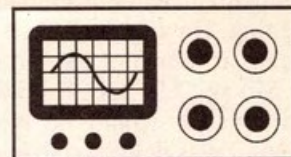


THE SERVICEMAN



The biggest repair and reconditioning job of all time?

One of our stories this month concerns a repair and reconditioning job that must qualify as the biggest we've ever described — despite the fact that it had to be done as a 'freeby'. There's also a tale of an electronic church organ that became rather unstable, even to the point of 'blowing raspberries' during services, and another about an NEC colour TV that began making nasty hissing sounds...

This month we open with a story that is, to some extent, a continuation of one that appeared in the February 1995 edition of this magazine, under the title 'High Tech in a Modern Cinema'. It comes from Reg Leahy, of Shepparton in Victoria, and in his original story he described much of the technology employed in a typical modern cinema, with particular reference to his local drive-in cinema.

This new story relates to what must be the biggest repair and reconditioning job of all time. Not for Reg the simple restoration of a discarded television set. No — Reg goes the whole hog and restores the complete 500-car drive-in cinema, described in the 1995 story!

The story is more or less self-explanatory, so I'll let Reg get on with the job of explaining all that was

involved with his part of the exercise...

Being a member and presenter on the local Community Radio Station One FM, I was approached by the Station Committee to check over the old drive-in theatre, to see what the possibilities were of re-opening the cinema as a fund raiser for the station.

As I was the last projectionist to work at the drive-in, I agreed to check it over, to make sure that there was enough equipment left to get the show up and running without spending megadollars. After a quick check, I was satisfied that it could be made operational without major costs to the station.

The drive-in was originally opened on April 2nd 1957, with the capacity to hold 700 cars (currently 500), with a holding area for other cars waiting for the next session. The screen is 80 feet (24m) across, with the bottom of the screen 20 feet (6m) from the ground and the screen itself 37 feet (11m) in height.

The original projectors and lamp-houses had been replaced over the years with more modern equipment, and now consist of two Century projectors and Eprad lamp-houses with 3600W Xenon arcs and a carbon arc slide projector.

My first task was to clean out three years of accumulated dust and rubbish from the projection room, clean the projectors and hand crank the mechanisms to make sure that no parts had seized up through lack of use. All gears and bearings were lubricated and the 'smoke test' applied. The projectors started up without out any problems and were left to run for an hour or two. So far so good...

The next step was to test the Xenons

in the lamp-houses, and see if the passing of time had had any detrimental effect on their operation. I switched on the arc for the 'B' machine and it worked first attempt. Then feeling confident, I tried the other lamp-house; but nothing stirred.

I was already aware that the bulb in this machine was near the end of its life (the Xenon tubes are guaranteed a life of 1000 hours — this one had already achieved 1724 hours!), but there was no sign of life from the ignitor. When all else fails, it is time to bring out the instruction manuals and study the circuit.

After a careful inspection, I found the ignitor consisted of nothing more than a spark gap transmitter (see diagram). Where are you Mr Marconi, when I need your help?. The circuit consists of a 240 volt to 9000 volt transformer (T-1), with a spark gap and a Tesla coil primary in series across the secondary windings.

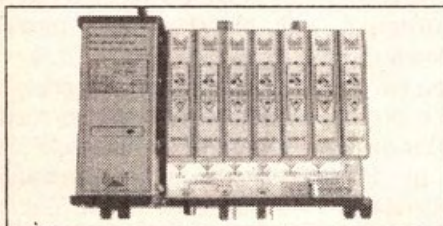
When power is applied to the circuit, a 45,000 VAC RF voltage is generated and superimposed upon the DC supply to the bulb. This causes the Xenon gas to ionise, thus creating a path for the DC across the gap between the electrodes in the bulb. Once this path has been established, the bulb remains on until the DC power is turned off.

Because of the possibility of the Xenon bulb igniting and/or exploding, there are a number of safety interlocks protecting the system and the operator. In this case, the bulb was removed from the lamp-house for my safety and the interlocks were then bypassed.

A visual inspection of the ignitor operation was made and after all the drama leading up to this point, the

Equalize..

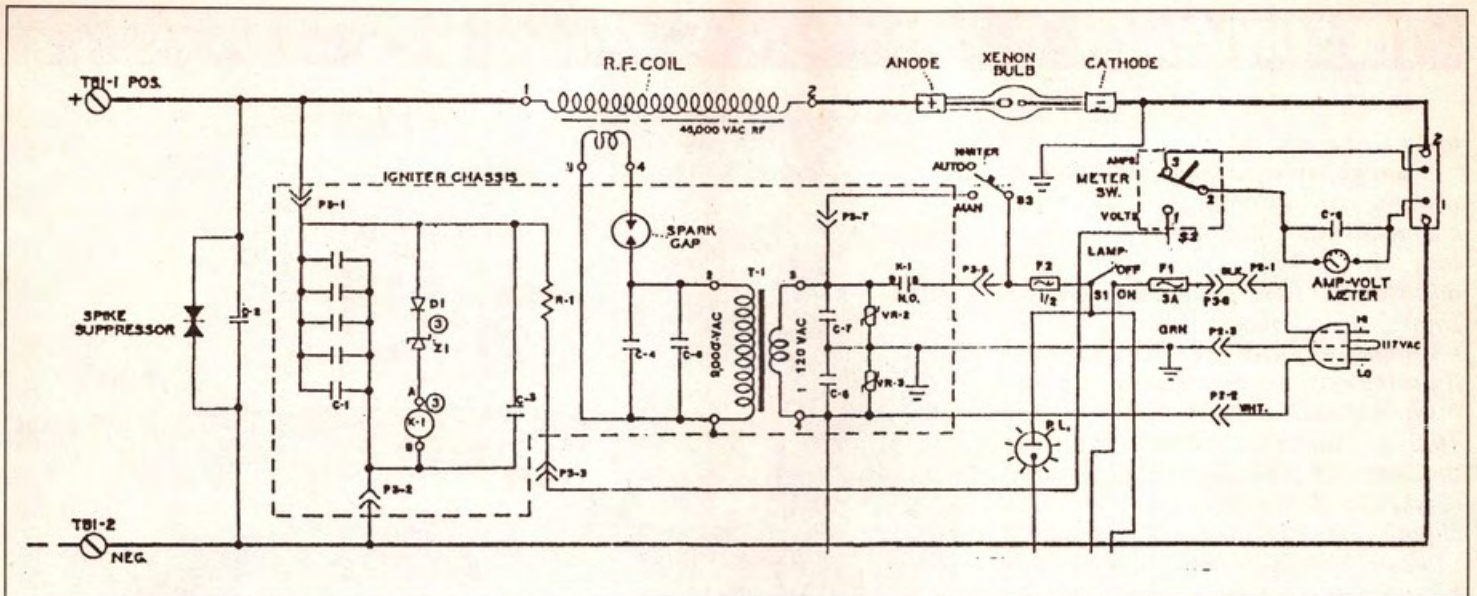
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The circuitry for igniting and running the 3600W Xenon arc projector lamp, as discussed in Reg Leahy's drive-in story. The ignitor is essentially a spark gap driving a Tesla coil, to produce a burst of high voltage RF.

problem turned out to be quite simple. The transformer secondary lead (T-1 pin 1), which connects to the chassis was too close to the windings of the transformer, shorting the high voltage to earth.

After dressing the lead away from the transformer high voltage windings, and the installation of a new Xenon bulb, both lamphouses were operational. The final step was to adjust the focal position and alignment of the mirrors, to achieve the brightest and most uniform light on the screen, without creating a hot spot which could damage the lens.

The next step was to power up the sound system, which is duplicated from the photo-cell to the ramp

switches. This allows for the change over to the standby system in case of sound

failure during the screening. The power amplifiers consists of two rack mounted valve amps, using 807's in the output stage.

One amplifier was on line during the screening while the other was kept on standby. These amplifiers supplied the audio for the speakers attached to the back two rows. In the four years that I worked at the drive-in, there was never a failure in the sound system. The old valve amps proved to be very reliable.

The Cine-fi sound system consists of a solid state AM transmitter which takes the audio from the valve pre-

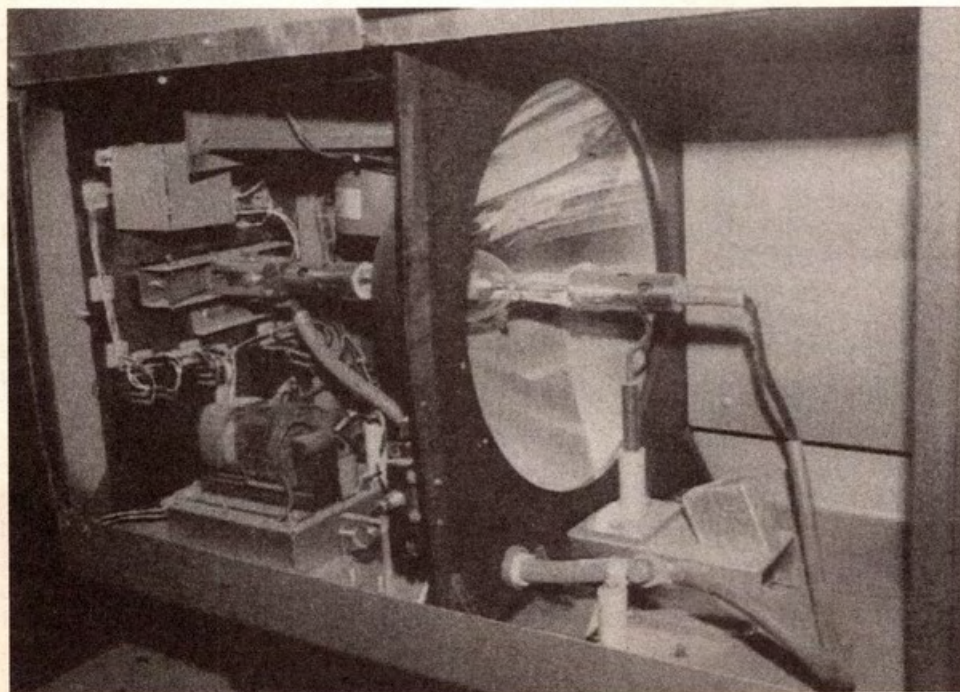
amp. The output AM signal is transmitted along cables to each ramp post, where a lead is then attached to the car antenna. The radios are then tuned to the frequency of the signal, which is 900kHz for this particular theatre.

(Is it possible that the valve amplifiers had originally fed 700 speakers, before the Cine-fi system was installed? This could account for their reliability when driving only a couple of rows — Ed.)

The smoke test proved OK, so a CD player was connected to the non-sync sound input and programmed to random repeat. I went for a walk along each of the back two rows to check out the remaining speakers, to see how many were still operational. Many of the speakers had been 'souvenired' during the period that the Drive-in was shut.

A quick check showed that half of the remaining speakers could be made operational with some maintenance. The rest were either full of insects, or had been left laying on the ground and now contained either dirt or mud. Others had their cones rain damaged or had icy pole sticks poked through them...

Fortunately, when the Cine-fi system was installed years ago, the speakers that were removed from the stands had all been stored in a shed. Enough workable speakers were made up from these spares to replace



The 3600W Xenon arc lamp fitted in one of the drive-in projectors. Some of the ignitor circuitry is visible behind the mirror.

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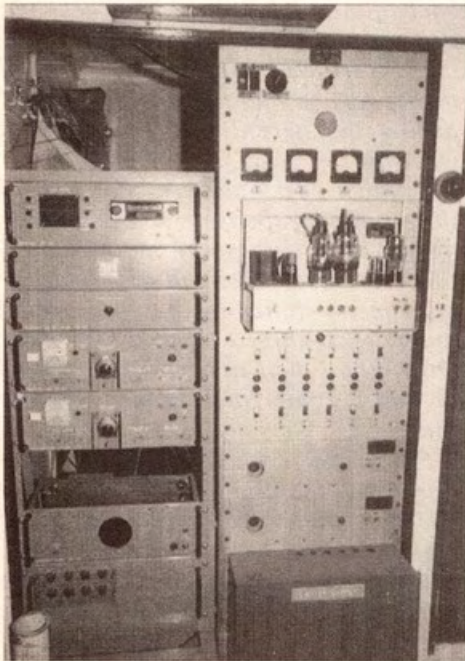
the missing and damaged ones.

A quick drive around the theatre with the car radio tuned to the Cine-fi frequency indicated that it was working, but down in modulation. An adjustment of the modulation control soon rectified that problem.

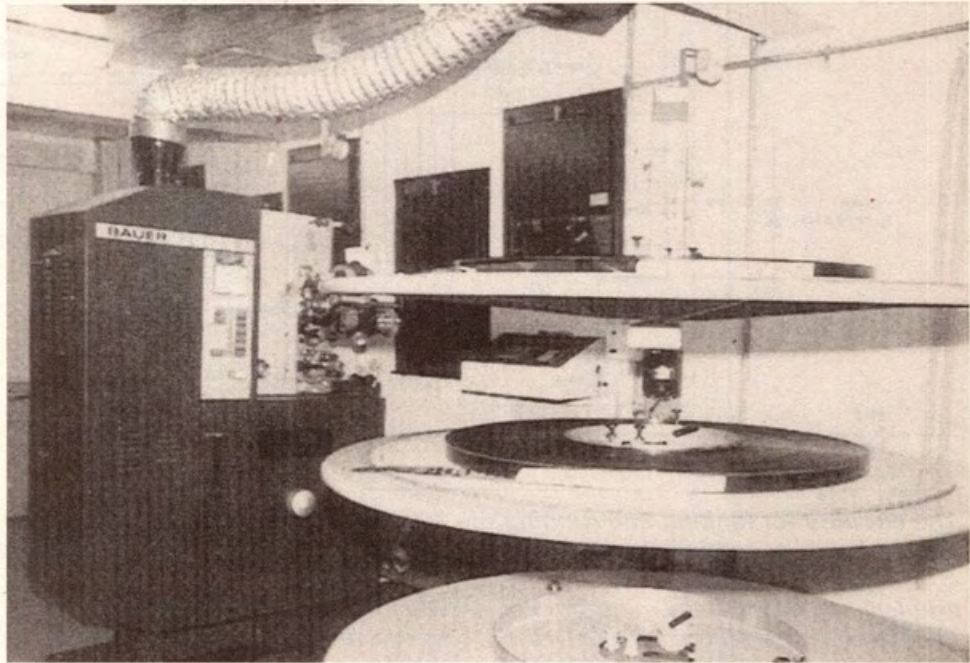
Another problem noticed in the Cine-fi during this test was that when it was installed, it had been set up for the then 10kHz channel spacing. Manually tuned radios of that era could be tuned to the set frequency, even if it was slightly off. However nowadays most radios are digitally tuned and can only be tuned to frequencies on the 9kHz-spacing channels.

Correcting this required the two transmitters to have their frequencies adjusted to suit the 9kHz spacing. A check at night time found a quiet spot on the frequency band adjacent to the original frequency, and the two transmitters were adjusted to 909 and 918kHz.

The next stage, after consultation with the appropriate communications authorities, was the installation of a 'flea power' FM transmitter set to the frequency of 99.3MHz. The transmitter was connected to the audio signal from the projector preamp, an antenna was installed on the top of the projection room, and a good quality audio signal could be heard anywhere



The sound system at the drive-in cinema discussed in Reg Leahy's story. Note the output valves at upper right.



A horizontal platter system as used in many modern cinemas, to avoid changeovers and also the need for rewinding the film.

within the Drive-in.

(The next step will be to replace the mono sound cells in the projectors with stereo cells, and have the transmitter converted to stereo. Then the patrons will be able to hear the soundtrack in stereo. Unfortunately, this will have to wait until funds and time become available.)

To find anymore subtle faults that may have been still lurking in the system, a spool of film was run through the projectors.

There was a smell of burning flesh, and I quickly removed my finger from a very hot film gate. This suggested to me that the system was not going to let me win without a fight.

The original cooling system used a 'captive water' arrangement, because at the time the drive-in was built, in 1957 on the then outskirts of Shepparton, there was no town water available. On investigation, the problem was found to be that the impeller on the pump had rusted on the keyway of the shaft and had broken off when the pump was started.

There was a simple means of switching the cooling system to the town water supply, so over it went. But this created other problems. The increased water pressure soon found the weak spots in the hose couplings. These couplings were all re-tightened and a dry floor was eventually achieved!

While all of this was going on,

members of ONE FM Community Radio painted the outside of the projection room, the ticket box, cut the grass, re-painted the signs and generally rejuvenated the drive-in. A group of young lads were encouraged to apply their graffiti art to an area beneath the screen, and they did an excellent job.

A special 'shake-down' screening for the members of ONE FM was put on prior to our opening night, in appreciation of their wonderful effort in restoring the drive-in to its former glory. There were no hiccups, so all was in readiness for our grand opening. All this work was done on a voluntary basis; only the materials were paid for.

Opening night was a highly successful evening, with cars lining the roadway outside, waiting for the gates to open. It was all a fitting reward for a group of enthusiastic, dedicated volunteers after a couple of months hard work.

Well, Reg. I don't know about the other volunteers, but it seems that what you did was the biggest charitable 'freebie' of all time. It's also the biggest restoration job I've ever heard of.

The nearest I've ever come to that kind of exercise was when I stripped the equipment from a disused cinema and relocated parts of it in the theatre belonging to an advertising agency. I had to rebuild the lamphouses, replacing the old carbon arcs with 100W

quartz iodine lamps. I have never fiddled with 3600W Xenons, and I don't think I would want to, either.

Anyway, thanks for your story, Reg. It's one of the most interesting contributions we've had for some time. I look forward to hearing from you again with more stories from the technical side of the movies.