

only 6 db at 100,000 cps, if that should matter to anyone.

On high-level inputs, noise and hum measured 78 db below rated output with the volume control at maximum. In the minimum position of the volume control, the noise drops to 112 db below rated output—as it should, of course, since one section of the volume control immediately precedes the output jacks. On the phono input, noise measures 64 db below rated output at the maximum setting of the volume control. At a volume control setting which gives an output of 1 volt at a phono input of 10 mv, the noise and hum were down 72 db.

With these impressive performance figures, the C 24 is truly a fitting companion for the "superb" MR 71 stereo tuner. **Circle 220**

DUAL 1010

The usual trend for automatic turntable manufacturers has been to build up their model inventory by adding a "super" changer. Dual has chosen to reverse that trend. The Model 1010 is a lower-priced version of their "super" unit, the Model 1009. At \$69.50 it is \$30 under the top-of-the line.

Naturally, this new unit shares much with the 1009. It has the same record changing mechanism, the same heavy-duty four-pole motor, and the same cartridge mount slide. The major differences are that this unit has a lighter platter and a completely different arm.

The Dual 1010 is a four-speed automatic changer/manual player. Record change is accomplished entirely with the center spindle. This spindle has three arms that support a stack of up to eight records. At the correct moment the spindle arms will retract, dropping the lowest record. To prevent the rest of the stack from following suit, the spindle has an expandable collar that grips the stack above the bottom record and lifts it slightly before dropping that bottom disc. All-in-all, a reasonably fool-proof spindle system that is very gentle on record centers. This system is dependent upon record companies that produce discs of standard center hole dimension and thickness. Our tests with a number of contemporary discs revealed no change problems at all.

For manual play, the large spindle can be exchanged for a short one. The automatic spindle has a pin on the bottom that fits a slot in the turntable spindle hole. With the pin in the slot, the record release arms are pulled out and in at the end of each cycle. Thus, this spindle cannot be used for manual play (the record can only go down over the support arms at the beginning of the cycle). This is no problem since most people will use the 1010 for automatic play only, but if you bounce back-and-forth from manual to auto, you may find



Fig. 3. Dual Model 1010 Record Changer.

this system somewhat of a nuisance. Of course, for manual play only, the short spindle, which simply drops in, solves all problems.

A switch on the side of the table selects record size. You cannot intermix sizes in a single stack, but you can play the three popular disc sizes, 7, 10, and 12 inch as long as segregation is practiced. (Note that this is true of all the better changers on the market. Ironically, only the less expensive units can intermix sizes automatically.)

The basic control for automatic or manual play is a slider of unusual smoothness. It is possible to activate the reject mechanism while a disc is playing at a light stylus force, without the slightest upset.

The tone arm is quite basic in principle. In this system, the arm simply hangs from its canted horizontal pivot without a counterbalance weight, and a spring is used to pull back and provide stylus force. A screw with a coin slot located on the side of the arm, near the pivot, is utilized for adjusting stylus force. It has click stops at regular intervals, which are no more than general indicators, since stylus force per click will vary according to the weight of the specific cartridge used.

The spring used is linear throughout most of its range. No more than half a gram variation may be expected from top to bottom of a stack of discs. The spring apparently becomes less reliable below 1.75 grams; thus, this would be the lowest recommended force we would suggest.

Performance

Using a very-high-compliance cartridge we substantiated the 1.75 minimum tracking force. Less than this, which the cartridge could do, caused some mistracking of heavily modulated passages. All subsequent tests were made at 2 grams.

System resonance was at 20 cycles and was slight. At 2 grams there was no mistracking at the resonance. Bass rolloff was rapid below this point. It is worthy of note that the trip mechanism can operate at forces considerably lower than the arm's capabilities, so no problems should ever occur on this score.

Turntable flutter and wow were unusually low for a unit in so modest a price category. Flutter was under 0.1 per cent and wow was 0.35 per cent.

Total rumble was 35 db below a 3.54 cm/sec, 1 kc stereo signal. This figure is very close to what we have measured on top-grade manual tables.

Our sample was 2 per cent fast, under load, at a line voltage of 120v. The drive motor proved extremely immune to minor voltage variations. At 100 volts the 1010 was 1 per cent fast. At 90 volts speed had dropped to -0.5 per cent. A load of several records had no appreciable effect on these speeds. Those who are familiar with the Model 1009 know that this unit has a vernier speed adjustment knob that allows you to correct for speed variation. The 1010 lacks this feature. However, the speed variations quoted are quite acceptable for a good changer.

All-in-all the Dual 1010 impressed us greatly. It must be considered in its price category. As such, it represents very good value indeed. Its performance is close to a good manual table, the changer mechanism is of the very best, only the arm falls short of allowing us to suggest this unit for the best systems. Although the 1010 will not get the ultimate from a cartridge, it is not intended for use with the ultimate cartridges either; the 1010 is designed for the moderately-priced system. As such it fulfills its design goals. **Circle 221**

"NETWORK" SPARK INJECTOR

With the curiosity indigenous to a long-time hi fi enthusiast, this observer was naturally intrigued by the advertisement of this product in the December issue. "High Fidelity" performance from an automobile appeared to be a new category of criteria.

Accordingly we undertook to obtain one for "test," not knowing just exactly how one would measure performance of such a device with the sort of objectivity we attempt to attain with the usual hi fi component.

In the first place, installation is slightly simpler than claimed in the advertisement, since it took just eight minutes to put it in place, connect the four wires, and start the car—a 4600-lb 1961 model. It started off immediately, better, if anything, than usual. Then, before essaying any long-trips, we "broke it in" around town for long enough to have confidence that it would continue to work—no real problem if it hadn't, really, since it is only necessary to move two wires from their usual terminals to a third one, all of which are readily accessible, to restore the normal ignition system to operation.

After sufficient local driving to establish confidence, we went on a couple of 450-mile trips. There was no noticeable

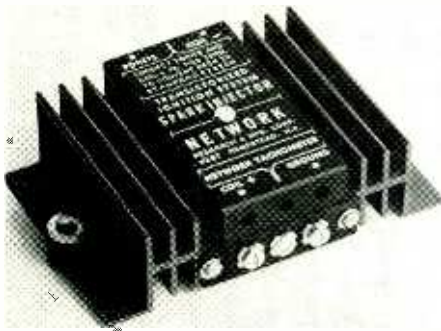


Fig. 4. Network Spark Injector Set

performance difference up to 60 mph, but above that when acceleration usually drops off, it was another story. Step on the gas at 60 and the car simply jumped,—about like it usually did at 30. With the usual test figure of time to reach 60 from a standing start, we measured 10 seconds, and another six from 60 to 80,—sport car performance from the “family sedan.” A more important figure for the user is the gasoline consumption, which showed an increase of 13 per cent over the normal ignition system. This was on a reasonably accurate controlled test. On a 500-mile trip, one way was with the Spark Injector and the return on normal ignition.

We had previously used another type of transistorized ignition for some 15,000 miles without changing plugs or points, and both were still like new—no point wear at all. With no stress on the points they should last until mechanically worn out, but not from pitting of the contacts.

Later we had the opportunity of observing a bench comparison of the Spark Injector with a normal ignition system. At engine speeds of over 4000 rpm, the normal system spark became erratic, and ceased altogether at about 5000. With the Spark Injector, the spark was still “fat” up to 7000 rpm, which is well above any speed a normal engine ever reaches.

With increased gasoline mileage, snappier acceleration at high speeds, easier starting, and longer spark plug and point life, we are most enthusiastic over the Spark Injector. **Circle 222**

ACOUSTECH III SOLID-STATE STEREO POWER AMPLIFIER KIT

The Acoustech III is a power amplifier intended to satisfy the need for high power at low distortion, and with the solid-state bonus of relatively little heat. Imagine a 40-watt-per-channel (rms mind you) amplifier weighing only 25 pounds. Simply unheard of in a tube amplifier.

This is certainly one of the new breed!

The Acoustech III features several innovations made practical by solid-state technology; plug-in printed circuit boards, direct-coupled circuit. These

high-quality glass-epoxy plug-in boards are the type which are commonly seen in military applications, plugged into a Blue Ribbon connector. The cost is high but so is the reliability. The advantage of this type of construction is the ease of service and replacement of defective electronics. The consumer need merely unplug the defective board and bring it to the appropriate service station. He can even perform some elementary troubleshooting by reversing boards. If other manufacturers adopt this approach, it may solve one of the difficulties facing the component consumer: the general unavailability of service comparable in quality to the component.

The circuit of the Acoustech III is not unusual, the output stage being of the well-known single-ended push pull persuasion, with the drivers in Darlington connection. Silicon transistors are used throughout, and the electrolytics are high-grade units (Acoustech calls them computer grade). All of the electronics except for the output transistors and the power supply are on the printed-circuit boards.

Although the amplifier we received was factory assembled (by accident we were told), examination of the assembly manual and the amplifier leads us to believe that it would take no more than a few hours to assemble. Especially since the printed circuit boards are factory assembled even in the kit.

The kit packaging is truly excellent, encompassing individual bags of components for each stage of assembly, plus an ample KitKloth to work on. A valuable plus if you must use a furniture-finish table as your work bench.

Performance

The Acoustech III is a top quality performer which meets its published specifications with ease and then some.

First of all, through the range from 20 to 20,000 cps it provided a minimum of 40 watts rms before clipping, and throughout most of the range it provided in excess of 60 watts *per channel*. This power was delivered to a 10-ohm load, with both channels operating. Distortion at rated output (40-watts rms) into a 10-ohm load was 0.22 per cent at

1000 cps. At 100 cps it was 0.28 per cent, and at 15,000 cps 0.3 per cent. Intermodulation distortion with the same load and using 60 and 7000 cps tones mixed in a 4:1 amplitude ratio was 0.49 per cent at rated power. Square wave response was truly excellent at both the top and bottom of the frequency range exhibiting no trace of overshoot or ringing. 1.7 volts was required to drive the amplifier to its rated output. Hum and noise were 82 db below rated output.

Listening to the Acoustech III proved to be a highly satisfying experience. We were especially impressed with the ease with which it handled transients and orchestral peaks. We can't recall having heard such open sound. The bottom end was truly superb. Altogether it is one of the most musical amplifiers we have experienced to date.

We must recommend a modicum of caution in certain modes of operating the amplifier. It exhibits an annoying, but harmless, tendency to pop fuses in the presence of non-musical transients which occur when the tonearm is dropped on a record or when a tuner is scanned across the dial. Of course, if you use the III with the Acoustic IV preamp this is no problem since the latter unit has a muting circuit built in.

However, we inserted it into our regular setup which has a different preamp with no muting provision. We managed to pop several fuses before we learned to exercise caution.

In sum, the Acoustech III is a truly first rate amplifier which merits careful consideration by the perfectionist. In its kit form it is easily buildable by the rankest novice. **Circle 223**

BENJAMIN STEREO 200 RECORD PLAYING SYSTEM

The Benjamin 200 is one of those new record playing systems which include in one package an automatic turntable, an amplifier, a control center, and a handsome case. In this instance the case is very handsome indeed, as illustrated in Fig. 5.

The turntable in this system is the well known Miracord Model 10, which is certainly one of the finest automatic turn-
(Continued on page 69)



Fig. 5. Benjamin Stereo 200