT MECHANISM: Turn rotary lift adjusting screw clockwise until almost at end of travel (within 1/8"). Back screw out in small increments until a cartridge held against the stop screws will barely pull tape (solenoid turned off). Now, turn screw clockwise 1/8 turn. The cartridge should not pull tape with this setting. Try several cartridges to confirm that adjustment is correct. Recheck adjustment of pinch roller.

FLYWHEEL THRUST BEARING: The flywheel thrust bearing is a nylon screw in self-locking threads in the support plate directly below the flywheel. A moderate vertical force exerted on the capstan should result in a noticeable movement of the shaft not to exceed 1/32 of an inch. If adjustment of the vertical play is required, a large blade screwdriver should be used to prevent damage to the nylon screw. If the nylon screw is screwed in just far enough to remove all play and then backed out 1/4 turn, satisfactory operation should result.

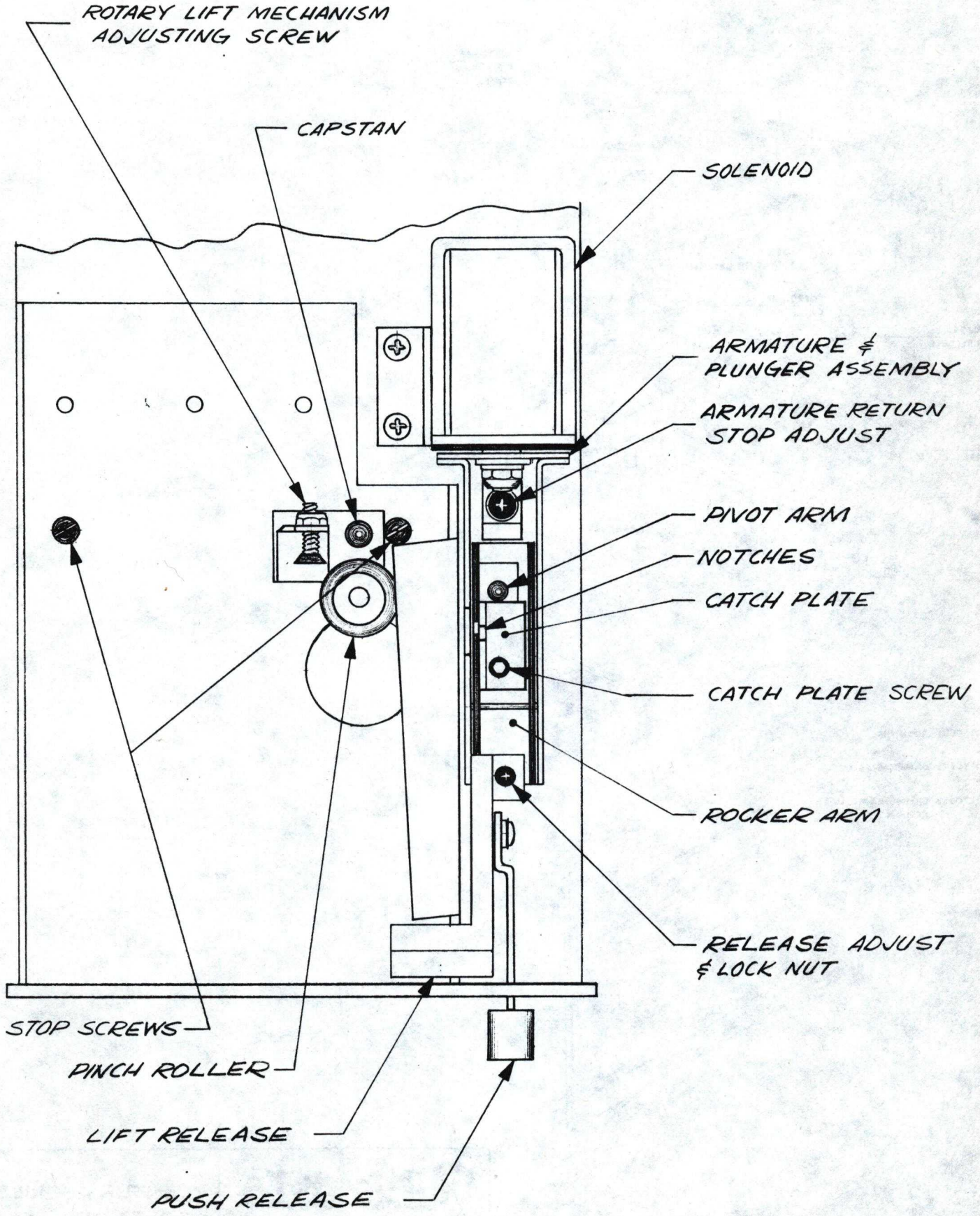
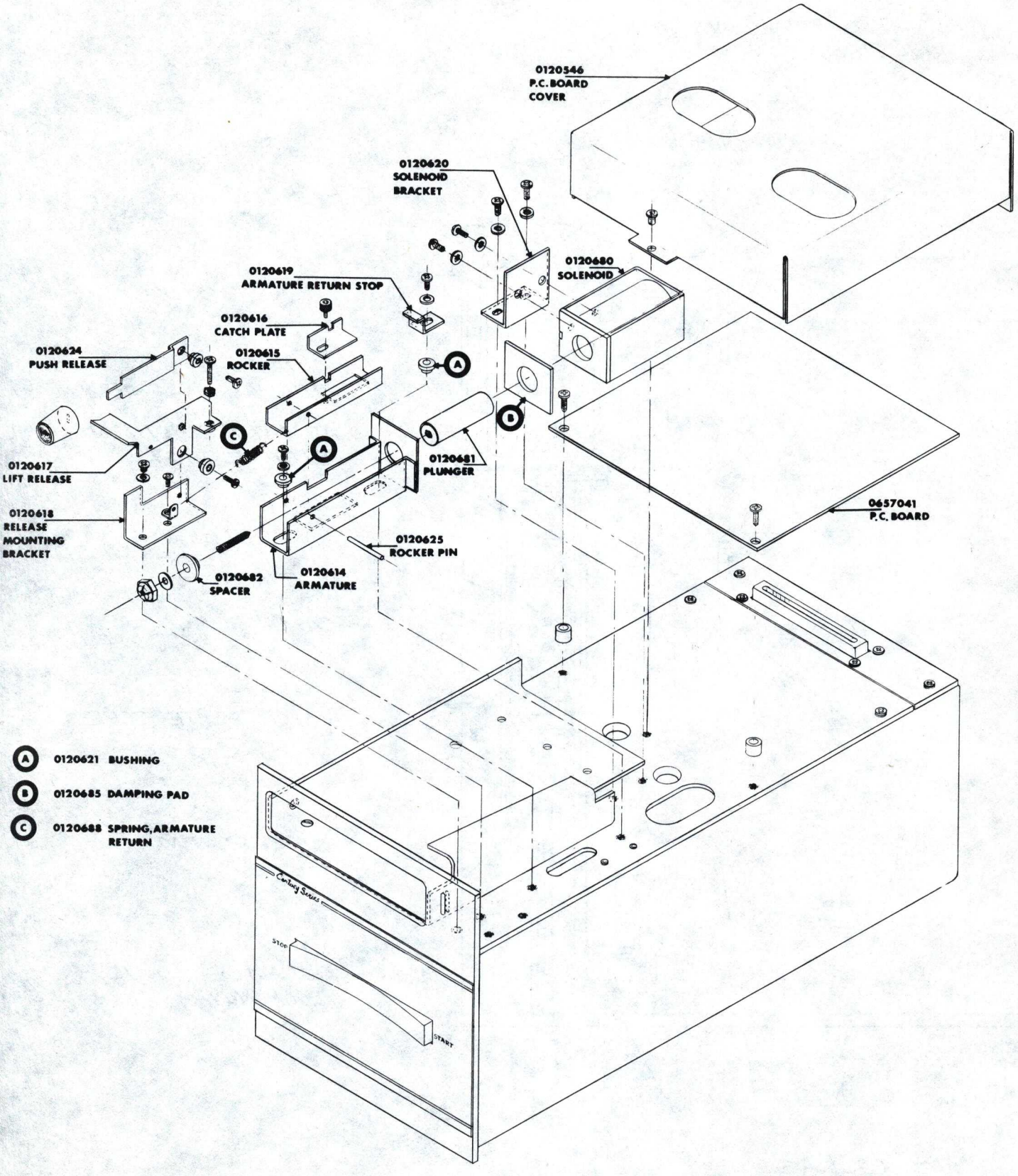


FIGURE 1



SPARTA ELECTRONIC CORPORATION SACRAMENTO, CALIFORNIA 95828 A DIVISION OF COMPUTER EQUIPMENT CORPORATION				TITLE CENTURY SERIES SOLENOID ASSEMBLY	
DWN B. SCUDDER	DATE 5-18-73	SCALE	SHT 1	DWG NO.	
APPD QWE	DATE 5-18-73		OF 1	P-38	

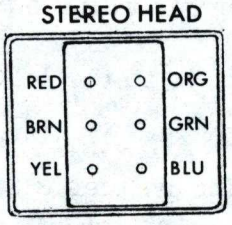
REPLACEMENTS & ALIGNMENT OF TAPE HEADS (See drawing P-120487)

TRACK CONFIGURATION: Monaural heads are standard 2 track, with the program amplifier connected to the upper track, and the cue amplifier connected to the lower track. Stereo heads are of the NAB standard 3 track configuration. The top track is the left program channel; the middle track is the right program channel; the lower track is for cue tones.

HEAD LOCATION: The reproduce head is located nearest the capstan shaft, or to the right, as viewed from the front. On recording equipment, the record head is located farthest from the capstan shaft, or to the left, as viewed from the front.

TRUE TANGENT: The HM-2 Head Mount utilizes a SPARTA innovation called "True Tangent" recording, in which the record head is rotated 5^{o} clockwise, as viewed from above, compared to the reproduce head. The result is a more consistent high frequency recording characteristic. As the tape is pulled around the corner post of the cartridge, it tends to move out from the corner post so that the tape travels an arc of more than 90^{o}. Therefore, with conventional record head mounts, the tape motion is not quite parallel to the face of the record head, and the cartridge pressure pad does not wrap the tape evenly across the pole pieces of the head. Engineering tests have indicated that a 5^{o} offset of the record head produces optimum tape wrap and more consistent high frequency recording characteristics. The design of the HM-2 Head Mount permits the head to be positioned in either the conventional or offset position. The reproduce head should always mount in the conventional (non-offset) position.

HEAD REPLACEMENT: Each tape head is secured by a retaining strap. To remove a head, loosen the machine screw at the top of the strap, which frees the head so it will slide out. Insert the new head (printed side up) with the rear of the head case aligned with the rear of the retaining strap and tighten screw. The notched end of the head cable socket should be up, then push it on to the rear of the head (mono only). Stereo heads use separate leads with clips for each head lug. Observe color coding when connecting clips.



HEIGHT ADJUSTMENT: "Height" is the vertical positioning of the head, relative to the tape guides, so that the pole pieces are equally spaced from the tape center line. Once this adjustment has been made, it will normally suffice for the life of the equipment even if new heads are installed. Height can be checked by removing the oxide from a strip of tape, using lacquer thinner. Stretch the tape through the head guides and across the face of the heads. The SPARTA AG-2 Alignment Gauge is recommended. If adjustment is required, loosen the locking screw, and turn the 2 zenith adjustment screws equal amounts in the same direction.

ZENITH ADJUSTMENT: "Zenith" is the perpendicularity of the head face to the deck surface. It is rarely necessary to make this adjustment again for the life of the equipment. Use a square object such as the AG-2 Alignment Guage against the face of the head and adjust the rear Zenith adjustment screw to make the face of the head parallel to the surface of the square object. There is interaction between the Height and Zenith adjustments, so the other must be checked each time one is changed.

AZIMUTH ADJUSTMENT: "Azimuth" is the most critical adjustment, having to do with the side-to-side tilt of the head, as viewed from the front. When correctly adjusted, the gap in the pole pieces will be perpendicular to the direction of tape travel. Correct Azimuth adjustment is necessary to reproduce high frequencies due to their short wavelengths. The SPARTA AG-2 Alignment Gauge can be used to achieve near optimum Azimuth alignment, optically. For exact alignment, a test tape such as the SPARTA AL-1 Alignment Cartridge should be used. The AL-1 cartridge provides a 12,000 Hz recorded tone which can be monitored for maximum program output, while adjusting the Azimuth screw. Several peaks may be found while setting the adjustment, so it is important to tilt the head through a sufficient range to determine the highest level. Monitoring can be done by ear, but a meter across the audio output will yield more accurate results.

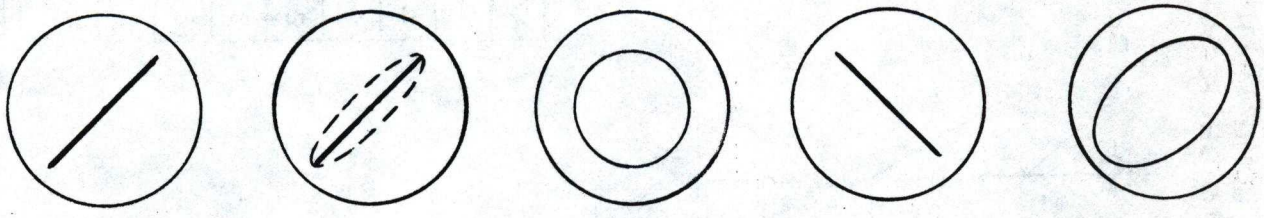
RECORD HEAD ALIGNMENT: As with the reproduce head, the record head will not normally require readjustment of Height or Zenith, during the life of the equipment. However, both should be checked when replacing heads, and if adjustment is required the preceding techniques should be employed. Normal

procedure is to align reproduce head Azimuth to a standard, such as the SPARTA AL-1 Alignment Cartridge, then align the record head to the standard of the reproduce head. This is done by applying a 12,000 Hz tone from a signal generator to the record amplifier audio input; adjust the record level to approximately -10 dbm; record the tone on a clean cartridge and adjust the record Azimuth screw for maximum reproduce audio output.

STEREO HEAD ALIGNMENT: Stereo tape heads can be adjusted for correct Height and Zenith using the same techniques as for mono heads. However, Azimuth alignment is more critical due to phase shift caused by variations in tape guiding within the cartridges. The use of a stereo alignment cartridge, such as the Model 304-S Phase Alignment Cartridge is strongly recommended. This procedure also requires an oscilloscope and a-c VTVM. If these facilities are not available, it is suggested that the reproduce head Azimuth be adjusted using a 12-15 KHz alignment cartridge, while monitoring the left channel. Align the record head Azimuth, using a signal generator applying a 12,000 Hz tone to the record amplifier left audio input. The reason for using the left channel is that since it is recorded on the upper track, it is more sensitive to Azimuth variations. Now, record a 5000 Hz tone on both channels of the same cartridge used to align the record head. After the recording is made, parallel the left and right program outputs and connect them to an a-c VTVM. Carefully fine tune the reproduce head Azimuth for maximum output. This will minimize phase shift in the frequency range that is most critical. If an oscilloscope is available, connect the left program output to the vertical amplifier input and the right program output to the horizontal amplifier input.

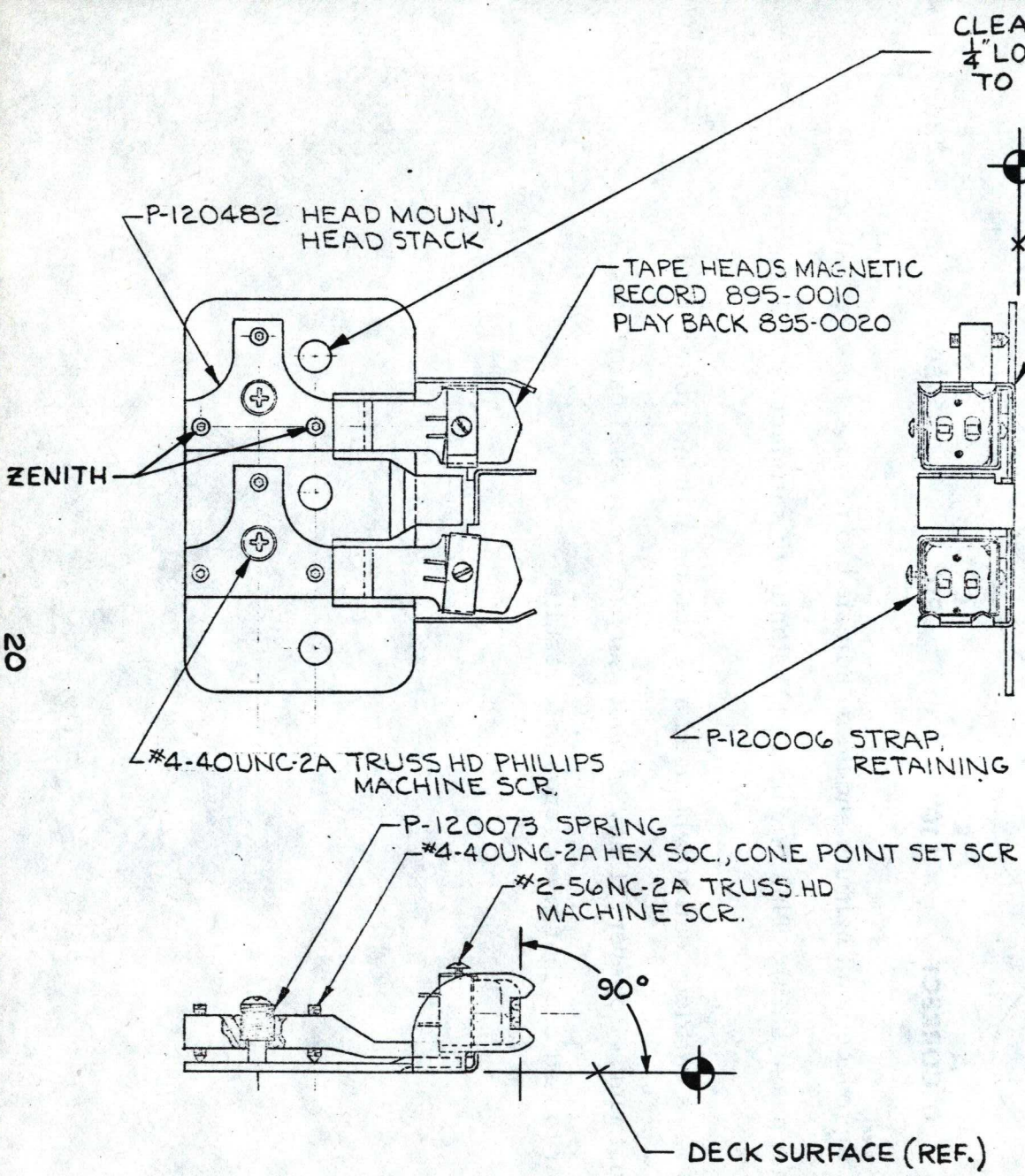
This will produce a Lissajous pattern on the screen. Connect the a-c VTVM across either program output. The maximum reading on the VTVM should coincide with the correct pattern on the scope. The scope pattern may be the reverse of the one illustrated, depending on the number of stages in the deflection amplifier(s). To determine the correct in-phase display, connect a signal generator simultaneously to both the horizontal and vertical inputs of the oscilloscope.

FIG. 1



The reproduce head Azimuth should be adjusted to produce the best pattern (least phase shift). Plus or minus 10° is entirely satisfactory.

The same cartridge can now be used as a station standard for Azimuth adjustment. However, it may be necessary to try several cartridges in order to find one that gives repeatable results.



NO REQD	PART NO	DESCRIPTION
AR	895-0020	TAPE HEAD MAGNETIC, PLAY BACK
AR	895-0010	TAPE HEAD MAGNETIC, RECORD
2	#2-56NC-2A	TRUSS HD. MACHINE SCREW 3/16 LG
6	#4-40UNC-2A	HEX SOCKET, CONE POINT, SET SCREW 7/16 LG
2	#4-40UNC-2A	TRUSS HD PHILLIPS MACHINE SCREW 5/16 LG
2	P-120006	STRAP, RETAINING
2	P-120073	SPRING
2	P-120482	HEAD MOUNT, HEAD STACK
1	P-120486	BASE-LOCK POST AND GUIDE ASSY OF

MATERIAL

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMALS ANGULAR
.XX ± .030
.XXX ± .010
DO NOT SCALE DRAWING

FINISH

QTY REQD | NEXT ASSY

CHECKED JB Little DATE 10-20-70

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DWN B SCUDDER DATE 10-16-70 SCALE 1/1
APPD R. Adams DATE 10-20-70

TITLE
HEAD STACK
FINAL ASSY
FOR MANUAL

SHT 1 OF 1 DWG NO. P-120487

STEREO CARTRIDGE CONSIDERATIONS

It is important to keep in mind that a monaural (main channel) signal is transmitted by stereo FM stations, and that a substantial percentage of listeners are hearing stereo broadcasts on mono receivers. Car FM radios are mostly monaural, as are portable radios. Businesses often hear their commercial messages only in mono, on portable radios. The main channel signal consists of the sum of L & R, and if one is out of phase with the other there will be partial cancellation of certain frequencies. This is particularly noticeable at voice frequencies and results in reduced voice levels, compared to music, and/or excessive sibilance on voice announcements. Neither effect is usually observed when the announcement is heard in stereo. Phase shift often occurs in the record/playback of cartridges, as the result of skewing of the tape. Skewing - uneven alignment of the tape across the record and reproduce head - is fairly common in most cartridges. Further, there is considerable variation in tape guidance from cartridge to cartridge of the same brand, apparently due to the molding process. Recently innovated cartridges stress better tape guiding as a direct result of improved corner post design. Additionally, cartridges are available with adjustable corner posts, so that a group of cartridges can be "tuned" for near-identical performance. Since most FM automobile radios and portables receive only monaural signals, it is important to check newly recorded cartridges for mono as well as stereo quality. See the section on head alignment for information on optimizing the performance of stereo tape heads.

MAINTENANCE

CLEANING: The heads, pinch roller, and capstan should be cleaned at least weekly. In automation systems, and other continuous duty applications, daily cleaning is recommended. Clean heads will last longer, and will cause less tape wear. Isopropyl alcohol or any standard brand tape head cleaner are preferred. A cotton swab or clean, lint-free cloth should be used to apply the cleaner. Avoid letting the cleaner seep into the capstan or pinch roller bearings as it may dissolve and wash away their lubrication.

HEAD DEMAGNETIZATION: The heads should be demagnetized monthly, as contact with the moving tape will eventually result in a residual magnetism of the heads. This magnetism can cause a deterioration of tapes played on the unit. The SPARTA DM-200 is available at a nominal cost and will extend the life and quality of cartridge recordings.

CARTRIDGE CARE: Because of the inherent friction present in tape cartridge systems, the tape is subject to considerable wear. Both the lubricated and oxide side of the tape gradually deteriorate. Cartridges of 5-10 minutes length can usually be used for several years before the tape must be replaced, but 20-40 second cartridges wear quite rapidly and the tape should be replaced about every six months for optimum performance. Of course, a cartridge used more often will require reloading sooner. Cartridges with badly worn tape shed more oxide, necessitating very frequent head cleaning, severaltimes a day in extreme cases. Worn tape will eventually cause cartridge malfunctions, such as failure to pull tape, unstable speed or slow running, poor high frequency response, low output and dropout of syllables during recording and playback. A regular

CARTRIDGE CARE:(Cont'd)

program of cartridge inspection and reloading is a must for optimum performance. SPARTA has a cartridge reloading service available at reasonable prices.

BELT CHANGE: The dual belts in the Century Series generally have a life of 3 or more years. Recommended interval between changes is 2 years, using the following procedure.

(a) Disconnect power cord.

(b) Remove unit from rack or cabinet or remove cover on desk models.

(c) Remove P.C. Board cover & Solenoid Cover

(d) Disconnect head cables from heads

(e) Remove P.C. Board.

(f) On the record playback units, remove the connecting tab between the record and playback chassis.

(g) Remove the screws securing the deck plate to the chassis. (Total of six screws)

(h) Remove the button from the cartridge release arm.

(i) Raise deck plate being careful not to damage wiring. If sufficient clearance cannot be obtained to provide access to the belts, the P.C. plug can be removed from the motorboard by removing the four attaching screws. Later models have the P.C. plug on a panel separate from the deck plate.

(j) Remove old belts and install new ones making sure the belts don't cross and that they are located in the upper and center grooves on the flywheel.

(k) Reassemble unit reversing steps (i) through (a).

POWER SUPPLIES (See drawing S-154)

The Century Series contains two power supplies, one of which is an -25 vdc regulated supply which furnishes the appropriate voltage for operation of the reproduce electronics, control circuitry and indicator lamps. The other is an unregulated 90vdc power supply used to power the pinch roller solenoid.

The transformer (T1) and diode bridge rectifier (D2) provide an unregulated voltage of approximately 34 vdc across a 1000 mfd filter capacitor. The series regulator, transistor Q2 supplies a constant output voltage which is independent of the load. A 27 volt Zener diode (D8) is used to provide a reference voltage to the base of transistor Q1. Any voltage change across the load causes a change in the base emitter bias of Q2, thus increasing or decreasing the current through Q2, which maintains the load voltage at the original value. The regulated voltage set point may be 21 - 26 volts dc, due to component tolerances and should be considered normal if it falls within this range. Current limiting is provided by a 10 ohm 1/2 watt resistor (R4). The value of resistance and wattage was purposely chosen to be the "weakest link" in the power supply, in the event of a major failure. The 10 ohm Resistor (R4) will act as a fuse, removing dc power from the electronics, preventing failure of the transistors and other electronic components.

The unregulated supply consists of bridge rectifier D1, capacitor C19, C20 and resistors (R38, R39 and R40). Upon insertion of a cartridge, ac line voltage is applied through the cart sense switch to the bridge rectifier D1 which charges C19 and C20 to a peak voltage of approximately 150 vdc. When the pinch roller solenoid is activated, the terminal voltage is maintained at approximately 90 vdc by resistors R39 and R40.

CONTROL CIRCUIT (See drawing S-150)

When the "start" end of the Touchbar is depressed, Relay K1 closes, applying +150 vdc to the pinch roller Solenoid through n.o. contacts 6 & 7. At the same time, the audio switching LCR is turned on by -25 vdc through n.o. contacts 9 & 10.

K1 is controlled by a regenerative relay driver comprised of transistors Q7 and Q8. -25 vdc from S2, the start switch, saturates Q8 which turns Q7 on, connecting the coil of K1 to the -25 vdc line. Resistor R48 provides the latching current for Q8 so that the relay remains energized.

The stop switch, S1, connects -25 vdc to the base of Q7, which turns it off and removes the voltage to K1. Q8 also turns off since the latching current is removed.

The relay drive can also be turned off by 1000 Hz stop tones on the cartridge cue track. The output of the cue detector is rectified by diodes D12 and D13 and integrated by capacitor C37 until the charge is sufficient to turn transistor Q8 off, removing the drive to the base of Q7.

CUE TONE DETECTORS (See drawing S-156)

The cue reproduce head connects to an integrated circuit preamplifier (IC5) which provides 40 db of gain to the "decoder" output. In automatic program logging applications, the AFSK signals on the cartridge cue track are received at this output.

IC5 also connects to an integrated circuit active filter that passes only the 1000 Hz stop cue tone. The output of the filter is rectified, integrated, and coupled to the base of Q8 in the relay driver circuit shown in drawing S-150. When a 1000 Hz tone is detected, the relay driver turns off the control relay K1, stopping the tape by turning off the pinch roller solenoid.

The optional 150 Hz E.O.M. (end-of-message) detector consists of an integrated circuit active filter and relay driver. The filter passes only the 150 Hz tones, which are rectified, integrated, and coupled to the base of Q10, in the relay driver circuit. When a 150 Hz tone is detected, Q10 starts to conduct, causing collector current flow through Q11. The resulting voltage drop across R20 is coupled back to the base of Q10, assuring that Q11 will remain saturated, to prevent relay "chatter" from weak tones.

When K2 is on, the voltage across the relay coil is connected to the "ready" lamp via diode D6 to give a visual indication of the presence of the tone.

CUE LOCKOUT (See drawings S-150 & S-156)

Each time a 1000 Hz tone is detected, the cartridge will stop. However, the recorded tone is nearly 1 second long, and so the last portion of the tone is still present at the cue reproduce head. The cue lockout circuit prevents the transport from stopping on the residual tone, by disabling the tone detector(s) for approximately 2 seconds after a cartridge is started.

When the transport is stopped, but "ready", -25 vdc passes through n.c. contacts 9 & 10 of K1, charging an RC circuit at the base of Q9, turning off the transistor. Diode switches D5 & D6 conduct to ground, disabling the tone detector(s).

When the transport is started, -25 vdc is removed from the RC circuit. However, Q9 remains off until C38 discharges through R56, which takes approximately 2 seconds, when Q9 changes state, Diodes D5 and D6 cannot conduct and so the tone detector(s) are enabled.

PROGRAM AMPLIFIER (See drawing S-157)

The Program Amplifier consists of two stages of voltage amplification and one stage of current amplification, which have been frequency compensated to the NAB standard for tape cartridge reproduction. The first stage is (IC1) an integrated circuit preamplifier with a gain of 35 dbm, the output of which is coupled through capacitor (C4) to the input of (IC2) an integrated circuit voltage amplifier with a gain of 30 dbm. This is then coupled through resistors R12 and R13 to bases of transistors Q1 and Q2 which are used in the complimentary mode as current amplifiers. The output is then fed through capacitor (C8) to transformer T1 which provides a balanced and isolated output.

The LCR (light-controlled resistor) turns on when a cartridge is played, connecting the amplifier to the audio output terminals.

SPARTA
ELECTRONIC CORPORATION

WARRANTY

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THE FOREGOING EXPRESS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, IT BEING EXPRESSLY UNDERSTOOD AND AGREED THAT SPARTA DOES NOT WARRANTY EITHER THE MERCHANTABILITY OF ITS PRODUCTS OR THEIR FITNESS FOR A PARTICULAR PURPOSE.

The obligation of Sparta under the foregoing express warranty is limited to repairing any warranted product which upon Sparta's examination proves to be subject to defective material and/or factory workmanship, when such product is returned to our factory, transportation prepaid by the purchaser, within one year from the date of original purchase from Sparta. Under no circumstances shall a breach of any warranty by Sparta subject Sparta to any claim for consequential damages, the purchaser expressly assuming all risk of such consequential damages. In the case of any breach of any warranty, the liability of Sparta shall not under any circumstances exceed the cost of repair or replacement of the defective product.

High voltage transformers, modulation transformers, reactors and filter chokes carry an extended warranty of 50% of the replacement cost being allowed should failure occur during the second year.

The foregoing express warranty does not apply to any products manufactured by Sparta that have been repaired, worked upon or altered by persons not authorized by Sparta, or that have been subject to misuse, negligence or accident, or the serial number of which has been altered, effaced or removed; neither does the foregoing express warranty apply to any products of Sparta that have been connected, installed, used or adjusted otherwise than in accordance with the instructions furnished by Sparta. Accessories, allied equipment, and components supplied, but not manufactured by Sparta are not warranted, either expressly or impliedly, by Sparta, and shall carry only such warranty, if any, as is made by the manufacturer of such product.

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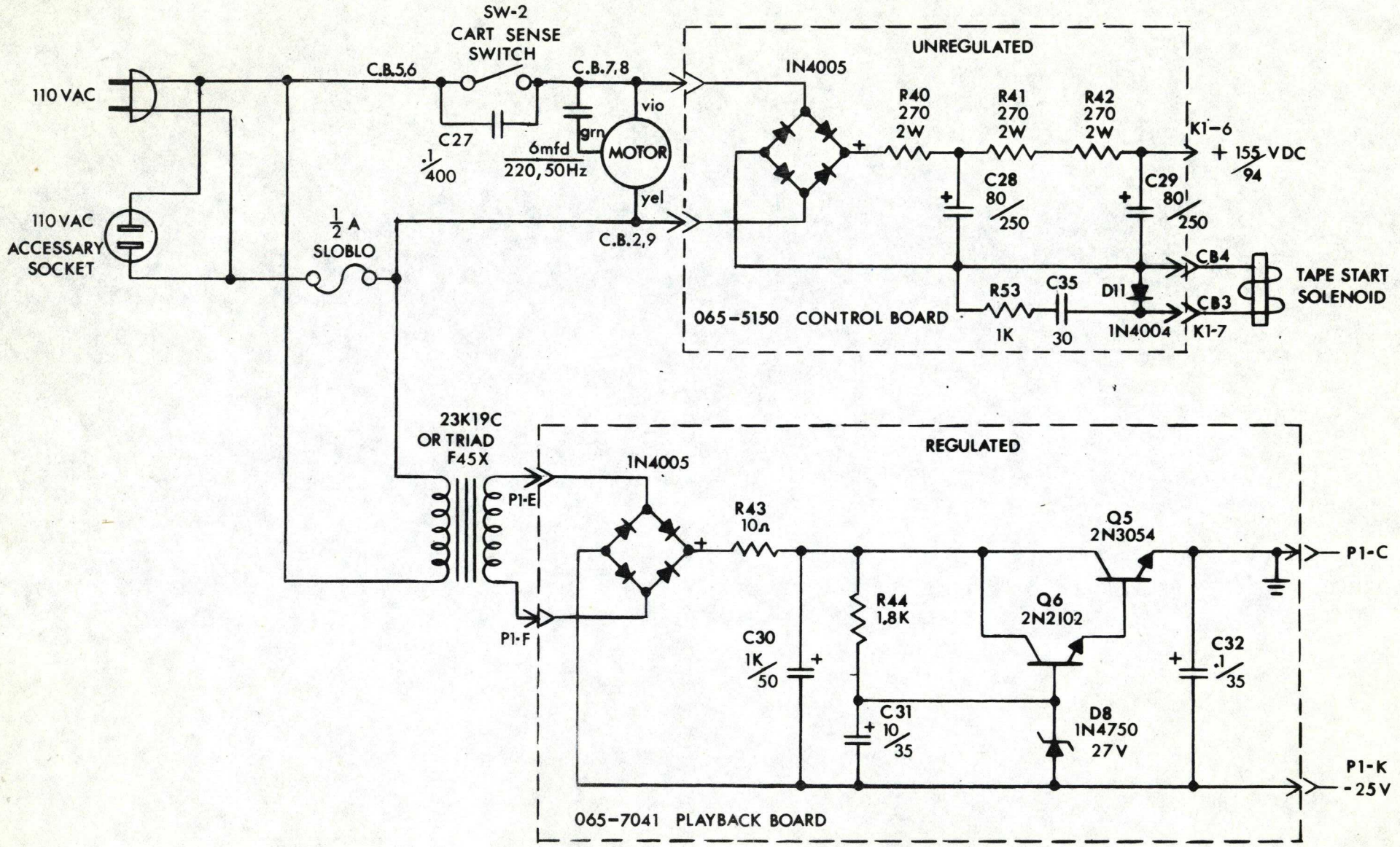
Sparta reserves the right to make changes in design and improvements upon its products without assuming any obligation to install the same upon any of its products theretofore manufactured.

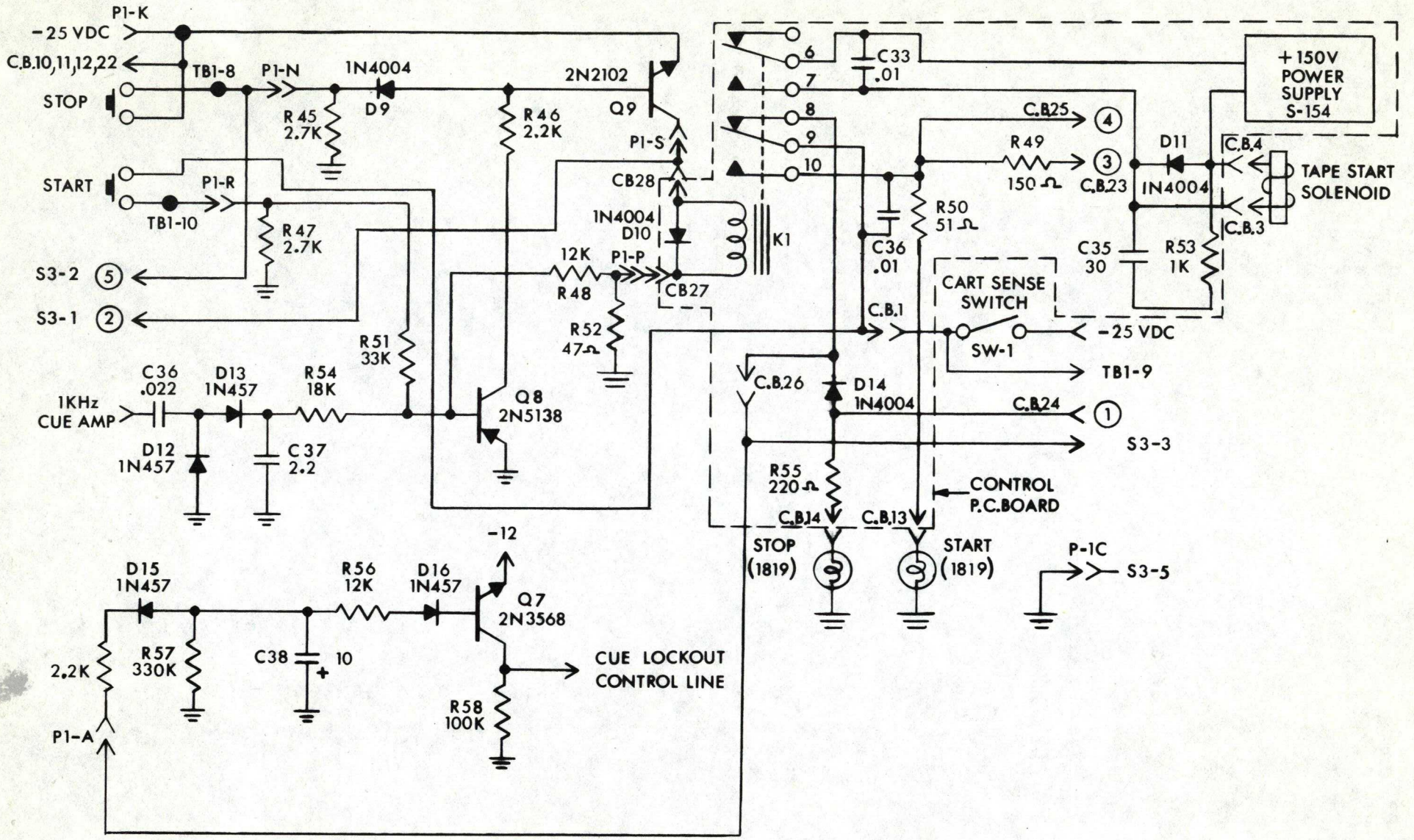
August 1, 1973



SPARTA ELECTRONIC CORPORATION
SACRAMENTO, CALIFORNIA 95828
A DIVISION OF COMPUTER EQUIPMENT CORPORATION

TITLE: UNREGULATED & REGULATED POWER SUPPLY, PLAYBACK
CENTURY SERIES

DWN	DATE	SCALE	SHT	DWG NO.
SMU	19 OCT 72		1	S-154 C
APPD	DATE 5-29-73		OF 1	

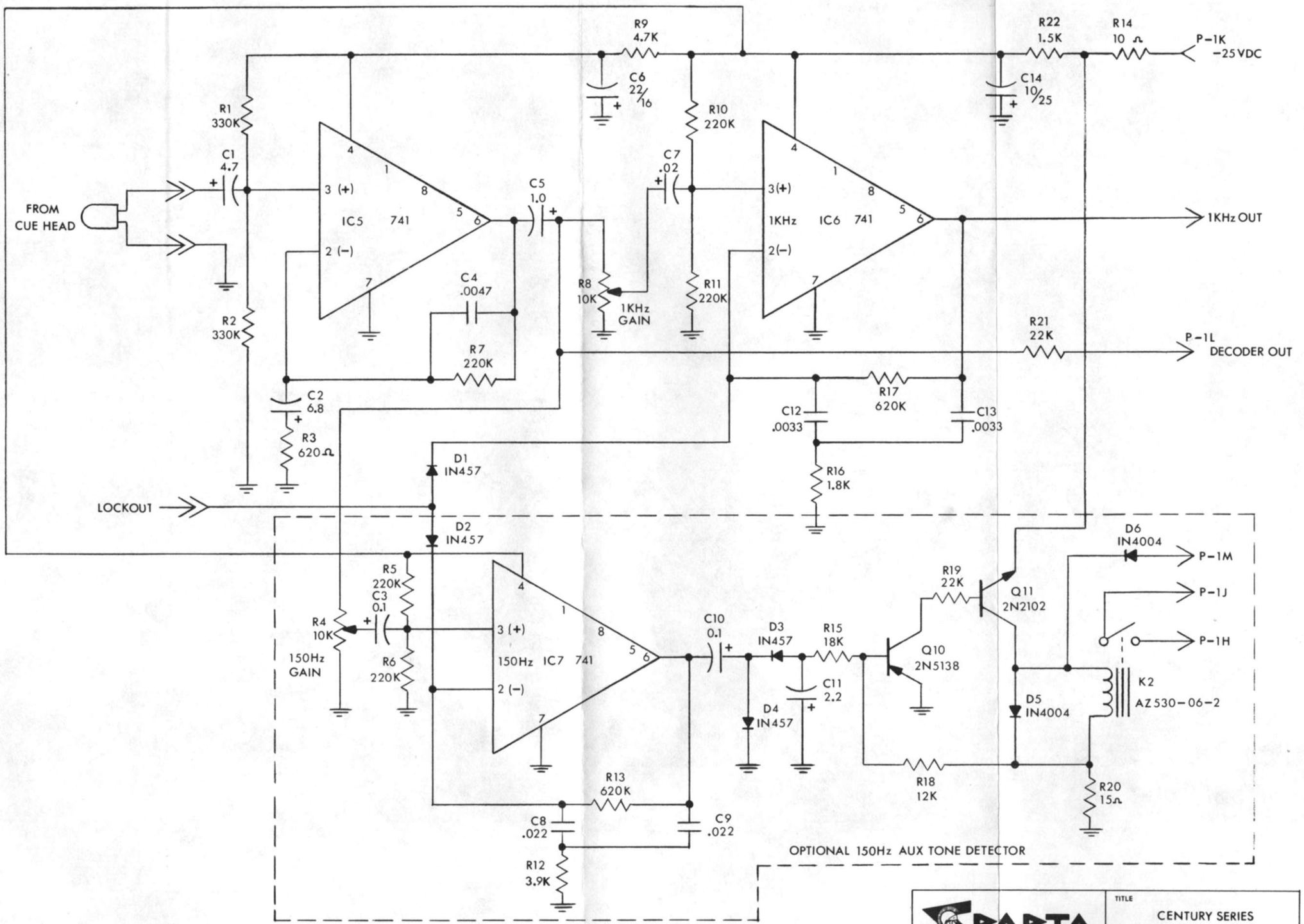


(1) 150Hz cue signal indicator.
(2) To record board preset line.
(3) To LCR lamp
(4) Key 1KHz osc
(5) Record preset clear.
(6) Relay shown in stop mode
(7) P1 is p.c. board connector on top of P/B chassis
(8) C.B. is Control Board inside P/B chassis
(9) S3 is 8 pin socket on P/B chassis rear panel
(10) TB-1 is barrier strip on chassis rear panel

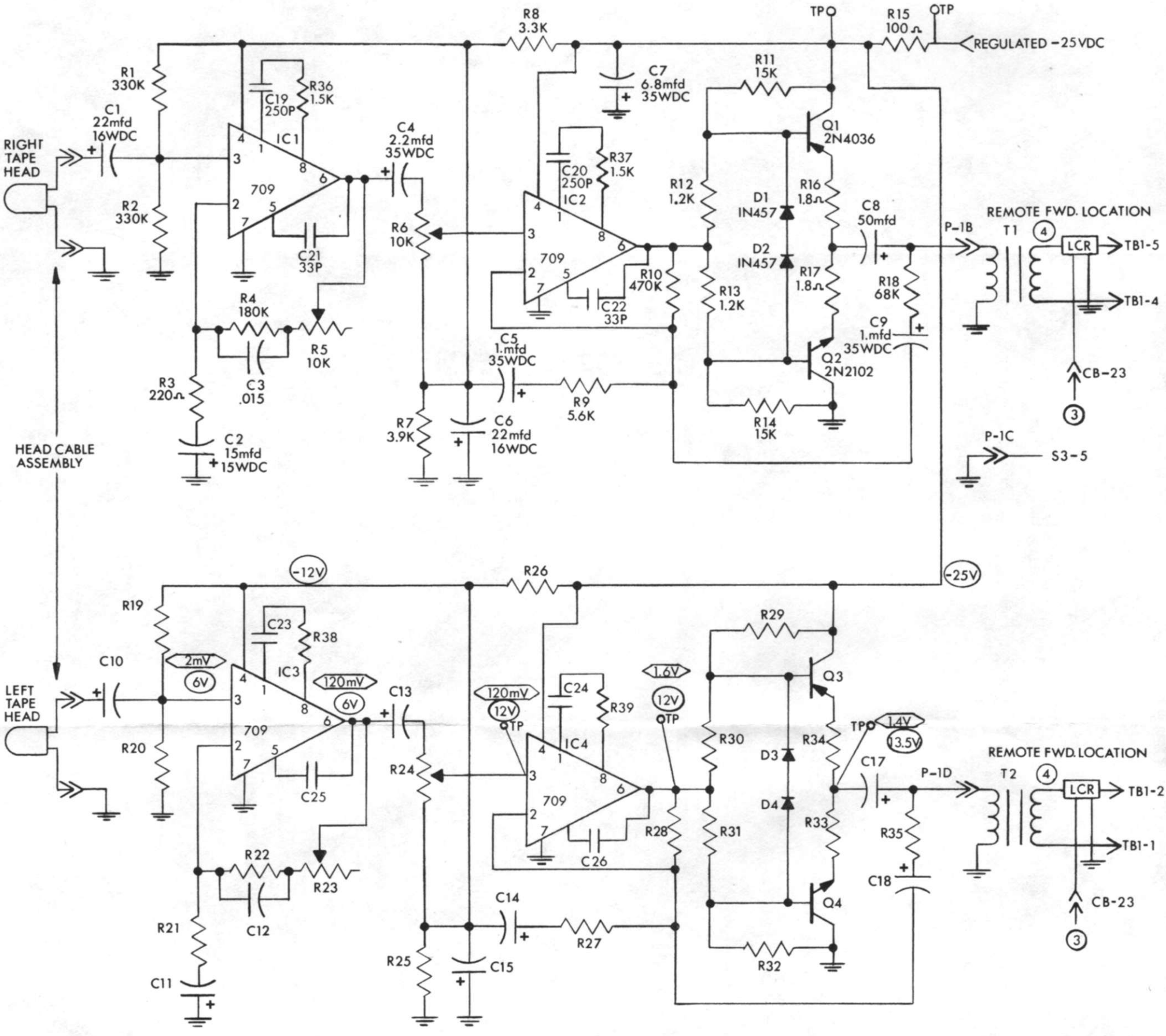
SPARTA ELECTRONIC CORPORATION
SACRAMENTO, CALIFORNIA 95828
A DIVISION OF COMPUTER EQUIPMENT CORPORATION

TITLE: CENTURY PLAYBACK CONTROL CIRCUIT

DWN	DATE	SCALE	SHT	DWG NO.
smu	24 Feb 72	0	1	S-150C
APPD DWS	DATE 2-5-72		OF 1	



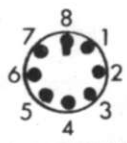
SPARTA ELECTRONIC CORPORATION, SACRAMENTO, CALIFORNIA 95828 (A DIVISION OF COMPUTER EQUIPMENT CORPORATION)			TITLE: CENTURY SERIES CUE DETECTOR — PLAYBACK
DWN B.SCUDDER	DATE 4-14-72	SCALE /	SHT 1 OF 1
APPD DWE	DATE 5-29-73		DWG NO. S-156A



SYMBOLS

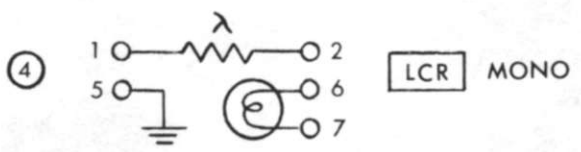
AC

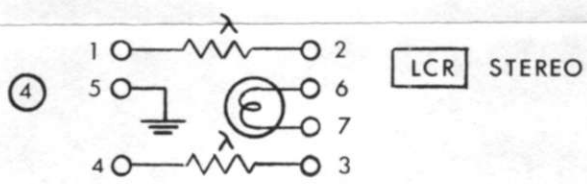
DC



709 BOTTOM VIEW

TRANSISTOR BOTTOM VIEW





IMPORTANT:

ALL DC READINGS MUST BE MEASURED WITH 20,000Ω/VOLT VOM.

ALL AC MEASUREMENTS TO BE MADE WITH HEWLETT-PACKARD 400E OR EQUIV.

(1) MEASUREMENT ON SECONDARY OF T1 & T2 IS TAKEN WITH A NOMINAL 600Ω LOAD.

(3) TO CONTROL BOARD.

SPARTA ELECTRONIC CORPORATION
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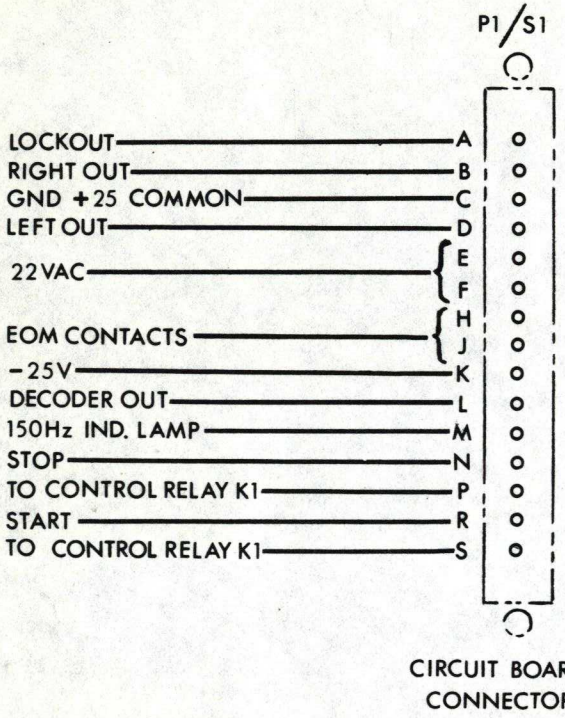
DWN SMU	DATE 1-30-73	SCALE	SHT / OF	DWG NO. S-157 B
APPD	DATE			

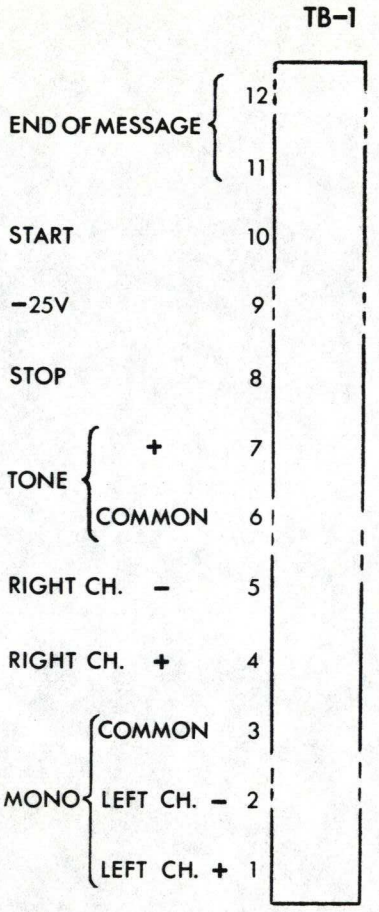
TITLE
PROGRAM AMPLIFIER
CENTURY PLAYBACK



CIRCUIT BOARD CONNECTOR

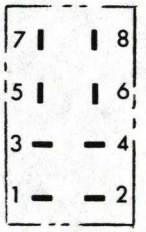
TOP

fold line



BARRIER STRIP

REAR PANEL PLAYBACK



RECORD CONTROL SOCKET

1. PIN S of P-1 (RECORD PRESET)
2. PIN 8 of TB-1 (STOP)
3. K1 N.C.
4. K1 N.O.
5. TB-1-6 (COMMON)

1/2 AMP S.B. FUSE

AC OUT

CAUTION
NOT FUSED
NOT SWITCHED

SPARTA ELECTRONIC CORPORATION
SACRAMENTO, CALIFORNIA 95828
A DIVISION OF COMPUTER EQUIPMENT CORPORATION

TITLE
CENTURY SERIES
INTERCONNECTING DIAGRAM

DWN	DATE	SCALE	SHT	DWG NO.
B. SCUDDER	3-27-72		1	P-34A
APPD	DATE		OF 1	